

bronzite, enstatite, magnetite, and chrome-spinels, besides traces of the original olivine, pyroxene, amphibole, mica, or felspar in the rocks which have been altered into serpentine.

Serpentine occurs in two distinct forms; 1st, in beds or bands intercalated among schistose rocks, and associated especially with crystalline limestones; 2dly, in dikes, veins, or bosses traversing other rocks.

As to its mode of origin, there can be no doubt that in most cases it was originally an eruptive rock, as is clearly shown by its occurrence in dikes and irregular bosses. The frequent occurrence of recognizable olivine crystals, or of



Fig. 34.—Microscopic Structure of Serpentine (20 Diameters).

their still remaining contours, in the midst of the serpentine-matrix, affords good grounds for assigning an eruptive origin to many serpentines which have no distinctly eruptive external form (Fig. 34). The rock cannot, of course, have been ejected as the hydrous magnesian silicate serpentine; we must regard it as having been originally an eruptive olivine rock, or a highly hornblendic or micaceous diorite, or olivine-gabbro. But, on the other hand, the intercalation of

beds of serpentine among schistose rocks, and particularly the frequent occurrence of serpentine in connection with more or less altered limestones (West of Ireland, Highlands of Scotland) suggests another mode of origin in these cases. Some writers have contended that such serpentines are products of the alteration of dolomite, the magnesia having been taken up by silica, leaving the carbonate of lime behind as beds of limestone. Others have supposed the original rocks, from which the serpentines were derived, to have been a deposit from oceanic water, as has been suggested by Sterry Hunt in the case of those associated with the crystalline schists.²⁰⁸ Beds of serpentine intercalated with limestone might conceivably have been due to the elimination of magnesian silicates from sea-water by organic agency, like the glauconite now found filling the chambers of *Joraminifera*, the cavities of corals, the canals in shells, sea-urchin spines and other organisms on the floor of the present

²⁰⁸ "Chemical Essays," p. 123.