

III - STRATIGRAPHY AND PALEONTOLOGY

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During the past 100 years the Upper Devonian rocks of New York State have received considerable attention from stratigraphers, paleontologists and petroleum geologists. Nevertheless a complete and satisfactory classification of these strata has not yet been obtained. Among the many different classifications proposed during the last 50 years the most recent include those by Cooper *et al* (1942), Woodruff (1942), Pepper and de Witt (1950, 1951, 1956), Sutton (1956) and Tesmer (1955). These classifications differ in the nomenclature applied to various units, e.g., names used for a rock unit, such as a formation or group, by some writers, are applied to time or time-rock units (ages, stages) by others. Complete agreement on the number and correlation of recognized rock units has also not yet been reached. Inasmuch as the Upper Devonian strata are still not thoroughly understood a more or less permanent classification satisfactory to a majority of workers probably will not be obtained for some time. For purposes of clarity, however, the strata encountered in the Wellsville region may be classified as indicated in the following description of rock units. (See also Table 2).

Since the youngest rocks described in the guidebook for the N. Y. S. G. A. meeting last year (1956) at Rochester were those found at the top of the Chemung group, it seems appropriate to continue this description of rock units in a similar fashion for the 1957 guidebook--thus completing the stratigraphic column of the Genesee River Valley, site of both meetings. Accordingly, several rock units encountered in the overlying Canadaway group which will not be seen during the meeting this year are included in the descriptions given below.

UPPER DEVONIAN

Chautauquan Series (Clarke and Schuchert, 1899)

CANADAWAY GROUP (Chadwick, 1933)

Includes beds between the base of the Dunkirk and the top of the Cuba. In this group the Caneadea, Rushford and Machias units contain the main oil producing horizons in New York State.

Dunkirk shale (Clarke, 1903)*

Overlying the Wiscoy shale at the top of the Chemung group in west-central New York is an interval of black or brownish-black shales to which the name Dunkirk is now restricted (Pepper and de Witt, 1951). Its relatively sharp lower boundary affords one of the most useful horizons in the Upper Devonian strata. The Dunkirk grades upward into the overlying South Wales shale and attains its maximum thickness in Erie County. It has been traced eastward to near Woodhull, Steuben County, where it is only a few inches thick. Fossils are not abundant in the Dunkirk shale, only carbonized plant stems and conodonts having been discovered in a few outcrops.

*Perrysburg "formation" (Pepper and de Witt, 1951)

In western New York all the recognized rock units present in the interval between the base of the Dunkirk shale and the base of the Laona sandstone have been considered members of one encompassing unit, the Perrysburg formation. Inasmuch as the Laona or its correlate has not been traced eastward into the Wellsville region the term Perrysburg cannot be rightfully applied to rocks of this interval in the latter area.

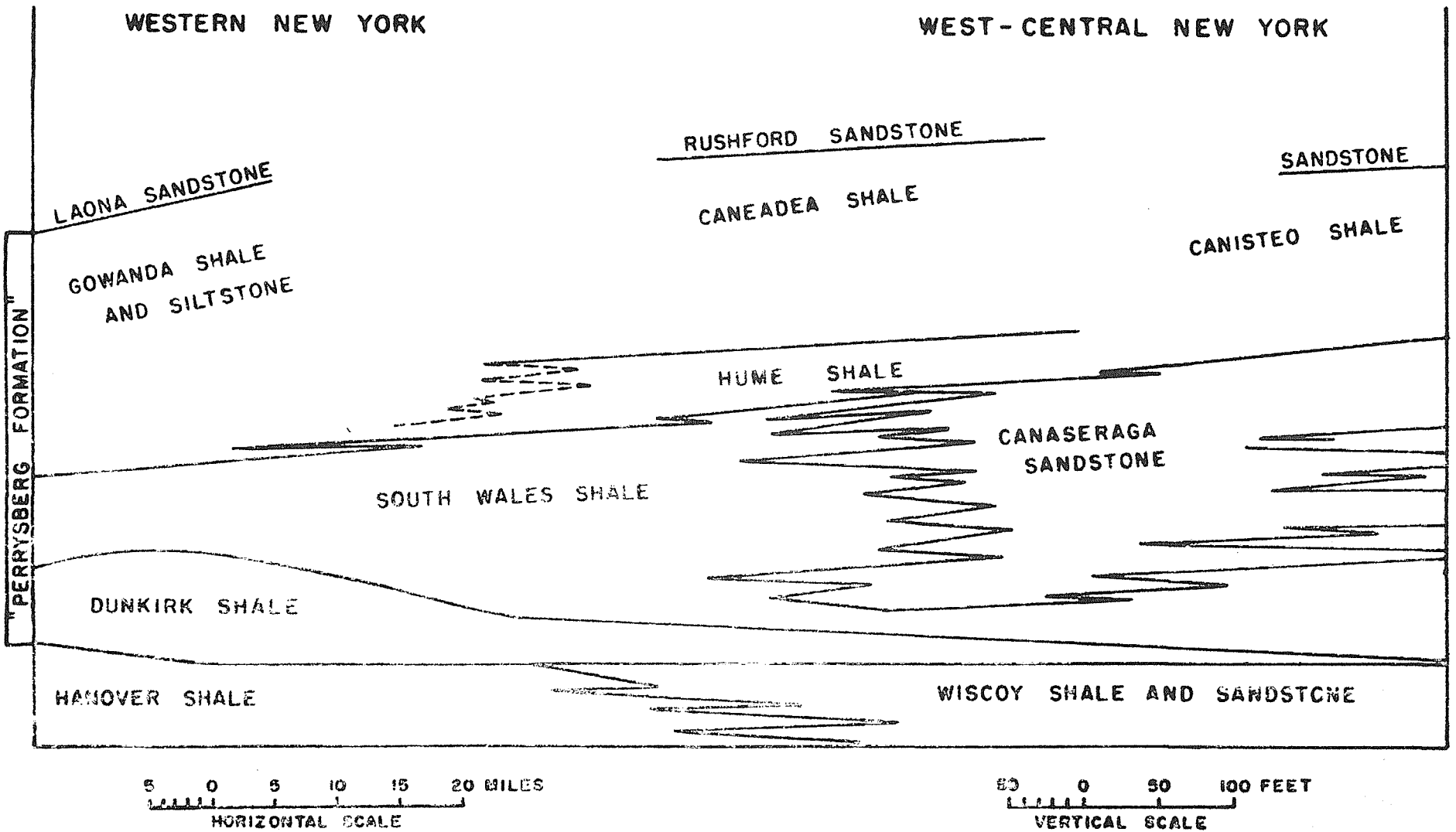


FIGURE 1
 UPPER CHEMUNG AND LOWER CANADAWAY STRATIGRAPHIC RELATIONSHIPS
 Modified from Popper and Gowen (1931)

Table 2 - General Stratigraphic Column of the Wellsville Area

*Those preceded by asterisk are the units seen on the trip (Skeleton section beneath Canadaway group)

Age		Rock Unit	Thickness (feet)
Lower Pennsylvanian Pottsville Series		Sharon Shale *Olean conglomerate (Sta. 13 & 16) (Unconformity)	50-90
Lower Mississippian Kinderhookian Series		Knapp "formation" (Unconformity)	
Upper Devonian	Chautauquan Series	*Oswayo shale (Sta. 15)	150 ±
		*Cattaraugus shale (Sta. 15)	375 ±
		*Wolf Creek conglomerate (Sta. 11 & 12)	5 ±
	Chadakoian Series	Germania "formation" (Sta. 5)	70 ±
		Whitesville "formation" (Sta. 8)	300 ±
		*Hinsdale sandstone (Sta. 2)	15 ±
		*Wellsville "formation" (Sta. 1)	200 ±
	Canadaway Group	*Cuba sandstone (Sta. 3)	40 ±
		*"Machias" shale (Sta. 4)	400 ±
		Rushford sandstone (Sta. 18)	?
Caneadea shale		280 ±	
Hume shale		0-35	
(Canaseraga sandstone and South Wales shale (Sta. 6))		160-300	
Dunkirk shale (Sta. 6)	20 ±		
		15 ±	
Senecan Series	Chemung, Naples & Genesee Groups	Several units	Subsurface
Middle Devonian	Tully Hamilton		-1890
Lower Devonian	Onondaga Oriskany		-2450 -2525
Upper Silurian	Salina		
Middle Silurian	Lockport Clinton		-3510 -3915
Lower Silurian	Medina		-3950
Upper Ordovician	Queenston Oswego Pulaski		-4025 -5050 -5190
Middle Ordovician	Trenton ls.		-5930
Lower Ordovician	Tribes Hill ls. dol.		-6780
Upper Cambrian	Little Falls dol. Theresa Potsdam ss.		-7050 -7590 -8220
Precambrian	granite, gneiss, etc.		0600

South Wales shale (Pepper and de Witt, 1951)

For the gray silty shales and mudstones, 20 to 80 feet thick, overlying the Dunkirk, Pepper and de Witt have recently proposed the name South Wales. In and east of the Genesee River Valley this shale is largely replaced by the Canaseraga sandstone (See figure 1). Save for rare conodonts, no fauna has yet been discovered.

Canaseraga sandstone (Chadwick, 1923)

In and to the east of the Genesee River Valley, thin to massive siltstone beds appear in the interval occupied by the upper South Wales and lower Hume shales to the west. These siltstones are well developed near Canaseraga, Allegany County, from which their name is derived. They include a thin local sequence of fossiliferous shales and sandstones to which Luther (1902) applied the name Long Beards Riffs sandstone. Aside from the "Chemung brachiopods" which reportedly occur in the Long Beards Riffs sandstone, no fauna is yet known from the Canaseraga. Its thickness increases eastwardly from 160 to 300 feet. (Woodhull or Cameron?)

Hume shale (Pepper and de Witt, 1951)

Above the Canaseraga (or South Wales) a second dark gray or black shale interval, 0 to 35 feet thick, has been recognized for which the name Hume has been proposed. This shale has not been traced extensively because of a lack of exposures and does not appear to contain fossils, excepting conodonts.

Caneadea shale (Chadwick, 1933)

Pepper and de Witt (1951) restricted the name Caneadea to an estimated 280 feet of gray silty shales and gray siltstones found in the Genesee River Valley overlying the Hume and extending upward to the base of the Rushford sandstone. Complete exposures of this shale are unknown. A small brachiopod fauna has been discovered. It grades eastwardly into the Canisteo shale (Pepper and de Witt, 1951) which, although lithologically similar to the Caneadea, is not strictly coterminous with it.

Rushford sandstone (Luther, 1902)

The fossiliferous gray siltstones and interbedded gray shales of unknown thickness occupying the interval between the Caneadea below and Machias above are but poorly known. The boundaries, extent, fauna and correlation of this interval of sandstone known as the Rushford afford fertile grounds for future investigators.

Machias shale (Chadwick, 1923)

The Machias consists of fossiliferous gray shales and gray siltstones whose limits, both stratigraphic and geographic, remain as yet unknown. It lies between the Rushford and Cuba sandstones, is approximately 400 feet thick, and appears to be equivalent to the Northeast shale of western New York. This is the lowest unit that will be visited on the geological field trip and will be examined at Station #3.

Cuba sandstone (Clarke, 1902)

At Cuba, Allegany county, about 40 feet of gray siltstones and finetextured sandstones overlie the Machias shale. The geographic extensions and correlations of this sandstone have not yet been fully determined but it appears that the Cuba may furnish a useful stratigraphic marker similar to that afforded by the base of the Dunkirk shale. The Cuba is fossiliferous, containing the highest known occurrences of the brachiopod Tylothyris mesacostalis which is a common Canadaway fossil. Cooper (1942) classified the Cuba as the basal unit of the Conneaut group but the presence of T. mesacostalis has caused several writers (Woodruff, 1942; Tesmer, 1955) to suggest that it be transferred to the top of the underlying Canadaway. This stratigraphic unit can be examined at Station #3.

CHADAKOIN GROUP (Chadwick, 1923)

Includes beds between the base of the Wellsville and the top of the Germania. Approximately the same as Conneaut Group (Chadwick, 1934).

Wellsville "formation" (Woodruff, 1942)

The Wellsville, overlying the Cuba sandstone in the Wellsville region, is about 200 feet thick and is composed of thin sandstones or siltstones and interbedded shales. It is relatively fossiliferous, containing particularly brachiopods and pelecypods. Calcareous beds, abounding in fossils, appear at several horizons within the Wellsville. The type locality of the Wellsville will be visited. It is Station #1 on the geological map.

Hinsdale sandstone (Chadwick, 1933)

This sandstone, named from the village of Hinsdale, Cattaraugus County, is recognized with some difficulty in the Wellsville region. In the latter area it consists of about 15 feet of hard, fine-grained sandstone containing a few small quartz pebbles at irregular intervals. Brachiopods, sponges and sponge spicules have been recovered from the Hinsdale at a few outcrops. Its geographic and stratigraphic limits remain poorly defined. This stratigraphic unit will be examined at Station #2.

Whitesville "formation" (Woodruff, 1942)

Originally the lower 300 feet of the Chadakoin "formation" of Chadwick (1923), the Whitesville is composed of both fossiliferous marine beds and equivalent green cross-bedded sandstones of non-marine origin. Apparently the Whitesville was deposited near the shore line under oscillating marine and non-marine conditions. It forecasts the dominantly non-marine deposition of the overlying Germania. The type locality of the Whitesville is at Station #8 with probable exposures of Whitesville at Stations #9 and 10.

Germania "formation" (Woodruff, 1942)

Above the Whitesville approximately 70 feet of thin green sandstones interbedded with red shales immediately underlie the Wolf Creek conglomerate. The Germania represents a period of non-marine deposition and usually lacks fossils except for a rather abundant pelecypod fauna in thin conglomerate beds near its base. The Germania is found exposed on the hills between Andover and Whitesville, New York. (See Station #5 on the geological map).

CONEWANGO GROUP (Butts, 1908)

Embraces strata from the base of the Wolf Creek to the top of the Oswayo. Approximately the same as Venango Group (Carll, 1880).

Wolf Creek conglomerate (Prosser, 1892)

The Wolf Creek is one of the persistent flat pebble conglomerates of the Late Devonian in New York. In the Genesee Valley it overlies the non-marine Germania and underlies the predominately red Cattaraugus shales above. It is composed of quartz-pebble conglomerates and light-colored sandstones and siltstones whose average thickness is about 30 feet. Fossils are rare in the Wolf Creek conglomerate although pelecypods, cephalopods, crinoids, fish and plant remains have been found. The type locality is at Station #12. The Wolf Creek, at Station #11 in a more recent but now abandoned quarry will be visited.

CATTARAUGUS SHALE (Clarke, 1902)

The Cattaraugus consists of red and green shales interbedded with greenishgray sandstones, about 375 feet thick in the Genesee River Valley. Westward in the Salamanca and Olean quadrangles the Cattaraugus has been subdivided into three units which are, in ascending order: the Amity shale (Chadwick, 1925), Salamanca conglomerate (Carll, 1880) and Saegerstown shale (Chadwick, 1925). The Salamanca is also a flat-pebble conglomerate. The Cattaraugus shales of the Genesee Valley have not yielded marine fossils with the possible exception of a few pelecypods. This stratigraphic unit can be examined at Station #15.

Oswayo shale (Glenn, 1903)

Overlying the non-marine Cattaraugus shales on the tops of the highest hills in the Wellsville region and westward in New York a fossiliferous shale of marine origin is found. The age of this shale, known as the oswayo, is not yet satisfactorily determined. Some geologists place it in the Devonian whereas others have considered part or all of it to be of Early Mississippian age. Its characteristic guide fossil is the brachiopod Camarotoechia allegania, although fossils in the Oswayo are rare east of the Olean quadrangle. The Oswayo of the Wellsville region is about 150 feet thick and is disconformably overlain by the Olean conglomerate of Pennsylvanian age. This stratigraphic unit will be seen at Station #15.

LOWER MISSISSIPPIAN

Knapp "formation" (Glenn, 1903)

In the Salamanca quadrangle, west of the Wellsville region, a shale containing two thin conglomerates intervenes between the Oswayo and Olean and has been differentiated as the Knapp. Its age is as yet uncertain but most authors place it in the Lower Mississippian Kinderhookian Series. The Knapp is apparently cut out of the section to the east by the sub-Olean unconformity and does not extend into the Wellsville region. It has been suggested, however, that a part of the rocks classified as Oswayo found beneath the Olean at "Rock City" may represent the easternmost occurrence of the Knapp.

LOWER PENNSYLVANIAN

Olean conglomerate (Lesley, 1875) and Sharon shale (Rogers, 1858)

West of the Wellsville region, the Oswayo shale is unconformably overlain by 50 to 90 feet of massively bedded conglomerate containing rounded pebbles. This is the Olean conglomerate which outcrops at the famous "Rock City" southwest of Olean in Cattaraugus County. It caps the highest hills just north of the Pennsylvania-New York state line. It is overlain by a small remnant of the Sharon shale, the youngest Paleozoic rock encountered in New York State. The type locality of the Olean conglomerate (Station #16) will be visited. The Olean is the highest unit which will be seen on this trip.