troublesome and harmful impurity when steam boilers are supplied with it. Chalk is as nearly insoluble in pure water as most substances with which we are acquainted, one million parts of water dissolving only eighteen parts of chalk. That is, were a gallon of water fully saturated with chalk to be evaporated to dryness the residue would weigh only about 1¼ grains. We shall see, however, that under conditions quite commonly found in nature the solubility of chalk may be increased to 880 parts per million, *i. e.*, a residue of 62 grains would be obtained from a gallon of water saturated under these circumstances. The condition referred to is the presence of free carbonic acid in the water. Before illustrating this, let me indicate the laws which govern the solution of gases in water. These are, briefly, (1st), the specific nature of the gas; (2nd), the temperature; (3rd), the pressure. The two gases, of which our atmosphere is essentially composed, are soluble in water only to a very slight extent. At the ordinary temperature and pressure of the air 100 gallons of water dissolve about 3 gallons of oxygen, and nitrogen is only about half as soluble as oxygen. A fourth law of gaseous solubility applies when a mixture of gases is exposed to a solvent, as in the case of air and water. Each gas is dissolved just in such proportion as it would be were the other gas not present (the pressure, of course, being correspondingly reduced). A consequence of this is that while oxygen and nitrogen are present in air in the ratio of 1 to 4 they are dissolved in water in the ratio of 1 to 2. Thus the atmospheric gases present in water form a mixture very much richer in oxygen than is the air, and the important consequences that follow from this are not far to seek. It is from this dissolved oxygen that fish and all water-breathers obtain the supply to arterialize their blood, and, what bears more directly upon our subject to-night, it is by means of this dissolved oxygen that the various processes by which the harmful and even poisonous organic impurities of natural water are changed to innocent substances, are carried on. So emphatically is the presence of oxygen in solution an essential condition of purity in a surface water, that many chemists always estimate the dissolved oxygen in water analysis. In illustration of this point I may quote the following figures from a report upon the river Seine, above, at, and below Paris :—