

EXPLANATION<sup>1</sup>

**QUATERNARY**

**Qal**  
Alluvium  
Unconsolidated stream deposits of gravel, sand, silt, and clay.

**MIDDLE PALEOZOIC (C)**

**d**  
Diorite  
Diorite, dark-gray, medium-grained, massive. Occurs as discordant intrusive dikes. Weathers to spherical boulders. Contains hornblende 44%, plagioclase (calcic oligoclase) 27%, biotite-clinohole 18%, quartz 8% with zircon, muscovite-sericite, epidote, sphene and opaque minerals.

**PE**  
Pegmatite  
Pegmatite, coarse-grained (locally finer grained). Composed of quartz, plagioclase, microcline, and muscovite, with minor amounts of biotite and garnet. Mainly concordant lenticular, tabular, or pod-shaped bodies, as much as 50 feet thick.

**ORDOVICIAN-SILURIAN**

**OSgg**  
Granitic gneiss  
Biotite granitic gneiss (quartz monzonite composition), light-gray, medium-grained, poorly foliated. Contains plagioclase (oligoclase) 26%, quartz 23%, microcline 30%, biotite 6%, muscovite, sphene, epidote, zircon and opaque minerals. Contains a few lenses of hornblende gneiss. Interlayered with augen gneiss (Cag) on eastern contact. Differs from augen gneiss in lack of augen and slightly lighter color. Equivalent to part of the Henderson Granite of Keith.<sup>2</sup> Zircon elongation ratios from reduced major axes, average 2.6, suggesting an igneous origin.

**Cag**  
Augen gneiss  
Biotite augen gneiss (quartz monzonite composition), medium-gray to medium-buff-gray, generally massive, homogeneous, and well-foliated. Consists of quartz (chiefly microcline) augen in a medium-grained matrix of quartz 23%, plagioclase (oligoclase) 31%, microcline (average, including augen) 28%, biotite 14%, muscovite 2%, epidote 3%, sphene, zircon and opaque minerals. Contains a few lenses of hornblende gneiss. Zircon elongation ratios from reduced major axes, average 2.6, suggesting an igneous origin.

**gms**  
Biotite-muscovite granitic gneiss  
Biotite-muscovite anitic gneiss (quartz monzonite composition), light-gray, medium-grained, massive to well-foliated. Weathers to a white to light-gray granular saprolite. Contains quartz 35%, plagioclase (oligoclase-andesine) 26%, microcline 28%, biotite 6%, muscovite 4%, garnet, epidote, zircon, clinohole 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.

**am**  
Amphibolite and hornblende gneiss  
Amphibolite, dark-gray to medium-gray, medium-grained, lustrous. Composed of hornblende 45%, plagioclase (andesine) 29%, quartz 10%, epidote 7%, opaque minerals 3%, and zircon. Weathers to a brown to reddish-brown saprolite. Grades southward from Sugarloaf Mountain to a feldspathic hornblende gneiss, gray to dark-gray (weathers buff-brown), medium-grained, interbedded with feldspathic quartzite, gray, medium-grained, thin foliated and lustrous muscovite schist, light-gray to light-brown, medium-grained, locally containing flattened garnets. Cut by numerous pegmatite dikes.

**gms**  
Garnetiferous muscovite schist  
Garnetiferous muscovite schist, dark-gray to medium-light-gray, lustrous, medium-grained. Composed of muscovite 28%, biotite 33%, quartz 24%, plagioclase (oligoclase) 7%, microcline 1%, garnet 2%, and opaque minerals. Grades southeastward from Sugarloaf Mountain to a gray to light-gray, highly lustrous, medium-grained muscovite schist composed of muscovite, quartz, and feldspar, with a decrease in garnet and a marked increase in magnetite southward. A discontinuous layer of coarse-grained, white crystalline marble, as much as 2 feet thick, crops out near the base of Worlds Edge.

**bgn**  
Biotite granitic gneiss  
Biotite granitic gneiss (granodiorite composition), light-gray, medium-grained, massive to well-foliated. Contains quartz 32%, plagioclase (oligoclase) 47%, microcline 7%, biotite 12%, muscovite 2%, and opaque minerals, orthoclase, clinohole and zircon. Contains lenses and bands of amphibolite and pods of pegmatite in the plane of foliation. Relationship to Sugarloaf Mountain rock units and augen gneiss is unknown.

1. Detailed manuscript of the map area is on open file with Tennessee Valley Authority, Gadsden, Ala., Raleigh, N.C. 27602, and the North Carolina Department of Natural and Economic Resources, Office of Earth Resources, Raleigh, N.C. 27611. Copies may be obtained for the cost of reproduction.  
Project was part of Ph. D. degree requirements at the University of North Carolina, Chapel Hill, N.C. 27515.  
2. Keith, Arthur (1906) Description of the Mount Mitchell Quadrangle (N.C. Topog. U.S. Geol. Survey Geol. Atlas, Folio 124.

**Geologic contact, approximately located; dotted where concealed**

**Thrust fault, dashed where approximately located; sawtooth on upper plate**

**Inferred fault; U upthrown block, D downthrown block; arrows indicate relative movement; relative movement questionable where queried**

**PLANAR FEATURES**

**A<sub>15</sub>** Strike and dip of schistosity  
**A<sub>200</sub>** Strike and dip of foliation in nonchistose rocks  
**A<sub>20</sub>** Strike and dip of axial plane of small fold  
**A<sub>v</sub>** Strike of vertical joints

**LINEAR FEATURES**

**A<sub>17</sub>** Bearing and plunge of axis of small open antiform  
**A<sub>13</sub>** Bearing and plunge of axis of small open synform  
**A<sub>12</sub>** Bearing and plunge of axis of small isoclinal fold  
**A<sub>11</sub>** Bearing and plunge of mineral elongation or streaking  
**A<sub>10</sub>** Bearing of horizontal mineral elongation or streaking

Note: Planar and linear symbols are combined where measurements were taken at the same point of observation.

**MINERAL RESOURCES**

**X** Abandoned quarry **cs** Crushed stone  
**X** Prospect or occurrence **fc** Feldspar  
**2** Map numbers refer to descriptions in Mineral Resources Summary **m** Marble  
**msc** Mica schist **mi** Muscovite mica

**QUARRIES, OCCURRENCES AND SAMPLE EVALUATIONS**

**1** Unnamed crushed stone and dimension stone quarry  
**2** Unnamed mica occurrence  
**3** Scrap mica evaluation sample  
**4** Feldspar evaluation sample  
**5** Feldspar evaluation sample  
**6** Marble occurrence

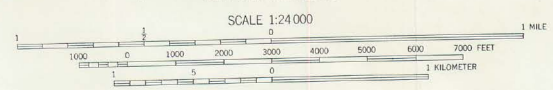
**ZONES OF REGIONAL METAMORPHISM  
BAT CAVE QUADRANGLE**

**Staurolite-kyanite (?) zone (Almandine-amphibolite facies)**

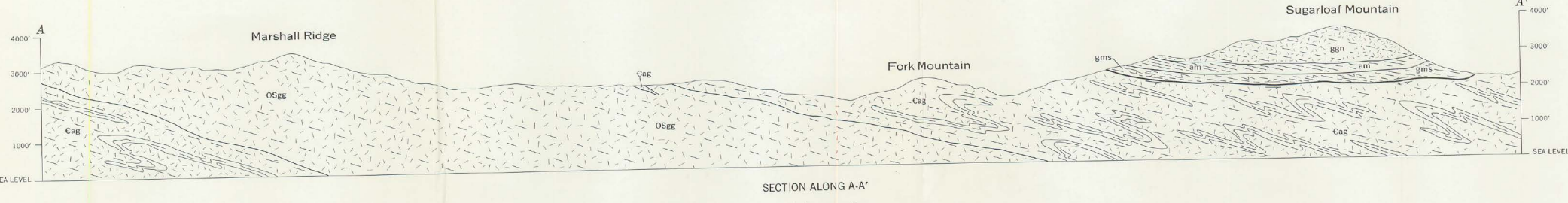
**Sillimanite zone**



Base topographic map by USGS-TVA, 1946  
Geologic map cartography and printing by TVA  
10,000 foot grid based on North Carolina Coordinate System  
The field and office compilation sheets used in the preparation of this geologic map are on open file and available for inspection at the North Carolina Department of Natural and Economic Resources, Office of Earth Resources, Raleigh, N.C. 27611



Geology mapped in 1970-71  
Map preparation and editing by R. E. Lemmon and R. J. Floyd



SECTION ALONG A-A'  
No vertical exaggeration

GEOLOGIC MAP OF THE BAT CAVE QUADRANGLE, NORTH CAROLINA

By  
Robert E. Lemmon and David E. Dunn  
1973