Trap of the Old Red Sandstone period.—By referring to the section explanatory of the structure of Forfarshire, already given (p. 48), the reader will perceive that beds of conglomerate, No. 3, occur in the middle of the Old Red sandstone system, 1, 2, 3, 4. The pebbles in these conglomerates are sometimes composed of granitic and quartzose rocks, sometimes exclusively of different varieties of trap, which, although purposely omitted in the section referred to, are often found either intruding themselves in amorphous masses and dikes into the old fossiliferous tilestones, No. 4, or alternating with them in conformable beds. All the different divisions of the red sandstone, 1, 2, 3, 4, are occasionally intersected by dikes, but they are very rare in Nos. 1 and 2, the upper members of the group consisting of red shale and red sandstone. These phenomena, which occur at the foot of the Grampians, are repeated in the Sidlaw Hills; and it appears that in this part of Scotland, volcanic eruptions were most frequent in the earlier part of the Old Red sandstone period.

The trap rocks alluded to consist chiefly of felspathic porphyry and amygdaloid, the kernels of the latter being sometimes calcareous, often chalcedonic, and forming beautiful agates. We meet also with claystone, clinkstone, greenstone, compact felspar, and tuff. Some of these rocks flowed as lavas over the bottom of the sea, and enveloped quartz pebbles which were lying there, so as to form conglomerates with a base of greenstone, as is seen in Lumley Den, in the Sidlaw Hills. On either side of the axis of this chain of hills (see section, p. 48), the beds of massive trap, and the tuffs composed of volcanic sand and ashes, dip regularly to the south-east or north-west, conformably with the shales and sandstones.

Silurian period.—It appears from the investigations of Sir R. Murchison in Shropshire, that when the lower Silurian strata of that county were accumulating, there were frequent volcanic eruptions beneath the sea; and the ashes and scoriæ then ejected gave rise to a peculiar kind of tufaceous sandstone or grit, dissimilar to the other rocks of the Silurian series, and only observable in places where syenitic and other trap rocks protrude. These tuffs occur on the flanks of the Wrekin and Caer Caradoc, and contain Silurian fossils, such as casts of encrinites, trilobites, and mollusca. Although fossiliferous, the stone resembles a sandy claystone of the trap family.*

Thin layers of trap, only a few inches thick, alternate, in some parts of Shropshire and Montgomeryshire, with sedimentary strata of the lower Silurian system. This trap consists of slaty porphyry and granular felspar rock, the beds being traversed by joints like those in the associated sandstone, limestone, and shale, and having the same strike and dip.†

In Radnorshire there is an example of twelve bands of stratified trap, alternating with Silurian schists and flagstones, in a thickness of 350 feet. The bedded traps consist of felspar-porphyry, clinkstone, and other va-

* Murchison, Silurian System, &c. p. 230.

† Ibid. p. 272.