
# *A brief geological history of the Precambrian rocks of the Needle Mountains, southwestern Colorado*

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# A BRIEF GEOLOGIC HISTORY OF THE PRECAMBRIAN ROCKS OF THE NEEDLE MOUNTAINS, SOUTHWESTERN COLORADO'

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This article briefly summarizes the Precambrian geologic history of the Needle Mountains uplift of southwestern Colorado. These rocks were studied by the author as a part of the preparation of a geologic map of the 1:250,000-scale Durango one-degree by two-degree sheet. Early results have been presented in abstract form (Barker, 1967), and a more extensive report is now being prepared.

The Needle Mountains lie approximately 20 miles north to 40 miles northeast of Durango, Colorado, and 10 miles southwest to 25 miles southeast of Silverton, Colorado. U.S. Highway 550 passes along the western margin of the Needle Mountains (Fig. 1 ) .

Products of early geologic investigations in this area include the Silverton folio (Cross and Howe, 1905a), the Needle Mountains folio ( Cross and Howe, 1905b), and the Engineer Mountain folio ( Cross, 1910) . The summary reports by Cross and Larsen (1935) and by Larsen and Cross (1956) followed. The type locality of the Uncompahgre Formation, south of Ouray and about 20 miles north of the Needle Mountains, was studied by Kelley (1946 ), Luedke and Burbank (1962), and Burbank and Luedke (1964 ). Preliminary results of radiometric age measurements of these rocks are given by Bickford and others (in press), and by Silver and Barker (in press) .

The Precambrian rocks of the Needle Mountains have a history of two major sequences of deposition, folding, metamorphism, and intrusion of plutonic igneous rocks.

The first sequence consisted of:

1. Deposition of the Vallecito Conglomerate—a quartzose, polymictic conglomerate containing clasts that indicate that the source terrane included quartzite, red and black jasper, chert, argillite, and epidote-rich greenschist probably 5,000 feet thick and at least 2,400 feet thick; the lowest part of this unit and the underlying rocks are not exposed;
2. Deposition of the Irving Greenstone and the Archean schist and gneiss of Cross and Howe (1905a and 1905b ) —volcanic rocks of basaltic to intermediate compositions, and minor amounts of graywacke, quartzite, siltstone, clay, and iron-formation; these units are of unknown thickness but are extensive and probably of eugeosynclinal type; original emplacement of the Twilight Granite ( See Cross and Howe, 1905b) took place either as a complex of hypabyssal sills and dikes or as ash flows interlayered with basalt (Silver and Barker, in press );
3. Intense folding along north to northeast trends and metamorphism to amphibolite facies;
4. Post-tectonic intrusion of the Tenmile Granite and of the granite of Bakers Bridge; followed by deep erosion.

Uranium-lead isotopic age determinations by Silver and Barker (in press) indicate that the Twilight Granite is about 1,780 m.y. old, and that the Tenmile Granite and the granite of Bakers Bridge are about 1,720 m.y. old. The latter two ages are substantiated by the Rb-Sr age measurements by Bickford and others (in press ).

The second sequence consisted of:

1. Deposition of the Uncompahgre Formation—quartz sand, aluminous clay, and minor amounts of silt; the aggregate post-metamorphic thickness of this formation is at least 8,000 feet; the upper part of this unit is not preserved and the overlying rocks are not known; the peletic layers are partly carbonaceous and pyritic;
2. Isoclinal folding with east to southeast trends, and metamorphism of low to medium rank; and
3. Intrusion of the composite batholiths of Eolus Granite — largely biotite-hornblende quartz monzonite and biotite quartz monzonite; intrusion of the stocks of the gabbro of Electra Lake and of Trimble Granite. Deep erosion followed. The Eolus Granite and the gabbro of Electra Lake are about 1,460 m.y. old (Bickford and others, in press; Silver and Barker, in press), and the Trimble Granite is somewhat younger but its age is still under study. Cambrian rocks lie on the Eolus Granite.

1 Publication authorized by the Director, U.S. Geological Survey.

## REFERENCES CITED

Barker, Fred, 1967, Precambrian sequence in the Needle Mountains, Colorado, *in* Abstracts for 1966: Geol. Soc. America Spec. Paper 101, p. 385.

Bickford, M. E., Barker, Fred, Wetherill, George, and Lee-Hu, Chinnan, Geochronology of Precambrian rocks of the Needle Mountains, southwestern Colorado: Part II, Rb-Sr results in Abstracts for 1967: Geol. Soc. America Spec. Paper, 115, p. 14, in press.

Burbank, W. S., and Luedke, R. G., 1964, Geology of the Ironton quadrangle, Colorado: U.S. Geol. Survey Geol. Quad Map GQ-291.

Cross, Whitman, 1910, Description of the Engineer Mountain quadrangle, Colorado: U.S. Geol. Survey Geol. Atlas, folio 171.

Cross, Whitman, and Howe, Ernest, 1905a, Description of the Silverton quadrangle, Colorado—geology and general geology of the quadrangle: U.S. Geol. Survey Geol. Atlas, folio 120.

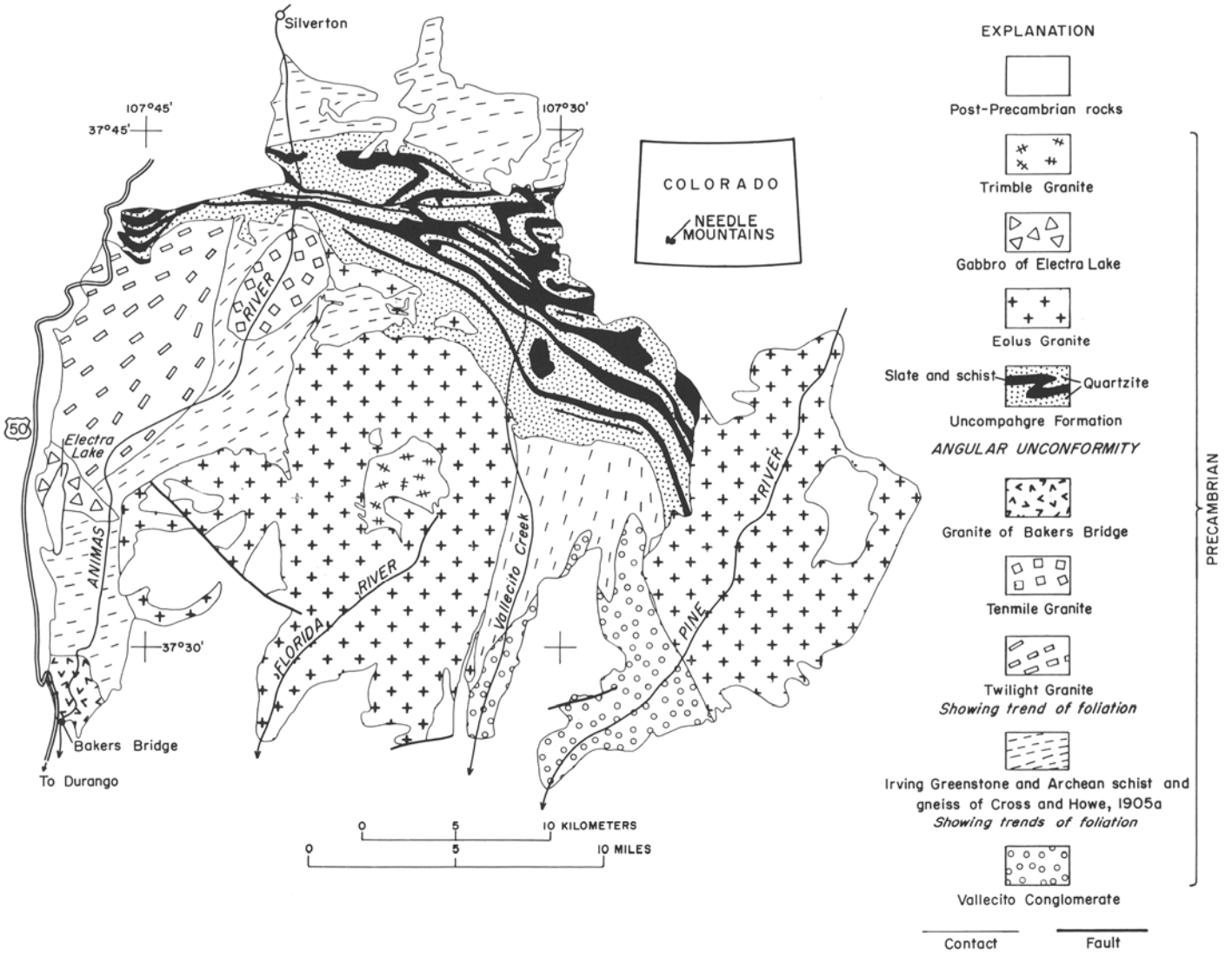


FIGURE 1.
Geologic sketch map of the Needle Mountains, Colorado

_____, 1905b, Description of the Needle Mountains quadrangle, Colorado—topography and general geology: U.S. Geol. Survey Geol. Atlas, folio 131.

Cross, Whitman, and Larsen, E. S., Jr., 1935, A brief review of the geology of the San Juan region of southwestern Colorado: U.S. Geol. Survey Bull. 843, 138 p.

Kelley, V. C., 1946, Geology, ore deposits, and mines of the Mineral Point, Poughkeepsie, and Upper Uncompahgre districts, Ouray, San Juan, and Hinsdale Counties, Colorado: Colorado Sci. Soc. Proc., v. 14, no. 7, p. 287-466.

Larsen, E. S., Jr., and Cross, Whitman, 1956, Geology and petrology of the San Juan region, southwestern Colorado: U.S. Geol. Survey Prof. Paper 258, 303 p.

Luedke, R. G., and Burbank, W. S., 1962, Geology of the Ouray quadrangle, Colorado: U.S. Geol. Survey Geol. Quad. Map GQ-152.

Silver, L. T., and Barker, Fred, Geochronology of Precambrian rocks of the Needle Mountains, southwestern Colorado: Part I, U-Pb zircon results, in Abstracts for 1967: Geol. Soc. America Spec. Paper 115, p. 204, in press.