Characters—As natural exposures of the Bone Valley formation are rare and of slight extent, either vertically or laterally, descriptions of it are based almost entirely on what can be seen or inferred in phosphate mines. These, naturally, are confined to places where the concentration of phosphatic lumps is greater than usual. The basal part of the formation is a conglomerate containing pebbles of phosphate, many of which are derived from the underlying bedrock, a phosphatic limestone of the Hawthorn formation. The pebbles are embedded in sand or soft, plastic clay, which hardens on exposure. According to Sellards (1915, p. 42)

> The phosphate beds are more or less definitely stratified, the bedding planes being frequently continuous for the full length of the exposures in the pit, some of which are half a mile or more in extent. Elsewhere the stratification is irregular and cross bedding is evident.

According to Matson and Clapp (1909, p. 138),

> Lithologically, the formation is composed of very poorly assorted materials, such as clay and phosphate pebbles, which usually show some evidence of stratification.

The upper part of the formation is much finer and, though it is generally phosphatic, the phosphatic particles are less conspicuous.

Matson (1915, p. 21) describes the Bone Valley as

> gray, brown, or mottled sand and phosphate conglomerate, in a sand matrix. The brown sands are locally cemented into a hard ferruginous sandstone, and slight induration is common. In places a phosphatic marl containing many sand grains lies just above the conglomerate, and though it is not possible to be sure whether this material belongs with the Bone Valley gravel or is part of an overlying formation its relation to the conglomerate is apparently conformable. The conglomerate is made up of pebbles and granules of phosphate embedded in clay or sand.

In the same report Matson (1915, p. 36) says:

> The Bone Valley gravel consists of rounded pebbles of phosphate embedded in a matrix of sand or clay overlain by varying thicknesses of loose or semi-indurated sand. The maximum thickness of this formation is probably more than 50 feet, but only about one-third of this thickness should be assigned to the phosphate.

The phosphate-bearing portion of the Bone Valley formation is a gravel containing rounded and subangular pebbles of phosphate in varying degrees of coarseness intermingled with more or less sand and clay. In general the deposit shows distinct stratification, some beds being wonderfully persistent over a distance of several hundred yards though others