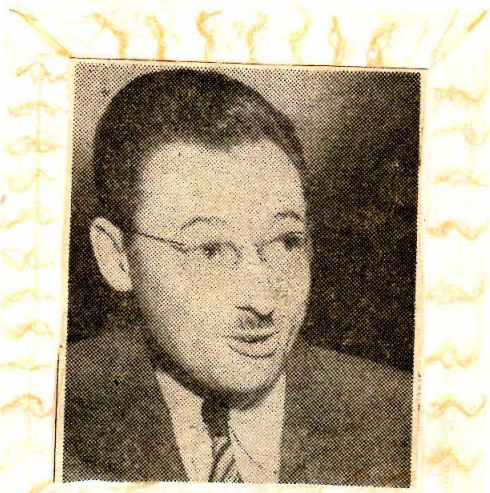
THE PACOIMA AREA

Robert Lloyd Fisher

C.I.T. '49

FRONTISPIECE



MY IDEAL

DEDICATION

This report is dedicated to the Pharisees,

who thought they would be heard for their much-speaking.

ABSTRACT

The Pacoima area consists of Miocene (sediments and basalts) rocks underlain by a quartz diorite basement complex of Jurassic age. The stratigraphic units range from 25 feet to more than 600 feet in thickness. The lower sediments are arkosic land-laid deposits while the Modelo formation, shallow marine in origin, consists of thinly bedded sandstones, shales, volcanic ash and calcareous members. An andesitic mass, possibly a volcanic plug, outcrops near the summit of one of the hills.

An anticline, and possibly an associated syncline, has been developed by compressional folding. Small scale contortion is locally exposed. Regional dip is northward, decreasing from south to north in the area. Faulting is common, most faults trending nearly north-south. Movement along these faults ranges from a few feet to several hundred feet.

There are no important mineral deposits in the area. Quarrying of the basement rocks has been abandoned.

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INTRODUCTION

The field work upon which the following report is based was undertaken at the instigation of Professor Richard H. Jahns of the Division of Geological Sciences, California Institute of Technology. The region had been mapped topographically by the United States Geological Survey and investigated geologically by several C.I.T. field geology classes.

The area mapped consists of approximately one-half of a square mile, two miles southeast of San Fernando in the Pacoima, California, Quadrangle. Osborne Boulevard, connecting U. S. Highway 99 and State Highway 118 borders the area on the east and provides easy access to the exposures.

The field mapping was carried out by two-man parties walking over the area. Contacts were traced and mapped on a 1:6000 base map, with an aerial photograph used as an aid to location. Station location was by pacing, interpolation from photographed surface features and by triangulation where aerial photograph coverage was lacking.

Apparent dip-and-strike of contact - contour anomalies along the basement sediments contact are due to changed topography, a result of quarrying operations subsequent to the topographic mapping. Since aerial coverage of this locality was very good, the writer ignored the mapped topography and depended solely on the aerial photograph for location at these points. The area was mapped during the months of March, April and May, 1948 with a total of ten days spent in the field.

The writer wishes to acknowledge assistance in field work given by D. R. Brown. Miss Shirley Chapman rendered valuable aid in the editing of copy. The writer is especially grateful to her for the support and encouragement she freely gave for the duration of the project.

GEOGRAPHY

The latitude and longitude of the Pacoima area are 34° 17' N and 118° 22' W respectively. The area mapped comprises o.54 square mile. Altitudes range from 975 feet at the southern end to 1300 feet on Peak Abu. Local relief is great, being most extreme at the southern face of the hills. Overall relief is small.

Water drains down gulleys and ravines, some passing into Hanson Dam, most going off to the south via irrigation ditches. All of the streams are intermittent.

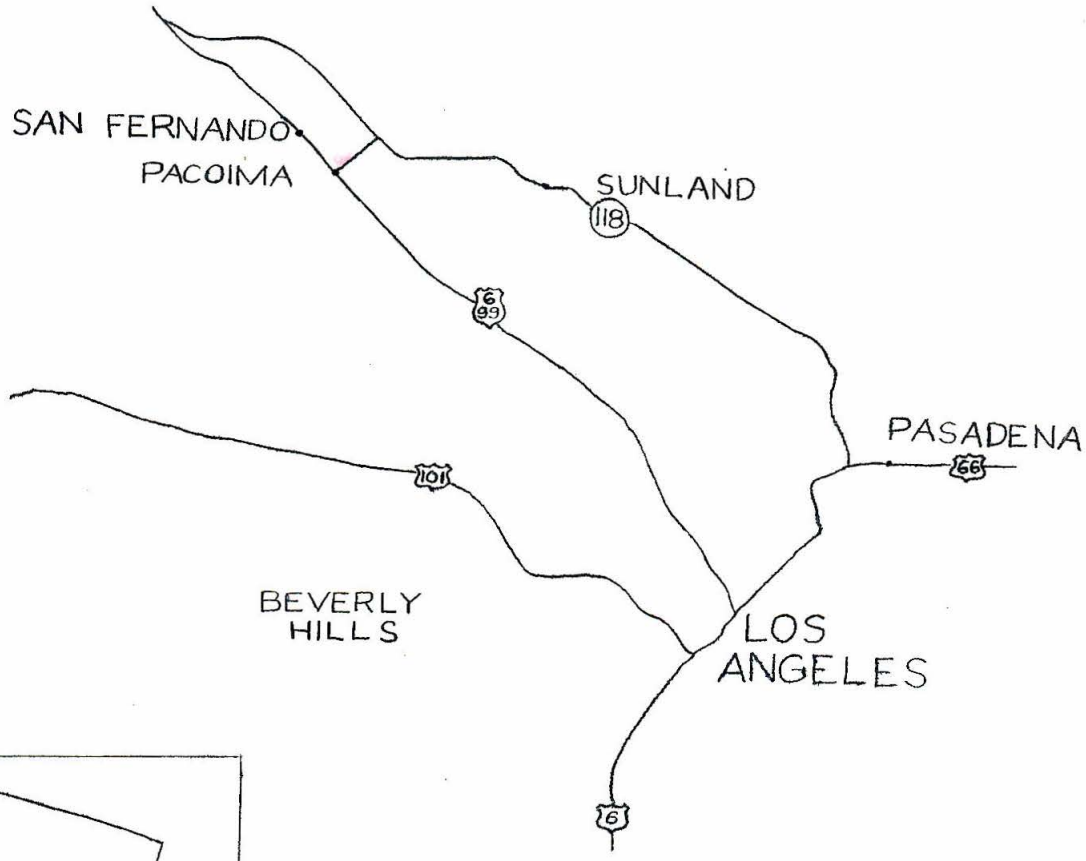
The vegetation consists of yuccas, live oak, waist-high chaparral, elderberries and numerous trees in man-made groves. Jackrabbits, quail, redwing blackbirds, orioles, snakes and ground squirrels comprise the fauna.

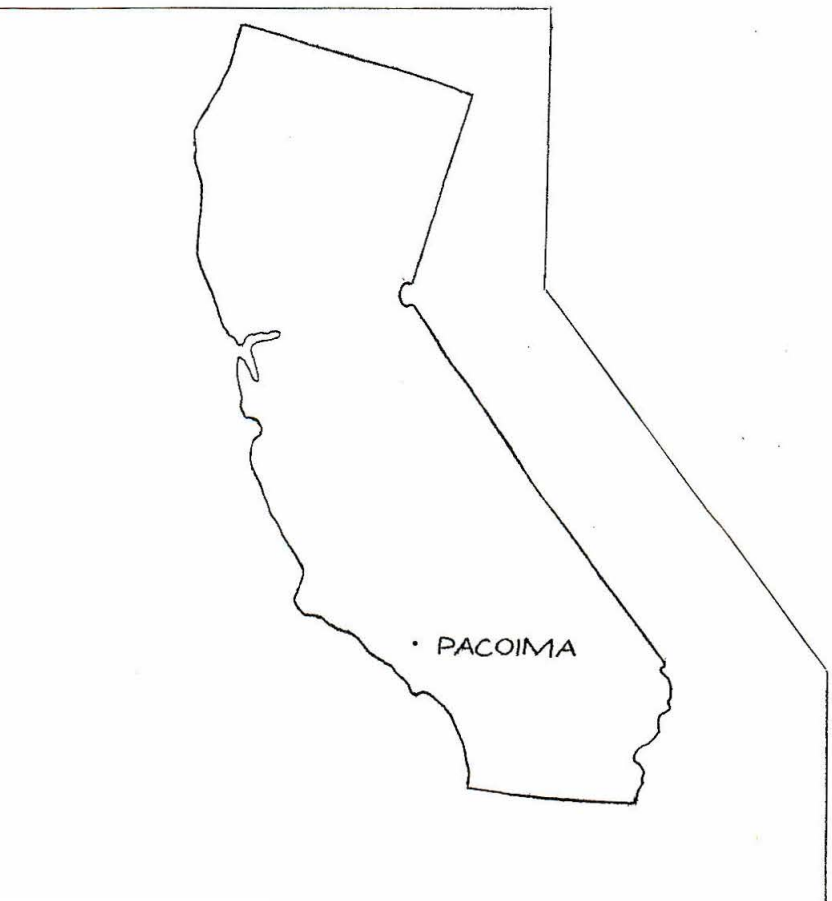
Two highways border the area, while it is crossed by dirt roads and telephone lines. Quarry buildings, small residences, a neighboring dam and an airport complete the culture.

Dominant topographic features are low, mature hills separated by broad, alluvium-filled valleys. Rocks are best exposed in quarry faces and along road cuts.

The area currently supports two industries, air travel and flower growing. Horses graze on the hills. Quarrying of the basement rock was formerly the major industry but these operations have ceased.

INDEX MAP





N

SCALE 1" = 5.46 MI.

101 U.S. HIGHWAYS

118 STATE HIGHWAYS

GEOLOGIC STRUCTURE

Unconformities -

The Shirley sediment - Basement complex contact is an unconformity, Miocene sediments lying upon Jurassic igneous rocks. It is a depositional contact over about one-half of its extent, becoming a fault contact in the southeast part of the area

The other contacts are chiefly depositional in character, though the Modelo-Broadwell contact may be a fault contact at the east or west ends. The basalt layers were extended essentially conformably on the arkose surfaces. The small "island" of Brassnuts basalt surrounded by Shirley sediments is probably a remnant of a stream channel filling in the eroded Shirley surface.

Folding -

Folding in this area was due mostly to compression acting in a nearly east-west direction. This is indicated by a broad anticline, whose axis bears about N 10° W through the mid-portion of the area mapped. Its presence is inferred solely from dip-and-strike changes since folding in the basalt and sedimentary units can't be observed. It apparently plunges into the Modelo sediments, possibly giving way to an even broader syncline or basin. Location of these features is not precise, since strike-and-dip data is not consistent even over very small sectors. This anticline is post-Modelo in age. Additional folding, very limited in extent, occurred as the andesite mass cut through Like Hill. Small scale contortion is exposed in the road cuts along Osborne Boulevard.

Dip-and-strike variation in the stratigraphic units, upon which the above hypothesis is based, may have come about through faulting or renewed intrusion in the basement complex. However, the author believes that the above described features are due to compression rather than to these causes.

Faulting

Faulting has been present as a companion to folding as a topography modifying agent in the Pacoima area. There are about twenty mappable faults, trending in a general north-south direction, whose traces are modified by surface irregularities. Displacement has been of the dip-slip and strike-slip types. No overall system may be postulated, but adjacent faults show similar characters, so the pattern may be broken down into seven major groups.

The major faults in the area are Frankie's fault and Friday Fault, which meet to form a fault wedge. Frankie's Fault appears as a fault scarp in the largest quarry, having a strike of N 25 E and a dip of 66° NW. Northeastward its position is inferred by marked thinning of the Shirley sediments and widespread occurrence of the basement complex. Friday Fault, whose position must be similarly inferred, joins it about 700 feet ESE of Peak Abu. The author believes this wedge was elevated subsequent to the nearby Mayfield sediment faulting and that the thin Shirley sediments capping the wedge were eroded off, leaving basement exposed far up the valley. A light, cream colored calcareous rock occurs on and just beneath the ground surface along Frankie's Fault trace in the valley. This is probably tufa deposited from carbon dioxide - bearing springs along the fault contact. Possibly associated with this movement is the apparent motion southward of a block of Shirley sediments now extending into the central quarry floor.

The four faults on the south flank of Like Hill trend nearly north and south. These are steep faults, possibly associated with the formation of the formation of the andesitic plug or dike. Displacement has been down on the east side on the two outside faults, while a block has been dropped between the two center faults. The western-most fault of this group is possibly a part of the larger fault immediately to the south, though it is less

likely that the other faults may be similarly correlated. An alternate interpretation, based solely on strike-and-dip data, is that the fault and contact lines along the Modelo-Broadwell boundary should be interchanged, with the assumption made that the fault pattern is due to East-West compressional forces. Field evidence is unconclusive on this point, but the author believes that this fault system owes its origin to radial forces associated with emplacement of the andesitic mass.

Three steep, NNE trending faults have offset the Mayfield sediments in the saddle 1000 feet west of Osborne Boulevard. Displacement was probably strike-slip in nature, and amount of offset must be inferred as about 100 feet

The Mayfield, Brassnuts and Shirley formations have been offset by two nearly parallel faults bounding a block near the west edge of the area mapped. The block has moved south-eastward or downward 10 - 25 feet. Possibly one of these faults is a continuation of the N70W trending fault in the nearby granite diorite, though no fourth fault can be found cutting the basement rocks. Minor offsets of the Brassnuts-Shirley contact occur farther east.

A fourth system offsets the Mayfield sediments northeast of Airport Ridge, where a block of Broadwell and Mayfield rocks was dropped 6-10 feet. Subsequently, an arcuate section of Broadwell basalt dropped several feet, abruptly terminating the Brassnuts basalts and burying a section of the Mayfield sediments.

High angle reverse faulting has re-exposed Mayfield sediments in a single locality just northeast of the above area, indicating minor north-south compression. The adjacent ridge and valley have been cut by numerous faults which, however, affected only the Broadwell basalts.

Joints

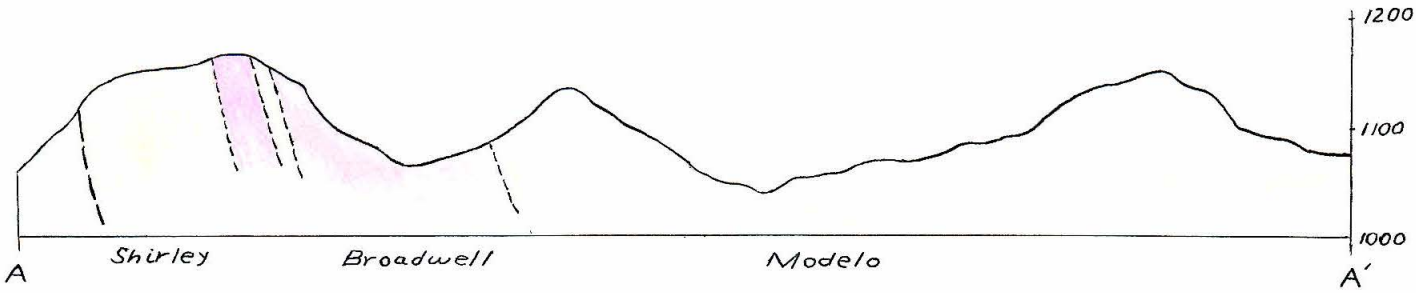
Joint systems are developed in the quartz diorite, a volcanic ash member of the Modelo formation and in the andesite plug.

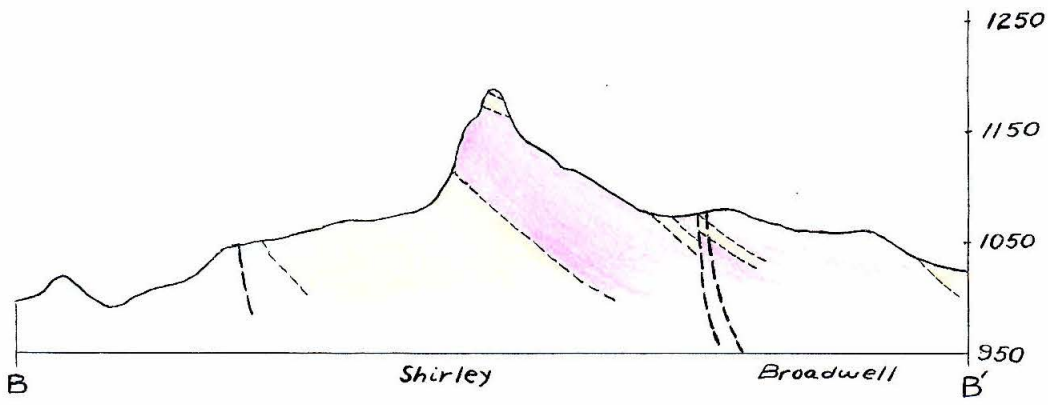
The basement joints are about equally developed, striking N50W and N53E and dipping 55° NE and 80° SE respectively. If these are due to compression, they indicate an East-West direction of compression.

In the volcanic ash, one excellently developed joint set strikes N 70° E and dips 72° SE, while a subordinate set strikes N5°W and dips 80° SW. However, the author does not believe that these joints have structural significance but merely were formed during the alteration and lithification of the ash beds.

Thirdly, the plug's joints, striking N 4 W and N 89 E and dipping 69° SW and 47° NW respectively, were formed during the cooling of the extruded andesite.

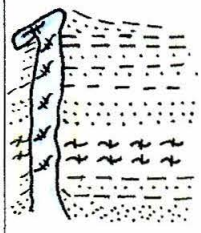
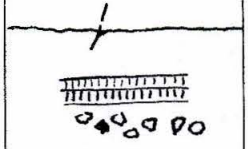
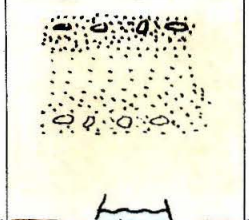
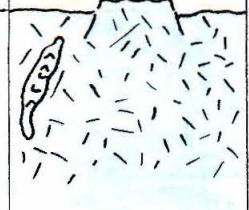
STRUCTURE SECTIONS





Horizontal scale 1" = 500'
Vertical scale 1" = 167'

COLUMNAR SECTION

Age		Unit	Name of Unit	Lithology	Thickness (avg.)
	Quaternary		Alluvium		
TERTIARY	Miocene		Modelo fm.	Thinly-bedded marine sandstones, shales, ash. Fossiliferous. Andesitic plug.	600'
			Broadwell	Basalts. Mud-flow (?) under blocky cinnamon basalt.	240'
			Mayfield	Non-marine arkose.	20'
			Brasshuts	Massive and amygdaloidal basalts.	75'
			Shirley	Non-marine sandstone and arkose. Boulder conglomerates.	250'
MESOZOIC	Jurassic		Basement	Granite--diorite; pegmatite dikes, schist.	

FIELD PHOTOGRAPHS

Frankie's Fault face, exposed in center quarry.

Bedded sediments of the Modelo fm., exposed in Osborne Blvd road cut.

GEOLOGIC HISTORY

Jurassic to Miocene

1. Intrusion of granite diorite into previously formed rocks.
2. Introduction of differentiated intrusives and pegmatites.
3. Removal of pre-intrusion rocks; leveling of intrusives' surface.

Miocene to Recent

4. Uplift (?) in source areas. Deposition of terrestial Shirley conglomerates and arkoses.
5. Volcanism. Extrusion of Brassnuts basalt in two separate flows.
6. Renewed terrestial deposition. Mayfield formation.
7. Volcanism. Broadwell basalts in two flows.
8. Submergence by sea. Deposition of marine Modelo formation continuous.
9. Broad warping; formation of anticline. Faulting of Mayfield sediments.
10. Formation of Andesite plug. Associated faulting. Volcanism. Ash deposits.
11. Dissection. Elevation of Frankie-Friday fault wedge.
12. Withdrawal of the sea. Continued dissection.
13. Quaternary alluvium formed in valleys.