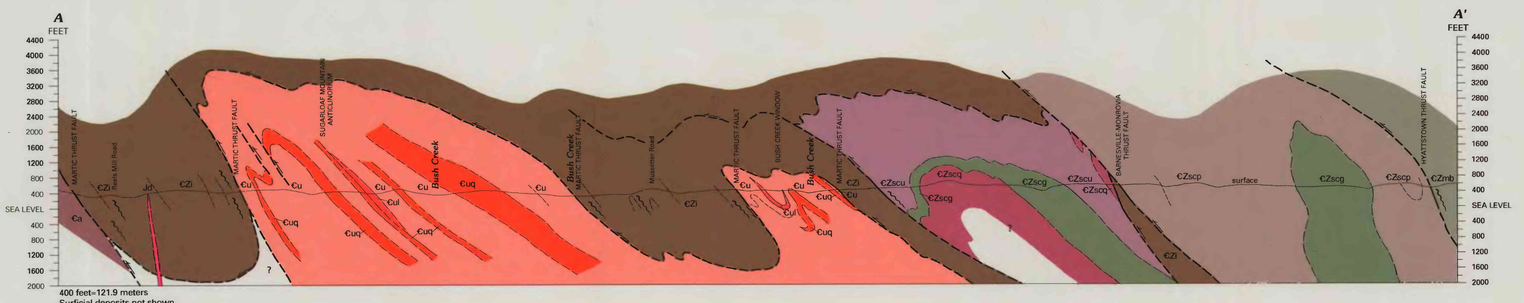
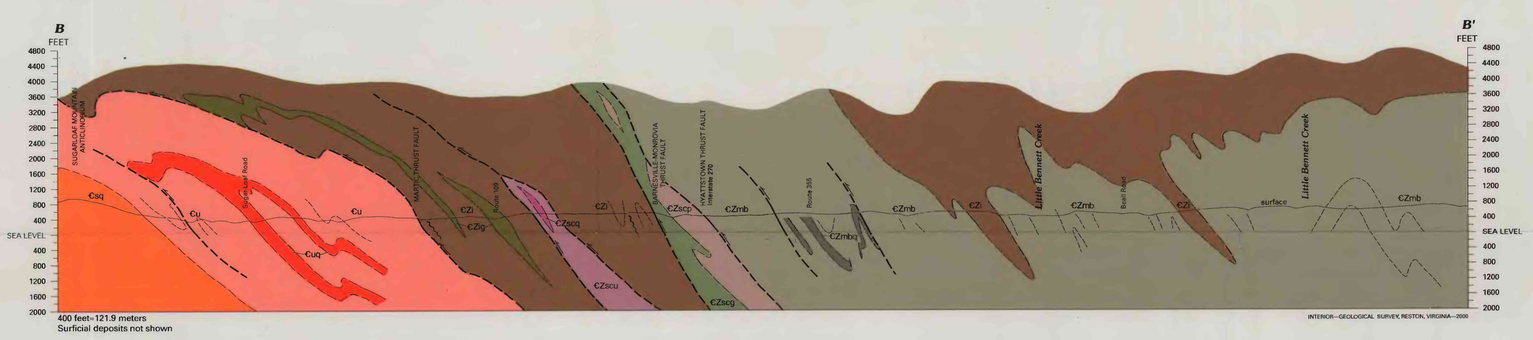
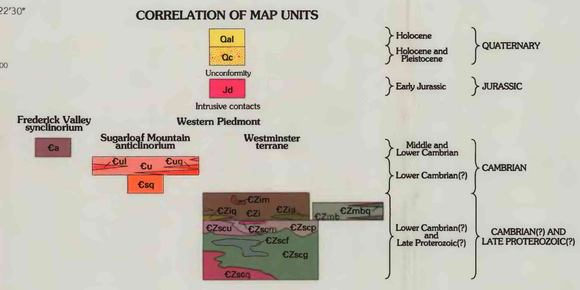
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
URBANA QUADRANGLE, MD.
MAP GQ–1768
Explanatory pamphlet accompanies map





CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Color designations, in parentheses, are from Goddard and others (1948)

CENOZOIC SURFICIAL DEPOSITS

Qal **Alluvium (Holocene)**—Unconsolidated mixtures of clay, silt, sand, gravel, cobbles, and some boulders underlying flood plains of Bush Creek, Bennett Creek, Little Bennett Creek, Fahrney Branch, and their tributaries. Includes alluvial terraces as much as 10 ft above stream channels and fine colluvial debris from adjacent slopes. Sediments well to poorly stratified, commonly in fining-upward sequences as much as 20 ft thick

Qc **Colluvium (Holocene and Pleistocene)**—Coarse cobbles, boulders, and blocks of quartzite that were transported by gravity and debris flow and modified by freeze-thaw processes concentrated in hillslope depressions and hollows on the northern end of Sugarloaf Mountain. Ranges in thickness from a thin veneer to deposits greater than 10 ft thick

EARLY MESOZOIC INTRUSIVE ROCKS

Jd **Diabase dikes (Early Jurassic)**—Medium (*N* 5)- to dark-gray (*N* 3), medium- to coarse-crystalline, equigranular, massive diabase, having characteristic light-brown (5*YR* 5/6) weathered surface. Discontinuous and en echelon subvertical tabular bodies

LOWER PALEOZOIC SEDIMENTARY ROCKS OF THE FREDERICK VALLEY SYNCLINORIUM

Ꞓa **Araby Formation (Middle and Lower Cambrian)**—Light-olive-gray (5*Y* 5/2), pale-brown (5*YR* 5/2), and moderate-brown (5*YR* 4/4), burrow-mottled metasiltstone containing sandy intervals; bedding is obscure because of strong cleavage

LOWER CAMBRIAN(?) METASEDIMENTARY ROCKS OF THE SUGARLOAF MOUNTAIN ANTICLINORIUM

Ꞓu, Ꞓul, Ꞓuq **Urbana Formation (Lower Cambrian?)**—Predominantly moderate-olive-brown (5*Y* 4/4) to light-olive-gray (5*Y* 5/2), calcareous metagraywacke and metasiltstone. Poorly sorted, graded beds, crossbeds, and sparse ripple marks. Contains light-olive-gray (5*Y* 6/1) and light-brownish-gray (5*YR* 6/1), very calcareous sandstone and quartzite (**Ꞓuq**). Fine- to coarse-grained, thin- to medium-bedded, crossbedded, pitted, friable, lensoidal, and discontinuous. Interbedded with light-brown (5*YR* 5/6), laminated metasiltstone. Also contains light-gray (*N* 7) to greenish-gray (5*G* 6/1), thin-bedded crystalline marble (**Ꞓul**). Laminated marble beds marked by seams of sericite and chlorite. Poorly exposed; produces distinctive reddish-orange (10*R* 6/6) soil

Ꞓsq **Sugarloaf Mountain Quartzite (Lower Cambrian?)**—Pinkish-gray (5*YR* 8/1) to white (*N* 9), fine- to medium-grained granular quartzite. Medium-bedded to massive, well-sorted, graded, crossbedded, contains sparse ripple marks. Quartzite interbedded with poorly exposed moderate-brown (5*YR* 4/4), quartzose metasiltstone and dusky-blue (5*PB* 3/2) phyllite similar to that of the conformably overlying Urbana Formation

LOWER CAMBRIAN(?) AND LATE PROTEROZOIC(?) METASEDIMENTARY AND METAVOLCANIC ROCKS OF THE WESTMINSTER TERRANE

ЄZmb, ЄZmbq **Marburg Formation (Lower Cambrian? and Late Proterozoic?)**—Complex lithologic sequence of greenish-gray (5*G* 6/1), light-olive-gray (5*Y* 5/2) quartz-sericite-chlorite phyllite, metasiltstone containing thin (0.1-in-thick), light-gray (*N* 7) quartz laminae and ribbons, and muscovite-chlorite-paragonite phyllite similar to that of the Ijamsville Phyllite. Light-gray to grayish-green (5*G* 5/2), medium- to coarse-grained quartzite (**ЄZmbq**). Phyllite and metasiltstone have porphyroblasts of albite and chloritoid. Much of unit is transposed, phyllonitized, injected by abundant vein quartz, and intensely folded. Relation to other units is uncertain

ЄZi, ЄZig, ЄZiq, ЄZim **Ijamsville Phyllite (Lower Cambrian? and Late Proterozoic?)**—Dusky-blue (5*PB* 3/2), grayish-blue (*PB* 5/2), very dusky red purple (5*RP* 2/2), greenish-gray (5*G* 6/1) to pale-olive (10*Y* 6/2) phyllite, phyllonite containing abundant vein quartz, and minor slate. Intensely folded and sheared; finely laminated beds seen only in slate. Phyllite consists mostly of muscovite and chlorite, but also contains paragonite and chloritoid. Has a lustrous sheen because of paragonite (determined by X-ray diffraction) and dark color because of abundant hematite dust. Also contains dark-greenish-gray (5*G* 4/1) to dusky-yellow-green (5*GY* 5/2) aphanitic to porphyritic greenstone containing epidosite (**ЄZig**). Three chemical analyses are given in table 2. Yellowish-gray (5*Y* 8/1), fine- to medium-grained sericitic quartzite (**ЄZiq**) locally intervenes between phyllite and greenstone. Light-olive-gray (5*Y* 5/2), sandy limestone and calcareous quartzite (**ЄZim**) occurs within phyllite at one locality. Includes flat-chip metaconglomerate consisting of light-olive-gray (5*Y* 6/1) muscovite phyllite clasts supported in a dark-gray (*N* 3) matrix of chlorite, quartz, ilmenite, magnetite, and zircon

ЄZscg **Sams Creek Formation (Lower Cambrian? and Late Proterozoic?)**—Dark-greenish-gray (5*G* 4/1) to medium-bluish-gray (5*B* 5/1), aphanitic to porphyritic, massive to schistose greenstone composed of chlorite, epidote, quartz, altered plagioclase, actinolite, hornblende, and albite; igneous texture is locally preserved and pods of epidosite are common; includes some greenstone pebble metaconglomerate. Ten chemical analyses of unweathered greenstone given in table 2

ЄZscf Intermediate-composition metavolcanic and metavolcaniclastic schist—Medium-bluish-gray (5*B* 5/1), grayish-blue (5*PB* 5/2), very pale blue (5*B* 8/2), and light-olive-gray (5*Y* 6/1), fine-grained schist locally interbedded with greenstone. Three chemical analyses given in table 2

ЄZscp Muscovite-chlorite phyllite—Light-bluish-gray (5*B* 7/1), dusky-yellow (5*Y* 6/4), and moderate-orange-pink (10*R* 7/4) phyllite containing albite porphyroblasts, quartz, and hematite dust. Contains minor metasiltstone. Lithologically distinct from rocks of the Ijamsville Phyllite and Marburg Formation. Interpreted to largely overlie greenstone, although the rocks are also interbedded at places

ЄZscq Quartzite—Light-gray (*N* 7) to grayish-green (5*G* 5/2), medium-grained, thin-bedded to massive quartzite and minor calcareous sandstone; contains detrital plagioclase, orthoclase, and polymictic quartz. Bedding is defined by concentrations of heavy minerals. Interbedded with phyllite (**ЄZscp**), greenstone (**ЄZscg**), and metasiltstone and metagraywacke (**ЄZscu**); interpreted to be overlain by greenstone in antiforms southwest of Monrovia

ЄZscu Metasiltstone, phyllite, quartzite, and metagraywacke, undifferentiated—Contains marble (**ЄZscm**) and quartzite (**ЄZscq**) units and appears to overlie greenstone (**ЄZscg**). Bedding can be recognized except where transposed in shear zones adjacent to faults. Muscovite phyllite containing albite porphyroblasts and elongate blebs of chlorite is interpreted to be a metatuff

ЄZscm Marble—Brownish-gray (5*YR* 4/1) to grayish-red-purple (5*RP* 4/2) calcite marble that contains quartz sand; includes minor calcareous metasiltstone

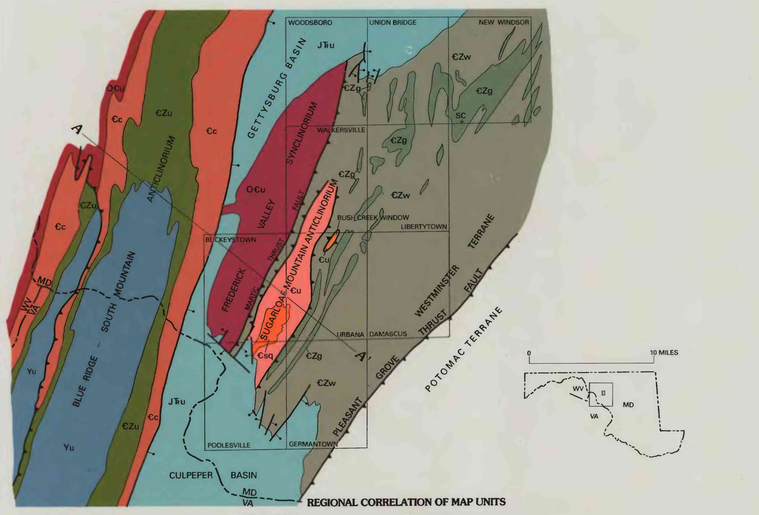


Figure 1.—Generalized regional geologic map showing location of the Urbana quadrangle, Md. (shaded box), and 7.5-minute quadrangles discussed in text. SC is the type locality of the Sams Creek Formation. See Explanation of Map Symbols for additional symbols.

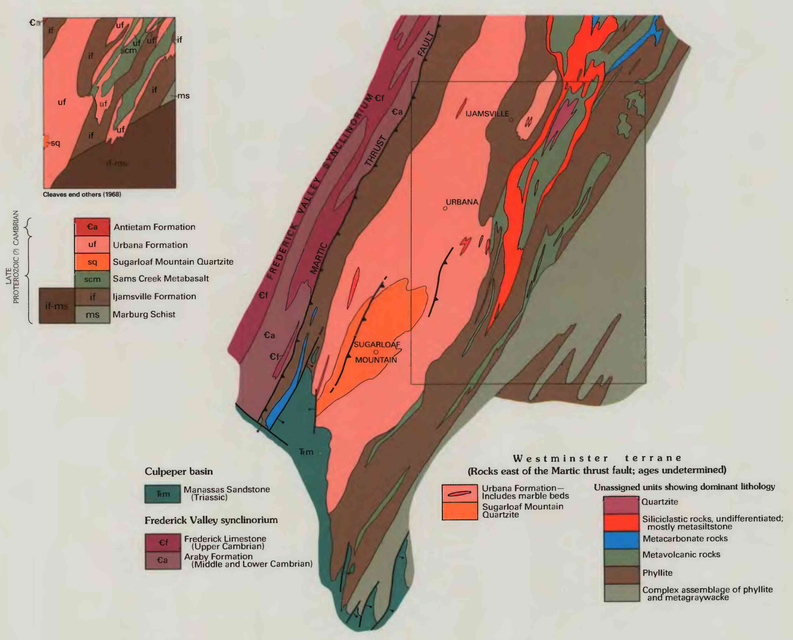


Figure 2.—Generalized geologic and lithologic map of the Urbana quadrangle, Md., and environs showing the type localities of the Ijamsville Phyllite, Urbana Formation, and Sugarloaf Mountain Quartzite. Inset map shows the geology of the Urbana quadrangle from Cleaves and others (1968). See Explanation of Map Symbols for additional symbols.

EXPLANATION OF MAP SYMBOLS

Contact—Dashed where projected in cross section; dotted where concealed

Fault—Dashed where approximately located or projected in cross section; dotted where concealed

Thrust—Sawteeth on upper plate. In cross section, half arrow shows direction of relative movement

Overturned thrust—Sawteeth point in direction of dip; bar on upper plate

Overturned thrust with recurrent thrust motion—Sawteeth on upper plate, open bar on early upper plate

Normal—Bar and ball on downthrown block. Dip shown where known

Phyllonitic zone—Showing strike of zone and dip in cross section

FOLDS

Anticline—Showing axial trace and direction of plunge where known. Dotted where concealed

Overturned anticline—Showing axial trace and direction of dip of limbs and plunge where known. Dotted where concealed

Syncline—Showing axial trace. Dotted where concealed

Overturned syncline—Showing axial trace and direction of dip of limbs. Dotted where concealed

Overturned fold—Showing axial trace and direction of dip of limbs; direction of closure unknown

Arch in schistosity or cleavage (S) or transposition foliation (F)

Trough in schistosity or cleavage (S) or transposition foliation (F)

MINOR FOLDS

Minor anticline—Showing bearing and plunge of axis

Minor asymmetric antiform (F_2) in complex fold train—Showing bearing and plunge of axis

PLANAR FEATURES

(May be combined with each other or with linear features)

Strike and dip of bed—Ball indicates top of bed known from sedimentary structures

Inclined

Vertical

Overturned

Strike and dip of schistosity or cleavage (dashed form lines shown in cross sections)

Inclined

Vertical

Strike and dip of crenulation cleavage

Inclined

Vertical

Strike and dip of transposition foliation

Inclined

Vertical

Strike and dip of joint

Inclined

Vertical

LINEAR FEATURES

(May be combined with planar features)

Bearing and plunge of mineral lineation

Bearing and plunge of intersection of bedding and cleavage

Bearing and plunge of crenulation

OTHER FEATURES

Quarry—S, slate

Geochemical sample locality—Number refers to table 2

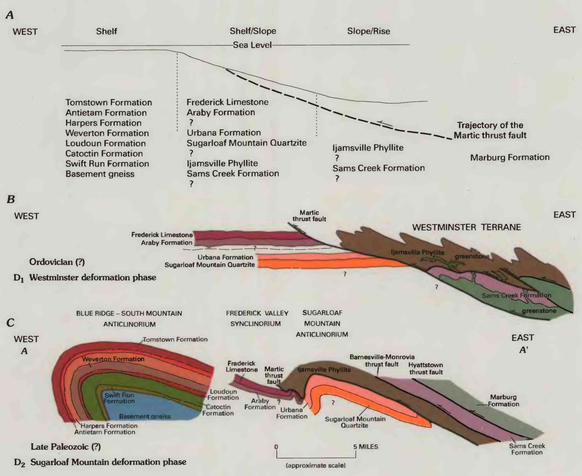


Figure 3.—Schematic cross sections (see *A–A'*, fig. 1) showing the inferred environment of deposition (*A*) and structural evolution (*B* and *C*) of rocks of the Piedmont and Blue Ridge provinces, Maryland. See Explanation of Map Symbols for additional symbols.

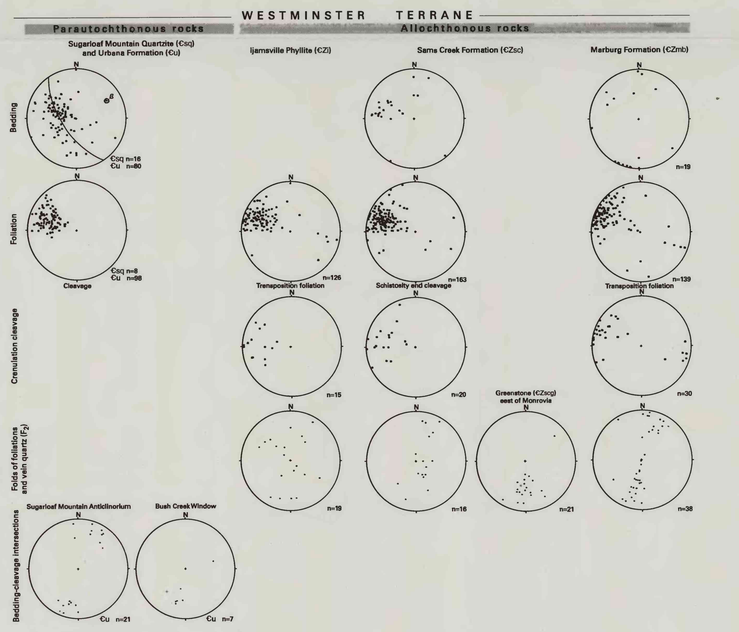


Figure 4.—Lower hemisphere equal-area projections of structural data of rocks of the Urbana quadrangle, Md. Formational domains are separated by thrust faults. See Description of Map Units for explanation of map-unit symbols.

GEOLOGIC MAP OF THE URBANA QUADRANGLE, FREDERICK AND MONTGOMERY COUNTIES, MARYLAND

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1999

ISBN 0-607-93253-8

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For sale by U.S. Geological Survey, Information Services, Box 25286, Federal Center, Denver, CO 80225

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