newer gneisses and mica-schists, and the still younger lustrous schists, corresponding respectively to the Laurentian, Huronian, Montalban and Taconian of North America; the second and third of these being the Pebidian and the Grampian of Great Britain. * Serpentines, it was shown, occur in the Alps interstratified in the second, third and fourth of these groups, the youngest of which includes the marbles of Carrara.

6. The view that this youngest group is mesozoic, is discussed, and the relations of all these groups of crystalline schists to the fossiliferous rocks of the mainland, and of those of Elba and Sardinia, are set forth, showing their pre-Cambrian age; while it is maintained that the ophiolites and other crystalline rocks which have there been referred to the tertiary are but exposed portions of these pre-Cambrian rocks.

7. The crystalline rocks of the Simplon and the St. Gothard, and those of Saxony and Bavaria, are considered and are compared with the younger gneisses of North America.

8. The relations of the so-called tertiary serpentines to the surrounding strata are elucidated by a detailed discussion of the mass of Monteferrato, in Tuscany, which is regarded as of pre-Cambrian or eozoic age.

9. The various theories proposed to explain the genesis of serpentines are considered, and that of their aqueous origin is adopted.

10. The geognostical history of olivine is discussed, and the essentially neptunian origin of many olivine-rocks, is maintained.

11. The contradictory views as to the geognostical relations of serpentine are considered, and an attempt is made to show that the appearances of intrusion, upon which some have insisted, are explained by subsequent movements of the strata in which the serpentines are included.

### Contents of Sections.



* It remains to be seen whether the Arvonian series, which is essentially composed of stratified halleflinta or petrosilex-rocks, passing into quartziferous porphyries, and is largely developed at the base of the Huronian in parts of North America, and of Great Britain, is not represented in the Alps. Since we have seen the serpentines, lherzolites, euphotides, diabases, and even the marbles of the Alps and other regions, removed from the category of eruptive mesozoic and cenozoic masses, and shown to be regularly interbedded members of pre-Cambrian stratified series, it is, I think, a legitimate subject for inquiry whether the quartziferous porphyries which are so largely developed at Botzen, and elsewhere in the Alps, and have been regarded as eruptive rocks of Permian age, may not prove to belong to a stratified series, the equivalent of the Arvonian, with which, to judge from descriptions, analyses and specimens, they bear a close resemblance. For an account of these rocks of Botzen by one who regards them as plutonic, see Judd in the *Geological Magazine* for 1876, vol. xiii., pp. 200-214, and for details with regard to the history of the Arvonian series, see the author in 1880, *American Jour. Science*, [3], (xix. pp. 274,278, et seq.)