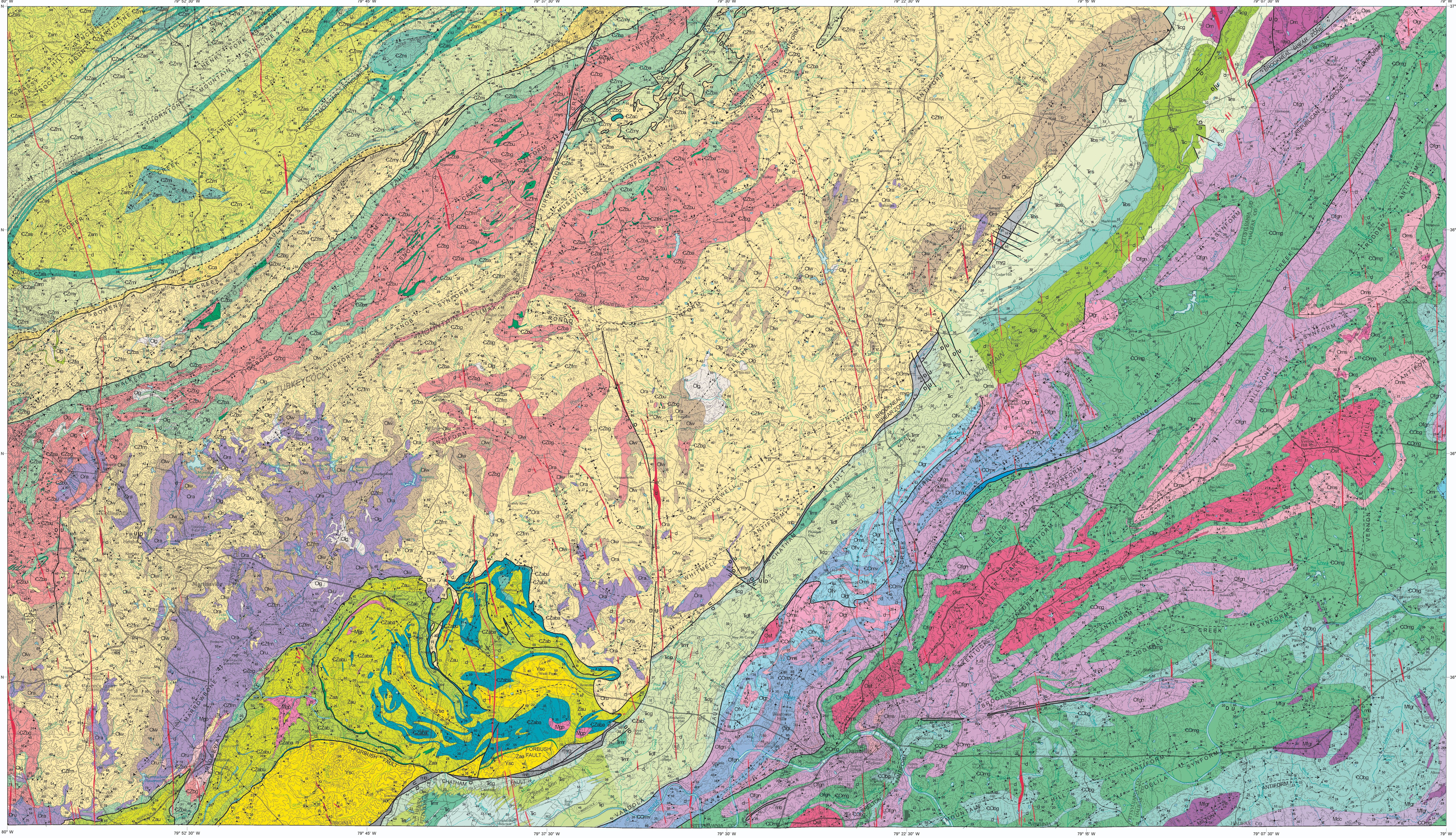
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF MINES, MINERALS AND ENERGY
DIVISION OF MINERAL RESOURCES

GEOLOGIC MAP OF THE VIRGINIA PORTION OF THE DANVILLE 30 X 60 MINUTE QUADRANGLE

Geology compiled by William S. Henika

2002

PUBLICATION 166
GEOLOGIC MAP OF THE VIRGINIA PORTION OF
THE DANVILLE 30 X 60 MINUTE QUADRANGLE



KEY

CONTACTS

Solid where exposed or approximate, dotted where covered.

FAULTS AND SHEAR ZONES

Solid where exposed or approximate; dashed where inferred; dotted where covered; **T** on the upper plate, tick marks indicate dip direction; **U** on the upthrown side, **D** on the downthrown side of high-angle fault; arrows indicate direction of movement.

Strike and dip of minor fault

Shear zone

FOLDS

Antiform drawn on bedding or foliation; arrow denotes plunge direction.

Synform drawn on bedding or foliation; arrow denotes plunge direction.

Recumbent anticline drawn on bedding or foliation; arrow denotes plunge direction.

Recumbent syncline drawn on bedding or foliation; arrow denotes plunge direction.

Minor antiform showing plunge direction

Minor synform showing plunge direction

Minor fold crenulation showing bearing, plunge direction, and sense of asymmetry

Minor symmetrical (M-style) fold crenulation showing bearing and plunge direction

Trend and plunge of early (F1) mesoscopic fold (Baird, 1988)

ATTITUDE OF ROCKS

Strike and dip of inclined bedding

Strike and dip of overturned bedding

Horizontal bedding

Strike of vertical bedding

Strike and dip of schistosity

Strike of vertical schistosity

Horizontal schistosity

Strike and dip of compositional layering

Strike of vertical compositional layering

Strike and dip of shear bands and kink planes

Strike and dip of quartz vein

Strike of vertical quartz vein

Strike and dip of pegmatite dike or sill

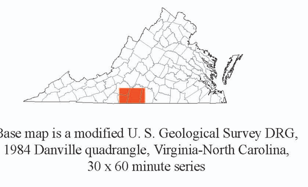
Strike of vertical pegmatite dike or sill

Bearing and plunge of mineral lineation

Bearing of horizontal lineation

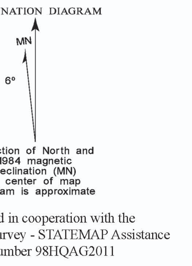
Strike and dip of schistosity with bearing of lineation on schistosity

Strike and dip of schistosity with bearing and plunge of lineation on schistosity



Base map is a modified U. S. Geological Survey DRG, 1984 Danville quadrangle, Virginia-North Carolina, 30 x 60 minute series

Projection: Modified Plate Carree
lon 0 = -79.5000000
lat 0 = 36.5000000
k1 = 0.0174533
k2 = 0.0140299



Map prepared in cooperation with the U. S. Geological Survey - STATEMAP Assistance Award Number 98HQAG2011

Digital conversion in cooperation with the Department of Geology, College of William and Mary, Williamsburg, Virginia

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Henika, W. S., 2002, Geologic map of the Virginia portion of the Danville 30 x 60 minute quadrangle: Virginia Division of Mineral Resources Publication 166.

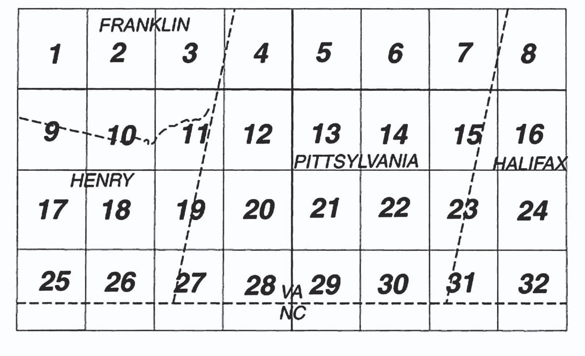
This map was compiled digitally with digital conversion by Daniel E. Sheres, Ryan L. Perroy, and Kevin B. Jones; digital editing by Kevin B. Jones, Daniel E. Sheres, and Elizabeth V. M. Campbell; final digital cartography by Elizabeth V. M. Campbell and Kevin B. Jones. The geospatially referenced files are available from the Division of Mineral Resources, P. O. Box 3667, Charlottesville, VA 22903.

SCALE 1 : 100,000

0 1 2 3 4 5 6 7 8 miles

0 2 4 6 8 10 12 kilometers

CONTOUR INTERVAL 20 METERS



CREDIT FOR 1:24,000 SCALE GEOLOGIC MAPPING USED IN COMPILATION OF THE GEOLOGIC MAP OF THE DANVILLE 30 X 60 MINUTE QUADRANGLE

1: Rocky Mount quadrangle (McCollum, 1989). 2: Gladehill quadrangle (McCollum, 1989). 3: Penhook quadrangle (Conley and others, 1989). 4: Sandy Level quadrangle (Berquist, 1988). 5: Pittsville quadrangle (Marr, 1984). 6: Gretna Quadrangle (Henika, Thayer, and Marr, unpublished manuscript). 7: Mount Airy quadrangle (Henika and Thayer, unpublished manuscript). 8: Republican Grove quadrangle (Baird, 1988; and Henika, unpublished manuscript). 9: Bassett quadrangle (Henika, 1971). 10: Snow Creek quadrangle (Conley and Henika, 1973). 11: Mountain Valley quadrangle (Conley and others, 1989). 12: Callands quadrangle (Berquist, 1988). 13: Chatham quadrangle (Marr, 1994). 14: Spring Garden quadrangle (Henika and Thayer, 1983). 15: Java quadrangle (Henika and Thayer, unpublished manuscript). 16: Vernon Hill quadrangle (Henika, unpublished manuscript). 17: Martinsville West quadrangle (Conley and Toewe, 1968). 18: Martinsville East quadrangle (Conley and Henika, 1973). 19: Axton quadrangle (Price and others, 1980). 20: Whitmell quadrangle (Price and others, 1980). 21: Mount Hermon quadrangle (Henika, 1977; and Ozdogan, 1997.) 22: Blairs quadrangle (Henika, 1977). 23: Ingram quadrangle (Cattanach, 1998; and Henika, unpublished manuscript). 24: Oak Level quadrangle (Henika, unpublished manuscript). 25: Price quadrangle (Henika and Algor, 1972). 26: Spray quadrangle (Conley and Henika, 1973). 27: Northeast Eden quadrangle (Price and others, 1980). 28: Brosville quadrangle (Price and others, 1980). 29: Danville quadrangle (Henika, 1977). 30: Ringgold quadrangle (Henika, 1977). 31: Milton quadrangle (Henika and Hibbard, unpublished manuscript). 32: Alton quadrangle (Hibbard and Henika, unpublished manuscript map).

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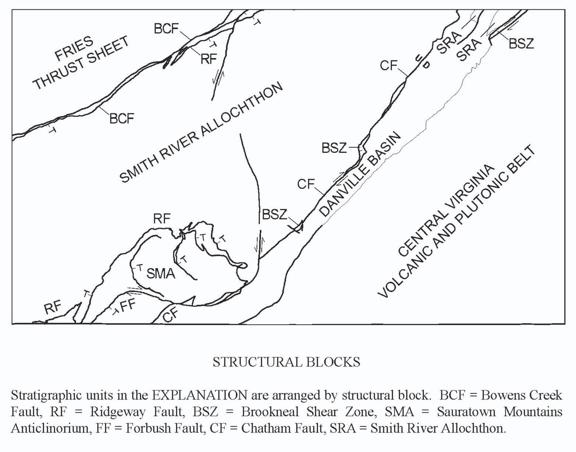

STRUCTURAL BLOCKS

Stratigraphic units in the EXPLANATION are arranged by structural block. BCF = Bowens Creek Fault, RF = Ridgeway Fault, BSZ = Brookneal Shear Zone, SMA = Sauratown Mountains Anticlinorium, FF = Forbush Fault, CF = Chatham Fault, SRA = Smith River Allochthon.

EXPLANATION

f: felsite, light-pinkish-white to light-gray, porphyritic dikes cutting mylonitic rocks along both sides of the Bowens Creek Fault.

MESOZOIC ROCKS

JURASSIC

Igneous dikes and sills

d: basalt, diabase, and gabbro, dark-greenish-gray to black, fine- to coarse-grained, aphanitic, subophitic to hypidiomorphic granular textures. Chilled margins common. Vertical dikes emplaced in Jurassic fracture systems.

Mylonitic and cataclastic rocks

mb: medium- to light-gray silicified microbreccia and reddish-brown to greenish-gray vitreous cataclasite dikes cutting coarsely-brecciated Triassic sedimentary rocks along the Chatham, Vandola, and Laniers Mill (Triassic) border faults.

myg: greenish-gray to pink-banded, medium- to fine-grained, gneissic-porphyroclastic to schistose metamorphic rocks deformed along the Brookneal Shear Zone during late Paleozoic ductile deformation.

mys: foliated mylonite with angular fragments of silicified mylonite and cryptocrystalline quartz.

DANVILLE BASIN

Newark Supergroup
Chatham Group

TRIASSIC

In the southwestern part of the area, Triassic rocks are divided into three formal units: the Pine Hall (Ŧp), the Cow Branch (Ŧc), and the Stoneville (Ŧs) Formations. The formations are named from bottom (southeast side of basin) to top (northwest side of basin). An inferred lateral facies boundary was drawn in the Brosville Quadrangle by Thayer (1980) where the Cow Branch pinches out to the northeast of Judy Bird Mountain. Where the Cow Branch is absent, the stratigraphy is undivided and the entire stratigraphic sequence is named the Dry Fork Formation. A similar boundary was inferred on White Oak Mountain in the Spring Garden Quadrangle (Henika and Thayer, 1983). Northeast of Spring Garden, lithologic names have been used to describe units where Thayer's detailed work was not completed and overlaps with Meyertons' previous 1:100,000-scale mapping.

Ŧbs: shale and siltstone, dark-gray, gray-green, and dull-black, with lesser amounts of claystone and sandstone. Fine-grained rocks are thick- to very-thick-bedded, calcareous, some pyritic, fissile, with fine lamination and bands of organic material. Sandstone is thick-bedded and feldspathic with coarse grains of quartz and feldspar embedded in a matrix of finer-grained clay minerals and organic matter (Meyertons, 1963, Leakesville Formation, Cow Branch Member).

Ŧrs: light- to dark-red and red-brown shale and siltstone with lesser amounts of brown to dusky-red arkosic sandstone, and very minor amounts of brown, gray, and dusky-red conglomerate and coarse-grained sandstone (Meyertons, 1963, Leakesville Formation, Cascade Station Member).

Ŧgs: graywacke; conglomeratic in part; brown, yellow, gray-green and dusky-red; very-thick-bedded; medium to coarse-grained lithic fragments mixed together with fine-grained micas, quartz, and feldspar. Gray arkosic sandstone and dusky-red siltstone and shale (Meyertons, 1963, Dry Fork Formation).

Ŧcg: conglomerate, sandstone, siltstone, and shale; red, dusky-red, thick-bedded, poorly sorted, polymictic, subrounded to angular, cobble- to boulder-sized lithic fragments (Meyertons, 1963, Cedar Forest Formation).

Ŧdf **Dry Fork Formation:** sandstone, predominantly gray, brownish-gray, and greenish-gray, lesser amounts of mudstone and sandy conglomerate, interbedded with predominantly poorly sorted, very coarse sandstone, siltstone, and shale. Conglomerate beds along both the southeastern and the northwestern basin margins contain lithic clasts derived from the metamorphosed igneous and volcaniclastic rocks of the Central Virginia Volcanic-Plutonic Belt.

Ŧmr: medium- to dark-gray shale and mudrock with lesser amounts of light- to medium-light-gray, medium-grained sandstone and conglomerate.

Ŧs **Stoneville Formation:** arkose and lithic arkose, light-gray and pale-yellowish-orange, thin lenses of poorly sorted lithic pebble and cobble conglomerate.

Ŧc **Cow Branch Formation:** siltstone, claystone and shale, medium- to dark-gray, carbonaceous, rarely dolomitic. Siltstone well indurated, evenly stratified, laminated, mottled or structureless, with some very-fine- to medium-grained arkose in irregular sandstone channel lenses.

Ŧp **Pine Hall Formation:** sandstone, light-gray and pinkish-gray, medium- to coarse-grained arkose, subarkose, and lithic arkose, locally with lenses of sandy, pebble, and cobble conglomerate and interbeds of reddish-brown siltstone and mudrock, sandy conglomerate, cobble and boulder beds interbedded with subordinate pebbly, coarse- and very-coarse-grained arkose and lithic arkose. Pine Hall conglomerate along the eastern basin margin derived from metamorphosed igneous and volcaniclastic rocks of the Central Virginia Volcanic-Plutonic Belt (Milton Belt of Butler, 1980). Silicified fragments and logs of araucarian conifers are locally abundant in sandstones along western basin margin.

ROCKS OF THE FRIES THRUST SHEET

CAMBRIAN

Candler Formation

Ꞓca: Medium- to dark-gray and greenish-gray, sandy, laminated muscovite-chlorite-chloritoid phyllite and schist. Lenses and pods of medium- to dark-gray, thinly laminated, fine-grained, dolomitic limestone, feldspathic quartzite, and metamorphosed quartzarenite. Complex mylonitic fabrics with rotated chloritoid porphyroblasts, and mica porphyroblasts distended in anastamosing schistose mass (C and S structure) along the Bowens Creek Fault indicate dextral transpression as well as episodic dip-slip deformation (Henika, 1994). The top of the Candler is not preserved in this area.

Metamorphosed igneous intrusive complexes

ꞒZmi: stratiform intrusions containing greenish-gray, coarse-granular metagabbro, dark-greenish to black fine-granular metabasalt or chlorite-amphibole schist, and fine-granular ultramafic schist or soapstone. Potential for asbestos vein deposits and disseminated metallic ore deposits. Forms structureless to porous, orange or deep-red clay saprolites.

ꞒZmu: grayish-green to light-gray talc-chlorite-actinolite or talc-tremolite schist.

LATE PROTEROZOIC - CAMBRIAN

Metasedimentary and metavolcanic rocks of the Lynchburg Group (includes Alligator Back and Ashe Metamorphic Suites)

Alligator Back Metamorphic Suite

ꞒZmy: heterogeneous assemblage of dark-greenish-gray actinolite schist (metabasalt); medium- to light-gray, laminated gneiss with thin mica schist partings; white and bluish-gray marble; and sparkling silver-gray to greenish-gray, fine-grained, graphite mica schist and quartzite; light-gray, medium- to fine-grained mica schist, massive quartzite with micaceous blue-quartz-granule and metaconglomerate beds.

ꞒZac: light-silvery-gray and dark-gray, laminated, fine- to medium-grained marble, calcareous gneiss and schist, equivalent to the Arch Marble.

ꞒZas: dark-greenish-gray to light-yellowish-green actinolite schist and quartz-epidote granofels with thin interlayered quartz-mica phyllite, quartzite, metagraywacke, calc-silicate beds and lens-shaped deposits of white and pink marble. Mafic and felsic metavolcanic units probably deep basinal equivalents of metabasalt and metarhyolite flows in the Catoctin Formation to the northeast.

LATE PROTEROZOIC

Ashe Metamorphic Suite

Zam: Medium- to light-gray, coarse- to very-coarse-grained, thick-bedded to structureless conglomeratic biotite schist and gneiss with feldspar, quartz, and granitic clasts. Grades upwards into medium- to fine-grained, salt-and-pepper textured two mica plagioclase gneiss with mica schist interbeds.

ROCKS OF THE SMITH RIVER ALLOCHTHON

ORDOVICIAN

Melrose Granite

Om: Light-greenish-gray to pink-banded, medium- to coarse-grained biotite granitoid. Fabric shows transition from protomylonite to mylonite to ultramylonite where the unit is truncated against the Brookneal Shear Zone (Gates, 1981). A U-Pb zircon date of 448 ± 11 Ma was obtained from nearly undeformed granite outcrops along the Roanoke River at Melrose (Wilson and others, 2000).

Leatherwood Granite

Olw: light-gray, medium- to coarse-grained, porphyritic biotite granitoid, commonly shows rapakivi texture. A U-Pb zircon date of 450 Ma was obtained from the granite exposed in the old quarry near Horsepen along U.S. Highway 58 west of Martinsville (Rankin, 1975). Additional dates include a 464 ± 20 Ma Rb-Sr whole rock date by Odum and Russell (1975) and a 448 ± 4 Ma U-Pb zircon date reported by Wilson and others (2000).

Olg: dikes and sills of leucocratic, white to pink, fine- to coarse-grained, equigranular to porphyritic granite and alaskite.

Rich Acres Igneous Suite

Ora: dark-greenish-gray, medium- to coarse-grained, locally porphyritic, hornblende-biotite metadiorite and metagabbro. Intrudes the Fork Mountain and Bassett Formations in extensive sill(s) near the base of the Smith River allochthon. Norite occurs as small, irregularly shaped masses or possibly as dikes cutting the gabbroic and dioritic rocks.

Oru: light-green to dark-greenish-gray, fine-grained to relict porphyritic, schistose to granular ultramafic rock. Localized along the complexly sheared southeastern boundary (bottom?) of the main body of the Martinsville Igneous Complex in the Ridgeway area.

LATE PROTEROZOIC - CAMBRIAN

Fork Mountain Formation

ꞒZfm: light- to medium-gray, fine- to medium-grained, porphyroblastic muscovite-biotite schist and medium-gray, medium- to coarse-grained, garnetiferous biotite gneiss. Quartzose and carbonate layers transposed along a mylonitic foliation. Chloritoid, garnet, staurolite, kyanite/sillimanite/andalusite and biotite/chlorite porphyroblasts all show effects of complex prograde and retrograde metamorphism. Calc-silicate granofels, rare white marble, amphibolite, quartzite and polymictic breccia lenses a few hundred meters wide and generally a few meters thick.

ꞒZfa: dark-dusky-green to black-and-white amphibolite and layered hornblende-plagioclase gneiss with epidote-quartz segregations.

ꞒZfmm: light-gray to pink coarsely crystalline marble, interlayered with green laminated calc-silicate granofels, amphibolite and iron-manganese spinel rock.

Bassett Formation

ꞒZba: dark-green to black-and-white, medium- to coarse-grained amphibolite and hornblende-plagioclase gneiss. Complexly folded layers and thin feldspar-rich dikes. Epidote-quartz segregations and flattened ovoid quartz-epidote-plagioclase amygdules.

ꞒZbu: light-green to dark-greenish-gray, fine-grained to relict porphyritic, schistose to granular mafic to ultramafic rock.

ꞒZbg: light-gray to black-and-white, fine- to medium-grained biotite granitoid gneiss. Porphyroclasts of zoned plagioclase in fine polygonal quartz-feldspar matrix suggests a volcanic protolith. Muscovite-biotite schist and calc-silicate quartzite with relict graded bedding and cut-and-fill structures suggest a mixed volcanic-volcaniclastic protolith.

SAURATOWN MOUNTAINS ANTICLINORIUM

MISSISSIPPIAN

Granite, pegmatite, and alaskite

Mgp: **Granite:** light- to medium-gray, poorly foliated to gneissic, fine- to medium-grained, composed of microcline, oligoclase, and quartz with accessory hornblende, garnet, sphene, and zircon intrusive into mica gneiss, mica schist, and garnetiferous amphibolite of the Ashe Metamorphic Suite along the Ridgeway and Forbush Fault Zones. **Pegmatite and Alaskite:** light-gray to white, very coarse-grained, structureless to rudely foliated, greenish books of muscovite, with accessory garnet, tourmaline, and beryl. Dikes and sills emplaced along the Ridgeway Fault Zone southwestward from Henry County, Virginia, westward through Rockingham and Stokes Counties, North Carolina form the Ridgeway-Sandy Ridge Mica District. Griffitts, Jahns, and Lemke (1953, p. 191) reported uranite, autinite, uranophane (?), other secondary uranium minerals, and allanite (?) at the Harry Knight Mine in Rockingham County, North Carolina. Deuser and Herzog (1962) reported a Rb-Sr whole rock date of 321 ± 17 Ma from pegmatite at the Harry Knight Mine.

LATE PROTEROZOIC - CAMBRIAN

Metasedimentary and metavolcanic rocks of the Lynchburg Group (includes Alligator Back and Ashe Metamorphic Suites)

Alligator Back Metamorphic Suite

ꞒZab: light-bluish-gray muscovite-biotite schist containing abundant pink to red garnet porphyroblasts, less abundant bluish-gray kyanite, and black, untwinned, prismatic staurolite porphyroblasts. Thin quartz and plagioclase segregations as well as discontinuous graphite schist layers.

ꞒZaba: greenish-black, schistose to conspicuously banded, medium-grained, garnet-plagioclase-hornblende schist and gneiss. Locally contains flattened, oval-shaped, epidote-quartz amygdules up to 7 mm long.

ꞒZabu: dark-green to greenish-black, generally schistose to granular, fine-grained to porphyroclastic altered ultramafic rocks.

LATE PROTEROZOIC

Ashe Metamorphic Suite

Zau: Light-gray, medium-grained, salt-and-pepper-textured muscovite-biotite gneiss. Contains many interlayers of muscovite-biotite schist. Pegmatite and alaskite dikes and sills pervasive along the Ridgeway Fault, truncated and mylonitized along the sheared contact with the Stuart Creek Gneiss (Forbush Fault-Brookneal Shear Zone) in the southeastern part of the Sauratown Mountains Anticlinorium.

Zaa: Dark-green to black, slightly to well-foliated, medium- to coarse-grained, garnetiferous, hornblende-plagioclase amphibolite with accessory garnet, titanite, epidote, and opaque minerals.

MIDDLE PROTEROZOIC

Stuart Creek Gneiss

Ysc: Light-gray to black-and-white-banded, coarse-grained, biotite protomylonite, biotite-augen gneiss, and mylonitic biotite gneiss or flaser gneiss. Mylonitic and flaser structure is generally in the sheared, upper part of the unit, along the contact with overlying, younger metasedimentary rocks.

CENTRAL VIRGINIA VOLCANIC-PLUTONIC BELT (MILTON TERRANE (Butler, 1980; Horton and others, 1989))

MISSISSIPPIAN

Farmers Lake Granite of Hibbard and others (1998)

Mfgr: Pinkish-gray to pink, fine- to medium-grained, weakly- to moderately-well-foliated. U-Pb zircon age date of ca. 320 Ma (Wortman and others, 1998).

Cunningham complex of Hibbard and others (1998)

Mcc: Light-gray to pinkish-gray, compositionally layered, fine- to medium-grained, equigranular granitic gneiss with concordant interlayers of Farmers Lake homogeneous biotite granitoid. Thin lens-shaped xenoliths and enclaves of biotite-garnet schist, sillimanite schist, hornblende gneiss, calc-silicate gneiss and amphibolite derived from the Chopawamsic to the northwest are common along the Hyco Shear Zone (Hibbard and others, 1998).

ORDOVICIAN

Shelton Igneous Suite

Ofgn: white to pink fine- to medium-grained, lineated, muscovite-quartz feldspar gneiss. Mafic minerals comprise only 3 to 4%. Contains enclaves or xenoliths of metavolcanic rocks. A U-Pb zircon date of 458 ± 4 Ma was obtained from outcrops of felsic gneiss concordantly interlayered in the unit on the golf course along Rutledge Creek south of Danville (Coler and others, 2000).

Olgr: greenish-gray to pinkish-gray, medium- to coarse-grained, nearly structureless to protomylonitic, muscovite granitoid gneiss. Thick homogeneous sills and dikes intruded into metavolcanic and metasedimentary rocks. A U-Pb zircon date of 450 ± 2 Ma was obtained from lineated granitoid gneiss near the Old Mill Church along Birch Creek north of Laurel Grove (Coler and others, 2000).

Ost: pinkish-gray to black-and-white, structureless to strongly lineated, coarse-grained to coarsely porphyritic, biotite granite to biotite quartz monzonite orthogneiss. Thick homogeneous sills form broad topographic domes surrounded by layered mafic and felsic metavolcanic rocks. A U-Pb zircon date of 443 ± 2 Ma was obtained from gneiss in the Shelton type locality —the Vulcan Construction quarry just south of Danville (Workman unpublished data reported in Hibbard and others, 2001). Earlier dates include a Rb-Sr whole rock age of 424 ± 3 Ma (Kish, 1983) and a 463 ± 14 Ma U-Pb date (Hund, 1987).

Metamorphosed mafic igneous complex

Omi: dark-greenish-gray to black-and-white, medium- to coarse-grained granoblastic amphibolite and hornblende gneiss. Some coarse-grained clinopyroxene relict from a gabbro or dioritic protolith.

Omu: dark-greenish-gray to olive ultramafic schist. Nematoblastic actinolite-tremolite intergrown with felted masses of chlorite, talc, serpentine, and green spinel relict from a probable ultramafic igneous protolith.

Metamorphosed sedimentary and volcanic rocks

Ofv: white to very-pale-orange, medium- to coarse-grained, slaty, schistose, and structureless layers of muscovite-quartz-feldspar schist and gneiss. Interlayered coarse-grained quartz-feldspar granite and pegmatitic granite sills locally abundant. Silvery-gray to greenish-gray, muscovite-rich lapilli, and flattened feldspar phenocrysts strung out along transposed flow banding are rare indicators of volcanic protoliths preserved in less metamorphosed rocks in a window through the Fall Creek Thrust Sheet north of Danville. Mylonitic foliation and amphibolite facies metamorphism associated with late Paleozoic transpressional deformation is predominant southeast of the Fall Creek Fault where the felsic metavolcanic rocks are included in the Ofgn unit (Henika, 1975, 1977, and 1980; and Ozdogan, 1997).

Oas **Arvonia Formation (?):** quartz-chlorite-muscovite schist, silvery-gray to greenish-black, medium- to coarse-grained porphyroblastic mica gneiss. Mica porphyroblasts distended in an anastomosing schistose matrix (mica) indicating intense deformation, locally graphitic with thin marble beds (Gates, 1981, p. 25-28).

Oms **Arvonia Formation (?):** quartz-muscovite-biotite gneiss, pinkish-gray to gray, fine- to medium-grained, interlayered with quartz-muscovite schist, silvery-gray to greenish-black, medium- to coarse-grained, with euhedral red garnet and brown staurolite porphyroblasts, ferruginous quartzite, calc-silicate quartz granofels and kyanite quartzite interlayers. Schist locally has coarse fragmental texture (slate cobble breccia).

Okq: promontory outcrops of kyanite-quartz schist and quartzite.

CAMBRO-ORDOVICIAN

ꞒOmv **Chopawamsic Formation, upper unit (?):** dark-green, fine- to medium-grained, amphibole schist and gneiss derived from mafic volcanic flows and volcaniclastic rocks. Includes interlayered quartzite, quartzose graywacke, schist, and phyllite units west of the Sandy Creek Shear Zone.

ꞒOmg **Chopawamsic Formation, upper unit (?):** black to moderate-olive-brown, medium- to coarse-grained hornblende biotite gneiss, hornblende gneiss, schist, and amphibolite. Highly deformed gneiss layers contain large amphibolite boudins, possibly metamorphosed mafic boulder breccia beds. Interlayered coarse-grained quartz-feldspar granite and pegmatitic granite sills locally abundant. Also includes metamorphosed felsic volcaniclastic rocks similar to Ofv unit (Henika, 1977, p. 3-7; Gates, 1981, p. 7-11; Conley, 1985).

ꞒObg **Chopawamsic Formation, lower unit (?):** brownish-gray to black-and-white, medium- to coarse-grained, garnetiferous biotite gneiss. Layered mylonitic to porphyroclastic textures. Interbeds of light-gray to pinkish-gray, fine- to medium-grained laminated gneiss, kyanite and sillimanite schist, and quartzite. Boudins and pods of calc-silicate gneiss and corundum-hornblende gneiss. Coarse-grained quartz-feldspar granite and pegmatitic granite sills locally abundant, especially towards southeastern contact.

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