

division takes a second one of the five methods, and so on till each has had them all. Lecture and laboratory exercise have helped each other. Each one understands the subject and is prepared to enjoy and profit by the more careful measurement of specific gravity with delicate balance and corrections for variation of temperature and pressure from standard conditions, that awaits him in his term or two of advanced practical work. Such a course prepares him fully for the higher grade of work, so that neither inherent difficulties or imperfect explanation can now be a bar to progress.

It must be admitted that the method presented involves some additional effort on the part of the instructor, but there is abundant compensation in the superior results obtained. If space permitted, I would add something concerning methods of securing at small expense the duplication of apparatus necessary to keep the laboratory studies in close connection with lecture and classroom work, but that would better be reserved for another occasion.

#### DISCOVERY OF ANCIENT ARGILLITE QUARRIES ON THE DELAWARE.

BY HENRY C. MERCER, DOYLESTOWN, PA.

THE discussion of the Trenton gravel specimens has forced several important questions upon our attention. Where did the argillite come from with which the chipped objects were made? Granted that much of it was found in the river-bed in the shape of boulders and erratic blocks, whence had this material been transported by the river?

To learn that modern Indians on the Delaware quarried jasper and in the process of blade-making strewed the quarry site with "wasters," resembling in form the Trenton specimens, was to ask whether they also quarried argillite.

We had found argillite "turtle-backs" on the surface at the camp-sites of Gilmer's Island, Gallows Run, Ridges Island, and Lower Black's Eddy on the Delaware, but they lacked the final and convincing association with the quarry to prove their pedigree, and we still sought the whereabouts of the ancient pits, the refuse heaps, and the "rejects" or blocked-out implements which were to repeat in the now famous blue stone, the story of the inchoate blades of jasper.

The way towards an answer to one of the vital questions that concerns the antiquity of man in the Delaware valley was opened on May 22, by the discovery by me of a series of seven or eight depressions surrounded by masses of argillite chips (a quarry in fact with all the surface characteristics of Macungie, Vera Cruz, and Durham, in America, or Grimes Graves, or Spiennes, in Europe) on the steep north slope of the hillside at Point Pleasant, Bucks County, Pennsylvania, on the right bank of Gaddis' Run, about one-quarter mile above its mouth and half a mile from the well-known Indian camp-site at Lower Black's Eddy. The work of carefully clearing out one of the depressions and trenching its refuse heap was begun yesterday afternoon and will occupy an indefinite time.

Notched in the slope whose angle is about 35 degrees, the depression, one of eight or nine others, fronts a solid ledge of argillite (an outcrop of the large vein here traversed and exposed by Gaddis' Run, and twice tapped near by, by modern quarries as the purest source of the material).

Its largest diameter is about thirty feet, its depth five, and breadth eight. The trench begun across its narrowest width, penetrating for three feet through loose yellow mould, has shown as yet nothing of importance beyond two bits of charcoal and broken (quartzite pebble) hammer-stones at a depth of one and one-half feet. Another excavation about three feet in diameter has entered the mass of refuse for four feet without reaching its bottom, and discovered at various points thirty-three "turtle-backs," twenty-five broken bases or points, and four hammer-stones. On the surface about the other pits I gathered in a few hours twenty "turtlebacks," six ends or points, and fourteen hammer-stones.

With the work of penetrating to the bottom of the refuse, and studying the ancient quarrying process scarcely begun, I have

hardly had time to more than think of the important questions suggested: Who made and worked the quarry? Will it show a successive series of occupations? Can it be connected with the village site at Lower Black's Eddy? What shall we say of these rudely chipped forms? Are they "wasters" and do they of all "wasters" yet heard of, resemble the Trenton specimens?

We are twenty-five miles above Trenton and at the largest and purest outcrop of argillite on the right river bank above that place.<sup>1</sup> The bed of Gaddis' Run and the river-shore below its mouth are thickly strewn with argillite blocks and water-worn boulders—a pathway, in fact, littered with blade material, extending, from the ledge above referred to, to the Indian camp half a mile distant. While the significance of this has been obscured by chipped fragments from the modern quarries fallen into the stream, and the stone dressing that has accompanied the building of a dam, two bridges, and a canal aqueduct, there can be little doubt that the inhabitants of the village often went no farther than a few hundred yards along these beaches for their material.

But too much hangs upon the further examination of this site and the neighboring camp, now at last unfolded to the student in its fuller significance, to warrant a premature word.

#### LETTERS TO THE EDITOR.

*\*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

#### Science Work at the Avalon Summer Assembly.

I HAVE just received a little blue pamphlet containing the announcement of the new summer school at Avalon, New Jersey, and an extremely interesting and suggestive address on "Science Teaching in the Schools," by Dr. Charles Doley, its president. Copies of this, I have been told, may be had by writing to Mr. Charles Adamson, secretary, 119 S. 4th Street, Philadelphia, Pa. The objects and methods of this new school are so new and attractive that it certainly marks the beginning of a new era in the teaching of science and art in our common schools.

The keynote of Dr. Doley's address is struck by the following sentences in speaking of the proper method of educating the coming generation: "They begin by moulding little birds' nests of clay, or constructing cones and cylinders, cubes, and octagons out of paper, without ever having examined a bird's nest, other than that of the sparrow under the eaves, and knowing absolutely nothing of the interest to be found in a prism of quartz, a snowflake, or an icicle. They have been taught of the distribution of whales and camels and all sorts of exotic varieties, but are absolutely ignorant and blind to the wonders of nature to be found at their very doors; wonders requiring no text-books, no costly instruments, but which may be investigated by means as simple and inexpensive as the key and kite string of Franklin."

How few the teachers, let me add, who have the slightest inkling as to the wonderful history written in the chalk or slate they daily use!

Missions and philanthropic societies do good work in this world, but much is wasted. "What is needed," says Dr. Doley, "is a sanitary missionary in every home, and this we can secure by training the children, by awakening in their minds a desire for something better, for more sunshine, more flowers, a wider horizon and more wholesome surroundings." How few the house-keepers who know the slightest whit about the yeast they use, the mother and flowers of vinegar, the moulds on jellies, the cause of rancid butter, or the nature of contagion! "The tritest things of our mortal experience are the most mysterious." There is enough of interest in a mucilage bottle to keep a man studying a lifetime.

<sup>1</sup> On Dark Hollow Run (below New Hope) I found a small vein of it nearly two miles from the river. The blue slate in Pidcock's Creek, on the south slope of Bowman's Hill and at the Harvey and Van Hart quarries below Taylor'sville, lacks the conchoidal fracture.