CHAPTER VI.

CHEMICAL PRODUCTS FORMED *IN SITU* ON THE FLOOR OF THE OCEAN.

THE organic remains met with in marine deposits, as well as the mineral particles derived directly from the crust of the earth and from extra-terrestrial sources, have been fully described in the preceding chapters. We have now to direct attention to some other substances in marine deposits, in the formation of which neither physiological nor physical phenomena can be said to be directly concerned. In the production of the substances to which we shall have to refer in this chapter chemical action plays the principal role; these substances indeed owe their origin to the reactions between sea-water and the heterogeneous solid materials making up the bulk of marine deposits. On account of the great variety in the composition of the deposits, and the varied conditions under which the chemical changes take place, it is evident that the reactions resulting in the formation of these secondary substances are of a very complex nature. What we here call chemical deposits are produced in situations rendering direct observation impossible, and under conditions differing widely from those obtaining where somewhat similar products have been formed on terrestrial surfaces.

It has been recently stated that the chemical action of sea-water is less powerful than that of pure water in bringing about the solution and destruction of silicates and other minerals.[1] However this may be, it is known as a matter of fact that mineral substances are attacked by sea-water, and in the discussion of this subject it is important to remember the influence time may exercise in all changes at the bottom of the sea, as well as the immense quantity of the solvent. The chemical products under consideration nearly all originate in a sort of broth or ooze, in which the sea-water is but slowly renewed. Many of them appear to be formed at the surface of the deposit,—at the line separating the ooze from the superincumbent water, where oxidation takes place. In the deeper layers of the deposit a reduction of the higher oxides frequently occurs, and at the surface of the mud or ooze there are many living animals as well as the dead remains of surface plants and animals. It must be admitted that the reactions referred to are effected very slowly, although there is evidence that in special localities, and at certain periods, some of them may be much accelerated.

It is not proposed to enter into any general considerations with reference to such chemical reactions in sea-water, but in each particular case we will give

[1] Thoulet, "Solubilité de divers minéraux dans les eaux de la mer," *Comptes Rendus*, tom. cviii. p. 753, 1889.