I. Location and Boundaries

The 1,069 square miles of Chautauqua County is located in the southwestern corner of New York State. It is bordered by Erie Co., N.Y. and Cattaraugus Co., N.Y. in the east and by Warren and Erie counties, Pa. in the south and west. Lake Erie forms the northern border of the county. (Figure 1).

II. Physiographic Divisions

Chautauqua County is located within two different physiographic provinces, the Central Lowlands and the Appalachian Plateaus. The Central Lowlands section is located along the plains of Lake Erie in the northernmost part of the county. The Portage Escarpment serves as the border between this area and the Appalachian Plateaus. The Appalachian Plateau section can be further divided into the Southern New York section and the Kanawha section. The Kanawha section occupies a triangular area in the southeastern corner of the county (Figure 3).

III. Elevation and Relief

<table>
<thead>
<tr>
<th>Location</th>
<th>Central Lowlands</th>
<th>Appalachian Plateaus</th>
<th>Kanawha section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Erie</td>
<td>580 ft. (avg.)</td>
<td>1000 ft.</td>
<td>2160 ft.</td>
</tr>
<tr>
<td>Max. relief</td>
<td>420 ft.</td>
<td>1160 ft.</td>
<td></td>
</tr>
</tbody>
</table>

Max. relief of Chautauqua County 1580 ft.

Relief - The lake plain section of the county has very minimal relief and the plateau section exhibits moderate relief with rolling landscapes.

IV. Structural Controls

The Lake escarpment morainal deposits influenced stream drainage in the county. North of the moraine, streams flow to the north into Lake Erie and the St. Lawrence River Basin. Streams south of the moraine flow into the Allegheny River Basin. Another moraine located in the southeastern corner of the county, between Jamestown and Salamanca, diverted a northward flow of the Allegheny River to its present course. Stream gradients vary dramatically due to the influence of the Portage escarpment and the Lake moraine. Streams that are forced to flow down the Portage escarpment by the Lake moraine are generally short and steep with high gradients (20-300 ft./mile). Streams that flow to the south have a gradient of only 1-2 ft./mile.

V. Geomorphic Processes

Two past geomorphic processes are the major influences on the geology of Chautauqua County. The first occurred 300 m.y. ago when sediments were deposited in the county which would later form the bedrock of the county. Most bedrock in the county are identified with the Upper Devonian period, with the Knapp formation being associated with the Lower Mississippian period. The order of deposition suggests an approaching shoreline with association with the Catskill delta. The other process was the advance and retreat of glaciers between 350 thousand and 10 thousand years ago. These glaciers are responsible for the sculpted landscapes and the deposition of glacial debris throughout the county. Some deposits in river valleys are 500 ft. thick.
Geomorphic processes (cont'd).

Present day processes include fluvial erosion, lake erosion, creep, and mass wasting.

VI. Landforms

Landforms in the county include the Portage escarpment, streamlined glacial deposits, kettle hole lakes (Cassadaga Lakes, Mud Lakes, Bear Lake, Findley Lake) and Chautauqua Lake. Chautauqua Lake is situated in a glaciated valley. It is thought by some people to have been two separate valleys and lakes. It became one lake valley as the last glacier retreated and scoured out a small ridge between Bemus Pt. and Stow.

VII. Climate

Chautauqua County's climate shows all Four Seasons. On the lake plain, Lake Erie is responsible for a cooler Spring and an extension of the growing season in the Fall.

VIII. Economic Geology

The geology of Chautauqua County is responsible for gas and oil industry, farming, and the presence of gravel pits throughout the county.

IV. Bibliography


Roseberry, C.R.; Niagara to Montauk, "Scenic Pleasures of New York State."


### Stratigraphic Units in Outcrop

<table>
<thead>
<tr>
<th>Series</th>
<th>Group Formation Member</th>
<th>Thickness</th>
<th>Lithologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Penn.</td>
<td>Olean</td>
<td>80</td>
<td>Conglomerate</td>
</tr>
<tr>
<td>Lower Miss.</td>
<td>Knapp</td>
<td>80</td>
<td>Sandstone, Shale, Cong.</td>
</tr>
<tr>
<td>Oswayo</td>
<td></td>
<td>150</td>
<td>Sandy Shale</td>
</tr>
<tr>
<td>Cattaraugus</td>
<td></td>
<td>350</td>
<td>Sandstones, Siltstones</td>
</tr>
<tr>
<td>Ellicott</td>
<td></td>
<td>150</td>
<td>Shale and Siltstone</td>
</tr>
<tr>
<td>Dexterville</td>
<td></td>
<td>100</td>
<td>Siltstone and Shale</td>
</tr>
<tr>
<td>Northeast</td>
<td></td>
<td>470</td>
<td>Shale and Siltstone</td>
</tr>
<tr>
<td>Shumla</td>
<td></td>
<td>30</td>
<td>Siltstone</td>
</tr>
<tr>
<td>Westfield</td>
<td></td>
<td>150</td>
<td>Shale and Siltstone</td>
</tr>
<tr>
<td>Leona</td>
<td></td>
<td>30</td>
<td>Siltstone</td>
</tr>
</tbody>
</table>

### Subsurface Units in NY and PA

- **Northeast**
  - **Shale and Siltstone**

- **Upper Devonian**
  - **Gowanda** 100+: Shale w/siltstone
  - **South Wales** 70: Shale
  - **Dunkirk** 40: Black Shale
  - **Hanover** 90: Shale
  - **Angola** 220: Shale
  - **Rhinestreet** 170: Black Shale
  - **Cashagau** 65: Shale
  - **Middlesex** 10: Black Shale

- **Devonian**
  - **Genesee** 25: Shale
  - **Hamlin** 270: Shale, some limestone, Limestone w/chert nodules
  - **Ongonaga** 100: Known at Bann
  - **Oriskany** 0-207: Sandstone, Abundantly fossiliferous Driller's "Flint"

- **Upper Mississippian**
  - **Bertie** 75: Dolomite, Waterlime
  - **Camillus** 80: Shale
  - **Syracuse** 100: Shale, salt, Gypsum
  - **Vernon** 200: Shale

- **Middle Silurian**
  - **Oak Orchard**
  - **Eramosa**
  - **Goat Island** 200: Dolomite
  - **Gasport**
  - **Depew**
  - **Rochester** 30: Shale
  - **Irondequoit** 35: Limestone

- **Upper Silurian**
  - **Thorold** 20: Sandstone

- **Ordovician**
  - **Grimsby** 110: Sandstone, Red

Note: The text includes various geological formations and their locations, with specific thicknesses and lithologies listed. The document is from the Chautauqua County Historical Society, Westfield, NY, 2012.
Figure 8.1: Outcrop map of the Lower, Middle, and Upper Devonian rock units in New York State. Notice that the Lower Devonian formations do not extend into the western part of the State. An unconformity cuts across these formations, as you can see on Plate 3. Erosion removed the Lower Devonian units from western New York before sediment was deposited there in Middle Devonian time.

Figure 8.2: Map of the area where "Caswell Della" Shale is exposed. The rocks originally extended farther north across New York, but erosion has removed them from that area. The Caswell Mountain range was the source of the sediments of the Shale. The arrows represent the general trend of the "Shale Belt."
Figure 6.15. Diagram of the depositional environments of the "Catskill Delta" and the facies that were deposited in them. The arrangement of the facies (Genesee-Pocono) shows that the environments have moved from right to left through time as the sediment has filled in the edge of the sea. This process could be reversed by a rise in sea level, which would move the shore zone toward the right. (In this oversimplified diagram, the Pocono facies looks as if it were underneath the Acadian Mountains. It was actually deposited at the foot of the mountains.)
Great Lakes History (Gordon Baird)

Lake Warren Stage

Lake Algonguin Stage

Lake Payette Stage

Present Day