tions extending over fifteen months that the average reduction of bacteria was 95.6 per cent. Here the untreated water contained from 52 to 793 organisms per c.c. Delépine points out that, if the number of bacteria in the untreated water is very small, little reduction in the number is made by filtration; when the number of bacteria in untreated water does not exceed 5, 10 or 20 per c.c., very little improvement can be expected from treatment. The results of Ross and Race bear out these observations. Bell's and Mather & Platt's filters were kept under supervision by these observers, and 74.7 and 75.9 per cent. purification respectively were found in dealing with water containing from 40 to 95 bacteria per c.c. in the original condition. Both Delépine's and Ross and Race's results were obtained from water which did not require filtration for the reduction of bacteria, but which was being filtered mechanically for other reasons.

During the first year of operation of Bell's filters in Shrewsbury analyses gave an average purification of only 73.3 per cent.; but after the treatment was adjusted, and certain defective valves in the chemical apparatus were corrected, the bacterial purification was found towards the end of 1910 to be from 95.9 to 96.6 per cent. Recent samples taken a few weeks ago gave successively 96.1, 94.1 and 95.6 per cent. purification. At Edinburgh, with the same class of filter, a similar result was obtained—a percentage reduction of from 67 to 81 in the earlier periods of testing, but a greater reduction when the chemicals were adjusted, the washing regulated and the filters kept under careful supervision. These experiences point to the necessity of careful and intelligent supervision of the filters checked by bacteriological examination, so as to determine the amount of coagulant to be used and the periods of washing. The Mather & Platt and Bell filters have been found to act in an equally efficient manner when compared under the same conditions, and it is probable that the Paterson filter, acting, as it does, on the same principles, has the same efficiency. With regard to the Candy filter, no extended bacteriological results appear to be available, and one is inclined to be sceptical as to its equal efficiency when no coagulant is used. Extended observations are required to improve our knowledge of the comparative value of all these types of mechanical filters.

There is a serious source of fallacy in speaking of the bacteria in the filtered water as so much per cent. purification, for the ultimate bacterial content may be large, although the percentage would indicate a large amount of purification. For example, the water of the Severn may contain anything from 143 bacteria per c.c. in the dry-weather flow in summer to 9,920 per c.c. in winter. high-level flow (flood water in all probability will contain more than this); but 94 per cent. purification in the former would result in 8 bacteria per c.c., and in the latter 590 per c.c., the latter the result of an actual analysis. On another occasion, as already noted, when the river water contained 8,000 per c.c., the filtered water gave 290 per c.c.—equal to 96.4 purification. This amount of purification cannot convert a polluted water into a potable one. For total bacteria in potable water the general view is that it should contain more than 100 bacteria per c.c.; but less than this amount does not render a water potable, since the presence of B. coli and its relatives must be considered. Houston, perhaps, expresses the general view of bacteriologists regarding the subject when he states: "Everything depends on the local circumstances, and a standard suitable for one place may be too high or too low for another. . . . Hence it may be said that there seems no convincing reason why, generally speaking, the absence of typical B. coli from 100 c.c. of water in a majority of representative samples should not be taken as a 'working standard.' " Were the water passing through the filters at Shrewsbury intended for potable purposes (which it is not, since another pure supply is available), the extreme limit of absence of B. coli in 100 c.c. would have to be required, since the river is known to be polluted by sewage. Severn water almost invariably contains B. coli in 1 c.c., and sometimes in 1/10th c.c., and the filtered water contains usually B. coli in 50 c.c., and sometimes in so small a quantity as 10 c.c. In the samples taken four weeks ago at several days' interval, B. coli were found in 1 c.c. of the river water, and in one out of three 10 c.c. tubes of filtered water. This result cannot be considered satisfactory from a hygienic point of view.

It may appear irrelevant to quote Shrewsbury results, since the water is not used for potable purposes but I have in mind other towns which receive their general water supply from rivers, only mechanical filtration being employed for purification before reaching the consumer.

These filters have no selective action on B. coli, and so not on B. typhosus. Bacillus coli is taken to be an index of danger of pollution by B. typhosus. Should the water be polluted from the discharges of a typhoid patient, the filters, while acting as a medium of dilution of the poison, would not act as an effectual safeguard. On this account mechanical filtration alone cannot be depended upon to render a polluted water; or one suspected of pollution, satisfactory for potable purposes.

Recourse must be had to other methods of rendering the water safe—for example, preliminary storage or sterilization. Preliminary storage for a sufficient length of time, as recommended by Houston, will render the water free from Bacillus typhosus, the number of other bacteria being lessened at the same time. Houston recommends thirty days' storage, although, from the results of his experiments to determine the viability of "uncultivated" typhoid bacillus in water, one would consider a fortnight a sufficient length of time to render the water practically "safe." In his observations on raw Thames water stored for about fifteen days at Chelsea, he found that the organisms were reduced, taking one year's samples, on an average 95.3 per cent., the B. coli content being also reduced proportionately. If the typhoid bacillus is killed by sufficient storage, mechanical filtration, it may be concluded, is all that is necessary for the stored water to reduce the total organisms to an amount which cannot be objected to, and to render it fit for potable purposes. Further, storage accommodation could be the means of excluding flood water, and so equalizing the quality of the raw water, and avoiding undue strain on the filters. If, as stated by Houston, slow sand filters without preliminary storage will remove 98 per cent. of the bacteria, mechanical filtration, which removes well over 90 per cent., should be all that is necessary for water which has been stored for a sufficient length of time. At York, mechanical filters without coagulant are used instead of storage to reduce the number of organisms, the filtered water passing on to slow sand filters before being supplied to the consumer, the total bacterial content being reduced by both processes to 99.1 per cent. I should, however, consider storage with mechanical filtration preferable to mechanical filtration plus slow sand filters as possessing a greater degree of safety.

As to sterilization of water, I shall simply allude to experience of sterilization at Shrewsbury. The river water is not used for potable purposes; but to render it safe, should it be so used, it was decided to treat it with an anti-bacterial agent. On the recommendation of Dr.