UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

PRELIMINARY GEOLOGIC MAPS SHOWING CENOZOIC DEPOSITS OF THE FARMINGTON AND BACHELOR VALLEY QUADRANGLES, SAN JOAQUIN, STANISLAUS, AND CALAVERAS COUNTIES, CALIFORNIA

by

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This report is preliminary
and has not been reviewed
for conformity with
U.S. Geological Survey editorial standards
and stratigraphic nomenclature

INTRODUCTION

This is one of a series of preliminary geologic maps depicting late Cenozoic deposits of the San Joaquin Valley in a manner that will facilitate understanding of the depositional and tectonic history of the valley (for example--Marchand, 1976, 1980; Marchand and Wagner, 1980). Our efforts have concentrated on refining and further subdividing the stratigraphic units proposed by earlier workers (Arkley, 1959, 1964; Davis and Hall, 1959) to allow for more precise dating of depositional and tectonic events. The interested reader should consult Marchand and Allwardt (1981) for a more complete discussion of the late Cenozoic stratigraphy.

Quaternary deposits of the eastern San Joaquin Valley occur near the Sierra Nevada foothills as a series of nested alluvial terraces. Though these are locally found as straths, major terrace-forming units generally appear as fills in valleys carved into Mesozoic, Tertiary, and older Quaternary units. The depositional surfaces of the terraces converge westward and open onto alluvial fans such that successively younger fans bury older fans toward the San Joaquin Valley axis.

Geologic, pedologic, and physiographic evidence was used to separate the Cenozoic deposits within the map area into nine stratigraphic units--from oldest to youngest, the Valley Springs, Mehrten, and Laguna Formations, the North Merced Gravel, the Turlock Lake, Riverbank (two units) and Modesto Formations, and post-Modesto deposits. Useful criteria for differentiating these units include superposition, lithology, degree of consolidation, degree of soil profile development, degree of erosional modification, and position within a sequence of geomorphic surfaces.

Mapping was carried out through the use of soil survey maps, old and modern topographic maps, available exposures, auger borings, and aerial photographs. Physiographic evidence for the relative age of the deposits is generally definitive near the foothills. As the depositional surfaces converge westward, geomorphic evidence becomes ambiguous and depositional units are separated primarily on the basis of unconformities, buried paleosols, or contrasting degree of development of relict soils.

In preparing the maps, boundaries between previously mapped soil units (Arkley, 1964; Retzer and others, 1951) were transferred manually to 1:24,000 scale 7.5-minute topographic maps. In defining Quaternary stratigraphic units, some soil units were combined and others were subdivided on the basis of field observation of soils exposed in auger holes, river bluffs, roadcuts, canal excavations, and other suitable exposures. The geologic contacts obtained from this soil information were then modified by means of additional field reconnaissance and, in some cases by examination of the oldest available topographic maps, or interpretation of 1:20,000-scale aerial photographs. The Tertiary and Cretaceous units on the Bachelor Valley quadrangle were mapped largely through field reconnaissance and aerial photo interpretation by J. A. Bartow. The fault northeast trending on the Bachelor Valley quadrangle was identified from field exposure.

Mapping and correlation of Cenozoic deposits in Stanislaus County has been greatly facilitated by consultation with R. J. Arkley. The authors, however, are responsible for any inaccuracies in the mapping. C. A. Price provided invaluable assistance by completing drafting of the maps and compiling data for the explanation after the death of Denis Marchand in January, 1981.

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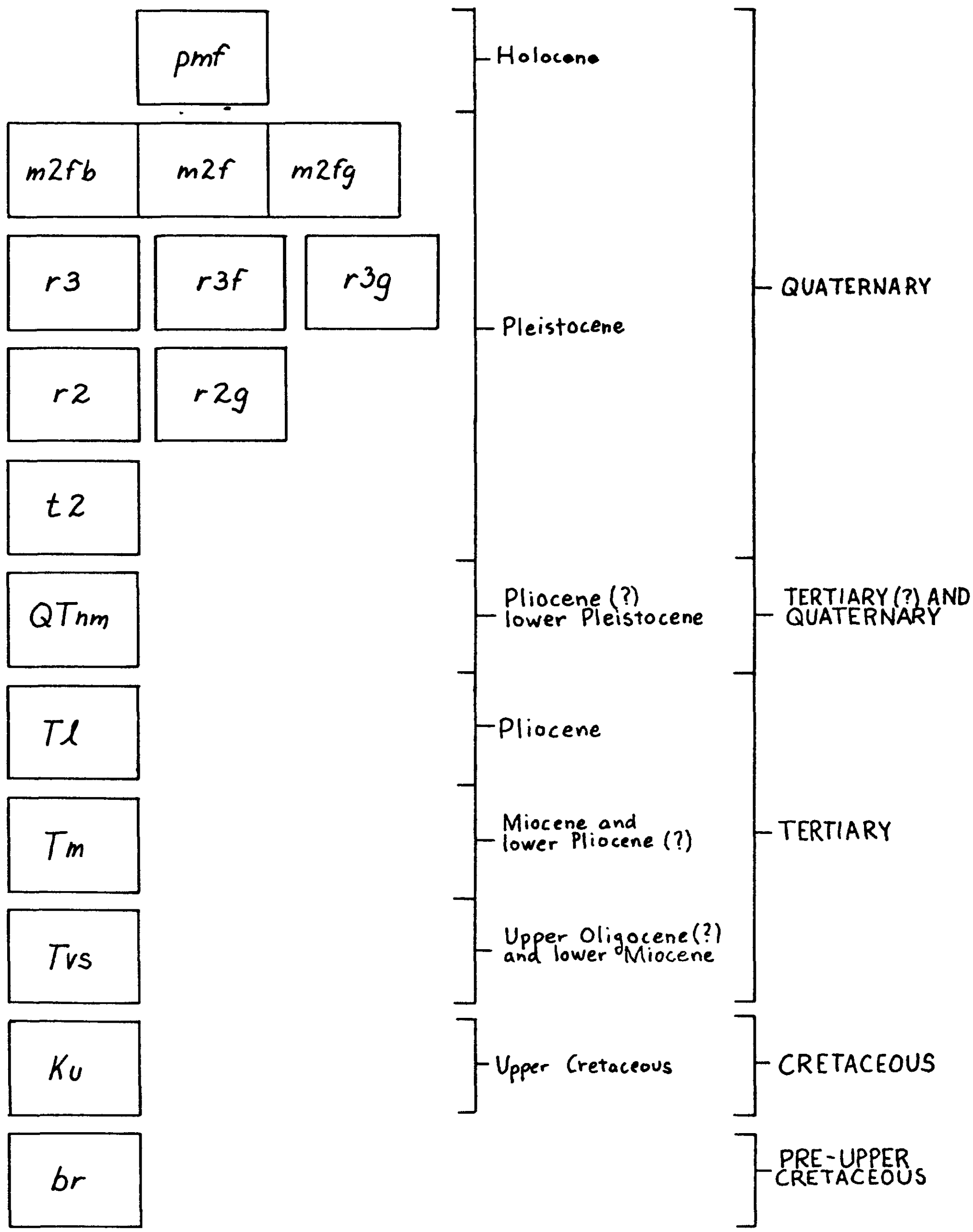
CORRELATION OF MAP UNITS



DESCRIPTION ON MAP UNITS 1/

pmf — POST-MODESTO DEPOSITS
Undifferentiated Holocene alluvium from foothill sources (Honcut soils)

MODESTO FORMATION
Upper member includes:

m2f — Locally (Sierra Nevada foothill) derived alluvial silt, sand, and gravel forming low terraces along creeks; contains abundant volcanic and metamorphic detritus (Ryer and Wyman soils)

m2fb — Locally (foothill) derived alluvial sand, silt, and clay of flood basins (Bear Creek and Landlow soils)

m2fg — Locally (foothill) derived gravelly alluvium (Anderson soils)

RIVERBANK FORMATION
Upper unit includes:

r3 — Sandy alluvium (Madera and Alamo soils)

r3f — Locally (foothill) derived alluvial silt and sand forming terraces slightly above m2f surfaces; contains andesitic detritus (Bear Creek soils)

r3g — Locally (foothill) derived gravelly alluvium (Redding soils)

Middle unit includes:

r2 — Sandy alluvium (Cometa soils)

r2g — Locally (foothill) derived gravelly alluvium forming terraces slightly above Modesto surfaces; contains abundant metamorphic detritus (Redding soils)

t2 — TURLOCK LAKE FORMATION-Upper unit
Undifferentiated alluvium underlying rolling hilly topography (Cometa and Montpelier soils)

QTnm — NORTH MERCED GRAVEL
Thin locally derived gravel veneer overlying a pediment surface cut across Tertiary and Mesozoic rocks (Redding soils)

Tl — LAGUNA FORMATION
Pebble conglomerate, brown arkosic sandstone, and siltstone. Some reworked andesitic detritus in the lower part (Redding soils)

Tm — MEHRTEN FORMATION
Gray andesitic sandstone, conglomerate, brown to pink claystone, and gray mudstone or sandy mudstone.

Tvs — VALLEY SPRINGS FORMATION
Light greenish gray to tan claystone and tuffaceous claystone, light gray vitric tuff, and minor (?) amounts of sandstone and conglomerate

Ku

UNNAMED CRETACEOUS ROCKS

Sandstone, siltstone and conglomerate locally containing very large blocks of metravolcanic rock at base; becomes finer grained and well bedded upward; carbonaceous material locally abundant. Has yielded Late Cretaceous ammonites from one locality near north boundary of Bachelor Valley quadrangle (Popenoe,Imlay, and Murphy, 1960, p. 1526)

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BASEMENT ROCKS

Consists mostly of metavolcanic rocks with few small granitic intrusions (not shown)

1/ The most characteristic soil series as mapped by Arkley (1959, 1964) are given in parentheses after unit description.

MAP SYMBOLS

Contact

Fault
Dashed where approximately located

Topographic or photo lineament
Dashed where approximately located