and are included within the Cambrian quartzite areas; the valley ores occur in the broad valleys in areas of Cambrian and Ordovician limestones.

DISTRIBUTION

Mountain ores.—The mountain ores are confined to the areas of Cambrian quartzite. Most of the mountain ore mines of the county are in a belt along the north slope of Morgan Hill. Mines in these ores have also been worked in the short, steep-sided valleys southeast, east, and northeast of Hellertown.

Mines are numerous in certain areas of the Cambrian quartzite but are lacking in others where the formation is equally well developed. The metamorphic changes that the formation has undergone locally since its deposition have determined the places where ore has been deposited. In the areas where the ore deposits occur, many of the original sandstone strata have been changed into jasperoid rocks, although certain conglomeratic strata remain practically unchanged; but in places where ore deposits are absent the formation is composed entirely of ordinary sandstones and conglomerates. It is therefore considered useless to prospect for iron ore of this type in areas where the irregular masses of yellow to red jasperoid rocks are absent in the soils.

Valley ores.—The limonite ores of the limestones are extremely irregular in their distribution. The map shows one belt of iron mines that extends in an east by north direction through Hanoverville to Hollo.

There seems to be some relation between the structural features of the rocks and the location of the ore deposits, for as a rule the largest deposits of ore are found in places where the limestones have been closely folded or faulted. As the rocks are likely to be much more shattered at the crests of closely folded and eroded anticlines, such places should be more favorable for ore deposition, and the investigations in this region indicate a relationship of that kind. In general, those places in the limestones where the underground waters have collected and flowed with greater freedom are the places where the ore was deposited in largest amount. Miners frequently remark upon the observed connection of underground watercourses and the limonite deposits. As a rule, throughout the limestone regions good wells can be procured in few places at depths less than 200 feet, and yet few good iron mines have been opened where the volume of water encountered at depths of 100 feet or even less was not an obstacle to the development.