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Precambrian Rocks of South-Central New Mexico

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PRECAMBRIAN ROCKS OF SOUTH-CENTRAL NEW MEXICO

This paper, which describes briefly the Precambrian rocks of the region in which the Sixth Field Conference of the New Mexico Geological Society is to be held, is essentially a review of published literature, and is intended to provide basic information for more extensive and detailed investigations. The literature describing the Precambrian rocks of New Mexico is not voluminous and, but for a few exceptions, is limited to the location and petrology of the Precambrian rocks and their associated mineral deposits. More extensive studies have been made by Kelley and Silver (1952), Kuellmer (1954), Montgomery (1953), and Stark and Dapples (1946), and from their works some conception of Precambrian problems in New Mexico can be gained. Toward this end comment upon their work is made.

GENERAL SURVEY OF THE PRECAMBRIAN OF NEW MEXICO

Exposures of Precambrian rocks (Darton 1928a), as compared with those of the Paleozoic and younger sedimentary rocks, are relatively not extensive. They are limited to uplifted areas where they have been laid bare by erosion. They occur in the Sangre de Cristo and other mountains of north-central New Mexico, in the Zuni, Manzano, Los Pinos, Pedernal, Ladrones, and Magdalena Mountains, and as smaller areas elsewhere. In southern New Mexico they are found along the eastern base of the San Andres Mountains, along the west front of the Oscura, Fra Cristobal, and Caballo Mountains, in the Black Range, and in the Burro Mountains. Other exposures of Precambrian rock are present in the Silver City district, Cooks Range, and Florida Mountains and as small areas elsewhere. The Precambrian of the subsurface of southeastern New Mexico has been studied by Flawn (1954a, b).

In general, knowledge of the petrologic and petrographic character, and the relative ages of the Precambrian rock units is limited. Granites, gneisses, schists, and associated rocks are known and, according to Kelley (1949, p. 21); "Both Archean and Algonkian rocks may be present in New Mexico, but their definite differentiation has not been made. In many places the oldest rocks of the Precambrian consist of a thick series of isoclinally folded and dynamically metamorphosed igneous and sedimentary rocks. These have been converted to rhyolitic gneiss and schist, amphibolite, talc schist, greenstone,

quartz-mica schist, and quartzite. In some places an older granite intruded into this series has been converted to gneiss. Locally unmetamorphosed basic igneous rocks are intruded into the older rocks. The youngest and one of the most widespread of the Precambrian rocks is a coarse-grained white or pink granite with associated pegmatite, aplite, and lamprophyric dikes."

Stark and Dapples (1946) examined the Precambrian rocks of the Los Pinos Mountains of north-eastern Socorro County and summarized their description as follows:

"The pre-Cambrian core, the area of greatest relief, is composed of the Sais quartzite (oldest), Blue Springs muscovite schist (originally siltstones), White Ridge quartzite, and Sevilleta rhyolite, all intruded by the Los Pinos (pre-Cambrian) granite. The pre-Cambrian bedded rocks exceed 12,000 feet in thickness, of which over 4,500 feet is rhyolite flows. All dip westward (average 50°), and schistosity parallels the dip. Schistosity of the Los Pinos granite (N. 20° E.) parallels that in other pre-Cambrian rocks. Granitization is pronounced along its borders, particularly along the contacts with the White Ridge quartzite."

Montgomery (1953) made a detailed investigation of the Precambrian rocks of the Picuris Range of north-central New Mexico. He recognized two formations, the older Ortega formation and the younger Vadito formation. An unconformity separates the two formations, and both are intruded by the Embudo granite, also of Precambrian age, and diabase dikes of probable late Precambrian age.

Thus a start toward more comprehensive investigation of the Precambrian rocks of New Mexico has been made but much remains to be done before these rocks can be divided into units, their petrographic character and relative ages determined, the units correlated from one region to another, and the structural history deciphered. Detailed mapping and petrographic identification of Precambrian rock types should prove to be a fruitful field of research.

SAN ANDRES MOUNTAINS

The Precambrian rocks of the San Andres Mountains have not been described in detail. We are indebted to Darton (1928a, b), Kelley (1949), and Lasky (1932) for most of our information concerning these rocks and the associated mineral deposits.

The Precambrian rocks are shown on the geologic map of New Mexico (Darton, 1928a) as a narrow strip along the eastern slope of the mountains, extending from the Organ Mountains at the south almost to the Oscura Mountains at the north, a distance of approximately seventy-five miles. They have been uplifted by faulting along the west margin of the Tularosa Basin and exposed to erosion.

Darton (1928b, p. 183) reported that the Precambrian rocks of the San Andres Mountains are in general similar to the Precambrian rocks in many other uplifts in New Mexico. The most abundant rock of this age is massive, coarse-grained granite. Schist was observed in Cottonwood, Deadman, Sulphur, Membrillo, and San Andres Canyons. Diorite containing much hornblende was reported by him in Lostman Canyon, and granite in Goodfortune and Membrillo Canyons, near Rhodes Canyon, and from Lava Gap northward.

Kelley (1949, p. 228) briefly mentioned the Precambrian rocks and stated that they are dominantly pink granite, but that considerable areas of schist, silicic and basic phyllites, talc schist, quartzite, and dioritic rocks exist. The intrusive pink granite has much disturbed the structure of the metamorphic rocks but uniformity of trend over great distances is apparent.

Lasky (1932, p. 73-85), in reporting on the ore deposits of Socorro County, mentioned the Precambrian rocks of the San Andres Mountains and the associated mineral deposits. He stated that granite is the chief rock of the Precambrian, but schist is very prominent locally. Practically all of the ore deposits on the eastern slope of the range are within or close to the Precambrian rocks, and are associated with the faulting and related fracturing that elevated the rocks of this age. The bismuth deposits of Grandview Canyon occur at the contact of Precambrian schist and granite, and the copper deposits in Sulphur Canyon is in schist. Other occurrences of minor mineral deposits within or related to the Precambrian rocks are described.

CABALLO MOUNTAINS

The Precambrian rocks of the Caballo Mountains are exposed with local interruptions along the western base of these mountains from a point east of Truth or Consequences southward approximately twenty miles (Kelley and Silver, 1952). They have not been examined in great detail.

Lindgren, Graton, and Gordon (1910, p. 225) reported granite in the vicinity of Shandon associated with hornblende schist and granitic gneiss, cut by

numerous acidic and basic dikes, and intersected by quartz veins having chiefly a northwest-southeast course. The granite is of reddish or brownish color and much jointed.

Darton (1928b, p. 320) mentioned the Precambrian rocks of the Caballo Mountains briefly and stated that massive granite predominates with some gneiss or schist, cut locally by darker rocks that appear to be diorites.

Kelley and Silver (1952, p. 32-33) described the Precambrian rocks in greater detail:

"In general the Precambrian terrain is irregular and knobby. It commonly has a reddish or brownish aspect, owing largely to the weathering of the pink ferroan feldspars of the granite and granite gneiss. The dominant rock of the Precambrian is a pinkish coarse-grained granite. In many outcrops the rock is gneissoid. J. J. Glass (Rothrock, et al, 1946, p. 143) found that the dominant feldspar of the granite is microcline and that the chief dark minerals are biotite and magnetite. Small dikes of simple granite pegmatite and silicite are fairly common. Small lamprophyric dikes are occasionally present. Here and there, small patches of mica schist, metadiorite, greenstone, and other rocks occur."

They reported between Granite Wash and Burbank Canyon several square miles of metamorphic rocks, the steep foliation of which strikes mainly almost due east. These rocks are chiefly mica schist, but granite gneiss, metadiorite, and greenstone are common. Very little quartzite is present. The metamorphic rocks are intruded by pink granite. Age units of the Precambrian rocks were not determined, but the authors express their belief that the metamorphic rocks may be of Archeozoic age, and that the granite may be of either late Archeozoic or early Proterozoic age.

Harley (1934, p. 197, 213), in describing the mineral deposits of the Caballo Mountains, mentioned the rock types which occur in the Precambrian and reports that the gold mined in the Shandon placers in and near Apache Canyon has been derived from the quartz veins in the Precambrian granites and schists. Rothrock, Johnson, and Hahn (1946, p. 146-166) and Jahns (1942), reported occurrences of fluorite in veins in Precambrian rocks. Kelley and Silver (1952, p. 33) stated that the mineral deposits in the Precambrian rocks include fissure veins containing fluorspar, lead, and copper, probably of Tertiary age, and gold in small veins probably of Precambrian age.

MUD SPRINGS MOUNTAINS

Precambrian rocks occupy a small area of about

one square mile or less in the Mud Springs Mountains about three miles northwest of Truth or Consequences. Harley (1934, p. 193) reported granite of Precambrian age in this area and Kelley and Silver (1952, p. 253) described the Precambrian rocks briefly as pink granite with small pegmatite dikes and inclusions of biotite schist.

FRA CRISTOBAL RANGE

The Precambrian rocks of the Fra Cristobal Range are represented on the geological map of New Mexico (Darton, 1928a) by an area about ten miles long and a mile or slightly more wide. They are shown as separated from the Paleozoic rocks by a north-south fault.

Harley (1934, p. 196) described the Precambrian rocks as predominantly granite. Schist is locally prominent, and at the north end of the range diorite containing abundant hornblende is exposed. Pegmatite dikes occur locally. No important mineral deposits were reported.

THE BLACK RANGE

The geologic map of New Mexico (Darton, 1928a) shows an area of Precambrian rock in the Black Range of western Sierra County. Darton mentioned the occurrence of granite (1928b, p. 326) in these mountains, and Harley (1934, p. 98) reported Precambrian granite, gneiss, and schist in the Kingston district. Kuellmer (1954, p. 6-10) described these rocks in some detail and noted that the Precambrian rocks at Kingston consist of graywacke, granite, and metadiabase. He stated that detailed mapping has shown that the exposures of Precambrian rocks are small and discontinuous in the Kingston region, in contrast with Darton's map (1928a). The graywacke is fine to coarse-grained, massive to thin-bedded, gray to dark green or black. It weathers green to brown, and it is penetrated by thin quartz stringers. The granite is brown to pink and medium-grained. It weathers to a reddish or yellowish brown. Metadiabase dikes transect both the graywacke and granite. It is a darker green to black rock, medium to fine grained, and it contains abundant laths of a chloritic material. No mineral deposits in Precam-

brian rocks were reported.

SIERRA CUCHILLO NEGRO

Precambrian rocks have been reported in the Sierra Cuchillo Negro of northwestern Sierra County but apparently have not been described in detail. Kelley (1949, p. 202) stated that Precambrian meta-andesite lies about 350 feet below and west of a saddle in the range in the vicinity of the iron deposits. The New Mexico Geological Society Guidebook (1952, p. 79) states that the Cuchillo Negro Mountains are a small, eastward tilted fault block consisting of rocks which range from Precambrian to Tertiary in age.

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