The structure, therefore, cannot be regarded as certainly indicating that the rock in which it is found ever flowed out at the surface as lava.

Some glassy rocks, in cooling and consolidating, have had spherulites developed in them (Fig. 17); also by contraction the system of reticulated and spiral cracks known as *perlitic* structure (p. 180 and Figs. 9 and 20).

The final stiffening of a vitreous mass into solid stone has resulted (1st) from mere solidification of the glass: this is well seen at the edge of dikes and intrusive sheets of different basalt-rocks, where the igneous mass, having been suddenly congealed along its line of contact with the surrounding rocks, remains there in the condition of glass, though only an inch further inward from the edge the vitreous magma has disappeared, as represented in Fig. 287; (2d) from the devitrification of the glass by the abundant development of microfelsitic granules and filaments, as in quartz-porphyry, or of crystallites, microlites and crystals, as in such glassy rocks as obsidian and tachylite; or (3d) from the complete crystallization of the whole of the original glassy base, as may be observed in some dolerites.

D. Clastic.—Composed of detrital materials, such as have been already described (p. 183 and Fig. 21). Where these materials consist of grains of quartz-sand, they withstand almost any subsequent change, and hence can be recognized even among a highly metamorphosed series of rocks. Quartzite from such a series can sometimes be scarcely distinguished under the microscope from unaltered quartzose sandstone. Where the detritus has resulted from the destruction of aluminous or magnesian silicates, it is more susceptible of alteration. Hence it can be traced in regions of local metamorphism, becoming more and more