

township. Variolitic textures are found on Austen and Kitchimine lakes. Breccias are common in the southern part of Argyle township. Well developed amygdaloidal textures may be seen on the upper part of Powell creek, in the northwest corner of Powell township. Porphyritic textures are rather common, and may be seen in many places along the east shore of Mistinikon lake. It is evident, therefore, that the alterations have not been of such a type as to destroy even the most delicate and destructible of original textures.

MINERALOGICAL ALTERATION.

Character of Alteration.

The basement volcanics have all undergone metasomatic alteration. In the peridotites, basalts, and andesites the alteration has been extreme; in the rhyolite and its tuffs it has been comparatively slight, although locally considerable, especially in the case of some of the tuffs. The secondary minerals developed are carbonate, epidote, zoisite, kaolin, sericite or paragonite, talc, serpentine, chlorite, quartz, and feldspar. The relative proportion of these varies in the different rocks. The rhyolites and rhyolite tuffs are altered principally to carbonates, sericite, kaolin, with some chlorite. Carbonates preponderate in the most highly altered types. The rhyolite tuffs are similarly altered, but usually more intensely, presumably because of their more open texture and correspondingly greater permeability. The andesites and basalts are altered to chlorite kaolin, sericite or paragonite, calcite, and epidotes principally, with albitization of their feldspars and some formation of residual quartz. The peridotites are altered to pure serpentine with residual iron oxide, to serpentine and chlorite, or to mixtures of carbonate, talc, and kaolin, occasionally epidotes, and serpentine in varying quantities or wholly lacking.

Time of Alteration.

M. E. Wilson¹ has shown that in the northern Quebec region the carbonate in the volcanics must have been present before the intrusion of the granite batholiths, as it is found in the hornblende schists resulting from the reaction of the granites with the volcanics with relations indicating that the carbonate did not originate after the alteration to hornblende schist took place. He also shows that the margins of the pillows found in ellipsoidal basalt are highly carbonated, whereas the interstitial material between the pillows is unaltered, thus proving that the alterations of the pillow margins must have taken place immediately after their formation, before the interspaces were filled. He concludes, therefore, that the metasomatic alteration of the lavas took place almost contemporaneously with the formation of the pillow structure, and immediately after extrusion, probably by water highly heated by the lava and charged with volcanic gases. The same conclusions have been reached by many other geologists²

¹ Geol. Surv., Can., Mem. 39, 1914, pp. 54-57, 59.

² Dewey and Flett, Geol. Mag. 58, 1911, pp. 201-209; 241-243.

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