Rep., 158, 171, 1875). The ore is chiefly silver chloride or horn-silver. The rocks are sandstone, argillaceous sandstone, and shale. The ore-beds are usually clayey layers or shales, and the ore is most abundant when the clays contain vegetable remains. Eruptive rocks are not far away, and J. E. Clayton, in the same report, urges that hot vapors, derived either from the fissures of eruption, or from other wide-spread fracturings made by the eruptive movements, were the chief source of the distributed ores.

In southern Utah and in Colorado, according to J. S. Newberry, veins exist made of coarse gravel and stones, in which the stones have become coated with argentiferous galena and other ores, including silver chloride, that were received from below. They are worked for the silver. Examples are the Bassick and Bull Domingo mines near Silver Cliff, Col., and the Carbonate mine at Frisco, Utah. The large fissures were opened near the base of the mountains, where they became filled with the pebbles, stones, and bowlders of all kinds there accumulated, and yet received the ascending metallic solutions, and also siliceous solutions, which deposited at the Bassick mine much chalcedony among the stones.

2. *The intersected rocks of easy corrosion.* — Many of the richest ore-deposits of the world occupy cavities in limestone made by the corroding action of solutions or vapors. The cavities were eroded usually along joints or fractures of the limestone. Examples occur in the Leadville region, Colorado; in the Wasatch and Oquirrh mountains, Utah; at the Eureka mine, Nevada; in Lake Valley, New Mexico; in the Los Carlos Mountains, Mexico; and elsewhere. The ores of these mines, as generally of others, are of two classes: (1) the original, and (2) the secondary — mainly the latter. The original ores include galena (PbS), containing some silver and chalcopyrite, with sometimes pyrite and sphalerite (ZnS). Some of the secondary are silver chloride and bromo-chloride, made from the silver of the galena; lead sulphate, carbonate, phosphate (and less commonly vanadate and molybdate), made from the galena; zinc silicate, made from sphalerite; and also iron oxide (hematite or limonite), made from pyrite and from iron in the limestone; and manganese oxides, probably from the limestones.

The following figures show the forms, at Leadville, of some of the cavities of ore in the corroded limestone (a blue Carboniferous limestone) underneath a sheet of porphyry, the latter being the igneous rock which carried up with it the ore and heated vapors. They are from the very valuable Report of S. F. Emmons (1886). The porphyry is also usually altered and often penetrated for some distance with ore, and its decomposition has afforded part of the ore for the limestone cavities. Although the ore deposits are usually in a Carboniferous limestone at Leadville, the time of the outflow of the porphyry and of the making of the cavities was not earlier than the Cretaceous period (Emmons). The similar silver-lead mines of all western America are probably likewise Cretaceous (chiefly the Laramie or later Cretaceous), or else Tertiary.

At the famous Eureka Mine, eastern Nevada, where the rocks are all Paleozoic, the eruptions were Tertiary, according to Hague (1892), and mostly late Tertiary; they were partly along old fault-planes of post-Carbonif-