tion. The serpentine contains imbedded, in some portions, not only olivine, but hornblende, talc and garnet. Intercalated with the serpentine, which is often distinctly stratified, are layers of schistose talc, of compact chlorite, of actinolite-rock, of ferriferous dolomite, and of mica-schist. The serpentine itself is chromiferous, and also contains magnetite.

§ 130. Dr. Stapff farther adds :—"The curious modifications of form which the mass of serpentine has suffered from the effect of faults, etc., correspond to those of the adjacent micaceous gneiss, but in the case of the former they have been better studied, for the reason that it is more easy to define the limits of these forms. If we suppose, in the section, in place of the serpentine, a mass of ordinary micaceous gneiss subjected to all the movements of displacement and elevation which we have here displayed, we should perceive nothing more upon the profile than a uniform surface of micaceous gneiss, with some interlacings of beds. It cannot, however, be denied that movements arrested by the hard and tough mass of the serpentine have produced in the neighboring rocks perturbations much more intense than would have resulted from similar movements acting upon a more tender rock," (loc. cit., pp 43-44.) It would be difficult to illustrate more clearly than Dr. Stapff has done, the manner in which movements in the earth's crust may effect interstratified masses of unequal hardness and tenacity, giving rise to accidents which simulate to a certain extent those produced by the intrusion of foreign masses, and may thus lead different observors, as we have seen, to opposite conclusions with regard to the geognostical relations of rocks like serpentine and euphotide.

VIII.—Conclusions.

The following are the chief points regarding serpentine and ophiolitic rocks which we have sought to set forth in the preceding pages :—

1. To show historically the diversity of opinions as to the geognostical relations of serpentine and related rocks, which have been regarded by some writers as eruptive and of igneous origin, and by others as aqueous and sedimentary.

2. To show how, from the hypothesis of their eruptive origin, came the application of that of metasomatosis, and also to set forth the hypothesis of the aqueous origin of serpentine, explaining how silicates of magnesia may, on chemical grounds, be looked for at any geological horizon.

3. To indicate the various horizons at which serpentines are found in North America ; and first, those of the Laurentian, of the Huronian, and of the younger or Montalban gneisses ; in which connection we have noticed the serpentines of Chester county, Pennsylvania, and those of New Rochelle, Hoboken, and Manhattan and Staten Islands, all of which are regarded as indigenous stratified rocks ; the apparently intrusive character of the serpentine of the latter locality being explained.

4. We have further described the occurrence of serpentine among the Taconian rocks in Pennsylvania, and also among the gypsiferous rocks of the Silurian series at Syracuse, New York.

5. Having noticed some points regarding the nomenclature of serpentine and related rocks, and Bonney's account of the serpentines of Cornwall, and of parts of Italy, we have considered the serpentine-bearing rocks of the Alps, in which we show four great groups, in ascending order, which are the older gneiss, the pietre-verdi or greenstone-series, the