

may be found in association with the development of saussurite.<sup>54</sup>

*Chloritization*—an alteration in which the pyroxene (or hornblende) of the so-called "greenstones" has been changed into secondary substances (1) more or less fibrous in structure allied to serpentine, not pleochroic but showing a decided action on polarized light; or (2) scaly, pleochroic, polarizing so weakly as to appear isotropic, and more or less resembling chlorite. This alteration is rather the result of weathering than of metamorphism in the strict sense.<sup>55</sup> Where chloritization and epidotization have proceeded simultaneously in aluminous pyroxene or hornblende, the result is an aggregate of sharply defined pale yellow crystals of epidote in a green scaly mass of chlorite.<sup>56</sup>

*Serpentinization*—an alteration more especially noticeable among the more highly basic igneous rocks in which olivine has been a prominent constituent. The gradual conversion of olivine into serpentine has been already described (p. 138), and the occurrence of massive serpentine has been referred to (p. 301).

*Alterations of Titanic Iron.*—The ilmenite or titaniferous magnetite of diabases and other eruptive rocks undergoes alteration along its margins and cracks into a dull gray substance (leucoxene, p. 130), which is now known to be a form of titanite or sphene. The gray rim frequently passes into well-defined aggregates and crystals of sphene.<sup>57</sup>

*Marmorosis*, or the alteration of an ordinary dull limestone into a crystalline-granular marble (p. 998), may be again referred to here as one of the characteristic transformations in regional metamorphism.

*Dolomitization.* See p. 546.

*Granitization.* See p. 960.

*Production of New Minerals.*—In tracts of regional metamorphism a number of secondary minerals may be observed to have crystallized out, and to be characteristic of the schistose rocks. Among the most conspicuous of these are white and black mica, garnet, quartz, epidote. Garnet occurs abundantly as a constituent of mica-schist and gneiss, and has resulted from the alteration of both clastic and massive rocks (compare p. 999).

<sup>54</sup> Lossen, Jahrb. Preuss. Geol. Landesanst. 1883, p. 640; 1884, pp. 525-530.

<sup>55</sup> Rosenbusch, "Mikroskopische Physiographie," pp. 180-184.

<sup>56</sup> G. H. Williams, Bull. U. S. Geol. Surv. No. 62, p. 56.

<sup>57</sup> A. Cathrein, Zeitsch. Kryst. und Mineral. vi. 1882, p. 244.