serpentine, and those containing the pure magnesian olivine, forsterite, are very close, and their relations indicate for all of them a common neptunian origin.

§ 123. We pass from the olivine-bearing limestones to those rocks composed chiefly of olivine, which have received the names of dunite and lherzolite, and appear to be indigenous interstratified masses. Such was my conclusion after examining them in North Carolina, in strata referred by me to the Montalban series, regarding which I wrote in 1879: "Noticeable among the basic members of the terrane is the granular olivine or chrysolite-rock which, often accompanied by enstatite and by serpentine, appears to be interstratified in the micaceous and hornblendic schists of the Montalban in North Carolina and in Georgia." * Olivine-rocks, similar to those of North Carolina, have been observed among the crystalline schists in the province of Quebec, on the south side of the Gulf of St. Lawrence, but have not yet been carefully examined.

§ 124. The typical lherzolite from the eastern Pyrennees, described by Zirkel, has since been studied by Bonney, who in 1877 † described the rock and its locality. It forms several masses of considerable size, near Viedessos (Ariège), and is in contact with a saccharoidal limestone, in which occur broad tongue-like portions of the lherzolite. This rock consists of olivine with admixtures of enstatite, diopside and picotite (a chromiferous spinel), the constituent minerals showing in their arrangement on weathered surfaces a "linear structure," suggesting "an internal parallelism," which Bonney, who looks upon the rocks as "igneous," regards as due to movements of flow. The rock varies from coarsely to finely granular in texture, and includes in some cases a serpentinic mineral in its joints. The dunite of New Zealand, in specimens before me, presents in the arrangement of the contained chromite, a well-defined gneissic structure.

§ 125. Similar rocks are found in Norway, specimens of which from Tafiord, received by the writer in 1878 from Prof. Kjerulf, were micaceous, and showed an evidently gneissoid structure. These rocks, consisting essentially of olivine, holding enstatite, diopside, chromite and a greyish mica, are found interstratified in gneiss, with quartzites and mica-schists, sometimes garnetiferous. From their late studies of this rock in various Norwegian localities, Tornebohm, Reusch, and Brögger agree that it must be classed among the crystalline schists, a judgment in which Rosenbusch concurs. The reasons for this conclusion, as set forth by Brögger, are briefly as follows: First, the invariably laminated structure of the olivine-rock, which is conformable to that of the enclosing gneiss; and, second, the variations in the composition of the rock itself, as seen in adjacent layers. ‡ With these gneissoid olivine-rocks of Norway may be compared the olivine known as glinkite, found in nodules in a talcose schist in the Urals, and also the schists lately described from Mount Ida in Greece. § In these, the transition is seen from true tale-schists to tale-schists containing more or less olivine, with pyroxene, and finally to massive olivine-rock; the whole being associated with other crystalline schists and with limestones. The obvious conclusion from all the above facts is that no argument in favor of the igneous origin of serpentine can be drawn from its supposed derivation from olivine-rocks, since these are themselves, for the greater part, of neptunian origin.

* Macfarlane's Geological Hand-book, page 13.

† Geological Magazine, Feb. 1877.

‡ Neues Jahrbuch fur Mineralogie, 1880, i., pp. 187, 195, 197.

§ Science, Aug. 31, 1883, p. 255.