rapid cooling. In some parts of these congealed streams, I could trace a transition of the obsidian into pumice. In these places, the obsidian contained scattered air globules, which were almost always lengthened in the direction of the stream. These globules gradually augmented in number until the whole substance became a light, fragile, and frothy pumice."* Obsidian is found in the crater of Vulcano, one of the Æolian islands, and may be seen forming there at the present time.

Rocks of trachyte sometimes, though rarely, have a columnar structure. Owing to the facility with which trachyte breaks down, it forms beds of conglomerate intermixed with scoriæ and pumice. The more finely comminuted parts of trachyte, intermixed with earthy matter, form beds of tufa. These beds of conglomerate and tufa, frequently environ trachytic mountains, and hide from the view of the geologist their connection with the subjacent rocks.

When trachyte becomes compact and hard, and acquires a laminar or slaty structure, it passes into clinkstone or phonolite, so called on account of its yielding a metallic sound when struck. (See Chap. IX., where it is observed, that dark lava or basalt also passes into clinkstone.) Thus it appears that both the light-coloured lava, or trachyte, and the dark-coloured lava or basalt, according to the different degrees of heat to which they have been subjected, or the different circumstances under which they have cooled, form volcanic glass, clinkstone, or pumice; and the only difference to be observed in the minerals formed from the trachyte or the basalt, is a difference of colour in the minerals themselves, or in the glass which they yield when melted. Black pumice from basalt is however very rare.† Basaltic dykes, and the overlying rocks of porphyry, trap, and basalt, described in Chap. IX. ought, I am persuaded, to be classed with ancient volcanic rocks, but their igneous origin is not yet universally

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* Memoirs of the Wernerian Society, vol. ii. p. 47.

† According to the microscope and mechanical analysis of light-coloured and dark lavas, by M. Cordier (whether compact or scoriaceous), it appears that the stony lavas which melt into a white glass, contain ninety per cent. of felspar. Those lavas which melt into a bottle-green glass or enamel, contain only from fifty-five to seventy per cent. of felspar; such are the greenish, greyish, or dark-coloured basalt. On a microscopic examination of dark lava or basalt, it appears to consist of minute crystalline grains. The whitish grains belong chiefly to felspar, but in the lava from Vesuvius, to leucite; a small proportion of these grains are chrysolite. The yellowish or greenish grains belong to augite and hornblende: those of augite are rounded and irregular, with a vitreous fracture and splendent lustre. The grains of hornblende are long, and assume a prismatic form; they present indications of a laminar structure, and have little lustre. The perfectly black grains are iron sand, combined with titanium; the grains of iron ore (*fer oligiste*) may be known by yielding a red powder when pulverized. Volcanic glass, volcanic scoriæ, and volcanic tufa, are all composed of the same minerals as the most compact lava; and all the most homogeneous dark volcanic rocks are composed of minute microscopic grains, which are chiefly felspar and augite, with a small proportion of olivine and iron sand. M. Cordier informed the author that the microscopic examition of lava was much facilitated by steeping the piece to be examined in dilute muriatic acid.