

reaction, and that afterwards it may act in consequence of the contained alkali. To this action of water may also be added the much more energetic, though more localised, phenomena,\* arising from acid exhalations, carbonic acid in particular, which form a habitual accompaniment of volcanic manifestations, and of which the submarine regions of the Pacific must often have been the theatre.

*Relation of Secondary Chemical Products to Rate of Deposition in Deposits.*—It must be admitted that at the present time we have no definite knowledge as to the absolute rate of accumulation of any deep-sea deposit, although we have some information and some indications as to the relative rate of accumulation of the different types of deposits among themselves. The most rapid accumulation appears to take place in the Terrigenous Deposits, and especially in the Blue Muds not far removed from the embouchures of large rivers. Here no great time would seem to have elapsed since the deposit was formed, so far at least as the materials collected by the dredge, trawl, and sounding tube are concerned. The various constituents of the mud are little altered, and if great chemical changes have taken place in the deep layers beyond the reach of our instruments, these are not apparent in the more superficial layers to which our direct knowledge is at present limited.

In glauconitic deposits, along high and bold coasts, where few rivers enter the ocean, a large number of the mineral particles have undergone profound alteration, there is a large admixture of *Globigerinæ* and other pelagic shells, and the glauconite with which many of these are filled, as well as the presence of phosphatic, calcareous, and barium nodules or concretions, all indicate that there has been an extensive formation of secondary products. All the constituents in the superficial layers of these deposits appear to have been for a long time exposed to the action of sea-water, and for the reasons here stated we must assume that the Green Muds and Sands have therefore accumulated at a much slower rate than the Blue Muds.

The majority of Volcanic Muds and Sands appear to accumulate at a relatively slow rate, judging from the large number of pelagic shells frequently present in them, and the depositions of manganese peroxide on many of the particles making up the deposits. Near some active volcanoes, however, there has evidently been a more rapid accumulation, as nearly all the mineral particles are fresh and unaltered, and there is but a slight admixture of pelagic organisms.

Around some coral reefs the accumulation must be rapid, for, although pelagic species with calcareous shells may be numerous in the surface waters, it is often impossible to detect more than an occasional pelagic shell among the other calcareous debris of the deposits.

The Pelagic Deposits as a whole, having regard to the nature and condition of their organic and mineralogical constituents, evidently accumulate at a much slower rate than

\* See R. Bunsen in Taylor's Scientific Memoirs, Nat. Phil., vol. i. p. 69, 1852