

Geologic Map of the Sykesville Quadrangle, Howard, Carroll and Baltimore Counties, Maryland

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2025

Description of Map Units

Quaternary

Qal

Alluvium (Holocene)

Poorly to well-sorted, stratified mixtures of unconsolidated clay, silt, sand, gravel, and cobbles underlying flood plains of nearly all rivers and tributaries. Channels of tributaries are incised into bedrock with alluvium covering and exposed along the banks. Thickness of alluvium is highly variable, and is a function of bedrock, topography, and land-use practices. Abundant deposits of alluvium are present along Benson Branch, the Little and Middle Patuxent Rivers, and the North and South Branches of the Patuxent River.

Qc

Colluvium (Holocene)

Coarse cobbles, boulders and large blocks of quartzite, pegmatite, and granitic gneiss. Typically derived from massive Setters Formation, Sykesville Formation, and pegmatite lithologies that were transported by gravity. Abundant on steeper slopes in the Patuxent River valley.

Devonian

Dg

Gulifford Granite

Massive, light gray, fine- to medium-grained, equigranular granite with occasional xenoliths of biotite schist. Weathers into large, rounded boulders. U-Pb dating of zircon from the Gulifford Granite yielded an age of 362.3 Ma (Aleinikoff et al., 2002).

Dw

Woodstock Granite

Massive, light gray, medium-grained, weakly foliated granite. Intrudes outcrops of the Baltimore Gneiss on the northeastern edge of the quadrangle. U-Pb dating of zircon from the Woodstock Granite yielded an age of 381-11 Ma (Sinha et al., 2012).

Silurian

Sp

Pegmatite

Massive, very coarse-grained, gray (smoky) quartz, light pinkish to grayish white feldspar (microcline and albite; Kearns, 2018), and grayish green muscovite with accessory garnet. Large blocks and boulders commonly mantle hillslopes below outcrops. Two historic quarry wall exposures of light pink, fine grained aplite just west of Marriottsville Road are mapped with pegmatite. Forms 1 to 150 feet (0.3 to 50 m) wide, cross-cutting bodies in rocks of the Baltimore Gneiss, Setters Formation, Cockeysville Marble, and Loch Raven Schist that were quarried and mined for feldspar in the early 1900s (Singewald, 1928). The largest is the Henrytown Pegmatite, 0.6 mi (1.0 km) west of Marriottsville. Rb-Sr dating of total feldspar from the Henrytown pegmatite yielded an age of 425±20 Ma (Wetherill et al., 1966).

Ordovician

Og

Granodiorite (Ordovician?)

Light gray, fine-grained, muscovite-biotite granodiorite composed largely of plagioclase feldspar, with lesser quartz and mica. Forms 3 to 6 feet (1 to 2 m) thick, cross-cutting bodies in rocks of the Mather Gorge and Sykesville Formations. Minimum age is estimated at 469±20 Ma based on Rb-Sr dating (Muth et al., 1979). Seen in the northwest corner of the quadrangle near Piney Branch and on an old railroad cut west of the town of Sykesville.

Cambrian

Cc

Cockeysville Marble

White to yellowish gray, fine- to medium-grained, marble and metadolostone with interlayered bands of yellowish brown phlogopite. Outcrop exposure is limited to interlayered schistose marble with phlogopite. Flat blocks of massive, homogeneous, white marble are found near old quarries and kiln sites, and is presumed to underlie valleys between outcrops of the Setters Formation and schistose marble. Abundant meter-scale folding is visible in outcrops near the North and South Branch of the Patuxent and Middle Patuxent Rivers. The thickness of the Cockeysville Marble is estimated at 350 ft (107 m) along the South Branch of the Patuxent River. This estimate is not equivalent to true stratigraphic thickness of the formation due to deformation.

Csq

Setters Formation

Light gray, fine to medium-grained quartzite and interlayered schist (quartz-feldspar-muscovite-tourmaline). Quartzite layers are typically 0.5 to 3 in (2 to 6 cm) thick, parting on this schistose bands covered in medium to coarse-grained muscovite and tourmaline. Quartzite of the Setters Formation commonly splits into flaggy slabs. Currently and historically quarried in the Marriottsville area (Singewald, 1946). Portions of the formation are predominantly schist with minor quartzite but are poorly exposed in the map area. The overall thickness of the formation in the map area ranges from 10 to 500 ft (3 to 160 m), the lower limit due to lack of exposure. Antiformal and synformal folds from 20 to 4000 ft amplitude are observable in outcrops and topography, respectively, of the Setters Formation. U-Pb dating of detrital zircon from the Setters Formation west of the Woodstock Gneiss dome yielded a maximum depositional age of 1 Ga (Martin et al., 2015). The thickness of the Setters Formation is estimated at 460 ft (140 m) along the South Branch of the Patuxent River. This estimate is not equivalent to true stratigraphic thickness of the formation due to deformation.

Lower Cambrian and/or Neoproterozoic

Csy

Sykesville Formation (Lower Cambrian)

Variiegated, olive to pinkish gray, granitic-looking matrix containing abundant small 0.04 to 2 inch (1 mm to 5 cm) fragments of quartz and dark gray schist. Weathers into massive, rounded outcrops and boulders. Locally contains coarse, angular fragments of metagraywacke, quartz-rich schist, amphibolite and banded schist ranging from 2 inches to 30 feet (5 cm to 9 m) in size. Felsic veins with sharp to diffuse boundaries commonly surround and cross-cut dark gray fragments of schist. Clast shape and orientation is heterogeneous in some outcrops and aligned with foliation in others. Strongly developed foliation and lineation comprised of dark gray schist and light gray felsic banding from 0.08 to 0.4 inch (2 mm-1 cm) in thickness, often with gneissic appearance, abundant 0.4 to 1.2 inch (1 to 3 cm) stretched quartz clasts with that form "eyes". Exposed in the northwest corner of the quadrangle in Piney Branch and marked with a lineated pattern as seen in the lower half of the symbol. U-Pb dating of detrital zircon of the Sykesville Formation from the town of Sykesville yielded a maximum depositional age of 550 Ma (Martin et al., 2015). The thickness of the Sykesville Formation is estimated at 14,850 ft (4,526 m) along the South Branch of the Patuxent River. Apparent thickness is not equivalent to the true stratigraphic thickness of the formation due to deformation.

CZng

Mather Gorge Formation (Lower Cambrian? and Neoproterozoic?)

Quartz-rich schist and quartzite metagraywacke interbedded in layers ranging from 0.1 inch to 3 feet thick (2.5 mm to 1 m). Schist is very fine grained and greenish gray to gray, with muscovite, chlorite, plagioclase, epidote, magnetite ± garnet. Metagraywacke is light to dark olive gray, fine- to medium-grained. Equivalent to the Peters Creek Schist of Jonas and Stose (1946), the Wisahickon Formation, Western Sequence, psammatic rocks of Cloos et al. (1964), and the Morgan Run Formation of Muller (1994). U-Pb dating of detrital zircon from the Mather Gorge Formation at Hoods Mill yielded maximum depositional ages of 540 and 550 Ma (Martin et al., 2015; Martin and Bosbyshell, 2019).

CZngb

Banded schist with interlayered metagraywacke

Interbedded quartz-mica schist and quartzite metagraywacke with intermittent zones of banded schist. The banded schist contains mm to cm-scale light gray to white and dark gray to black layers interpreted as in-situ leucosome (light layers) and melanosome (dark layers) produced by partial melting of the parent material (Sawyer, 2008). Metagraywacke remains similar in appearance to CZng but is often surrounded by cm-scale zones of light gray to white quartz. Weathering form of outcrops with banded schist is more massive and rounded than CZng, and foliation is less apparent.

CZngf

Banded schist with metagraywacke fragments

Banded, light gray to white and dark gray to black, commonly contorted, schist. Metagraywacke fragments, similar in appearance to CZng, 1 to 3 feet (0.3 to 1 m) long, are surrounded by banded schist. Also contains 0.25 to 1 foot (10 to 40 cm) thick, felsic bands containing abundant small schist clasts, similar in appearance to Csy. Interpreted to be produced by partial melting of quartz-mica schist and quartzite metagraywacke (Sawyer, 2008). Cross-cutting, cm-scale, bands are white to very pale orange and comprised of mm-cm size crystals of plagioclase feldspar, quartz, and muscovite. These felsic bands sometimes contain clasts of schist and metagraywacke and are interpreted as in-situ or in-source leucosome (Sawyer, 2008).

CZio

Loch Raven-Oella Formation, undifferentiated (Lower Cambrian? and Neoproterozoic?)

Light to medium gray, medium- to coarse-grained, schist containing biotite-plagioclase-muscovite-quartz ± euhedral garnet, staurolite, and kyanite. Garnet is locally 0.5 in (1 cm) in size and covers foliation surfaces. The thickness of the Loch Raven-Oella Formation is estimated at 1,930 ft (588 m) along the South Branch of the Patuxent River. This estimate is not equivalent to true stratigraphic thickness of the formation due to deformation.

CZioma

Meta-arenite

Light gray, fine-grained quartzite with fine bands of biotite every 0.3 to 0.6 in (1 to 2 cm), ranging from 0.1 inch to 1.5 feet thick (2.5 mm to 0.5 m). Interlayered with dark gray, medium-grained schist. Similar in appearance to CZng but occurs east of Soldiers Delight ultramafite. Equivalent to the Peters Creek schist of Jonas and Stose (1946), Wisahickon Formation, Eastern Sequence, psammatic rocks, of Cloos et al. (1964), and portions of the Oella Formation of Crowley (1976).

CZum

Ultramafic Rocks

Greenish gray to black, occur as large bodies or smaller blocks within rocks of the Mather Gorge, Sykesville, and Loch Raven-Oella undifferentiated Formations. The cores of the bodies are comprised of dark green to black, medium-grained serpentinite with a rounded, often light gray, fractured weathering surface. The margins are typically magnesian schist. The largest of these is the Soldiers Delight ultramafite (Drake, 1994), which transects the quadrangle from NE to SW and is estimated at 2,360 ft (716 m) thickness at Marriottsville Road #2. This estimate is not equivalent to true stratigraphic thickness of the formation due to deformation. May include magnesian schist (CZs) and metagabbro (CZg) lithologies.

CZs

Magnesian schist

Soft, very light gray to dark greenish gray, fine- to coarse-grained talcose schist with occasional euhedral biotite, actinolite, and tremolite from 0.1 to 0.4 inch (3 mm to 1 cm) in length. 0.1 to 0.2 inch (3 to 5 mm) euhedral magnetite grains can occur in abundance. The weathering surface appears foliated. Found within Sykesville Formation and comprises part of the Soldiers Delight Ultramafite. Historically quarried for soapstone and talc near Marriottsville (Singewald, 1946; Perre and Heyl, 1960).

CZg

Metagabbro

Very light gray and dark gray to black, medium- to coarse-grained plagioclase feldspar, hornblende, epidote. Weathering form is massive. Found within the Sykesville Formation and comprises part of the Soldiers Delight Ultramafite.

Yb

Baltimore Gneiss

Light gray to white and dark gray to black, alternating felsic and mafic bands of biotite, feldspar, quartz, and plagioclase typically 0.1 to 1 in (3 mm to 2 cm) in thickness. Thicker light gray felsic bands (2 to 5 in / 5 to 10 cm) are present parallel to and cross-cutting thinner banding. 1 to 3 ft (0.3 to 1 m) layers of dark gray schist with bands of light gray, stretched quartz feldspar lenses (augen or eyes) 0.5 to 1 in (1 to 2 cm) occur. 1 to 3 ft (0.3 to 1 m) thick, friable-weathering, layers of dark-gray to black hornblende-biotite schist occur intermittently in outcrops in the Patuxent River between Woodstock and Marriottsville. Where visible they define folds and faults. U-Pb dating of zircon from the Baltimore Gneiss yielded an age of 1.25 Ga (Aleinikoff et al., 2004).



Explanation of Map Symbols

A — A'

Cross section line

Contacts

Geologic contacts; approximately located, dotted where concealed

Faults

-? -? Fault, unknown type; location approximate, dotted where concealed

Thrust fault, location approximate. Sawtooth on upper (tectonically higher) plate, dotted where concealed

Minor fault, showing strike and dip

Folds

Axis, overturned anticline; showing strike and dip

Axis, overturned syncline; showing strike and dip

Small, horizontal antiform; showing strike

Small, plunging antiform; showing strike and plunge

Small, plunging synform; showing strike and plunge

Small, inclined folds; showing strike and plunge

Other Features

Quarry or mine, active

Quarry or mine, inactive

Planar Features

Horizontal bedding

Inclined bedding; showing strike and dip

Inclined joint; showing strike and dip

Vertical or near-vertical joint; showing strike

Inclined cleavage, showing strike and dip

Vertical cleavage, showing strike

Horizontal foliation

Inclined foliation, showing strike and dip

Vertical foliation, showing strike

Inclined shear band cleavage, right hand sense of shear, showing strike and dip

Inclined, shear band cleavage, left hand sense of shear, showing strike and dip

Linear Features

Inclined lineation at intersection of foliation and cleavage, showing bearing and plunge

Base Map Symbols

Transportation

Primary highway, divided by median strip

Primary route, class 1 (divided, lanes separated)

Primary route, class 1 (undivided)

Secondary route, class 2

Light duty road or street, class 3

Railroad

Topography

Topographic index contour (100-ft interval)

Topographic intermediate contour (20-ft interval)

Hydrography

Muddy Creek Stream

Spring

Water body (e.g. lakes, ponds, rivers)

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Acknowledgements: This map was partially funded by the U.S. Geological Survey, National Cooperative Mapping Program, under USGS award number G22AC00575. The author appreciates the map reviews by D.K. Brezinski and C.P. Williams. Digital map compilation by R.M. Higgins. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government. Geologic field mapping conducted in 2021, 2024.

