DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
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GEOLOGIC MAP OF THE MORONGO VALLEY QUADRANGLE SAN BERNARDINO AND RIVERSIDE COUNTIES, CALIFORNIA

By
T. W. Dibblee, Jr.

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-517

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TO ACCOMPANY MAP I-517

GEOLOGIC MAP OF THE MORONGO VALLEY QUADRANGLE, SAN BERNARDINO AND RIVERSIDE COUNTIES, CALIFORNIA

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DESCRIPTION OF MAP UNITS*

CENOZOIC SEDIMENTARY AND VOLCANIC ROCKS

Surficial sediments and rubble

Unconsolidated generally undissected alluvial fill of present canyons and valleys; thickness probably less than 100 feet, unconformable on older formations, but in Coachella and Morongo Valleys may conformably overlie the older surficial sediments. Includes several slumped masses of landslide rubble. Age, very late Pleistocene and Recent. Units as follows:

Alluvium.—In stream channels mostly gravel of unsorted boulders, cobbles, and pebbles; elsewhere mainly coarse pebbly arkosic sand.

Landslide rubble.—Slumped, shattered masses of gneissic or granitic rocks on mountain slopes.

Older surficial sediments

Slightly consolidated alluvial deposits derived from pre-Tertiary rocks. On elevated areas much dissected and preserved only as erosional remnants. Unconformity at base. Age, presumably Pleistocene. Composed of the following units:

Older alluvium.—In Bowden Flat area, as thick as 150 feet, composed of quartz monzonite cobbles and pebbles in matrix of arkosic sand.

Gravel or fanglomerate.—Included in Cabazon Fanglomerate by Vaughan (1922, pl. 1) and Allen (1957, pl. 1); between Whitewater River and Coachella Valley similar to the fanglomerate described below, but probably in part, if not wholly, younger; deposited after slight uplift and erosion of area as fill in ancestral canyon of Whitewater River. As thick as 200 feet.

Fanglomerate.—Light-gray to light-brown, massive to crudely bedded, fanglomerate of unsorted boulders, cobbles, and pebbles in matrix of coarse, gritty, arkosic sand. Exposed thickness as much as 300 feet. In northern part of quadrangle and southeast of Morongo Valley northeastward from sec. 23, T. 1 S., R. 4 E., clasts mostly of Saragossa Quartzite and quartz monzonite; few of gneissic rocks, but near Morongo clasts mostly of granitic and gneissic rocks. In exposures between Coachella Valley and Whitewater River, fanglomerate (mapped as Cabazon Fanglomerate by Vaughan, 1922, pl. 1, and Allen, 1957, p. 331, p. 1) made up mostly of granitic detritus (quartz monzonite, pegmatite, aplite) and some of gneissic rocks; derived probably in large part from mountains southwest of quadrangle, possibly from San Jacinto Mountains. Presumably underlies alluvium of Morongo and Coachella Valleys.

Sand and silt.—In secs. 24, 25, and 28, T. 2 N., R. 3 E. (in north part of quadrangle), as thick as 100 feet; underlies the fanglomerate; composed of stream-laid light-gray, medium- to fine-grained arkosic sand and some interbedded greenish-gray siltstone; in places contains thin layers of lacustrine(?) clay and white marl.

Basalt

Black massive nonvesicular basalt composed of scattered small phenocrysts of olivine and plagioclase in microcrystalline groundmass of plagioclase laths, green pyroxene(?), and specks of magnetite. Forms several flows that total as much as 150 feet thick. Conformable on the Old Woman(?) Sandstone at Black Hill and Sorrel Horse Canyon; unconformable on the quartz monzonite elsewhere. Age, presumably Pliocene or early Pleistocene. Same unit as basalt of Ruby Mountain area of Emerson Lake quadrangle (Dibblee, 1967). Basalt exposed 1 mile south of Cienga Seca flat may be same age as basalt at base of Santa Ana Sandstone (Pliocene?) 5 miles west in San Gorgonio Mountain quadrangle (Dibblee, 1964b).

Old Woman(?) Sandstone

Terrestrial sandstone similar in lithology and stratigraphic position to Old Woman Sandstone (of Shreve in Richmond, 1960; Dibblee, 1964a) in Lucerne Valley northwest of quadrangle. At Black Hill, as thick as 300 feet; unconformable on the quartz monzonite east of quadrangle; uppermost part interbedded with the overlying basalt; sandstone light-buff, friable, massive to bedded, fine- to coarse-grained, arkosic, commonly conglomeratic with granitic pebbles, contains a few interbeds of soft siltstone. At Sorrel Horse Canyon, less than 70 feet thick, of similar lithology but locally brown and highly ferruginous with local deposits of limonite. Deposited by streams in a low valley or plain. Age, presumably late Tertiary (Dibblee, 1964a), possibly in part early Pleistocene.

Coachella Fanglomerate

Named by Vaughan (1922, p. 386) for exposures (mostly south of quadrangle) at type locality just east of Whitewater River wash and southward from Red Dome, west of Coachella Valley. Unconformable on the gneissic rocks; within quadrangle about 2,000 feet exposed, but beyond south border as thick as 4,600

*Potassic and sodic-calcic plagioclase feldspar content of igneous rocks determined by chemical staining of sawed surface of samples by M. B. Norman.

feet and overlain by Imperial Formation of late Miocene or early Pliocene age. Presumably derived mostly from area north of San Andreas fault. Unfossiliferous. Age, probably Miocene (Allen, 1957, p. 328). The following members were mapped:

Upper member.—Light-gray bedded fanglomerate composed of poorly sorted boulders, cobbles, and pebbles mostly of granitic rocks (quartz monzonite presumably), pegmatite, and aplite; very few of gneiss, embedded in matrix of medium- to coarse-grained gritty arkosic sandstone; as thick as 600 feet. On west slope of Red Dome, most is poorly bedded red conglomeratic sandstone and some siltstone. In exposures east of San Andreas fault near mouth of Big Morongo Canyon, as thick as 350 feet, fanglomerate as described above but clasts are mostly of gneissic and granitic rocks; in lowest 100 feet, clasts mainly of cobble size; fanglomerate of this exposure questionably assigned to Coachella Fanglomerate, but may be younger.

Basalt member.—Black massive basalt composed of scattered phenocrysts of olivine and labradorite in fine-grained to microcrystalline groundmass of plagioclase laths, green pyroxene, and magnetite. In canyon 1½ miles southeast of Red Dome, about 10 feet thick and separates the lower and upper members; elsewhere, as thick as 100 feet and unconformable on the gneissic rocks.

Lower member.—Light-gray bedded fanglomerate composed of poorly sorted boulders, cobbles, and pebbles, mostly of quartz monzonite; some of pegmatite, aplite, gneiss, and Tertiary basalt, embedded in matrix of arkosic sandstone. About 800 feet thick; present only south and southeast of Red Dome.

MESOZOIC PLUTONIC AND HYPABYSSAL IGNEOUS ROCKS

Pegmatite and aplite dikes

White, fine-grained aplitic to very coarse grained pegmatitic rocks composed essentially of quartz, potassic feldspar, and plagioclase (albite-oligoclase) and less than 2 percent accessories (mostly biotite, muscovite, locally sphene, zircon, apatite, epidote, and garnet). Forms nearly parallel dikes, generally less than 2 feet thick but in places as much as 20 feet thick. Intrusive into the quartz monzonite and older rocks. Age, Mesozoic, presumably Cretaceous.

Quartz monzonite

Mapped as Cactus Granite by Vaughan (1922, p. 344, 364-365, and map). Gray-white, massive (nongneissoid). Ranges from coarse through medium to locally fine grained equigranular granitic rock composed of quartz, potassic feldspar, and plagioclase (oligoclase-andesine) in generally equal proportions, 3-7 percent biotite (generally as scattered euhedral plates 1-3 mm in diameter), and a total of less than 2 percent sphene, apatite, zircon, and magnetite; rarely hornblende. Intrusive into all metamorphic and other plutonic rocks described below. Age, Mesozoic, presumably Early Cretaceous, possibly Late Jurassic (Dibblee, 1967).

Hornblende diorite or gabbro

Dark-gray to black, massive to rarely gneissoid, medium- to coarse-grained diorite or gabbro composed mainly of calcic plagioclase and hornblende in variable proportions (hornblende partly altered to biotite, chlorite, and epidote), and small amounts of magnetite, sphene, and apatite. Epidote veinlets common. Intrusive into the gneissic rocks, into Paleozoic metasedimentary rocks northwest of quadrangle; intruded by the quartz monzonite. Age, presumably Mesozoic.

Quartz diorite

Gray, massive (nongneissoid), medium-grained granitic rock composed of about 50 percent plagioclase (andesine); a total of nearly 50 percent quartz, potassic feldspar, biotite, and hornblende; small amounts of sphene, apatite, zircon, and iron oxides. Intrusive into Paleozoic metasedimentary rocks, intruded by the quartz monzonite in Coon Canyon; exposed more extensively west of quadrangle (Dibblee, 1964b). Age, presumably Mesozoic.

Granodiorite to quartz monzonite

Light- to medium-gray, massive to slightly gneissoid, medium-grained granitic rock of composition ranging from granodiorite to quartz monzonite; mainly quartz, potassic feldspar, and plagioclase (oligoclase-andesine) in proportions that range from nearly equal to predominance of plagioclase, with 3-20 percent biotite, and total of less than 2 percent hornblende, sphene, zircon, and iron oxides. Biotite forms minute flakes unevenly distributed. Rock weathers gray to reddish buff. Intrusive into the gneissic rocks and Saragossa Quartzite, intruded by the quartz monzonite. Age, Mesozoic.

PALEOZOIC METASEDIMENTARY ROCKS

Furnace Limestone

Light blue-gray to white thick-bedded carbonate rocks that range from limestone to dolomite (distinguished only by acid test) crystallized to medium- to coarse-grained marble. Maximum exposed thickness about 2,500 feet. Unfossiliferous in quadrangle but to northwest contains Paleozoic (Mississippian and Pennsylvanian?) fossils (Richmond, 1960, p. 17; Dibblee, 1964a).

Saragossa Quartzite

Quartzite and schist, in part mapped as Saragossa Quartzite by Vaughan (1922). In northwest part of quadrangle, about 4,500 feet thick, conformably overlain by Furnace Limestone, unconformable on gneissic rocks with angular discordance, as in areas west of quadrangle (Dibblee, 1964a, b). In west-central part of quadrangle about 4,000 feet exposed, unconformable(?) on the gneissic rocks but without visible discordance. Unfossiliferous. Age, presumably Paleozoic on basis of stratigraphic position. Composed of the following units:

Quartzite.—Gray-white, gray to tan, massive to bedded, very hard but brittle, fine-grained quartzite composed mainly of quartz and a little muscovite, biotite, and alkali feldspar. In places crossbedded, ripplemarked. Brown iron oxide stains common on fractures.

Phyllite.—Dark-gray, hard, shaly phyllite composed mainly of mica, quartz, and a little plagioclase. Foliation and cleavage parallel to original bedding. Contains some interbedded gray quartzite.

Schist.—Dark gray to locally tan, fine- to medium-grained schist composed mainly of mica, quartz, and plagioclase. Foliation and cleavage parallel to original bedding. In places, approaches gneiss in texture and is commonly banded with nearly black laminae rich in biotite and light-gray laminae rich in quartz and feldspar. Contains some interbedded gray quartzite.

Marble.—White, thick-bedded, coarsely crystalline calcitic to dolomitic marble; forms several lenses as thick as 15 feet in the quartzite and schist.

PRECAMBRIAN(?) METAMORPHIC ROCKS

Gneissic rocks

Banded or laminated gneissic rocks, in part lineated; laminae generally undulating, in places contorted. Recrystallized probably during Precambrian metamorphism and possibly in part later, mainly from sedimentary but perhaps in part from granitic rocks of Precambrian(?) age. The following general types were mapped:

Quartz diorite to quartz monzonite gneiss.—Medium- to dark-gray medium-grained gneiss composed of quartz, plagioclase (andesine), potassic feldspar, biotite, hornblende, muscovite, and iron oxides in that general order of decreasing abundance. In places contains large porphyroblasts of potassic feldspar as long as 2 cm. Generally prominently banded with black laminae rich in biotite and (or) hornblende alternating with white laminae rich in quartz and feldspar and gray laminae of intermediate composition.

Granitic gneiss.—Light-gray, buff-weathering, medium- to fine-grained granitic gneiss composed mostly of quartz, potassic feldspar, plagioclase (oligoclase-andesine), biotite, and a little muscovite. Rock nearly homogeneous, but faintly to moderately banded with thin biotite-rich laminae.

MINES, PROSPECTS, AND QUARRIES

Gold, silver, lead, and tungsten

A. Rose and Monte Cristo mines. NE¼ sec. 19, W½ sec. 20, T. 2 N., R. 3 E. Gold and some copper ore said to occur in red hematite-stained quartz-calcite gangue that forms zone about 20 feet wide, at least 2,000 feet long, striking about N. 20° W., dipping moderately north, in Furnace Limestone; zone contains mica schist and granitic dikes. Zone not exposed at surface. Workings now caved and inaccessible, but probably numerous, judging from large mill tailings of red granitic sand. Said to have been worked by Mexicans as early as time of Spanish rule; worked by Americans, probably beginning in 1860's, most active from 1895 to 1903; yielded gold, silver, and a little copper with estimated total value of $450,000 to $600,000. Long idle (Wright and others, 1953, p. 78).

B. Log Cabin (Saviers) prospect. NE¼ sec. 30, T. 2 N., R. 3 E. Gold and scheelite in narrow tactite zone in mica schist striking N. 20° W., dipping 60° SW., in Saragossa Quartzite. Explored by trench about 10 feet deep, 60 feet long; pilot mill installed (Wright and others, 1953, tab. list p. 46, no. 139).

C. Hollie-Ann prospect. SE¼ sec. 30, T. 2 N., R. 3 E. Gold and scheelite in thin north-striking quartz veins in mica schist in Saragossa Quartzite near contact with Furnace Limestone to east, dipping steeply west (overturned). Explored by 30-foot trench, 15 feet deep, and two shafts, 20 and 80 feet deep, 100 feet apart (Wright and others, 1953, tab. list p. 42, no. 127, in part).

D. Holliday (Saviers) prospect. SW¼ sec. 29, T. 2 N., R. 3 E. Gold and tungsten-bearing oxidized zone in marble of Furnace Limestone at contact with quartz monzonite. Explored by 30-foot shaft and shallow trench driven west (Wright and others, 1953, tab. list p. 42, no. 126, in part).

E. Shooting Star mine. S½ sec. 29, T. 2 N., R. 3 E. Scheelite and quartz in garnet-epidote tactite zone as wide as 8 feet, strikes N. 30° E., dips moderately northwest, at contact of dolomitic marble of Furnace Limestone to west with quartz monzonite to east. Explored by adit driven southwest 300 feet, and about 1,000 feet of level workings, and by surface trench. In 1916-1918 known as United Tungsten-Copper mines, produced small tonnage. In 1949 relocated as Shooting Star mine, with small production in 1952-1954 (Wright and others, 1953, p. 151-152).

F. Sleepy Creek prospect. SW¼ sec. 32, T. 2 N., R. 3 E. Adit driven northwest about 300 feet in quartz monzonite in 1950's, presumably in search of tungsten ore in marble of Furnace Limestone.

G. Rattlesnake Canyon placers, including Roy Ex and Weaver diggings. Secs. 27, 28, and 34, T. 2 N., R. 3 E. Scheelite and gold from shallow diggings in gravel of the gravel or fanglomerate unit. Several thousand dollars produced in 1938-1939 from Roy Ex diggings according to W. H. Schmidt, owner; minor activity in 1951 (Wright and others, 1953, tab. list nos. 170, 203, 377).

H. Jeff Davis (Sunnyside Lode) prospect. SW¼ sec. 22, T. 2 N., R. 3 E. Argentiferous galena and free gold in stockwork of low-dipping quartz veins in schist and some limestone. Explored from vertical shaft and 70-degree inclined shaft intersected at depth of about 100 feet by a 200-foot adit. Small production (Wright and others, 1953, tab. list no. 258).

Iron

J. Sorrel Horse Canyon iron ore deposits. NE¼ sec. 22, T. 1 N., R. 4 E. Deposits of limonite in ferruginous conglomerate of Old Woman(?) Sandstone resting on quartz monzonite. Largest deposit about 5 feet thick, traceable for about 30 feet. Small tonnage quarried in late 1950's.

Limestone

K. Rattlesnake Gulch quarry. Sec. 27, T. 2 N., R. 3 E. White marble of Furnace Limestone. Quarried since 1951 for use as roofing granules.

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