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GEOLOGIC MAP OF THE SAN GORGONIO MOUNTAIN QUADRANGLE SAN BERNARDINO AND RIVERSIDE COUNTIES, CALIFORNIA

By

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MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-431

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DESCRIPTION OF MAP UNITS

PRECAMBRIAN(?) METAMORPHIC ROCKS

Schistose rocks

Dark highly foliated schists metamorphosed possibly as early as Precambrian or as late as Mesozoic times from Precambrian(?) sedimentary or volcanic rocks. The following lithologic units were mapped:

Schist.--Dark greenish-gray, greenish-brown-weathering, medium- to fine-grained schist composed mostly of flaky chlorite and smaller amounts of finely divided actinolite and epidote, and abundant white augen or porphyroblasts as large as 2 mm of albite or albite-quartz aggregates (Allen, 1957, p. 320-321). Foliation presumably parallel to original bedding. Exposed thickness about 2,000 feet; grades upward (southward) into mylonitic schist. Schist similar to chlorite-albite-actinolite-epidote (green schist) facies of Pelona Schist (Precambrian?) of Sierra Pelona (Dibblee, 1961) and eastern San Gabriel Mountains.

Mylonitic schist.--Dark, greenish- to brownish-gray, foliated rock composed of scattered to numerous lenticular white augen as long as 2 mm of mostly albite or albite-quartz aggregate in dark, indistinctly banded, milled aggregate of indistinguishable mineral content. Mylonitic texture presumably formed by shearing along foliation planes during or after metamorphism. Forms upper approximately 1,000 feet of schistose rocks; grades upward into gneissic rocks.

Gneissic rocks

Includes San Gorgonio Igneous-Metamorphic Complex of Allen (1957). Gray, fine- to coarse-grained gneissic rocks; formed probably at great depth by extreme recrystallization of Precambrian(?) sedimentary or metamorphic rocks, or possible in part by lit-par-lit injection by granitic magmas, possibly as early as Precambrian or as late as Mesozoic times. The following units were mapped:

Mylonitic gneiss.--Light- to dark-gray, hard, fine- to coarse-grained banded mylonitic or cataclastic gneiss composed of rounded white grains as large as 5 mm in diameter in dark banded matrix. White grains mostly plagioclase (andesine, oligoclase, or albite) or plagioclase-quartz aggregate, some of potassic feldspar (Allen, 1957, p. 320); presumably rounded by having been rolled in matrix, matrix is dark milled aggregate of indistinguishable mineral content, presumably including chlorite, biotite, and iron oxides. Unit includes lenses as thick as 50 feet of dark grayish-brown fine-grained mylonitic rock composed mainly of chlorite, biotite, and iron oxides, with scattered white augen of plagioclase. Unit as thick as 4,000 feet, forms present lower part of gneissic rocks; grades upward into gneiss.

Gneiss.--Light- to dark-gray, ranges from laminated gneiss to gneissoid quartz diorite or granodiorite, composed of plagioclase (andesine), quartz, biotite, potassic feldspar, and hornblende, in variable proportions but generally in that order of decreasing abundance, and small amounts of muscovite, sphene, apatite, and clinozoisite. Rock banded with light-gray to white laminae rich in feldspar and quartz alternating with dark-gray to black laminae rich in biotite and hornblende and gray laminae of intermediate composition; laminae fine- to coarse-grained; mica-rich laminae foliated, schistose; laminae generally undulating, commonly contorted, in places have lineation; some biotite-rich gneiss contains large lenticular knots (augen) of pink potassic feldspar and quartz. Gneissoid quartz diorite or granodiorite, gray, nearly homogeneous, but with generally parallel orientation of biotite and hornblende. Thin sills and dikes of white pegmatite commonly present.

Quartzite.--Tan to light-gray, poorly bedded, fine-grained, vitreous, brittle, severely fractured; interstratified in about 600 feet of gneiss on Yucaipa Ridge.

Marble.--White, poorly bedded, medium- to coarsely crystalline marble composed mostly of calcite, minor amount of dolomite; occasionally forms lenses as thick as 25 feet in gneiss.

PALEOZOIC METAMORPHIC ROCKS

Saragossa Quartzite

Named by Vaughan (1922, p. 344, 352-363) for Saragossa Spring near type locality on Gold Mountain, Lucerne Valley quadrangle. Unfossiliferous. Age, presumably Paleozoic.

Quartzite.--Light-gray to white, massive to laminated, locally cross-bedded, hard, brittle, fine-grained to vitreous quartzite composed almost entirely of quartz and locally minor amounts of feldspar and biotite; fractures coated with brown to pink iron stains. Maximum thickness possibly 3,000 feet, unconformable on gneissic rocks; basal part commonly contains small subrounded fragments as large as 2 cm of granitic(?)

rocks; uppermost part white, massive. Crystallized from sandstone.

Phyllite.--Dark-gray, hard, thin-bedded, shaly, phyllite composed of finely divided biotite, muscovite, quartz, feldspar, and iron oxides. Forms lenses as thick as 250 feet. Crystallized from shale.

Furnace Limestone

Named by Vaughan (1922, p. 344, 352-365, and map) for Furnace Canyon, the type locality, in Lucerne Valley quadrangle. White to less commonly blue-gray, poorly bedded to massive, medium- to coarsely crystalline marble composed mostly of clacite and some dolomite; includes occasional lenses a few feet thick of pink calc-silicate hornfels and dark-gray micaceous phyllite; exposed thickness about 1,500 feet, top eroded; conformable on Saragossa Quartzite. Crystallized from limestone. Unfossiliferous. Age, Paleozoic, presumably Carboniferous (Richmond, 1960, p. 16-17).

MESOZOIC PLUTONIC ROCKS

Granodiorite

Light-gray gneissoid to massive medium-grained granitic rock composed of about 10 to 20 percent quartz, 15 to 30 percent potassic feldspar, 30 to 50 percent plagioclase (oligoclase-andesine), 7 to 30 percent biotite, and a total of less than 5 percent hornblende, iron oxides, sphene, and secondary chlorite. Small masses near Raywood Flat mostly massive, with less than 10 percent dark minerals. Gneissoid facies in Allen Peak area may have recrystallized from Precambrian(?) gneiss, presumably in Mesozoic time.

Dioritic rocks

Dark-colored, medium- to coarse-grained, mafic plutonic rocks intrusive into gneissic and metasedimentary rocks. Age, possibly late Jurassic or early Cretaceous. Composed of the following types:

Hornblende diorite gabbro.--Dark-gray to black, generally massive but rarely gneissoid, medium-grained mafic rocks composed mostly of plagioclase and hornblende in variable proportions, and small amounts of biotite, chlorite, epidote, iron oxides, and accessories.

Quartz diorite.--Medium-gray, massive medium-grained plutonic rock composed of about 50 to 60 percent plagioclase (andesine) and a total of 40 to 50 percent quartz, biotite, and hornblende, including about 2 percent accessories (sphene, apatite, iron oxides).

Quartz monzonite

Includes Cactus Granite of Vaughan (1922). Intrusive into all other pre-Tertiary rocks. Age, presumable early Cretaceous, possibly late Jurassic. Rock as follows:

Quartz monzonite.--Gray-white, generally massive, but rarely faintly gneissoid, medium-grained equigranular granitic rock composed of quartz, potassic feldspar, and plagioclase (oligoclase) in generally equal proportions, 3 to 7 percent biotite (generally as scattered euhedral tablets) and a total of less than 2 percent accessories (sphene, apatite, zircon, magnetite, and rarely hornblende). Weathered rock buff white, weakly coherent.

Quartz monzonite porphyry.--A local facies of quartz monzonite that contains potassic feldspar phenocrysts as long as 2 cm.

CENOZOIC SEDIMENTARY AND VOLCANIC ROCKS

Potato Sandstone of Vaughan (1922)

Strongly consolidated stream-laid sedimentary rocks. Age, Tertiary, probably Miocene but possibly Pliocene. The following units were mapped:

Conglomerate.--Pinkish-gray to buff, hard, bedded conglomerate composed of cobbles and pebbles of granitic rocks and some schist in matrix of medium- to coarse-grained arkosic sandstone. About 2,000 feet thick. Contains some interbeds of sandstone and reddish-gray siltstone. Lens as thick as 200 feet of granodiorite(?) breccia at base. Unconformable on pre-Tertiary rocks. Grades upward into sandstone.

Sandstone.--Buff, hard, bedded, fine- to coarse-grained, arkosic sandstone; locally contains granitic pebbles; contains some interbeds of micaceous gray siltstone. About 1,000 feet exposed; top eroded.

Santa Ana Sandstone of Vaughan (1922)

Formation as thick as 2,000 feet; unconformable on pre-Tertiary rocks; top eroded; unfossiliferous. Age, presumably Tertiary, most probably Pliocene on basis of correlation with similar formation in Cajon Pass area. The following units were mapped:

Basalt.--Black, friable-weathering, fine-grained basalt, composed of plagioclase, augite, a little olivine, and iron oxides; contains scattered small vesicles commonly filled with calcite, zeolite, or silica. Forms basal lens less than 60 feet thick near Wildhorse Creek only.

Sandstone.--Light-gray to buff, bedded, friable, fine- to coarse-grained arkosic sandstone about 2,000 feet thick; includes some interbedded light-red to gray, micaceous, sandy siltstone, and quartz-monzonite-pebble conglomerate.

Older surficial sediments

Slightly consolidated alluvial deposits derived from pre-Tertiary rocks of adjacent mountains. Much dissected and preserved only as erosional remnants. Age, presumably Pleistocene. Composed of the following units, with unconformity at base of each:

Fanglomerate.--Buff to light reddish-brown, massive to crudely bedded fanglomerate of unsorted boulders, cobbles, pebbles, and sand derived mostly from gneiss and quartz monzonite. In Barton Flats area as thick as 300 feet. In Bear Valley as thick as 400 feet, contains much quartzite detritus, and basal 50 feet contains gray-white arkosic sandstone and greenish- to reddish-gray siltstone with white calcareous nodules. Deposited as alluvial fans.

Older terrace gravel.--Partly included in Cabezon Fanglomerate of Vaughan (1922) by Allen (1927, pl. 1). Light reddish- to yellowish-brown, crudely bedded fanglomerate and gravel of unsorted boulders, cobbles, and pebbly sand of gneissic and granitic detritus. Deposited as alluvial fill in canyons, as thick as 150 feet; largely eroded away except for isolated remnants.

Terrace gravel.--Similar to older terrace gravel; deposited at lower levels after much of older terrace gravel was eroded away. Much dissected and partly eroded.

Glacial till.--Unsorted angular fragments as large as 10 feet across of gneiss and (or) quartz monzonite, carried downslope and deposited by glacial ice during last ice age (Sharp, Allen, and Meier, 1959).

Surficial sediments and rubble

Unconsolidated, generally undissected alluvial fill of present valleys and canyons; thickness less than 100 feet; unconformable on older formations. Includes rock rubble on mountain slopes. Age, Recent, possibly in part very late Pleistocene. Composed of the following units:

Landslide rubble.--Slumped, shattered masses of granitic or metamorphic rock on mountain slopes.

Talus rubble.--Loose angular rocks at base of steep mountain slopes.

Alluvium.--Torrential boulder gravel in major stream-channels, mostly cobble-pebble gravel and coarse sand elsewhere.

Clay.--Micaceous clay, silt, and sand of Big Bear and Erwin Lakes.

PROSPECTS AND QUARRIES

A. Erwin mine. W½? sec. 32, T. 2 N., R. 2 E. (location not shown). Gold-bearing pyrite in oxidized quartz vein in quartzite and phyllite of Saragossa Quartzite, and reportedly in (Furnace?) limestone. Explored from adit about 150 feet long. Long idle. (Wright and others, 1953, tab. list no. 98, p. 34)

B. Big Bear Graphite deposit. SE¼NE¼ sec. 31, SW¼NW¼ sec. 32, T. 2 N., R. 2 E. Graphite and iron oxides disseminated in sheared dark-gray to black phyllite below Saragossa Quartzite, dips 30° to 50° NW. Explored by several open pits; no production known. (Wright and others, 1953, p. 166)

C. Green Canyon limestone quarry. SE¼SW¼ sec. 32, T. 2 N., R. 2 E. White marble of Furnace Limestone, dipping north. Small tonnage removed from small quarry in 1960-1961, presumably for roofing granules.

D. Mill Creek limestone quarry. S½ sec. 15, T. 1 S., R. 1 E. Two lenses of white marble 15 and 25 feet thick, about 100 feet apart in gneiss, largest about 2,500 feet long; both lenses and banding of gneiss strike about N. 65° E., dip 40° to 50° NW. Small open cut on lower lens high on slope, with chute to loading bin below. Small tonnage quarried in 1942-1943. (Wright and others, 1953, tab. list no. 452, in part)

E. Alger Creek (St. Patrick Group) uranium prospect. SW¼ sec. 8, T. 1 S., R. 1 E. Small crystals and grains of magnetite, allanite, uranothorite and zircon in lens of reddish-brown feldspar (mostly microcline, a little orthoclase, microperthite, and sodic plagioclase), quartz and some biotite. Lens as thick as 15 feet, elongated parallel to foliation of enclosing gneiss that dips 35° to 40° SW. Prospected by open cut about 30 feet long, limited by wall 15 feet high. A few tons sorted and shipped for its uranium content in 1954 (Hewett and Stone, 1957, p. 104-107).

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