Bathymetry of the area exhibits a complex fabric of arcuate and linear shoals having relief of 4-8 m and lengths of 2-8 km. A collection of 120 vibracores (1-3.7 m length), 35 grab samples, and 1400 line-km of high resolution seismic reflection profiles has been analyzed to date. The cores and seismics show that four primary units are present to subbottom depths of 25 m: (1) sand and gravel of fluvial/deltaic origin (Cape May Fm. of Sangamon age); (2) muddy estuarine sands, possibly representing a mid-Wisconsin high sea level; (3) Holocene estuarine/lagoonal/barrier units; and (4) modern marine shelf sands representing a mix of winnowed and reworked substrate and littoral sediments transported south along the New Jersey coast. Sandy muds exposed in swales between shoals are eroded by tide and wave generated currents. These may be a major source of fine sediment for resuspension and transport. Asymmetric infilling from the north has offset the present Delaware Shelf valley to the south from a buried paleochannel.

Estimates for mineral resources in the upper 10 m of the seabed are encouraging. Volumes of sand and granule-size gravel (3ϕ to -2ϕ) are conservatively estimated to be $> 1 \times 10^9$ m^3, and heavy-mineral concentrations are $\leq$4% at the seabed but show large variance due to complex Quaternary sea-level history and associated nearshore processes.

LITHOTECTONIC CHARACTER OF THE WESTERN GNEISS TERRANE, SENJA, TROMS, NORWAY | № 57208

WILLIAMS, T.J., CLARK, A.H., DALLMEYER, R.D., Department of Geology, University of Georgia, Athens, GA 30602; ANDRESEN, A., Institute of Geology, University of Tromsø, Tromsø, Norway

Crystalline Precambrian rocks of the Western Gneiss Terrane (WGT) form a structural foundation for tectonically overlying Caledonian allochthonous sequences in northwestern Norway. The WGT exposed on Senja is heterogeneous and appears to consist of three distinct chrono-tectonic units. The oldest is represented by a series of polydeformed, biotite-quartz-two feldspar gneisses together with intercalated amphibolite. This terrane is host to an older intrusive sequence (OIS) which is largely represented by magnetite-bearing metagranite, metagranodiorite, and metadiorite. Representatives of the OIS may be traced into extensive zones of blastomylonitic rocks which have previously mapped as 'migmatitic gneisses'. Xenoliths of these blastomylonitic gneisses occur within undeformed portions of members of a younger intrusive sequence (YPS) which includes metaquartz syenite, metasyenite, variably textured metagranite and megacrystic alkali-feldspar metagranite. Consideration of preliminary Rb-Sr whole-rock analyses and geochronological data previously reported for the WGT exposed on islands immediately southwest (Lofoten-Vesterålen; Griffin et al., 1978) and north (Kvaløy; Andresen, 1980) of Senja suggest that the older, polydeformed gneisses are likely of Archean (Karelian) age, and that at least some members of the YPS are of Svecokarelian age (c. 1700-1800 Ma).

A NNE-NNW trending, conjugate set of steep, west-dipping, variably mylonitic ductile strain zones are developed throughout the WGT exposed on Senja. These affect all chrono-tectonic units, including the YPS, and appear to record ductile basement shortening associated with emplacement of the structurally overlying Caledonian allochthons.

WERE OPHIOLITIC ROCKS A SIGNIFICANT SOURCE FOR THE NEW YORK TACONIC FLYSCH? | № 68434

WOLF, Douglas; KIDD, W.S.F.; KUSKY, Tim, and ROWLEY, David B., Geological Sciences, S.U.N.Y. at Albany, Albany, N.Y., 12222

Turbidites in the Taconic flysch of Quebec (Hiscott, 1978) and Newfoundland (Stevens, 1970) contain substantial quantities of chromite as well as serpentine and other ophiolite-derived detritus. The source is apparent in well-preserved relics of an ophiolite thrust sheet above the flysch. In the New York-New England and more southerly segments of the Appalachians, no well-preserved ophiolites are present. We have made a preliminary study of the oldest (allochthonous) flysch of the Taconic Allochthon (the Pawlet Fm.) to determine if an ophiolite nappe comprised part of the source in this segment of the Taconic orogen. Analyses by energy-dispersive electron probe of grain mounts made by magnetic separation show that the opaque mineral suite in the four samples consists dominantly of magnetite and ilmenite. Large variations in the proportion of these two minerals occur between samples. Up to about 10% of the opaque grains in three samples are chromite, but it is not present in the other sample. Minor quantities of rutile, sphene, and (?) pyroxene are also present. Garnet is present in one sample in minute quantity. In comparison with the Quebec and Newfoundland flysch, the samples examined are much poorer in chromite, although not wholly devoid of it. It is therefore unlikely that there was a significant ophiolite nappe in this and more southerly sections of the Taconic Appalachians (the direction from which the sediments were transported). Small tectonic slivers of ophiolitic ultramafic rock, such as are presently seen in the Taconic suture zone, are the likely source for the chromite found, but the possibility of recycling from older sediments with a Grenville source cannot be discounted. The difference between the Newfoundland-Quebec flysch (ophiolitic, N-derived) and the New York-S. Appalachian (non-ophiolitic, S-derived) can be explained by a contrast in source island arc basement (e.g. Rowley, 1983).

PLUTONIC EVIDENCE FOR A MAJOR CARBONIFEROUS THRUST IN WESTERN MAINE AND EASTERN NEW HAMPSHIRE | № 71145

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Recent age determinations (Gaudette and others, 1984) demonstrate that peraluminous H_2O-saturated magmas intruded older rocks, now found in SW Maine and eastern New Hampshire, during Mississippian time. These late stage aluminous and hydrous magmas are inconsistent with the observation that, during Devonian time, crustal source rocks in New England were progressively dehydrated.

The association of the Mississippian plutons with sillimanite grade metamorphic rocks, 270 m.y. K-Ar mica ages, and a lack of gravity anomalies suggest major thrust emplacement of the terrane containing these plutons during Pennsylvanian time. This thrust is consonant with the recognized fault-bounded blocks of eastern New England, the younger H_2O-saturated granites of southern Rhode Island, and the anomalous ages of lower Paleozoic plutons within the Merrimack group. The Mississippian age of the plutons and the Pennsylvanian age of the thrusting are similar to geologic events of the southern Appalachians.

EVIDENCE FOR ICE MARGINAL FLUCTUATION IN AND NEAR A RELICT MELTWATER CHANNEL IN CHAUTAUQUA COUNTY, NEW YORK | № 57772

WOODBURY, Randy J., and LASH, Gary G., Dept. of Geology, State University College, Fredonia, NY 14063

The escarpment southeast of Lake Erie in western New York, with relief of about 300 meters, is drained by stream networks generally trending northward. Anomalous flow directions (along with other supporting evidence) may indicate a glacio-fluvial origin for the stream valley; e.g., Little Canadaway Creek which flows to the west and is recognized as a relict sub-marginal meltwater channel and outlet of a pro-glacial lake. Little Canadaway Creek is roughly V-shaped, with about 30 m of relief and is parallel with and about 3 km north of the Lake Escarpment terminal moraine complex of late Winsconsin age. The channel, holding an under-fitting stream, was apparently incised in the flat-lying Devonian shales and siltstones during one or more glacial stands. Although much of the valley floor is exposed bedrock with a westerly inclined gradient, subsurface borings where Chautauqua Road crosses the channel through a topographic gap in the north valley wall reveal anomalously deep bedrock covered by about eight m of sediment. Fluvio-lacustrine clay and silt deposits are among the sediments recovered here. Peat and twigs collected from 5 m below present creek level yield a radio-carbon date of 8,520± 200 years BP. Palynological analysis of this horizon indicates a predominanceof hemlock (Tsuga). The anomalously low bedrock elevations, the fluvio-lacustrine sediments, and refraction seismic data suggest that the natural topographic gap used by Chautauqua Road may be the junction point for a deeper, drift-filled branch or former outlet of the upper channel. This gap separates two different geometries in the channel: sinuous westward meanders upstream and southwestward linear downstream. It appears to be a nodal point around which ice margin conditions pivoted, burying one section of the meltwater channel and cutting or reopening another. The radio-carbon and pollen data indicate post-glacial filling of the exposed junction to the buried channel.

Timing of Cleavage vs Folding Shortening in the Martinsburg and Reedsville Formations of the Central Appalachians | № 68212

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Regional cross-strike shortening in the Great Valley and Valley and Ridge of the central Appalachians was accomodated by folds, faults and cleavage related flattening. The timing of cleavage development relative to folding is controversial as are the mechanisms involved. In some examples layer-parallel shortening and cleavage development preceed folding, whereas the opposite timing is also possible in other examples. Several lines of evidence indicate that cleavage in the Martinsburg Formation, in Pennsylvania west of Carlisle, and the Reedsville Formation to the northwest, formed after the folds had nearly reached full amplitude and that pressure solution loss from cleavage selvages was the dominant process. This conclusion is based on the following observations: 1)graptolites show shortening strain depending on the cleavage/bedding angle, which would not be the case if cleavage preceeded folding, 2) there is no cleavage strain discontinuity across the Alleghany front, where there is a marked fold strain discontinuity and 3) there is little evidence of down-dip stretching on cleavage planes, which would be expected if cleavages preceeded folding but not required if cleavage followed folding. Along strike, these same units may have responded by first cleaving and then folding. These are not mutually exclusive responses, and recognition of these variations will help lead to discovery of the controls on the operative mechanisms.

M'hamed Bokreta*: TWO-SITES MIXING IN GARNET SOLID SOLUTIONS [69094] ..... Booth 5

Robert C. Hendricks*, Peter S. Dahl: TRACE-ELEMENT DISTRIBUTIONS BETWEEN COEXISTING MINERALS IN METAMORPHIC ROCKS FROM THE RUBY RANGE, SOUTHWESTERN MONTANA [72522] ..... Booth 6

John T. Blackman*, John J. Anderson: GEOLOGY OF A VENT OF THE MOUNT DUTTON FORMATION, MIOCENE, SOUTHWEST TUSHAR MOUNTAINS, UTAH [72525] ..... Booth 7

Falk Koenemann*: AXIAL DISTRIBUTION MAPS FOR QUARTZ FROM A GRANITE UNDERGOING SYNTECTONIC RECRYSTALLIZATION [63265] ..... Booth 8

Richard A. Jackson*: STRUCTURE AND STRATIGRAPHY OF PLEASANT BAY, CAPE BRETON ISLAND, NOVA SCOTIA [72973] ..... Booth 9

Michael Jeffrey Kalaka*, Russell H. Waines: A NEW INTERPRETATION OF FLORENCE HOLSWASSER'S (1926) GEOLOGIC STRUCTURE SECTION IN ORDOVICIAN STRATA IN THE WALLKILL PRESSURE TUNNEL, CATSKILL AQUEDUCT, TOWN OF GARDINER, ULSTER COUNTY, NEW YORK [68500] ..... Booth 10

Virginia J. Pfaff*: FORMS OF SMALL FOLDS IN THE CENTRAL APPALACHIANS [72085] ..... Booth 11

Assad Iranpanah*: KINEMATIC ANALYSIS OF THE TRIPLE JUNCTION BETWEEN ARABIA, INDIA, AND THE TURAN PLATES [69025] ..... Booth 12

SYMPOSIUM: HYDROLOGIC TRANSPORT OF ORGANIC CHEMICALS II
Baroque Ballroom, Host Farm Resort Motel, 1330 hours

Jeffrey P. Sgambat, Presiding

INTRODUCTION: Jeffrey P. Sgambat 1330

1 **H. James Reisinger II*, Robert E. Hinchee:** DIFFERENTIAL SOLUBLE CONTAMINANT TRANSPORT IN GROUND WATERS: THEORY & APPLICABILITY TO SUBSURFACE SPILLS [72868] 1340

2 **Elly K. Triegel*:** FACTORS AFFECTING MIGRATION AND RECOVERY OF SEPARATE PHASE ORGANICS IN GROUNDWATER [72158] 1410

3 **Donna L. Koltuniak*, William A. Tucker:** CRITICAL PARAMETERS AFFECTING MIGRATION OF CONTAMINATION IN SOIL [72865] 1440

COFFEE BREAK 1510

4 **Thomas C. Cambareri*:** HYDROGEOLOGY AND HYDROCHEMISTRY OF A SEWAGE EFFLUENT PLUME IN THE BARNSTABLE OUTWASH OF THE CAPE COD AQUIFER, HYANNIS, MA. [67506] 1530

5 **David A.V. Eckhardt*, Kenneth A. Pearsall:** TRICHLOROETHYLENE IN GROUND WATER AT ROOSEVELT FIELD, NASSAU COUNTY, LONG ISLAND, NEW YORK [73470] 1600

SYMPOSIUM: PRE-WOODFORDIAN GLACIAL GEOLOGY OF CENTRAL AND EASTERN PENNSYLVANIA
Monte Carlo Room, Host Farm Resort Motel, 1330 hours

Duane D. Braun and Thomas W. Gardner, Presiding

1 **G.H. Crowl*:** PRE-WOODFORDIAN DRIFTS OF PENNSYLVANIA [68971] 1330

2 **W.D. Sevon*:** ALTONIAN-AGE GLACIAL DEPOSITS IN PENNSYLVANIA [68941] 1350

3 **Jack C. Ridge*, Edward B. Evenson, William D. Sevon:** THE WOODFORDIAN-PRE-WISCONSINAN BORDER IN THE GREAT VALLEY OF PENNSYLVANIA AND NEW JERSEY [58960] 1410

4 **Duane D. Braun*:** PRE-LATE WISCONSINAN GLACIATION IN THE VALLEY AND RIDGE OF NORTHEASTERN PENNSYLVANIA [56673] 1430

5 **Edward J. Ciolkosz*, Richard C. Cronce, Robert L. Cunningham, Gary W. Petersen:** PRE-WOODFORDIAN SOIL DEVELOPMENT IN NORTHEASTERN PENNSYLVANIA [72794] 1450

COFFEE BREAK 1510

6 **Richard Cronce*, Edward J. Ciolkosz, Robert L. Cunningham:** SOIL FEATURES INDICATIVE OF A PREVIOUS PERIGLACIAL CLIMATE IN CENTRAL PENNSYLVANIA [72793] 1530

7 **William J. Waltman*, Edward J. Ciolkosz, Robert L. Cunningham:** THE STRATIGRAPHY AND GENESIS OF PRE-WISCONSINAN SOILS IN THE UNGLACIATED ALLEGHENY PLATEAU [72792] 1550

8 **Ben Marsh*:** WISCONSINAN PERIGLACIAL TOPOGRAPHY ON PRE-WISCONSIN DRIFT IN CENTRAL PENNSYLVANIA [56669] 1610

9 **T.L. Kaktins*, T.W. Gardner:** FLUVIAL TERRACES IN THE JUNIATA RIVER VALLEY [63359] 1630

10 **Noel Potter Jr.*:** COLLUVIAL AND ALLUVIAL GRAVELS, CARBONATE WEATHERING, AND THE PRESERVATION OF A CENOZOIC EROSIONAL HISTORY IN THE GREAT VALLEY, SOUTHCENTRAL PENNSYLVANIA [56645] 1650

TECTONICS III
Cabaret Theater, Host Farm Resort Motel, 1330 hours

Michael Ellis and John F. Sutter, Presiding

1 **D.R. Lux*, J.N. Aleinikoff:** 40Ar-39Ar AND U-Pb GEOCHRONOLOGY OF THE SONGO PLUTON, WESTERN MAINE [66962] 1330

2 **David R. Wones*:** PLUTONIC EVIDENCE FOR A MAJOR CARBONIFEROUS THRUST IN WESTERN MAINE AND EASTERN NEW HAMPSHIRE [71145] 1350

3 **Norman L. Hatch Jr.*:** A NEW LOOK AT THE MONROE "LINE" IN EAST-CENTRAL VERMONT: EVIDENCE FOR ACADIAN AND MESOZOIC FAULTING [71971] 1410

4 **J.D. Keppie*:** EMPLACEMENT OF CANADIAN TACONIC ALLOCHTHONS [69062] 1430

5 **Wallace A. Bothner*, Jo Laird:** ARE GLAUCOPHANE- AND OMPHACITE-BEARING MAFIC ROCKS IN NORTH-CENTRAL VERMONT OLISTOLITHS IN A MELANGE? [72138] 1450

6 **Douglas Wolf*, W.S.F. Kidd, Tim Kusky, David B. Rowley:** WERE OPHIOLITIC ROCKS A SIGNIFICANT SOURCE FOR THE NEW YORK TACONIC FLYSCH? [68434] 1510

COFFEE BREAK 1530

7 **Barbara A. Strehle*, Rolfe S. Stanley:** STRUCTURAL EVOLUTION OF FAULT ZONES AND SPATIAL ZONATION OF DEFORMATION MECHANISMS [65890] 1550

8 **David S. Westerman*:** FAULTS ALONG THE WESTERN MARGIN OF THE CONNECTICUT VALLEY-GASPE SYNCLINORIUM IN CENTRAL VERMONT [65896] 1610

9 **E.F. Hawkins*, J.W. Skehan:** DEFORMATION ALONG THE SOUTHEASTERN MARGIN OF THE GREEN MOUNTAIN MASSIF, SOUTHERN VERMONT [69017] 1630

10 **John F. Sutter*, Norman L. Hatch Jr.:** TIMING OF METAMORPHISM IN THE ROWE-HAWLEY ZONE, WESTERN MASSACHUSETTS [69097] 1650

11 **Nicholas M. Ratcliffe*:** BASALTIC ROCKS IN THE RENSSELAER PLATEAU AND CHATHAM SLICES OF THE TACONIC ALLOCHTHON: CHEMISTRY AND TECTONIC SETTING [71948] 1710

IGNEOUS PETROLOGY II
Lower Cabaret #1, Host Farm Resort Motel, 1330 hours

G. Nelson Eby and Raymond Talkington, Presiding

1 **J. Gregory McHone*:** ZONED CLINOPYROXENES AND THE CRYSTALLIZATION OF LAMPROPHYRES [70892] 1330

2 **G. Nelson Eby*:** GEOLOGY AND GEOCHEMISTRY OF THE MOUNT PAWTUCKAWAY RING-DIKE COMPLEX, WHITE MOUNTAIN IGNEOUS PROVINCE, NEW HAMPSHIRE [70145] 1350

3 **Carol J. Dye*, Daniel A. Sundeen, Marilyn C. Thoroman:** PETROLOGY, AGE AND STRUCTURE OF THE ONWAY DIKE, A THOLEIITIC PLUTON IN ROCKINGHAM COUNTY, SOUTHEASTERN NEW HAMPSHIRE [58591] 1410

4 **Angela Martello*:** THE BRIDGEPORT-PELHAM DIKE OF CONNECTICUT AND MASSACHUSETTS [59451] 1430

COFFEE BREAK 1450

ABSTRACTS with PROGRAMS 1985

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