was fifty times weaker than this. He concedes, however, that it would be undesirable to ask consumers to drink water containing even so innocuous a medicine as dilute lime water, even allowing for the fact that such a liquid is perfectly harmless to practically all persons and actually beneficial for not a few.

Dr. Houston then discusses the experiments which he carried out at Sunbury with Thames water. A diagrammatic sketch of the plant he used is given in the accompanying illustration, in which the various parts are referred to by letters. Raw Thames water was pumped into a tank A, which was arranged to tip periodically a definite volume of water into another tank C, which received with each tip a definite volume of milk of lime from tank B, which latter tank was supplied by hand pumping with milk of lime from tank M T. The mixture of raw water and milk of lime then passed on to the first sterilizing and settling tank T_1 and from thence to the second sterilizing and settling tank T_2. It is explained that the period of contact between the lime and the water cannot be stated with any certainty, as undoubtedly "short-circuiting" took place. Theoretically, however, it was about 1.8 days in tank T_1 and about 1.3 days in tank T_2. The volume of water treated varied considerably owing to certain causes over which there was no control, and the proportion of lime to water was kept nominally as constant as possible throughout the tests; but Dr. Houston states that it is evident from the detailed results that variations did occur. Approximately 167,985 gallons of water were treated per day.

The dose of milk of lime of known strength was such that nominally 1.4 lb. of lime were added to 500 gallons of the water. As a matter of fact, it was discovered at the end of the experiment that actually 1.7 lb. of lime had been used for every 500 gallons. This, stated in terms of slaked lime (calcium hydrate $Ca(OH)_2$), amounts to 3,400 lb. per million gallons, and in terms of quicklime (calcium oxide CaO) to 1,972 lb. per million gallons, *i.e.*, .986 lb. per 500 gallons.

The water discharged from tank T_2 contained an excess of caustic alkalinity, and to neutralize this it was passed through tank T_3, where it was mixed with approximately four times its volume of stored water from the Staines reservoirs. In this tank there was further precipitation owing to the action of the "excess lime" on the bicarbonates of the Staines water. The effluent from tank T_3 was led on to an ordinary sand filter. According to one investigation, the amount of carbonate of lime in suspension as the water went on to the filter was 1.9 parts per 100,000. As far as could be observed, this had no deleterious effect on the filter; but it is pointed out that perhaps the experiment was not continued long enough for the filter to get clogged, and that too much reliance must not be put on the apparent success of this part of the experiment.

The results of the investigation as a whole are set out in numerous detailed tables. With these we need not be concerned in the present instance, but can pass on to the conclusions at which Dr. Houston arrived. He remarks that, apart from questions of subsequent neutralization and filtration, the following results were achieved after sedimentation, as a consequence of the addition of 0.986 lb. of lime, calculated as CaO, to 500 gallons of raw Thames water:—

Chemical Results.—(1) The turbidity of the water was almost entirely removed, apart from slight cloudiness due to suspended particles of carbonate of lime.

(2) The brown color was reduced to a remarkable extent, especially when the river was in high flood.

(3) The ammoniacal nitrogen was increased, but for reasons explained in the report, Dr. Houston does not consider this fact as having any real hygienic importance.

(4) The albuminoid nitrogen was reduced on the average 38.6 per cent. in passing through the first tank.

(5) The oxygen absorbed from permanganate was reduced on the average 53.7 per cent. in passing through the first tank.

(6) The hardness of the water after neutralization of the excess lime by untreated water in the third tank was reduced by 22.7 per cent. (soap test) and the alkalinity by 32.9 per cent. Much more untreated water, however, was added than was necessary to effect exact neutralization. Under ideal conditions of exact neutralization and excluding questions of super-saturation the loss of hardness (soap test) would be over 71 per cent.

Bacteriological Results.—(7) The total number of bacteria was reduced over 99 per cent. in the first tank.

(8) The agar "count" was reduced over 91 per cent. in the same tank.

(9) The bile-salt-agar "count" in the raw water was 50 per 10 c.c., as compared with none per 10 c.c. in the outlet from the first tank.

(10) The B. coli results were remarkable. The raw water yielded the following results:—

Typical B. coli present in—

(*a*) 100 c.c.	(or less)	in	100	
(*b*) 10 c.c.	"	"	82.5	Per cent of samples examined.
(*c*) 1 c.c.	"	"	41.2	
(*d*) 0.1 c.c.	"	"	19.5	
(*e*) 0.01 c.c.	"	"	4.3	

None of the samples from the first and second tanks—ninety-two in all—contained B. coli even in 100 c.c.

Ten experiments were made on ten separate days with 10,000 c.c.—100,000 c.c. in the aggregate—of the water from tank T_2. The results were entirely negative as regards B. coli.

These results, Dr. Houston explains, imply on the (*a*, *b*, *c*, *d*, *e*) raw water basis an improvement of at least:

100	times	in	all	the	samples	
1,000	"	"	82.5	per cent.	of	the samples
10,000	"	"	41.2	"	"	"
100,000	"	"	19.5	"	"	"
1,000,000	"	"	4.3	"	"	"

Practically this means that B. coli was absolutely devitalized, a result which, apart from sterilization, cannot be achieved by any known process of water purification

(11) The effluent from the first tank could not conceivably have contained any of the microbes of epidemic water-borne disease—for example, typhoid fever.

General Results.—(12) Apart from its caustic alkalinity and slight turbidity due to calcium carbonate, the effluent from the first tank compared favorably—chemically—with the filtered water as supplied to London, and, bacteriologically, it was far purer, inasmuch as it was seemingly absolutely—not merely relatively—free from excremental microbes.

Of two works sand filtering (*a*) stored river water and (*b*) a mixture of stored river water and "lime-treated" river water, the latter would be likely to give, perhaps actually, and certainly relatively to the initial qualities of the water dealt with respectively, the better chemical and bacteriological results.

Dr. Houston sums up the results in the following words: "No hesitation is felt in expressing the opinion