LANDPRINTS

ON
THE MAGNIFICENT
AMERICAN
LANDSCAPE

WALTER SULLIVAN
For Charles Merguerian

With warm regard

and thanks for your help.

Willie P.

Landprints
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exposed in road cuts and gorges all along the south shore of Lake Ontario. They were subsequently capped by durable dolomite, a stone derived from the shells of countless sea creatures but, unlike its cousin limestone, relatively hard. When, 10,000 years ago, retreat of the last ice sheet allowed the Great Lakes to begin draining down the Saint Lawrence Valley, a great waterfall formed at Niagara. The falls cascade over a rim of dolomite, but they gradually undermine the shale beneath it. This, over the last ten millennia, has created the Niagara Gorge in whose walls the limestone and shale are exposed.

In the 1950’s Eugene N. Cameron of the University of Wisconsin delineated an abrupt change in geology along a line that parallels the east side of the highlands in western Connecticut, skirting Torrington on the west. It has now been extended north into Massachusetts long the east flank of the Berkshires and south across Westchester County into New York City along White Plains Road, west of Bronx Park. Although more hidden than the Brevard Zone of the Piedmont, the line (a zone 50 to 300 feet wide) shows ample signs of crushing, compression, and slippage. Along parts of it the movements involved plastic deformation, rather than cracking, that could have occurred only under the heat and pressure at depths of eight miles or more—testimony to the extent of erosion there.

Formations to the west of Cameron’s line largely consist of rocks that apparently remained from the continent’s earlier coastline as well as greatly altered remnants of the shallow water material shoved in front of an advancing island arc. Everything to the east of this line is thought to be of exotic, oceanic origin—the leading edge of a slab derived from deep-sea sediments laid down on the outer slope of the continent’s original margin. In the process of being shoved inland this material became buried as much as ten miles underground. There it was altered into the rock known locally as Manhattan schist and became plastic enough for folding into extraordinarily complex patterns. One recent autumn day Charles Merguerian of Hofstra University and Leo M. Hall of the University of Massachusetts allowed me to accompany them as they debated the origins of these formations. They focused special attention on a schist exposure west of Riverside Drive at 165th Street in Manhattan. The rock there records a complex history of repeated, widely spaced episodes of intense folding and alteration. Amidst the folds are light-colored veins of coarse crystals intermingled with black tourmalines (not of gem quality) and glittering mica. Much of the ledge is densely studded with garnets. Its subtle north-west-trending grooves testify to far more recent activity—the passing of a great ice sheet. It is hard to believe this material formed as sediment on the surface of a sea floor, was buried eight miles down, and rose again to be exposed after prolonged erosion of what lay above it.

It is on Manhattan schist that most of New York’s towering buildings rest. That forming Washington Heights and the other heights in Manhattan is massive, with little evident layering. It towers as a mighty wall alongside the High Bridge sector of Harlem River Drive. Structurally above it, Merguerian has identified another slab of schist, distinctly layered and rich in garnets that he believes underlies much of lower Manhattan. It can be seen at the southeast corner of Central Park and in Riverside Park along the Hudson shore, including the outcrop at 165th Street. Also east of the Hudson River extending from Yonkers into the Bronx and northward beyond White