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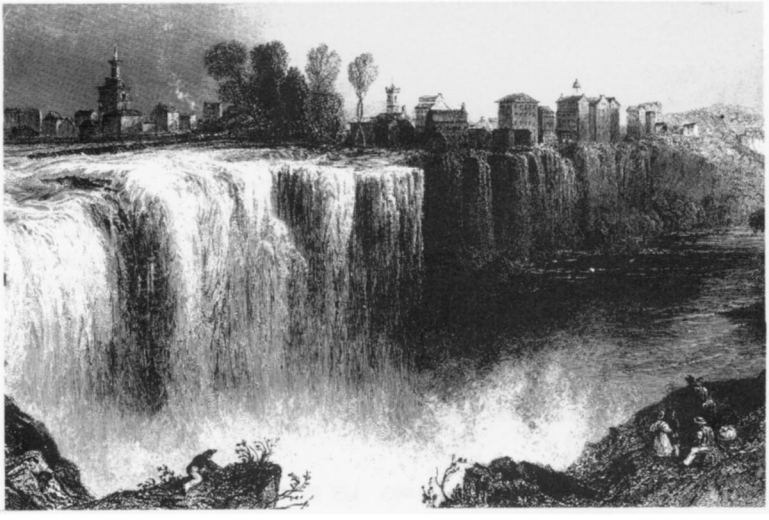
Geology and Industrial History of the Rochester Gorge Part Two

by Thomas X. Grasso



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This issue is the second of a two-part study of the geology of the Genesee River Gorge.

KEY: *RMSC - Photographs courtesy Stone Collection, Rochester Museum and Science Center.*

RPL - Local History Division, Rochester Public Library.

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COVER: The Upper Falls in the late 1830s, looking west by W.H. Bartlett after a drawing by J. Cousen. (RPL)

GEOLOGY AND INDUSTRIAL HISTORY OF THE ROCHESTER GORGE

Part II

Sequence VI

The initial deposit of Sequence VI, the Penfield Dolostone, was laid down, when the sea once again flooded Western New York submerging the sequence bounding unconformity. This unit is a coarse, sandy dolostone containing wave induced ripples. Some beds within the Penfield display fine laminae, inclined at an angle to the normal bedding. These laminations are called crossbeds and, as inferred from studies of recent environments, crossbeds and ripplemarks are indicators of high current activity in the water column. The Penfield Formation was most likely a shallow water deposit as, in addition to its coarse grained sediment and sedimentary structures (such as ripplemarks and cross-bedding), many of the fossils are broken and fragmented. The Penfield Dolostone is exposed in the bed and banks of the river upstream from the High (Main) Falls, to the Court Street Dam, and in the Barge Canal cut on the west side of the city.

The upper part of the Penfield once formed a small cascade of 14 feet between what are now the Court Street and Main Street bridges. This cascade, as described earlier on page 9 and Figure 5 of Part One, was

the original Upper Falls of the Genesee at Rochester. It was first blasted away to make room for the foundation of the first Erie Canal (Clinton's Ditch) Aqueduct over the river, completed in 1823, but was further altered by the two subsequent P.W.A. deepenings described in Part One. Later, 1836 to 1842, just south of the old aqueduct, the present Enlarged Erie Aqueduct was constructed, today supporting the Broad Street Bridge. The red sandstone blocks of the old aqueduct were transported to East Avenue, now the Upton Court Building of the Methodist Home.

In 1789, at the original Upper Falls of the Genesee, Ebenezer (Indian) Allen, the first non Native American settler in what is now downtown Rochester, established a saw and grist mill on the west side of the river. The site is now occupied by the Lawyer's Cooperative Publishing Company and Aqueduct Park (Figures 28 and 29). The mills of Allen had not prospered, probably because there weren't enough settlers in the region to support them. A few years later, in 1792, Allen sold his holdings and by 1807 little remained of the first mills at the Upper Falls. The Genesee crossing had not yet come of age. Eventually, in 1803, Nathaniel Rochester, William Fitzhugh, and Charles Carroll purchased Allen's 100 Acre Tract site, which had by now gone through several hands. This acquisition approximates all the land within the Inner Loop on the west side of the river. In 1811, Rochester surveyed the tract and subdivided it into mill and residential lots which he then put up for sale.

Eventually a mill race was blasted out on the west side of the river and in so doing incorporated the original race of Indian Allen. This race came to be known as the Rochester, Fitzhugh, and Caroll Race (hereafter, in text and figures, referred to as the Rochester Race) and it extended north to Main Street. By 1817 several mills were in operation such as the Red Mill erected in 1814 near Main Street (Figure 28).

The tract on the east side was slower to develop. Three years after the Red Mill was raised Elisha Johnson and Orson Seymour purchased 80 acres opposite Rochester's 100 Acre Tract. On July 4, 1817, while ground breaking ceremonies for the Erie Canal were taking place in Rome, New York, Johnson began blasting the Johnson and Seymour Mill Race. Water still cascades from this race to the river beneath

Rundel Library (Figure 30 and 31). The Johnson and Seymour Race once continued north beneath the present Convention Center, Holiday Inn and Old Rochesterville to the Main Falls. Water Street was so named because it roofed over the race which flowed beneath. Johnson also constructed a dam (near the present Court Street Dam) above the Upper Falls to secure a sufficient water supply for his and the Rochester Race on the opposite bank (Figures 32 and 33).

Before the close of 1817, William Atkinson was constructing his Yellow Mill near the Main Street Bridge, the first on the Johnson and Seymour Mill Race. [15] Hervey Ely, in 1822, moved from the Rochester Race, after a flood, and built a mill next to Atkinson's. On October 29, 1822 Atkinson and Ely shipped the first boat load of flour east to Little Falls, because the Erie Canal was not yet complete to Albany. The birth of the Flour City had begun.

The five water power sites and mill races at Rochester (from downtown going northward) were the Rochester Race, Johnson and Seymour Race, Brown's Race, Third Water Power, and Upper Step-Lower Falls. [16] Of the five the Brown's, Johnson and Seymour, and Rochester Races dominated the flour and industrial output of the city, as they were located closest to the Erie Canal. Collectively these sites formed the industrial and manufacturing core of Rochester thereby providing the economic underpinning of the city's rapid growth (Figure 34).

Mills along these races quickly flourished after the first aqueduct was completed, thereby transforming Rochester into the first boom town in America. The village population mushroomed from 330 in 1815 to 1,502 by 1820. In its charter year of 1834 12,252 people resided in Rochester.

Wheat floated down the Genesee River supplied the grist for Rochester's mill stones. Early in the canal era, new mills were in operation on this city's three main races and in the first 10 days of the 1823 canal season 10,450 barrels of flour were shipped eastward. [17] In addition, 58 boats had departed Rochester in this interval while 45 boats arrived, unloading, among other important items, 4,000 gallons of beer and 2,300 gallons of whiskey at Gilberts Basin alone (behind the

Old Stone Warehouse at South and Mt. Hope Avenues). One can perhaps safely conclude that the rapid growth and industrial boom of the early years fueled an analogous but nearly unquenchable thirst for ardent spirits!

In 1821, on the Rochester Race, Thomas E. Rochester and Harvey Montgomery erected a mill with three runs of stone on the site of the Indian Allen Mill. This mill was later flanked on its south side by Thomas Kempshall's mill (where the Lawyers Co-op Building now stands) and on the north by the City Mills of Joseph Strong. In 1826, Benjamin Campbell came to own a mill with four pairs of stone on the southwest side of the original aqueduct. In 1836 it was torn down to make room for the new enlarged aqueduct. However Campbell's Greek revival home with Ionic columns still stands on Troup Street adjacent to I-490; now the Campbell-Whittlesey House operated by the Landmark Society (Figures 35-40).

The Johnson and Seymour Race did not lag far behind and soon began to rival the west side Rochester and Brown's Races. Horatio Curtis' Mill at the southeast corner of the Main Street Bridge with two runs of stone was followed by others such as the four-story Crescent Mill of Thomas Emerson with six runs of stone. The mill was so named because it was built on a bend in the river and therefore was curved. It was a stone structure equipped with the latest grinding and sifting machinery designed by the millwright Robert M. Dalzell and completed about 1830. Dalzell also designed many other mills in Rochester. South of the Crescent Mill Joseph Hall, in 1828, built a three story stone building to house his agricultural works, a machine shop and furnace (foundry) for the manufacture of agricultural implements. He added another three story stone structure adjacent to this one in the late 1840's to serve as a factory for the production of his newly invented threshing machine. [18] South of Hall's factory was a two story stone malt house dating back to 1832 owned by William Burtis and Samuel Oothout. The Riverside Convention Center now occupies the site of these and other mills, and still displays the curve adjacent to the river that was the distinctive feature of the Crescent Mill many years ago (Figures 35, 41, and 42).

In 1827 Hervey Ely moved south (upstream) on the Johnson and Seymour Mill Race, relocating on the south side of the original 1823 aqueduct. His mill was built of stone, as a protection against fire, was five stories high on the river side and housed nine runs of stone. When Ely's Mill was completed, it was surrounded by water on three sides - the river on the west and the original Erie Canal on the north and east sides. The Enlarged Erie Canal aqueduct, completed in 1842, struck the east bank on the south side of Ely's Mill thereby making his mill an island. For awhile the state kept the old canal open on the east and north sides of the mill as a small spur or basin off the Enlarged Erie (Figure 35). Hervey Ely's 1837 Greek revival home with Doric columns can be seen in Corn Hill at 138 Troup Street.

The R G & E Water Street substation just south of the Convention center rests on the original Ely Mill foundation. The tail races, through which the waters escaped from the mill race back to the river, with their magnificent stone arches, are still visible and seem to echo the rush of water that once turned the mighty wheels (Figures 43 and 44).

North of Main Street where the Holiday Inn stands today, was the tannery of Jacob Graves, one of the largest in the state in 1838. Many other commercial establishments were located north of the Graves' tannery extending to the High Falls, but all that remains is old Rochesterville (Figures 45-48).

Oak Orchard Dolostone

Upstream and south of downtown the uppermost formation of the Lockport Group was once exposed. It formed a small rapids in the river and a common fording point for travelers during low water. The rapids were just north of the Interfaith Chapel on the University of Rochester campus. From the west side of the river the rapids were located opposite the point where Brooks Avenue joins Plymouth Avenue. The settlement that grew up at the intersection of Brooks Avenue and Genesee Street was known originally as Castletown or "The Rapids" or the "Genesee Rapids" (see Ruth Rosenberg-Naparsteck *At the Rapids on the Genesee: Settlement at Castletown*, Rochester History, Vol. LIV, No. 3, 1992).

By 1822 the State erected a dam at the rapids and constructed the Genesee Feeder on the east side that joined the river, just above the dam, with the Erie canal behind the Old Stone Warehouse (South and Mt. Hope Avenues). This feeder canal conveyed Genesee River water to the Erie Canal, thereby augmenting and replacing the water supply coming from Lake Erie, as most of the Lake Erie water, by the time it reached Rochester, was lost to evaporation and seepage. By 1918 Barge Canal construction had obliterated the rapids by blasting, in addition to the Court Street Dam raising the level of the river.

The Oak Orchard Dolostone contains abundant cavities called vugs lined and/or filled with exquisite minerals and crystals such as gypsum, selenite, calcite, dolomite, sphalerite and fluorite. It also possesses a fairly high diversity assemblage of corals and other invertebrates although the preservation is often poor. Its inferred environment of deposition was shallow, subtidal marine but deeper than the underlying Penfield Formation.

The Oak Orchard is exposed in road cuts on I-390 north of the airport, I-490 near the NY 531 (Spencerport) interchange, I-490 and I-590 junction, I-490 near the Penfield Road interchange, and in the Barge Canal cut on the west side of the city.

LATE PALEOZOIC ERA

From Late Silurian through Devonian time the Genesee region was mostly below sea level and continued to accumulate sediment that, today, totals approximately 4,500 feet of strata. Exposures of these units may be found from the southern boundary of the city to the Pennsylvania state line. Above the Lockport Dolostone is the Salina Group of late Silurian age. It is made up of shallow water, hypersaline, lagoonal deposits of dolomite, salt, and gypsum combined with nonmarine and occasional marine shales. Sparse and widely scattered exposures of the Salina Group may be found south of the city line to Honeoye Falls, Avon, and Caledonia. The mines at Garbutt, southwest of Scottsville, once extracted gypsum from the upper part of the Salina Group. The Bertie Group, famous for eurypterids (the state fossil) overlies the Salina Group and is in turn succeeded by the Akron Dolostone.

The Silurian-Devonian contact is exposed at Honeoye Falls, Avon, Caledonia, Leroy, and Batavia. Middle Devonian rocks are exposed from here south to Geneseo and Leicester. Lower Devonian rocks, well exposed in central and eastern New York, have been removed by erosion in western New York. Therefore, in general, the Middle Devonian Onondaga Limestone rests unconformably on Upper Silurian rock units such as the Bertie Group or the Akron Dolostone. Middle Devonian strata above the Onondaga Limestone belong to the Hamilton Group which are predominately fossiliferous shales and limestones deposited in normal marine waters. The Hamilton Group is especially significant as it is the most fossiliferous unit in the state (Figure 51).

Upper Devonian shales, siltstones, and sandstones are found from Mt. Morris south to the state line and are magnificently exposed in Letchworth Sate Park as well as in tributary streams to the Genesee south of Letchworth.

Beginning in the Middle Devonian and continuing episodically into the earliest Mesozoic Era, eastern North America collided first with the small microcontinent of Avalonia in the Devonian and then, subsequently, with Africa in the Late Paleozoic-Early Mesozoic Eras. These collisions produced enormous compressive forces that heaved and buckled the earth's crust and generated much volcanic activity. The result was a climax of mountain building that brought the Appalachian Mountains not only into existence, but lifted them to lofty, majestic, snow-capped peaks. As a result of this event the eastern backbone of North America had been formed and the essential geologic and geographic character of the eastern seaboard was firmly established. The shallow seas that had for so long occupied the Appalachian region and western New York had now completely withdrawn never to return.

The grandeur of the Appalachian Mountains, that once equaled the Alpine and Himalayan chains is nearly gone now as 400 million years of erosion has taken its toll. Relative to the Rochester region, the orogenic forces that produced the Appalachians had its greatest impact in New England, eastern most New York State, and Pennsylvania from Williamsport south. In the Genesee Valley the result of these forces

was to impart a gentle dip of 1/2° south to the previously deposited strata. A dip of 1/2° south means that any one rock layer will drop vertically 35 to 50 feet lower into the earth for every horizontal mile. The southerly dip in conjunction with erosion of overlying rock layers results in the orderly stratigraphic sequence of older rocks in the north to younger in the south. Therefore, Rochester is located on Ordovician-Silurian strata while Geneseo rests on Middle Devonian (Figure 51).

MESOZOIC-CENOZOIC ERA

Throughout the Mesozoic and Cenozoic Eras the Genesee region was undergoing erosion and the Genesee River gradually came into existence. The details of how the Genesee River came to be may be found in the countless publications of Herman Leroy Fairchild but particularly his 1928 *Geologic Story of the Genesee Valley and Western New York.*

Just before the Ice Age, nearly two million years ago, the Genesee River flowed north from Avon turning east at Rush to nearly Honeoye Falls where it continued its northward flow through what is now the Irondequoit Valley as shown on Figure 52. At this time the Genesee River joined the Ontario River somewhere in the center of what is now the Lake Ontario Basin. Had the Genesee River remained in its preglacial course human events of the 18th and 19th century would have taken a drastically different direction. The glaciers of the ice age were about to make some dramatic changes in the landscape of the Rochester region.

GLACIAL HISTORY

Pleistocene Epoch

The last two million years of earth history are known as the Pleistocene Epoch or the Ice Age. During this time four separate and distinct "ice ages" affected the Northern hemisphere, separated by intervals of milder, ice free, interglacial episodes. The last glacial event, called the Wisconsinan Ice Age, was the one that left its indelible

imprint on the face of New York State. Although there is evidence of earlier glacial stages, the bulk of the erosional and depositional record is from the Wisconsinan. This glacier was at its maximum extent 19,000 to 20,000 years ago and covered nearly all of New York State, save for a small triangular area in southwestern New York near Salamanca-Olean called the Salamanca Re-entrant. The present course of the Allegheny River in this area was controlled by the ice margin.

The source of the glacier was a large snow field located in the Laurentian Highlands of south central Quebec. Due to the snow's great thickness and downwardly directed pressure, the lower portion of the snow column was compacted into ice. Furthermore, because of the internal pressure that was thus generated, the ice flowed outward in all directions from its snow-field source region, like pancake batter on a grill. The pressure and weight of the ice plucked the bedrock over which the glacier moved and its internal flow carried this rock rubbish away as if on a conveyer belt.

Glacial Moraines

At the south edge of the city stretches a southwardly convex, linear, lobe of hills and knolls approximately 4 miles long called the Pinnacle Range. From west to east the main components of the range are Oak Hill, now the University of Rochester campus, Mount Hope Cemetery, Highland Park, Colgate-Rochester Divinity School campus, Pinnacle Hill, Cobbs Hill and several smaller knolls extending east to Winton Road (Figure 53). Pinnacle Hill at 750 feet above sea level is the highest in the range and rises 230 feet above the city plain below. The Pinnacle Range is part of the Albion-Rochester Moraine deposited nearly 12,000 years ago, and is the best example of a moraine north of the south end of the Finger Lakes.

The Pinnacle Range formed when the melting edge of the glacier retreated north from the Finger Lakes region then readvanced south to a position that laid against what is now the north slope of the Pinnacle Range. At this time the rate of melting at the edge of the glacier equaled, or nearly equaled, its rate of internal flow; therefore, the melting edge of the glacier remained relatively stationary. When this

occurred the rock debris in the ice, ranging from fine clay, silt, and sand to large rocks and boulders, was dumped at the melting edge as a linear ridge, parallel to the ice front and there formed a series of irregularly shaped mounds crudely resembling large "eggs in a basket". Mount Hope Cemetery and Highland Park are good examples of these formations. The hummocky ridge that is today the Pinnacle Range is a recessional moraine because it formed after the terminal moraine which marks the farthest advance of the glacier. Furthermore, the Albion-Rochester Moraine is only one of about six other recessional moraines in New York State marking successive, static, positions and configurations of the ice margin (Figure 54). When the rate of melting regained its superiority over the ice's internal flow, due either to greater melting or decreased ice flow, the melting edge receded north and in so doing deposited an irregular blanket of soil called ground moraine. When the equilibrium between flow and melting was once again re-established another younger moraine was formed north of the previous one. An analogy may be drawn to serpentine, parallel rows of variously sized dump trucks, some gigantic others small, depositing their loads while stationary (recessional moraine) or while slowly moving northward (ground moraine).

Recessional moraines may be deposited directly by the ice, in which case they are composed of glacial till, an unbedded mixture of boulders, cobbles, sand and clay. If the moraine is constructed by meltwater flowing off the glacier, it tends to be made up of well sorted, stratified sand and/or gravel and is known as a kame moraine. The term kame has a Scottish origin meaning mound or knoll of water laid sand and gravel. The Pinnacle Range is primarily a kame moraine, although glacial till may be found capping most of the hills in the range. This attests to a late, major readvance of the ice that overrode the moraine. The ice margin must have been relatively thin because it did not scrape the moraine away. Instead the moraine forced the ice to flow over its crest leaving the till behind when the glacier melted away.

In the late 19th and early 20th Centuries the Pinnacle Range was utilized as a burial ground by the Roman Catholic Church and was also heavily mined and excavated for its sand and gravel. From 1838 to the early part of the 20th Century St. Partrick's Cemetery occupied the northwest portion of Pinnacle Hill, bounded by South Clinton Avenue

on the west and Field Street on the north. The cemetery was commonly known as the Pinnacle burial ground as Clinton Avenue was formerly Pinnacle Street. Today the Far View Hill subdivision occupies part of the site.

Numerous pits and gravel quarries were opened in the Pinnacle Range from Winton Road to Clinton Avenue. The north side of Cobbs Hill was heavily excavated in the late 1800's but the workings were subsequently buried by tailings from the excavation of the reservoir in the early 20th Century. Along the north side of Highland Avenue east from Clinton Avenue nearly to Monroe Avenue, Casper Schwalbach operated a large sand and gravel quarry, from the 1890's to approximately 1910. The Schwalbach Pit was the single largest excavation in the entire Pinnacle Range. Schwalbach extended his operations to the west side of South Clinton Avenue, just south of Field Street, and this site remained active into the mid 1920's and perhaps beyond.

Proglacial Lakes and the Rerouting of the Genesee River

Proglacial lakes are mostly high level lakes in front of the ice well above the elevation of present day Lake Ontario, which stands at 250 feet above sea level. However one, Admiralty Lake, was below the level of Lake Ontario as described later in this section. They came into existence because glacial ice acted as a dam and the land in central and western New York slopes to the north as evidenced by the Finger Lakes, Genesee River, and Niagara River all draining northward. Therefore, as long as the ice occupied the Lake Ontario basin and the Thousand Islands outlet, waters from northward flowing streams and glacial melting were impounded in front of the ice as proglacial lakes. The southern border of the lakes was the highland to the south while the lake waters laved north against the ice. The glacial lakes found outlets to the ocean either west past Chicago and down the Mississippi or east past Syracuse and Rome and out the Mohawk-Hudson Valleys. In the Genesee Valley fifteen proglacial lakes, at various elevations, existed from 19,000 to 9,000 years ago. [19] The Pinnacle Range, discussed above, was deposited in a proglacial lake.

One of these proglacial lakes was Lake Dawson (10,000 years ago) at approximately 480 feet above sea level, over 200 feet higher than Lake Ontario. It flooded most of the Rochester area north and east of downtown. The shoreline of this lake extended on the west side of the river, along Ridgeway Avenue to Mount Read Boulevard and then southeast to intersect the present Genesee River north of the Bausch Street Bridge, east of Edgerton Park near Clifford Avenue. From here the beach extended eastward north of Clifford Avenue to near Portland Avenue, where it turned southeast past Bay and Goodman Streets to Culver Road and Cedarwood Terrace. Here the shoreline turned south, crossed University Avenue near East Blvd., continued due south, west of I-590 and crossed the expressway just south of the Monroe Avenue interchange. Twelve Corners at an elevation of 491 feet above sea level, was less than 11 feet above Lake Dawson's waters (Figure 55).

In the Genesee Valley, and contemporaneous with Lake Dawson, Lake Scottsville existed, dammed at its northern end by the Pinnacle Range. This lake, at an elevation of 540 feet above sea level, was the immediate ancestor of the Genesee River, and extended up the valley to Avon. Previous to Lake Dawson's time the eastward leading portion of the preglacial Genesee Valley, past Rush and Honeoye Falls, had been filled and buried by glacial deposits making this outlet unavailable for Lake Scottsville. Because of this, Lake Scottsville's waters drained northward across a sag or saddle in the Pinnacle Moraine at the U of R and did not reoccupy its preglacial valley, now largely filled with glacial deposits. The Genesee River flowing due north in its new postglacial course, emptied into Lake Dawson about one mile north of the present High Falls. The High (Main) Falls now came into existence near the Bausch Street Bridge as the river tumbled over the edge of the Niagara Escarpment forming a series of rapids (Figure 55).

Continued withdrawal of the ice margin farther north exposed a lower outlet. The result was a rapid 45 foot drop of Lake Dawson's water forming Lake Iroquois at an elevation of 435 feet above sea level. Without delay Lake Scottsville completely drained and the mouth of the river shifted north one more mile to approximately two miles north of the High Falls at a point just north of the Veterans Memorial Bridge near Kodak. The High Falls now became a cascade just north of its present location and only 40 feet high compared to nearly 80 feet today.

Contemporaneously the Middle and Lower Falls emerged as a series of small rapids at the top of the gorge with the Middle Falls near the Veterans Memorial Bridge and the Lower Falls a short distance north. Once the ice abandoned the Thousand Island Outlet, Lake Iroquois lowered to form Admiralty Lake at 50 feet above sea level, because the land which had been depressed earlier by the ice's weight, permitted the existence of a lake 200 feet below the present level of Lake Ontario. The mouth of the river extended another seven miles north from its previous location to a position nine miles north of the present southern shore of Lake Ontario at Charlotte, whereupon all three waterfalls were etched into relief and retreated upstream (south) to nearly their present positions. At the same time the lower portion of the gorge, near to and south of Stutson Street, was carved by river erosion. After this, the land gradually rose due to the release of the glacier's weight, more so on the north than on the south. Consequently present Lake Ontario rose in elevation from the Admiralty Lake stage but also spilled over on its south shore forming Irondequoit Bay, Long Pond and the other bays and inlets that line the south shore of Lake Ontario.

In summation the Rochester Gorge was formed by the river carving its way through solid bedrock as lakes first fell then rose beginning approximately 10,000 years ago. Rochester's most remarkable and certainly its most significant feature had come into existence.

SUMMARY AND CONCLUSIONS

As we have seen, Rochester's preeminence as a water powered industrial giant did not begin with Indian Allen or the purchase of the 100 Acre Tract by Rochester, Fitzhugh, and Carroll. It was preordained for greatness by its long geological history. Back through the arch of time, one can glimpse the seeds of its growth in the deposition of the resistant Lockport Dolostone and its subjacent Clinton and Medina Group strata. The Silurian seas that rose and fell resulted in a depositional package of sediment that contained rock units of varying resistance to the destructive force of erosion. The Grimsby-Kodak Sandstones, Reynales Limestone, and Lockport Dolostone are resistant, while the Queenston, Maplewood, Sodus-Williamson, and Rochester shales are relatively weak. All were uplifted near the end of the

Paleozoic Era imparting a southerly dip to the strata and after millions of years the Niagara Escarpment was etched into relief.

Leaping forward to the Ice Age, the Pinnacle Range moraine temporarily dammed proglacial Lake Scottsville which was prevented from escaping eastward past Rush because the old channel was choked with glacial debris. As Lake Dawson rapidly lowered to Lake Iroquois, Lake Scottsville drained north across the Pinnacle Range and the carving of the Rochester Canyon had begun; first as a series of rapids north of the Bausch Street bridge and then later as a well defined falls. In a similar fashion, but later in time, a series of rapids farther north would eventually evolve into the Middle and Lower Falls. Finally, the ice melted back exposing the Thousand Island outlet and Lake Iroquois fell to form Admiralty Lake below the present level of Lake Ontario. The Rochester Gorge was now deeply incised through its entire length and as Lake Admiralty waters rose to form Lake Ontario the lower gorge from Charlotte to the base of the Lower Falls was flooded.

And so, the rapids and waterfalls came into existence; namely "The Rapids" at the University of Rochester campus at the top of the Niagara Escarpment, the original Upper Falls downtown near Broad Street over the Penfield Formation, the High (Main) Falls over the Gates Member of the Rochester Shale, the Middle Falls over the Reynales Limestone, and the Lower Falls over the Kodak-Grimsby Sandstones. These majestic cascades and waterfalls lay waiting thousands of years for people to one day take up their inheritance. Though humans have nearly squandered it through neglect, abuse, oversight and overuse (Figure 56) we have finally begun to dimly comprehend how precious, how significant, how important and how beautiful the river and its canyon is for us today. Let us hope that we never forget!

ACKNOWLEDGMENTS

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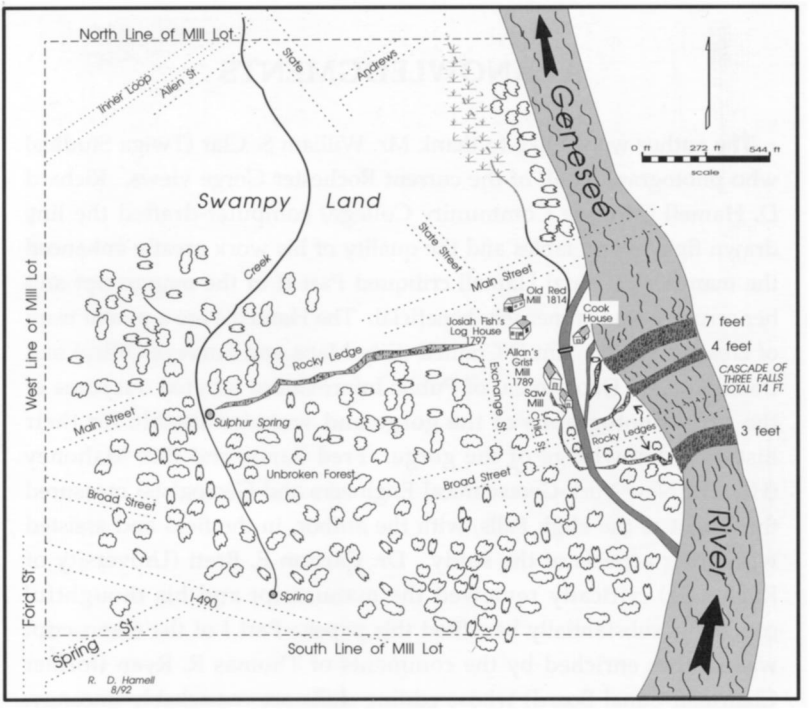

FIGURE 28: An Early Map of the 100 Acre Tract-Unsettled Rochesterville, circa 1789. (Redrawn from McKelvey, Blake, 1979, ***Panoramic History of Rochester and Monroe County, New York,*** *p. 19).*

FIGURE 29: West side of the Genesee River Downtown, showing site of Indian Allan's Mill. Lawyer's Co-op Building occupies part of the site. Original Clinton's Ditch Aqueduct (1823) struck the west bank where the left (south) portion of building now stands, built of darker brick. Enlarged Erie Canal Aqueduct (1836-1842) and Broad Street at far left. (Bill Clar)

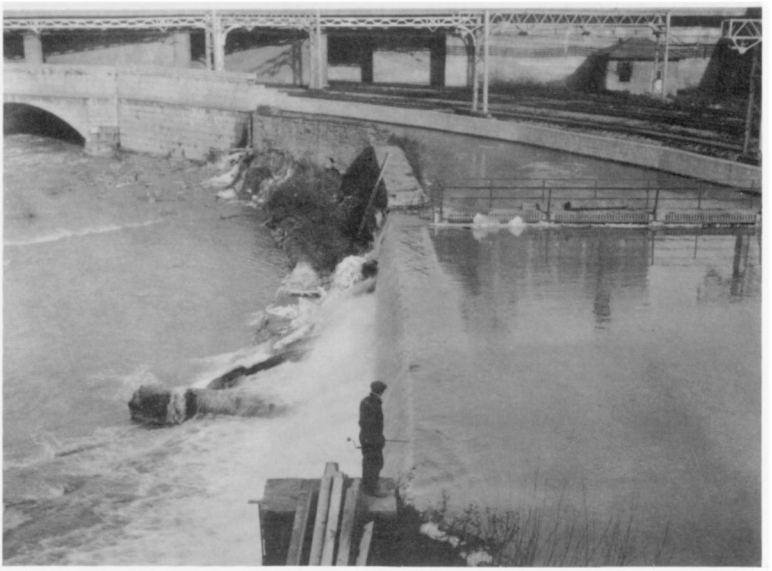

FIGURE 30: Johnson and Seymour Mill Race, looking north, flowing beneath the aqueduct which by now (circa 1928) was modified for rapid transit rail service (subway). Note the spillway just north of the man. (Tim O'Connell, Maps and Surveys Dept., City of Rochester)

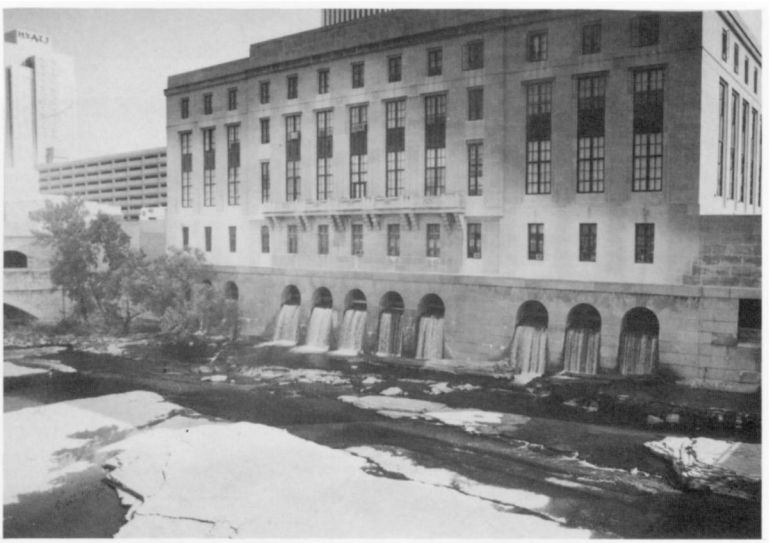

FIGURE 31: East side of Genesee looking northeast from the Court Street Bridge showing water from the Johnson and Seymour Mill Race (1817) cascading back to the river beneath Rundel Library. Compare with Figure 30. (Bill Clar)

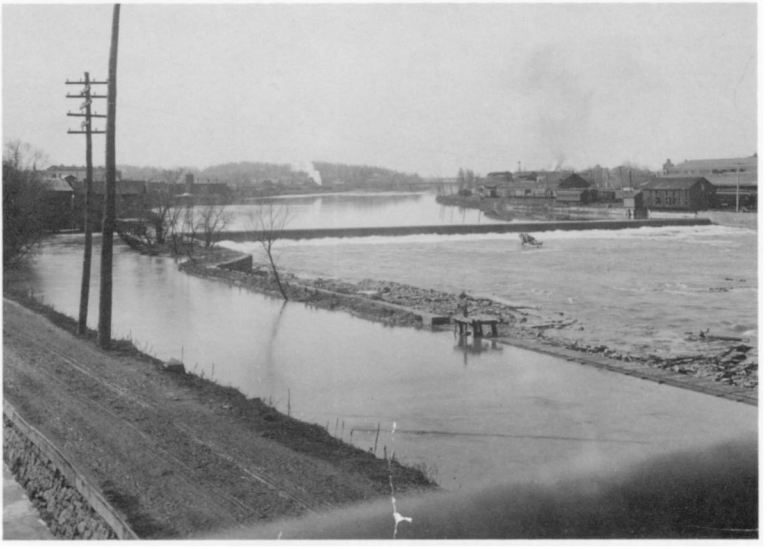

FIGURE 32: Johnson and Seymour Dam circa 1912 looking southwest from Court Street. Erie Canal and towpath lower left, Johnson and Seymour Mill Race center, Genesee River right. (RPL)

FIGURE 33: Court Street Dam today looking southwest. Constructed (1918) near the Johnson and Seymour Dam to impound water for the Barge Canal. (Bill Clar)

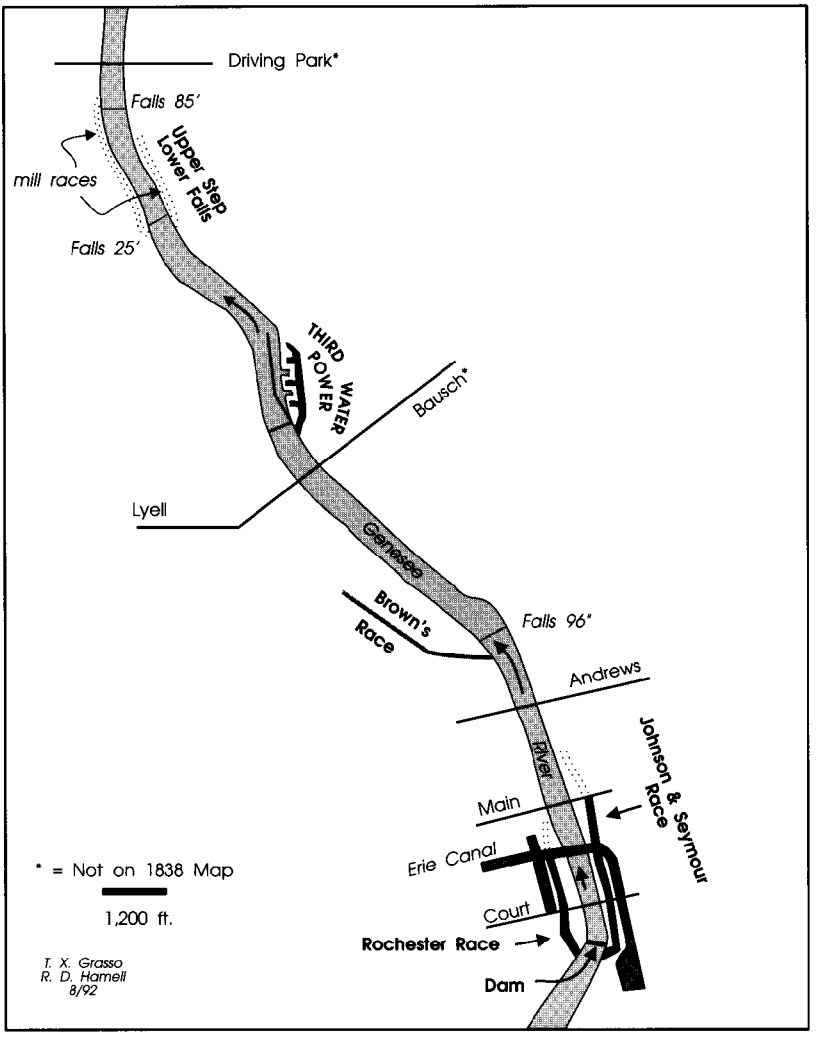

FIGURE 34: Rochester's mill races. Modified from S. Cornell, 1838: O'Reilly's ***Sketches of Rochester.***

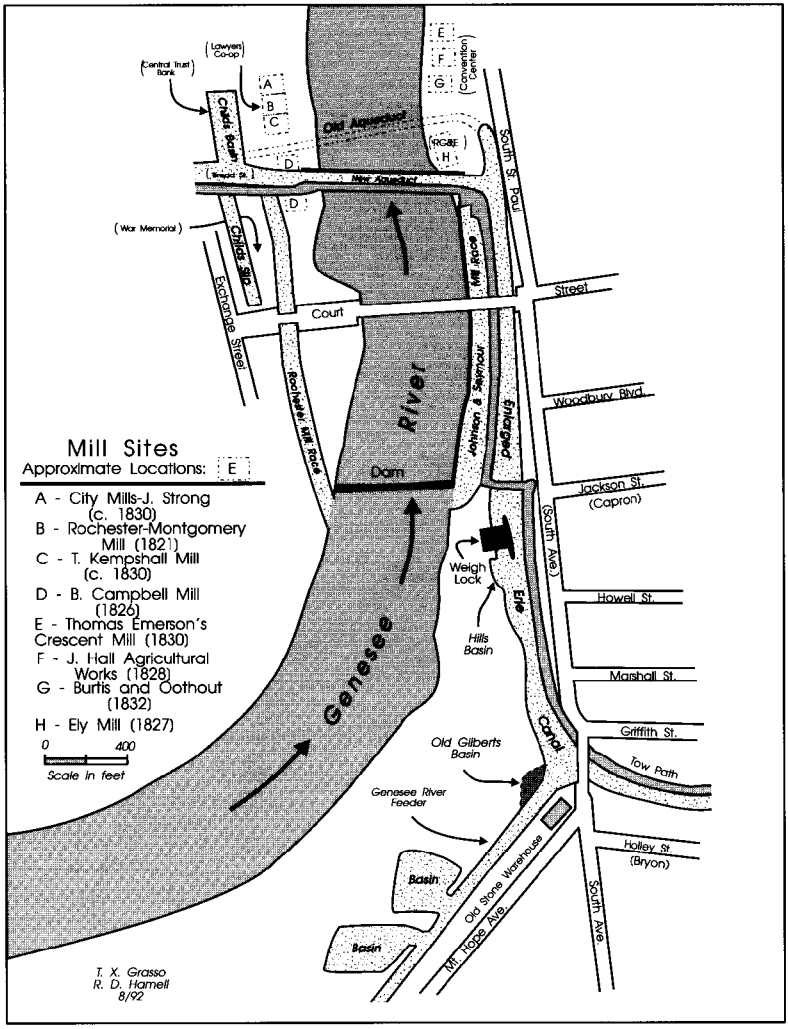

FIGURE 35: Downtown Rochester in 1873 with older mill site locations. (Parenthesis are current names).

FIGURE 36: West side mill sites on the Rochester Race circa 1946, looking northwest from Court Street showing Kimball's Tobacco Factory in the foreground and the Lawyers Co-op Building and Broad Street Bridge in the distance. Note the statue of Mercury on top the second chimney from left. (Tim O'Connell, Maps and Surveys Dept., City of Rochester)

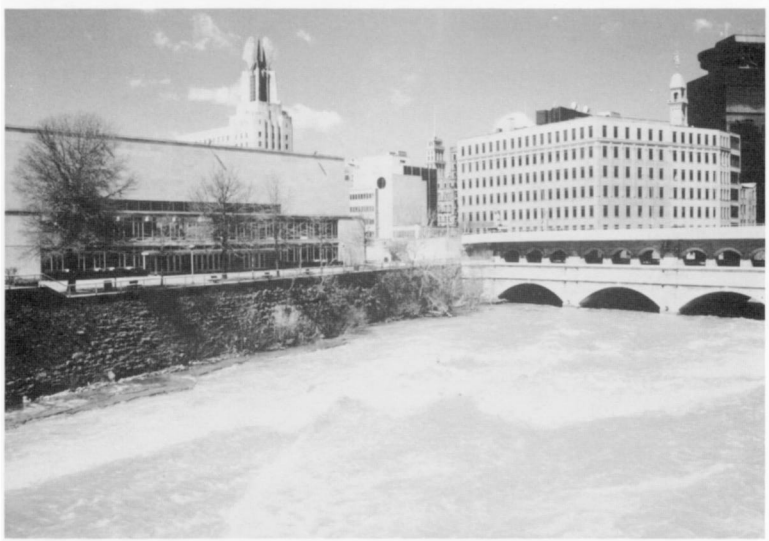

FIGURE 37: West side mill sites today. War Memorial occupies Kimball's Tobacco Factory and Benjamin Campbell Mill sites. Lawyers Co-op Building and the Broad Street Bridge are in the distance. (Bill Clar)

FIGURE 38: West side mill sites on the Rochester Race looking northwest from South Avenue during the 1865 flood. Note timber jammed against aqueduct and water nearly to the top of the structure. Thomas Kempshall's Mill (later known as the Beehive Building) adjacent to aqueduct, with the Rochester-Montgomery and City Mills farther north. Second Courthouse with rotunda in center distance. (RPL)

FIGURE 39: West side mill sites on the Rochester Race looking northwest from South Avenue circa 1924. Compare with Figure 38. (Stone Collection, RMSC)

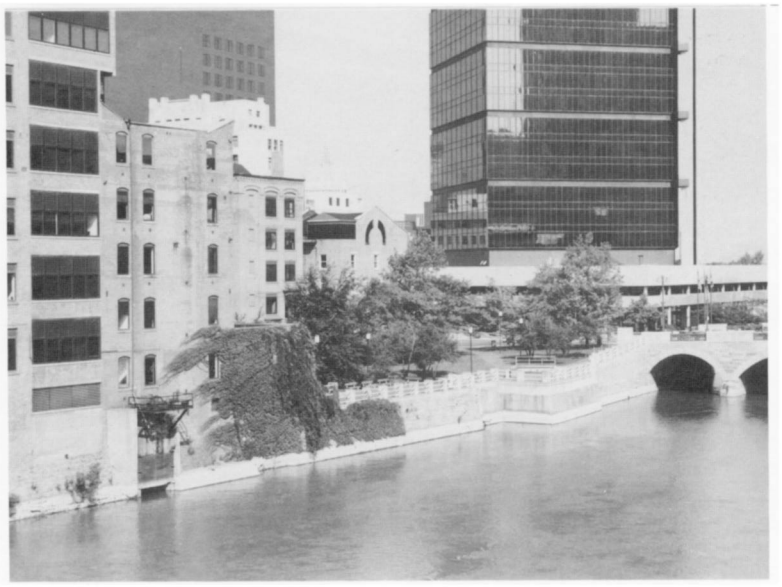

FIGURE 40: West side mill sites on the Rochester Race today. Lawyers Co-op and Aqueduct Park occupy sites of many earlier mills and industries. Mainstreet bridge on right. (Bill Clar)

FIGURE 41: East side mill sites on the Johnson and Seymour Mill Race looking northeast from the aqueduct to Main Street (March, 1922). Note the curve on which the Crescent Mill was built. (Stone Collection, RMSC)

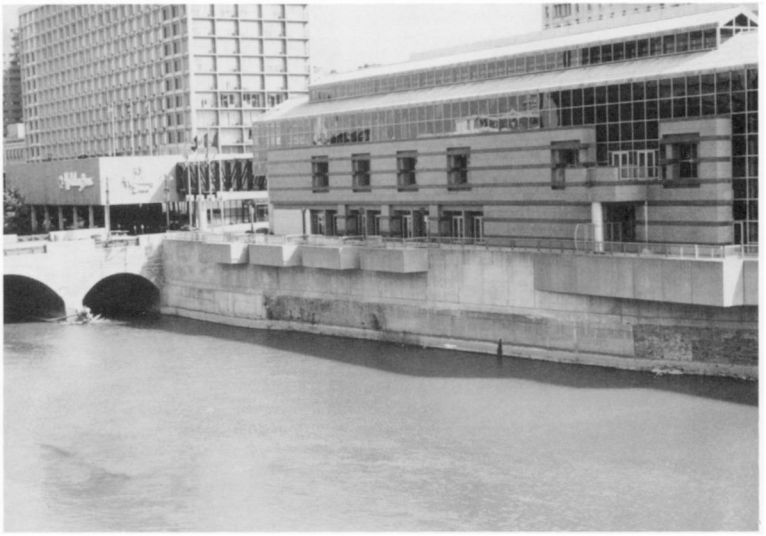

FIGURE 42: East side mill sites on the Johnson and Seymour Mill Race today. Looking northeast from Broad Street to the Main Street Bridge. The Convention Center mirrors the curve of the Crescent Mill at far right. (Bill Clar)

FIGURE 43: Hervey Ely's Mill on the Johnson and Seymour Race at the northeast side of the Enlarge Erie Canal Aqueduct, (building at far right) looking northwest from South Avenue, during the 1865 flood. Note canal boat in aqueduct. (RPL)

FIGURE 44: Hervey Ely's Mill site today. The RG&E Water Street Substation rests on the Ely foundation. Note openings for the tail race. View looking northeast from the Broad Street Bridge. Convention Center left. The gap between the Convention Center and the substation marks the site of the east abutment of the original Clinton's Ditch Aqueduct. (Bill Clar)

FIGURE 45: Site of Jacob Graves Tannery circa 1880. Looking northwest from East Main and North Water streets. Note plank road over the Johnson and Seymour Mill Race. The Holiday Inn now occupies the site. (Stone Collection, RMSC)

FIGURE 46: Jacob Graves Tannery site now the Holiday Inn, looking northeast from Main Street Bridge. (Bill Clar)

FIGURE 47: East side mill sites and industries on the Johnson and Seymour Mill Race looking north towards Andrews Street circa 1917. Men are preparing forms for concrete wall in river. (Stone Collection, RMSC)

FIGURE 48: East side mill sites today. Looking north from the Main Street Bridge. Old Rochesterville in right distance. (Bill Clar)

FIGURE 49: Erie Canal Aqueduct without water looking west from South Avenue circa 1913. (Stone Collection, RMSC)

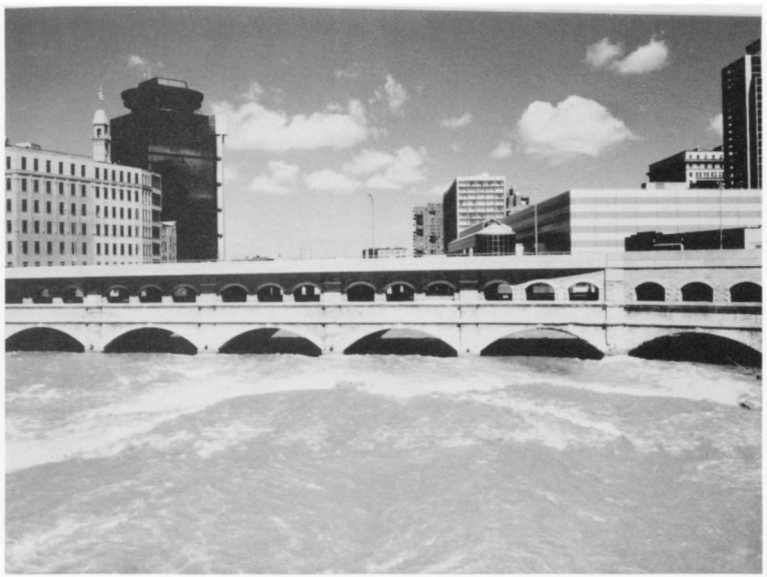

FIGURE 50: Aqueduct today looking north from Court Street. (Bill Clar)

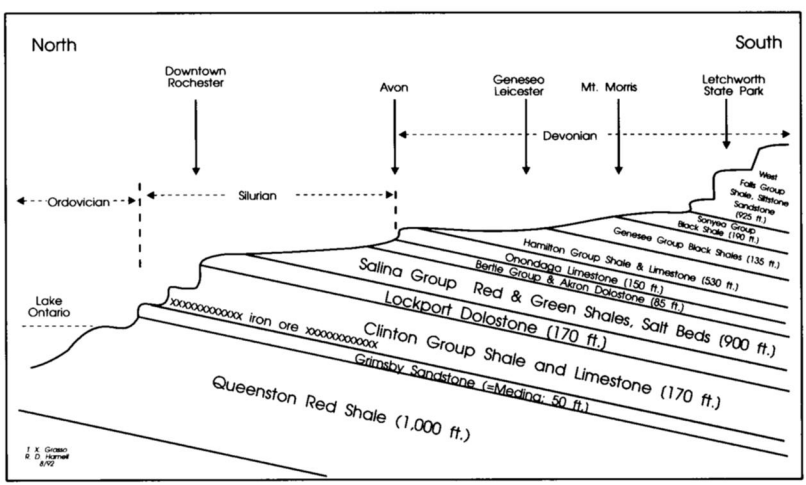

FIGURE 51: Cross Section Along Genesee Valley. (Not to Scale - Dip Exaggerated)

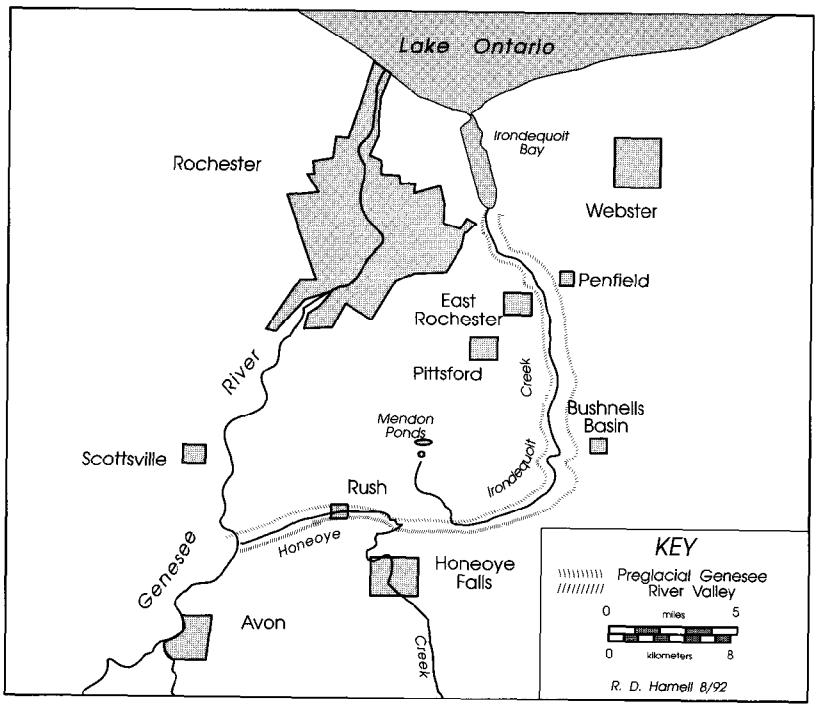

FIGURE 52: Preglacial Genesee River near Rochester

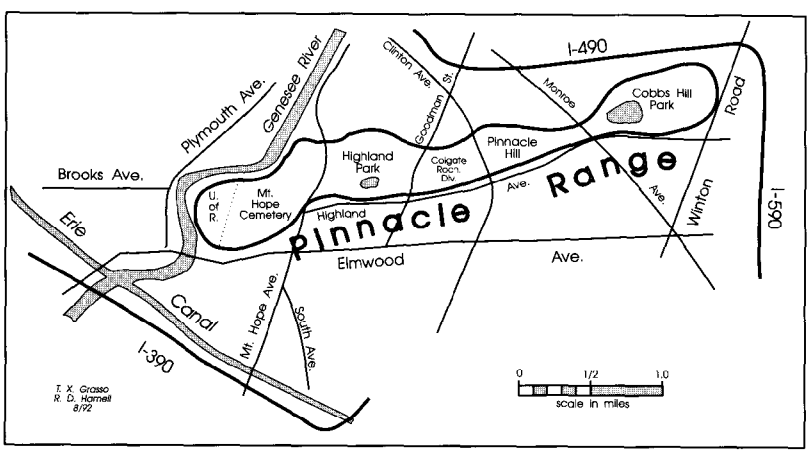

FIGURE 53: Map of the Pinnacle Range

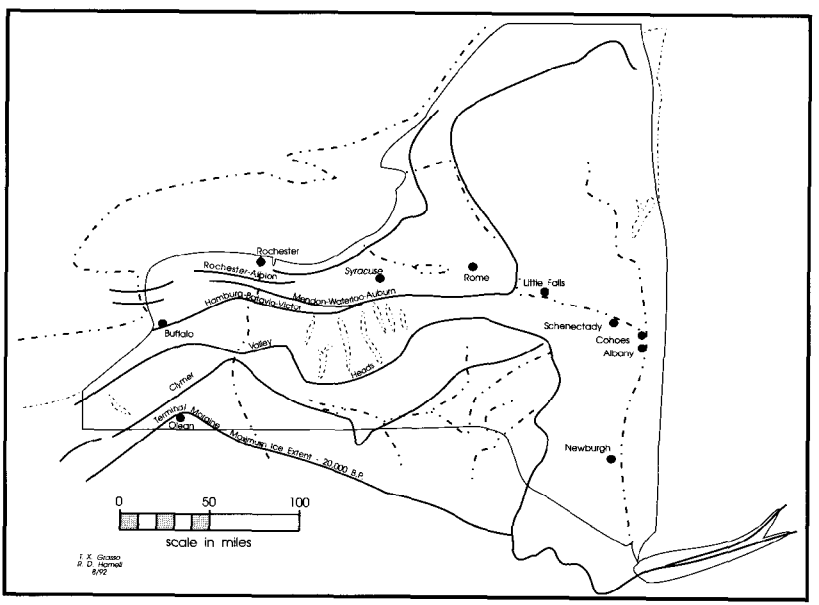

FIGURE 54: Moraines in Western New York and Adjoining Areas
(Modified from N.Y.S. Geological Association Guidebook, Univ. Rochester, 1956)

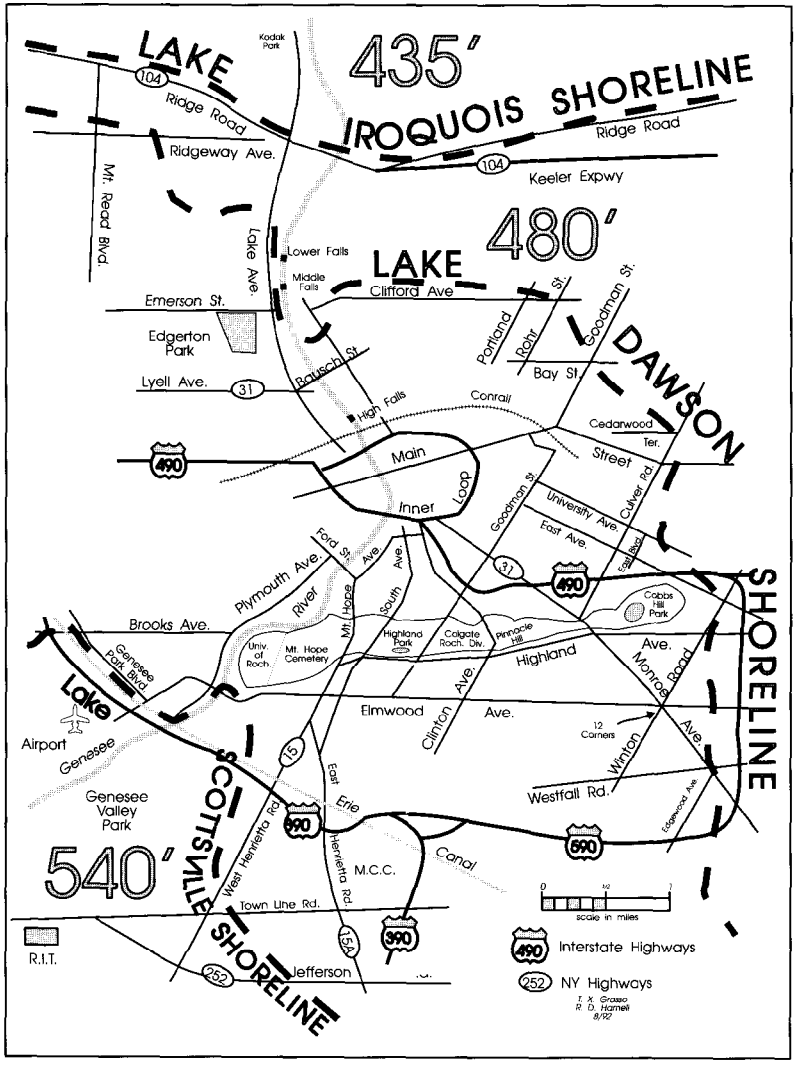

FIGURE 55: Proglacial Lakes in the Rochester Vicinity

FIGURE 56: Fill, sundry waste products, and garbage line the west bank of gorge north of the Bausch Street Bridge. (Bill Clar)

End Notes

15. McKelvey, Blake, "Canaltown, A Focus of Historical Traditions", **Rochester History** Vol. XXXVII, 1975.

16. O'Reilly, Henry, **Sketches of Rochester,** William Alling, Rochester, New York, 1838.

17. McKelvey, Blake, "Rochester and the Erie Canal", **Rochester History** Vol. XI, 1949, p. 6 & 7.

18. McKelvey, Blake, "Canaltown, A Focus of Historical Traditions", **Rochester History** Vol. XXXVII, 1975.

19. Muller E.H., Duane, B.D., Young, R.A., Wilson, M.P., "Morphogenesis of the Genesee Valley", **Northeastern Geology**, Vol. 10, 1988, p. 112-133.

CORRECTIONS FOR PART ONE:

"GEOLOGY AND INDUSTRIAL HISTORY OF THE ROCHESTER GORGE"

1. The caption for Figure 15 should read: *Industrial development on the west side of the gorge between the Lower and Middle falls circa 1880. C.J. Hayden Furniture Co. in foreground, Rochester Paper Co. in middle distance, Middle Falls in distance. (RPL)*

2. Figure 16A should read coal gasification plant rather than coal classification plant.

3. Figure 25 should place the Phoenix Mill on the north side of Pont de Rennes Bridge rather than the south side.

BACK COVER: Aerial view of the Genesee River about 1940. Notice the water as it "Falls" over the rock ledges between the Court Street and Broad Street Bridges. The bridges are (L-R) Court Street, Broad Street and Main Street. Note the Rundel Memorial Building in the lower right and The Kimball Tobacco Co. across the river from Rundel. Buildings on the Main Street Bridge hid the river from view until the 1960s. The Broad Street Bridge was once the foundation of the second Erie Canal aqueduct. (RPL)