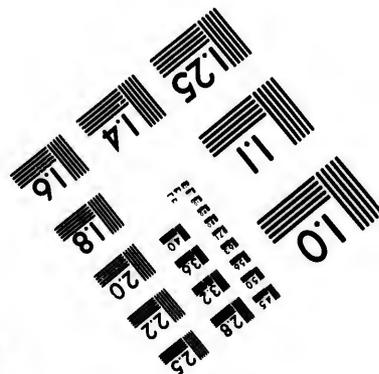
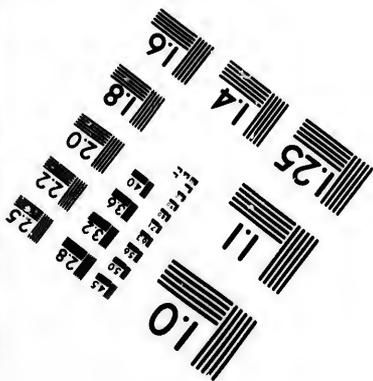
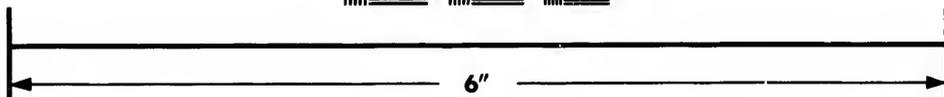
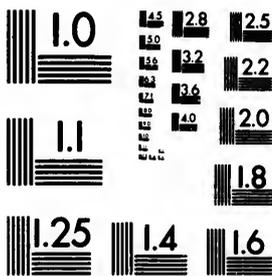


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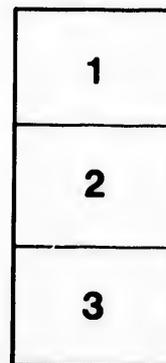
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OBSERVATIONS
ON THE EXTENT OF THE
GOLD REGION
OF
CALIFORNIA AND OREGON,
WITH NOTICES OF MINERAL LOCALITIES IN CALIFORNIA,
AND OF SOME REMARKABLE SPECIMENS OF CRYSTALLINE GOLD.

BY WM. P. BLAKE,
Geologist of the U. S. Pacific R. R. Survey in California.

EXTRACTED FROM THE AMERICAN JOURNAL OF SCIENCE AND ARTS, VOLUME XX, SECOND
SERIES, JULY, 1855.

THE information contained in the following brief notes was partly obtained in connection with the government exploration in California for a practicable route for a railroad to the Pacific, and partly during a visit to the mining region and a residence of several months in San Francisco. The localities and minerals found in the course of the explorations for the government will receive a more extended notice in the report now in preparation.

GOLD.—It is not yet possible to state the boundaries of the great gold-field of California. It has been gradually expanding on the north, west and east with the progress of exploration, until placers have been worked under the snows of the high ridges of the Sierra, and it appears probable that the crest of that great mountain chain is overlaid by the precious dust. On the north and west, new placers of unequalled richness are constantly discovered, and gold is brought from nearly all of the numerous ranges and ridges that trend off from the upper or northern portion of the Sierra Nevada, and traverse nearly the whole breadth

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of the State and a portion of Oregon, reaching the coast between Cape Mendocino and the Umpqua river in lat. $43^{\circ} 45'$.^{*} The placers are therefore no longer confined to the State of California but extend into Oregon, not only to the Umpqua river but beyond it, throughout both Oregon and Washington Territories to the parallel of 49° .[†] Of this northern portion of the gold region there is however but little known, and the latitude of the Umpqua river may be regarded as the northern limit of general mining operations for the present. On the south, the limits of the field have been extended nearly to the Tejon pass at the head of the Tulare valley in lat. 35° . This point is about forty miles south of Kern river where, according to the recent intelligence the placers are rich and are exciting considerable attention. This river rises in Walker's pass (lat. $35^{\circ} 39'$), and flows westward over a broad area of granitic rocks to the Tulare valley, where it empties into the most southern of the Tulare lakes. South of the head-waters of this river the crest of the Sierra Nevada gradually deflects to the west and the breadth of the exposure of granitic rocks decreases, until at the Tejon, the slopes of the Great Basin and the Tulare valley are only thirteen miles distant. The auriferous slates, (talcose slates,) are not found in the section at the Tejon pass, and this may be considered as the southern limit of the Sierra Nevada gold field.

It is more difficult to determine even approximately the eastern and western boundaries of the auriferous area. The elevated portions of the Sierra having been but slightly explored, its eastern limits are not yet defined. Its western margin along the Sacramento and San Joaquin is better known, but is exceedingly irregular. The greatest expansion of the field from east to west is probably in the northwestern part of the State where gold is found from Mt. Shasta to Gold Bluffs on the coast south of the Klamath (lat. $41^{\circ} 30'$)—a distance of 110 miles.

Farther south on the Yuba river the breadth in the direction of the general course of the river is not less than fifty miles. This is believed to be its average width for a long distance southward or to the vicinity of the San Joaquin, beyond which, its limits become more and more contracted to its final termination at the end of the Sierra Nevada. The average breadth of the field for its entire length may be said to be not less than fifty miles.

^{*} It is interesting to observe in this connection that when Prof. J. D. Dana, the geologist of the U. S. Expl. Exp., passed rapidly over the section of country in 1841, he noticed that the rocks gave indications of the presence of gold and in an article published in this Journal in 1849, he mentions the region as follows: "It is quite probable from indications observed by the writer that gold may be found in many parts of the range of country between the Umpqua and Sacramento,"—*Am. Jour. Sci.*, [2] xii, 262.

[†] This statement is made on the authority (verbal communication) of Dr. John Evans, geologist of Oregon and Washington Territories.

If, for the convenience of making an approximate estimate of the area of that portion of the auriferous belt that is now partly explored and worked, we assume the latitude of the mouth of the Umpqua river ($43^{\circ} 45'$) as the northern margin, we find that placers are worked over nearly nine degrees of latitude; or if the distance be measured in the direction of the trend of the field, the region is over 700 miles in length. Multiplying this length by the average breadth (50 miles), we have as the result, an area of 35,000 square miles. If, instead of the parallel of $43^{\circ} 45'$ the parallel of 49° is regarded as the northern limit of the gold region, it extends over fourteen degrees of latitude or over about 1100 miles. According to this estimate a very considerable portion of the field lies to the northward of the state line of California (lat. 42°) and is within Oregon and Washington Territories. There is evidently no natural separation or boundary in the auriferous region of California and Oregon, and it must therefore be regarded as one continuous field.

It is desirable for convenience of description and reference that the whole gold region should be known by a suitable name, and that it should be separated into convenient geographical divisions.* Our knowledge, however, of the region north of the California line (or north of the Umpqua) is yet so limited that it is useless to propose any division beyond the general one of *Oregon Mines* and *Washington Mines*, which will naturally be adopted as explorations extend over those Territories.

In California the gold district extends through, and in some cases includes the following Counties: Klamath, Trinity, Humboldt, Siskiyou, Shasta, Butte, Sierra, Yuba, Nevada, Placer, El Dorado, Sacramento, Calaveras, Tuolumne, Mariposa and Tulare. The counties of Tuolumne, Mariposa, and Tulare are each large enough to form several of the size of Placer and El Dorado.

It is already the custom in California to speak of the mining region south of Stockton as the *Southern mines*: this name passed into general use before the placers in the northwestern corner of the State were discovered. In 1854 a map of the *North-ern* and *Middle mines* was published in San Francisco, but no boundaries for these divisions were given.

The division of the California district into three great and nearly equal areas with the above appellations, is certainly desirable, and an excellent natural boundary between the northern and middle divisions is found in the upper Sacramento and Pitt rivers; while the Calaveras river is perhaps the best that can be

* It is desirable that a name for the gold field should conform to that which may be given to the great mountain chain of which the Sierra Nevada forms but a part. The writer is engaged in preparing a description of the mountain chains of California, with a view to their classification and nomenclature. The appellation *Columbian Chain* has been suggested as a suitable one for the great line of elevation referred to.

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selected as the dividing line between the middle and southern. I therefore suggest that these names be adopted for the areas within the boundaries that I have given.

The Northern mines and those in Oregon are now very productive and important: the gold is considered to be superior in its quality and generally commands a high price among the purchasers. The facilities for access and transportation to them from the Sacramento valley and from the coast, are better than in the Southern mines. A large portion of the supplies is sent to the interior towns from Crescent City and other ports on the coast. Mining operations are conducted at various points on the beach, from famous Gold Bluffs—about 30 miles south of Crescent City—to the Umpqua river. The most important localities are in the vicinity of Port Orford between Gold river (Rogue river) and Coose bay, a distance of 80 miles. Gold is found over the whole distance in the beach-sand from the surface to a depth of six feet or more; it is in very small and thin scales and separates from the black sand with difficulty. Platinum and the associate metals, iridosmine, &c., are found with this gold in large quantity; and as they cannot be separated from the gold by washing, its value in the market is considerably lessened—indeed it is sometimes difficult to make a sale of the mixed metals in San Francisco.

The black sand is found in enormous quantity, it is very deep, and is irregularly stratified by the tides. It is undoubtedly stirred to a considerable depth by the surf during storms, and this is shown to be the case by the fact that the richness of claims that have been worked is renewed during high tides or a storm.

Placers of San Fernando and San Francisquito—Santa Barbara? Co.—This locality of gold has hitherto received but little attention, although it was known to the Californians long before the gold of the Sacramento valley was discovered. These placers are on the southern flank of the mountains that have a nearly east and west trend from Point Conception to San Bernardino and from the southern boundary of the Great Basin and the Tulare valley.

These placers are about fifty miles southeast of the Tejon pass and eighty south of the Kern river placers; they were worked near the ranch of San Francisquito by Mexicans in 1840, and were abandoned when the reports of the great discoveries at the north reached them in 1849.

Talcose slates apparently auriferous and resembling those of North Carolina, occur in the pass of San Francisquito and are traversed by quartz veins. It is reported that veins of auriferous quartz in that vicinity were worked simultaneously with the placers.

An occasional excitement is produced by glowing reports from this locality, and according to recent accounts new placers have been found in the vicinity of Los Angeles. Although we are not yet aware of the extent of these placers, it may be safely asserted that they will not compare favorably in area or richness with those of the Sierra Nevada. They are comparatively local in their extent, but the region is worthy of a careful examination.

Gold of the Great Basin—Tulare Co.—Armagosa Mines.
—A vein of auriferous quartz traverses one of the granite ridges of the Great Basin near the Mormon trail to Salt Lake and about 170 miles from Los Angeles. The vein has been prospected and attempts to work it have been made by several companies organized in San Francisco, but it is now abandoned.

The gold is found in wire-like filaments ramifying through quartz and carbonate of lime. I have an interesting specimen in which a string of gold traverses a rhombohedron of carbonate of lime and protrudes from its opposite faces. The form was reduced to a rhombohedron by cleavage.

The occurrence of gold in place, in one of the ridges of the Great Basin, so far removed from the Sierra Nevada gold field, is an important fact, and renders it more than probable that extensive placers will be found throughout its length and breadth.

Colorado River—San Diego Co.—It has been frequently reported that gold exists along the Colorado river not far from Camp Yuma at the mouth of the Gila. I could not obtain satisfactory evidence of the truth of this statement; but if it does occur, it is far from water and vegetation and prospectors are obliged to carry the earth they wish to test many miles before water enough to wash it out can be found.

On the western slope of the mountains between San Diego and the desert, there are good indications of gold at several points west of Santa Isabel and near the travelled road. The region is worthy the attention of prospectors.

Coast Mountains, Santa Cruz Range.—According to J. B. Trask,* gold has been found in the Coast mountains, in the counties of Monterey, Santa Clara and San Luis Obispo.

AURIFEROUS QUARTZ.—Quartz veins are found in great numbers traversing the slates, the granite and greenstone rocks of various portions of the Sierra Nevada gold field; but comparatively few of them have been worked to any extent. Among those that produce the most interesting specimens, the following may be mentioned.

Nevada Co., Lafayette and Helvetia Mine.—Beautiful plates and angular masses of gold are found imbedded in snow-white quartz in this mine. They are frequently intimately associated

* Report on the Geology of the Coast Mountains. Sacramento. Senate Doc., No. 9. Sess. of 1854. p. 58.

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with brilliant crystals of white iron pyrites, and in other specimens the gold is entirely isolated from the sulphurets and is surrounded on all sides by the compact opaque quartz. Specimens of this character are sought after by jewellers and are cut and polished for ornamental purposes. An immense quantity of "quartz-gold" is ground and polished in San Francisco into shapes suitable for rings, bracelets, cane-heads and the like. Specimens for this purpose are mostly obtained from the placers, but some of the purest and most brilliant are procured from this mine.

Nevada Co., Grass Valley—Gold Hill Mine.—Extraordinary specimens of gold in large smooth plates have been found in one of the veins of this mine. They traverse a semi-crystalline quartz, and in some specimens the gold is crystalline and is implanted among the ends of the quartz crystals.

Specimens that I obtained, have many interesting mineralogical peculiarities and appear to throw light upon the phenomena of the deposition of the metal.

Nevada Co., Grass Valley—Ophir Hill.—The Empire Company are working a quartz vein at this place, which bears a large amount of white iron pyrites, remarkable for the quantity of gold it contains. If a specimen of the pyrites which does not appear to contain gold, is placed in strong nitric acid so that the sulphuret is partly dissolved, gold becomes visible in many points, showing that it exists in a form favorable for collection.

Tuolumne Co., Marble Springs (Merced River).—An interesting quartz vein at this locality bears plates of gold, iron pyralena and zinc blende. These mineral are abundantly disseminated in a compact gangue of white quartz and form beautiful specimens for cabinets.

Placer Co., Volcanoville.—This place is opposite Forest Hill on the middle Fork of the American river, and is noted as the locality of one or more very rich quartz veins. They occur traversing slates in connection with erupted rocks and contain iron pyrites and free gold, disseminated in irregular masses. Specimens of unusual value and weight have been broken out of parts of one of the veins, and gold can now be found ramifying through the quartz where it has been uncovered and brought to view by the removal of the earth from the top of the vein.

Placer Co., Georgetown—Mamaluke Hill.—A quartz vein of unusual richness occurs at this place traversing the talcose slates and apparently conforms to the bedding. It is narrow and much decomposed, the quartz being cellular and friable, and is highly charged with irregular filaments and ragged masses of gold. The decomposition and discoloration of the vein and the adjoining slates rendered it so obscure that it remained unnoticed while the claim was worked as a placer mine. I had the satisfaction of pointing out its true character and washing out the first prospect,

which amounted to several dollars. Within a few weeks after this discovery, the owners of the claim were taking out 274 ounces a week, sometimes finding four ounces in a pan. The last accounts that I have received state, that sixty-five thousand dollars worth of gold had been obtained—all from an ordinary mining shaft fifty feet deep, and without the aid of machinery.

CRYSTALLINE GOLD.—Good crystallizations of gold are comparatively rare in California. A hundred pounds of coarse placer gold may be carefully examined without finding a single well formed crystal. This may partly result from the custom among the miners of reserving any peculiar or remarkable specimens of small size for breast-pins or for preservation as curiosities.

Placer Co., Forest Hill.—Interesting octahedral crystals have been found in the claims of the Messrs. Deidesheimer at this place. These crystals occur with placer gold 2500 feet above the level of the river: but they are not much worn by transportation. Quartz crystals are found mingled with the auriferous earth with only their sharp edges and angles removed by attrition, which shows that the drift is comparatively local and indicates the presence of a parent vein in the vicinity. Most of the crystals have the peculiar triangular depressions in the faces, generally found in gold crystals, and some of them are very much distorted; others are flattened parallel to a face so as to become thin triangular plates. These specimens are seldom more than three-eighths of an inch across the base.

An imperfect octahedral crystal of extraordinary size was taken from the claim last year. The planes are only partially developed for a short distance above and below the basal ridges, and the peculiarity of a series of similar parallel planes, lying like plates one within the other, is presented.

The crystal is elongated in the direction of a line parallel with two basal edges and thus becomes a rectangular octahedron.

The length of the longer base is one inch, and the shorter seven-eighths of an inch. I believe this to be the largest crystal ever reported; it may be called a *skeleton* crystal on a grand scale.

Arborescent and Dendritic Gold—Placer Co.—Some of the most remarkable and beautiful specimens of gold ever seen, have been found at Irish creek three miles from Coloma. They simulate the veined and reticulated appearance of leaves and more closely resemble the foliage of the *Arbor Vitæ* or the fronds of the most delicate ferns than of any other forms of vegetation. The filamentous and arborescent masses are frequently united to plates (as broad as the hand) which are covered with lines of crystallization and are brilliant with numberless faces of partly formed crystals. They are also combined with good crystals which are generally octahedral and have perfect faces.

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I have a very beautiful specimen of this character in the form of a leaf: one side is beautifully arborescent, and the other is studded with perfect octahedrons of various sizes and about twenty-five in number, including the smallest. They are geometrically arranged, all their similar edges being parallel. This is believed to be the most remarkable and beautiful specimen known. Its weight is 17 pwt. 10 grains. Length, two and one quarter inches, width, one and a half inches.

One of the foliated specimens in my collection, bears a crystal having the form of a pentagonal dodecahedron with cavernous faces.

One of the largest specimens of this arborescent and foliated gold that has been procured, was about twelve inches long and about four broad. A part of the specimen was a plate three or four inches long, covered with triangular marks; the remainder was arborescent, and the whole appeared to have grown from one end.

Another specimen slightly different in its character and probably from another locality in the vicinity, was ten inches long, three broad and about half an inch thick. It weighed 31 ounces, and was free from quartz; forming a most beautiful mass of a rich yellow color and a delicately marked surface, consisting of a net-work of fibres. It appeared like a bundle of broken fern leaves closely matted together.

These specimens are evidently from a quartz vein, but although I have visited the locality, I have not been able to see the place from which they were taken, or to obtain any reliable information concerning their mode of occurrence and the associate minerals. Some of the foliated specimens were incrustated with a thick scale of sesquioxyd of iron.

The locality is about three miles from Sutter's mill—the point where the gold was first discovered.

PLATINUM.—The occurrence of this metal and its associates with the gold of Port Orford, has been previously noticed in this Journal.* It appears to constitute a large percentage of some of the samples of gold brought from that region and this renders the locality peculiarly interesting. Several ounces of the mixed metals were obtained, and are now being carefully examined. The platinum is in very small thin scales and is easily lifted by a magnet. The difference in the specific gravity between this metal and gold is beautifully shown by the newly invented separating machine,† which distributes black-sand, gold and platinum in separate zones at the upper edge of the oscillating copper table.

I have found platinum in small quantities in the gold of the Middle mines, and in the fine scale gold from the forks of the American river, but it appears to exist in small quantity. It is

* Second Series, vol. xviii, p. 156.

† Invented by Horatio Bradford, Esqr., of New York.

an interesting fact that the metal is more common in the Northern mines, and that it is most abundant on the coast.

MERCURY.—*Santa Clara Co., New Almaden.*—The ore at this mine is a massive sulphuret (cinnabar) and its character and association have already been described in this Journal, vol. vi, p. 270, and xvii, p. 438.

The rocks at the locality appear to be metamorphosed sedimentary strata: They crop out at several places below the mine on the side of the hill, and consist of regular strata of argillaceous shales and layers of flint and jaspery rock, which resemble those of San Francisco near the Mission and Fort Point. Serpentine rock is found in, and near the mine and trappean rocks are also found in the vicinity.

The similarity of these strata and the serpentine to those of San Francisco leads me to consider them as of the same age at each place, and it is probable that the flint and jaspery rock is a metamorphosed portion of the blue sandstone formation of San Francisco.

Guadalupe Mine.—This is another locality of cinnabar about three miles from the New Almaden mine, but it is not now worked.

Monterey Co.—Other localities are reported in this county and at one point a vein has been opened by parties residing in Monterey. I have no definite information of its extent, but specimens of the ore of fair quality were exhibited in Monterey.

COPPER.—Small amounts of copper pyrites and green coats of the carbonate resulting from its decomposition, are found in many of the veins of auriferous quartz that have been opened in different parts of the State. I have not, however, yet heard of any locality that promised to reward explorations conducted for the copper alone. According to J. B. Trask, sulphuret of copper and the blue and green carbonates occur with quartz in Monterey Co. at Alisal; also in Santa Barbara Co. and San Luis Obispo.

A vein of copper pyrites occurs on the slope of the Great Basin about seven miles east of Johnson's river. It is associated with quartz and by its decomposition has produced abundant green crusts of malachite. Oxyd of iron in fine powder is found in the cells and cavities of the quartzose gangue, and appears to have resulted from the decomposition of the pyrites. It is very probable that this vein is auriferous, but the specimens have not yet been examined. The vein traverses a micaceous granite and appears (from the outcrop) to have a width of over twenty feet, including the quartzose gangue. This is a valuable vein, and doubtless will show some splendid ore when thoroughly opened. Its discovery is one of the results of the geological reconnoissance in connection with the R. R. Survey.

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Copper pyrites is also found in a vein about seven miles below the summit level of the New Pass, which leads from the Great Basin to the valley of San Francisquito. This vein outcrops on the southern slope of a granite hill on the north side of the Pass, and is about 90 feet above the bed of the creek. The ore resembles in its luster and color the variegated copper pyrites, but is much softer. It is found in strings and narrow veins distributed through a hard quartzose gangue about fifteen feet thick: the thickest seam of ore, however, does not exceed two inches; but when several such were closely combined a thickness of eight inches of good ore was seen.

This vein has been prospected and a small quantity of ore broken out. It is about sixty miles distant from Los Angeles by the trail.

Native Copper and Red Oxyd of Copper.—When visiting Camp Yuma at the junction of the Colorado and the Gila rivers in Dec., 1853, several large masses of superior copper ore were shown to me by the officers of the fort. This ore was brought from the adjoining State of Sonora, Mexico, and the vein is reported to be near Altar. It is within the limits of the strip of territory recently acquired by purchase and is therefore now in the United States. Specimens are frequently brought in by emigrants who cross the Colorado at the ferry below the fort. The ore is principally the red oxyd of copper associated with the pure metal and green crusts of carbonate. The specimens that I saw ought to yield about ninety p. c. of pure copper. This is probably the ore that has recently excited so much attention in California, and has been reported to be highly charged with gold.

Calaveras Co.—Native Copper and Silver.—A specimen of pure copper combined with silver is reported to have been found in a placer mine near Mokelumne Hill. The specimen was exhibited in several places and sent to San Francisco, but I have not been able to obtain any reliable information concerning it, or the circumstances under which it was found.

IRON ORES.—*Mariposa Co., Burn's Creek.—Limonite.*—An outcrop of hydrous sesquioxyd of iron or limonite occurs near the banks of this creek, on the right of the road going south. It is associated with a quartz vein and forms a bed about twenty-five feet thick, lying conformably with talcose and chloritic slates. The ore outcrops in great solid blocks from two to four feet in diameter: it is compact, of a dark brown color, and breaks with a smooth conchoidal fracture. The position and peculiarities of this ore indicate that it has resulted from the decomposition of pyrites, and that it forms the "gossan" of a vein of sulphuret below the surface. The mass does not, however, present that cavernous and friable condition in which gossan is generally found.

Magnetic Iron Ore.—A massive and fine-grained variety of this ore is found associated with one of the auriferous quartz veins of the county. Specimens that I have seen were colored green by their layers of carbonate of copper. It has polarity and lifts small fragments.

Tulare Co.—Magnetic Iron Ore.—This ore occurs in a bed or vein about three feet thick in a low ridge of white crystalline limestone at the summit of the pass known as the Cañada de las Uvas. The ore is compact but not crystalline, when broken it shows a brilliant fracture and a granular surface, and does not break with flat faces, like the massive magnetic ores of New York and New Jersey.

New Pass.—Magnetic Iron Ore.—Specimens of very pure and highly crystalline magnetite were picked up in the valley of this Pass: it is associated with hornblende, cinnamon-colored garnets and chlorite.

Placer Co., Volcanoville.—Large boulders of compact magnetic ore occur in the bed of the creek that flows by the side of the great vein of auriferous quartz at that place. These boulders are so large and abundant that it is probable a vein of ore will be found in sites in that vicinity.

San Francisco Co.—The fissures and crevices in the serpentine rocks of San Francisco are occasionally drusy, with small but brilliant octahedral crystals of magnetite. They did not give reactions for chromium when examined before the blowpipe.

Sulphuret of Iron.—Good crystals of pyrites are obtained in the talcose slates in various parts of the mining region. At Georgetown, Placer Co., it is abundant in minute cubic crystals. They are obtained free from rock or gangue as one of the products of gold washing, and as they are very brilliant and of uniform size they are worthy of a place in good collections.

CHROMIC IRON.—Monterey Co.—Massive chrome ore of excellent quality was shown me in San Francisco and reported to be from a short distance south of the Mission of San Juan. It is an interesting fact that it is almost identical in its appearance with the ore from "Wood's pit" in Maryland and like it, is partly covered with green coats and crusts of emerald nickel. The extensive distribution of this mineral in California has been noticed at length by Mr. P. T. Tyson in his report.*

ANTIMONY.—Tulare Co.—A large vein of the sulphuret of antimony, (antimony glance,) exists in the high granitic range that borders the Tulare valley on the south. It is about eighty miles from Los Angeles and is most readily visited from the Tejon. By observations with the barometer, I found the outcrop of this vein to be at an altitude of about 6000 feet above the sea. It is on the side of a precipitous ridge of granite and not favorably situated for examination. Its thickness was estimated to be ten feet

* Ex. Doc., No. 47. 31st Cong., 1st Session. (Senate.)

or more. A steep chasm or channel extends from the top of the ridge to its base, and is partially filled with rocks and the debris of the vein. Solid blocks of the ore were found with this accumulation, having been broken out from the vein above; one of them was twenty-seven inches long and sixteen to eighteen wide.

The ore is associated with quartz, and where it has decomposed, an abundance of antimony ochre is found, together with crystals of selenite. Specimens of quartz traversed by long prismatic crystals of the ore were obtained.*

SALT.—Salt is found in small quantity as an incrustation or efflorescence on the soil along streams or on the margins of ponds in nearly all parts of California. It appears to be most abundant in connection with the tertiary strata and in the streams that flow from them. It is doubtless the fact that a great part of the incrustations called soda, consist principally of common salt.

Tulare Co.—Cañada de las Uvas.—There is a small shallow lake near the central part of this Pass fed by springs and streams from the adjoining valleys and ridges which are partly of tertiary strata. During the summer season the water of this lake evaporates, and its bed becomes covered with a white crust of salt which glitters in the sunlight like a field of snow.

Takeechaypah Pass.—A lake of a similar character to the one just described is found in one of the elevated valleys of the Sierra Nevada near this Pass. At another locality in that vicinity and near the margin of the Great Basin, salt occurs in a thick bed, from which over one hundred mule-loads have been taken, and carried to the Tejon Indian reservation for the use of the Indians.

This salt is perfectly white and amorphous, being reduced to a fine powder by simple pressure. It is sufficiently pure for table use.

Dry salt lakes are also found near the termination of the Mojave river in the Great Basin, and at many other places throughout Southern California.

Los Angeles Co.—Salt is now manufactured in large quantity from sea-water by solar evaporation on the coast near Los Angeles.

Lower California.—A dry salt-lake has been discovered about 250 miles south of San Diego and near Marguerita bay. It forms a thick bed and is very pure, being well crystallized in large hopper-shaped crystals. It is reported that the locality has been purchased by capitalists and that the salt is being shipped from there in large quantity.

GYP SUM.—Transparent plates of selenite are common in the soft unconsolidated tertiary strata in various parts of the state. At some localities it forms seams or beds several inches thick lying conformably with the stratification. In Tulare Co., at Ocoya

* A more detailed notice of this locality will be found in the author's Preliminary Geological Report accompanying the Report of a Reconnaissance and Survey in California, by Lieut. R. S. Williamson. House Doc., 129. 1855.

creek these transparent plates are found in the Miocene strata; some of them are combined with the fibrous variety, and form beautiful cabinet specimens. Good crystals are also found in this county, at the antimony localities. Thin transparent plates are numerous in the Miocene strata bordering the Colorado Desert, and on the borders of Carrizo creek they are found lying loose upon the surface where the strata have been worn away by the rains. Seams of gypsum are numerous in the tertiary strata of Benicia.

Wherever I saw the gypsum in the tertiary strata, it appeared to have been formed by the infiltration of sulphates and their decomposition by the lime of the beds.

BITUMEN.—The occurrence of bitumen springs in the Coast Mountains has been noticed in the writer's preliminary Report.*

Near the Pueblo de los Angeles, there is a large pond or lake of the bitumen about one quarter of a mile in diameter. Its central portion is soft and semifluid but the outer parts are hardened by exposure. The material is much used for covering roofs, and at Monterey I saw a good basement formed from its mixture with sand and gravel.

SULPHUR.—Very interesting specimens of sulphur can be obtained at the Geysers or hot springs in Napa Valley. It occurs in crusts or lining fissures in the soil and tufaceous deposits around the springs, and is in small crystals, forming drusy surfaces.

BERYL?—*Tuolumne Co.*—Small and well formed hexagonal crystals having the hardness and color of beryl have been obtained from the Tuolumne river three or four miles from Jamestown. The specimens that I saw were apple-green, and one of the smallest was emerald-green and transparent. The largest crystal was nearly $\frac{1}{4}$ of an inch in diameter and terminated at both ends with the planes R, and $-\frac{1}{2}$, as in tourmaline. I was unable to retain the specimens for further examination.

TOURMALINE.—*San Diego Co.*—Black tourmalines of unusual size (from six to eight inches in diameter) occur abundantly in the huge feldspathic veins that traverse the granite ridges bordering the elevated valley of San Felipe, in the mountains between San Diego and the Colorado desert. These crystals are not perfect.

FELDSPAR.—**ORTHOCLASE.**—*San Diego Co.*—Good crystallizations of this mineral can be found in the granite veins near the road between Santa Isabel and San Pasquale. They are associated with tourmalines and garnets.

ANDALUSITE, *Mariposa Co.*—This interesting mineral was found in great abundance in a conglomerate that caps the hills along the Churchillas rivers (San Joaquin valley) at the crossing of the road leading to Fort Miller.

* See also this Journal, [2] xix, p. 433.

14 *W. P. Blake on the Gold Region of California and Oregon.*

Very fine crystals of unusual size occur in the gravel along the bank of the stream. I picked up several that were two inches long and three quarters of an inch in diameter. They have a delicate pink or rose color and some of them are translucent. The peculiar tessellated appearance displayed in a cross section of crystals of this species, is exhibited by these specimens in a beautiful manner.

CALCITE.—Crystallizations of this mineral are found at the Quicksilver mine, (New Almaden), at the Pass of Jacum, San Diego Co, and on the surface of the Colorado desert north of Carrizo creek, where some transparent crystals were picked up. It also occurs in beautiful stalactites and delicate crystals in the great cave in Calaveras Co.

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