GEOLOGY OF THE JAWBONE CANYON REGION

KERN COUNTY, CALIFORNIA.

1928

By
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Geology Dept.

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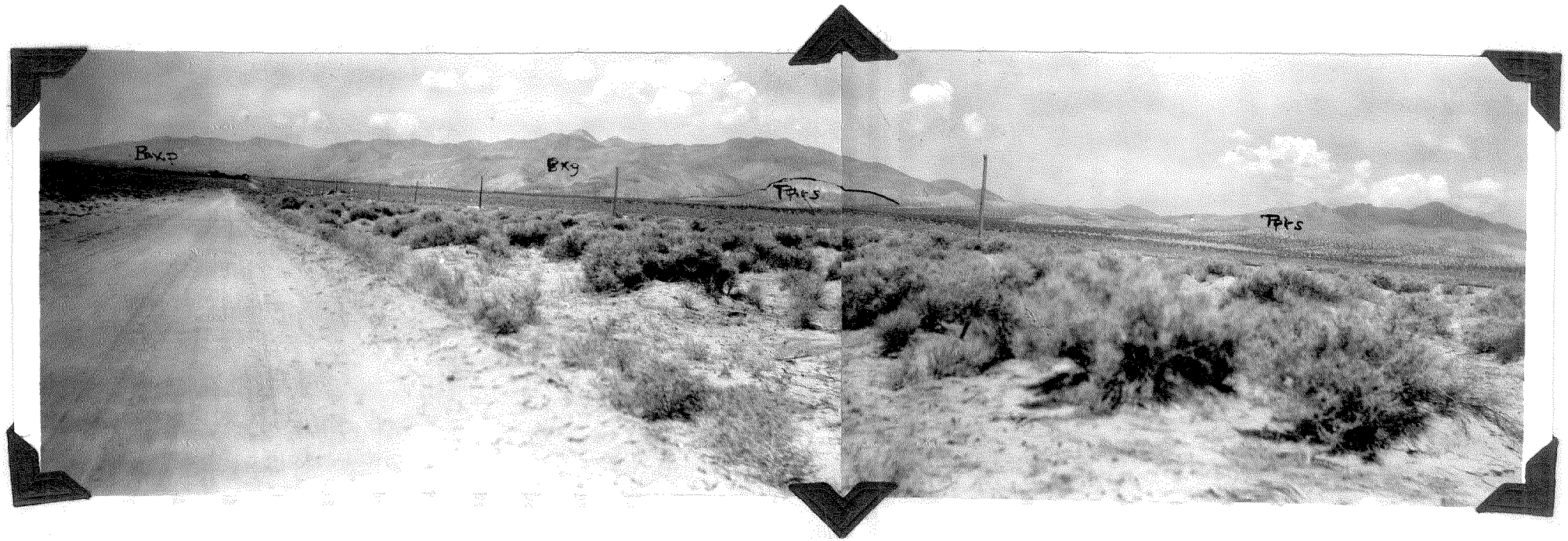
Panorama of the base of the Sierra Nevada Mts., in the vicinity of Jawbone Canyon. The entrance to Jawbone Canyon is represented by the low portion of the range. To the left of the canyon are the granitic basement complex, and the Paleozoic basement complex as indicated. On the right are the Ricardo sandstone beds. The Cameron fault runs from the mouth of the canyon, to the left, along the scarp in the granitic rocks.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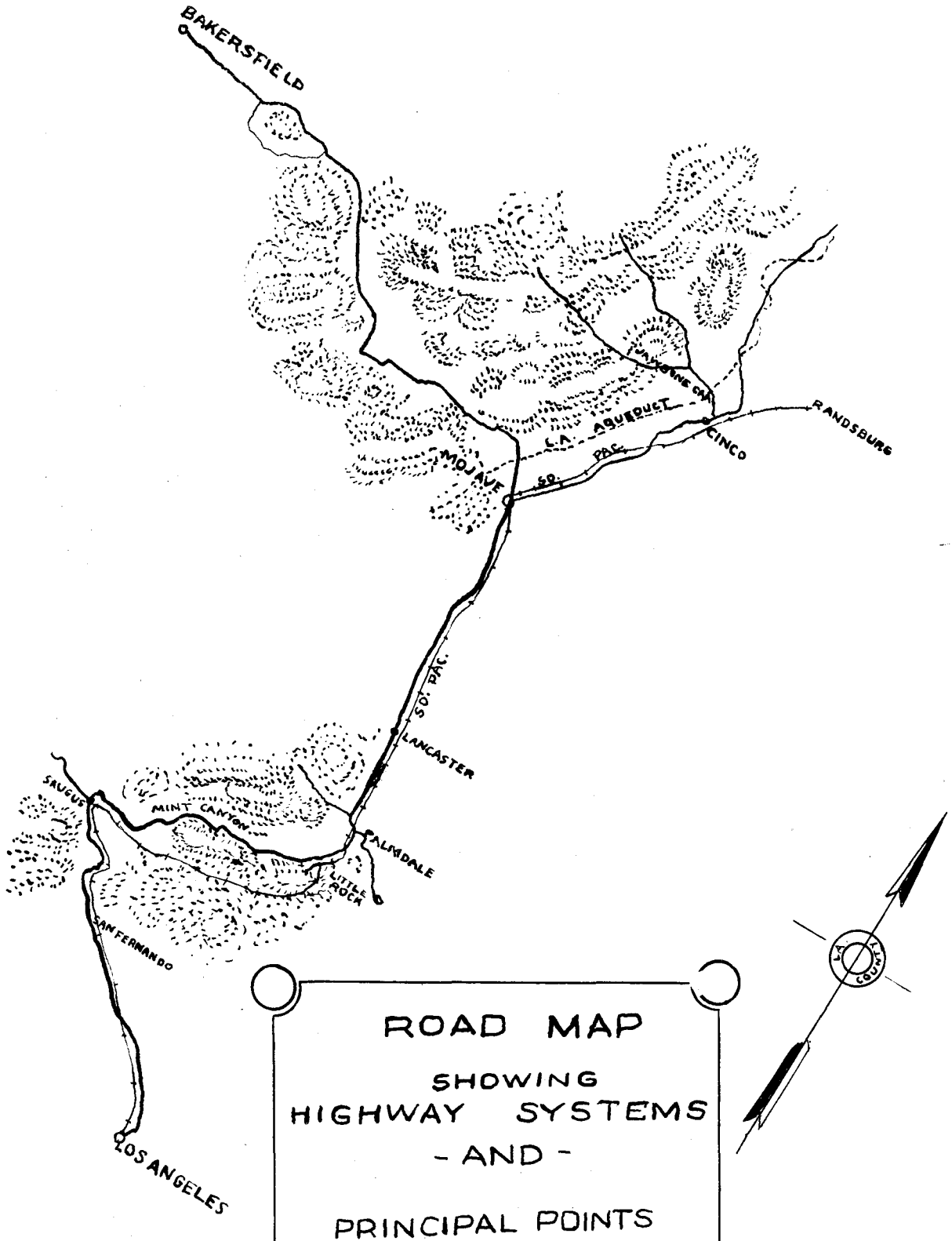
INTRODUCTION.

The work on the Jawbone Canyon area was undertaken at the suggestion of Dr. J. P. Buwalda, with the intention of working out the physical, aerial and historical relations as completely as possible. The problem was carried on by Mr. G. A. Schroeter and myself as partial fulfillment of the requirements for the degree of Bachelor of Science.

Operations began about the middle of January, 1928, and lasted until the first of June of the same year. The total time spent in the field amounted to approximately twenty-six days, since but two days of each week were available for this work.

LOCATION.

Jawbone Canyon is located in Kern County, California, at the base of the Sierra Nevada Mountains, on the northwestern edge of the Mojave Desert. It lies eighty-two miles northeast of Los Angeles by air line, or a distance of one hundred thirty-five miles by road. It may be reached conveniently from either Los Angeles or Bakersfield by train or auto. There are good macadam roads leading from both points to Mojave, from which a smooth, well-packed dirt road leads to the area. See Plate I. Within the area itself the roads are of little consequence. The main one goes up Jawbone Canyon, with



ROAD MAP

SHOWING HIGHWAY SYSTEMS

- AND -

PRINCIPAL POINTS

SCALE · IN · MILES

0 5 10 15 20 25

Plate. I.

a branch which enters Blue Point Canyon. There are also a few short roads constructed at the time the Los Angeles Aqueduct was built, which are of little value to the geologist. They are all dirt roads, poorly kept, and practically impassible in places. However the one up Jawbone Canyon, being the best of the lot, served admirably for reaching the interior of the area.

The area worked comprises about forty-five square miles of this region, being a rectangle with dimensions of approximately 5½ x 8 miles. There being no distinct natural boundaries the area was laid out by drawing lines directly North to South and East to West so as to include Jawbone Canyon and small portions on each side of it.

METHOD OF INVESTIGATION.

The first two days in the field were spent in making a general survey of the area in order to facilitate the future work. Beginning the detailed study of the area we started at the mouth of Jawbone Canyon and worked northward. The country being very rough, even dangerous, it was necessary for both parties to work close together. This method also proved practical in settling questions which arose at various times regarding the problem.

The topographic map used was a regular United States Geological Survey map, surveyed in 1913. The scale of this map is 1/125000, with a contour interval of 100 feet. The scale being too small for practical detailed field work it was necessary to have the Jawbone portion enlarged to just five times its original dimensions. This gave a map with a scale of one inch equal to 2000 feet. This map proved quite serviceable with the exception that the enlarging lessened the accuracy of the topographic representation. As a result of this it was necessary to use triangulation in most cases for locating points.

The region has practically no cultural development with the exception of the roads mentioned, a few poor homesteaders and the Los Angeles Aqueduct. The aqueduct passes through the eastern portion of the area in a general north south direction. There is a caretaker's house at the point where the aqueduct crosses Jawbone Canyon. This point, being about the center of the area, proved of great value as a source of water.

GEOGRAPHY

TOPOGRAPHY.

The average relief of the area is approximately 3000 feet, rising to its maximum height of 5175 feet at Cross Mountain in the southwest corner, and dropping to its lowest level of 2070 feet in the southeast corner. The old Paleozoics have by far the greatest relief. Here

exist Cross and Chuckwalla Mountains rise to heights of over 5000 feet. The sides of the peaks are steep, dropping almost vertically in places to form steep-walled canyons. Going northward from the Paleozoics the granitic basements rocks are encountered. Although the elevation of these rocks is much less than that of the Paleozoics, they, nevertheless, present a type of topography which is in many places identical with it. These rocks reach a maximum height in the northwest corner of the field. Here the elevation is about 4000 feet. In general the walls of the canyons of this basement complex have faces, which although steep, have considerable more slope to them than those of the Paleozoics. The valleys in these granites are broad across the bottom giving a modified "U" shape in contrast to the distinct V-shaped valleys present in the old basements. The Ricardo sandstones and conglomerates have a maximum elevation of 3000 feet. In general they present a typical bad-lands topography, steep faces existing where the beds have been cutoff perpendicularly to the dip, with gentle slopes following back the plane of the dip. As a result of the low elevation of this region the valleys are filled with

less steep?

large quantities of alluvial material which give them a cross-section like the arc of a circle.

CLIMATE.

This region has a typical arid climate, the average precipitation over a period of years being close to five inches. The rainfall occurs almost entirely in the winter months. Cloud bursts are frequent in this vicinity, and when they occur, tremendous quantities of debris is carried by the floods as they rush down the steep canyons into the Mojave Basin. The temperature of this locality varies greatly between summer and winter. Temperatures as high as 130° are not infrequent during the summer months, while at night during the winter, freezing temperatures often occur. This extreme variation in temperature is an important erosional agency. It affects especially the basement rocks in which expansion and contraction causes a network of fractures to form on their surfaces, thereby lessening their resistance to other erosional agencies.

High winds are frequently experienced, often-times reaching velocities of forty miles per hour. At this speed the pressure is close to eight pounds per square

inch, hence the value of wind in this region as an erosional agent and transporter cannot be over-estimated. It is especially notable in the Ricardo sandstones and conglomerates, where the wind by abrosion has produced pothole-like forms in the face of the rocks.

DRAINAGE.

The drainage pattern of the area is quite simple. Jawbone Canyon, an intermittent stream, which flows from west to east across the middle of the area, forms the principal outlet for the run-off. Feeding into Jawbone are numerous smaller streams, the largest of which is the one that runs north from Jawbone up Blue Point Canyon. This stream drains a large area of granitic and Ricardo rocks. The other streams are relatively short and empty with a steep grade into Jawbone. All of the water from this area, after entering Jawbone, runs down onto the Mojave Basin at the base of the range. Here the material carried by the flow is gradually dropped as the velocity of the water lessens, until finally a practically loadless stream of water reaches Kane Lake.

VEGETATION.

With the exception of the plants common to an arid climate there is practically no vegetation in this region.

The principal forms which exist the year round are cactii, yucca, greesewood and squaw tea. In the winter and spring months a mantle of short, wiry grass and vividly-colored desert flowers appear. However they are short-lived and disappear atthe first sign of dryness. On the higher elevations, such as Cross Mountain, where the winter snows remain for some time, a few pine and oak trees occur. Where sufficient water is available fruit trees are grown with considerable success, but the scarcity of water has prevented such ranching to any important degree.

EXPOSURES.

The slopes of this arid region are swept clean by the high winds and heavy rains, and as a result, almost the entire area is one great exposure of naked rocks. In places it is possible to trace contacts for many miles without interruption. Practically the only soil mantle encountered, with the exception of the alluvial deposits in the canyon bottoms was the Quaternary old alluvium, which occurs only sparsely, resting on the Ricardo beds in the northeast section of the area.

STRATIGRAPHY and PETROGRAPHY.

It is convenient to divide the rocks of the Jawbone Canyon area into four major divisions. The highly

PLATE II.

G E O L O G I C T I M E S C A L E

OF THE JAWBONE CANYON REGION

SYSTEM	SERIES	FORMATION	THICKNESS
Quaternary	Pleistocene	Alluvium	
Quaternary	Pliestocene(?)	Old Alluvium (Sierran Debris)	
	UNCONFORMITY		
Tertiary	Upper Pliocene	Jawbone Basalts	2000 ±
	UNCONFORMITY		
Tertiary	Upper-Lower Pliocene	Ricardo Agglomerate	I950 ±
	Lower Pliocene	Ricardo Tuffs	I850 ±
	Lower Pliocene	Ricardo Ss. & Cong.	4300±
	UNCONFORMITY		
Mesozoic		Basement Granites	
Paleozoic		Basement Marbles Quartzites	

metamorphosed basement complex rocks, Paleozoic in age, are present in the southwest portion of the area. The Mesozoic basement granites, which form about five-tenths of the area, are found in the central, extreme north, and western portions. On these basement granites lie the Tertiary Ricardo and basalt formations. The Ricardo sandstones and conglomerates exist mainly in the northeast section of this locality. Following in sequence to the Ricardo are the Jawbone basalts, the Quaternary old alluvial deposits, consisting of Sierran debris, and the Quaternary recent alluvial deposits, an erosional product of the present ranges.

PALEOZOIC BASEMENT COMPLEX.

This formation is composed chiefly of metamorphosed marbles, quartzites and biotite gneiss. They vary in color from white to dark gray. The marble contains pebbles of limestone, many of which have been lengthened out into lense-like forms due to the metamorphism. The marble in places has a laminated structure and at a distance has the appearance of an augen, as a result of the bending of the lamenations around the contained limestone pebbles.

Going up S. B. Canyon from the Horseshoe Mining

Claims one encounters several felsite dykes. They occur in the white marbles present here, and the largest one, a rhyolite, which is from fifteen to twenty feet in thickness dips off at a steep angle toward the north. The rhyolite has a dark, reddish color and is composed chiefly of large orthoclase phenocrysts, and a small amount of quartz. It is practically the only rhyolite of this character present. There are also some smalll basic dykes present. They are very dark in color and apparently consist of augite and plagioclase.

The secondary biotite gneiss of this region is found in contact with the marble, occurring along the numerous small fault planes, where considerable movement has taken place. Its origin must have been sedementary as indicated by its close proximity to the marble. It is platy, containing considerable mica, feldspar and a little quartz. The feldspar occurs as phenocrysts with granular aggregates of quartz about it. In general, these old basement complex rocks have a gray to brownish appearance on weathered surfaces. They break down into rather fine, sharply-angled material. This erosion is aided by the extensive fracturing which has occurred in this region.

GRANITIC BASEMENT COMPLEX

The compssition of this basement rock varies considerably over the whole region but in general consists of quartz, orthoclase, and biotite with minor amounts of pyrite and plagioclase. In places, as along the north side of Jawbone Canyon, it is found to be seamed quite extensively with orthoclase or microcline. At points of contact it is usually locally brecciated, the alteration products being mainly kaolin, limonite, and serpentine.

On fresh surfaces it is gray in color which changes to a dark gray , brown or green with weathering. The brown being the predominate weathered color in this r region. At contacts with basalts and agglomerates, when it is not altered, it is found to be stained to a dull red.

A phaneric texture predominates throughout these granites. The mineral grains are of uniform size and are evenly distributed throughout the mass. The rock as a whole, is badly jointed and fractured, breaking up into particles of variable size.

The areal distribution of these rocks is very general throughout the region, They accupy the whole area west of the Ricardo formation and north of the Paleozoic basement rocks, with the exception of a

small area near the center where basaltic flows and Ricardo tuffs and agglomerates occur. As stated before, they represent approximately one-half of the rocks of the area.

Topographically they are intermediate about half way between the very rugged Paleozoics and the more gentle, bad-lands topography of the Ricardo sandstones and conglomerates. They are apparently in the late youthful stage of erosion. See plate III.

TERTIARY RICARDO FORMATION

Unconformably on the Mesozoic granitic basement rocks lies the Ricardo formation. The Ricardo consists of three distinct rock types. The lowermost is first, the Ricardo sandstones and conglomerates, the middle member is ~~second~~ the Ricardo tuffs, and the uppermost is ~~third~~ the Ricardo agglomerates.

RICARDO SANDSTONES AND CONGLOMERATES

The major portion of these sandstones and conglomerates is made up of granite pebbles, particles of rhyolite and tuffs. The granite particles form the largest constituent. They vary in size from that of fine sand, which with feldspar acts as a cementing material, to that of a mans head, with colors ranging from light brown or red to gray. The rhyolite and tuff particles are much less numerous and more uniform in size. The

PLATE III.

Looking downstream in Water Canyon. Showing the deeply incised canyon and trenching effects. Also typical, large and distinct granitic outcrops.

rhyolites have a rather persistent greenish color, while the tuffs are generally light red to gray.

Taking the Ricardo formation as a whole the principle colr is a dull red to gray, depending on the relative proportions of minerals present and the weathering. The particles vary in shape from sub-angular to well rounded, the rounded ones being the most numerous. The beds are well stratified and possess an Arkosic matrix. The hardness however, varies considerably in the different beds, so that the less resistent ones form well rounded hillocks, while the harder ones stand out in bold relief.

The sandstones and conglomerates comprise about two-tenths of the total area and are present in the northeastern portion, with a small outcrop in the tuffs and basalts of the central portion.

The outcrops of these beds are distinct and numerous, excepting where the less resistent ones have been covered by a detrital mantle. As previously stated, the outcrops of the harder beds are represented bold bluffs and other characteristic bad-land features.

TERTIARY RICARDO TUFFS

The Ricardo tuffs occur in beds of variable thickness, in places associated with a breccia. They are aphanitic and contain basaltic particles which look like phenocrysts in the ground mass. The tuffs in the vicinity of Painted Canyon have a creamy color while those near Blue Point are

green.The breccias are darker and more resistent than the tuffs. See Plate IV.

The tuffs are distributed locally about the extrusives in Painted Camyon and the basalts at Blue Point. They are quite resistent, especially at Blue Point where a large spur is formed by their projection into Jawbone Canyon.

TERTIARY RICARDO AGGLOMERATE

The Ricardo agglomerate consists of a heterogenous mass of various sized granitic and basaltic particles in a sandstone-like matrix.These particles are all angular to sub-angular. Those of granite are gray to brown in color while those of basalt are dark red.

The general appearence of this formation on a weathered surface is a dark brown to red. Its texture is coarse, aphaneric, the constituent particles ranging in size from very fine to those the size of a base-ball or larger.In places it seemingly has slight indications of stratification but no distinct bedding lines could be found. With weathering it darkens and assumes a pitted appearence as the rock paricles are erroded away.It is quite resistent and often projects out beyond the ajacent rocks. This formation is found associated with the Ricardo tuffs throughout the region and is often interculated with the tuff beds. It weathers into typical hog-backs.

See Plate V

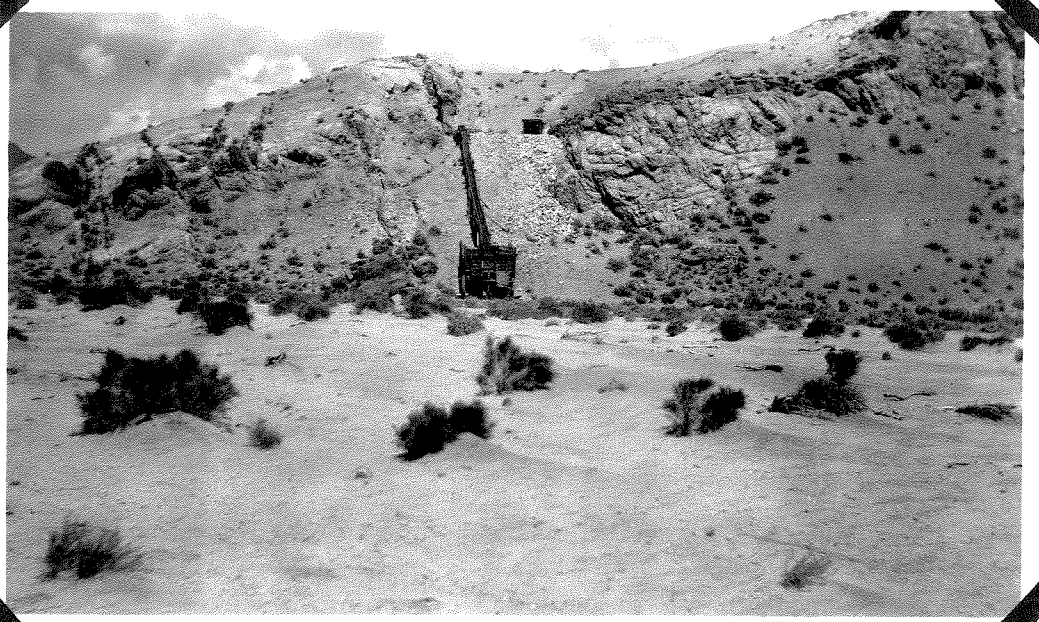


PLATE IV.

Tuff-breccia beds at Blue Point. Quary in foreground where greenish tuffs are mined. Darker beds are breccia and most resistent.

PLATE V.

Looking northwest from Blue Point showing Ricardo agglomerates with typical hog-back weathering.

TERTIARY JAWBONE BASALTS

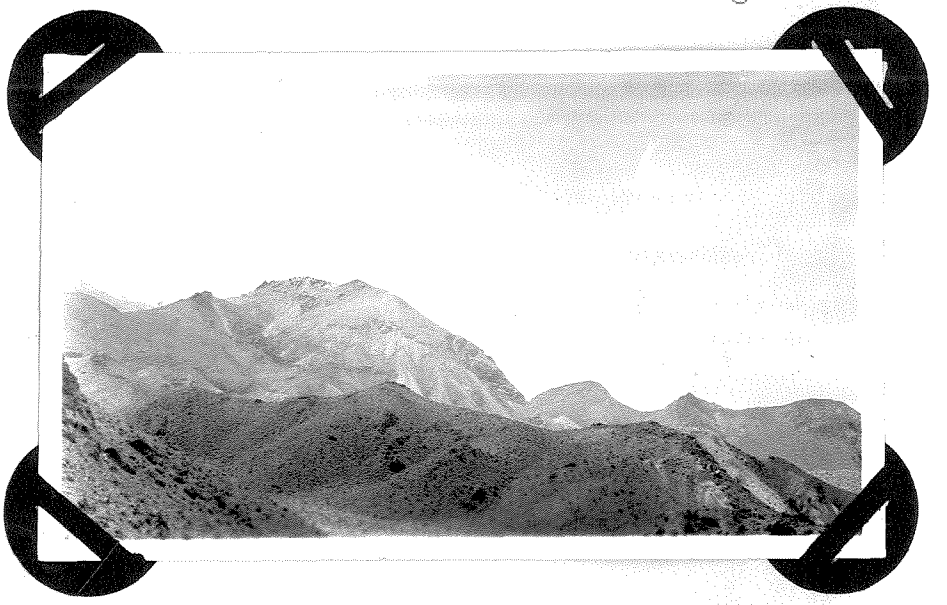
The Jawbone basalt flows occur principally in the vicinity of Blue Point. There are some three or four distinct flows here which are nearly identical in character. These flows are usually reddish in color on a weathered surface and gray when fresh. They exhibit a distinct flow structure and in places are very vesicular. The texture varies from aphanitic to aphanitic porphryitic. The phenocrysts which are found are uniform in size and composed of either quartz or orthoclase. With weathering these basalts break off of the edges of the main flow in large pieces, oftentimes having a pseudo-columnar structure.

Since these flows lie on the surface they are a large outcrop in themselves. Their surfaces are practically ~~clean~~ free from ~~any~~ detrital material and their contacts may be followed with ~~little~~ ease difficulty. See Plate VI.

At the head of Painted Canyon a basalt flow occurs which is quite different from those at Blue Point. This flow overlies a creamy-colored volcanic ash. It is yellow on weathered surfaces and gray on fresh. The texture is aphanitic porphryitic, in places distinctly vesicular and at times amygdaloidal. A distinct,banded structure is present throughout the mass. The phenocrysts of quartz, orthoclase, biotite, limonite or kaolinite are embedded in a dense ,firm, yellowish-brown ground mass. This flow is badly shattered and broken considerably throughout.

PLATE V I

Looking west from Blue Point, showing the dip of the Jawbone basalts. No-Name Mt. in the background.



Looking further west from picture above, showing basalts and tuffs in the vicinity of NoName Mt.

QUATERNARY OLD ALLUVIUM

The Quaternary old alluvium deposits are composed chiefly of angular to sub-angular granite particles. They range in size from fine sand to those the size of a pea. The color of this formation ranges from dark gray to light red. It is not stratified and is poorly cemented. With weathering it usually becomes lighter considerably in color and erodes much like ordinary alluvium.

This formation is found lying on the Ricardo sandstones and conglomerates, and in contact with the granites, in the area just north and east of Jawbone Canyon proper. Its total area is not more than five or six square miles. It is dissected slightly but in general forms a broad plain dipping slightly to the south.

QUATERNARY ALLUVIUM

The Quaternary alluvial deposits found, in the canyon bottoms and on the Mojave basin to the east of the area, offer a very heterogenous mixture of material. In it are found angular to sub-angular granite particles, metamorphics, basalts and rounded boulders from the Ricardo conglomerates. The granitee particles make up the larger part of this formation. It is uncemented and unstratified, except locally, in places, and has a predominate gray color. It is spread out at the mouths of canyons in the form of fans, some of which have been recently dissected showing thicknesses of fifty feet or over.

STRUCTURE

The structure of the Jawbone region presents a very interesting problem to the geologist since the field relations, tho easily discernable, are nevertheless complicated. The structural and historical relations of the formations of the Mojave Desert region have been studied considerably by previous investigators and they all agree fairly closely on these subjects.

PALEOZOIC BASEMENT COMPLEX

The old Paleozoics, as previously stated, lie in the southwest portion of the area. They consist mainly of highly folded and faulted metamorphic rocks. They are cut by numerous dykes, both acidic and basic. The majority of these dykes are rhyolites which dip sharply to the west and are cut by smaller, almost vertical, dykes of acidic rock.

The faults in this formation lie at all imaginable angles, a large number of them being horizontal. Along these faults gneisses and sometimes schists are found, the fault plane being clearly marked by slickensides.

Approximatelt four square miles of these metamorphics were mapped in the vicinity of S.B. Canyon and they apparently continue some distance to the west beyond this point.

GRANITIC BASEMENT ROCKS

The metamorphics just described and the granitic base-

ment rocks are separated by a series of intrusive rhyolites which have apparently come up through the faults developed between the two rock bodies. These rhyolites are highly mineralized and were intruded subsequent to the last movement between the basements as indicated by the numerous, continous"shoots' which branch from them.

These granitic basement rocks which lie north of the Paleozoics are undoubtedly the core of a great fault batholith that forms a part of the Tehatchipi and great Sierran ranges. These granites are badly fractured by frature systems which cut the rock into sharply angled blocks.

what is a fault batholith?

RICARDO FORMATION.

Lying unconformably on the granite basement ~~is~~ are the Ricardo sandstones and conglomerates. They dip approximately twenty degrees to the west and butt into the granites at fault contacts. The contacts are formed by the Cameron Fault just south of the entrance to Jawbone Canyon and by the Tentic fault north of this point. The beds are crossed by a series of minor faults which have a general north to south strike. This faulting has resulted in a system of tilted beds with bluff-likes faces toward the east and more gentle dip slopes to the west.

RICARDO TUFFS

In the vicinity of Blue Point occur the Ricardo tuffs and agglomerates. They dip to the west at an angle of twenty degress and have a total thickness of about twenty eight hundred feet. They are recurrent, which postulates

the possibility of a fault up the canyon to the immediate left of Blue Point. See cross section B-B'.also plate VIII.

TERTIARY BASALTS

What kinds of rocks are these basalts?

Unconformably on the Ricardo tuffs and agglomerates lie the Tertiary basalt flows,covering also some of the ajacent granites.They are thought to have been extruded during Pliocene time. A mosaic fracture system has broken them considerably and in places they present a columnar structure. See Plate VII.

OTHER TERTIARY EXTRUSIVES.

The Tertiary extrusives occur locally along both the Cameron and Tintic faults. They cover a little less than one square mile and have evidently been extruded through conduits developed along these faults.

QUATERNARY OLD ALLUVIUM

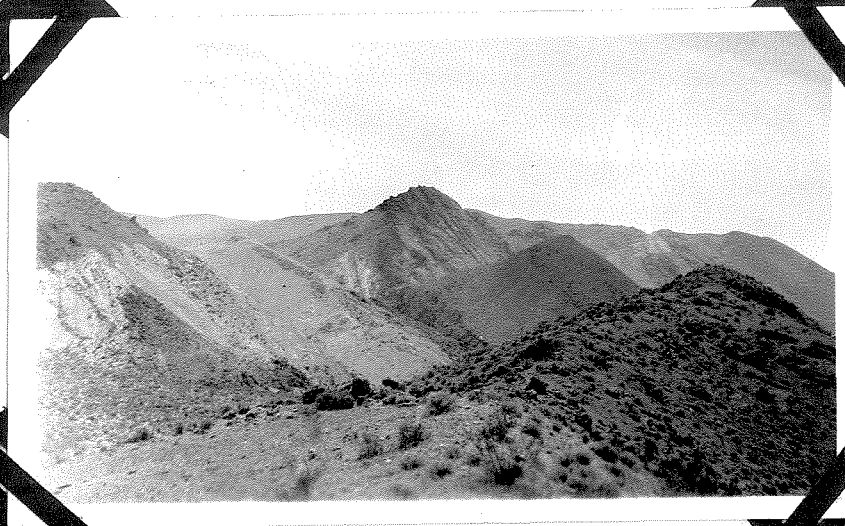
How do they cut other rocks?

Cutting the Ricardo sandstones and conglomerates are the old Quaternary alluvial deposits. They lie nearly horizontal with their contact at the granites formed by the Tintic Fault. At the Punchbowl their thickness was approximately fifty feet.

QUATERNARY AND RECENT ALLUVIUM

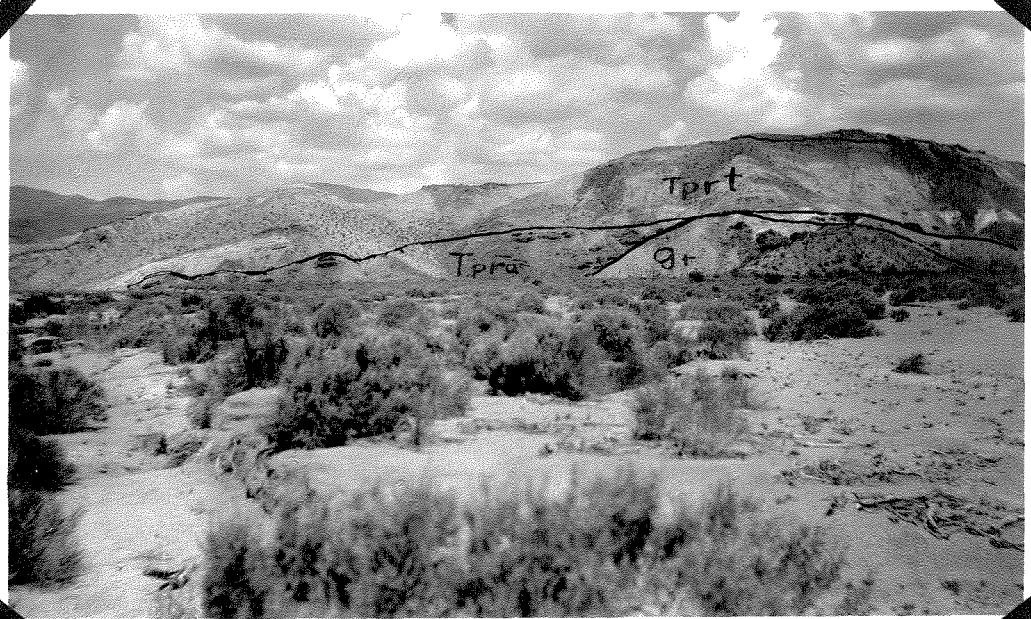
This alluvial formation if found mainly in the canyon bottoms and in the Mojave Basin where it is known to be several hundred feet thick. In Jawbone Canyon near Blue Point it is found adhering to the recently uplifted granites which form the walls of the canyon.

PLATE VII



Structure in Jawbone Basalts showing dip surface. These basalts lie unconformably on the Ricardo tuff-breccias.

PLATE VII.



Looking west at tilted Ricardo tuffs and agglomerates. Here the granite is overlain unconformably by Ricardo agglomerate. The top line marks a basaltic cap.

FAULTING

This region possess three major faults, the Cameron, the Tintic and the Jawbone respectively and several minor ones such as the Blue Point and Cross Mt. faults.

CAMERON FAULT

The Cameron Fault may be followed from the base of the Paleozoics northward along the base of the granites to Jawbone Canyon thence along the base of the Ricardo sandstones and conglomerates until it intersects the Garlock fault at Red Rock Canyon. These two faults, the Cameron and the Garlock, form the boundries of the great depressed Mojave Basin. The total movement along the Cameron Fault is thought to be better than twenty five thousand feet. It has evidently been produced by tension, most of the movement having taken place along the hade. In places, as at Jawbone Canyon, there are evidences of thrusting as indicated by the presence of ground water, the clear topographic expression along the through, the repetition of beds and the dipping of the beds into the fault plane at an angle of about twenty degrees.

JAWBONE FAULT

Beginning at the head of Jawbone Canyon and following alongbthe base of the granites on the left side then crossing at Blue Point and following the right side is the Jawbone Fault. This fault is undoubtedly a very old one and it is probable that it was the direct cause for the development of Jawbone Canyon. It is the plane along which the differential movement between the two

granite masses , on each side of the canyon, takes place. That movements in the past on this fault have been extensive is indicated by the fact, that the granite masses are only parts of the core of a once great batholith which by periods of upraise and erosion has been gradually erroded down to its present state. The presence of uplifted, slightly dissected, alluvial fans, along the base of the granites also indicates a recent movement. These fans measure over one hundred feet from top to bottom. See Plate IX.

Not related to the faulting? Doubtful?

TINTIC FAULT

The Tintic Fault intersecting the Jawbone Fault at the head of the canyon, runs northward for fifty miles where it joins the great Owens Valley Scarp. It is a normal fault throughout, the Ricardo and Quaternary alluvium beds dipping into it at an angle of about twenty degrees. The direction of applied stresses is apparently from the north as indicated by the fracture of the granite and the displacement along the strike is approximately two hundred and twenty five feet.

OTHER FAULTS

Branching to the north and to the southwest of the Jawbone Fault are the Blue Point and Cross Mt. faults respectively.

The direct evidence of the existence of the Blue Point Fault was found, excepting that there is a repetition of the Ricardo tuff and agglomerate beds at Blue Point. This fault, if present, evidently follows the west bank of the

PLATE IX

Recently uplifted and slightly dissected alluvial fans just north of Blue Point in Jawbone Canyon. They were produced by the Jawbone Fault.

Is this legend correct?

small canyon to the immediate left of Blue Point.

The Cross Mt. Fault forms the contact between the basalt flows and the granites on the south side of Jawbone. The plane of the fault dips forty degrees to the southeast and does not vary over five degrees in the entire distance traced. Its presence is indicated by slickensides, rock debris along its surface, an acidic lava feeder and typical spur saddles developed by faults. See Plate X.

HISTORICAL GEOLOGY

The old Paleozoic basement complex rocks were originally sandstones, quartz conglomerates and limestones. They have suffered a tremendous metamorphic action and as a result have been recrystallized to form the present rocks. Subsequent to or during the metaporphism were intruded dykes, both acidic and basic, many of which still persist.

Following the metamorphism was the intrusion of a great granite batholith, of which, the present granite basement rocks are a part. At the same time extrusive flows were occuring. The granites and the extrusives were then erroded with the result that the present Ricardo beds were formed. Next there was a tilting of the Ricardo b beds and subsequent peneplaination. When the next cycle of deformation occured the peneplained surface of the Ricardo was covered with a thin mantle of detrital derived from the basement rocks. Further uplift of the basement

PLATE X

Typical spur saddle developed by faulting. Solid line is fault trace and dotted one is reconstructed spur. This type of spur is found on both the Cameron and Cross Mt. Faults. The one above is on the Cameron Fault west of the town of Cinco.

rocks caused the dissection of the old alluvial depoits and the Ricardo beds. Contemporaneous with the last uplift was the developement of the present fault system which follows the base of the Sierra Nevada Mts.

ECONOMIC GEOLOGY

Along the walls of the rhyolite dykes and the necks of the extrusive flows in the old metamorphics occur mineralized "shoots" formed by secondary enrichment. The minerals found are chiefly gold, copper, lead, and a little silver. In the past many attempts, some of them successful, have been made to mine these deposits. The region is so badly faulted and cut up that in general it has not proved profitable. The cost of "hunting" for lost veins usually exceeds the amount of mineral produced.

The tuffs have found use as a clay and scouring ingredient and consquently are being mined quite extensively for such purposes.

SUMMARY

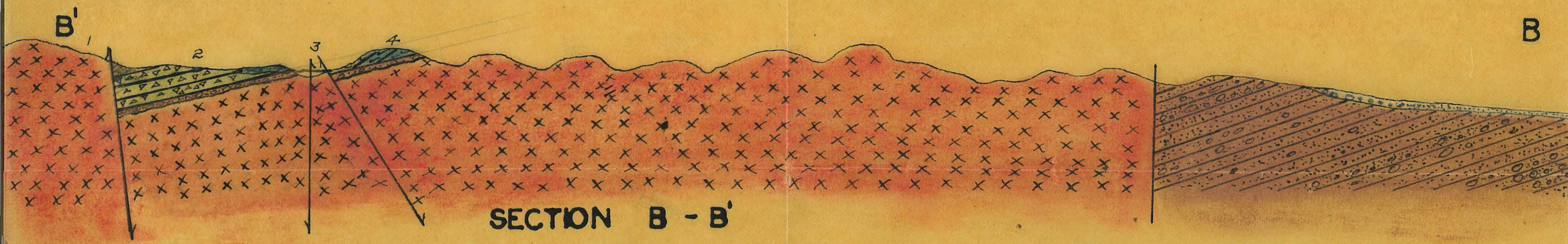
The oldest known rocks in this region are the Paleozoic metamorphics. Next in age, thought to be Mesozoic, are the granite basement comples rocks. These basement rocks furnished the materials of which the Ricardo sandstones and conglomerates are composed and subsequently the material

for the old alluvial deposits. Following the deposition of the alluvium there was a period of deformation, during which the granites were uplifted and dissection of the alluvial material and the tilted Ricardo beds set in.

Compton — 1928

1. More care needed in spelling
2. Some sections of report should be in greater detail - a more complete statement
3. Cameron and Lambone faults do not turn but doubtless continue as straight faults. Tuite fault continues S of Lambone Canyon.
4. Could not use reversed order in sentences as often (verb before subject.)

SECTION A - A'



SECTION B - B'

TERTIARY — QUAT.

RECENT	Qal.	Quaternary Alluvium: Poorly consolidated stream sands and gravels. Rudely classified.	Ti.	Tertiary Extrusions: Dykes, pipes, and sills of Tertiary lavas, mostly acidic, sometimes basic. Frequently mineralized.
PLEISTOCENE	Qoal.	Sierran Debris: Coarse, angular granite particles, only locally consolidated. Forming a piedmont alluvial mantle on flanks of hills.	Bxg.	Granitic Basement Complex: Rich in Feldspars North of Jawbone Canyon. Ferro-magnesium minerals highly altered South of the canyon.
UPPER PLIOCENE?	Tpbs	Jawbone Basalts: Fairly thick lava flows, dipping quite steeply to the South. Rich in plagioclase. Flows separated by flow-breccia or ash. columnar structure locally.	Bxp.	Paleozoic Basement Complex: Highly metamorposed limestones, schists, and quartzites. Flow structure well developed.
	Tpra	Ricardo Agglomerate: Particles angular chiefly granite, some basaltic bombs. Associated with ash.		
LOWER PLIOCENE	Tprt.	Ricardo Tuff-Breccia: Boldly weathered, massive, green hogbacks and cuestas of resistent volcanic tuff-breccia. Well indurated and quite hard.		
	Tprs.	Ricardo Sandstones and Conglomerates: Poorly to well indurated, arkosic sandstones and conglomerates. Dominant colors some shade of brown or gray. Particles sub-angular to well rounded. Weathers into subdued topography.		

CONTACT-KNOWN

CONTACT-OBSCURED

LIVE FAULT

DEAD FAULT

SUPPOSED FAULT

GEOLOGY OF PART OF TEHACHAPI MTS. IN THE VICINITY OF JAWBONE CANYON CALIFORNIA

1928.

NATURAL SCALE

BY

G. AUSTIN SCHROTER

Compton 1928