

organisms have apparently disappeared, probably as silicate of lime ( $\text{CaOSiO}_2$ ), for it may be presumed they were once present in the ooze.<sup>1</sup> At other times they are found to be all present in considerable abundance, and in some localities may make up over 10 per cent. of the whole deposit.

(b) *Minerals*.—In the Challenger samples the mineral particles range from 1 per cent. in the majority of cases to 50 per cent. at Station 318, and they average 3.33 per cent. The particles themselves range in size from 0.06 mm. to 0.80 mm., the average being 0.089 mm. in diameter. They are in the majority of cases angular, but in 3 cases they are recorded as rounded, and in 18 cases as rounded and angular.

In the purest samples of Globigerina Ooze, mineral particles are exceedingly rare, and consist for the most part of a few minute fragments of felspar, augite or hornblende, magnetite, volcanic glass, sometimes more or less altered, with which are associated a small quantity of clayey matter and the oxides of iron and manganese. In the less pure samples the residue as a whole increases in bulk and the mineral particles become more numerous, monoclinic and triclinic felspars, augite, olivine, hornblende, and more rarely white and black mica, bronzite, actinolite, chromite, glauconite, quartz, and cosmic dust being then met with. Some of these mineral particles are only present in deposits which are passing, from nearness to land, into terrigenous deposits. In the 118 samples, magnetite is recorded 95 times, felspars (86), augite (82), glassy volcanic particles (63), hornblende (58), quartz (49), pumice (45), manganese (37), mica (31), plagioclase (24), sanidine (21), olivine (19), lapilli (18), glauconite (13), palagonite (10), and enstatite, bronzite, pyroxene, garnet, actinolite, tourmaline, zircon, microcline, serpentine, phillipsite, and magnetic spherules (1 to 5 times). Phosphatic and manganese nodules are sometimes dredged from Globigerina Oozes.

(c) *Fine Washings*.—This portion of the residue varies from 1.20 to 64.62 per cent. of the whole deposit, the average being 30.56 per cent. The following table gives the average percentage of fine washings in the samples from each zone of 500 fathoms:—

3 cases from depths less than	500	fathoms,	9.60 mean per cent.
2	from 500 to 1000	13.50	“
13	1000 „ 1500	30.85	“
35	1500 „ 2000	22.72	“
49	2000 „ 2500	32.76	“
16	over 2500	47.73	“

Although not quite regular, this shows a gradual increase in the abundance of fine washings with increasing depth. In the same way, but not quite regularly, the abundance of minerals and their size are shown in the 118 samples to be greater in the shallower depths.

<sup>1</sup> See Murray and Irvine, "Silica and Siliceous Organisms in Modern Seas," *Proc. Roy. Soc. Edin.*, 1891. It is manifest that, wherever alkaline sea-water is in contact with oozes made up of dead siliceous and calcareous organisms, solution of silicic acid must take place, alkaline silicates being formed— $\text{SiO}_2 + \text{RCO}_3 = \text{RSiO}_2 + \text{CO}_2$  (see also chapter IV.).