THE RESUSCITATION OF THE TERM BRYN MAWR GRAVEL.

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In the course of geologic and physiographic work in eastern Pennsylvania, it has seemed to the writer that the time was ripe for the restriction of the term Brandywine formation, now including presumably both Pliocene and Pleistocene gravels, and the reinstatement of the old term Bryn Mawr gravel for a portion of the divided Brandywine. A brief history of the nomenclature and usage involved will show the grounds for the choice of terms.

In 1888 the term "Appomattox" was used by McGee [1] for the "older terrace sediments," and in 1891, in conference with Hilgard [2] and others, McGee correlated these sediments with the deposits of Lafayette County, Miss., which had been assigned to the early Quaternary and which were then called the "Lafayette formation." Since that date the term "Lafayette" has been very generally used. Recent work, however, has shown that the "Lafayette formation" of the type locality in the Gulf region is not Quaternary but of Wilcox Eocene age. A new name was therefore proposed in 1915 for the Atlantic coast deposits by Clark,[3] who called them the Brandywine formation, from a type locality in the vicinity of Brandywine village, Prince Georges County, Md. The name was defined to cover all the gravels that lie above the Sunderland formation at 200 feet, in Maryland reaching an altitude of 480 feet and having a width from northwest to southeast of 40 miles. At that time the Brandywine formation was questionably referred to the Pliocene on the ground that it had suffered extensive erosion and that its constituent minerals showed great decay. Clark was himself inclined to think that the deposits were earlier Pleistocene rather than Tertiary. In thus naming these deposits it was the intention to replace by a term signifying a specific age and stratigraphy older terms which included deposits at that time recognized to be of different ages. The term Brandywine itself, however, has in turn been found to cover deposits of more than one level and age.

In 1920, in the Elkton-Wilmington geologic folio,[4] the Brandywine formation was for the first time separated into early (high-level) and late (low-level) Brandywine. The early Brandywine gravels are found in the Elkton-Wilmington district at an altitude of 380 feet, capping Egg Hill and other outstanding hills on the western border of the Elkton quadrangle. The late Brandywine gravels lie at altitudes of 220 feet or more. As the firm hard layers and decomposed pebbles of the early Brandywine gravels indicate a greater age than the Pleistocene, they were referred to the Pliocene (?), and it was stated that the later gravel, though provisionally included with the Brandywine formation, might be of early Pleistocene age. The deposit at the type locality in Maryland is the low-level (200–300 feet) or late Brandywine, presumably of Pleistocene age, as Clark was led to believe; the high-level gravels (390–480 feet) are presumably of Pliocene age. Such a time interval between the early and late gravels as is now recognized has made it infeasible to treat the deposits as a unit. It is therefore proposed to restrict the term Brandywine formation to the late or lower-level deposits of the type locality, and to reinstate the old term Bryn Mawr gravel for the early or high-level deposits of Pennsylvania, Delaware, and Maryland (Cecil County).

[1] McGee, W J, Three formations of the middle Atlantic slope: Am. Jour. Sci., 3d ser., vol. 35, p. 328, 1888.

[2] Hilgard, E. W., Orange sand, Lagrange, and Appomattox: Am. Geologist, vol. 8, pp. 128–131, 1891.

[3] Clark, W. B., The Brandywine formation of the middle Atlantic Coastal Plain: Am. Jour. Sci., 4th ser., vol. 40, p. 499, 1915.

[4] U. S. Geol. Survey Geol. Atlas, Elkton-Wilmington folio (No. 211) p. 12, 1920.

The history of the term Bryn Mawr is as follows: Carvill Lewis first proposed the term for the deposits of gravel and ironstone conglomerate on the "Upland Terrace" of eastern Pennsylvania. The report upon these gravels, which was made to the Academy of Natural Sciences of Philadelphia in November, 1878, and published in 1880,[5] contains the following descriptions:

> This hill is easily recognized where uncrossed by creeks, being remarkably straight and of uniform height. Being the first hill of importance west of the Delaware, it often commands a fine view and is a favorite site for residences.
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> The geographical position of this ancient terrace may be more exactly defined in the vicinity of Philadelphia as the hill which crosses Second Street Pike near Foxchase * * * and runs north of Kellyville, Clifton, and Morton, to Swarthmore College and thence past Village Green into Delaware.
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> This hill, which is approximately parallel not only to the river [Delaware] but also to the shore of the Atlantic Ocean and the line of strike of the Cretaceous formations of New Jersey, forms, as we have seen, the main dividing line between the ancient and the modern formations.
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> We shall call it for convenience "the Upland Terrace."

A description of the Pleistocene clays and gravels deposited between the "Upland Terrace" and Delaware River follows, and then the report continues:

> Upon the summits of some of the highest hills in the gneissic region back of Philadelphia, at a mean distance of about 9 miles from the river and at elevations of from 325 to 450 feet above it, there are isolated patches of an ancient gravel, different from any yet described, to which we have given the provisional name of "the Bryn Mawr gravel." It can always be recognized by the presence of sharp or partially rounded fragments of a hard, heavy iron sandstone or conglomerate. Such fragments are often covered by a brownish-black iron glaze. More than ten years ago the writer noticed in the soil of the upper part of Germantown pieces of this conglomerate, unlike any known rock, and it is only of late that its origin has been suspected. It consists of well-rounded pebbles of quartzite or siliceous sandstone cemented by iron into a stone which is often very hard. This conglomerate is found in occasional fragments upon ground over 300 feet high but is not found in abundance until an elevation of over 400 feet is reached. At these highest points it occurs in a red gravel whose pebbles are identical with those of the conglomerate. * * * A similar tract of this gravel occurs at Bryn Mawr, extending from that place to near Cooperstown. A good section is exposed in the railroad cut below the station. From this locality, so easy of access from the city, we have named the formation. It is here about 450 feet high and 9 miles from the river. The gravel is 10 feet deep and lies upon a steeply dipping gneiss so completely decomposed that it is as soft as clay.

At a later meeting (March, 1879) Lewis reported that "the Upland Terrace has now been traced continuously from near Trenton, through Bucks, Philadelphia, and Delaware counties to beyond Wilmington in Delaware." He calls attention to

> the great development of the Bryn Mawr gravel in Delaware, and to the indications of its assuming an important position in the geology of the Southern States. * * * Numerous hills in Delaware County have been found to be capped by this formation, and in northern Delaware it covers the gneissic hills in patches several miles long and comes close to the river. * * * This formation so abundant in Delaware is thus proved to be by no means a local one, and it is probable that it will be identified with some of the formations grouped together under the name of "Southern drift."[6]

It is plain from this account that by the "Upland Terrace" was meant the upland the lowest slopes of which are at the 300-foot level, separated by an escarpment from the lower terrace upon which lie the low-level Brandywine deposits and rising to the northwest to the 480-foot level, with a dominating level of 400 feet; and that by the term Bryn Mawr gravel was meant the gravel and ironstone conglomerate capping the interstream areas of this terrace. The gravels of the type localities described by Lewis are plainly the high-level or early Brandywine gravels, and the term Bryn Mawr as used by Lewis covered only the high-level Brandywine deposits as they occur in Pennsylvania and Delaware. The term received considerable usage prior to the introduction of the designation "Lafayette." The Second Pennsylvania Geological Survey referred to the Bryn Mawr gravel as Tertiary or Upper Cretaceous. McGee at first regarded it as of Columbia age and later classified it as lower Potomac.

The term Bryn Mawr gravel is here proposed for the high-level Brandywine because it has the claim of priority, preceding in usage all other designations for the Tertiary deposits of the Atlantic slope, because the gravels of the type locality are the older gravels, and because

[5] Lewis, H. C., The surface geology of Philadelphia and vicinity: Acad. Nat. Sci. Philadelphia Proc., vol. 32, pp. 258–272, 1880; see also pp. 277–278, 288, 296–309.

[6] Op. cit., pp. 277–278.

the 400-foot terrace, upon which the early Brandywine deposits lie, is so prominent a physiographic feature in eastern Pennyslvania, where these gravels and terraces were so early described and given a local name.

The correlation of the Bryn Mawr formation with other Tertiary gravels near the fall line depends upon the origin of the gravels and upon their topography. Whatever origin is eventually ascribed to the high-level Brandywine by those at work on the Tertiary and Pleistocene deposits of the Atlantic coast, it will doubtless be required to explain acceptably all the high-level gravels, so similar are these deposits and so uniform are the levels upon which they are found.

That these high-level gravels were originally deposited in detached areas is quite possible, but their approximate equivalence is so little to be doubted that until it is disproved the less misleading and less cumbersome method would seem to consist in the use of a single term. The logical alternative is to give a separate name to every patch of gravel above the low-level or typical Brandywine—that is, above the 300-foot level—an alternative which would lead to confusion and which would not reflect the present state of our knowledge.