plagioclase, augite, and magnetite—with or without a vitreous base. Generally they are fine grained; rarely they are seen to have the structure of dolerites. A great number are scoriaceous, the vesicles being filled with zeolites, or carpeted by zeolitic zones, as in the case of the palagonitic lapilli. They are often associated with volcanic ashes, in which the mineralogical elements of basalts predominate. Their alteration is less advanced than in the case of the basic glasses, which is undoubtedly due to the facts that they contain more crystalline elements, and are more compact. However, if they possess a vitreous base, or are porous, the hydrochemical decomposition appears to have advanced rapidly from the periphery towards the centre.

This decomposition attacks not only the base, but also the olivine and augite, transforming them into secondary products; the plagioclases, however, offer a greater resistance to this alteration, as may be seen by reference to Pl. XIX. figs. 2 and 4. The two fragments there represented come from Station 276 in the South Pacific; it will be at once seen how much they are altered, and how much their structure is masked by deposition of secondary products. Fig. 4 shows a felspathic basalt with a decomposed vitreous base coloured by manganese; the lamellæ of plagioclase alone seem to have remained intact, and they are sharply marked off from the fundamental mass. The pyroxene enclosed in the base is entirely decomposed, and often transformed into delessite; in order to recognise this mineral, it is necessary to clean the preparation with an acid, when the form of the sections of pyroxene is revealed, but the optical properties are effaced.

Olivine is the element in which the decomposition is most advanced; to such a point is this the case that it would be even impossible to recognise it except for the cleavages and the form of its sections. These sections are shown in Pl. XIX. fig. 4, where they appear regularly terminated with geometrical inclusions of the vitreous base with a fibrous structure, and covered with the red colour of hematised olivine. In the basalt represented in Pl. XIX. fig. 2, the alteration has attacked the olivine to such an extent that the crystal is almost destroyed; not only is it hematised, but it seems to be broken up and everywhere invaded by infiltrations of manganese disposed in large brown or opaque patches. No better example could be given of the state of decomposition of the volcanic rocks and minerals so frequently met with in deep-sea deposits.

The vitreous base of some of the basaltic specimens is the first portion of the rock to undergo alteration, and it generally presents the same palagonitic appearance as the basic glasses, forming irregular patches of variable dimensions, or thin veins between the crystallised minerals. When thus altered this base assumes a zonary structure, presenting a beautiful red tint, and reacting between crossed nicols; in fact it behaves in every way like palagonite. Generally manganese infiltrations follow with the progress of the decomposition, and the structure of the base is then entirely masked, as may be observed by reference to Pl. XIX. fig. 4. When it happens that this fundamental vitreous