mass is still sufficiently intact to permit observation with high powers, it is sometimes seen to be devitrified by globulites, by trichites, and other embryonic crystalline elements. In short, the basalts met with in deep-sea deposits do not offer any peculiarities of structure or of composition different from those met with in similar rocks found on sub-aerial surfaces; that which more especially characterises them is their advanced state of alteration.

Fragments of *limburgite*, more or less palagonitised and filled with whitish zeolites, are also found under the same conditions in deep-sea deposits as the lapilli already referred to, from which they are distinguished by their mineralogical composition. In these, crystals of porphyritic augite and olivine are observed in an altered vitreous base. When the fundamental mass is still fresh it offers all the characters of the glass in the basic lapilli; when it is altered it presents all the characters of palagonite. These fragments of limburgite are relatively rare, and are easily confounded with the basic glasses and the vitreous basalts into which they pass. We have only found them sharply characterised at a few stations, and especially at Station 157, 1950 fathoms, in the Southern Indian Ocean, where they were associated with pebbles of ancient and recent volcanic rocks.

The fragments of *augite-andesite*, or of andesite with rhombic pyroxene, occur very frequently, and with the same external characters as the lapilli of the preceding types. They may be distinguished by their composition, the absence of olivine and the presence of sanidine and quartz separating them from the basaltic lapilli. Sometimes they contain rhombic pyroxene, and are associated frequently with tufaceous andesitic cinders. In the Tables of Chapter II. they are stated to occur at Stations 147 and 150, in the Southern Indian Ocean; Station 214, among the Philippines; Stations 276, 293, and 295, in the South Pacific. Some rare lapilli of hornblende-andesite were also met with; these had a fundamental mass with a fine greyish black grain, enclosing plagioclases, hornblende, and sometimes sanidine.

It may be said that, generally speaking, fragments of acid rocks are especially rare among the recent volcanic rocks in the Challenger dredgings. An exception must, however, be made with respect to pumice, for we have seen that its mode of transport may be quite different from that of the fragments and lapilli just referred to. Just as the lapilli of basic rocks are abundant in certain regions of the Pacific, for example, so, with the exception of pumice, are trachytic and liparitic lapilli rare in these same positions. At certain stations, however, the nature of the mineral particles, the relative abundance of sanidine and of hornblende, the occasional presence of quartz, and especially of splinters of acid glass, all indicate that eruptions of trachytic cinders and lapilli must have taken place at the bottom of the sea. But it is difficult to be quite certain upon this point, for after what has been said above with reference to the distribution of pumice, its origin, and its disintegration, it may quite well happen that what is regarded as trachytic ashes from a submarine eruption may be nothing else than the residue derived from the disintegration of liparitic