

**GEOLOGIC RELATIONS IN THE
KELSEY CANYON AREA COCHISE
COUNTY, ARIZONA**

by

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GENERAL RELATIONS

Geological relations in the Kelsey Canyon area between Palomas Wash and Teran Wash were mapped in reconnaissance at 1:24,000 in 1985 to connect various structures and reconcile differing interpretations mapped previously by Cooper and Silver (1964), Drewes (1974), and Grover (1982). From Allen Flat on the east to the San Pedro River on the west, Kelsey Canyon transects a range of low hills, here termed informally the Kelsey Hills, which lie between the Galiuro Mountains to the north and the Johnny Lyon Hills to the south. The mapped area surrounds the common junction of four quadrangles, and thus includes parts of all three previous map areas but was not of central concern to any of the previous workers. The Kelsey Canyon area displays stratigraphic relations and structural features not found in the main Johnny Lyon Hills to the south (Cooper and Silver, 1964), in the Little Rincon Mountains to the west (Drewes, 1974), or in Teran Basin to the north (Grover, 1982).

MAP UNITS

- Qal FLOODPLAIN ALLUVIUM (QUATERNARY): riverine deposits shown separately only in San Pedro River valley and broad lower course of Kelsey Canyon.
- TQs BASIN FILL (NEOGENE): Miocene-Pliocene Quiburis Formation and its equivalents together with overlying terrace and pediment gravels; post-mid-Miocene assemblage regionally, but probably all Pliocene and younger locally within map area.
- Tke SAN MANUEL FORMATION (KELSEY CANYON FACIES): Lower (?) Miocene (post-Oligocene, pre-mid-Miocene) tilted granite-clast conglomerate and associated arkosic sandstone with paleocurrent trends (N=40) from gravel imbrications indicating streamflow toward N20W distributing clasts of Johnny Lyon Granodiorite (dominant) and Paleozoic sedimentary rocks (subordinate).
- Tgv GALIURO VOLCANICS (OLIGOCENE): concordant with underlying Mineta Formation along contact ~27.5 Ma in age locally near map area.
- Tmi MINETA FORMATION (OLIGOCENE): previously termed Three Links Conglomerate within Dragoon quadrangle (Cooper and Silver, 1964), but correlated by Grover (1982) with type locality.
- Kw WILLOW CANYON FORMATION: interbedded buff to gray sandstone (locally conglomeratic) and reddish to greenish mudstone of Lower Cretaceous Bisbee Group.
- Kg GLANCE CONGLOMERATE: massive limestone-clast conglomerate, with subordinate sandstone and chert clasts, forming basal conglomeratic phase of Lower Cretaceous Bisbee Group.
- Jw WALNUT GAP VOLCANICS: reddish volcanoclastic strata of probable mid-Jurassic age.
- Ps SEDIMENTARY FORMATIONS (PALEOZOIC): homoclinal sequence (Cambrian to Pennsylvanian) of Kelsey Hills including Bolsa Quartzite, Abrigo

Formation, Martin Formation, Escabrosa Limestone, Black Prince Limestone, and Horquilla Limestone as mapped by Cooper and Silver (1964).

- Pe EPITAPH DOLOMITE (PERMIAN): identification tentative.
- IPh HORQUILLA LIMESTONE (PENNSYLVANIAN): may include other Paleozoic carbonate units (see Drewes, 1974).
- Me ESCABROSA LIMESTONE (MISSISSIPPIAN)
- Eb BOLSA QUARTZITE (CAMBRIAN)
- Yp PIONEER SHALE (PROTEROZOIC): basal formation of Apache Group together with intrusive diabase locally.
- Yj JOHNNY LYON GRANODIORITE (PROTEROZOIC)
- Xp PINAL SCHIST (PROTEROZOIC)

STRATIGRAPHIC RELATIONS

Local stratigraphic features of special interest include the following:

1. Tilted granite-clast conglomerates of presumed Miocene age were mapped as Paige Gravels by Grover (1982) after Lingrey (1982), but are here assigned to the San Manuel Formation; local exposures are denoted the Kelsey Canyon Facies of the San Manuel Formation to distinguish them from other facies containing different clast assemblages in areas west of the San Pedro River.
2. Mapping along Kelsey Canyon confirms the inference of Grover (1982) that the Mineta Formation of Teran Basin is continuous laterally into beds mapped as Three Links Conglomerate by Cooper and Silver (1964) in the Dragoon quadrangle.
3. Massive limestone-clast conglomerates around Palomas Spring were mapped by Drewes (1974) as part of the Walnut Gap Volcanics, but are here assigned to the Glance Conglomerate, an identification implied earlier by Cooper and Silver (1964, p. 73).
4. Formational assignments of isolated erosional inliers of Paleozoic carbonate rocks lying north, west, and south of Palomas Spring are tentative, and may be no more correct in detail than the partly different assignments made by Drewes (1974).

STRUCTURAL RELATIONS

The mapped area includes a segment of a poorly understood Laramide thrust system; on the south, a belt of east-dipping thrust faults that strike north-south across Palomas Wash was mapped by both Cooper and Silver (1964) and Drewes (1974). The sense of overturning of strata in the Bisbee Group beneath the thrust system at Palomas Wash suggests west vergence. The distribution of erosional inliers of pre-Tertiary rocks exposed locally beneath basin fill to

the north indicates that the thrust system projects northward to form three klippen of Precambrian crystalline rocks exposed near Kelsey Canyon. Structurally beneath the three klippen, a thick sequence of strata in the Bisbee Group, well exposed along Kelsey Canyon, dips moderately to gently northeast or southwest, but varied sedimentological features on outcrop indicate that the section is wholly overturned. This wholesale overturning affects a band of exposures at least 2.5 km wide as measured at right angles to prevailing strike of bedding. Although the relationship of the local thrusting and overturning to Laramide structural features in the Catalina and Rincon Mountains is uncertain, the scale of the Laramide structural features in the Kelsey Canyon area implies significant tectonic transport. The Palomas Wash thrust system and its northward continuation across Kelsey Canyon thus merit further topical study.

REFERENCES CITED

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- Lingrey, S.H., 1982, Structural geology and tectonic evolution of the northeastern Rincon Mountains, Cochise and Pima Counties, Arizona [Ph.D. dissertation]: Tucson, University of Arizona, 202 p.