

the size of plaice to be landed. The results of Dr. Johnstone's plaice-marking experiments are also given.

Mr. William Riddell continues his hydrographical investigations, and the results of the chemical analyses of the water samples and a dissertation on their import are given by Prof. Bassett. As part of a proposed general scheme of investigation of the British herring races arranged by the Board of Fisheries, several samples of herrings from the Welsh coast and from the Smalls were examined and the measurements are detailed in the report. A paper of a preliminary nature on sea-bottom deposits and fish food off the Lancashire and Cumberland coasts is contributed by Mr. R. Ray. Dr. Johnstone gives a topographical description of the mussel grounds in the Ribble Estuary and several other Welsh beds. From the results of a bacteriological analysis, also given, much sewage contamination seems to exist at several of the grounds.

Two important papers by Prof. Moore and his collaborators are given on the debated question of the ability of marine animals to subsist on the organic carbon dissolved and in suspension in sea-water. The results seem to prove conclusively that such subsistence for long periods is impossible, and that neither dissolved organic matter nor the average amount of suspended plankton suffices to account for the nutrition of the larger marine organisms.

Several minor reports conclude the survey of the year's work.

THE METROPOLITAN WATER SUPPLY.¹

THE two reports by Dr. A. C. Houston, director of water examination, recently issued by the Metropolitan Water Board, show how much is now being done to safeguard from contamination with dangerous micro-organisms the metropolitan water supply, which is admittedly largely derived from sewage-polluted sources. The eighth annual report gives the results of the chemical and bacteriological examination of the London waters for the twelve months ended March 31, 1914. In the introduction Dr. Houston points out that experience in the Water Board laboratories indicates that *Bacillus coli* is practically totally absent from pure waters; in ten specially devised experiments with the Twins well (Deptford) water, typical *B. coli* was absent from 10,000 c.c., and it has been abundantly shown that it is possible, at a not impracticable cost, to purify the raw river waters that the final product contains no typical *B. coli* in 100 c.c. in more than 80 per cent. of the samples.

In the tenth report on research work, the results of several important researches are detailed. The search for the typhoid bacillus and similar micro-organisms in raw river water and crude sewage has been continued, but although a large number of samples has been examined, none has been found. Various methods for the isolation of the typhoid bacillus in these circumstances are reviewed.

A study of the streptococci present in excremental matters has not resulted in finding any definite difference between those present in human, and those present in animal, excrement.

The value of storage as a means of eliminating pathogenic micro-organisms and of lime as a bactericidal agent are further confirmed in series of new experiments.

¹ Metropolitan Water Board (a) "Eighth Annual Report" on the results of the Chemical and Bacteriological Examination of the London Waters for the twelve months ended March 31, 1914. (b) "Tenth Report on Research Work." Both by Dr. A. C. Houston, Director of Water Examination, Metropolitan Water Board.

Altogether these two reports are worthy of careful perusal by public health authorities and bacteriologists, and show how much valuable but unobtrusive work is being done by Dr. Houston and his staff.

R. T. HEWLETT.

LOCAL CASE-HARDENING OF STEEL.¹

IN a paper read to the Société d'Encouragement pour l'Industrie Nationale, MM. Guillet and Bernard discuss the various methods employed when it is desired to case-harden steel objects in certain parts only. The methods used are:—

(1) The parts to be protected against cementation are covered with fire-clay. The protection thus furnished is not complete, as the gases penetrate the fire-clay. Also in complex shapes the method becomes complicated and expensive.

(2) A tube is shrunk over the parts to remain uncemented, the thickness of the tube being slightly greater than the depth of case required. After the end of the cementing process, the tube is broken off. This method is obviously very limited in its application.

(3) The object is made with extra thicknesses in those parts which must not be hardened. After cementation and before hardening, these extra thicknesses are machined off. This process is very expensive.

(4) The parts not to be cemented are protected by a metallic deposit which must be (a) solid at the cementing temperature, (b) impervious to the cementing materials, (c) easily obtained commercially, and (d) easily removed after the operation. Copper and nickel are the only metals which fulfil conditions (a) and (c), and the latter fails to comply with condition (b).

The metal may be deposited by immersion in a salt solution, by electrolysis, or by the Schoop spraying process. The first mentioned is not satisfactory owing to the thinness and uncertain adherence of the coating. The electrolytic process is cheaper to instal than the spray process, which, on the other hand, is quicker and more easily localised.

The authors also consider the question of diffusion of metals. They show that for this to take place, (1) the two metals must be capable of forming solid solutions with each other, (2) they must be in very good contact, and (3) the temperature must be between the limits at which the solid solution exists. The higher the temperature, the greater is the rate of diffusion. They conclude that the diffusion of solids into solids is a very common phenomenon, which in certain cases (*e.g.* tinned condenser tubes) may introduce very considerable changes into the properties of the metal.

THE AUSTRALIAN MEETING OF THE BRITISH ASSOCIATION.

SECTION K.

BOTANY.

OPENING ADDRESS BY PROF. F. O. BOWER, D.Sc., F.R.S., PRESIDENT OF THE SECTION.

To preside over the botanical section on the occasion of its first meeting in Australia is no slight honour, though it also imposes no small responsibility. We members from Great Britain have a deep sense of the advantage which we derive from visiting these distant shores. I am doubtful whether any scientific

¹ Les réserves en cémentation et la diffusion dans les solides." By MM. Léon Guillet and Victor Bernard. *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, vol. cxxi, No. 5. Pp. 588-618.