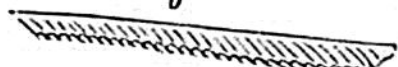


Fig. 599.



b

a, b. *Didymograpsus (Graptolites) Murchisonii*, Beck.

Llandeilo Flags. Wales.

Fig. 600.

*Didymograpsus geminus*, Hisinger, sp.
Sweden.

Fig. 601.

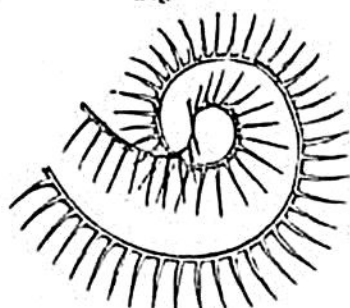
*Rastrites peregrinus*, Barrande.
Scotland; Bohemia; Saxony.

Fig. 602.

*Diplograpsus folium*,
Hisinger.
Scotland; Sweden.

Fig. 603.

*Diplograpsus pristis*,
Hisinger, sp.
Shropshire; Wales; Sweden,
&c.

Beneath the black slates above described no graptolites appear as yet to have been found, but the characteristic shells and trilobites of the Lower Silurian rocks are still traceable downwards, in North and South Wales, through a vast depth of shaly beds, interstratified with trappean formations, sometimes not less in their aggregate thickness than 11,000 feet. Hence the total thickness of the beds assigned to the Lower Silurian, or the Llandeilo group of Murchison, is not less than 20,000 feet, and the Upper Silurian rocks are above 5000 feet in addition. If these beds were all exclusively of sedimentary origin we might well expect, from the analogy of other parts of the earth's crust, to find that they must be referred paleontologically to more than one era; in other words, that changes in animal and vegetable life, as great as those which occurred in the course of several such periods as the Devonian, Carboniferous, and Permian, would be found to have taken place while the accumulation of so enormous a pile of rocks was effected. But in volcanic archipelagoes, as in the Canaries for example, we see the most active of all known causes, aqueous and igneous, simultaneously at work to produce great results in a comparatively moderate lapse of time. The outpouring of repeated streams of lava,—the showering down upon land and sea of volcanic ashes,—the sweeping seaward of loose sand and cinders, or of rocks ground down to pebbles and sand, by torrents descending steeply inclined channels,—the undermining and eating away of long lines of sea-cliff exposed to the swell of a deep and open ocean,—above all, the injection, both above and below the sea-level, of sheets of melted matter between the lavas previously formed at the surface,—these operations may combine to produce a considerable volume of superimposed matter, without there being time for any extensive change of species.