Friends of Pleistocene Geology

May 26 - 27, 1951
La Plata, Maryland

Note: The meeting place has been changed from Waldorf to La Plata. La Plata is about 6 miles south of Waldorf on U.S. 301.

Time and place: The excursion will begin at 8:30 A.M. (daylight saving time), Saturday, May 26. The group will meet at the Parkway Tourist Center on U.S. route 301, between Waldorf and La Plata, Maryland, about 1 mile north of La Plata.

The tourist center has a dining room and below it a bar at which early arrivals on Friday evening can gather if they wish.

How to get there: Those arriving by car through Baltimore take U.S. 301 south out of Baltimore. Those arriving through Washington, D. C., take Pennsylvania avenue S.E. to Branch Ave.; turn south on Branch Ave., which connects with Maryland route 5; follow Maryland 5 to T.B. where it joins U. S. 301.

Anyone wishing to arrive by train may write to John T. Hack, U. S. Geological Survey, Washington 25, D. C., in advance so that he can arrange to meet them in Washington on Friday afternoon. The Parkway Tourist Center can however be reached by very infrequent bus service from Washington (Greyhound Lines). The last bus leaves Washington, D. C., at 5:30 P.M. daylight saving time from the Greyhound Bus terminal at New York Ave. and 11th St. NW.

Accommodations: As the tourist courts in the vicinity are frequently filled by 6:00 P.M. it is strongly recommended that you reserve accommodations in advance. The Parkway Tourist Center is recommended as being reasonable and quite satisfactory. Our Saturday evening dinner will be held there.

Accommodations are available in the vicinity at all of the following places:

1. Parkway Tourist Center, La Plata, Maryland. Prices average $3.00 - $4.00 per person.

2. Charles Tourist Court, La Plata, Maryland. Nearby on route 301.

3. Spring Lake Hotel, Waldorf, Maryland, on U. S. route 301 between T.B. and Waldorf, about 8 miles north of the meeting place.

4. Waldorf Motor Court, Waldorf, Maryland, on U. S. route 301 between T.B. and Waldorf. (This court is the most modern and commodious in the vicinity but prices are higher than at the other places.)

General description of trip:

The field trip is concerned in general with two subjects:

(1) The problem of the Coastal Plain terraces in Southern Maryland, and

(2) The soils developed on the terraces.

The excursion will proceed from near La Plata on Saturday morning to the type locality of the Brandywine terrace and formation. This is the highest of the so-called Coastal Plain terraces. The entire morning will be spent studying the details of the lithology and soils of the Brandywine formation. After lunch we will proceed eastward to look at outcrops of the deposits underlying the terraces of the Patuxent River. The last part of the trip occupying the last part of Saturday afternoon and Sunday morning will be concerned with the relationship of the Brandywine formation to the Tertiary deposits and with the Sunderland formation, the terrace deposit next younger than the Brandywine according to Shattuck. Sunday morning will be spent near Sunderland, in Calvert County.

The investigation of the geology and soils of this area is part of a cooperative project between the Geological Survey and the Division of Soil Survey, Bureau of Plant Industry. Dr. C. C. Nikiderroff, of the Bureau of Plant Industry, has made the study of the soils. Geological work was done by J. T. Hack and R. M. Lindvall, of the Geological Survey. Considerable assistance has been given by John G. Cady of the Bureau of Plant Industry, and by K. E. Lohman and Julia Gardner, of the Geological Survey.

References

The following references are suggested for any one wishing to read some of the literature of the geology of this area and on the subject of the Coastal Plain Terraces of this region:

1. Shattuck, G. B., The Miocene of Maryland. Maryland Geological Survey, 1904.

2. Shattuck, G. B. and others, Pliocene and Pleistocene of Maryland. Maryland Geological Survey, 1906.

3. Wentworth, C. K., Sand and gravel resources of the Coastal Plain of Virginia. Virginia Geological Survey, Bull. 32, 1930.

4. Campbell, M. R., Alluvial fan of the Potomac River, Geological Society of America, Bull. vol. 42, pp. 825-853, 1931.

5. Cooke, C. Wythe, Seven Coastal Plain Terraces in the southeastern states, Washington Academy of Science, Jour., vol. 21, pp. 503-513, 1931.

6. Flint, R. F., Pleistocene features of the Atlantic Coastal Plain. Amer. Jour. Sci., vol. 238, pp. 757-787, 1940.

7. Dryden, L., The physical features of Charles County, Maryland Dept. Geology, Mines and Water Resources, 1948.

8. The Coastal Plain Geology of Southern Maryland, the Brandywine area, by J. T. Hack and C. C. Nikiforoff; and Southern Maryland, by R. M. Overbeck. Johns Hopkins University Studies in Geology, No. 16, Part 3. Johns Hopkins Press, 1950 (Guidebook III, Field Trips, G.S.A., Washington meeting, 1950.)

Maps

Good maps of the area can be obtained either from the U. S. Geological Survey, Washington 25, D. C., or from the Maryland Department of Geology, Mines and Water Resources, Latrobe Hall, Baltimore 18, Maryland. The area to be visited is shown in part on the Prince Frederick 15' quadrangle of the U. S. Geological Survey and in part on the Brandywine 7½' quadrangle of the Army Map Service (sold and distributed by the Geological Survey). The maps distributed by the Maryland Department of Geology are up-to-date County maps on scale of 1:62,500 and might be more convenient for use on the field trip. The maps of Prince Georges, Charles and Calvert Counties include all the area to be visited.

It is recommended that you do not order the U. S. Geological Survey's Brandywine 15' quadrangle as it is obsolete.

Part I (Steps 1 - 5, Saturday morning)

Subject: Brandywine formation at type locality and soils developed on it.

Summary

The Brandywine formation in this area slopes to the south at about 5 feet per mile. It may be subdivided into a basal gravel member and an upper loamy member, consisting generally of sandy loam grading upward into silt. Resting on top of the Brandywine are younger deposits of aeolian sand, for the most part extensively eroded. These sand lentils have influenced the development of the drainage so that where the surface of the plain has been eroded the topography commonly consists of irregular longitudinal ridges, some capped by the aeolian sand, others by silt or even gravel. The Brandywine formation rests on the Choptank formation of Miocene age, a marine sand. This formation has not heretofore been recognized in this area. It will be seen at stop 4.

The typical soils developed on the upland plain are the following:

Gravel member of Brandywine fm: Evesboro series, generally sandy or gravelly loam, very little profile development.

Silt in upper member: Beltsville series, generally a silt loam with very pronounced profile, characterized by a hardpan 18 - 25 inches from the surface, cut by clay-filled cracks. The origin of this hardpan is a subject for discussion.

Aeolian sands: Woodstown series, generally fine sandy loam. This soil profile has a pronounced B horizon with considerable clay, and because the aeolian sandy parent material is so thin, the C horizon is generally composed of the silt of the underlying Brandywine formation.

Other soils in the area are alluvial soils in the valley bottoms and soils of poorly drained areas.

Localities to be visited:

Stop 1. One mile east of Brandywine on Maryland route 381 and at junction of North Keys Road. Typical undissected area on upland plain. Silt member of Brandywine formation underlies swampy plain west of road. Higher area east of road underlain by aeolian sand lentil. The sand area ranges from 0 to 12 feet thick and rests on silt. Outcrop of sand on North Keys Road.

Stop 2. Gravel pit on country road one-half mile south of Gilbey's Church. Gravel member of Brandywine formation. Thin lens of silt interbedded with gravel in wall of pit.

Stop 3. On Forest Road north of boundary of Cedarville State Forest. Pits exposing Beltsville soil and showing details of profile. Soil is developed on upper loamy member of Brandywine formation.

Stop 4. On Sunset Trail in Cedarville State Forest. Dissected area of Brandywine formation. At this place can be seen the principal soils developed on the Brandywine formation, the sandy ridges, and the Choptank formation. Discussion of soils and their origin.

Stop 5. Malcolm. Junction of U. S. Navy Railroad and road from Waldorf to Aquasco. View of open fields showing typical ridge and valley topography developed where the Brandywine formation is incised by erosion. Ridges are composed of silt and aeolian sand. Valleys floored by gravel.

If we are ahead of schedule a large gravel pit nearby can be visited to see gravel in Brandywine formation.

Part II (Stops 6 - 9, Saturday afternoon)

Subject: Terrace deposits and other surficial deposits of the Patuxent Valley, and brief examination of soils on lower terraces.

Summary.

The Brandywine formation which caps the upland of Southern Maryland is eroded on the west side of the Patuxent Valley forming a prominent

serrated escarpment. The Brandywine is underlain by the Calvert and Choptank formations, both Miocene marine deposits. The base of the Calvert is near sea level in this area and slopes about 10 feet per mile to the southeast. The Choptank is extensively exposed in the higher parts of the Patuxent Valley, below the Brandywine formation at altitudes between 130 and 180 feet.

The higher valley slopes are eroded into sharp butte-like hills capped by gravel and underlain by Choptank sand. Since the gravel, derived from the Brandywine formation is a resistant deposit it has resulted in the formation of inverted topography, and the present hill tops are mostly the former sites of channel deposits formed during the erosion of the valley.

Near the Patuxent River the valley walls and floor are almost entirely mantled by terrace deposits. These deposits like the Brandywine formation are composed of basal gravels overlain by sands and silts. Five terraces have been mapped in this area.

#1. About 10 feet above sea level. Only a few remnants are left. Entirely gravel.

#2. About 15 feet above sea level at this latitude. This terrace slopes downstream rapidly. Very poorly developed.

#3. Very prominent terrace (20-40 feet); gravel; capped by silt and sand (sassafrass soil series). The terrace slopes down stream.(This terrace formerly mapped as Talbot terrace in this area.)

#4. Very prominent terrace of gravel capped by silt (60-80 feet alt.). Soil resembles Beltsville series on Brandywine formation. This terrace apparently slopes down stream. (Formerly mapped as Wicomico Terrace.)

#5. Poorly developed terrace remnants at various altitudes around 100-160 feet. Underlain by gravel capped by silt. Soil resembles Beltsville silt loam. Slope not determined. Probably represents a set of several terraces now much dissected.

<u>Localities to be visited:</u>

Stop 6. On road from Baden to Croom. Inverted topography exposed east of Brandywine escarpment. Excellent exposures of Choptank formation in road cuts. Hill east of stop is capped by Brandywine gravel. Lower hills in vicinity mostly capped by gravel channel deposits.

Stop 7. (Prince Frederick quadrangle) Side road north of road from Croom to Nottingham. No. 4 terrace (60 - 80'). Road cut showing silt mantle and Beltsville-like soil.

Stop 8. (Farm road north of Stop 7) Remnant of No. 5 terrace. This remnant has altitude about 120 feet. It is capped by silt.

Stop 9. No. 3 terrace. This is best developed terrace in area. Soils on this terrace, although sand and silt, belong to Sassafras series and are markedly different from soils of higher terraces. The hardpan is lacking but the soil has a prominent B horizon characterized by a high clay content. This terrace very clearly slopes downstream at about 2 feet per mile.

The two lower terraces (#1 and #2) are developed at Nottingham. The village of Nottingham (between stops 9 and 10) is on the No. 2 terrace.

Part III (Stops 10-17, Saturday afternoon and Sunday morning)

Subject: Relationship of Brandywine formation to Miocene deposits, age of Brandywine formation, and the Sunderland formation.

Summary

Regionally, there is an angular unconformity at the base of the Brandywine formation. The Brandywine slopes to the south at 2 - 8 feet per mile and rests on deposits ranging in age from Cretaceous to late Miocene which dip more steeply to the southeast. In this area, however, there is no apparent unconformity. Locally the marine sands of the Miocene Choptank formation are interbedded with the basal gravels of the Brandywine, as can be seen at stop 12. The Choptank near Brandywine is from 20 - 60 feet thick and consists of fine sand grading downward into very loamy sand. No good fossil localities have been found in it west of the Patuxent River. The Choptank rests on the Calvert formation with a gradational contact. For the purposes of this survey the contact between the Choptank and Calvert formations is defined by the highest thick clay bed in the Miocene. The clay bed is 15 to 30 feet thick, is generally fossiliferous, contains index fossils belonging to zone 12 (as defined by the Maryland Survey) and may be traced over a very wide area. This marker bed at the top of the Calvert is underlain by interbedded sands, clays and diatomites. The diatomites are generally in the lower part of the section. The Calvert is from 80 to 120 feet thick and rests on the Eocene Nanjemoy formation.

The Choptank has not been heretofore recognized quite this far north and the sandy deposits here correlated with the Choptank formation were mapped by Shattuck as Pleistocene Sunderland formation. Reconnaissance work on the east side of the Patuxent River in CalvertCounty near Sunderland shows that the same stratigraphic sequence is found on both sides of the Patuxent River and that the column at Sunderland is the same as at Brandywine. Furthermore, Choptank fossils have been found in Shattuck's Sunderland formation only a few miles from his type locality. It is believed, therefore, that the basal part of the Sunderland on both sides of the river is actually a sandy facies of the Choptank formation. The upper gravelly part of Shattuck's Sunderland is in some places Brandywine formation, and in some places channel gravel deposits formed during the erosion of the area.

It is also believed that the Brandywine formation has a long and complex history. At the type locality it represents the deposit of a

stream or delta advancing into the Miocene sea. On a wide regional scale, the Brandywine plain has been formed over a long period of time by the reworking and terracing of the original deltaic deposits.

Localities to be visited:

Stop 10: Road cut on Maryland route 382 north of Brookfield Church. Exposure of contact between Choptank and Calvert formations. The fossiliferous clay in the base of the cut has been used as a marker bed in the mapping.

Stop 11. Road from Brandywine to North Keys. Contact between Brandywine and Choptank formations. Note the irregular nature of the contact. In lower cut 100 yards east is an exposure of the top of the Calvert formation.

Stop 12. Road from Croom to Duley, west of Maryland Route 382. Road cuts showing complete section of Brandywine formation where it is interbedded with Choptank formation.

Note: This is last stop scheduled for Saturday. If there is additional time the group can visit localities nearby where there are excellent exposures of the Patuxent River terrace deposits.

(Sunday - Calvert County)

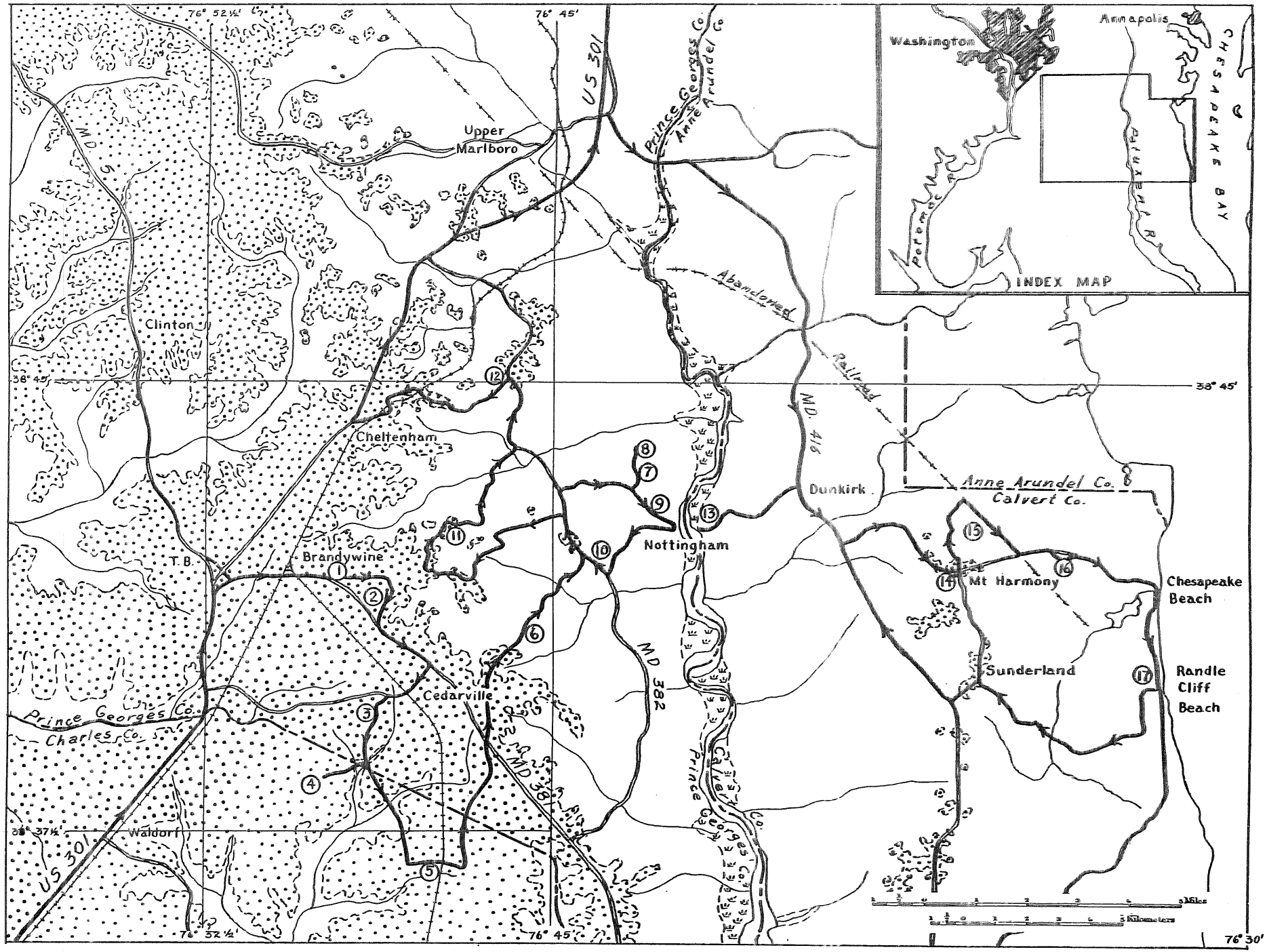
Stop 13. Diatomite quarry on Patuxent River. Exposures of lower Calvert formation and deposits on No. 3 terrace.

Stop 14. Mt. Harmony on Maryland Route 260. Gravel pit in Brandywine formation near type locality of Shattuck's Sunderland formation.

Stop 15. Abandoned Chesapeake Beach railroad between Owings and Paris. Exposure of contact between Choptank and Calvert formations. (Compare with locality 10.)

Stop 16. Side road east of Paris: Sand pit in Choptank formation. Fossil locality.

Stop 17. Randle Cliff Beach: Excellent exposures of Calvert formation.



MAP OF PART OF SOUTHERN MARYLAND SHOWING ROUTE OF 1951 FIELD TRIP FRIENDS OF PLEISTOCENE GEOLOGY

Stippled area is approximate area underlain by Brandywine formation, from published maps of N. H. Darton and unpublished maps and reconnaissance work of J. T. Hack. Prepared by J. T. Hack, U. S. Geological Survey.