G3841 .C5 S24 .M3 Union Bridge

EXPLANATION

QUATERNARY

Artificial fill:
Primarily spoil from quarrying operations. Consists of a heterogeneous mixture of soil and rock debris. Also included are landfill sites which contain trash, junk metal, and building demolition waste mixed with soil. Thickness ranges from 0 to 30 feet (~10 meters).

Qal **Alluvium:**
Gray-brown to light brown, poorly sorted, coarse to fine sand, silt, and clay with sporadic lenses of subround quartz cobble gravel. In places includes chips and cobbles of local bedrock. Thickness of unit may range up to 10 feet (~3 meters). In smaller tributary streams alluvium has not been shown, but is present as a thin veneer overlying a bedrock channel.

Qt **Terrace deposits:**
Reddish-orange to light brown sandy clay with subround cobbles of quartz and local bedrock. Commonly occurs as a thin veneer which caps low hills, spurs, and terrace remnants adjacent to the present flood plains. Most extensively developed along Big Pipe Creek and Little Pipe Creek where bedrock is the Triassic New Oxford Formation. Thickness ranges from 0 to 10 feet (~3 meters).

unconformity

TRIASSIC

T̶n, T̶nc **New Oxford Formation:**
Maroon to dark reddish-brown, argillaceous to silty sandstone and micaceous siltstone with subordinate interbedded silty shale and mudstone. Some reddish-gray to gray arkosic sandstone also occurs. Crossbedding is present in some layers. Bedding in sandstones and siltstones ranges up to one foot (~30 cm) in thickness and may be cut by as many as three sets of joints. Shales and mudstones are intensely broken by closely-spaced fractures to the extent that bedding is obscured. Formation is best exposed in bluffs along Big Pipe Creek and Little Pipe Creek and also in channels of minor streams. Maximum thickness of unit is about 1,000 feet (~300 meters), but section is complicated by numerous normal faults and the top of the formation is not present within the quadrangle.

T̶nc: Poorly bedded, massive, grayish-white to reddish-gray conglomerate with minor amounts of interbedded reddish-brown shale and siltstone. Generally occurs at the base of the New Oxford Formation, but in places a thin interval of dark maroon shale up to 5 feet (~1.5 meters) thick lies between the conglomerate and the pre-Triassic rocks. Clasts are predominantly round to subround cobbles and pebbles of vein quartz and quartzite with maximum dimension up to 8 inches (~20 cm) embedded in a clayey, micaceous sand matrix. The conglomerate generally is loose and friable but locally has been cemented by silica. Hematite staining and cementation occurs sporadically. Thickness ranges from 0 to approximately 100 feet (30 meters) with an average of about 25 feet (8 meters). Maximum thickness and greatest clast size are in the northeast part of the quadrangle. Along strike to the southwest, the clast size decreases and the unit pinches out. Sporadic lenses of conglomerate recur farther to the southwest along strike of the unconformity.

unconformity

EAST FLANK OF SUGARLOAF MOUNTAIN ANTICLINORIUM

CAMBRO-ORDOVICIAN (?)

mfb, mfs, mfq, mf **Marburg Formation:**
Silvery gray-tan, pale olive-tan, and waxy, pale bluish-green quartz-chlorite-muscovite phyllite with abundant thin laminae of very fine-grained quartz silt. Poorly exposed. In places contains abundant limonite pseudomorphs after pyrite in cubic crystals up to one inch (~2.6 cm) across. Includes sporadic lenses and layers of quartzite and a few thin lenses of medium to dark bluish-gray phyllitic limestone or calcareous phyllite which may represent greatly thinned sections of the Silver Run Limestone Member. Formation has been thoroughly deformed by close folding and cleavage and the thickness is not known.

mfq: *Lenses of light gray to tan, medium-grained phyllitic quartzite and subordinate brown to black, medium-grained, thick-bedded quartzite. Phyllitic quartzite is composed of round grains of quartz in a very fine-grained matrix of sericite and quartz. Thick-bedded quartzite is composed of round quartz grains tightly bound by fine-grained quartz. Thickness of individual lenses ranges up to 10 feet (~3 meters).*

mfb: *Black, calcareous muscovite phyllite or slate with minor amounts of silvery-gray muscovite phyllite and thin lenses of bluish-gray phyllitic limestone. Poorly exposed and deeply weathered. Occurs with and apparently overlies the Silver Run Limestone Member.*

mfs: Silver Run Limestone Member. *Medium to dark bluish-gray, fine-grained, thin-bedded to laminated siliceous to argillaceous or micaceous limestone interbedded with minor amounts of black to silvery-gray phyllite. Bedding ranges from 1/4 inch to four inches (~0.5 to 10 cm) in thickness and exposures exhibit tight internal folding and strong penetrative cleavage. Best exposure of formation is in the relocated channel of Sams Creek on the Lehigh Portland Cement Company property south of Union Bridge. Thickness of unit is estimated to range between 10 and 100 feet (~3 and 30 meters).*

The Marburg Formation is here considered to be of Cambro-Ordovician age. This unit was originally composed of fine-grained, clastic sediments which represent a deep water, off-shelf shale-siltstone facies. Lenses of carbonate sediment were sporadically deposited within this sequence. The Silver Run Limestone Member, which occurs near the top of the Marburg, is very similar in lithology to the Frederick Limestone in central Frederick County west of the Union Bridge area and also to the Conestoga Limestone in the southeastern Pennsylvania Piedmont. It is here considered to be correlative with those units. The Frederick Limestone bears a Late Cambrian fauna (Rasetti, 1959; 1961; Reinhardt, 1974). Fossils found in the Conestoga range from Middle Cambrian to Early Ordovician (Gohn, 1978).

LATE PRECAMBRIAN (?) TO CAMBRIAN

ifq, if **Ijamsville Formation:**
Intermixed layers of lustrous to dull, purple to reddish-gray hematitic muscovite phyllite and tan to green chlorite-muscovite phyllite. Formation has been thoroughly deformed by close folding and cleavage and the thickness is not known.

ifq: *Sporadic thin layers and lenses of gray, tan, and brown, medium-grained quartzite, in places a very dense to porcellaneous light purple quartzite. Thickness of individual layers ranges from one to 10 feet (~0.3 to 3 meters).*

The Ijamsville Formation is here considered to be correlative with part of the Lower Cambrian Harpers and Antietam Formations which are present in the Appalachian region to the west. The purple, green, and tan phyllites and associated sandy beds may represent materials derived from the erosion and transportation of weathered and oxidized subaerial surficial materials and deposited as marine redbeds (see Ziegler and McKerrow, 1975) into the offshore deep-water basin during the Early Cambrian marine transgression.

ufq, uf **Urbana Formation:**
Dark gray-tan to gray-green chlorite-muscovite phyllite with thin interbeds of tan silty phyllite and some thin zones of pale purple phyllite. Weathers tan to orange-tan. Thin layers of quartzite occur throughout the unit. Formation has been thoroughly deformed by close folding and cleavage. Thickness is unknown.

ufq: *Layers and lenses of gray, tan, and brown, fine- to medium-grained quartzite composed of well-sorted, round quartz grains in a matrix of fine-grained quartz. Thickness of individual layers ranges between one and 50 feet (~0.3 and 15 meters).*

The Urbana Formation is probably Late Precambrian or Early Cambrian in age because it bears a strong resemblance to the Upper Precambrian – Lower Cambrian Harpers Formation at Harpers Ferry, West Virginia. It has been correlated with that unit by Scotford (1951) in southeastern Frederick County, followed by Cloos and Cooke (1953), Thomas (1954), and Hopson (1964), based on the structural interpretation of Sugarloaf Mountain as an anticlinorium.

LINGANORE NAPPE

gf **Gillis Formation:**
Dark to light silvery gray, tan, and greenish-gray quartz-chlorite-muscovite phyllite with thin zones of bluish-green and reddish-purple to pale purple muscovite phyllite. Some layers of greenish-gray phyllite contain crystals of chloritoid. Thickness of formation is unknown.

The Gillis Formation occurs in the Linganore Nappe (Muller and Edwards, 1985) and probably represents the eastern equivalents of the Marburg, Ijamsville, and Urbana Formations of the Sugarloaf Mountain Anticlinorium, but cannot be subdivided into these units because of severe deformation and poor exposure.

LATE PRECAMBRIAN

scm, scp, scq, scb, scw **Sams Creek Formation:**
Dark bluish-green to olive-green and gray-green metabasalt and lustrous dark to pale purple, gray, and green phyllite. Sporadic small lenses of marble are present throughout the unit and a few thin but persistent layers of quartzite occur in the southern part of the quadrangle. The formation has been thoroughly deformed by cleavage and small-scale folds and the true thickness is unknown, but is estimated to range between 200 and 1,000 feet (~60 and 305 meters).

scb: *Dominant lithology is albite-epidote-chlorite metabasalt. Commonly fine-grained and massive with abundant epidotized nodules in places up to 8 inches (~20 cm) in longest dimension, but also contains many areas that are sheared and schistose with interbedded layers of dark purple to black phyllite and green phyllite. A small patch of metabasalt about 1/2 mile (805 meters) northwest of Clemsonville contains sporadic sericitized remnants of plagioclase phenocrysts, up to 3/8 inch (~1 cm) long.*

scp: *Dominant lithology is lustrous phyllite with interbedded layers of dark green sheared and phyllite metabasalt. Purple and gray phyllite is composed primarily of sericite and muscovite with small amounts of magnetite and hematite. Green phyllite is composed of chlorite and muscovite. Flattened blebs of chlorite or aggregates or sericite are common on cleavage surfaces. Layers with numerous calcite amygdules are also present. Locally, phyllite may contain many thin calcite laminae. Unit is thoroughly deformed by cleavage and small-scale folds and the thickness is not known.*

scq: *Thin layers and lenses of fine- to medium-grained, white to pale gray-green saccharoidal quartzite composed of well-rounded grains of quartz. Occur in places within the phyllite lithology of the Sams Creek Formation. Thickness of layers ranges from 6 inches (15 cm) to about 20 feet (6 meters).*

scm: *Small lenses of fine-grained, white to gray and reddish-purple calcite to dolomite marble. Occur throughout the Sams Creek Formation in both metabasalt and phyllite lithologies. Some lenses may be isolated patches of the Wakefield Marble Member exposed in crests or troughs of small folds, but others are present at different stratigraphic levels within the formation. Thickness of lenses ranges up to about 20 feet (6 meters).*

scw: Wakefield Marble Member. *Predominantly white to gray, massive to banded or bedded crystalline marble but also contains dark gray, blue-gray, pale green, and purple marble and interbeds of green and purple phyllite. Appears to occur in the lower part of the Sams Creek Formation. Some zones or layers of the marble are made up primarily of calcite whereas others are primarily of dolomite. Zones of complex internal folding, boudinaged layers, and purple-colored brecciated zones occur throughout the unit. Thickness of Member is estimated to range between 3 and 500 feet (~1 to 150 meters).*

In the Sams Creek Formation, the association of phyllite and marble with metabasalt bears a strong resemblance to similar lithologies in the Catoctin and Swift Run Formations of Late Precambrian age which are present in the South Mountain Anticlinorium in northern Virginia (Furcron, 1939; Nickelsen, 1956; Allen, 1963; Parker, 1968, Gathright and Nystrom, 1974; and Luckert and Nuckols, 1976). Therefore, the Sams Creek is considered to be correlative with the Catoctin Formation (Edwards, 1984). Phyllites in the Sams Creek formerly were included in the Ijamsville Formation (Jonas and Stose, 1938; Stose and Stose, 1946), which they closely resemble.

overthrust fault

GEOLOGIC SYMBOLS

- Geologic contact — generally inferred or approximate
- Strike and dip of bedding
- Strike and dip of foliation
- Strike and dip of crenulation cleavage or slip cleavage
- Strike and dip of joints
- Plunge of minor fold axis — dextral rotation
- Plunge of minor fold axis — sinistral rotation
- Plunge of mineral elongation lineation
- Normal fault
- Trace of Linganore Overthrust Fault — teeth on upper plate
- Overturned overthrust fault — bar on upper plate; teeth show direction of dip
- Land disturbed by quarry operations
- Active mining operation — Lehigh Portland Cement Company

Base map from U.S. Geological Survey
Union Bridge Quadrangle, 7 1/2-minute Series
1953 (photorevised 1971)

Field mapping done 1967-1972

Williams & Heintz Map Corporation, Capitol Heights, Md. 20743

GEOLOGIC MAP OF THE UNION BRIDGE QUADRANGLE, CARROLL AND FREDERICK COUNTIES, MARYLAND

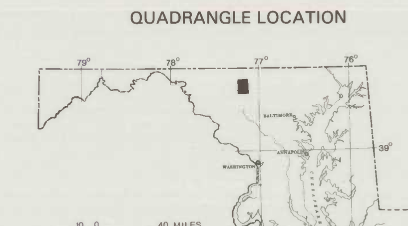
by
Jonathan Edwards, Jr.

1986

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
MARYLAND GEOLOGICAL SURVEY
Kenneth N. Weaver, Director

Copies of Map available from
Maryland Geological Survey

QUADRANGLE LOCATION



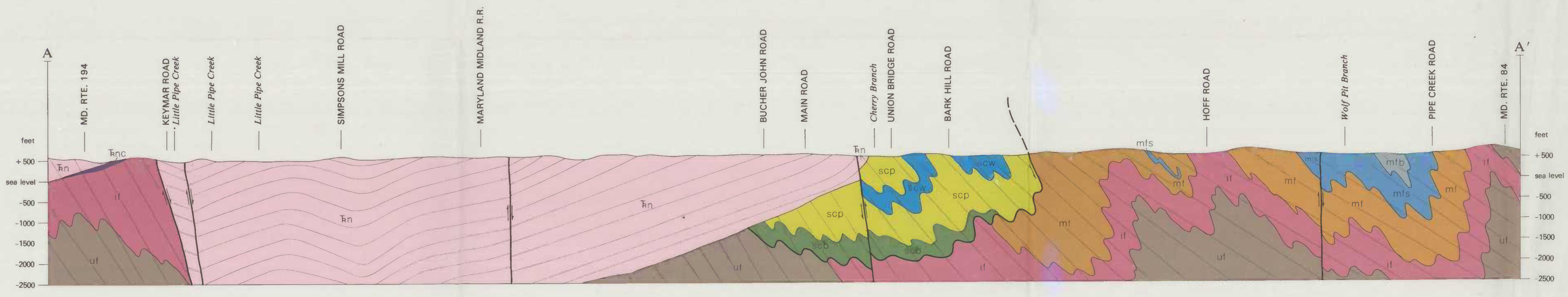
SCALE 1:24 000

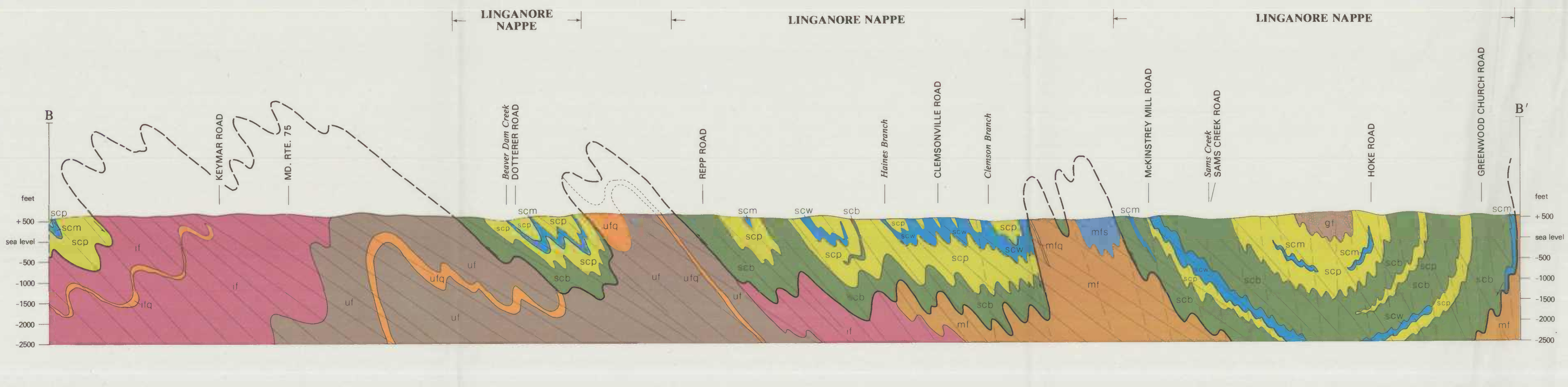
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

GEOLOGIC CROSS SECTIONS

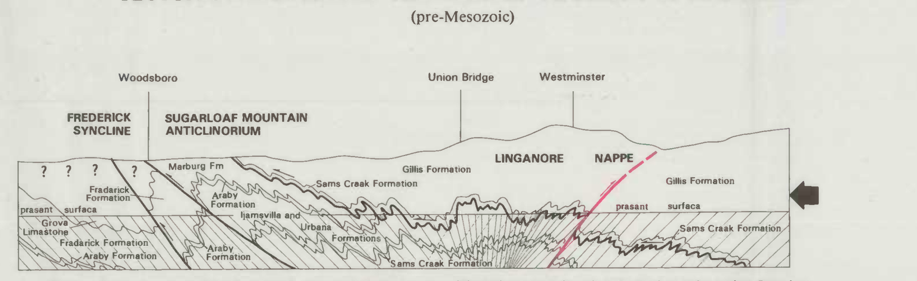
Horizontal scale same as map scale, no vertical exaggeration



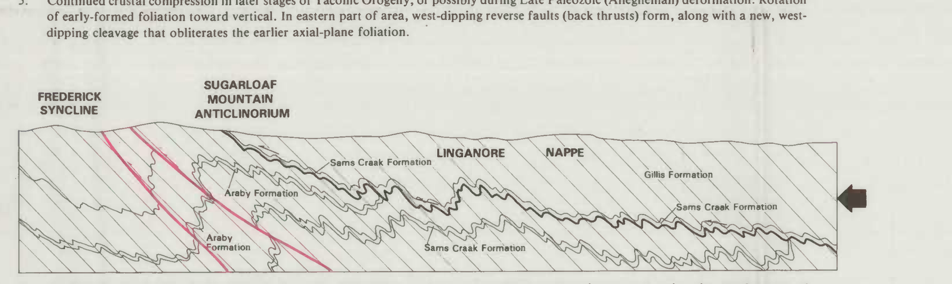


TECTONIC EVOLUTION OF THE WESTERN PIEDMONT OF MARYLAND

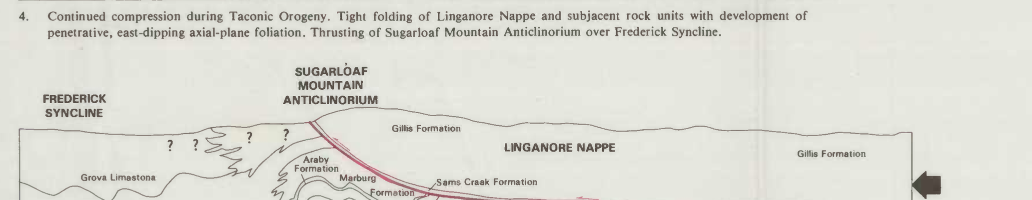
(pre-Mesozoic)



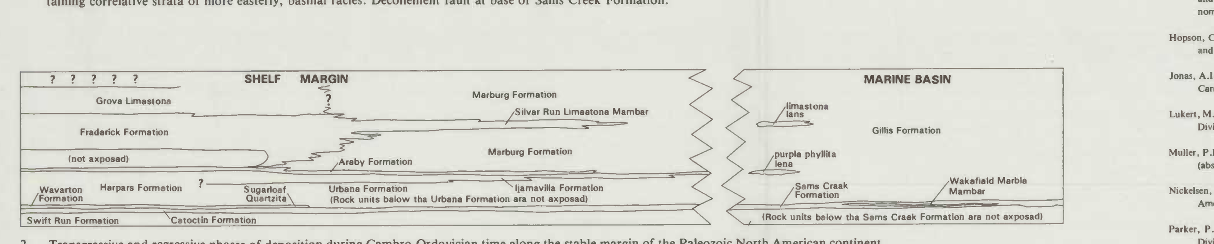
5. Continued crustal compression in later stages of Taconic Orogeny, or possibly during Late Paleozoic (Alleghenian) deformation. Rotation of early-formed foliation toward vertical. In eastern part of area, west-dipping reverse faults (back thrusts) form, along with a new, west-dipping cleavage that obliterates the earlier axial-plane foliation.



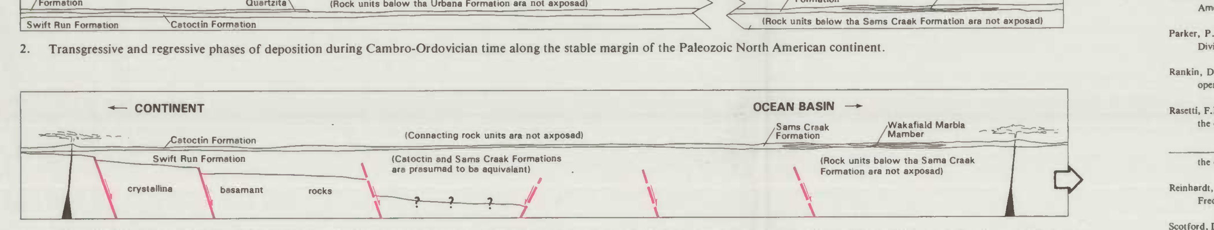
4. Continued compression during Taconic Orogeny. Tight folding of Linganore Nappe and subjacent rock units with development of penetrative, east-dipping axial-plane foliation. Thrusting of Sugarloaf Mountain Anticlinorium over Frederick Syncline.



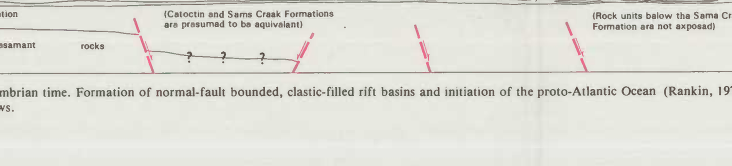
3. Crustal compression at initiation of Taconic Orogeny in early Late Ordovician time. Folding of rock units and emplacement of Linganore Nappe containing correlative strata of more easterly, basinal facies. Decollement fault at base of Sams Creek Formation.



2. Transgressive and regressive phases of deposition during Cambro-Ordovician time along the stable margin of the Paleozoic North American continent.

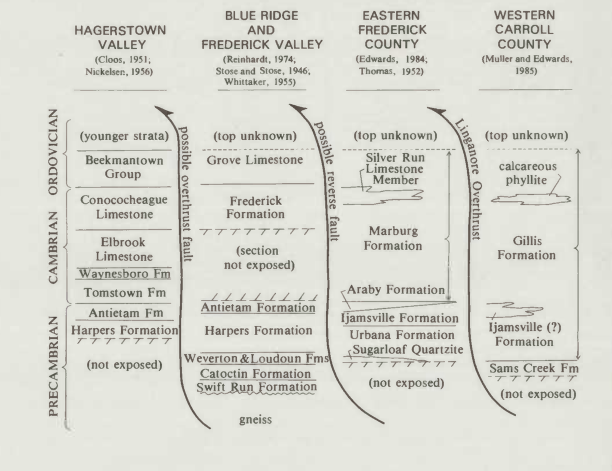


1. Crustal extension in Late Precambrian time. Formation of normal-fault bounded, clastic-filled rift basins and initiation of the proto-Atlantic Ocean (Rankin, 1975), accompanied by eruption of basaltic lava flows.



Approximate horizontal scale
No vertical scale

CORRELATION OF WESTERN PIEDMONT ROCK UNITS



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