§ 2. We find at the beginning of our century, that the most competent observers were agreed in regarding serpentines as stratified contemporaneous deposits in the so-called primary rocks. Patrin described those of Mont Rose and of the Rothhorn as interstratified with calcareous and micaceous schists, while Saussure found those of Mont Cervin to present similar conditions, and described certain serpentines, found near Genoa, as alternating with bands of calcareous, quartzose, and micaceous schists or argillites. Humboldt, in like manner, noticed the stratified character of the serpentines near Beyruth, and Jameson found those of Rothsay, in Scotland, to be interstratified with micaceous and talcose schists, and with crystalline limestone, in repeated alternations, of which he gives a diagram, mentioning, however, as an opinion held by some, that the masses both of serpentine and of limestone "form great veins rather than vertical sheets." He elsewhere describes serpentine as a primitive stratified rock, contemporaneous, and alternating with crystalline schists.*

§ 3. A little later we find, in 1826, Macculloch, in his *Geological Classification of Rocks*, separating the primitive rocks into two groups, stratified and unstratified, the latter consisting of granite and serpentine. He assigned as a reason for placing serpentine in the latter class that it does not appear to be decidedly stratified, but, at the same time, remarks that, unlike other unstratified rocks, as granite or trap, he had not found serpentines to present ramifying veins. Subsequent studies in the Shetland Isles led him to make what he calls "an important correction" in its history, in the Appendix to the volume just named, where he announces his conclusion that the serpentines are stratified rocks, like gneiss or mica-schists, adding a revised tabular view, in which they are included with these in the stratified division of the primitive rocks, granite alone being retained in the unstratified division.†

§ 4. Boase, in his *Primary Geology*, in 1834, describes the serpentines of Cornwall as associated with talcose and chloritic and actinolite-schists, and what had been "called hornblende-slate," to which the serpentine seemed in some instances subordinated. He further compares these associations and modes of occurrences with those described by Macculloch.‡ *De la Beche, in like manner, in his *Geology of Cornwall and Devon*, notes the seeming passage of the serpentine into the hornblende-slate in many places, but also its apparent "intrusion amid the latter with force;" a seeming contradiction which he recognizes, but endeavors to explain.§

§ 5. Unlike Macculloch and Boase, De la Beche regarded serpentine as an eruptive rock of posterior origin to the associated schists, agreeing in this with Brongniart, who had placed serpentine among plutonic rocks. A similar view was held by Elie de Beaumont‖ and by Savi, and, without entering into further details, we may notice that they have been followed by Sismondi, Lory, and others, who maintain the plutonic origin of the Alpine serpentines, while, on the other hand, Scipion Gras, Gastaldi, Favre and Stapff regard them

* See for the text of the above references the quotations in Pinkerton's Petralogy, 1821, I. 334-343; II. 608:612.

† Macculloch, loc. cit., pp. 78, 243, 652-655.

‡ Boase, loc. cit., p. 46.

§ De la Beche, loc. cit., pp. 35, 99.

‖ After discussing the question with Elie de Beaumont in 1855, I asked his eminent colleague de Senarmont as to the eruptive origin of serpentines. He replied that his own extended studies of the serpentines of Europe had led him to reject, as wholly untenable, the theory of their plutonic origin.