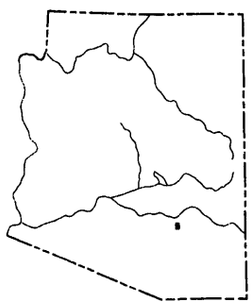
MAP GQ-670

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAPS OF THE UNITED STATES

GEOLOGIC MAP OF THE LOOKOUT MOUNTAIN QUADRANGLE PINAL COUNTY, ARIZONA

By
Medora H. Krieger



QUADRANGLE LOCATION

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TO ACCOMPANY MAP GQ-670

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DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Alluvium (0-15 ft exposed).—Flood-plain deposits along San Pedro River and Aravaipa Creek composed of sandy silt, mudstone, and some sand and gravel, locally cemented with caliche; along washes largely unconsolidated sand. Some undivided alluvium and gravel veneer on low terraces is locally included.

Older alluvium (0-100 ft or more).—Well-cemented channel gravels overlain by reworked fine-grained facies of the Gila Conglomerate. Absence of regular bedding and presence of sandy to conglomeratic beds and lenses distinguish the reworked material from the fine-grained Gila. Includes much unmapped alluvium, colluvium, gravel veneer on pediments and terraces, and fine-grained facies of the Gila Conglomerate.

Talus (0- about 50 ft).—Rock debris consisting of large angular blocks to silt-sized particles, locally cemented with caliche.

Gravel veneer on pediments and lower terraces (0-25 ft).—Largely subangular pebbles and cobbles of Paleozoic and Precambrian rocks in a generally reddish-brown, fine- to coarse-grained matrix. Lower terraces are lighter colored. Locally includes some pediments and terraces stripped of gravels.

Surficial deposits, undivided (0-20? ft).—Alluvium, colluvium, talus, and gravel veneer on pediments and terraces.

GILA CONGLOMERATE (0-3,000? FT)

A conglomeratic and fine-grained, lacustrine facies with intertonguing contact. The change occurs within ¼ mile and probably reflects a buried fault. The western contact between the two facies is beneath the flood plain of the San Pedro in this quadrangle. East of the San Pedro, the beds are essentially flat lying. West of the San Pedro, in many places they are deformed. The Gila in this area is assigned to the Pliocene because of the presence of pre-Blancan vertebrate fossils (J. F. Lance, oral communication, 1963) in presumably equivalent beds southeast of Mammoth.

Fine-grained facies (about 400 ft exposed).—Thin and evenly bedded, grayish-orange-pink to yellowish-gray clay, silt, marl, and very fine grained sand; thin beds of gypsum and a few of white rhyolite tuff and opaline-appearing material; commercial deposits of gypsum north and south of Aravaipa Canyon. Forms vertical cliffs along many washes; elsewhere largely concealed by unmapped alluvium, colluvium, and pediment and terrace gravels.

Coarse-grained facies (0-600 ft exposed).—Fanglomerate consisting of subangular to subrounded pebbles, cobbles, and small boulders of younger Precambrian and Paleozoic rocks. West of the San Pedro, older Precambrian granitic rocks and volcanic rocks from the Cloudburst Formation (Creasey, 1965, p. 11-16) are common in the southern part of the area. East of the San Pedro, Galiuro Volcanics locally occur in the conglomerate. Matrix is light shades of gray, green, and brown, generally well cemented, and composed of small-pebble to silt-sized particles.

GALIURO VOLCANICS

Include andesite of Depression Canyon and latitic lavas of Zapata Wash. K-Ar determination on biotite and sanidine from other members of the volcanics (Krieger, 1967a, c) yielded ages of 22.4-25.9 million years (S. C. Creasey, oral communication, 1965).

ANDESITE OF DEPRESSION CANYON (0-50 FT)

Small masses of dark-gray andesite are tentatively assigned to this member. Two are west of the San Pedro (northwest of center of sec. 5, T. 7 S., R. 16 E., and north of center of sec. 9, T. 8 S., R. 16 E.); the third is on the east edge of the quadrangle north of Zapata Wash.

LATITIC LAVAS OF ZAPATA WASH (500? FT)

Very fine grained, aphanitic to almost glassy flows and flow breccias in shades of gray, brown, and olive and characterized by swirly and straight flow banding and tiny flattened vesicles. The unit includes a few flows of olivine andesite or trachyandesite. Staining with cobaltinitrite indicates fairly abundant potassium feldspar(?).

INTRUSIVE RHYOLITE

Dikes.—Light shades of gray and brownish-gray porphyritic rhyolite with quartz phenocrysts as large as 2-3 mm, less abundant albite-oligoclase(?), variable amounts of sanidine, biotite, magnetite (ilmenite-leucoxene), and zircon in a devitrified, spherulitic groundmass. Dikes are a few to more than 100 ft wide. They may be younger than the rhyolite plug, and possible middle Tertiary in age.

Plug.—Light-gray and brownish-gray, aphanitic, massive to flow-banded rhyolite, with or without few to fairly abundant phenocrysts of quartz and albite (both about 1-2 mm), and magnetite (0.5 mm) in a devitrified groundmass rich in potassium-bearing material. South of the quadrangle similar plugs intrude the Upper Cretaceous and (or) lower Tertiary Cloudburst Formation (Creasey, 1965, p. 17).

MESOZOIC(?) SEDIMENTARY ROCKS (70 FT)

Mostly poorly exposed and faulted. Probable sequence (see Krieger, 1967b, for more complete section) from top to bottom: (1) Red beds consisting of siltstone and very fine grained sandstone, locally with spherical concretions, as much as 2 ft in diameter, of well to poorly formed, fibrous, plumose crystals. (2) Interbedded very fine grained sandstone and siltstone in shades of brown, red, yellow, and white, with fusinized wood and plant material. (3) Chert breccia and conglomerate.

ESCABROSA LIMESTONE (ABOUT 350 FT)

Massive, cliff-forming, thick-bedded, mostly coarse-grained limestone in shades of gray and yellowish to greenish gray; chert nodules common in some beds. Some slope-forming, thin-bedded, medium- to fine-grained, gray limestone and brown silty and dolomitic limestone. The lower contact is arbitrarily located in a 25-50 ft zone because of interbedding of coarsely crystalline, Escabrosa-like limestone and brown limestone beds similar to those in the upper part of the Martin Formation. Fossils include crinoids, brachiopods, and corals.

MARTIN FORMATION (150 FT)

A slope-forming shale unit with about 40 ft of interbedded shale and limestone at top and 10-15 ft of limestone at base. Shale is olive to reddish brown; interbedded limestone beds (2 in. to 4 ft thick) are brown to gray and weather to rounded surfaces that are light shades of brown and red. Basal limestone is thin bedded and grayish red, and weathers to shades of brown. It contains silicified horn corals (*Macgeea?*) and brachiopods (*Atrypa*) of early Late Devonian age, according to J. M. Berdan (written communication, 1961). Shark teeth and arthrodiran fish fragments occur locally at the base.

ABRIGO FORMATION[1] (MAXIMUM OF 350 FT)

Because of structural complications, thickness and correlation are locally uncertain.

Upper (or brown sandy) member (less than 100 ft).—Dark-brown-weathering, thin- to thick-bedded (8 in. to 8 ft, mostly 3 ft), medium- to coarse-grained, mostly poorly sorted and

[1]For discussion of the Troy and Cambrian formations, see Krieger (1961).

crossbedded, dolomitic and glauconitic sandstone; some dolomite, sandy and glauconitic dolomite, light-colored sandstone and quartzite, intraformational conglomerate, and siltstone; local granule- and small-pebble conglomerate beds; basal pebble and cobble conglomerate on Troy Quartzite.

Middle (sandstone) member (about 200 ft).—Cliff-forming, nearly white, thin- to thick-bedded (2-3 ft), well to poorly sorted quartzite and sandstone. Conglomerate at base is in a red silty, sandy, in part diabasic, matrix.

DIABASE

Dark-gray to dark-greenish- or olive-gray, medium-grained diabase occurring as sills and multiple sills (totaling more than 600 ft in places). The texture is diabasic, ophitic to poikilitic. Composed of plagioclase (mostly 3-5 mm), smaller pyroxene (poikilitic crystals as large as 1 cm), magnetite, ilmenite, and a little olivine. The chilled contact of diabase against older rocks contrasts with the weathered appearance of diabase beneath Paleozoic rocks, where the diabase grades upward into crumbly, red to purple rock with a pronounced platy structure.

TROY QUARTZITE (0-POSSIBLY 1,000 FT OF MORE)

Structural complications in area make accurate measurement of thickness impossible.

Upper unit (0-700 or more ft).—White to very light gray, somewhat lenticular, thin- to thick-bedded (mostly 1-3 ft), feldspathic (white feldspar or clay alteration) to nonfeldspathic sandstone, quartzite, and granule to small-pebble (less than ½ in.) conglomerate. Pebbles are composed largely of quartz. Unit contains local slump structures and large-scale crossbedding. Surficial silicification obscures bedding features.

Lower unit (0-375 ft).—Dark-brownish-gray outcrops of medium-gray to pale-red conglomerate and sandstone that are mostly thin bedded (many are 6 in. or less), lenticular, and channeled. The upper part consists of light-colored sandstone and quartzite interbedded with and replaced downward by dark sandstone, granule to small-pebble conglomerate, and thin beds of greenish-gray argillite. Much of the conglomerate contains abundant pink to orange fragments of feldspar and quartz porphyry or rhyolite. The basal 30-50 ft consists of pale-red sandstone and conglomeratic sandstone underlain by pebble to small-cobble conglomerate that locally contains sparse to closely packed well-rounded pebbles derived from the Barnes Conglomerate Member of the Dripping Spring Quartzite.

APACHE GROUP (MAXIMUM OF ABOUT 550 FT)

Includes Mescal Limestone, Dripping Spring Quartzite (upper and middle members and Barnes Conglomerate Member), and Pioneer Formation.

MESCAL LIMESTONE (0-125 FT)

Thin- to thick-bedded, pale- to dark-brown and light-olive-gray dolomite and silty to cherty dolomite, some red to pink, thinly laminated limestone; brown dolomitic sandstone locally at base. Metamorphosed near diabase to white crystalline limestone and yellowish-gray silicated limestone and chert beds; locally serpentinized and veined with asbestos.

DRIPPING SPRING QUARTZITE

Upper and middle members (about 400 ft).—The upper member (maximum of 200 ft) is thin-bedded (¼-12 in.), very fine grained, feldspathic to arkosic quartzite and siltstone that is shades of gray, brown, red, and yellow. Some beds are ripple marked; others contain shallow crossbeds. The middle member (maximum of 200 ft) is medium-grained, locally fine- to coarse-grained, red to pink, feldspathic to arkosic quartzite and a little nonfeldspathic quartzite. It is thin- to very thick-bedded (2-12 ft) and crossbedded. The lower one-third of the member in this area is buff to fine-grained quartzite, sandstone, and grayish-red-purple siltstone and fine-grained sandstone. It resembles many of the beds in the Pioneer Formation.

Barnes Conglomerate Member (0-10 ft).—Ellipsoidal, extremely well rounded pebbles (¼-6 in.) of quartzite, quartz, and red jasper, mostly closely packed, locally sparsely scattered, in a matrix of red to gray, arkosic sandstone or quartzite.

PIONEER FORMATION (0-30 FT)

Contains two members: The upper member is dark-red to purple siltstone and very fine grained sandstone with numerous pale-red to yellowish-gray elliptical leached spots; interbedded with light-colored and reddish-orange, fine- to medium-grained, crossbedded sandstone and some dark-red to purple, coarse-grained sandstone. Many beds are tuffaceous. The Scanlan Conglomerate Member (0-3 ft) is represented by only a few widely scattered, angular quartz fragments (as much as 9 in. long) in a red or brown arkosic matrix.

APLITE DIKES

White to very pale orange and light-brownish-gray. Includes some pegmatite and a little white muscovite granite.

ALASKITE AND QUARTZ MONZONITE

Alaskite and quartz monzonite appear to be gradational and have been arbitrarily separated: to the west an area of relatively low relief is underlain by coarse-grained, porphyritic, light-gray quartz monzonite; to the east an area of higher relief is underlain by red alaskite and by pink or red quartz monzonite, which is finer grained and less (or non) porphyritic and has fewer mafic minerals and a higher groundmass content of K-feldspar than the quartz monzonite to the west.

Alaskite.—Includes alaskite, porphyry, aplite, and potassium-rich quartz monzonite. Alaskite is equigranular, medium to coarse grained (mostly less than 10 mm), dark orange pink to pale red; composed of microcline and microcline-perthite, unzoned, slightly sericitized or saussuritized plagioclase, quartz, and minor amounts of biotite, muscovite, and magnetite-chlorite alteration. Plagioclase and K-feldspar are about equally abundant. Porphyry is fine grained, red to reddish brown with phenocrysts (as large as 10 mm) of euhedral and rounded and resorbed quartz, with or without a few perthitic K-feldspars and areas of magnetite (ilmenite-leucoxene)-chlorite derived from mafic minerals or xenoliths. Groundmass is a very fine grained, graphic and myrmekitic intergrowth of K-feldspar and quartz.

Quartz monzonite (Oracle Granite of Peterson, 1938).—Typically a coarse-grained porphyritic, pink- to yellowish-gray rock speckled with dark biotite books (as large as 5 mm), and containing euhedral, somewhat poikilitic and perthitic, microcline phenocrysts (as large as 4 x 2 cm, locally larger). Plagioclase (mostly less than 10 mm, locally 3 cm) is somewhat zoned; much of it is sericitized. Quartz occurs as rounded crystals (about 6 mm) and as finer intergrowths with microcline; accessory minerals are magnetite and apatite. Biotite has locally been altered to a mixture of magnetite and chlorite.

GRANODIORITE

Very light gray and dark-gray (salt-and-pepper), medium-grained (less than 4 mm, mostly less than 1 mm); contains zoned, sericitized and saussuritized plagioclase, somewhat strained quartz, biotite, and hornblende (some of which are altered to chlorite), minor amounts of interstitial microcline, and accessory magnetite and sphene. Locally beneath the Barnes Conglomerate Member of the Dripping Spring Quartzite, especially in Capgage Wash, the granodiorite is red to reddish brown and composed of K-feldspar, altered mafic minerals, and quartz. Faint evidence of plagioclase twinning and zoning can be seen in thin section. X-ray and staining reveal no plagioclase and X-ray reveals no clay (from alteration of plagioclase) which might have absorbed a potassium mineral. The rock grades down into the gray granodiorite.

GRANITIC ROCKS, UNDIVIDED

Quartz monzonite, alaskite, aplite, and granodiorite.

PINAL SCHIST

Fine- to very fine-grained, gray to mottled gray and brownish-gray, finely laminated, foliated to slaty quartz-sericite-magnetite schist and spotted schist, some with biotite and muscovite metacrysts. A little chlorite schist.

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