

waters that contain chemical or putrefactive decomposition, second, waters that contain odors of growth, third, water containing physical disintegration, the last two being due to odorous oils.

Thresh states that the fishy smell often found in drinking water is due to a microbe called *Uroglena Americana*, Professor Remson says it is due to a decomposition of a fresh water sponge, while Mr. Rafter says that it is caused by a germ named *Valvax Globator*.

The storage reservoir of Norwood at Plymouth, Mass., was well charged with the germ *Uroglena Americana* in 1892, but as long as the water remained in the reservoir and the germs were in active life, the waters did not smell, but when they were drawn into the water-mains life became extinct and they became completely disintegrated and liberated a strong smelling, oily element that was very unpleasant and unhealthy.

In a village in Essex, Eng., the water supply was poisoned by dead fish that had died in the water during the time the reservoir was frozen over, and afterward set up putrefaction; another village in the same county had the water in the watermains poisoned by a large number of small eels that were drawn into the supply pipes where they lost their life and set up decomposition. (See British Local Government report for 1887.) I lately visited the source of supply of a town that draws from the waters of the Oswegatchie River and noticed that gas rose through the volume of water from which they took their supply in many places, just as if peas were shot upward through the water causing bubbles at the surface and miniature colored circles for a second on the water where the gas burst forth. The water of this river is of a reddish color which shows the presence of iron in the water, and the gas discharged proved that there were vegetable or animal substances in a state of decomposition in the water. This class of water I should consider unfit for a public supply unless well filtered.

Rivers are natural open sewers, where the filth discharged by the inhabitants living along the land contained within the water shed is carried away to the salt water of the sea for purification; during the passage of the water towards the sea most of the solid disagreeable matters the water contains settle to the bed of the streams, occasionally making their appearance when the waters of the river are violently disturbed and the filth raked up from the bottom by wind storms. At such times the water is unsafe to use for domestic purposes and the supply should be discontinued until the river becomes calm and settled again.

A couple of weeks since I was on a diver's raft attending the laying of a water pipe into a river; the diver was down about twenty feet when a due east wind storm occurred, churning up the river water as if a number of gigantic Ferris wheel bucket pumps had been set in motion. The water quickly turned from a bright, clear fluid to a bluish black, and the diver was soon unable to see but a few inches before his glass; when the turbulent water was placed in a tumbler it exposed a great number of particles of dirt and had a slight odor. Such sudden changes in a quality of river water are common where the sewage from the inhabitants and the refuse of manufacturers are discharged into it. The waters of rivers may easily purify the dirty fluids collected from the face of the land and stagnant pools, but they cannot also provide for the purification of the sewage of the inhabitants and the foul refuse cast out by lumber mills, dyehouses, soap works, sugar refineries, chemical works and other factories. When such substances enter the river they go down the stream, the particles clinging together, seldom mixing with

the fresh water of the river until the heavy solids have settled down to the bed of the river, or by some means the fresh and sewage waters are violently agitated to compel incorporation. The solids carry with them anaerobic germs which breed and multiply until disturbed by storms and they receive partial oxidation by the agitation it gets during the commotion. Should such water enter the town's waterpipe the dirt would settle to the invert of the water main, especially if such water mains are larger than are necessary to supply the water takers. When once the foul solids secure lodgment in the water mains they will ferment and breed more germs, and continue to breed and increase the contamination of the water supply until the germs and dirt are well washed out; this is why efficient provision should always be made to thoroughly clean out the water pipes.

(To be continued.)

#### ST. LAWRENCE LEVELS.

The Chicago Drainage Canal was opened January 2nd. The water should have been let in December 1st, but legal delays made themselves felt. It was to be hoped that these delays would continue. Not that we wished to have the people of Chicago supping sewage as has been their wont these many years, nor drawing all their liquid supplies from Milwaukee, as we fear there is danger, but if the St. Lawrence is to be maintained at anything like its present level and our costly canals to be available, the people of Chicago must still continue to receive their present filthy water supply of which their own analysts constantly report "unusable." The engineers appointed by the United States Government to enquire into the probable effects of the opening of the canal state that the lake levels will be reduced by at least six inches and perhaps three feet. We have not alarmed ourselves here in Canada hitherto about this matter because we knew that what we suffered in loss of harbors and ship channels would be small in comparison with the loss of such towns as Buffalo, where each inch of deficiency in the harbor costs one million dollars for dredging, but a new danger threatens us, and we must now take measures to protect our interests, and that at once, before our all too friendly Government at Ottawa has fallen into the trap which has been set for the Canadian interest. It is contained in the report of the engineers, designated to make surveys and examinations of deep waterways and routes between the great lakes and Atlantic tide waters, which recommends the regulation of the Lake Erie level by controlling the discharge through the Niagara River by a system of fixed weirs, built near the head of the Niagara River, and a series of sluices to be operated in connection with them so as to control the discharge of the lake, and reduce the *variation of its level to a small amount.*

This will, of course, entail the erection of wing dams on the St. Lawrence to make Lake Ontario ports and the St. Lawrence channels navigable. It is a scheme to throw all the loss of level due to the new canal onto Lake Ontario and the St. Lawrence. The dams will make whatever level is determined upon permanent, but whatever loss is due to the diminished flow will fall on the St. Lawrence. But more serious than that, in both its first cost and its disastrous delays, would be the absolutely necessary dam and locks below Montreal at the foot of Lake St. Peter.

The Chicago drainage canal may not ruin the Canadian lake and river towns and cities, and if it does it also