The minerals that have been mined and utilized are discussed more fully in that portion of the volume dealing with the economic geology.

Instead of the full bibliographic reference for each citation or quotation, only the author's name and the year of publication are given. The full title can be found readily by reference to the chapter on Cartography and Bibliography. For one who wishes to obtain all the information available, it will generally be necessary to refer to the individual articles.

**NATIVE ELEMENTS**

**Copper (Cu)**

Native copper has been twice reported from the Ironton Mines as follows:

"An interesting occurrence (of native copper) has been noticed by Prof. W. Th. Roepper in the limonite deposits of Ironton, Lehigh County, where it is occasionally met with in minute distorted, probably cubical crystals disseminated through quartz." (Genth, 1875, p. 5.)

"Of more interest to the mineralogist is the occurrence of native copper in this black clay (of the Ironton Mines), which is found in small filiform pieces. Its presence in the metallic state being probably due to the carbonaceous matter in the clay." (Prime, 1878, p. 41.)

**Graphite (C)**

Graphite in thin flakes has been noted at several places in the metamorphosed rocks of Lehigh County. In two different places attempts have been made to open mines for the purpose of obtaining it in commercial quantity. These are described in the chapter on Mineral Resources.

The most numerous occurrences of graphite in the region are in the acid and basic gneisses of South Mountain. About half a mile west of Seidersville, along the Lehigh-Northampton County line, small, thin flakes have been noted in the basic gneiss. Flakes of graphite have been noted in the gneiss along the Little Lehigh west of the Western Salisbury Church. On the crest of South Mountain about three-fourths of a mile east of Emmaus and the same distance east of Vera Cruz, graphite flakes are so numerous that exploratory shafts were dug.

The microscopic examination of some of the gneisses has revealed the presence of tiny flakes indistinguishable to the naked eye.

In the cement rock of the Jacksonburg formation, the carbonaceous matter of these argillaceous limestones has been converted into what is assumed to be graphite along slickensided surfaces. These smooth, brightly polished surfaces are mainly along bedding planes and are abundant in the rock of many quarries. The graphite rubs off readily. Veins of calcite and quartz have developed along these slippage planes and it is common to find fine specimens of veins coated on both walls with a film of graphite.

Graphite is present as a microscopic constituent in most of the commercial slates of the county. Behre (1933, p. 180) describes it occurr-