TRIP I

EOLIAN FEATURES IN FREEPORT AND WAYNE, MAINE

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Introduction.

The purpose of this trip is to examine certain eolian features of south central Maine. Other than dunes in coastal regions and on the shores of some lakes, eolian features in this section are of two principal types: 1. Active sand dunes developed on deposits of outwash sand as the result of the destruction of the stabalizing soil and vegetation cover. Although the soil cover on these sand deposits is poor at best, man has contributed to the erosion of the soil through overcultivation and overgrazing. The Desert of Maine (Stop 1) is a feature of this type. 2. "Fossil" deposits of windblown sand which were formed shortly after deglaciation of the area. Sand dunes and sheets of windblown sand became stabilized by a soil and vegetation cover at some time following their deposition. "Fossil" dunes of this type range in size from small hummocks a few feet high to large transverse dunes several miles long and more than 20 feet high (Caldwell, 1959, 1960). The Desert of Wayne, Maine (Stop 3) consists of a deposit of "fossil" windblown sand which has recently been reactivated.

A third type of eolian deposit in this area is a layer of silt which occurs in the A horizon of many of the soils of the region. This silt has been ascribed to wind deposition by many workers in New England and has been classified as loess by some (Smith and Fraser, 1935). Observations by Lyford (1963) suggest that at least some of this presumed wind-deposited silt may be the result of the activities of ants. According to Lyford, ants may return an inch of fine sand and silt to the surface in 250 years or a foot or more in 3,000 years.

Road log for Trip I.

Approximate number of miles from start.	
0	Assemble at designated point on Bowdoin College campus.
1	Turn left to Interstate 95 and U. S. 1.

8 Turn right to Desert Road.

10 Desert Road to Desert of Maine, Stop 1.

Stop 1. The Desert of Maine

Introduction. The Desert of Maine is without doubt the best known sand deposit in New England. It now consists of several tens of acres of drifting sand which became active about 50 years ago. The source of the sand is a glacial outwash deposit which is exposed near the center of the Desert. A strong oxidized zone on the outwash approximately marks the pre-Desert land surface.

The winds effective in moving sand are from the north and northwest. In a seven-year period, the sand encroached six feet southward into a wooded area (Trefethen, 1949 and Allen, 1955). During the same period measurable wind erosion occurred in the central part of the Desert.

The tour will leave from the parking lot and proceed through the entrance building (the management of the Desert of Maine has graciously invited members of the Conference to be their guests on this tour). The barn beside the entrance building is built on the pre-Desert land surface. Dunes from 10 to more than 20 feet high have been built on this surface.

In a 100 to 200 foot-wide strip running north-south through the central part of the Desert, up to 10 feet of erosion has occurred. The oxidized zone of the pre-dune soil surface is exposed, or only thinly covered, along the eastern and southern part of this strip. A layer of fine sand and silt in the underlying outwash is exposed in much of the central part of the Desert. Below the fine sand and silt, the outwash sediments consist of gravelly sand. Small pebbles and granules from this sediment are wind-polished and form a kind of minature desert pavement.

In parts of the central blow-out, the land has been eroded to or almost to the water table. Soil moisture remains in these parts for periods long enough to allow mosses, lichens and fungi to become established. Pine, birch and cherry trees subsequently become seeded on the moss-covered surface and these portions

of the Desert become stabilized.

A spring house near the eastern margin of the drifting sand has been completely buried during the past 20 years. Beyond the spring house, a small stream has effectively stopped migration of sand dunes toward the east.

At the southern edge of the Desert, the sand deposited by wind action is more than 40 feet thick. In this area of the Desert, the very tops are all that are exposed of several large trees. According to Allen (1955), the area of the Desert becoming stabilized by natural reforestation is approximately equal to the area being lost to drifting sand.

On returning through the entrance building, notice the specimens of fulgarite collected from the Desert.

Return to cars and proceed back along Desert Road.

10.5 Turn left on Merril Road.

11.0 Turn right on Hunter Road.

11.2 Turn left on Murch Road.

11.7 Turn Right on Pownal Road.

13.2 Bear left to Routes 125 and 136. Presumpscot Formation of Bloom (1960) on right.

14.0 Turn right on Route 125.

23 Turn right over Androscoggin River to Lisbon Falls and Route 9.

24 Bear right on Route 9.

32 Turn right at Drinkwater Corner. Note Kettle Lake on left.

33 Cross Route 126 to Route 132.

37 Turn left at Wales Corner, toward Leeds Junction and Keenes Corner. Near Leeds Junction, the outwash plain has a few

inactive, "fossil" dunes. The similarity of the degree of weathering on these dunes and the surrounding sand plain suggests a similar age for both features. If this similar soil development is pertinent to the question of age, these and similar "fossil" dunes in this area were formed shortly after the deposition of the outwash sand and are not stabilized forms of more recently active dunes of the type seen at the Desert of Maine.

40 Turn right on U. S. 202.

40.75 Turn left on Route 106.

42. Leave Lewiston Quadrangle and enter Livermore Quadrangle. From just north of concrete mix plant to Curtis Corner, the road follows the crest of an esker. This esker may be traced for more than 25 miles northward, across the Livermore Quadrangle and into the Farmington Quadrangle (Caldwell 1953, 1959).

46.5 Stop 2. Leeds, Maine.

This stop has nothing to do with eolian features, but is interesting enough that a brief stop here is justified.

The outlet of Androscoggin Lake is by way of the Dead River to the Androscoggin River (see Livermore Quadrangle, Maine). During periods of high discharge, the Androscoggin River reverses the flow of the Dead River back into the Androscoggin Lake. Sediments deposited in the lake during these periods of reversed flow have formed the large delta at what is normally the outlet of the lake. This delta may be seen on the Livermore Quadrangle map and from the vantage point at stop 2.

The drainage conditions which allow the formation of this "reversed" delta likely have existed since the emergence of this area from the sea about 12,000 years ago. However, the present rate of delta formation can not be used to estimate the age of the delta because a dam constructed near the mouth of the Dead River has influenced the sediment load in the river. This ingenious device, known locally as "the flip-flop dam", normally controls the flow of water in the Dead River into the

Androscoggin River. Wshen the Androscoggin River is flooded, the dam automatically reverses itself and controls the flow of water in the Dead River into the Androscoggin River. When the Androscoggin River is flooded, the dam automatically reverses itself and controls the flow of water from the Androscoggin River into Androscoggin Lake.

A further interesting feature of the Dead River is the occurrence in its waters of the freshwater hydroid, Craspedacusta sowerbii, that passes through a reproductive cycle which includes a medusa stage. It is an unnerving experience for one such as this writer, who was unaware of the existence of freshwater jellyfish, to see hundreds of these creatures, 2 to 3 cm. in diameter, pumping themselves through the water. According to Lytle (1960), C. sowerbii is indigenous to the Yangtze River basin in China and may have been introduced into this country with certain oriental water plants. As far as this writer knows, this is the first reported occurrence of C. sowerbii in Maine and only the fourth in New England.

48.0 Bear right along the shore of Androscoggin Lake. Hedgehog Hill (see Livermore Quadrangle, Maine) is formed of a coarse grained border phase of a nearly circular stock of gabbro which underlies Androscoggin Lake. Erratic boulders from this stock form a boulder train to the southeast of this area. Boulders of this gabbro occur along the left side of the road in the vicinity of the colony of summer camps.

50 Turn right on Route 219.

51.5 Turn sharp left on Route 133.

53 Turn right near crest of hill through what appear to be the gate-posts of a driveway.

53.5 Stop 3. The desert of Wayne, Maine.

Introduction. In appearance, the desert of Wayne is very much like the Desert of Maine (stop 1). Present here are fields of drifting sand, dunes, ripple marks and trees buried by sand. Sand has been drifting in this area since the memory of (interviewed) man runneth not to the contrary (a period which

covers the past 70 years). Many local residents are of the opinion that sand-free pastures existed here about 100 years ago.

The source of the sand in the Wayne area is unlike that of the Desert of Maine, where, it will be recalled, outwash sand became windblown during the past 50 years. Evidence seen by this writer suggests the sand in the Wayne area was derived from the sand deposits bordering the Androscoggin River, 3 to 4 miles to the west. It seems likely that this sand was wind-transported to its present location shortly after the area emerged from the sea some 12,000 years ago and before enough vegetation and soil cover existed to prevent extensive wind action. After deposition of this sand, the development of a soil and vegetation cover may have stabilized the sand until about 100 years ago. The evidence upon which this origin is postulated is as follows:

1. The lack of any known stratified drift deposits in this area at elevations great enough for the Wayne sand to be simply reworked stratified drift.

2. The occurrence in the Androscoggin River valley of sand deposits of the proper texture that they could be considered as the source of the Wayne sands.

3. The occurrence of a continuous layer of sand on the west-facing hills on which the Wayne sands are deposited.

4. The occurrence of the thickest deposits of sand on the lee side of these hills (the east side, assuming the effective wind to be from the west or northwest).

5. The extreme uniformity of the sand. The median diameters of 20 samples range from 0.4 to 0.7 mm. and the Trask sorting coefficients range from 1.25 to 1.40.

6. The occurrence near the summit of the hill of numerous wind-polished boulders. The boulders are derived from the underlying till. The polished surfaces face westward, an orientation which is consistent with the view that the sand in the Wayne area was wind-transported from the Androscoggin River sand plain by west or northwest winds.

Leaving the cars, the tour will proceed along a woods road to the crest of the hill where the wind-polished boulders occur. Also of interest in this area are numerous wind-polished pebbles and cobbles, some with poorly developed faceting. These smaller rock fragments, like the wind-polished boulders, are from the underlying till. There also exists here a thin veneer of wind-polished, granule-sized fragments which form a desert pavement of the type seen at the Desert of Maine.

It is interesting to speculate on how long the wind-polished surfaces on the boulders have been exposed to weathering. If one accepts the view proposed here that the transport of sand from the Androscoggin River valley occurred approximately 12,000 years ago, it then follows that the polished surfaces were also formed at that time. Although there is little data available concerning the length of time a bare rock surface may withstand chemical and mechanical weathering, one feels, intuitively anyway, that it could not be of the order of 12,000 years. It has been the writer's experience that only on recently exposed bedrock surfaces are glacial polish and striations preserved. This suggests that the wind-polished boulders in the Wayne area may have been buried by sand shortly after the formation of the polish and exposed to weathering only during the last 100 years. On the other hand, Bryan and Albritton (1942) conclude that wind-polished rocks studied by them in the Trans-Pecos region of Texas have been exposed to weathering for at least 5,000 years.

From the area of the wind-polished boulders, the tour will proceed eastward across several tens of acres of active sand.

In a pit near the eastern edge of the sand, cross-bedding is exposed. In one part of this pit a weak soil developed on bedded sand is overlain by sand with identical bedding characteristics.

To return to Maine Turnpike, etc: Continue for about 1 mile. Turn right toward Wayne and Route 133. Follow Route 133 left to Winthrop and U.S. 202. At Winthrop one may take U. S. 202 northward to Augusta (10 miles) and the Maine

Turnpike or U. S. 202 southward to Lewiston (18 miles) and enter the turnpike there. Both routes take about the same length of time; the Lewiston route is shorter (15 miles) and cheaper (50 cents). From Winthrop, the driving time to Boston is about 3 1/2 hours.

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