—he does not follow up the first statement by including it in his list of reputed poisons (vol. vi. p. 309.) It may be added that Dr. Watt's selection of authorities, generally, appears to be somewhat capricious. He does not appear to be acquainted with Garcia de Orta's famous work on Indian drugs, for he gives Linschoten and others credit for observations not originally made by them, but by Garcia, *e.g.* art. *Manna*.

Again, when writing of ambergris, surely he might have found some more direct source of information regarding a product derived from *whales*, than a work, excellent though it be, which deals properly with the products of the Punjab.

I write as one not wishing to find fault, especially as I recognise the good services done by Dr. Watt, but because I believe such a work so brought out, should be a faithful summary of recorded facts, which, if hitherto only known to comparatively few, should be so stated as not to mislead the many who may have occasion to refer to the Dictionary. V. BALL.

Science and Art Museum, Dublin, November 19.

Drift-Bottles in the Irish Sea.

IN NATURE for Nov. 8 (p. 35) mention is made of the travels of some drift-bottles in the south seas. It may be of interest to put on record the results so far obtained of the distribution of bottles set free by the Liverpool Marine Biology Committee in order to get further information in regard to those currents in the Irish Sea which would affect small floating bodies. The objects we have had in view are: (1) A purely scientific matter, the source and distribution of the plankton; and (2) the probably utilitarian object of determining the movements of the food of fishes, and so one of the causes of their migrations, and also the drift of the floating ova and embryos of food fishes. The tidal currents of the area in question are to a considerable extent known, and marked on the charts and given in books on "Sailing Directions"; but to these currents have to be added the modifying influence of prevalent winds, and what we want to get at is the resulting average effect. We want to know in what direction an object set floating at any spot will probably be carried at various times of the year in ordinary weather. The surface organisms are such feeble swimmers, if locomotory at all, that any results obtained from small floating bottles may reasonably enough be regarded as holding good for the plankton.

The form of bottle we have chosen is cheap, buoyant, strong, and well corked. It measures 7·5 cm. in length over all, and 1·8 cm. in diameter. Inside it is placed a printed paper requesting the finder to fill in date and locality, in spaces left for the purpose, and post it back to myself. The papers are numbered, and are folded in the bottle in such a way that the distinguishing numbers can be read through the glass, so as to ensure that the bottles are set free in consecutive order. After the bottle has been corked up, the end is immersed a couple of times in melted paraffin, so as to close up the pores in the cork. None of the papers that have been returned show signs of water having got into the bottles.

As to the distribution, I sent off the first few dozen myself from steamers crossing between Liverpool and the Isle of Man, dropping a bottle over every fifteen or twenty minutes between the Bar and Douglas, and also from a steam-trawler while dredging between Port Erin and Ireland. Mr. A. Holt has had a number of bottles distributed for me from his outward-bound steamers on their course between Liverpool and St. George's Channel, and from the Mull of Galloway round to the Mersey. The Lancashire Sea-Fisheries steamer has set free another series along various lines up and down the Lancashire coast, and finally some have been set free at equal intervals of time during the rise and fall of the tide from the Morecambe Bay Light vessel in the northern part of the district, and from the Liverpool North-west Light vessel in the southern part. The distribution has now been going on since the beginning of October, and a very fair proportion (about one out of every three) of the papers have already been returned to me duly filled in and signed. They have come from various parts of the coast of the Irish Sea—Scotland, England, Wales, Isle of Man, and Ireland. Some of the bottles have gone quite a short distance, having evidently been taken straight ashore by the rising tide. Others have been carried an unexpected length—*e.g.* one (No. 35) set free near the Crosby Light vessel off Liverpool at 12.30 p.m. on October 1, was picked up at Saltcoats in Ayrshire on November 7, having travelled a distance of at least 180 miles (probably far more) in 37 days or less; another (H 20), set free near the Skerries, Anglesey, on October 6, was picked up at Ardrossan, Ayrshire, on November 7, having gone at least 150 miles in 31 days.

It would be premature as yet, until many more dozens or hundreds have been distributed and returned, to draw any very definite conclusions. It is only by the evidence of large numbers that the vitiating effect of exceptional circumstances, such as an unusual gale, can be eliminated. However, I may state, as provisional results so far, that nearly fifty per cent. of the bottles found have been carried across to Ireland, and they are chiefly ones that had been set free in the southern part of the district (between Liverpool and Holyhead) and off the Isle of Man. The bottles set free along the Lancashire coast and in Morecambe Bay seem chiefly to have been carried to the south and west—to about Point of Ayre, in North Wales, and Douglas, in Isle of Man. It is apparently only a few that have been carried out of the district through the North Channel. The most interesting point, so far, is that so many of the bottles have been stranded on the Irish coast, although they were sent off for the most part much nearer to the English and Welsh coasts, showing no doubt the influence of the spell of easterly winds in October. W. A. HERDMAN.

University College, Liverpool, November 29.

The Explosion of Gases in Glass Vessels.

WHEN Prof. Lothar Meyer was visiting Manchester a few years ago (on the occasion of the meeting of the British Association), he surprised me by saying that it was his custom in lecture to explode mixtures of ethylene and other hydrocarbons with oxygen in glass cylinders, some 10 to 12 inches long by 1½ to 2 inches in diameter (if I remember rightly), and that he had never had an accident. I suppose I did not sufficiently conceal my surprise, for he immediately demanded that we should go to the laboratory and repeat the experiment. Not having a mixture of ethylene and oxygen ready, I could not accept the challenge on the spot. The issue was therefore changed. Prof. Lothar Meyer said that he would fire a mixture of hydrogen and oxygen in a thin glass test-tube without breaking it. I confess I was sceptical, until I saw him do it time after time without injury. He argued that if the thin test-tube would withstand the explosion of hydrogen and oxygen, a thick glass cylinder would withstand the more violent explosion of a hydrocarbon. Nevertheless I ventured to warn him against trying the experiment with either acetylene or with cyanogen, the two gases I had found to explode more violently than any others, *especially with a small quantity of oxygen*. Prof. Meyer's recent accident with acetylene and oxygen has led him to warn chemists against the danger of that mixture. I would wish to add to that warning that the danger is equally great, if not greater, with a mixture of cyanogen and oxygen.

Prof. Lothar Meyer asks how we can account for the violence of the explosion of acetylene, when the velocity of its explosion is so little greater than the velocity of explosion of marsh gas and of ethylene, while it is far less than that of hydrogen? It is important to bear in mind that the explosion-wave is not set up at once; when a gaseous mixture is ignited at the open end of a tube the flame starts comparatively slowly. The violence of an explosion in a short tube depends mainly on whether the explosion-wave is set up or not. I think the immunity so long enjoyed by Prof. Meyer's cylinders depends on the fact that the wave was not set up. I have found that pieces of strong combustion tubing, which will stand an hydraulic pressure of twenty-five atmospheres, are broken by the explosion-wave of hydrogen and oxygen. It requires exceptionally strong glass tubes, capable of bearing at least 120 atmospheres, to withstand the shock of the explosion-wave with cyanogen or acetylene. With both these gases it is the incomplete combustion which occurs with the greatest rapidity and violence. According to the hypothesis I have published, viz. that the explosion-wave travels with the velocity of sound in the burning gases, the pressures existing in the explosion-wave of cyanogen and acetylene with their own volume of oxygen are 117 and 105 atmospheres respectively. Quite apart from this hypothesis, the pressures may be calculated from Riemann's equation for the propagation of a wave of constant type, since we know the density of the unburnt gases and the rate of propagation of the wave. According to Riemann's equation the pressure in the cyanogen explosion is 140 atmospheres, and in

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