

non-putrescible on incubation. It contained in 100,000 parts about 1.5 parts of matter in suspension, and when maintained at 65° F. for five days took up 1.97 parts of oxygen per 100,000.

The ratio of the sewage effluent to the dry-weather flow of the river is about 1 to 8; the river flow being 4,500,000 gallons per twenty-four hours. No smell was observed near the Rugby outfall, and there was very little of the grey growth, which, as already stated, seems to be characteristic of polluted waters. Small coarse fish were present in the water below the outfalls, although in dry weather the admixture of the effluent caused considerable deoxygenation of the water in the sluggish reaches. The Coventry sewage reaches the river 13 to 14 miles further down. At this point the river has practically completely recovered from the effects of the Rugby discharge, at least so far as its chemical constitution is concerned, the chlorine content of the water alone being permanently increased. Coventry has a population of 90,000, and the sewage discharged amounted to 4,000,000 gallons per day in 1911. It is of a domestic character, but with trade wastes. The treatment to which it is subjected before discharge is settlement followed by land irrigation and land filtration; the area assigned for this purpose was 378 acres at the time of the observations, but has since been largely augmented. The effluents are stated to be very variable in quality. The dry-weather flow of the river, which is said to be fairly clean on its arrival at Coventry, is put at 7,500,000 gallons per hour, and the ratio of dilution less than 3 to 1. Under these conditions of an inferior effluent and little dilution there was an abundant grey growth below both outfalls, and masses of putrifying mud have formed in parts of a very sluggish reach, where many dead fish are found in warm, dry weather, accompanied by an objectionable smell. Nevertheless, the river purifies itself further on, and though it receives also the sewage effluent from Leamington, Warwick, Kenilworth, Stratford, and Evesham, it is, as already stated, now maintained in a passably fair condition, so far as actual nuisance is concerned. Bacteriologically the results are much less satisfactory, although there is in all cases a well-marked progressive improvement of the river as the distance from each new outfall increases. It appears, however, that from the standpoint of bacteriology reversion to the original state of the unpolluted stream cannot in general be effected within the limits of distance which are probable in this country between independent sources of pollution.

The observations made at Berkhamstead have rather a special interest, since the sewage is discharged not into a natural stream, but into the Grand Junction Canal, where practically the whole of the flow is merely that due to lockage operations. The sewage is from a population of 8,000, and is "domestic" in character. It is treated in closed septic tanks, followed by double-contact beds, the average flow being 500,000 gallons per 24 hours. The effluent is slightly opalescent, with a brown tint, and generally, but not always, has a clean smell. Two out of seven samples putrified on incubation. This effluent is discharged into a pound, where the water is practically stagnant. This water has a stale wormy smell on shaking, but there was no smell on the tow-path. Much grey fungus was present below the outfall, and the only fish observed in the pound were minnows. Several cases in which sewage is discharged direct into the stream without treatment of any kind are discussed in the report. Apparently where the dilution is sufficient this practice does not give rise to any active nuisance, but even in these

cases the discharge of paper, corks, and matches into the stream is objectionable, and could be avoided by straining the sewage before discharge.

### "DUKE OF CONNAUGHT" TOLLS.

The Canadian Gazette publishes the tariff of tolls submitted by the Canadian Vickers, Limited, in connection with their floating dock, the "Duke of Connaught," at Montreal. The schedule has been recommended for approval, subject to amendment, by the Minister of Public Works. It is as follows:—

#### Montreal Floating Ship-Dock Canadian Vickers, Limited Tariff.

Gross Reg. Tons.	1st day	Commencing 24 hrs. after vessel is raised. Following days or fractions thereof each.
Up to 1,000.....	\$ 300.00	\$ 80.00
1,000—1,199.....	340.00	95.00
1,200—1,399.....	365.00	95.00
1,400—1,599.....	390.00	95.00
1,600—1,799.....	415.00	110.00
1,800—1,999.....	450.00	110.00
2,000—2,249.....	475.00	110.00
2,250—2,499.....	500.00	125.00
2,500—2,749.....	525.00	125.00
2,750—2,999.....	550.00	125.00
3,000—3,499.....	575.00	150.00
3,500—3,999.....	600.00	150.00
4,000—4,499.....	625.00	150.00
4,500—4,999.....	650.00	175.00
5,000—5,499.....	700.00	175.00
5,500—5,999.....	750.00	200.00
6,000—6,749.....	875.00	200.00
6,750—7,499.....	950.00	225.00
7,500—8,249.....	1,025.00	225.00
8,250—8,999.....	1,100.00	250.00
9,000—9,999.....	1,200.00	275.00
10,000—10,999.....	1,300.00	300.00
11,000—11,999.....	1,400.00	350.00
12,000—12,999.....	1,500.00	400.00
13,000—13,999.....	1,600.00	450.00
14,000—14,999.....	1,700.00	500.00
15,000—15,999.....	1,800.00	550.00
16,000—16,999.....	1,950.00	600.00
17,000—17,999.....	2,050.00	650.00
18,000—18,999.....	2,150.00	700.00
19,000—19,999.....	2,250.00	750.00
20,000—20,999.....	2,350.00	850.00
21,000—21,999.....	2,450.00	950.00
22,000—22,999.....	2,550.00	1,050.00
23,000—23,999.....	2,650.00	1,150.00
24,000—25,000.....	2,750.00	1,250.00

### THE MONTANA IRRIGATION PROJECT.

The Sun River diversion dam, a part of an immense irrigation project in Montana, is at present under construction by the United States Government. A contract has just been awarded to MacArthur Bros. Company, of New York, consisting of the construction of about forty-five miles of main canal and several small tunnels, aggregating about three-quarters of a mile in length. The canal will have a capacity of 1,700 feet per acre per day. It will be twenty-seven feet wide at the bottom and sixty-nine feet in width at the top, the water having a depth of eleven feet. Its cost will amount to about \$900,000.