TRIP J

PROGLACIAL LAKE SEQUENCE IN THE TULLY VALLEY, ONONDAGA COUNTY

by

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Introduction

Few locations in the New York State display as varied an array of geological features as does the Tully Valley.

The Tully Valley is a glacially scoured trough carved into the northern margin of the Appalachian (Allegheny) Plateau (von Engeln, 1921). The glacial erosional and depositional features found here have been the subject of a number of theses and publications (Fairchild, 1909, 1932; von Engeln, 1921, 1959; Brainerd, 1922; Faltyn, 1957; Durham, 1958; Muller, 1964).

Most of the valley lies within the outcrop belt of the Middle Devonian Hamilton Group. Unlike similar steep-sided troughs to the west, the Tully Valley does not now contain a finger lake. Because of the relatively low temporary base level, due to the absence of a lake, tributary streams have opened excellent exposures even in the lower formations of the Hamilton Group. East-west tributaries, in hanging valleys have carved deep, post-glacial, bedrock gorges, wherein the extremely fossiliferous Hamilton rocks are easily accessible. Therefore, the Tully Valley is also a highly stimulating region for the paleontologist and stratigrapher.

The purpose of this narrative is to outline the proglacial lake sequence of the Tully Valley as indicated by correlating the elevations of the delta

masses deposited in these lakes with those of the abandoned outlet channels southeast of Syracuse.

This report is a compilation based mostly on the work of previous investigators and the examination of topographic maps. It should not be misconstrued as the final authoritative explanation of the apparently simple, but actually complex late Pleistocene history of the Tully Valley.

The Tully Valley lake sequence occurred during the Lake Dana stage (Fairchild, 1909, 1932) after the second Lake Warren (elevation 690 ft.), outlet through the Mississippi system and before the Lake Iroquois stage (elevation 435 ft.), outlet through the Mohawk River. Calkin (1966) has correlated high level lake stages in the Huron, Erie and Ontario basins with years B.P. and indicates an age of about 12,000 - 12,500 B.P. for Lake Dana.

The reader should consult Calkin's report, Fairchild's numerous publications, and also those by Rich (1908), von Engeln (1921, 1959), Hough (1958), Muller (1964, 1965), and Krall (1966) for more details concerning this extremely fascinating topic.

Description of Deltas

The great delta remnants of the Tully Valley extend from the village of Cedarvale on the west, eastward through South Onondaga and north-eastward to the city of Syracuse. They occur as a series of terraces that the author has grouped into five stages, whereas Fairchild (1909) distinguishes six. The South Onondaga 7 1/2 minute quadrangle covers this area.

The highest delta remnant declines in terraces from an elevation of 860 to 780 feet. The major portion of this delta is located at the Western end of Pumpkin Hollow and south-southeast of Cedarvale. Two other remnants

of this delta occur as mesas farther to the east; one just southeast of Nichols Corners with a summit elevation of 800 feet and the other northwest of South Onondaga with a summit elevation of 780 feet. These would correlate with Fairchild's (1909) Upper Terrace and Mesa Terrace.

The next series of deltas begins at an elevation of 720 feet and extends down to 660 feet. This delta is found in two distinct masses. The first, just east of the main mass of the first delta and northwest of Nichols Corners. It is bounded by Amber Road on the west, Holmes Road on the north, and Tanner Road on the south. The remainder of this delta is located northwest of the village of South Onondaga. This delta corresponds to Fairchild's (1909) middle Terrace.

The third delta mass (640 feet - 600 feet) is perhaps the most extensive and best developed of the Tully Valley deltas. The village of South Onondaga rests directly on its summit, that extends up the northwest side of the valley ending north of Indian Village. On the south and southwest side, this delta forms a large triangular mass from just west of the settlement of Ironsides to the east branch of Onondaga Creek. Hitchings Road north of its intersection with U. S. Route 20 and south of its intersection with Nichols Road traverses this large delta. Fairchild (1909) has named this delta the South Onondaga Terrace.

At an elevation of 560 feet, the fourth delta terrace can be recognized. It is composed of small deltaic remnants occurring on both sides of the Tully Valley north of Indian Village and south of Nedrow. These may in part be kame terraces (Muller, personal communication). Fairchild (1909) refers to this deltaic remnant as the Lower Terrace.

The lowest easily recognizable delta, Fairchild's (1909) Lowest Terrace

occurs at an elevation of 500 feet. It is located north of the 560 foot delta, on both sides of the valley, underlying Nedrow and the southern extremities of the city of Syracuse.

Description of Meltwater Channels

Southeast of Syracuse, lies a group of meltwater channels that carried the waters of the proglacial lakes in the Tully Valley eastward across the intervalley divide into the adjacent trough, the valley of Butternut Creek. These are, from south to north, the Smoky Hollow, Clark Reservation, Rock Cut, Meadowbrook and Erie Canal Channels.

Muller (1964) and Sissons (1960) have described the numerous channels found in east central New York. Sissons (1960) further suggests that many of these glacial meltwater channels are subglacial and not marginal in their origin.

Smoky Hollow is the highest of the meltwater channels with a threshold of approximately 790 feet. It is about 2.25 miles long and over 100 feet deep. This channel is distinctive because of the large horseshoe-shaped meander loop located east of Barker Hill Road.

Perhaps the most impressive meltwater features to be found in the area are those of the Clark Reservation Channel at Clark Reservation State Park. Here, glacial meltwaters once plunged over a horseshoe waterfall more than 100 feet high. The abandonment of this channel has left behind a large ampitheater at the base of which is a plunge pool basin containing Green Lake.

East of the precipice a well developed channel leads into the Butternut trough. Just west of the brink of the ampitheater, there is a smaller plunge pool feature, the basin of Dry Lake. Muller (1964, p. 31) in discussing this feature states:

> "...Although considerably smaller and shallower than the basin of Green Lake, this too has characteristics of a plunge pool occupied for a short interval and cut perhaps by a stream with smaller discharge. The rock threshold at 720 feet, between the two basins, rules out any suggestion of uninterrupted progressive headward migration of the falls. Rather, it raises a question as to the initial declivity responsible for originating the upper plunge-pool."

There is no well developed channel upstream from Dry Lake. The source of the water responsible for the meltwater scour presents a problem. The water could have been carried over or through the ice from the Tully Valley lake then emerging as a subglacial or submarginal stream at Clark Reservation. Another possibility is that the waters are derived entirely from the ice mass as englacial streams.

The best developed channel is the Rock Cut Channel. It has a threshold of 555 feet, is 100-200 feet deep, and 2-3 miles long. Due to the magnitude of this channel plus certain features on the south wall (Muller, 1964), it seems reasonable to hypothesize more than one episode of glacial meltwater scour.

Just north of the Rock Cut Channel is the Meadowbrook Channel. This channel is smaller in size than the others and has a threshold at about the same elevation as the Rock Cut Channel.

The Erie Canal Channel, the lowest of the scourways, lies at about 410 feet. This channel was utilized by the old Erie Canal (now Erie Boulevard) through the city of Syracuse. The floor of this channel is depositional rather than erosional (Muller, 1964).

Tully Valley Lake Sequence

The classical approach to analyzing the proglacial drainage in New York

State has been that of H. L. Fairchild or some modification thereof. Fairchild (1909, p. 7) succinctly states this premise as follows:

> "... The glacier acting as a barrier to northward drainage is the fundamental fact to be apprehended by the reader. The ice sheet was a melting dam during both its advance and its retreat, and waters were flowing copiously from it, not into it. Valleys or land depressions sloping toward the ice front were by the ice barrier made into lake basins ...."

This notion has been recently challenged by Sissons (1960), who suggests that the ice was permeable substance and that subglacial and/or englacial drainage was a common occurrence. In the Tully Valley, the proglacial lake sequence can best be explained by the ice dam hypothesis, or a combination of the two. The cross-channels may well have been initiated subglacially, (Muller, personal communication).

When the ice front melted back from the Valley Heads Moraine at Tully New York, Lake Cardiff was formed south of the ice front and north of the moraine (Fig. J-1 & J-2). It drained south over the moraine into the Susquehanna system and had an elevation of about 1200 feet. Another lake at a slightly lower elevation in the vicinity of Cedarvale drained southwest into the Otisco Valley (Krall, 1966). This lake is not shown in Fig. J-2.

The ice front continued to retreat northward until it permitted initial eastward drainage, (Fig. J-3) through Smoky, Hollow, of the imponded Tully waters. The northward drainage of waters in the neighboring Otisco Valley to the west, blocked by the ice located near Marcellus, overflowed to the east through Pumpkin Hollow. As this meltway debouched into the "Smoky Hollow" lake, the first delta (860-780 feet) was constructed (Fig. J-3).

With continued northward withdrawal of the ice front, a new lower outlet was uncovered, the Clark Reservation Channel (Fig. J-4). The lake level dropped

to a lower elevation of about 720 feet. The Smoky Hollow Channel was abandoned and the first delta became a terrace above lake level. Reworking of the first delta partially contributed to formation of the lower delta at about 720 feet (Fig. J-4).

The Clark Reservation Channel may have been formed at the same time or before the Smoky Hollow Channel as discussed on page J-5. However, the geographic location of this channel, north of the Smoky Hollow and south of the Rock Cut Channels, best fits the lake drainage sequence hypothesized here, i.e., that it is the second oldest channel.

The downcutting of the Rock Cut Channel began when the ice front retreated north of the Clark Reservation Channel. This scourway controlled lake level from 720 feet down to 560 feet (Fig. J-5). As the elevation of the lake was gradually lowered in response to the outlet, deltas number two (720-660), three (640-600 feet), and four (560 feet) were formed in succession (Fig. J-5). Each succeeding delta received a portion of its material from the reworking of the previous higher delta.

The Meadowbrook Channel, because of its size and orientation toward the ice front (Muller, 1964), may have operated briefly and perhaps simultaneously with the Rock Cut Channel. If this happened, it occurred just prior to the opening of the Erie Canal Channel.

Finally, the Erie Canal Channel was uncovered and began to drain water from the Tully Valley trough. The lake level gradually dropped from about 550 feet to 410 feet. The fifth delta terrace at 500 feet (Fig. J-6) is one of the deltaic deposits that record this final episode in the Lake Dana history of the Tully Valley. (Figs. J-6, J-7)

In conclusion, it should be pointed out that the delta terraces may not have been deposited from highest to lowest as outlined above. Muller (1964) and Krall (1966) offer evidence for multiple episodes of glaciation involving at least one major readvance and perhaps numerous oscillations of the ice front. Furthermore, Krall (1966) suggests that delta remnants in the vicinity of Nichols Corners were built one on top of the other. Certainly the lake sequence is more complex than that proposed here. However, in the absence of fully detailed analysis the sequence of events and deltaic terraces is still most economically explained in terms of a gradual lowering of lake levels within a single deglacial episode.

Acknowledgements

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Fig. J-1

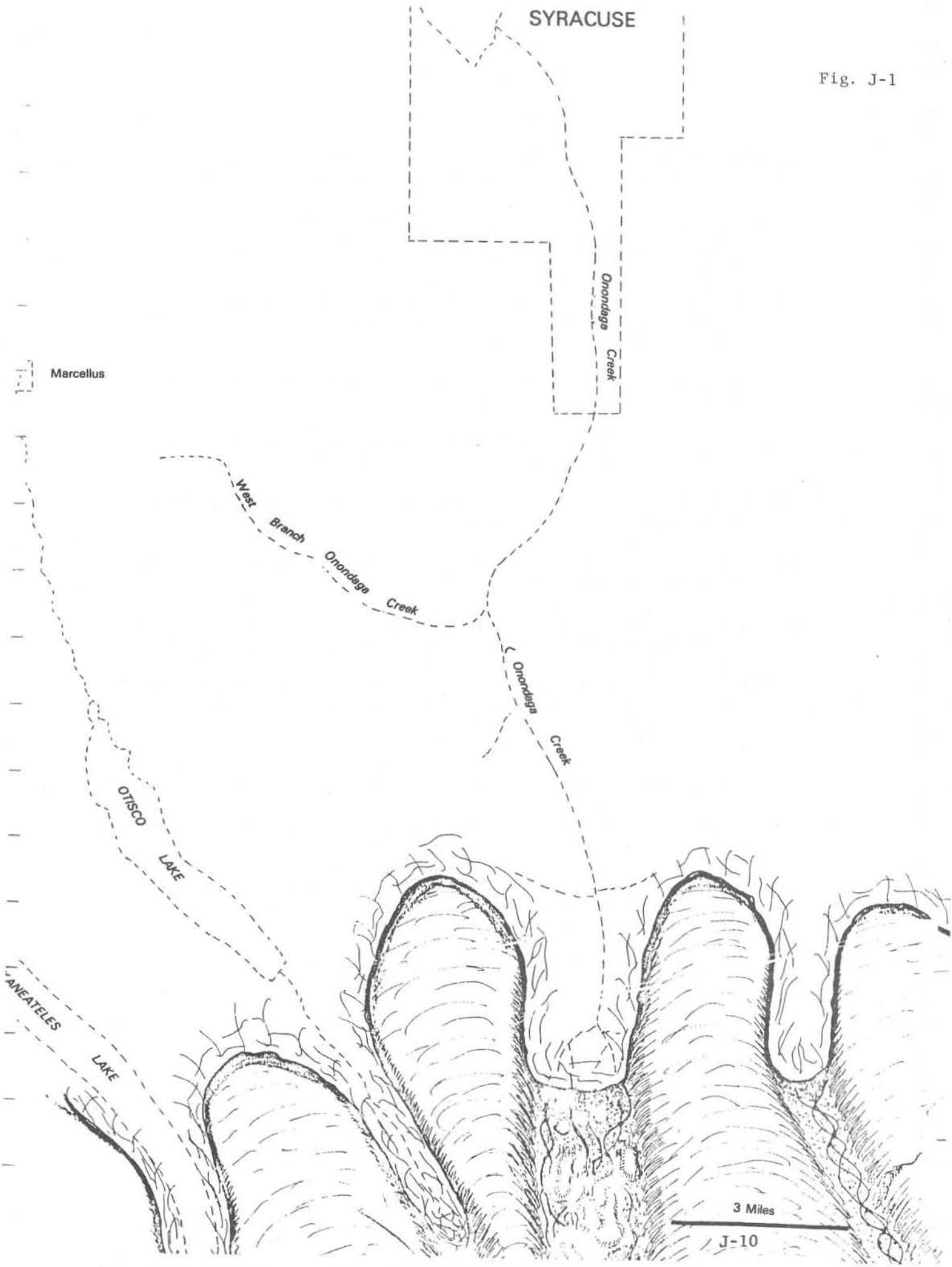

SYRACUSE
Onondaga Creek
Marcellus
West Branch Onondaga Creek
Onondaga Creek
OTISCO LAKE
LANEATELES LAKE
3 Miles

Fig. J-2

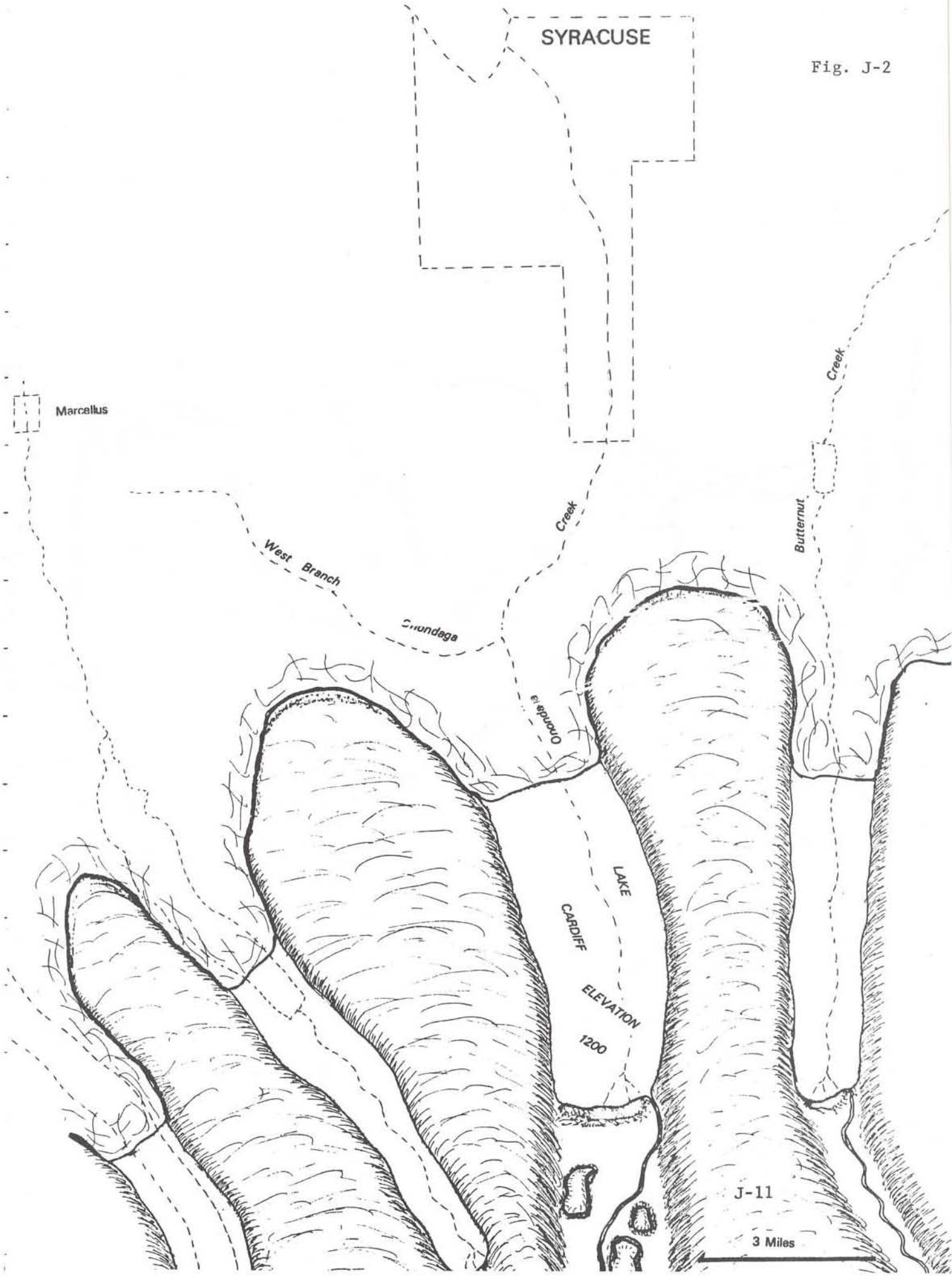

SYRACUSE
Marcellus
West Branch
Creek
Butternut
Creek
Onondaga
LAKE
CARDIFF
ELEVATION
1200
J-11
3 Miles

Fig. J-3

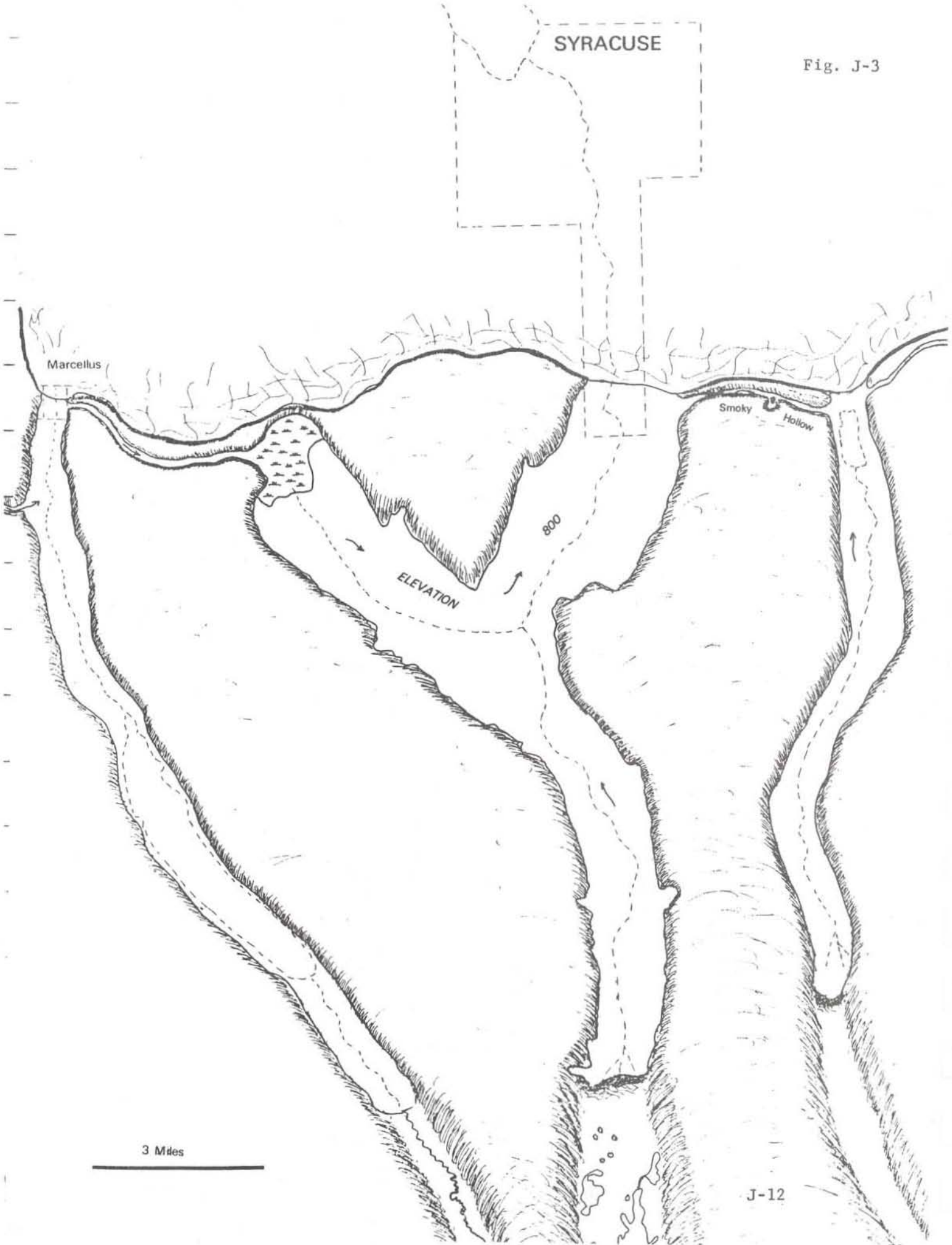


Fig. J-4

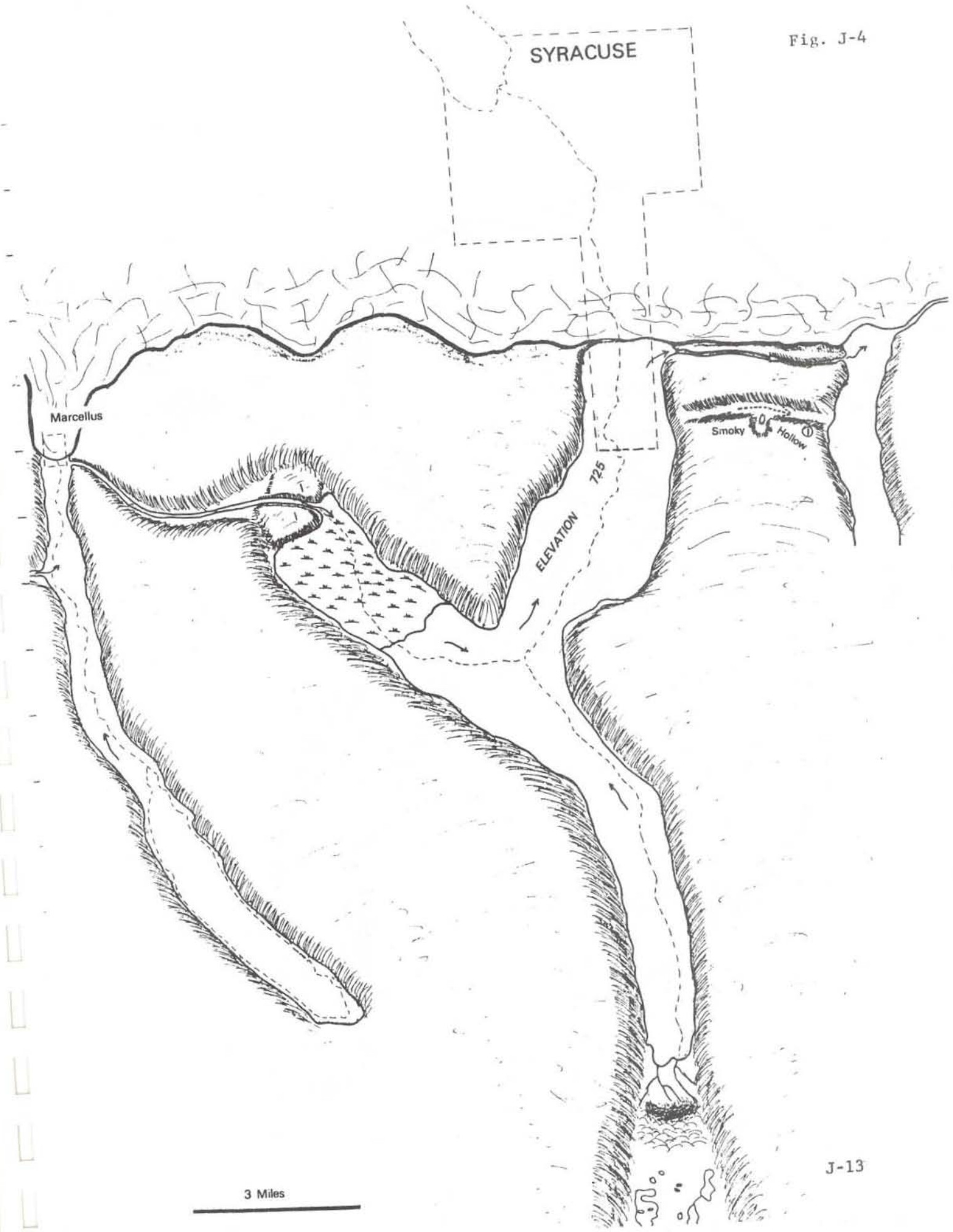
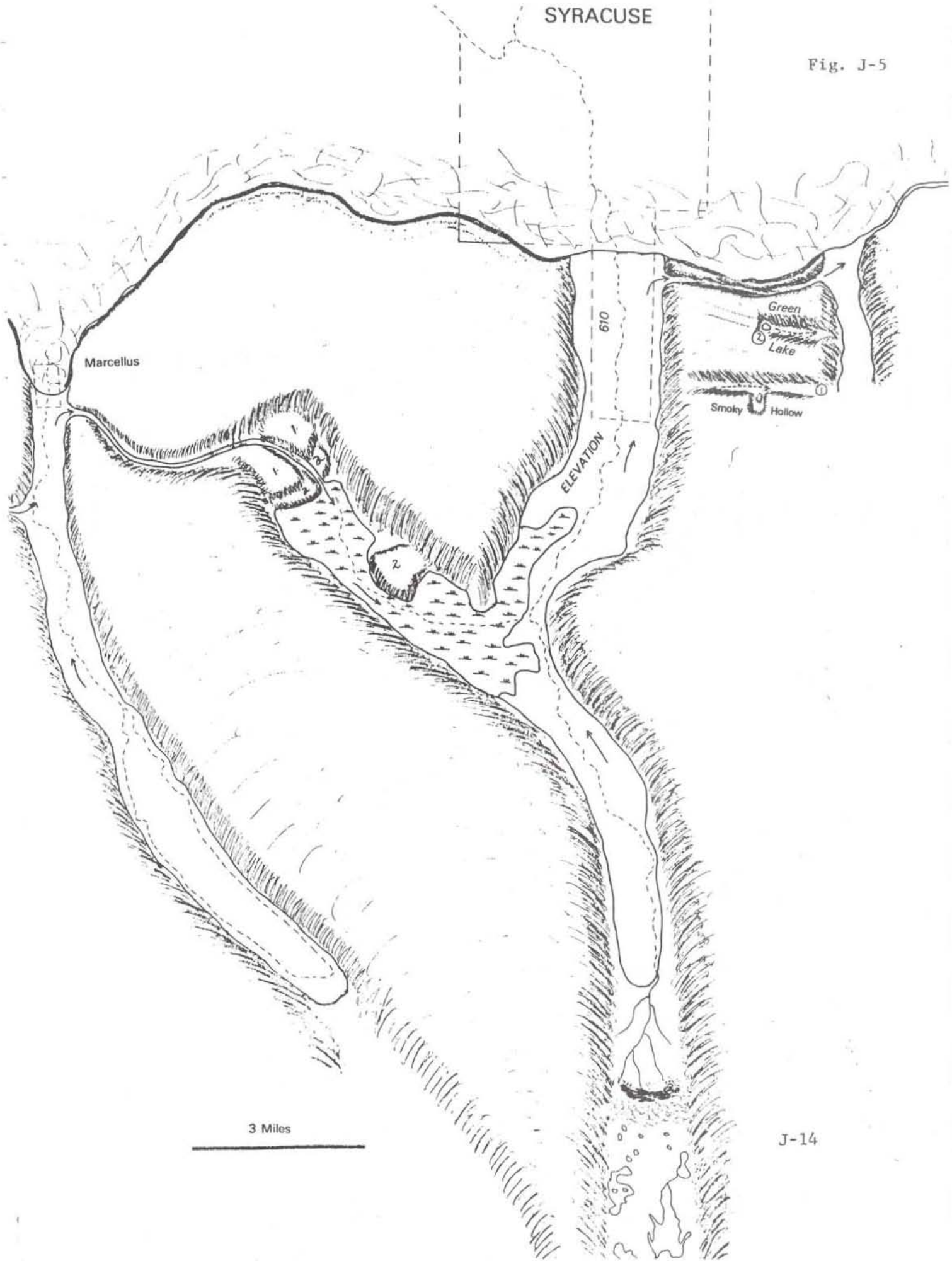


Fig. J-5


SYRACUSE
Marcellus
610
ELEVATION
Green
Lake
Smoky
Hollow
3 Miles

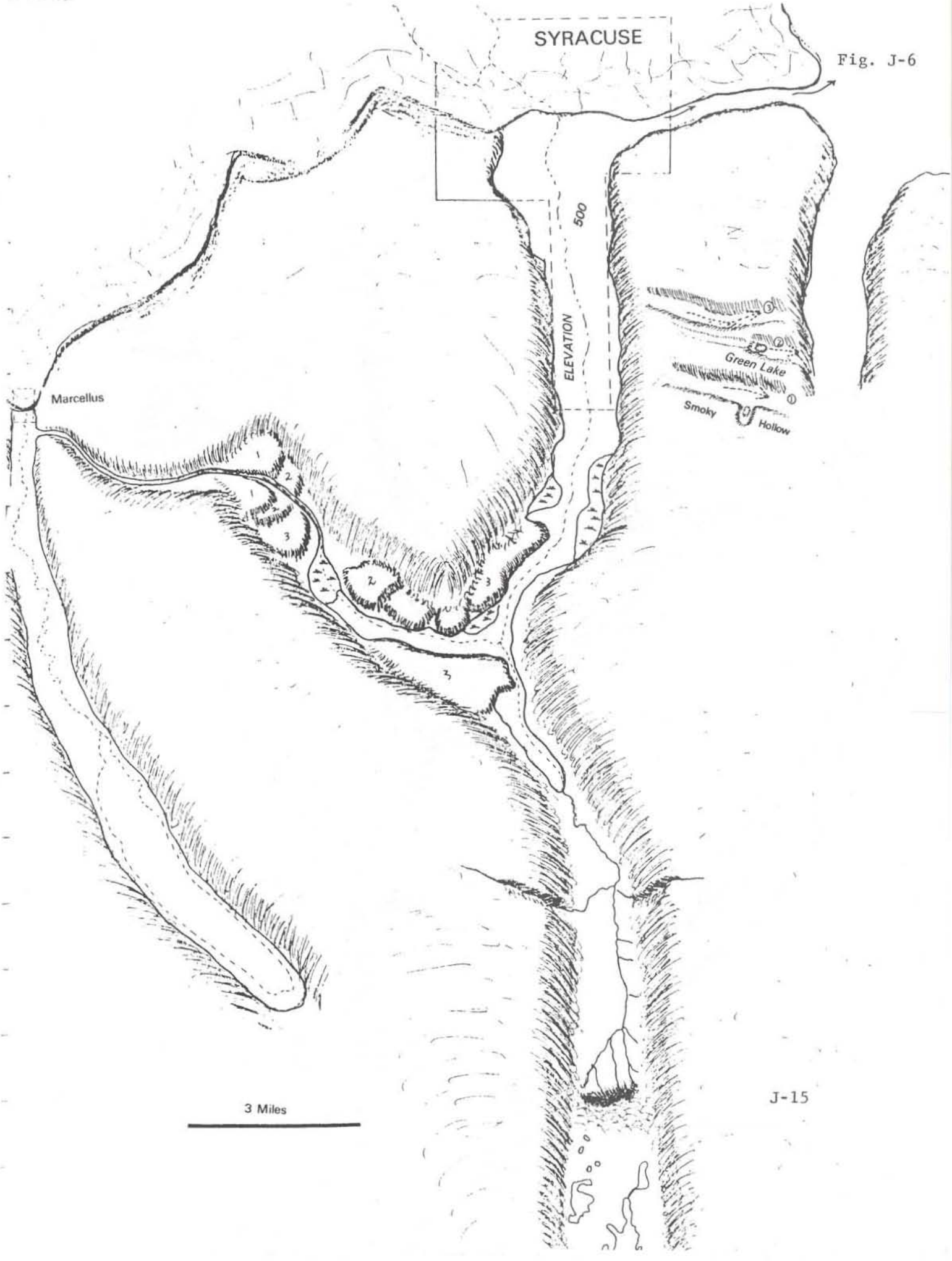

SYRACUSE
500
ELEVATION
Green Lake
Smoky
Hollow
Marcellus
3 Miles

Fig. J-6

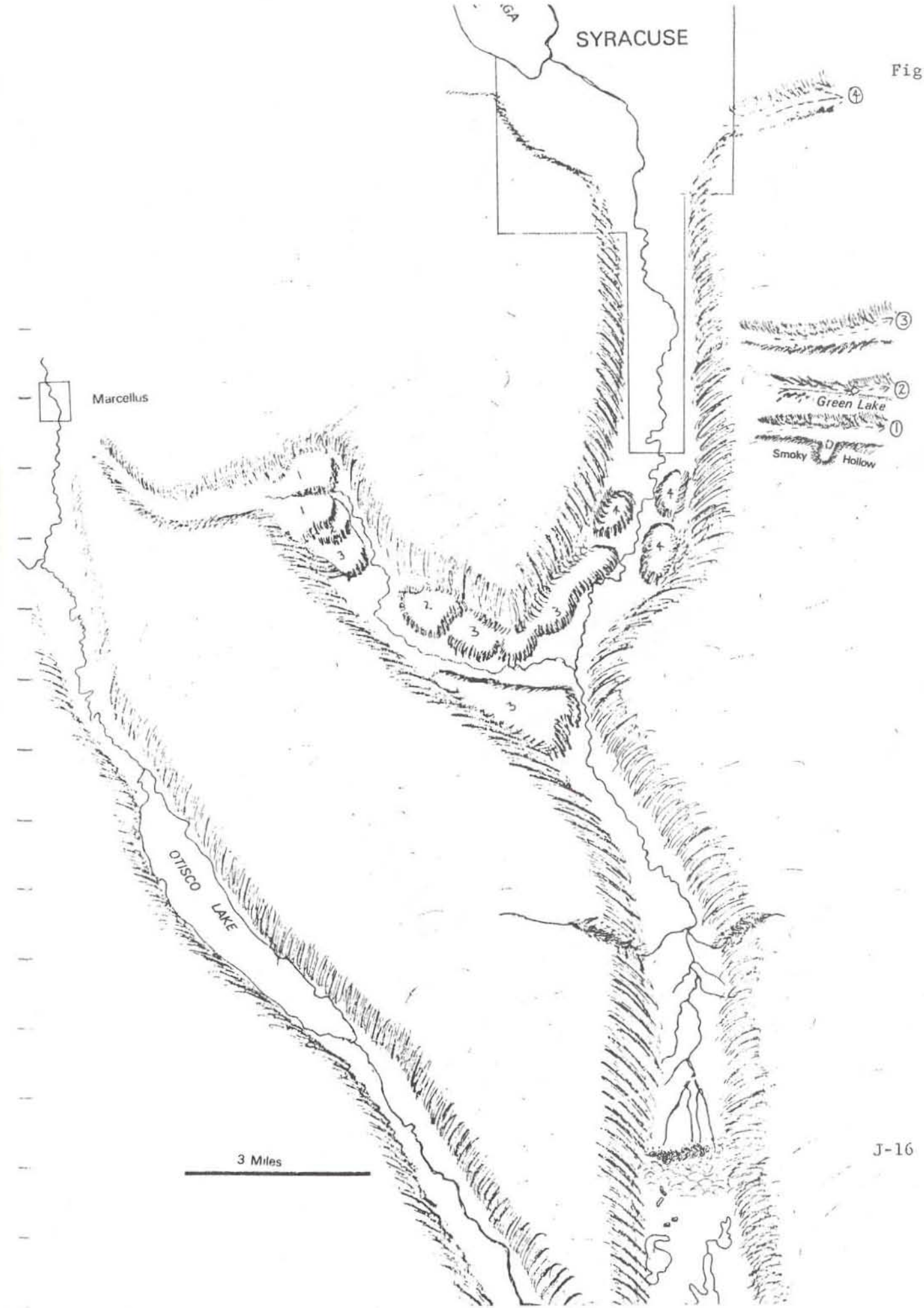

SYRACUSE
Marcellus
Green Lake
Smoky Hollow
OTISCO LAKE
3 Miles

Fig. J-7

TRIP J: PROGLACIAL LAKE SEQUENCE IN THE TULLY VALLEY, ONONDAGA COUNTY

Leader: Thomas X. Grasso, Monroe Community College, Rochester, N.Y.

Total miles	Miles from last point	Route description
0.0		Right (E) on Route 13 from Holiday Inn to Interstate 81.
0.1	0.1	North on Interstate 81. Notice along the route that kettles are more numerous on the west side of the valley where a narrow bench can also be seen. Greater insulation and melting occurred along the east sides of valleys at the time of final deglaciation. The ice remained longer along the west valley wall where it was protected from the afternoon sun. Here the relatively thicker ice masses were finally buried to form Little York Lake, Crooked Lake and Song Lake.
10.0	9.9	In the Preble region, Interstate 81 crosses a fan deposited by a stream from Otisco Valley. Deposition of the fan crowded the West Branch Tioughnioga River against the east wall of the valley. These factors suggest that ice was active longer in Otisco Valley than in Onondaga Valley. Buried ice still existed in the valley so that melting and collapse were occurring while deposition continued from the northwest source.
14.0	4.0	Proceed north on Interstate 81 to Tully Exit (#14), New York Rte. 80.
14.2	0.2	Turn left (west) on New York Rte. 80.
15.5	1.3	Turn right (north) onto Tully Farms Road.
15.7	0.2	STOP 1. Gravel Pit in Tully Moraine

GATEHOUSE POND AND SOLVAY GRAVEL PIT

Steep-walled gravel pit exposes materials composing major part of Tully moraine, showing it to be largely a product of outwash deposition from a stationary to narrowly oscillating ice margin. Exotic component in this through valley gravel is high with crystalline-carbonate-clastic ratios on the order of 10:40:50. The "bright" character of the gravels results from proximity to carbonate sources, attrition of diluting

Total miles	Miles from last point	Route description
		shale fraction from the lake plain, and effectiveness of glacial transport in a major through valley.
		Continue north on Tully Farms Road.
19.4	3.7	Intersection, Otisco Road, continue north on Tully Farms Road.
21.0	1.6	Cross Onondaga Creek which drops at Fellows Falls with hanging and barbed juncture into Onondaga trough, in this area called Tully Valley. Ahead (NE), local relief exceeds 1250 ft. from upland to trough floor on proximal (northern) flank of massive Tully (Valley Heads) Moraine. The abrupt proximal border and gently graded distal slope of this moraine is characteristic of valley blocking moraine loops of this system on divides and northward opening valleys of central New York.
		Seismic refraction profiles suggest that the unconsolidated valley fill in mid-trough opposite Fellows Falls may be 400 to 500 ft. thick, with the bedrock floor at 300 to 400 ft. msl. Northward, in the vicinity of Syracuse the bedrock floor of the trough lies below sea level. Southward the rock floor rises to 975 ft. above sea level in the col at Tully Lake.
22.1	1.1	Junction U.S. Rte. 20 - turn left (west).
23.8	1.7	Now riding over the surface of the third delta (el. 610') built into a lake whose outlet was the Rock Cut Channel.
24.4	0.6	Intersection of Hitchings Road - continue west.
25.7	1.3	Junction N.Y. Rte. 80 - continue west.
26.7	1.0	Southwest of Joshua Corners note level swampy area at head of minor meltwater channel which deposited a delta complex into a predecessor of Otisco Lake, 3 miles to the southwest.
28.1	1.4	Intersection of Amber Road (Navarino) - continue west.

Total miles	Miles from last point	Route description
28.6	0.5	Cross Smith Hollow (Navarino Channel). With threshold at 1005 ft. about one mile north of Rte. 20, the Navarino Channel developed as an outflow or overflow channel, bearing meltwater from Pumpkin Hollow (Lake Cedarvale) into Lake Marietta in Otisco trough.
30.3	1.7	Intersection Slate Hill Road - turn right (north) onto Slate Hill Road. Four small marginal meltwater channels notch the nose of Slate Hill to the west.
31.8	1.5	Intersection Seal Road - continue north on Slate Hill Road. Observe Pumpkin Hollow to the east (right). Cut sharply through Hamilton Shale section and floored on Onondaga Limestone. This is one of the largest of the cross channels which carried drainage eastward along the plateau margin. Pumpkin Hollow is about 0.25 miles wide and as much as 400 feet deep. Three miles east of Marcellus it widens abruptly to nearly a mile.
33.4	1.6	Intersection Rockwell Road - bear right on Slate Hill Road.
33.7	0.3	Junction N.Y. Rte. 175 - turn right (north) on N.Y. Rte. 175.
34.1	0.4	Intersection Pleasant Valley Road - turn right (east). This is the head of the channel that carried the meltwaters from the Otisco Valley eastward into the Tully Valley. It becomes progressively wider eastward (downstream).
37.4	3.3	Sharp hairpin turn in Pleasant Valley Road. Proceed for several hundred feet. STOP 2. The sudden widening of the valley at this point, plus the absence of bedrock exposures in this area has led Krall (1966) to suspect that this is a buried pre-glacial or interglacial valley.

Total miles	Miles from last point	Route description
		Continue on Pleasant Valley Road
39.1	1.7	Intersection Amber Road - turn right.
39.3	0.2	Intersection Cedarvale Road - turn left.
41.2	1.9	Intersection Tanner Road - turn left.
41.7	0.5	STOP 3. Gravel Pit Entrance - turn right.
		This pit is being excavated in the second series of deltas (elev. approx. 700'). Shale pebbles occur frequently in the gravel and crossbedding is conspicuous.
		Return to Tanner Road - turn right.
42.3	0.6	Intersection South Onondaga Hill Road (Makyes Road) - turn right.
42.8	0.5	Break in slope on S. Onondaga Hill Road.
43.1	0.3	Entering Village of South Onondaga.
43.3	0.2	Junction - N.Y. Rte. 80, Cedarvale Road and S. Onondaga Hill Road (Makyes Road) - Turn right onto Cedarvale Road.
43.4	0.2	STOP 4. Gravel Pit Entrance.
		Gravel pit is in the second delta terrace. (Fairchild's Middle Terrace)
43.7	0.2	Return to Cedarvale Road - turn left. Junction - N.Y. Rte. 80, Cedarvale Road, S. Onondaga Hill Road (Makyes Road) continue straight through the intersection on N.Y. Rte. 80 (Cedarvale Road).
44.6	0.9	Bear right on N.Y. Rte. 80.
44.7	0.1	Griffin Road on left.
45.1	0.4	Hitchings road on right.
45.7	0.6	Unnamed road at bend in N.Y. Rte. 80 - turn right.

TRIP J (Continued)

Total miles	Miles from last point	Route description
46.5	0.8	Junction - Unnamed road and N.Y. Rte. 11A- turn left (north).
47.0	0.5	Settlement of Indian Village
47.6	0.6	Leaving Indian Village
50.9	3.3	Junction U.S. Rte. 11 - turn right.
51.8	0.9	Overpass (bridge) carrying I-81.
51.9	0.1	Intersection - Kennedy Road - turn left (east).
51.95	0.05	Bear sharp right onto Kennedy Road (south).
52.9	0.95	Intersection Bull Hill Road - turn left (east).
53.9	1.0	Intersection Sentinel Heights Road - turn right (south).
54.2	0.3	Road leading to base of WSYR TV tower - turn right (west).
54.3	0.1	STOP 5. Base of tower.
		Looking west can view the Tully Valley deltas just traversed. Also Joshua Coral Bed (Ludlowville Fm.) is exposed here.
54.4	0.1	Return to Sentinel Heights Road - turn left.
54.7	0.3	Intersection Bull Hill Road - turn right (east).
55.9	1.2	Intersection Lafayette Road - turn left (north).
56.6	0.7	Coye Road on right - continue north on Lafayette Road.
57.3	0.7	Intersection Barker Hill Road - turn right.
57.7	0.4	Meltwater channel - Smoky Hollow with horseshoe-shaped loop
58.5	0.8	Floor of Smoky Hollow meltwater channel (elev. 790'). East Syracuse reservoir on left.
		Smoky Hollow, with bedrock floor just below 800 feet, is sharply incised in Hamilton Shales. This outlet may have controlled drainage of

Total miles	Miles from last point	Route description
		imponded waters in the Onondaga trough at the highest delta level in Cedarvale Channel (seen at STOP 3). Descend from drumlinized Hamilton upland onto channeled Onondaga bench.
59.4	0.9	Junction N.Y. Rte. 173 turn right (east).
60.1	0.7	Entrance Clarke Reservation - turn left. Straight ahead to parking lot and "waterfalls".
60.3	0.2	STOP 6. Parking Area. Clarke Reservation Channel observed here.
		Erosion by glacial meltwater, solution by underground water and joint control responsible for the features. Green Lake occupies the plunge basin cut into the Onondaga Limestone and underlying beds by waterfalls fed by glacial meltwater.
60.6	0.3	Return to N.Y. Rte. 173 - turn left.
61.3	0.7	Jamesville City limits.
61.9	0.6	Crossing D.L.&W. Railroad tracks. Make a sharp left onto Jamesville Road after crossing tracks.
62.7	0.8	Intersection Rockcut Road.
62.8	0.1	Bear left at fork in road. Proceed over one lane bridge.
62.9	0.0	Bear right. Entering Rock Cut Channel.
		This steep-walled, flat-bottomed channel is floored by the Fiddlers Green Dolomite, with threshhold at 550 feet at the west end and average eastward gradient of less than 10 feet per mile. The size of this channel and the configuration of the south wall suggest glacial advance south of Rock Cut Channel after the channel had attained essentially its present dimensions.
63.6	0.7	Nottingham Road - continue straight.
		Note features in south wall (left side) of channel.

TRIP J (Continued)

Total miles	Miles from last point	Route description
65.4	1.8	Syracuse City limits
65.9	0.5	Intersection E. Brighton Avenue - turn right on E. Brighton Avenue to I-81.
66.8	0.9	Bridge overpass I-81.

END OF TRIP