

of frequent occurrence also as veins and irregularly intruded masses among highly convoluted rocks, especially when these have been more or less metamorphosed; (2) in the chimneys of old volcanic orifices, forming there the "neck" or plug by which a vent is filled up; and (3) as bosses sometimes of large size which have been protruded in connection with volcanic action. Between the granophyres which are characterized by a micropegmatitic structure and the felsites or ancient rhyolites there is a close relation. Quartz-porphyrines are abundant in Britain among formations of Lower Silurian, Old Red Sandstone and Lower Carboniferous age. In the Inner Hebrides they occur in large bosses or domes (granophyre) rising through the older Tertiary basaltic plateau.

Many of the rocks called "quartz-porphyr" are not microgranitic but have the "felsitic" structure arising from the devitrification of ancient forms of rhyolite (see p. 280).

**Rhyolite**<sup>172</sup> (Liparite, Quartz-trachyte)—a rock having a compact pale-gray, yellowish, greenish or reddish ground-mass, sometimes with glassy patches and layers, often showing perfect flow-structure, not infrequently also with spherulitic and perlitic structures, and with crystals of orthoclase (sanidine), granules of quartz and minute crystals of black mica, augite, more rarely hornblende. Considerable diversity exists in the texture of the rock. Frequently it is finely cavernous, the cavities being lined with chalcidony, quartz, amethyst, jasper, etc. Some varieties are coarse and granitoid in character. Intermediate varieties may be obtained like the quartz-porphyrines, and these pass by degrees into more or less distinctly vitreous rocks. Throughout these gradations, however, which doubtless represent different stages in the crystallization of an original molten glass, a characteristic ground-mass can be seen under the microscope having a glassy, enamel-like, porcelainous, microlitic character, with characteristic spherulitic and fluxion structures. In the quartz, glass-inclusions, having a dihexahedral form, may often be detected; but liquid inclusions are absent. An analysis by Vom Rath of a rhyolite from the Euganean Hills gave—silica, 76.03; alumina, 13.32; soda, 5.29; potash, 3.83; protoxide of iron, 1.74; magnesia, 0.30; lime, 0.85; loss, 0.32; total, 101.68—specific gravity, 2.553.

<sup>172</sup> On rhyolite see Richthofen, *Jahrb. K. K. Geol. Reichsanst.* xi. 156. Zirkel, "Micro. Petrog." p. 163. King, "Explor. 40th Parallel," vol. i. p. 606.