DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

DESCRIPTION OF MAP UNITS

Less than 1 percent of the quadrangle is exposed bedrock; remainder is saprolite, residual soil, or alluvium. Flood-plain alluvium present in quadrangle is too small to be indicated on the map.

All rocks of Paleozoic age within the quadrangle contain mineral assemblages of the greenschist facies of regional metamorphism; grade of metamorphism increases slightly northwestward across the quadrangle.

The thicknesses of map units are estimated limits only.

Trd **DIABASE DIKES** (5–25 ft)—unmetamorphosed, dark-gray to black; weathers to buff or rust-colored rinds a few millimeters thick. Composed of augite, labradorite, olivine, and disseminated magnetite. Dikes parallel north to northwest joint pattern. Mapped largely on float

Pzg **GABBRO**—foliated greenish-black fine- to medium-grained; weathers to greenish gray and reddish brown. Contains oligoclase-andesine plagioclase, quartz, tremolite-actinolite, chlorite, epidote, clinozoisite, sphene, leucoxene, and magnetite

Pzm **QUARTZ MONZONITE**—schistose, coarse- to medium-grained yellowish-gray cataclastic rock; weathers to a distinctive grayish sandy soil. Contains quartz, albite, oligoclase, potassic feldspar, biotite, sericite, chlorite, epidote, magnetite, and sphene-leucoxene. Shearing and metamorphism have altered the rock by stretching, crushing, and recrystallizing the mineral components

MILLINGPORT FORMATION:

Omy YADKIN MEMBER (4,000–6,500 ft)—best exposed in adjacent Albemarle and Mount Pleasant quadrangles. Poorly sorted dark-greenish-gray to greenish-black volcanic sandstone interbedded with siltstone of similar composition, both of which contain quartz, plagioclase, and silt- to fine sand-sized rock fragments. The fine-grained matrix is composed of sericite, chlorite, quartz, and plagioclase. Epidote, clinozoisite, magnetite, ilmenite, and apatite are also present

Omf FLOYD CHURCH MEMBER (2,500–5,000 ft)—gray to greenish-gray argillite; weathers olive, gray, or brown. Lower part is moderately distinctly bedded and graded; upper part less obviously bedded. Locally, contains layers of volcanic sandstone and siltstone; in places has thin layers of calcareous siltstone. Argillite chiefly composed of quartz, feldspar, sericite, some chlorite, minor amounts of biotite, epidote, clinozoisite, pyrite, and sphene-leucoxene

Omfb Volcaniclastic andesitic basalt (variable)—contains volcanic rock fragments of either pyroclastic or epiclastic origin

Omfr Rhyolitic-rhyodacitic rocks (variable)—may contain volcanic rock fragments of both pyroclastic and epiclastic origin. Rhyodacite is herein used as extrusive equivalent of granodiorite

Omfl Lentil of argillaceous tuff breccia (20–50 ft)—represents the final phases of the Flat Swamp Mountain volcanic activity as indicated by essential and reworked felsic volcanic debris and slabs of the enclosing argillite of the Floyd Church Member in an argillaceous matrix. Original shard structures have been observed

CID FORMATION:

Ocf FLAT SWAMP MEMBER (2,500–4,500 ft)—chiefly vitric-crystal-lithic tuff breccia (ash flow?), vitric tuff, and stratified tuff, all of composition intermediate between rhyolite and rhyodacite. Breccias contain laths of albite, scattered accessory aphanitic rock fragments as large as 3 cm, lenticular aphanitic fragments as much as 5 cm in length, elongated parallel to a crude stratification, all set in an aphanitic devitrified quartzofeldspathic matrix. Also present are scattered grains of pyrite, phyrrhotite, magnetite, sphene-leucoxene, grains of metamorphic biotite, chlorite, sericite, epidote, clinozoisite, and calcite. Irregular splintery-appearing wedges as much as 25 mm long made up of microaggregates of biotite-chlorite-feldspar occur in places. On Wildcat Mountain breccias contain stretched and bent recrystallized essential lithic fragments that have distinct to obscure outlines. Tuff breccias grade vertically and horizontally into fine tuffs of the same composition. Transitional rocks of tuffaceous siltstone and claystone occur at the top and bottom of the member; their planoconvex layering indicates deposition in shallow water

Ocfb Andesitic basalt (variable)—includes crystal-lithic tuff breccia, agglomeratic lapilli tuffs (0.8 mile northwest of New Jerusalem Church), flow breccia, and bedded tuff. Breccias and tuffs contain essential lithic fragments locally subrounded, and plagioclase clasts. The fine-grained matrix is altered to tremolite, chlorite, epidote, calcite, and sphene-leucoxene. Accidental fragments of felsic rock occur locally

Ocfl Lentil of felsic tuffaceous breccia (20–100 ft)—contains reworked plagioclase crystals and rock fragments in a brownish matrix of shard-bearing tuff. Probably deposited from avalanches of volcanic debris triggered by intermittent eruptions from the nearby Flat Swamp volcanic highlands

Ocm MUDSTONE MEMBER (about 8,500 ft)—siltstone and claystone that is partly tuffaceous and partly poorly to moderately well bedded, locally contains interbeds of fine-grained bluish-gray blocky tuff that typically weather white. Grades upward into shale that is mined locally for flagstone (Councill, 1954). The flagstone contains about 75 percent quartz and feldspar, 15–20 percent sericite, some chlorite, traces of epidote, and sphene-leucoxene. Where sheared west of the Silver Hill fault, the unit consists of cream-colored sericite schist or gray phyllite

Ocmb Andesitic basalt (variable)—includes crystal-lithic tuff breccia, agglomeratic lapilli tuff (along N.C. Route 109, 0.8 mile southeast of N.C. Route 49), tuff, bedded tuff, and vesicular lava. Pyroclastics chiefly contain essential lithic fragments and some plagioclase fragments in a matrix altered to tremolite, chlorite, epidote, calcite, and sphene-leucoxene. Vesicles are filled with quartz, chlorite, epidote, and calcite

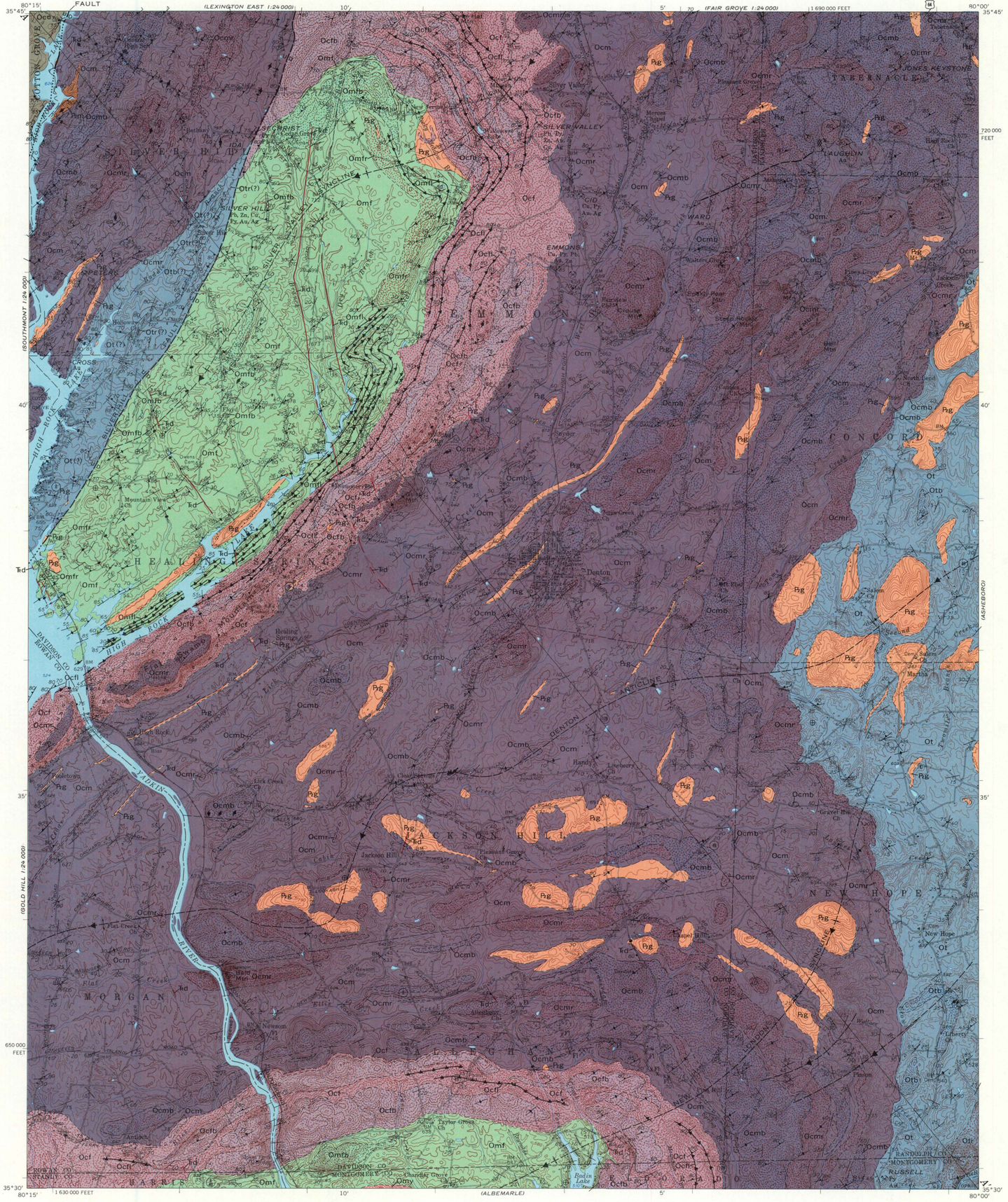
Ocmr Rhyolitic-rhyodacitic rocks (variable)—includes feldspar porphyry, vitrophyre, and vitric crystal tuff. Many steep hills and ridges consist largely of vitrophyre and may be volcanic plugs and fissure fillings; examples are Crouse Mountain and Steep Rock Mountain. On Bald Mountain flow banding occurs as conspicuous varicolored swirls; elsewhere in the quadrangle flow banding is recognized on weathered surfaces as discontinuous ridges a few millimeters high and apart. Volcanics are medium gray and contain albite laths or fragments as large as 3 mm set in an aphanitic groundmass. Some albite grains contain patchy intergrowths of microcline making up 5–90 percent of the grain. Secondary quartz is present locally as amygdules and as mosaic patches and veins. Most rocks contain disseminated biotite and leucoxene, scattered grains of pyrite, pyrrhotite, and magnetite; a few contain stilpnomelane. West of the Silver Hill fault these units are sheared to form sericite schist and blocky schists—some with chalky-feldspars and elongated rock fragments (for example, west end of Jerusalem road)

Ocu **MUDSTONE MEMBER OF CID FORMATION AND INTRUSIVE ROCKS**—undifferentiated rocks located northwest of the Gold Hill fault include quartz-sericite schist, chlorite-epidote and plagioclase-rich greenschist, and small bodies of quartz monzonite, diorite, and gabbro. We think that except for the intrusives, these rocks belong to Cid Formation

Ot **TILLERY FORMATION** (10,000 ft±)—bluish- to greenish-gray siltstone and claystone that are varvelike or thinly laminated. Laminations range in thickness from less than 0.1 mm to about 8 mm and average 1–3 mm; they grade upward from silt to clay displaying a corresponding increase in the relative abundance of sericite and chlorite over quartz and feldspar. Flakes of spongy reddish-brown biotite with ragged but roughly hexagonal cross sections lie randomly across the laminations; some consist of sericite and chlorite with remnants of biotite. Flakes may be altered metacrysts

Otb ANDESITIC BASALT (variable) — includes vesicular lava and crystal lithic tuff

Otr RHYOLITIC—RHYODACITIC ROCKS (variable)—comprises feldspar porphyry, vitrophyre, and aphanitic crystal tuff. Spherulites occur in places



Base by U.S. Geological Survey, 1957
10,000-foot grid based on North Carolina coordinate system

SCALE 1:62 500
1 ½ 0 1 2 3 4 MILES
1 .5 0 1 2 3 4 KILOMETERS
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1971

N.C.
QUADRANGLE LOCATION

1 2
3 4

INDEX TO GEOLOGIC MAPPING

1. A. A. Stromquist, 1955–58, 1964; W. P. Schulholf, 1955; P. W. Choquette, 1956–58; and H. W. Sundelius 1964.
2. A. A. Stromquist 1961–64; and A. M. White, 1961.
3. A. A. Stromquist, 1959, 1961–62.
4. A. A. Stromquist, 1959, 1961, 1963–64; and H. W. Sundelius, 1964.

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Councill, R. J., 1954, A preliminary geologic report on the commercial rocks of the Volcanic-Slate series, North Carolina: North Carolina Dept. Conserv. and Devel. Div. Mineral Resources Inf. Circ. 12, 30 p.

St. Jean, Joseph, Jr., 1965, New Cambrian trilobite from the Piedmont of North Carolina, *in* Abstracts for 1964: Geol. Soc. America Spec. Paper 82, p. 307.

White, A. M., Stromquist, A. A., Stern, T. W., and Westley, Harold, 1963, Ordovician age for some rocks of the Carolina slate belt in North Carolina, *in* Short papers in geology and hydrology: U.S. Geol. Survey Prof. Paper 475–C, p. C107–C109.

GEOLOGIC QUADRANGLE MAP
DENTON QUADRANGLE, NORTH CAROLINA
GQ–872

EXPLANATION

Trd — Diabase dikes

Pzg — Gabbro

Pzm — Quartz monzonite

PALEOZOIC — TRIASSIC

Albemarle Group[1] — ORDOVICIAN(?)

Omy, Omf, Omfb, Omfl — Millingport Formation
Yadkin Member:
Omy, *volcanic sandstone and siltstone*
Floyd Church Member:
Omf, *argillite*
Omfb, *volcaniclastic andesitic basalt*
Omfr, *rhyolitic-rhyodacitic rocks*
Omfl, *lentil of argillaceous tuff breccia*

Ocfb, Ocf, Ocfl, Ocmb, Ocm, Ocmr — Cid Formation
Flat Swamp Member:
Ocf, *rhyolitic-rhyodacitic pyroclastics underlain by fine-grained tuff and stratified tuff. Triangle pattern indicates area underlain by tuff breccia*
Ocfb, *andesitic basalt*
Ocfl, *lentil of felsic tuffaceous breccia*
Mudstone member:
Ocm, *mudstone and shale*
Ocmb, *andesitic basalt*
Ocmr, *rhyolitic-rhyodacitic rocks*

Otb, Ot, Otr — Tillery Formation
Ot, *thinly laminated siltstone and claystone*
Otb, *andesitic basalt*
Otr, *rhyolitic-rhyodacitic rocks*

Ocu — Mudstone member of Cid Formation and intrusive rocks, undifferentiated

Contact
Dashed where approximately located; short dashed where indefinite or gradational

Fault
Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side

Shear zone

Anticline — Syncline
Folds
Showing approximate trace of axial plane and direction of plunge of axis

PLANAR AND LINEAR FEATURES
Symbols may be combined and joined at point of observation

Inclined — Vertical — Horizontal
Strike and dip of beds

Strike and dip of beds based on graded bedding

Inclined — Vertical
Strike and dip of flow banding

Inclined — Vertical
Strike and dip of joints

Inclined — Vertical
Strike and dip of axial plane cleavage

Inclined — Vertical
Strike and dip of slip cleavage
Open symbol indicates vertical slip cleavage and vertical lineation

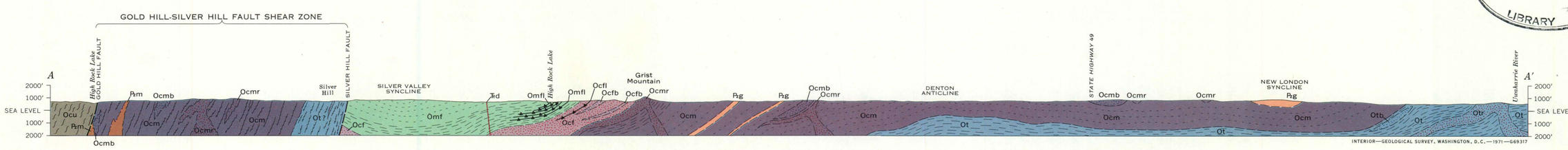
Bearing and plunge of lineation
Indicated by elongated rock or mineral fragments, or intersection of bedding and cleavage

Quartz vein

Active — Inactive — Small pit or trench
Mine, quarry, or pit

Ag, silver — Pb, lead
Au, gold — Py, pyrite
Cu, copper — Zn, zinc
Fl, flagstone

[1] Two lead-alpha age determinations (White and others, 1963) made on zircon concentrates from felsic volcanic rocks below the Albemarle Group in the adjacent Albemarle quadrangle yielded calculated ages of 440±60 m.y. and 470±60 m.y. On this basis the Albemarle Group in the Denton quadrangle is still thought to be probably Ordovician, even though it is possibly Cambrian to Devonian age. Recently a trilobite of probable Cambrian age was found in rocks of the Albemarle Group in Stanly County (St. Jean, 1965).



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GEOLOGIC MAP OF THE DENTON QUADRANGLE, CENTRAL NORTH CAROLINA

By

Arvid A. Stromquist, Philip W. Choquette, and Harold W. Sundelius

1971

For sale by the U.S. Geological Survey, price $1.00