

CHAPTER 1

Prehistory

About 10,000 years ago the wall of ice departed northern New York. It left behind a landscape that quickly came back to life. Fast-growing plants like grapevines were early colonizers; wild grapes repopulated nearly every corner of the state. The prospects for commercial viticulture would be another matter.

On the North Fork of Long Island some vineyards wash against a line of bluffs that hold back Long Island Sound and the ocean. When tractors till vine rows skirting those bluffs, their discs may stir up cobbles of granite that by all rights belong on 2,000-foot Berkshire mountaintops, 100 miles away.

Along the slopes rimming the Finger Lakes, growers also run discs through vineyards, sometimes peeling up scrim of shale imprinted with the shapes of ocean creatures—scallop shells, trilobites, brachiopods, sometimes fragments of the shells themselves—200 miles from the sea. Grape-growing pioneers in the Thousand Islands district of the St. Lawrence River Valley and on Lake Champlain might keep an eye out for shards of whale bone.

The vineyards of New York are where they are, partly due to these anomalies in the ground underfoot. To flourish, vineyards need well-drained sites like the coarse stones and sand on Long Island or the crumbly shale of the Finger Lakes. Limestone deposits left from the shells of ancient sea creatures give some wines an edge of complexity. The geologic curiosities that turn up in New York's vineyards give us

clues about how the land has created microclimates that ripen grapes slowly, bringing subtlety and balance to wine.

Fully appreciating New York's unique viticultural heritage requires a quick look back in time, beginning as far back as the era of earth's supercontinent Pangaea. The earliest fossils of the plant genus "vitis"—the grapevine—date from the time of that single land mass more than 200 million years ago. When continents separated, vitis also split onto distinct eastern and western evolutionary paths, accounting for vivid differences between the flavors, aromas, and cultural habits of North American and European (*vinifera*) grapes. As it colonized divergent habitats, the genus fragmented into many species adapting to varied topography, soils, and climates. North America suited the plant particularly well, inviting it into nearly every temperate corner of the land, especially east of the Rocky Mountains. Of the perhaps 60-odd species of grapevine identified worldwide (the number is in dispute), almost three-quarters are native to North America. A half dozen of those grow wild in New York State, most notably vitis *Riparia*, *Aestivalis*, and *Labrusca*.

Millions of years ago much of what would be western, central, and northern New York lay under a shallow lobe of the ocean. It pulsed with rising and falling sea levels, collecting run-off from Acadian mountains to the east—layer upon layer upon layer of mud and sand spread across the sea bottom, liberally sprinkled with marine animal shells.

As the inland sea eventually receded, its bottom sediments compacted into the stratification of shale and limestone that underlie central and western New York. Over this emerging plain, river systems drained north and south. The lines of the Finger Lakes were once the upper reaches of those rivers; Keuka Lake's slingshot shape records the confluence of two tributaries.

This was the landscape that glaciers descended upon in the last Ice Age, the geologic event that shaped the state we know from Lake Erie to the tip of Long Island and the top of Lake Champlain. A mantle of ice more than a mile high moved over the land at about a meter a day. It covered the highest peaks of ancient Adirondacks, causing a spectacular alteration of topography. Trees, soil, boulders were bulldozed for scores of miles. Where they encountered valleys, the vanguards of ice channeled into lobes: one down the Champlain-

Hudson corridor (with a spur along the Mohawk), another down the Black River Valley, others following the western river valleys—gouging out deep troughs.

It was a halting assault. Ice advanced, retreated, advanced again as earth’s temperature fluctuated. Where it paused at the end of each surge it dumped a moraine: massive quantities of debris like the lines of seaweed left on a beach after high tide. The furthest advance south occurred around 22,000 years ago, drawing a line through northern Pennsylvania and New Jersey and dropping its terminal moraine as Staten and Long Islands. Long Island actually consists of two moraines, distinct on the east end as the North and South Forks but overlapping to the west. New York’s ocean island is not, after all, an overzealous sandbar but rather a colossal, 120-mile-long, glacial dump—a mélange of silt, sand, gravel, and rocks courtesy of upstate New York and New England.



MAP 1.1. The most recent surge of glaciers across New York State came and went in waves that reached farthest south around 25,000 years ago. In the ice sheet’s 15,000 years of fitful retreat, it shaped the terrain that governs the growing of New York wine. (Map by Matthew Bazylewskyj)

The ice lobe making its way down the Hudson Valley cut a trench deepening at about the present location of Troy and creating what is essentially a fjord through the Hudson Highlands. The depth of the river channel allows ocean tides and with them the warming influence of a maritime climate to penetrate north as far as Albany. Salt water reaches Poughkeepsie, regularly pushing the upper Hudson backwards—a river that flows both ways.

In the central part of the state, the glacial moraine most significant in shaping modern topography was deposited during the ebb and flow of the ice sheet's retreat. The Valley Heads moraine is easily traced today along the southern ends of Finger Lakes, where dumped debris plugged up old river valleys. The extraordinary depth of modern Seneca and Cayuga Lakes—the bottoms of both fall well below sea level—tells us those were the two largest rivers channeling the flow of ice.

Meltwater accumulating along the front of the receding ice sheet formed gigantic postglacial lakes that remained for thousands of years. Lake Albany filled the Hudson Valley from the terminal moraine at Staten and Long Islands to Glens Falls. It eventually punched through the moraine at Verrazano Narrows and drained into the ocean, leaving sediments of mud and sand. Another postglacial lake filled the valley between New York and Vermont, leaving sandy beach lines well up into the Adirondack foothills as it dwindled down to become remnant Lake Champlain.

By far the largest of these meltwater lakes spread across central and western New York, over the plain once covered by inland sea. The Finger Lakes, Lake Oneida, Lakes Erie and Ontario are all remnants of what geologists call Lake Iroquois. The gravel terraces stepping down from the escarpments along both Erie and Ontario record sudden drops in the level of Lake Iroquois as ice dams holding back meltwater periodically gave way.

About 10,000 years ago the wall of ice departed northern New York. It left behind a landscape that gradually came back to life. Fast-growing plants like grapevines were early colonizers; wild grapes repopulated nearly every corner of the state.

The prospects for commercial viticulture are another matter. Much of interior New York is too cold to ripen grapes reliably enough for a profitable farm, with a growing season too short and winter-low

temperatures dropping too far below zero. Searching out more temperate microclimates is the first order of business for aspiring grape-growers. Slope and aspect to the sun can be critical. Good water drainage is essential, grapevines being notoriously intolerant of “wet feet.” And everywhere soil composition enters into the equation behind good wine.

Erie and Ontario

In the Erie-Chautauqua district, the ridge-line paralleling Lake Erie's shore crests from 500 to 1,000 feet above the lake's surface. Alluvial clay soils at water's edge give way to gravel along beach-line terraces, then outcrops of shale at the face of the escarpment.

The undulating, easily worked mid-section became New York State's home for the Concord grape. In his 1907 magnum opus, *The Grapes of New York*, horticulturist U. P. Hedrick suggests the leaner shale loams on the side of the ridge promise the best wine while the deep, richer soil of the lake plain produces higher yields. In any case the most important role played by the escarpment is to capture and contain the climatic benefits of the lake: taking the edge off winter-low temperatures, holding back spring vine growth until after late frosts, homogenizing night and day temperatures in summer, lengthening the growing season and delaying fall frosts.

The escarpment hovers between one and a few miles from the lake. It comes closest and contains the strongest microclimatic influence around Westfield. All winter-bets are off, though, when the shallow lake freezes over.

Along the southern shore of Lake Ontario the Niagara escarpment sits farther back from the water, from four to nine miles, crossing the Niagara River at Lewiston and running east through Rochester. Ridge Road (Route 104) rides beach lines below the ridge like a surfer on the face of a wave. The climate dynamic is similar to Erie-Chautauqua, somewhat more diffused because it spreads over a wider area, but more reliable every winter because the deeper water of Ontario stays open. The gravelly soil of this lake plain has a higher limestone content, shared with the neighboring vineyards of Canada's Niagara Peninsula and with nearby northern Finger Lakes.

Finger Lakes

Indian legend tells us the lakes fill the imprint of the Great Spirit's hands, an account that rings true when we imagine those hands bearing down with fingers of ice. The depth of the trenches they scraped out has left slices of water, large volumes with narrow surfaces, creating a relatively stable core water temperature—in Seneca Lake, about 40 degrees year-round. The bottoms of Seneca and Cayuga Lakes fall well below sea level, containing bodies of water that virtually never ice-over even when air temperatures drop below zero. On such a day, funnels of vapor skitter along the lake surface as if frantically seeking a warm spot. As they radiate stored heat to enclosing hillsides, the lakes make viticulture possible in an inland region otherwise off limits. January–February temperatures are often 10 to 15 degrees warmer near the open lakes compared to half a mile away.

Like Erie and Ontario, the Finger Lakes also cushion the transitions of spring and fall. If temperatures briefly spike up in spring when vines are still dormant, the cooling influence of nearby water holds back impatient buds and tender new vine shoots until the risk of late frost passes. In fall the effect reverses, and the lakes give warmth to ripening grapes, sometimes postponing first frosts into November when the trees on surrounding hills are bare.

Long, even slopes along the lakes suggest a consistent soil profile. Not so. The glacial rearrangement of furniture left soils around the Finger Lakes extremely and abruptly variable; pH values veer from quite acid to alkaline. Ancient lakes and seabeds tended to leave more calcium from marine deposits in the flatter north, but glaciers smeared limestone down the valleys in erratic patterns. Patches of gravelly till pop up amid prevailing shale, which can be brittle and webbed with fractures that let vine roots go exploring, or the shale can turn thick and forbidding.

Hudson Valley

The Hudson River region presents viticulture with the state's most complex set of both opportunities and challenges. Opportunity comes with the valley's general climate: more sunny days than any of the state's



FIGURE 1.1. A vineyard behind the Bully Hill winery perches atop an excavated bank, revealing a subterranean profile typical of the Finger Lakes: a modest bed of soil over countless layers of crumbly shale, sandstone, and limestone from sediment at the bottom of an ancient sea. Vine roots feel their way down through fissures, sipping dissolved minerals, until they hit thick horizontal walls.

other grape areas; also a somewhat drier growing season as Taconic hills shield the area from some of the Atlantic moisture moving inland; and above all, the warming effect of maritime air channeled upriver.

The challenges come with the valley's turbulent topography. This is geologically wild country. The Hudson Highlands slash diagonally across the river around Cold Spring. To the north, shale and limestone recall the sedimentation in postglacial Lake Albany. To the south the highlands are made of the hard gneiss and granite that appear elsewhere mainly in the Adirondacks. The soils derived from these different rocks are more variable in the Hudson Valley than in any other New York vineyard district. The rolling terrain adds a second kaleidoscope of microclimates created by shifting degrees of slope, aspects to the sun, and presentations to the river.

Long Island

Natural phenomena that worry grape growers upstate—deep freezes, slope and air drainage, water drainage, rocky outcrops, abruptly changing soil types—not much of this bothers on Long Island. Deep glacial till and the warm embrace of the Atlantic on one side, the Sound on the other, Peconic Bay in the middle, make this in many ways New York's most comfortable base for viticulture. The island's maritime climate is moderately sunny. Atlantic sea breezes brush the low profile of the East End, tempering summer heat waves and helping to flush mildew and rot out of vine canopies.

There are modest differences between the viticultural potential of the island's two forks. Offshore breezes and fog banks tend to keep the South Fork a bit cooler, with a somewhat shorter ripening season. North Fork soil can be a little lighter, drier, warmer, opening more possibilities for red grape varieties.

The same ocean embrace that usually protects Long Island's East End from crop-threatening frosts and vine-threatening winter freezes also brings a hug of humidity that increases disease pressure. A less persistent but more potent threat comes periodically with coastal hurricanes, lashing land that dangles out in the sea. The storm season unfortunately coincides with the time when ripening grapes are most vulnerable, but even when storms come early, salt spray carried by withering winds can defoliate vines.



FIGURE 1.2. The nearly level North Fork of Long Island lifts gently up to a line of bluffs skirting Long Island Sound in the distance. They are the worn remains of the Harbor Hill moraine, deposited by glaciers giving birth to the island. Vineyards like the well-drained soil of outwash spilled from the moraine as the ice sheet melted. (Courtesy of the Long Island Wine Council)

There are some issues in the ground as well. Long Island's sandy-gravelly soil is so well-drained it dries out quickly in droughts, calling for irrigation on an island where the fresh-water aquifer is precious, threatened by development. And the East End's naturally acidic soil composition, without manipulation, is unfriendly to the European *vinifera* grape species, the only grapes islanders want to grow. For many reasons, what looks like New York's warmest climate for growing wine is not necessarily the easiest.