of the deposits. Pink clay coats the surfaces and penetrates crevices of all the coarser fragments; it serves as the cement which has consolidated the originally incoherent sediments into fairly hard rocks. Locally, where the supply of pink clay was deficient, the Newark beds may be gray; and they have also turned gray in places where heated waters given out by intruding igneous rock-magmas have changed the red mineral, hematite, into the black iron oxide, magnetite. Elsewhere carbon compounds liberated by the decay of vegetation have reduced the iron to the ferrous state, resulting in a greenish coloration; or the accumulation of excess carbon has blackened the beds. But, however prominent one or another of these colorings may be at individual localities, one can not go far in any direction before encountering the deep red rocks characterizing the Newark group in general.

Even where no actual outcrop exists, the nature of the underlying material can often be recognized by the color of the soil resulting from present-day weathering of the substratum. The coloring effect of hematite is so powerful that many Newark soils, known to soil surveyors as Penn soils, are nearly as red as the rocks themselves. On the other hand, the gray or otherwise-colored rocks of this group give rise to yellowish or brownish soil types.

The streams descending from the mountains into the Newark trough were evidently highly variable and intermittent, so that the materials they carried down and deposited changed markedly from time to time. Streams so sluggish as to be capable of transporting only the finest mud would now and again receive so much more water that they could bring down sand, gravel, and even good-sized boulders. These would form coarse strata superposed on the fine ones and would in turn be covered by finer deposits when the water flow slackened again. When hardened into rock, the result was a series of formations termed shale, sandstone, and conglomerate, varying greatly in thickness from place to place, and following one another in various sequences. Near the margins of the trough, where streams emerged from the mountains, coarse materials would naturally be deposited in the greater amounts, and finer and finer sediments would be carried progressively further out toward the center of the trough. In Lehigh County the bulk of the Newark rocks represent marginal deposits, and are correspondingly relatively coarse-grained, consisting indeed largely of the aggregate of pebbles and boulders known as conglomerate, with only subordinate and local beds of the finer-grained sandstone, and the still finer argillite or shale.

The conglomerate consists of stones of all sizes up to at least 2 feet in diameter, embedded in a red clayey matrix. In some places the stones are chiefly sandstone, and elsewhere chiefly limestone; occasionally these two rock types are uniformly mixed. Fragments of shale, slate, gneiss, and other rocks are occasionally present, but rarely if ever dominant. The sandstone fragments are almost always well-rounded, indicating transportation from a considerable distance; their lithology resembles closely that of the Shawangunk (Tuscarora) formation of Kittatinny (Blue) Mountain, and they may well have been broken from beds of that formation exposed in Triassic times. The limestone fragments, on the other hand, are mostly angular or subangular, proving that they came from close to the margin of the