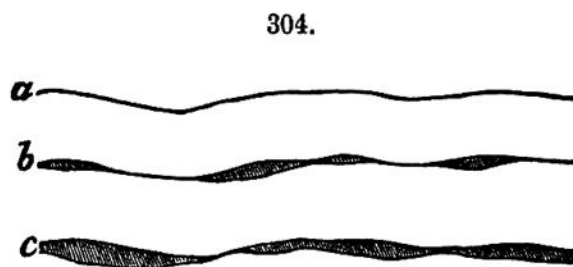
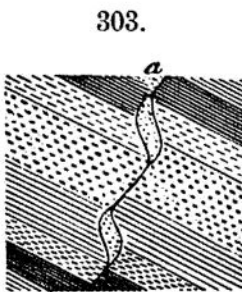


### 3. Mineral Constitution and Structure of Veins.

1. *Constitution.* — Quartz is the most common material of veins. This is so because siliceous solutions form at a low temperature, and easily deposit quartz. Others are *feldspathic* and *granitic*. Others consist largely of calcite, barite, fluorite; others of hornblende, epidote, pyroxene, etc. Moreover, a large part of the minerals of the world, including most of its gems and ores, occur in veins, and some of them only in veins. The minerals are crystalline in texture, and where there is any open space, or seam, in the course of the vein, crystals of one or more of the minerals line the cavities, making *geodes*. The most magnificent of crystallizations are found in veins.



When ores occur along a vein, it is in miners' language a *lode*. The earthy minerals of the vein are the *gangue* of the ore, or *what goes with it*, and also the *veinstones*; and the rock outside of the vein, the *country rock*. Quartz, calcite, barite, and fluorite, are the most common kinds of gangue.

Iron sulphide,  $\text{FeS}_2$ , is a very common associate of all kinds of ores, constituting the mineral pyrite or marcasite, generally the former. In a large part of the important ores of veins, the other metals are in combination with sulphur; but in many with arsenic, selenium, tellurium, bismuth, antimony, with or without sulphur; in a few with chlorine, iodine, bromine. Some ores are in the state of carbonates, sulphates, phosphates, arsenates; only two of economical importance are silicates, and two are oxides. The great deposits of oxides of iron are in beds, and not veins.

A few metals occur in the native, or unmineralized, state, essentially pure — as gold, platinum, copper, silver, bismuth, and sparingly so some others. Almost all the gold and platinum of the world is in this condition, and a large part of the copper.

The upper, or exposed, part of a vein is often a region of much decomposition, because (1) ores, being mainly sulphides, often oxidize easily; and (2) water readily percolates downward in many veins, owing to the nearly vertical position and structure of the vein, and the frequent existence of open spaces along the center and sides. Pyrite is often oxidized to red ocher, giving a reddish look to the vein rock; and if it contains gold, it often leaves the scales of gold in the cavities it has deserted. Pyrite also changes to the yellow-brown oxide of iron. Chalcopyrite, or sulphide of copper and