

## A Note on Amoebae living in a Sea Water Sample.

By

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AT 1.0 a. m. on 11th August 1934 a sample of sea water was drawn by means of the Surface Sampler at 54°5'N., 1°30'E.; there was a strong north-westerly wind, with rain squalls and a rough sea. On 26th November 1934, when this sample was examined, there appeared to be nothing defective about the bottle or stopper, but it was noticed that the sample contained a flocculent, dark brown sediment which showed no characteristic vegetable cellular structure with a  $\frac{1}{8}$ " objective, and was found to contain much iron. In determining the salinity the titration was made three times, twice with the sample shaken up and later without stirring the deposit. The three determinations gave values of 22.34, 22.34 and 22.32 ‰ respectively, compared with values above 34.5 ‰ at neighbouring positions. It was not considered that the sediment would account for any material change in the salinity.

Part of the sample was returned to the Lowestoft laboratory for a more intensive microscopic examination of the sediment. This examination showed that the principal constituent was organic detritus; a few flagellates were swimming freely in the liquid and there were also some rod-shaped bacteria, and an occasional empty diatom frustule. A few strands of vegetable tissue (xylem) were noticed embedded in the detritus. In addition to these there were considerable numbers of amoebae creeping about amongst the detritus. We do not feel competent to identify the amoeba, but from the absence of a contractile vacuole in all the specimens we examined we came to the conclusion that it might be an *Entamoeba*. One of the writers had considerable experience during the Great War in identifying entamoebae from human stools, and is of the opinion that these entamoebae were similar to *Entamoeba coli* which is commonly found in human faeces.

The amoebae were of a pale green colour, between 20  $\mu$  and 35  $\mu$  in length, and moved sluggishly around the edges of the organic detritus. The pseudopodia were clear, generally blunt and narrow.

The amoebae may have come from three sources: 1. the atmosphere, e. g., when the bottle was opened; 2. the sea itself: they may be marine amoebae; and 3. bilge or other waste water pumped from the ship.

The pipettes used in the determination of salinity are connected with a mechanical suction apparatus and are suspended in air in closed bottles so that they do not come in contact with any solid or liquid substance between insertions in consecutive sea water samples. Moreover, since the absence of a contractile vacuole suggests that they are entamoebae, this alone appears to rule out both sources 1 and 2, leaving a distinct probability of the amoebae having come from source 3, even though this entails the assumption that entamoebae from the human intestine had survived for nearly four months in the free state in cold salt water.

Occasionally a sample of sea water is collected which, on analysis, proves to have a salinity differing somewhat widely from what might ordinarily be expected, considering the time and place of origin. Such values, besides being difficult to co-ordinate with the majority, would, if true, seem to indicate a state of affairs in the sea so unusual as to warrant the closest investigation, and it therefore becomes important to pay special attention to the question whether the values are trustworthy or not. It is difficult to justify their wholesale rejection merely because the values seem extraordinary; the assumption should be that they are correct, unless an examination of the circumstances of sampling shows at least a strong probability of their incorrectness. All widely aberrant results are confirmed by repeated analytical determinations, but errors may arise through inadequate arrangements for sampling and for storage after collection. In the case of samples from commercial and other ships, records of the state of weather at the time of collection may help in coming to a decision, and a sample likely to have been spoilt by a damaged and leaking storage bottle can usually be noticed at the time of analysis. The Surface Sampler was designed for the collection of sea water samples from ships under way, as an improvement on the bucket method of collection. Nevertheless, some responsibility still rests upon the observer using the apparatus, and deficiencies arising here are perhaps least readily noticeable.

In the present case the evidence — the low salinity, the presence of iron, the large quantity of detritus with some vegetable strands, the numerous amoebae (suspected of being entamoebae from human faeces) — strongly suggests that the sample of water was contaminated by bilge pumped from the ship, due to the Sampler having been towed too close to a discharge.

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