

trout found in the neighbourhood are those in the drain which finally discharges the mine water into the River Tamar.'

It may be added that carbonate of lead also occurs in the 'slime' from the dressing floors of lead-mines. Of course the metal occurs in various combinations, sulphides, carbonates, &c., frequently in very small quantities; but, as has been pointed out, the effects of lead poisoning are cumulative, and hence as pernicious if not more so to fish-life than rapid and direct poisoning, the effects of which are apparent immediately.

The mine-water from ironstone mines and from haematite iron mines is to the eye of the ordinary observer offensive and injurious on account of its thick murky character, and the yellow ochreous appearance it presents. The yellow and red tints imparted to the streams is evidence of the amount of foreign matter in suspension which must seriously affect, if not altogether prevent the respiration of fish. The ochre and reddish colour is due of course to oxide of iron, and an exaggerated example is the coloured pollution produced by the decomposition of iron pyrites, which so long as it is unaffected by air or water and not oxidised remains unaltered, but on exposure to either produces ferrous sulphate, which acidifies the water and absorbs oxygen, thus rendering it less supporting to fish-life. Ferruginous mine-water is charged with ochreous matter usually on account of the presence of iron pyrites. Coal mines, again, injure rivers and streams, as already pointed out not only on account of shale and pyrites which in many ways produce polluting effects, but from the fine coal dust carried away into rivers in suspension and acting mechanically in injuring fish-life. Instances might be quoted without number of which the following, from a report of an officer in Wales to H. M. Inspectors of Fisheries, Board of Trade, London. He said: "For a distance of six or seven miles I found the Mawddach seriously discoloured by the matter which was being poured into it from the Gwynfynydd Gold Mine. According to the quantity of stone which was then being crushed the amount of slime poured into the river would not be less than 25,000 tons a year. No attempt whatever was being made to treat the sludge, notwithstanding the representations made to the company by both the Board of Conservators and this Department. The result cannot fail to be of serious importance to the fisheries of the Mawddach, for the slime, whether or not it is in itself actually poisonous to fish, is of a nature to completely smother the spawning beds with a layer of tenacious paste. The tailings of gold mines either hydraulic on gravel-benches, or stamping and crushing mills for treating quartz and other gold-bearing rock, when poured into rivers are harmful mainly where such waste muddy matter is deposited on or near spawning beds. Many of the evils arising from the mining of metal are repeated in a more acute form in the working of metals and their utilisation in factories. Thus the processes of galvanizing and electro-plating involving the use of various acids, muriatic, sulphuric etc., have resulted in the pollution and poisoning of many streams in England. The manufacture of tin-plate, so intensively carried on in South Wales embraces several processes in which sulphuric acid, copperas or green vitriol are used results in waste products highly injurious to fish when poured as has been done almost universally into rivers. Nail factories and allied industries all use various kinds of 'pickle' consisting largely of various poisonous acids.

In recent years the extraction of paraffin from bituminous shale has introduced another source of pollution in the ammoniacal waste, and offensive organic matters. Tarry impurities have worked widespread harm and universal complaints have arisen regarding the injury done. Even the tar used on certain forms of traps or fyke nets called 'verveux' in the Province of Quebec is said to have resulted in a tenacious scum which has destroyed fish or driven them away. The watery waste, however, which results after the distillation of paraffin oil is regarded as most injurious not only because it is charged with organic ingredients; but its odour and taste are pungent and must be offensive to fishes. Indeed some years ago hundreds of salmon, trout, etc., were found dead along several miles of the River Dee in Cheshire poisoned by the refuse from the paraffin and carbolic acid works, this refuse containing pitch or tar, picric and carbolic acids and other injurious matters.

An industry which has attained some proportions in the Dominion, viz.: the production of wood alcohol has, in other countries, been accompanied by the produc-