Sir John Murray & Johan Hjort, The Depths of the Ocean: Scientific Researches of the Norwegian Steamer Michael Sars (1912)

the potash and soda of sea-water, and these oxides enter to the extent of about 4 per cent each. The iron becomes ferric, and can no longer get away as bicarbonate. The resulting palagonite is a more or less homogeneous and transparent amorphous mineral. Exposed naked to the action of bottom-waters it rapidly breaks down to clay.

Synthetic products.

Deep-sea conditions are, on the whole, more favourable to the degradation of mineral matter than to the generation of new minerals. Nevertheless a few syntheses are being continually carried on in the muddy parts of the bottom and in the immediately superjacent layers of water; they fall into two groups, viz. true chemical syntheses of new classes of silicates, and mineralogical syntheses of concretionary minerals. The first group comprises glauconite and phillipsite, the second group ferromanganic and phosphatic concretions.

Glauconite.

Glauconite is a hydrous double silicate of potassium and trivalent iron, occurring in rounded grains said to be composed of minute felted crystals. The ideal composition ($KFeSi_2O_6.Aq$) is claimed for it, but actually the purest marine glauconite hitherto analysed contains 1.5 per cent of Al_2O_3, 3.1 per cent of FeO, and 2.41 per cent of MgO, with only 7.7 per cent of K_2O.[1] The chemistry of its genesis is still a complete mystery; all that can be said is that it appears to result from a metamorphosis of ferruginous clay, and that, in view of its frequent formation inside the shells of foraminifera (and of its absence in the Red clay and Red mud areas), decomposing organic matter probably plays a part in its formation. On the score of abundance glauconite is a mineral of considerable importance in bottom-deposits, being the characteristic component of the Green sands and Green muds. Glauconite is a mineral belonging essentially to the reducing areas of the deep sea.

The most notable geochemical change associated with glauconite is the withdrawal of potassium out of solution in the sea. This element has a remarkable tendency to be held in loose combination in amorphous and colloidal minerals (like palagonite), and all submarine muds and clays contain a small amount (less than 1 per cent) of absorbed potash; the quantities thus progressively entangled at the bottom will be roughly proportional to the aggregate accessions of clayey matter, and can only be a tiny fraction of the total potassium imported into the ocean. In glauconite-producing areas, on the other hand,

[1] Collet and Lee, *Proc. Roy. Soc. Edin.*, vol. xxvi. p. 238, 1905.

http://19thcenturyscience.org/HMSC/HMSC-Reports/1912-Murray/README.htm