sulphuretted hydrogen being given off; the latter passing into the circumambient water is oxidised into sulphuric acid, which in turn decomposes the carbonate of lime dissolved in the sea-water or existing in the form of calcareous shells, sulphate of lime being finally formed. The nitrogenous or albuminoid matters present in animal tissues and fluids break up ultimately, by a series of complex reactions, into ammonia and nitrogen; the former is either liberated, or, combining with the carbonic acid, passes into solution as carbonate of ammonia, or becomes oxidised into nitrates. Further, the sulphur and phosphorus are given off in combination with hydrogen, becoming finally oxidised into sulphuric and phosphoric acids, which, decomposing the alkaline and earthy carbonates present in sea-water, give rise to sulphates and phosphates.

Murray and Irvine have shown by direct analyses that the ammoniacal salts, formed as indicated by the above reactions, are everywhere present in the ocean, due to the decomposition of albuminoid matter, ammonia being always one of the products. This change is accelerated by a high and retarded by a low temperature, consequently tropical or warm water contains much more ammonia than is found in the waters of temperate zones.[1] The carbonate of ammonia, arising from the decomposition of animal products in presence of sulphate of lime in the ocean or in the bodies of animals, becomes converted into carbonate of lime and sulphate of ammonia. The whole of the lime salts in the sea may be thus available for the coral- and shell-builders.[2] The much more rapid decomposition of the nitrogenous organic matter in the tropics may probably explain the greater development of coral reefs, and generally of all lime-secreting organisms, in tropical than in colder seas.

The low temperature at the bottom of the ocean and possibly also the pressure retard putrefaction, but it is evidently incorrect to state that putrefaction does not exist in great depths,[3] for everywhere there are signs to the contrary. This opinion has apparently been founded on some interesting but inconclusive experiments made by Regnard with fresh water,[4] where the absence of sulphates excludes the supply of oxygen, which in sea-water, as has been shown, is the great factor in oxidizing organic remains.

From the reactions referred to above some idea may be formed of the nature and extent of the changes that are continually going on in the ocean, and they are referred to in this place in order to indicate the circumstances which must be taken into consideration when treating of the presence or absence, the quantity, condition, and distribution of organic remains and other materials in deep-sea deposits.

[1] Murray and Irvine, *Proc. Roy. Soc. Edin.*, vol. xvii. p. 89.
[2] Murray and Irvine, *loc. cit.*, p. 90.
[3] Pelseneer, "Exploration des Mers profondes," Gand, 1890.
[4] Regnard, "Influence des hautes pressions sur la putréfaction," *Rev. Scientif.*, tom. xliii. p. 284, 1889.