

and warmer the temperature, the more intense will be the odour and the infection of the water.

'Whenever the water has attained a certain degree of putridity all the fish will strive to reach the bank, gasping for air, and in such a state of torpor that they can easily be caught with the hand. If they do not speedily get fresh, pure water, they die, and remain lying on the bank, where they serve as food for birds, or are caught in the grates of mills, from which they are gathered, only to be thrown away.

'At one station I have known years when fish of all kinds were picked off the mill-grates by the hundred-weight, some dead and some alive.'

Curious cases are on record, happily very few, of the destruction of fish by poisoning or asphyxiation, or in some other way arising from natural causes, specially the impregnation of water with toxic vegetable matters. On the great lakes of Canada there is annually a great devastation of fish, principally a species of *Clupea* commonly called shad or alewife, though the former name is wholly incorrect. The fish are practically identical with the gaspereaux which ascend the St. John River and other rivers on the Atlantic coast. It is stated that the fish were introduced artificially many years ago. To quote from the International Commissioners Report, 1896:—

'The alewife is supposed not to be indigenous to Lake Ontario, and the manner of its introduction is not known, but it now seems to be quite firmly established there, and is exceedingly abundant. It has no market value, although it is used to some extent as bait and fertilizer, and is supposed to furnish a large part of the food supply of the lake trout, wall-eyed pike and other species. It is said to spawn along the shores and to some extent in the creeks during the spring. This species has attracted special attention on account of the remarkable mortality which annually affects the schools. Large quantities of the dead fish become stranded upon the shores to the great annoyance of the inhabitants, and the fishermen believe that the pollution of the water and fouling of the bottom by this cause has had much to do with the depletion of the whitefish.'

Some authorities have thought that an excessive amount of vegetable matter, plant-spores, etc., which so charged the water as to impart to it an opaque green colour for a time in summer, is the cause of this mortality. I have found along the great lakes a similar mortality amongst yellow perch, white and black bass, and many small species, evidently due to a poisonous or noxious condition of the water at particular seasons of the year.

In June, 1895, a Quebec journal *L'Electeur*, published a letter addressed to Sir J. M. Lemoine by Mr. Gustave Ouimet, describing a fatal epidemic which had ravaged the fish in the Richelieu River and neighbouring waters. From the widespread character of the mortality amongst the fishes it would seem justifiable to regard the fatality as due to some temporary noxious condition such as might be expected in sluggish and turbid waters, especially during the hot summer months.

The following extract from Mr. Ouimet's letter shows that the disease or affection was not confined to the skin, upon which large round sores, red and white in colour, appeared; but the viscera and interior of the fish appeared to be destroyed, and there appears little evidence to support his theory that the cartridge and gun-powder factory on the banks of the Richelieu River, Vercheres Co., P. Q. was the primary cause of the malady. If these waters, like the more westerly waters of Ontario are temporarily rendered impure, and unfavourable to fish-life during the warmer months of the year by reason of minute vegetable matter, possibly microscopic spores of algae, and lowly plants, the widespread mortality referred to is explained, and the appearance of whitish or reddish sores upon the exterior of the fish and the decay of the internal organs are to be understood as subsequent and secondary results. The following extract from Mr. Ouimet's letter shows the view taken by that gentleman:—

'Il y a quelques années la cartoucherie de Bécot faisait des expériences malheureuses dans la rivière Richelieu. Il s'en est suivi que des centaines de poissons de toutes espèces petits et gros ont été détruits. Les rives du Richelieu devinrent bientôt couvertes des cadavres de ces malheureuses victimes et la pêche est devenue de plus en plus rare. Depuis ce temps-là les Campbell avaient fait prendre au filet