

PRELIMINARY GEOLOGIC MAP OF THE MURRIETA 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA

Version 1.0

Bv

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Digital preparation by

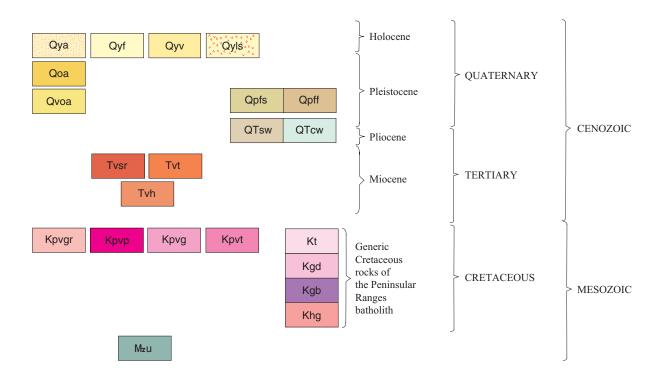
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CORRELATION OF MAP UNITS



On some SCAMP geologic map plots, including the Murrieta 7.5' quadrangle, characteristic grain size information is displayed using subscripted alpha characters (e.g. Qyfg, Qova), where the characters conform to the following

a - arenaceous (very coarse sand through very fine sand)
b - boulder gravel (>25mm)
g - gravel (cobble through granule gravel)
s - silty

c - clayey

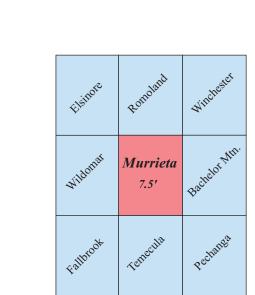
In the Description of Map Units, the Ma following U/Pb ages has an attached subscript; Ma_{id} for isotope dilution analyses, and Ma_{ip} for ion probe analyses.

Kpvp—Pegmatite dikes of Paloma Valley Complex. Arrow and number indicate measured dip of dike.
Strike and dip of beds

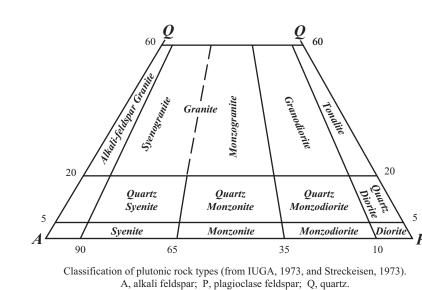
Strike and dip of metamorphic foliation

70
Inclined

Strike and dip of joints in sedimentary rocks



SURROUNDING 7.5' QUADRANGLES



This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the North American Stratigraphic Code. Any use of trade, firm, or product names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

This map was printed on an electronic plotter directly from digital files. Dimensional calibration may vary between electronic plotters and between X and Y directions on the same plotter, and paper may change size due to atmospheric conditions; therefore, scale and proportions may not be true on plots of this map.

Digital files available on World Wide Web at http://geopubs.wr.usgs.gov

LOCATION MAP

DESCRIPTION OF MAP UNITS

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Qyf series) typically have high coarse:fine clast ratios. Younger surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (A/C to A/AC/B_{cambric}C_{ox} profiles).

Young alluvial fan deposits (Holocene and latest Pleistocene)

Unconsolidated deposits of alluvial fans and headward drainages of fans. Consists predominately of gravel, sand, and silt

Young alluvial channel deposits (Holocene and latest Pleistocene)

Fluvial deposits along canyon floors. Consists of unconsolidated sand,

Silt, and clay-bearing alluvium

Young alluvial valley deposits (Holocene and late Pleistocene)-Fluvial deposits along valley floors. Consists of unconsolidated sand, silt, and clay-bearing alluvium

Young landslide (Holocene and latest Pleistocene)-Highly fragmented to largely coherent landslide deposits. Unconsolidated to consolidated. Most mapped landslides contain scarp area as well as slide deposit.

Many landslides in part reactivated during late Holocene

OLD SURFICIAL DEPOSITS—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed pedogenic soils (A/AB/B/C_{OX} profiles and Bt horizons as much as 1 to 2 m thick and maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature Bt horizons reaching 5YR 5/6). Includes:

Old alluvial channel deposits (late to middle Pleistocene)-Fluvial sediments deposited on canyon floors. Consists of moderately indurated, commonly slightly dissected gravel, sand, silt, and claybearing alluvium. Locally capped by thin, discontinuous alluvial

VERY OLD SURFICIAL DEPOSITS—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/AB/B/C_{OX} profiles having Bt horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6)

Qvoa

Very old alluvial channel deposits (middle to early Pleistocene)-Fluvial

deposits of Holocene age

sediments deposited on canyon floors. Consists of moderately to well-indurated, reddish-brown, mostly very dissected gravel, sand, silt, and clay-bearing alluvium. In places, includes thin, discontinuous alluvial deposits of Holocene age

Pauba Formation (Pleistocene)-Siltstone, sandstone, and conglomerate.

Named by Mann (1955) for exposures of in Rancho Pauba area about 3.2 km southeast of Temecula. Vertebrate fauna from Pauba Formation are of late Irvingtonian and early Rancholabrean ages (Reynolds and Reynolds, 1990a; 1990b). Includes two informal members:

Sandstone member-Brown, moderately well-indurated, cross-bedded sandstone containing sparse cobble- to boulder-conglomerate beds

Fanglomerate member-Grayish-brown, well indurated, poorly sorted fanglomerate and mudstone; occurs along the east flank of the Santa Ana Mountains

Sandstone and conglomerate of Wildomar area (Pleistocene and late)

Sandstone and conglomerate of Wildomar area (Pleistocene and late Pliocene)-Unnamed sandstone and conglomerate unit unconformably overlain by the Pauba Formation (Kennedy, 1977). Lower part yields vertebrate fauna of late Blancan age, 2 to 3 Ma; upper part yields fauna of Irvingtonian age, less than 0.85 Ma (Reynolds and Reynolds, 1990a, 1990b; Reynolds and others, 1990). At Chaney Hill in Murrieta area, unit contains 0.7 Ma Bishop ash (Merriam and Bischoff, 1975). Estimated maximum thickness is 75 m. Subdivided into sandstone unit and conglomerate unit:

Sandstone unit-Primarily friable, pale yellowish-green, medium grained.

Sandstone unit-Primarily friable, pale yellowish-green, medium grained, caliche-rich sandstone

Conglomerate unit-Primarily cobble-and-boulder conglomerate.

Conglomerate electrone locally derived

Conglomerate clasts are locally derived

Santa Rosa basalt of Mann (1955) (Miocene)-Remnants of basalt flows having relatively unmodified flow surfaces. See Hawkins (1970) for detailed petrologic description of basalt. Originally described by Fairbanks (1892) and informally named by Mann (1955) for basalt flows in vicinity of Rancho Santa Rosa, west of Temecula. Name also has been applied to basalts in general area of Temecula and Santa Ana Mountains, but here is restricted to rocks in area west of Temecula. Southwestern part of Santa Rosa basalt of Mann (1955) extruded on deeply weathered surface of low relief similar to Paleocene age surfaces found elsewhere in southern California. Morton and Morton (1979) report whole-rock conventional potassium-argon ages for Santa Rosa basalt of Mann (1955) 6.7 and 7.4 Ma. Slightly older age of 8.7 Ma was obtained by Hawkins (1970)

Basalt of Temecula area (Miocene)-Basalt; restricted to single exposure 3

km northwest of Murrieta in quadrangle. Outside quadrangle, includes scattered exposures of basalt north and east of Temecula, and a small exposure of vesicular basalt within valley area of Elsinore Fault zone near Wildomar (Mann, 1955; Kennedy, 1977; Hull, 1990). East of Temecula, rocks assigned to this unit include exposures of vesicular basalt and what appears to be a dissected cinder cone and scattered volcanic bombs (Mann, 1955)

Basalt of Hogbacks (Miocene)-Basalt capping Hogbacks 5 km northeast of

Basalt of Hogbacks (Miocene)-Basalt capping Hogbacks 5 km northeast of Murrieta. Remnant of channel-filling basalt flow. Thin deposit of unconsolidated gray stream gravel underlies axial part of channel-filling basalt. Basalt is less vesicular than most of Santa Rosa basalt of Mann (1955) (Tvsr) and tends to break into slabby fragments. Whole-rock conventional potassium-argon ages are 10.4 and 10.8 Ma (Morton and Morton, 1979)

Rocks of the Peninsular Ranges batholith

Paloma Valley Ring Complex (Cretaceous)-Composite ring dike intrusion. Named and described by Morton and Baird (1976) for exposures south of Paloma Valley area. Included within Woodson Mountain granodiorite and San Marcos gabbro by Larsen (1948). Ring complex consists of older, elliptical in plan, single ring-dike and two subsidiary short-arced dikes. Younger ring-set of thin dikes is largely within older ring dike. Older dike consists of granodiorite and monzogranite with vertical walls emplaced into gabbro by ring fracturing and magmatic stoping of gabbro. Younger ring-dike consists of hundreds of granitic pegmatite dikes. Most pegmatite dikes range from 30 cm to over 1 m in thickness, and define a domal ring-dike geometry in which outer dikes are moderately to steeply outward dipping and pass progressively inward to near horizontal dikes in center. Spatially associated with younger dikes in center of complex, are bodies of granophyre that contain stringers of granitic pegmatite. Younger dikes are interpreted as products of volatile-rich magma that filled a domal set of fractures resulting from cauldron subsidence. Granophyre is interpreted as product of pressure quenching of pegmatite magma and attendant loss of volatiles. Zircon ages of rock from atypical hornblende-bearing granodiorite from western part of older dike is 121 Ma_{id} and 118.5 Ma_{in}. ⁴⁰Ar/³⁹Ar age of hornblende 117.7 Ma and biotite 118.8 Ma. Includes:

Granophyre-Pale gray, very fine grained, porphyritic, granophyre. Forms numerous, small, irregular shaped flat-floored bodies intruding gabbro (Kgb) in central part of complex. Phenocrysts of altered plagioclase are in groundmass of granophyric intergrowths of quartz, potassium feldspar, and sodic plagioclase. Pyrite is ubiquitous accessory mineral, and where oxidized, discolors outcrops reddishbrown. Network of pegmatitic-textured stringers averaging 2.5 cm thick cuts much of granophyre. Stringers are compositionally and texturally zoned, with fine-grained margins and coarse-grained interiors

Pegmatite dikes of Paloma Valley Ring Complex-Linear to arcuate, leucocratic pegmatite dikes typically 30 cm to 1 m thick. Very concentrated in central part of complex. Most are texturally and compositionally zoned. Outer zones are coarse-grained granite composed of quartz, perthite, and sodic plagioclase, and may or may not contain biotite and minor magnetite. Inner zone consists of pegmatitic-textured perthite, sodic plagioclase, quartz, biotite, and (or) muscovite, and accessory magnetite, schorl, garnet, and epidote. Quartz crystal-lined vugs found locally. Graphic intergrowths of quartz and perthite are common in rock transitional between coarse-grained granite and pegmatitic textured granite. Dikes that lack pegmatitic cores consist entirely of coarse- to extremely coarse-grained granitoid textured rock, with or without graphic intergrowths

Monzogranite to granodiorite-Pale gray, massive, medium-grained hypidiomorphic-granular biotite monzogranite, and less abundant hornblende-biotite granodiorite forming older ring dike. Plagioclase is An₂₀ to An₃₅, subhedral, tabular crystals. Contains included small to large stoped blocks of gabbro

Tonalite-Foliated biotite-hornblende tonalite. In eastern part of complex

Generic Cretaceous granitic rocks of the Peninsular Ranges batholith

Kgd Granodiorite, undifferentiated (Cretaceous)-Biotite and hornblende-biotite granodiorite, undifferentiated. Most is massive and medium-grained. Restricted to small exposure along east edge of quadrangle Tonalite, undifferentiated (Cretaceous)-Gray, medium-grained biotite-hornblende tonalite, typically foliated. Restricted to single area

flanking Tucalota Creek along east edge of quadrangle

Gabbro (Cretaceous)-Mainly hornblende gabbro. Includes Virginia quartz-norite and gabbro of Dudley (1935), and San Marcos gabbro of Larsen (1948). Typically brown-weathering, medium-to very coarse-grained hornblende gabbro; very large poikilitic hornblende crystals are common, and very locally gabbro is pegmatitic. Much is quite heterogeneous in composition and texture. Includes noritic and dioritic composition rocks. Abundant stoped blocks of gabbro are included in the Paloma ring complex

Heterogeneous granitic rocks (Cretaceous)-A wide variety of heterogeneous granitic rocks. Rocks in Santa Ana Mountains, 5 km northwest of Murrieta, include a mixture of monzogranite, granodiorite, tonalite, and gabbro. Tonalite composition rock is most abundant rock type

Metasedimentary rocks, undifferentiated (Mesozoic)-Wide variety of low-to medium-metamorphic grade metasedimentary rocks. Within the Santa Ana Mountains rocks are of low grade, greenschist or lower grade. Most of the eastern occurrences include biotite schist

GEOLOGIC SUMMARY

The Murrieta quadrangle is located in the northern part of the Peninsular Ranges Province and includes parts of two structural blocks, or structural subdivisions of the province. The quadrangle is diagonally crossed by the active Elsinore fault zone, a major fault zone of the San Andreas fault system, and separates the Santa Ana Mountains block to the west from the Perris block to the east. Both blocks are relatively stable internally and within the quadrangle are characterized by the presence of widespread erosional surfaces of low relief.

The Santa Ana Mountains block, in the Murrieta quadrangle, is underlain by undifferentiated, thick-layered, granular, impure quartzite and well-layered, fissile, phyllitic metamorphic rock of low metamorphic grade. Both quartzite and phyllitic rocks are Mesozoic. Unconformably overlying the metamorphic rocks are remnants of basalt flows having relatively unmodified flow surfaces. The age of the basalt is about 7-8Ma. Large shallow depressions on the surface of the larger basalt remnants form vernal ponds that contain an endemic flora. Beneath the basalt the upper part of the metamorphic rocks is deeply weathered. The weathering appears to be the same as the regional Paleocene saprolitic weathering in southern California. West of the quadrangle a variable thickness sedimentary rock, physically resembling Paleogene rocks, occurs between the basalt and metamorphic rock. Where not protected by the basalt, the weathered rock has been removed by erosion.

The dominant feature on the Perris block in the Murrieta the composite Peninsular Ranges batholith. The complex is elliptical in plan and consists of an older ring-dike with two subsidiary short-arced dikes that were emplaced into gabbro by magmatic stoping. Small to large stoped blocks of gabbro are common within the ring-dikes. A younger ring-set of hundreds of thin pegmatite dikes occur largely within the central part of the complex. These pegmatite dikes were emplaced into a domal fracture system, apparently produced by cauldron subsidence, and include in the center of the complex, a number of flat-floored granophyre bodies. The granophyre is interpreted to be the result of pressure quenching of pegmatite magma. Along the eastern edge of the quadrangle is the western part of a large septum of medium metamorphic grade Mesozoic schist. A dissected basalt flow caps the Hogbacks northeast of Temecula, and represents remnants of a channel filling flow. Beneath the basalt is a thin deposit of stream gravel. Having an age of about 10Ma, this basalt is about 2-The Elsinore fault zone forms a complex of pull-apart basins. The

3Ma older than the basalt flows in the Santa Ana Mountains.

The Elsinore fault zone forms a complex of pull-apart basins. The west edge of the fault zone, the Willard Fault, is marked by the high, steep eastern face of the Santa Ana Mountains. The east side of the zone, the Wildomar Fault, forms a less pronounced physiographic step. In the center of the quadrangle a major splay of the fault zone, the Murrieta Hot Springs Fault, strikes east. Branching of the fault zone causes the development of a broad alluvial valley between the Willard Fault and the Murrieta Hot Springs Fault. All but the axial part of the zone between the Willard and Wildomar Faults consist of dissected Pleistocene sedimentary units. The axial part of the zone is underlain by Holocene and latest Pleistocene sedimentary units.

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