Plate 3: Compiled geologic map of the Columbus Promontory, South Mountains, and Hickory-Cherryville area, Inner Piedmont, southwest-central North Carolina.

Heather E. Byars, 2009, The University of Tennessee

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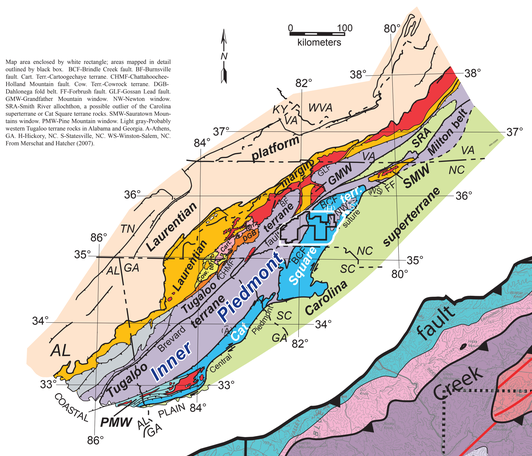

Map area enclosed by white rectangle; areas mapped in detail outlined by black box. BCF-Brindle Creek fault. BF-Burnsville fault. Cart. Terr-Cartoogechaye terrane. CHMF-Chattahoochee-Holland Mountain fault. Cow. Terr-Cowrock terrane. DGB-Dahlonega fold belt. FF-Forbrush fault. GLF-Gossan Lead fault. GMW-Grandfather Mountain window. NW-Newton window. SRA-Smith River allochthon, a possible outlier of the Carolina superterrane or Cat Square terrane rocks. SMW-Saunatown Mountains window. PMW-Pine Mountain window. Light gray-Probably western Tugaloo terrane rocks in Alabama and Georgia. A=Athens, GA. H-Hickory, NC. S-Statesville, NC. WS-Winston-Salem, NC. From Merschat and Hatcher (2007).

Structure

- Trace of axial surface of F_{2n} overturned, recumbent anticline
- Trace of axial surface of F_{2n} overturned, recumbent syncline
- Hinge of F_2 sheath fold
- Trace of axial surface of F_3 open, upright anticline
- Trace of axial surface of F_3 open, upright syncline
- U / D — Normal fault, dashed where inferred; where displacement is known, arrows are used and/or U = upthrown wall; D = downthrown wall
- Thrust fault; teeth on the hanging wall
- Area of intense migmatization

CONTOUR INTERVAL 50 METERS
Projection Universal Transverse Mercator, zone 17
One centimeter on the map represents 1 kilometer on the ground.
Kilometers 0 1 2 3 4 5 6 7 8 9 10
Miles 0 1 2 3 4 5 6 7 8 9 10

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7.5-minute Quadrangle Index and Mapping Responsibilities

Description of Map Units

WESTERN INNER PIEDMONT

Diabase (Jurassic and Triassic ?)
Dark-gray, fine- to medium-grained diabase, forming dikes a few centimeters to several tens of meters thick. Description from Goldsmith et al. (1988).

Silicified Cataclasite (Jurassic and Triassic ?)
Beige to tannish white zone of steeply dipping cataclasite composed of quartz and clay minerals. Commonly contains vugs after pyrite cubes and recemented multiphase veins. Description from Longtown 7.5-minute quadrangle.

Lenoir quartz monzonite
Light- to dark-gray, medium- to coarse-grained, biotite, quartz, feldspar, hornblende-gneiss, coarse-grained, foliated biotite hornblende granodiorite, amphibolite, and leucocratic granodiorite. Stromatic layering ranges from ~1 cm to 1 m thick. Contains many small to large mafic inclusions. May incorporate portions of the Opma, Opmq, Ocb, Ogg and tf.

Granite gneiss
Light-gray, nonporphyritic, medium-grained, discontinuously banded to nonbanded biotite granitoid gneiss or granitic gneiss. Mainly granodioritic but composition ranges from quartz monzonite and monzogranite to granodiorite. Locally contains small pegmatite pods and abundant, magnetic, allanite, zircon, and apatite are common accessories. Chlorite and calcite occur locally. Discontinuous black, biotite-rich bands, 2 to 10 cm thick, commonly occur in the gneiss. Foliation is commonly wavy and typically folded. Interbedded with crosscutting bodies of light-gray, fine-grained, massive to foliated, garnet-bearing muscovite-biotite granite are too small to portray at the map scale. Description modified from Nelson et al. (1998).

Granitic gneiss
Biotite granitic gneiss (granodiorite to monzogranite in composition), light-gray, medium-grained, poorly foliated. Contains plagioclase (oligoclase) 28 %, quartz 33 %, microcline 30 %, biotite 6 %, muscovite, sphene, epidote, allanite, zircon, and opaque minerals. Differs from the Henderson Gneiss by lack of augen and slightly lighter color. Interlayered with Henderson Gneiss (Ohg) and Opmq. Contains many small to large mafic inclusions ranging from reduced major axes, average 2.6, suggesting an igneous origin. Description modified from Lemmon and Dunn (1973b).

Poor Mountain Quartzite
Feldspathic micaceous quartzite, light-tan to light-gray, fine- to medium-grained, massive to medium-bedded, sometimes schistose. Composed of plagioclase (An_{10-20}) 30-60 %, quartz 30-63 %, biotite 0-20 %, muscovite 0-10 %, and accessory minerals. Contains thin beds of quartz-chlorite-mica schist and opaque minerals. Interlayered with the poa unit. Weathers to a yellowish sand or saprolite. Probably derived from a feldspathic sandstone. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Poor Mountain Amphibolite and Poor Mountain Metagabbro, undivided
Amphibolite and amphibolite gneiss, dark- to medium-gray, fine- to medium-grained, locally laminated, fine- to medium-layered. Composed of hornblende 40-85 %, plagioclase (An_{15-35}) 5-45 %, epidote/clinozoisite 0-20 %, and quartz 0-10 %. Contains minor biotite, chlorite, and opaque minerals. Interlayered with the Poor Mountain quartzite unit and muscovite schist. Weathers to an orange-ochre saprolite. Chemically has a mid-ocean ridge basalt affinity. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Brevard-Poor Mountain transitional unit
Garnetiferous muscovite schist, dark-gray to medium-light-gray, lustrous, fine- to medium-grained, commonly crenulated. Contains 5-15 % garnet, 5-15 % plagioclase (oligoclase) 7 %, microcline 5 %, quartz 2 %, and opaque minerals. Grades southeastward from Sugarloaf Mountain to a gray to light-gray, fine- to medium-grained, garnetiferous, biotite-muscovite schist, muscovite, quartz, and feldspar, with a decrease in garnet and a marked increase in magnetite southeastward. A discontinuous layer of coarse-grained, white crystalline marble as much as 0.5 meter thick crops out near the base of Worlds Edge. Description from Lemmon and Dunn (1973a).

Biotite Gneiss and Amphibolite
Interlayered biotite gneiss, hornblende gneiss, amphibolite, metagabbro (?), and subordinate mica schist. Locally contains much granitoid rock. Description from Goldsmith et al. (1988).

Sugarloaf Mountain gneiss
Biotite-muscovite granofels (quartzofeldspathic composition), light-gray, medium-grained, massive to well-foliated. Weathers to a white to light-gray granular saprolite. Contains quartz 35 %, plagioclase (oligoclase-andesine) 30 %, microcline 20 %, biotite 10 %, muscovite 5 %, and accessory minerals: chlorite, and opaque minerals. Cut by numerous pegmatite-dikes and locally contains isolated discontinuous lenses of hornblende gneiss. Zircon elongation ratios, from reduced major axes, average 2.6, suggesting a sedimentary origin. Description modified from Lemmon and Dunn (1973a).

Dysarts Mills Tonalite
Biotite-muscovite granitoid gneiss (tonalite composition), light- to medium-gray, medium-grained, massive to weakly-foliated. Contains plagioclase (An_{10-25}) 40-55 %, quartz 30-45 %, biotite 4-15 %, muscovite 0-5 %, and accessory minerals: chlorite, epidote, and opaque minerals. Weathers to a light-gray granular saprolite. Contains map-scale and smaller hornblende gneiss enclaves. Probably has an igneous protolith. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Henderson Gneiss
Biotite augen gneiss (granite to granodiorite in composition), medium-gray to medium-bluish-gray, generally massive, homogeneous, and well-foliated. Composed of microcline phenocrysts (augen) in a matrix of plagioclase, quartz, and biotite. Contains 25 % plagioclase (An_{10-25}), 35 % microcline (average, including augen) 28 %, biotite 14 %, muscovite 2 %, epidote 1 %, allanite, sphene, zircon, and opaque minerals. Contains many mafic inclusions and is cut by the Brevard fault zone. Interlayered with biotite-granitic gneiss (Ogg). Zircon elongation ratios, from reduced major axes, average 2.6, suggesting an igneous origin. Description modified from Lemmon and Dunn (1973b).

Marble
Marble, light-gray to light-bluish-gray, fine- to medium-grained; as discontinuous pods and calcareous layers within the cataclastic schist. Composed of calcite, dolomite, and minor amounts of calc-silicate minerals: 50-70 % muscovite-schist, 20-40 % quartz 1-5 %, and opaque minerals. Description from Lemmon and Dunn (1973b).

Cataclastic schist, phyllonite, and mylonite
Cataclastic schist and phyllonite, light- olive-gray to dark-gray, medium- to fine-grained, with variable development of "fish-scale" texture formed by shearing of muscovite. Composed of quartz 40-60 %, muscovite-sericite 45-55 %, biotite-chlorite 2-24 %, garnet, opaque minerals, and locally graphite and staurolite. Interlayered calcareous zones from a few inches to several meters thick. Mylonite, light bluish-gray, fine-grained groundmass with rounded to lenticular feldspar porphyroclasts; strongly foliated. Interlayered with cataclastic schist. Probably derived from a feldspathic sandstone. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Upper Tallulah Falls Formation (utf) and undivided Tallulah Falls (tf)
Metagraywacke-biotite gneiss, light-gray to dark-gray, medium- to fine-grained, massive to thick-layered, well-foliated, commonly porphyroblastic. Major minerals include plagioclase (An_{10-30}) 30-50 %, and muscovite 1-7 %. Minor constituents are epidote, microcline, chlorite, and opaque minerals. Porphyroclasts are plagioclase and microcline. Layer thickness varies from a few millimeters to several meters. Foliation is defined by quartzofeldspathic material and micas. Commonly contains 1-5 % garnet porphyroblasts 1 to 4 mm in diameter. Probably derived from a feldspathic sandstone. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Lower Tallulah Falls Formation
Metagraywacke-biotite gneiss, light-gray to dark-gray, medium- to fine-grained, massive to thick-layered, well-foliated, commonly porphyroblastic. Similar to the utf in dominant mineralogy. Generally contains a larger amount of amphibolite and is commonly more migmatite than the utf unit. Probably derived from a feldspathic sandstone. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Amphibolite
Amphibolite, black to dark-gray, medium-grained and foliated. Composed of hornblende 60-70 %, plagioclase (andesine-labradorite) 30-40 %, quartz 0-5 %, and accessory minerals 0 %. Generally occurs as a discontinuous, concordant body. Description from Lemmon and Dunn (1973b).

Ultramafic
Altered ultramafic rock, generally gray, medium- to fine-grained, fair to poor schistosity. Composed mainly of chlorite, amphibole, talc, carbonate, and opaque minerals. Probably derived from medium-grained olivine-pyroxene rock. Description from Butler (1972).

EASTERN INNER PIEDMONT

Cherryville Granite (Mississippian)
Light-gray to white, medium-grained, non- to weakly foliated, two mica granite. Contacts are mostly concordant, but locally discordant to foliation of country rock.

Walker top orthogneiss
Biotite granitic gneiss (granite to granodiorite in composition), light-gray, massive, weakly foliated, megacrystic. Microcline and plagioclase porphyroclasts (augen) in a matrix of plagioclase, microcline, quartz, and biotite. Contains 25-35 % quartz, 15-30 % microcline, 15-22 % plagioclase (An_{20-35}), and equivocal 1-7 % Accessory minerals include garnet, zircon, sphene, and opaques. Description from the Boiling Springs Knob 7.5' quadrangle.

Granite of Sandy Mush
Light-gray, megacrystic, medium-grained, monzogranite containing conspicuous microcline megacrysts up to 2 cm long. Probably cogenetic with the Toluca Granite. Garnet is a common accessory.

Toluca Granite
Granitic gneiss, light-gray, medium-grained, granodioritic, poorly to non-foliated. Major minerals include plagioclase (An_{10-30}) 38-42 %, quartz 17-25 %, microcline 25-30 %, biotite 5-10 %, and muscovite 0-5 %. Accessory minerals include garnet, monazite, ilmenite, zircon, and opaque minerals. Weathers to white and tan saprolite, and contains xenoliths of biotite gneiss. Description from the Bean Knob 7.5' quadrangle.

Metamorphosed Quartz Diorite
Dark-gray, gneissic hornblende, biotite, quartz diorite and diorite, locally gamet/sillimanite.

Hibriten granitoid
Dark bluish gray to black, medium-grained porphyroclastic quartz, plagioclase, biotite gneiss. Porphyroclasts range in size form 1/4 to 1 cm, and are dominantly plagioclase. Locally, it may contain significant amounts of calc-silicate Amphibolite bodies are common and layering ranges from 6 cm to massive.

Amphibolite
Dark-gray, fine- to medium-grained, thin- to thick-layered amphibolite gneiss. Composed of hornblende, plagioclase, and quartz. Biotite and chlorite present adjacent to mica schist layers. Bodies are generally concordant. Some contain thin layers and pods of calc-silicate rock and some rare marble. Unit includes small restinylered masses of metadiorite and metagabbro.

Ultramafic Rocks
Variably altered ultramafic rocks; weakly to strongly foliated. Consist of serpentine, amphibole, talc, chlorite, carbonate, opaque minerals, relict pyroxene, and rare olivine in different proportions and combinations.

White-mica Schist
Yellowish-gray to bluish-gray, medium- to coarse-grained schist composed of quartz, white mica, and feldspar. Biotite, garnet, kyanite, staurolite, sillimanite, chlorite, and tourmaline are common; staurolite and kyanite are sporadic. Typically coarse-grained and quartz-rich near the Cherryville Granite. Weathered schist is grayish pink to pale red. On western side of Inner Piedmont, contains subordinate layers of fine-grained biotite gneiss, amphibolite, and quartzite. Contains numerous pegmatite dikes and is gradational to sillimanite schist, but at lower metamorphic grade. Description by Goldsmith et al. (1988).

SDbgn
Gray to dark-gray, thin- to thick-layered, fine- to coarse-grained, garnet, biotite, quartz, feldspar gneiss, in part granofelsous. Locally megacrystic and porphyroblastic. Insubordinate amounts of garnet, biotite schist occur as thin layers. Contains numerous concordant pegmatite dikes and sills. Composed of biotite and hornblende (4-16 %, biotite 13-22 %), plagioclase (An_{20-35}) 25-35 %, and equivocal 1-7% Accessory minerals include garnet, zircon, sphene, and opaques. Description from the Bean Knob 7.5' quadrangle.

SDss
Thin- to thick-bedded sillimanite-mica schist and gneiss, variably garnetiferous, kyanite-staurolite-bearing, commonly migmatitic to strongly migmatitic, with local garnet/sillimanite leucosomes and subordinate lenses of biotite gneiss (metagraywacke), quartz schist, micaceous quartzite, and calc-silicate rock. Weathers to a brown- to reddish-brown or silvery blue-gray, or yellow and reddish orange.

NEWTON WINDOW

Undivided Tallulah Falls (tf)
Metagraywacke-biotite gneiss, light-gray to dark-gray, medium- to fine-grained, massive to thick-layered, well-foliated, commonly porphyroblastic. Major minerals are quartz, 20-40 %, plagioclase (An_{10-30}) 30-50 %, and muscovite 1-7 %. Minor constituents are epidote, microcline, chlorite, and opaque minerals. Porphyroclasts are plagioclase and microcline. Layer thickness varies from a few millimeters to several meters. Foliation is defined by quartzofeldspathic material and micas. Probably derived from a feldspathic sandstone. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Lower Tallulah Falls Formation
Metagraywacke-biotite gneiss, light-gray to dark-gray, medium- to fine-grained, massive to thick-layered, well-foliated, commonly porphyroblastic. Similar to the utf in dominant mineralogy. Generally contains a larger amount of amphibolite and is commonly more migmatitic than the utf unit. Probably derived from a feldspathic sandstone. Description from the Glenwood and Sugar Hill 7.5' quadrangles.

Porphyroclastic orthogneiss mylonite
Light- to dark-gray, fine- to medium-grained, garnet-bearing, quartz-biotite-plagioclase-alkali feldspar gneiss. Feldspar porphyroclast sizes range from 2 to 45 cm. Description from the Rutherfordton and Lincolnton West 7.5' quadrangles.

Biotite orthogneiss
Light- to dark gray, fine- to medium-grained, garnet-biotite-quartz-plagioclase-alkali feldspar gneiss. Felsic layers range from 1 to 30 mm. Description from the Rutherfordton 7.5' quadrangle.

Amphibolite
Amphibolite, black to dark-gray, medium-grained and foliated. Composed of hornblende 63 %, plagioclase (calcic oligoclase) 18 %, quartz 18 %, sphene 4 %, and opaque minerals 8 %. Generally occurs as a discontinuous, concordant body. Description from Lemmon and Dunn (1973b).

Ultramafic
Altered ultramafic rock, greenish-gray, medium- to fine-grained, fair to poor schistosity. Composed mainly of chlorite, amphibole, talc, carbonate, and opaque minerals. Probably derived from medium-grained olivine-pyroxene rock. Description from Butler (1972).

Sillimanite-mica schist
Thin- to thick-bedded sillimanite-mica schist and gneiss, variably garnetiferous, kyanite-staurolite-bearing, commonly migmatitic to strongly migmatitic, with local garnet/sillimanite leucosomes and subordinate lenses of biotite gneiss (metagraywacke), quartz schist, micaceous quartzite, and calc-silicate rock. Weathers to a brown- to reddish-brown or silvery blue-gray, or yellow and reddish orange.

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Correlation of Map Units

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