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There are, likewise, valid objections to the explanation proposed by Chance,\textsuperscript{15} who believes that the ores are gossan deposits that were formed by the oxidation of pyrite which was "a mechanically transported sediment, derived from the erosion of older eruptives." On account of the instability of pyrite it could hardly be liberated from igneous rocks through the decomposition of some of the constituent minerals without itself being oxidized, and the situation of most if not all the ore bodies in regions where the rocks have been greatly shattered might also be used as an argument against this view.

Whether the carbonate ores were formed during the primary mineralization cannot be definitely determined without additional information. The carbonate ores are found in the lower levels of both the valley-ore and the mountain-ore mines in association with the limonite, but data are lacking as to their association with the underlying pyrite. Where the ascending iron-bearing solutions came into contact with limestones or encountered carbonate waters from the limestones, it would be natural to expect the formation of siderite, and in all probability part of the iron in the primary segregation was precipitated as siderite and either replaced the rocks or filled fissures just as the pyrite did. In the Wharton mine, southeast of Hellertown, the carbonate ore was less abundant in the lowest workings than it was a short distance above them, which might mean that it did not extend into the region of unaltered primary mineral deposition and thus point to its secondary character. At present it is well to consider the carbonate ores as in part primary and in part secondary, and not to attempt to say which class is the more important.

Secondary concentration of the iron ores.—The present workable iron deposits are the products of alteration of the original segregations of pyrite by descending waters carrying oxygen and carbon dioxide in solution. Some of the sulphide was changed directly to limonite, forming a spongy ore characteristic of gossan deposits; other portions were altered to limonite that was taken into solution and metasomatically replaced part of the associated quartzite or was precipitated in open spaces as stalactites of limonite; and still other portions were converted into siderite and precipitated as bombshell ore or compact rounded concretions. Numerous specimens illustrating each of these processes have been found in the vicinity of the abandoned iron mines.

The following chemical reactions illustrate some of the probable changes which took place.