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STATE OF NORTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
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GEOLOGIC MAP
SHERWOOD QUADRANGLE
NORTH CAROLINA—TENNESSEE
GM 214-SE

MAP UNITS

QUATERNARY

- Qal — Alluvium
- Qf — Fan deposits
- QTt — Terrace deposits
- QTf — Older fan deposits

TERTIARY AND QUATERNARY

MIDDLE - LATE PALEOZOIC

- mb — Microbreccia
- my — Mylonite and ultramylonite
- d — Dikes and sills of intermediate composition

NORTHWEST OF FORK RIDGE FAULT

SOUTHEAST OF FORK RIDGE FAULT

EARLY CAMBRIAN

- Ꞓr — Rome Formation
- Ꞓs — Shady Dolomite
- Ꞓe — Erwin Formation
- Ꞓh — Hampton Formation
- Ꞓuu, Ꞓul — Unicoi Formation
  - Ꞓuu, Upper metasandstone and quartzite member
  - Ꞓul, Lower metaconglomerate member
  - gs, greenstone
  - UNCONFORMITY

LATER PRECAMBRIAN

- bhgb — Bakersville (?) Gabbro
- agg — Aegirine granitic gneiss
- Dikes of amphibole gneiss Shown on Figure 1 only

EARLIER PRECAMBRIAN

- p€wrg, p€wrm — Granodiorite gneiss
  - p€wrg, Massive gneiss facies
  - p€wrm, Mylonite gneiss facies
- lbg — Layered biotite gneiss
- gmg — Granitic mylonite gneiss
- bs, p€c — Cranberry Gneiss
  - bs, biotite schist

DESCRIPTIONS OF MAP UNITS[1]

Qal — **ALLUVIUM**—Unconsolidated stream deposits of stratified, light-tan to brown sand, silt, and clay containing layers and lenses of well-rounded to subangular, moderately well sorted boulders, cobbles, and pebbles.

Qf — **FAN DEPOSITS**—Unconsolidated deposits of unstratified poorly sorted, angular to subangular boulders, cobbles, and pebbles in a silty clay matrix; typically occur in narrow, V-shaped valleys at the base of debris-avalanche chutes, and generally modified by fluvial processes.

QTt — **TERRACE DEPOSITS**—Unconsolidated deposits of stratified, dark-brown to dark-reddish-brown sand, silt, and clay containing layers and lenses of coarser detritus.

QTf — **OLDER FAN DEPOSITS**—Unconsolidated deposits of unstratified, poorly sorted, dark-brown to dark-reddish-brown colluvium and alluvium. These appear to be older mass-wasting deposits considerably modified and dissected by fluvial processes.

mb — **MICROBRECCIA** —Grayish-tan to medium-gray, fine- to medium-grained microbreccia containing fragments of quartz and feldspar in a fine-grained siliceous matrix. Occurs in two dikelike zones (N.C. coordinates: 935,300N., 1,187,400E. and 940,550N., 1,185,400E.) which cut across mylonitic foliation of the enclosing Cranberry Gneiss.

my — **MYLONITE AND ULTRAMYLONITE**—Medium- to dark-greenish-gray mylonite and light-greenish-gray to light-green ultramylonite. Typically occur as moderately to steeply dipping, 10- to 100-foot-wide zones of mylonite containing 3- to 30-foot-wide cores of siliceous ultramylonite; zones are gradational into mylonite or protomylonite of the granodiorite gneiss unit. Crinkle folds are common.

d — **DIKES AND SILLS OF INTERMEDIATE COMPOSITION**—Medium- to dark-greenish-gray or black, fine-grained, well-foliated to crudely foliated, metamorphosed dikes and sills. Contain relict feldspar within a metamorphic mineral assemblage of calcite, chlorite, biotite, and quartz. Commonly occur as 1- to 5-foot-thick layers within the earlier Precambrian mylonite gneisses (these layers too small to indicate on map) and as two 5- to 10-foot-thick dikes cutting the massive gneiss facies of the granodiorite gneiss unit (N.C. coordinates: 932,100N., 1,154,300E. and 922,900N., 1,164,220E.).

NORTHWEST OF FORK RIDGE FAULT

Ꞓr — **ROME FORMATION**—Mudstone, maroon and greenish-gray, fine-grained, calcareous, thinly bedded to fissile. *s* — indicates one or more beds of tan to light-gray, fine-grained quartzose sandstone and jasperoidal rock. Maximum preserved thickness of formation approximately 1,000 feet.

Ꞓs — **SHADY DOLOMITE**—Dolomite, light- to medium-gray to brownish-gray, thinly bedded to massive. Contains nodules and masses of light- to medium-gray chert. Approximate thickness 1,000 feet (King and Ferguson, 1960, p. 45).

Ꞓe — **ERWIN FORMATION**—Metasandstone and quartzite, light-gray to tan, fine- to medium-grained. Composed mostly of rounded to subrounded quartz grains with siliceous cement; minor sericite forms a poorly developed metamorphic foliation. Contains beds of light-gray to greenish-gray, coarse-grained conglomeratic metasandstone and sandy quartz-pebble metaconglomerate. Approximate thickness 1,000 feet (King and Ferguson, 1960, p. 42).

Ꞓh — **HAMPTON FORMATION**—Metamudstone, dark-gray to dark-greenish-gray, thinly bedded. Interbedded with thin lenses and beds of dark-greenish-gray quartzose metasiltstone. Has well-developed sericite foliation. Estimated thickness 600 feet (near Locust Gap).

UNICOI FORMATION—Consists of an upper unit of conglomeratic metasandstone, quartzite, and phyllitic mudstone; and a lower unit of interlayered feldspathic metaconglomerate, feldspathic metasandstone, metasiltstone, quartzite and several layers of greenstone.

Ꞓuu — Upper unit—Light- to medium-gray to greenish-gray, medium- to coarse-grained conglomeratic metasandstone composed of quartzose detritus with a siliceous cement; poorly developed sericite foliation. Interbedded with light- to medium-gray, medium- to coarse-grained quartzite and some greenish-gray, fine-grained phyllitic mudstone. Estimated thickness 1,100 feet (near Locust Gap).

Ꞓul — Lower unit—Interbedded light- to medium-gray lithic cobble and quartz pebble metaconglomerate with coarse-grained metasandstone matrix and siliceous cement; light-gray to tan, conglomeratic quartzose and feldspathic metasandstone and metasiltstone; and light-gray, coarse-grained quartzite. *gs* — indicates one or more layers of dark-green greenstone (metamorphosed basalt flows). Sericite foliation moderately well developed in metasediments; chlorite foliation well developed in greenstone. Estimated thickness of unit 300 feet (near Jones Branch). Unconformably overlies the granodiorite gneiss unit.

GRANODIORITE GNEISS—Consists of a massive gneiss facies and a mylonite gneiss facies. The mylonitic rocks were derived from the massive gneiss of Precambrian age during thrusting along the Fork Ridge fault in earlier Paleozoic time. This unit corresponds in part to the "migmatite of Watauga River area" and "gneiss of the Forge Creek area," both described by Hamilton (*in* King and Ferguson, 1960, p. 18-20).

p€wrg — Massive gneiss facies—Coarse-grained massive gneiss to protomylonite gneiss, greenish-gray to pinkish-green. Generally granodiorite in composition; locally ranges from quartz diorite to granite. Gneiss is cut by numerous small pegmatite and aplite dikes, and quartz veins. Contains 50 to 75 percent feldspar as porphyroclasts of microcline, plagioclase, and locally perthite; 5 to 10 percent large (2 to 5 mm) biotite flakes; and 20 to 30 percent fine-grained intergrown microcrystalline quartz, plagioclase, chlorite, biotite, muscovite, epidote (or calcite), magnetite, sphene, and apatite. Fine-grained material is foliated and foliation is typically crinkled. Relict texture is hypidiomorphic granular. Relict minerals include microcline, perthitic feldspar, plagioclase (An_{35}), quartz, and orthopyroxene (bronzite?). Contains scattered xenoliths of more mafic gneiss with relict granoblastic texture and with the following relict minerals: perthitic feldspar, plagioclase (An_{60}), quartz, brown hornblende, and magnetite. Biotite foliation in the massive gneiss facies predates cataclastic foliation.

p€wrm — Mylonite gneiss facies—Interlayered medium- to dark-green mylonite schist and light-pinkish- green to greenish-gray quartzo-feldspathic mylonite gneiss. Contains lenses and layers of protomylonite of the massive gneiss facies. Contains porphyroclasts of microcline, perthitic feldspar, plagioclase, and quartz in a fine-grained, well-foliated matrix of intergrown sericite, epidote, biotite, sphene, and microcrystalline quartz. Matrix exhibits well-developed mylonitic foliation, which is typically crinkled.

lbg — **LAYERED BIOTITE GNEISS**—Dark-gray, coarse-grained, biotite-bearing quartzo-feldspathic gneiss. Contains xenoliths that may represent older, more mafic gneiss.

SOUTHEAST OF FORK RIDGE FAULT

bhgb — **BAKERSVILLE (?) GABBRO**—Dark-gray to black, medium- to coarse-grained gabbro dike with ophitic texture (N.C. coordinates: 923,250N., 1,186,710E.). Composed of 75 percent euhedral plagioclase (An_{57}); 20 percent subhedral olivine; and 5 percent hypersthene, biotite, and magnetite. Alteration noted only along margins of some olivine grains. Rock weathers spheroidally.

agg — **AEGIRINE GRANITIC GNEISS**—Light- to medium-gray, coarse-grained, massive to poorly foliated generally protomylonitic rock having relict hypidiomorphic granular texture. Contains 70 percent coarse-grained perthitic feldspar porphyroclasts and 5 percent aggregates of aegirine or, less commonly, coarse-grained brown hornblende; in a fine-grained matrix of microcrystalline quartz, plagioclase, microcline, aegirine, sphene, sericite, and magnetite, with small perthitic feldspar porphyroclasts.

AMPHIBOLE GNEISS—(See figure 1; individual dikes too small and discontinuous to show at map scale) Medium- to dark-green, medium- to coarse-grained amphibole gneiss and schist dikes which range in thickness from 3 to 100 feet. Contain relict plagioclase and dark-green hornblende in a fine-grained matrix of younger minerals—green amphibole, chlorite, epidote, microcrystalline quartz, and magnetite.

gmg — **GRANITIC MYLONITE GNEISS**—Light- to medium-gray, coarse-grained, massive protomylonite to mylonite gneiss. Contains relict perthitic feldspar, plagioclase, and quartz porphyroclasts with a relict hypidiomorphic granular texture. Intergrown sericite and microcrystalline quartz define a mylonitic foliation.

p€c — **CRANBERRY GNEISS**[2]—Heterogeneous, coarsely layered (2 to 20 feet thick) mylonite rock. Consists of interlayered light- to medium-gray, medium- to coarse-grained, biotite-muscovite mylonite gneiss; dark-greenish-gray, fine-grained biotite mylonite schist; medium- to dark-gray, coarse- grained biotite mylonite gneiss with coarse (1 to 3 cm) feldspar augen; and light-gray, fine- grained blastomylonite. Relict perthitic feldspar, plagioclase and quartz are found as porphyroclasts in a fine-grained metamorphic mineral assemblage of biotite, muscovite, epidote, quartz, and plagioclase in the dominant biotite-muscovite mylonite gneiss. *bs* — indicates lenses, as much as 50 feet thick, of dark-gray to black biotite schist containing large (2 to 10 cm) plagioclase porphyroblasts and small (less than 1 mm) poikiloblastic garnets in a metamorphic mineral assemblage of biotite, epidote, and quartz.

[1] Cataclastic rock nomenclature follows Higgins (1971).

[2] As used herein, the term "Cranberry Gneiss" is restricted to rocks in lateral and lithologic continuity with the Cranberry Gneiss in the type area; most workers previously have grouped all the earlier Precambrian rocks as "Cranberry Granite" or "Cranberry Gneiss."

RELATIONSHIPS BETWEEN MAJOR METAMORPHIC, STRUCTURAL, AND PLUTONIC EVENTS

Rocks in this region have been affected by at least three major metamorphic-structural episodes and several periods of intrusive activity. The earliest of these is the complex of plutonic and metamorphic events radiometrically dated as ranging from about 1250 to 1000 m.y. (million years) ago and generally correlated with the Grenville orogenic event of Canada. All of the earlier Precambrian rocks of this quadrangle were either emplaced or metamorphosed during this interval.

The Cranberry Gneiss, as here delineated, apparently is the oldest unit in the quadrangle. In nearby areas correlative rocks are assigned an age of 1252 ± 45 m.y. (Fullagar and Odom, 1973, p. 3070). Locally, the Cranberry was intruded by a granitic pluton, now represented by the granitic mylonite gneiss unit. Four samples from mylonite gneiss collected along U.S. Route 421 near the northeast corner of the Sherwood quadrangle in the adjacent portion of the Zionville quadrangle yielded a Rb/Sr whole-rock age of 1063 ± 41 m.y. (Fullagar and Odom, p. 3070-3072). This date is taken to indicate the time of intrusion. Fullagar and Odom (p. 3070-3072) obtained a Rb/Sr whole-rock age of 1063 ± 41 m.y. from three samples tentatively assigned to the granodiorite gneiss unit which were collected along U.S. Route 321 within 2 miles of the west boundary of the Sherwood quadrangle. Rb/Sr whole-rock data from four samples assigned to the granodiorite gneiss unit located along Forge Creek about 7 miles north of the Sherwood quadrangle, on the adjacent Baldwin Gap quadrangle, provided a date of 871 ± 17 m.y. (Fullagar and Odom, p. 3072). These samples, however, came from altered and mylonitized rocks near the Fork Ridge fault; hence the 871 m.y. date is considered to represent a minimum age for the granodiorite gneiss unit. Fullagar and others (1979, p. 76) recently revised the 1252 and 1063 m.y. ages to 1227 ± 44 m.y. and 1042 ± 40 m.y., respectively.

Porphyroclasts, interpreted to be relict Grenville-age minerals, are found in xenoliths in the Precambrian granodiorite gneiss unit west of the Fork Ridge fault. These minerals are perthitic feldspar, plagioclase (An_{40}), quartz, brown hornblende, and magnetite. This assemblage suggests that temperature and pressure conditions during the early phase of the Grenville event probably attained upper amphibolite or possibly lower granulite facies. East of the Fork Ridge fault, Paleozoic metamorphism and mylonitization have largely, but not entirely, altered or even obliterated Grenville- age minerals. Biotite, however, appears to have been a major constituent of the original assemblage. In addition, porphyroclasts of perthitic feldspar, plagioclase, and quartz along with some sphene and poikiloblastic garnet are found in the Cranberry Gneiss and the granitic mylonite gneiss unit, and are considered to be part of relict assemblages. Thus, Grenville-age metamorphism of the rocks now lying east of the Fork Ridge fault is thought to have been no higher than upper amphibolite facies.

During the first Paleozoic metamorphic-structural event isoclinal folds with axial plane foliation were formed. Rocks now occurring to the west of the Fork Ridge fault were metamorphosed to the greenschist facies; those now to the east of the Fork Ridge fault reached amphibolite facies. Throughout the quadrangle the relatively water-deficient Grenville-age rocks were little affected by this metamorphism; however, original minerals in the more reactive Early Cambrian pelitic sedimentary rocks and the greenstone and amphibole gneiss were strongly recrystallized.

The second Paleozoic metamorphic-structural event involved widespread and pervasive mylonitization, recrystallization of the Grenville-age rocks associated with thrust faulting, and concomitant greenschist facies metamorphism. The fine-grained to microcrystalline mylonitic fabric found in many of these rocks developed during this event.

Postmetamorphic structural events of Late or Middle Paleozoic age include development of numerous mylonite and ultramylonite zones and an associated set of younger thrust faults, as well as some of the light folds and crinkles found at many places.

The youngest structures present in the quadrangle are high-angle reverse faults, microbreccia zones, and gentle warps with east-west axes.

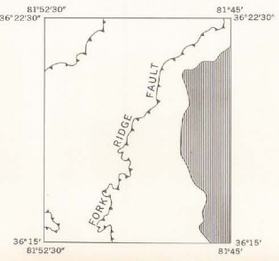

FIGURE 1.—Index map showing area containing abundant dikes of amphibole gneiss (shaded pattern)

Contact, dashed where approximately located or indefinite. Contacts not projected through surficial deposits

Fault, dashed where approximately located or indefinite, short-dashed where inferred or concealed. U, upthrown side; D, downthrown side. on upper plate denotes later Paleozoic thrust fault. Sawteeth on upper plate denotes earlier Paleozoic thrust fault

PLANAR FEATURES
Strike and Dip

Bedding (ball indicates top of bed known from sedimentary features)
- Inclined
- Vertical
- Overturned
- Horizontal

Compositional layering
- Inclined

Zones of postmetamorphic mylonite and ultramylonite
- Inclined
- Vertical

Younger mylonitic foliation
- Inclined
- Vertical
- Horizontal

Older foliation
- Inclined
- Vertical

LINEAR FEATURES
Folds

Axial trace of major fold — Antiform, Synform

Bearing and plunge of axis of minor fold — Postmetamorphic fold; Younger isoclinal fold; Antiform, Overturned; Synform, Overturned; Isoclinal fold; Older fold

MINERAL RESOURCES

- Large inactive pit
- Small inactive pit
- Inactive quarry
- Prospect or occurrence
- Map numbers refer to descriptions in Mineral Resources Summary
- cs Crushed stone
- Fe Iron
- Mn Manganese
- ph Phosphate
- s Saprolite
- su Sulfide

Table 1.—Quarries, pits, prospects and occurrences

Map Number	Name	Mineral Commodity
1	Wilson Hill mine No.1	Manganese
2	Wilson Hill mine No. 2	Manganese
3	Unnamed quarry	Crushed stone
4	Unnamed pit	Saprolite
5	Unnamed prospect	Phosphate
6	Unnamed prospect	Phosphate
7	Unnamed prospect	Phosphate
8	Unnamed prospects (4)	Iron
9	Unnamed prospect	Iron
10	Unnamed prospect	Iron
11	Unnamed prospects (4)	Iron
12	Unnamed prospects (2)	Iron, manganese (?)
13	Unnamed prospect	Iron
14	Unnamed occurrence	Sulfide

REFERENCES CITED

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Higgins, M. W., 1971, Cataclastic rocks: U. S. Geol. Survey Prof. Paper 687, 97 p.

King, P. B., and Ferguson, H. W., 1960, Geology of northeasternmost Tennessee *with a section on the* Description of the basement rocks *by* Warren Hamilton: U. S. Geol. Survey Prof. Paper 311, 136 p.

Base topographic map by USGS-TVA 1938
Photorevised by TVA 1969

Geologic map cartography and printing by TVA

1,000 meter Universal Transverse Mercator Grid ticks, Zone 17, shown in blue

10,000-foot grids based on North Carolina and Tennessee coordinate systems

Field and office compilation sheets are on open file at Raleigh, N.C.

UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

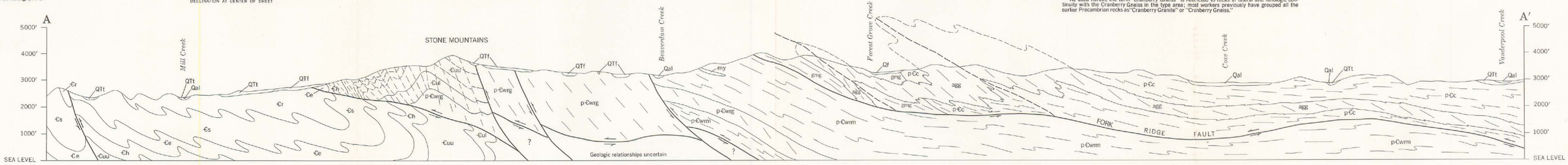
SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DASHED LINES REPRESENT HALF-INTERVAL CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

Geology mapped in 1975-76. Geology of Early Cambrian rocks modified after King and Ferguson, 1960

Map preparation and editing by M. J. Bartholomew, L. S. Wiener, C. E. Merschat and R. J. Floyd



GEOLOGIC MAP OF THE SHERWOOD QUADRANGLE, NORTH CAROLINA-TENNESSEE

By
Mervin J. Bartholomew and Jeffrey J. Gryta

1980