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PART II.

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AGRICULTURAL DESCRIPTIONS

OF THE

COUNTIES OF CALIFORNIA.

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# AGRICULTURAL DESCRIPTIONS

## OF THE COUNTIES OF CALIFORNIA.

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[The descriptions which form this portion of the report are necessarily concise, rather general, and restricted almost exclusively to the topographical and agricultural features, as given in various published and unpublished sources referred to in the introductory statement. As these are to a large extent very deficient in regard to these points, dealing chiefly in generalities regarding settlement, products, and communication, much that should have been stated may be found wanting, and the statements given may not in all cases convey the correct impression. This is especially true of the descriptions of the mountainous portions of the state, the personal exploration of which did not come within the province of this work. Reference to towns and settlements is, of course, made here only casually in connection with the description of the natural features, which forms the object of this publication.]

The arrangement of counties is by agricultural regions as already given in the first part of the report, and each county is described under the head of that region to which it predominantly belongs, and is described as a whole. When its territory is covered in part by several adjacent soil regions, its name will be found under each of the several regional heads in which it is concerned, with a reference to the one under which it is described. In the lists of counties placed at the head of each group the names of those described *elsewhere* are marked with an asterisk (\*); and the reference to the head under which they are described will be found in its place in the order of the list in the text itself. In each region the counties follow each other as nearly in their geographical order as possible, and this order is indicated in the list.

The statistical matter forming the headings of the counties was obtained in part from the Census Office; the regional areas are only approximate.

To some of the county descriptions are appended abstracts from letters or descriptions (intended originally for the Paris exposition) from correspondents, and also abstracts from the report of Mr. N. J. Willson on the country through which the Southern Pacific railroad passes southward from Sacramento to the Colorado river. This latter report was furnished by the Central Pacific Railroad Company for the use of the Census Office.]

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### GREAT VALLEY REGION.

(Embraces the following counties and parts of counties: Butte, Tehama,\* Colusa, Yuba, Placer,\* Sutter, Yolo, Solano, Sacramento, San Joaquin, Contra Costa,\* Stanislaus, Merced, Fresno, Tulare, and Kern.)

#### BUTTE.

*Population:* 18,721.

*Area:* 1,720 square miles.—Sacramento valley, 595 square miles (treeless adobe lands, 70 square miles); lower foot-hills, 965 square miles; higher foot-hills, 160 square miles.

*Tilled lands:* 304,677 acres.—Area planted in wheat, 127,189 acres; in corn, 1,325 acres; in oats, 418 acres; in barley, 23,288 acres; in vineyards, 570 acres.

Butte county is separated in part from Colusa on the west by the Sacramento river and Butte creek, these streams receiving the drainage from the western half of the county. Very near the heads of these small tributaries, and flowing in a general south, but irregular course, is Feather river, whose tributaries are all on the eastern side. The surface of the county thus has the general appearance of two successive plains, both sloping westward; the one on the east, or the foot-hills, is broken and rolling and has Feather river at its foot; the second or the plains proper, rises rather abruptly from this river and slopes gradually and with a more even surface to the Sacramento river on the west. A large part of the latter plain, forming a belt from 12 to 20 miles wide along the Sacramento river and through the county, is quite level, and is embraced in the great valley region. It is the

chief farming portion of the county. Its surface is treeless, and its lands vary from the rich sandy loam of the rivers to the stiff black and gray adobe, which is underlaid by limy hard-pan at depths of from one to several feet. A large adobe tract lies between the railroad and the alluvial lands of the Sacramento river, and is liable to overflow in wet seasons. These lands are said to yield an average of 30 bushels of wheat or 45 bushels of barley per acre. The adobe lands are bordered on the east by a light, reddish loam, which is considered an excellent fruit and wheat land, and at some points bear an oak growth.

The line separating the valley from the foot-hills is said to be well defined, the surface of the latter being not only undulating and broken, but barren and stony, with an abundance of boulders. This line passes about 3 miles east of Chico, and a short distance west of Oroville, into Yuba county, on the south. A belt of red land lies near the foot-hills. (For an analysis of this land from Bidwell's ranch, near Chico, see page 22.) The lands of the foot-hills region are generally of a red and gravelly clay character, destitute of trees, and on the hills are barren. The valley soils are better adapted to farming purposes. There is a belt of 8 or 9 miles width in the western portion of the foot-hills region, in which the soil is thin and apparently derived from eruptive rocks. This belt in some places has an elevation of 1,000 feet above the plain.

The northeastern and eastern parts of the county are broken with ridges and hills between the creeks, and are well timbered with pine, cedar, and spruce. Turpentine and resin are obtained from the pine forests. The county is comparatively well populated and under cultivation, the averages being 10.8 persons and 177.1 acres per square mile.

The Oregon division of the Central Pacific railroad connects the county with Sacramento on the south.

### TEHAMA.

(See "Lower foot-hills region".)

### COLUSA.

*Population*: 13,118.

*Area*: 2,500 square miles.—Sacramento valley, 1,275 square miles (including adobe, 100 square miles; tule land, 140 square miles); lower foot-hills, 580 square miles; Coast range, 645 square miles.

*Tilled lands*: 653,016 acres.—Area planted in wheat, 261,381 acres; in corn, 851 acres; in oats, 176 acres; in barley, 39,939 acres; in vineyards, 14 acres.

Colusa county lies in the western part of the great Sacramento valley, the Sacramento river in part forming its eastern boundary. Its western boundary-line lies upon the summit of the Coast range. The western third of the county is hilly, broken, and partly mountainous, and the general surface, falling eastward to the level valley lands of the Sacramento, is interspersed with narrow valleys along the many small streams that flow eastward. Stony creek, the largest of these streams, flowing northward and northeastward until it escapes from the foot-hills, when it turns eastward toward the Sacramento. That portion of the great valley north of Jacinto has a gradual fall to the Sacramento river, and its lands are chiefly a reddish gravelly loam, quite similar to that of the foot-hills. The rest of the valley, or the part south of Jacinto, has a gradual fall to what is termed the basin, or "trough", a low, trough-like depression, partly of tule lands, lying 3 or 4 miles west of the river, and receives the waters of the western streams. From the basin to the river there is a rapid rise, and eastward of the river a fall to another basin or depression of Butte creek; so that the river has the appearance of flowing along the summit of a low ridge. The lands of this river section between the basins comprise the rich alluvial loams that in other counties southward form so prominent a feature of the valley, and have a natural timber growth of cottonwood, sycamore, and ash.

The tule lands along the sloughs in this county are estimated to cover about 30,000 acres, and are excellent meadow lands. They are low, flat, and ill-drained, and are generally regarded as unproductive or irreclaimable, though crops of grain and cotton have been raised on them after proper drainage and protection by levees from the overflow of the river and other streams. The high land between Sycamore and Dry sloughs is called Mormon basin, and embraces rich lands, which yield about 50 bushels of wheat per acre.

The great valley (which includes also the tule and river lands) is a broad, level plain, open and almost entirely destitute of trees, and to the foot-hills has a width west of the river varying from 15 to 20 miles. The soil is chiefly a loam or sediment from the hills, that from one mile north of Willows to the Tehama county-line being reddish and gravelly in character. These valley lands are largely in cultivation, and yield large crops of wheat, the principal crop of the county. Much alkali land occurs in spots in the region lying between the two tule-land belts east and southeast of Williams. The small streams have shallow valleys, with silty or sandy alluvial soils, and are separated from each other by low ridges of brownish-gray adobe, which is often humpy or hog-wallow in character, and has more or less alkali in the depressions. These are called "goose lands". W. S. Green, of Colusa, says of this land:

All the creeks that run from the foot-hills in winter run on ridges. Between these ridges we sometimes have low, flat land with imperfect drainage, so that the water chills the soil; and as it goes off by evaporation it leaves all the salts near the surface, and when entirely dry it is more or less encrusted with alkali. In winter there are ponds on this land around which the geese congregate, and as it was considered worthless for anything else it was called "goose land". It is now found, however, that drainage and cultivation improve this land, and a great deal of what was called "goose land" now produces good crops.

The foot-hills which lie between the valley and the mountains and become more and more broken westward are partly covered with an oak growth and partly with brush, chamisal, and laurel. These hills are chiefly devoted to grazing purposes, and their lower valleys embrace almost the only farms of the region. The low hills capable of cultivation are thought to cover about 700 square miles, while the estimated area of the foot-hill valleys is about 200 square miles. Of the latter, Bear valley, within 2 miles of the Lake county-line, has a width of from 1 to 2 miles and a length of 10 miles, its elevation above the plains being about 1,000 feet. There are some wheat farms in the eastern part of this valley, but the western portion is hardly under cultivation.

The upper part of Cortina valley also is rough and unproductive, while the lower, near the plains, is of a better character, and is partly under cultivation.

Indian valley, in the northwestern part of the county, has a length north and south of about 30 miles and a width of 5 miles on the north, but becomes very narrow on the south.

The soil of the foot-hills is red and gravelly, more or less rocky, and is especially adapted to fruits. The mountains of the Coast range are too high for farming purposes. Pine is their chief timber growth.

The lands of Colusa under cultivation average 261.2 acres per square mile, the county ranking as ninth in the state in this regard. The average of population is but 5.2 persons. The California Pacific railroad connects the county with San Francisco and Sacramento.

#### YUBA.

*Population* : 11,284.

*Area* : 700 square miles.—Sacramento valley, 285 square miles; lower foot-hills, 415 square miles.

*Tilled lands* : 110,839 acres.—Area planted in wheat, 28,134 acres; in corn, 603 acres; in oats, 1,461 acres; in barley, 11,057 acres; in vineyards, 618 acres.

Yuba is a comparatively small county, and lies on the eastern side of the Sacramento valley, reaching from Feather river northeastward to the foot of the high Sierra. Its extreme western part, bounded on the south by Bear river, is intersected by Yuba river, and is largely included in the great Sacramento valley. The country embraced in the angles formed by the junction of these two streams with Feather river, the western boundary, is very level, and is intersected with small streams or sloughs. Along the rivers the lands, though formerly much above high water, are subject to overflow, the mining *débris* from the hills having in late years so filled up the channels as to cause the waters to spread out over the adjoining bottoms at every slight rise. These lands, once the richest in the county, are now so covered with this *débris*, or slickens, as to be "only a swamp of willows, cottonwood, and vines; a waste where bars of white sand and pools of slimy water glisten through the saplings. At high water the thick and muddy waters of the river are spread out over a wide region of level country, sometimes a mile or even three miles wide, once the richest farming lands of the region, but now deserted, leveed in, and covered with mountain mud, sand, and pebbles". Marysville is now surrounded by levees so high as to preclude a view of the surrounding country, giving it the appearance of a walled city of the Old World.

The great valley in this county passes about 10 miles east of Marysville and southeast to the corner of the county. Its surface is quite level and treeless, with a soil well adapted to the culture of small grain, and is the chief farming portion of the county.

The foot-hills region, which reaches from the valley eastward nearly, if not quite, to the county limit, is at first rolling, but becomes more and more hilly, brushy, and rocky as the Sierra mountains are approached. Small valleys occur among the hills, but the lands are as yet but little under cultivation. The soils of the foot-hills are red and pebbly clays, and in the lower portions are well adapted to fruits and grapes. The northeastern part of the county is rugged and broken. The farming portion of Yuba county is estimated to embrace not more than one-third of the total area, the remainder being devoted to grazing and mining purposes.

The lands of the county under cultivation average 158.3 acres per square mile, while the population has an average of but 16.1 persons.

The Oregon division of the Central Pacific railroad connects the county with Sacramento on the south.

#### PLACER.

(See "Lower foot-hills region".)

#### SUTTER.

*Population* : 5,159.

*Area* : 580 square miles.—Sacramento valley, 530 square miles (including tule lands and some adobe); buttes, 50 square miles.

*Tilled lands* : 171,856 acres.—Area planted in wheat, 74,338 acres; in corn, 1,596 acres; in oats, 243 acres; in barley, 14,830 acres; in vineyards, 169 acres.

Sutter county, bounded on the west by the Sacramento river and on the east in part by Feather river, lies entirely within the eastern part of the great valley of that river, its eastern boundary-line not reaching even the foot-hill region of the Sierra mountains. Between the two rivers, with the exception of Butte slough, in the southeastern part of the county, there are no streams, the country being apparently without drainage. Bear river and several creeks flow westward, but disappear before reaching the rivers.

The surface of the country is very level, the only exception being a region in the northwest having a diameter of about 12 miles, in which appear a number of high, prominent, and craggy isolated peaks or buttes of basaltic rock rising more than a thousand feet above the open plains, whose northern sides only are covered with a scrubby growth of oaks and pine. The border of this region, consists of low, rolling foot-hills, whose lands are mostly devoted to pasturage. On the north and east are meadow lands, embracing, it is thought, about 10,000 acres, naturally subject to overflow, but largely reclaimed, while on the south and west there are marshes and tules, which extend southward in a belt several miles wide, nearly bordering the Sacramento river through the length of the county. The drainage of these hills is through Butte slough, at their southern foot, which also in time of high water connects the Sacramento and Feather rivers. The immediate river lands of both the Sacramento and Feather rivers are alluvial loams, timbered with a growth of cottonwood and sycamore, which, with the exception of some scattering oaks on the plains, is the only timber of the county.

The lands of the Sacramento river are highly productive and largely under cultivation, as are also those of other smaller streams, while in the case of Bear and Feather rivers the originally rich alluvial lands on each side of the river for a width of  $1\frac{1}{2}$  miles have been to a great extent covered with a slickens deposit of 2 or more feet. The

lands of the rest of the county are mostly dark loams, with some red gravelly clays on higher spots, yielding in their original condition an average of 25 bushels of wheat per acre. Stiff adobe tracts extend both north and south for some distance from the foot of the buttes and occur in the low grounds south of Yuba city and along the tules, and are said to yield from 30 to 40 bushels of wheat per acre.

The lands of Sutter county under cultivation average 296.3 acres per square mile, the county ranking fifth in the state; the average population is 8.8 persons per square mile. The Oregon division of the Central Pacific railroad runs through the county to Sacramento, on the south. The Sacramento river is also navigable for boats from Marysville southward, and furnishes transportation facilities to Sacramento and San Francisco.

ABSTRACT FROM A DESCRIPTION BY GEORGE OHLEYER, OF YUBA CITY.

The surface of the county, except that portion in the northwest where the buttes occur, is level. Most of it is also liable to overflow in extreme wet winters, and levees have been built to protect the lands, with, however, only partial success. Our streams originally ran in deep channels, and the Sacramento river above the confluence of the Feather river does so yet; but Feather river and the lower Sacramento have largely filled with *debris* from the mines. Bear river now has no channel, its original deep one having been filled entirely; as also the adjacent bottom land to the depth of many feet. The Butte mountains are covered on their north side by a scrubby growth of oak and pine, but the south sides have very little or no timber. The mountains being little else than rocks, no cultivation is attempted, but they afford good pasturage during winter and early spring. In wet winters these mountains are nearly surrounded by water, which on the west and south remains till late in the summer, forming tule and marsh lands.

The lands of the county embrace the following varieties: *red gravelly clay uplands*, which endure drought better than excessive wet seasons, and *dark sandy uplands*, with clay subsoil and hard-pan, the latter generally from 1 to 10 feet deep. Where no hard-pan exists the soil is usually about 6 feet deep, underlaid by quicksand, and then by cement. These lands are best adapted to wheat, endure drought and wet better than any other, are easily cultivated, and were originally covered with oaks. All kinds of fruit and ornamental trees grow to perfection. *Alluvial bottom lands*, best for corn and barley, are extensive. *Adobe lands* occur chiefly along the tule swamps and around the Butte mountains, and are productive when not too wet or too dry. Wheat is the chief production of the county; barley, corn, potatoes, etc., are also produced. Irrigation is not practiced. Hard water is generally found 10 or 15 feet from the surface.

YOLO.

*Population*: 11,772.

*Area*: 940 square miles.—Sacramento valley, 610 square miles (including tule land, 250 square miles); lower foot-hills, 170 square miles; Coast Range mountains, 160 square miles.

*Tilled lands*: 278,983 acres.—Area planted in wheat, 115,369 acres; in corn, 714 acres; in oats, 55 acres; in barley, 18,320 acres; in vineyards, 757 acres.

Yolo county is bounded on the east by the Sacramento river and on the south in part by Putah creek, which rises in the hills of the Coast range. Its surface is drained by but few streams, and of these Cache creek, in the middle, is the most important. This creek enters the county from Clear lake, on the northwest, flows eastward through narrow cañons for 12 or 15 miles, thence southeast through the broad Capay valley to Langville, whence it turns eastward through the more level lands and plains to the tule lands, and disappears before reaching the river. Water for irrigating purposes is supplied from this creek by ditches to a large region of farms on either side.

From the Sacramento river westward across the tule and the level plains the surface of the country rises to the lower hills of the Coast range, which appear abruptly along the western border, rising to about 1,500 feet above the sea. The county thus possesses the soil varieties usual to the country lying between the Sierra and Coast Range mountains.

The tule lands in the eastern part of the county, with a width of from 5 to 10 miles, are separated from the river by a narrow belt of bottom lands having originally a rich alluvial soil, but now covered with a thick deposit of mining *debris* brought down from the foot-hills. A part of this belt is known as Grand island. The timber growth of both this and the bottom land of Cache creek is chiefly cottonwood, sycamore, and willow. Westward from the tule lands the surface for many miles is very level, comprising a part of the great plain, with its very deep and rich alluvial loam, and is mostly under cultivation in grain and fruits. The central part of this region, from a short distance south of Woodland for several miles to the north and west, is timbered with wide-spreading oaks, while the rest of the plains, and even of the county, is comparatively treeless. In the northern part of the county the plain is limited on the west by a line of low hills, lying about 3 miles west of the railroad, and reaching from the northern boundary south to Cache creek, the extreme southern point appearing on the south of the creek about 4 miles from Woodland, and covering there an area of 2 or 3 square miles. This belt is 3 or 4 miles wide, and is all well adapted to cultivation, the soil being a dark gravelly loam, interspersed with tracts of red lands. It is not timbered, and to the northward, in Colusa county, it flattens out, and has a gravelly soil, with a stunted growth of white oak and chamisal.

On the west of the belt is what has been termed a hollow, or Fairview valley, some 2 or 3 miles wide, reaching south to within a mile of Cache creek, and embracing fine wheat lands. This valley is separated from Capay valley on the west by the low Coast Range mountains.

The country south of Cache creek is mostly a level and treeless plain (excepting around Woodland), and its soils are dark loams, nearly all under cultivation. A belt of adobe lands, somewhat lower than the plains, reaches from Madison, near the foot-hills, eastward within one and a half miles of Cache creek and 8 miles south of Woodland; "it has a width of a little more than a mile, and forms a drainage sink from the cañons of the mountains to Willow slough."

The county has an average population of 12.5 persons per square mile, while the lands under cultivation comprise 46.3 per cent. of the area and average 296.6 acres per square mile, thus placing the county fourth in rank in the state, and but very little ahead of Solano and Sutter. It is one of the raisin-making centers of the state.

The county is connected with Sacramento and San Francisco by railroad.

## DESCRIPTION BY R. B. BLOWERS, OF WOODLAND.

The surface of the valley in this part of the county shows evidence of deposit from the sources of Cache creek, which drains quite a large tract of mountain country and Capay valley before coming out on the plain. The valley south of Woodland is interspersed with slight ridges, in the centers of which are found light soils, sand and gravel, the latter mostly at a depth of from 4 to 8 feet. The soil on either side of these ridges is a light sandy loam, gradually and almost imperceptibly changing to a heavy clay loam at a distance of from 1 to 1½ miles. The former soil comprises the best fruit land of the county, its slight elevation above the valley being just sufficient to facilitate irrigation.

## SOLANO.

*Population*: 18,475.

*Area*: 940 square miles.—Sacramento valley, 625 square miles (including tule land, 205 square miles); Coast Range mountains, 315 square miles.

*Tilled lands*: 278,596 acres.—Area planted in wheat, 107,538 acres; in corn, 443 acres; in oats, 127 acres; in barley, 32,222 acres; in vineyards, 1,638 acres.

Solano county forms the southwestern end of the Sacramento portion of the great valley, which occupies the eastern part of the county. The western boundary lies in part along the Coast range, whence the surface gradually slopes eastward, southward, and southwestward.

Putah creek forms the northern and Sacramento river the southeastern boundary, while within the county there are but few creeks of any importance. The county embraces tule lands along the bay and streams, a level and open treeless valley over its eastern part, and a rolling foot-hill region over the western, the latter including rounded and prominent hills, with intermediate valleys of rich clay soils. The hills and valleys are treeless, and very little timber is found anywhere in the county. The lands have been classified by the county tax assessor as follows: First class, agricultural lands for fruit, 50,000 acres; second class, for grain, 250,000 acres; third class, reclaimed swamp and overflowed lands, 200,000 acres; fourth class, partially reclaimed swamp and adjacent uplands having an alkali soil, 75,000 acres; fifth class, swamp and overflowed lands and high and unproductive mountain ranges, the remainder.

One of the most prominent agricultural features of the county is what is known as the "Vacaville fruit region", reaching from Vacaville north to Putah creek, and embracing Vacaville and Pleasant valleys and the adjoining foot-hills, its length being about 12 miles, and its width from 1 to 3 miles. Vacaville valley slopes from the hills in a south and southeast course, while Pleasant valley slopes northward, each opening out into the Sacramento plain. A part of the region is in what is known as the thermal belt of the Coast range, a location of a few hundred feet above the Sacramento plains and above frost limits. The southern part of the region is cut off from Suisun bay on the south by the Montezuma hills, a succession of low, rounded hills, which extend eastward beyond the railroad. They have chiefly an adobe soil, partly under cultivation in wheat. There is some adobe land around Vacaville, but otherwise the soils of the belt are a dark loam.

Green valley, north of Benicia, is about 11 miles long and 5 miles wide, and is bordered southward by high rolling uplands, which at some points fall off steeply into Suisun and San Pablo bays. Mare island, the site of the United States navy-yard, is opposite the thriving town of Vallejo, and is separated from the mainland by Napa slough. Its southern end presents a bold and rocky headland, projecting into the bay, and falling off gradually to the northward into a broad expanse of tule lands. The valley lands around Vallejo are partly adobe, while those of the adjoining hills are dark sandy loams; light-colored calcareous clays underlie some of the lands.

The foot-hills of the county are partly covered with a scattered growth of oaks, horse-chestnut, buckeye, etc., and where not too steep or broken are partly under cultivation.

The lands of the Sacramento valley, or eastern portion of the county, are the dark loams, often adobe in character, belonging to the higher portions of the great valley. These lands are almost treeless and very level, and are cut occasionally by arroyos or ravines. The greater part is under fence and cultivation, the chief crop being small grain. The lands of Putah Creek valley embrace *low* and *middle* lands of rather stiff loam soils, and *high lands*, lighter in character, and 2 or 3 feet above the latter. These are described below by the correspondent, and an analysis of the middle lands will be found on page 22.

The average population of the county is 19.6 persons, and that of lands under cultivation 296.3 acres per square mile. In the latter regard the county ranks as fifth in the state, and this average is the same as that of Sutter, and but three-tenths of an acre below that of Yolo.

Transportation facilities to San Francisco and Sacramento are afforded the county by the California Pacific and Northern railroad, which passes through from east to west, and by a branch road from Elmira to Vacaville and Winters on the north. Ships also can reach Benicia and Vallejo through the bay and receive their cargoes of grain direct from the warehouses at these points.

## ABSTRACT FROM A DESCRIPTION BY J. M. DUDLEY, OF DIXON.

The section described lies in the northern part of the county, along and south of Putah creek, extending eastward from near the foot-hills of the Coast range for a distance of 10 or 12 miles and varying in width (southward from the creek) from 2 to 12 miles. It is intersected by several dry sloughs or "arroyos", which run nearly parallel with each other from northwest to southeast. The land is highest along the banks of these arroyos, but otherwise the whole tract is quite level, and has a slight fall toward the southeast, which affords good drainage without washing or gullying.

There is no timber growth, except a few scattering oaks along Putah creek, and occasionally a few dwarfed elder bushes. There is a natural growth of wild oats, alfalfa, wild clover, and *Eschscholtzia Cal.*, with occasional patches of bunch-grass.

The soils of this region are rich and deep, and embrace three chief varieties, *low*, *middle*, and *high* lands—the first two dark loams, the last a lighter loam, and all very productive. There is some adobe in small tracts in the lowest parts of the surface away from the creek.

The crops comprise wheat and barley, with small patches of alfalfa, which does not grow remarkably well. The yield of wheat and barley on land after ten and twenty years' cultivation is as great as at first. Summer-fallowed land yields from 35 to 40 bushels of wheat, while winter-sown wheat yields about 25 bushels per acre. The average of barley, if winter-sown, is about 40 bushels per acre.

Abundant water for common purposes is obtained in wells, which are dug from 30 to 90 feet deep, the water then rising and remaining at from 16 to 25 feet from the top. The water is hard, and is usually found in a quicksand stratum.

ABSTRACT FROM A DESCRIPTION OF THE VALLEJO REGION BY G. C. PEARSON, OF VALLEJO.

This region is bounded on the north by Napa valley, east by Suisun bay, south by Carquines straits, and west by San Pablo bay, and embraces from 90,000 to 100,000 acres. The only outlet to the ocean for the waters of the great valley is through Carquines straits, which has a width of about a mile and a length of 8 miles. This gateway not only affords easy railroad facilities for reaching the ocean shore, but is also an immense aerator, the ocean winds from May till November blowing daily and strongly through this pass into the valley on the east, thus tempering the heat of summer, which would otherwise be oppressive. The fogs brought from the bay by these winds apparently pass no further inland, but are piled up in fog banks upon the sides of the mountains on the north and south and against the highest points of the ridge intersecting this gap. With an average temperature of 70° in summer and 55° in winter, and almost surrounded by water which has a tidal service of from 4 to 6 feet, vegetation is seldom seriously affected by frost. Flowers bloom continuously, and vegetable gardens yield good returns at all seasons of the year for the labor bestowed on them.

A rocky ridge, running northwest and southeast near the center, renders a small portion of the district rough and broken; elsewhere it is undulating, diversified by rounded hills, cozy valleys, and open plains sloping gradually from the central ridge to the level of the bays on the east and west. The district is well watered by springs and streams flowing from them. Good and sufficient water is obtained in wells from 10 to 80 feet from the surface, and a noticeable feature is that at tide-level much deeper wells are required to secure an unfailing supply than upon the uplands or even hilltops. The soil varies in thickness from 1 to 6 feet on the hills and sloping ground to about 8 and 10 feet in the valleys. In the valleys, where unmixed with sand from the hills, the soil is a black tenacious adobe, and upon the uplands a clay loam; both are durable and excellent for grain or grass. The crops comprise the cereals and fruits, the latter including apples, pears, plums, figs, oranges, and grapes.

SACRAMENTO.

*Population:* 34,390.

*Area:* 1,000 square miles.—Sacramento valley, 935 square miles (including tule land, 245 square miles); lower foot-hills, 65 square miles.

*Tilled lands:* 304,627 acres.—Area planted in wheat, 44,123 acres; in corn, 3,928 acres; in oats, 871 acres; in barley, 30,547 acres; in vineyards, 1,938 acres.

Sacramento county is bounded on the west by the river of the same name and on the south in part by the Mokelumne river, and lies almost entirely within the great valley.

The American and Cosumnes rivers are the two other most important streams of the county. These rivers rise among the mountains of the adjoining eastern counties and flow southwestward, the former to the Sacramento river at Sacramento city, and the latter to the Mokelumne river on the south. Several creeks are tributary to these streams.

The county includes on the extreme east a belt of foot-hills from 6 to 8 miles wide, Folsom being on its western limit; but otherwise the surface has only gentle undulations, and is watered by streams flowing into the marshes of the tule lands, through which their waters reach the Sacramento river by many channels. "The main Sacramento river (also separating, as it flows south, into diverse branches or sloughs, some of which are very intricate) runs across the broad tule bottoms in crooked channels, cutting them up into numerous small and several large islands." Along the border of this river there is a belt of alluvial land varying in width from one-half mile to a mile or more, originally timbered with cottonwood and sycamore, which is almost entirely under cultivation.

A lower region or belt of tule lands borders this on the east, which is quite narrow in the northern half of the county, but expands to a width of 15 miles on the south. Portions of these lands have been reclaimed or protected from the overflow to which they are subject and are under cultivation, but the greater part is used as pasture land; thence eastward the surface gradually rises to the foot-hills, from whose spurs diverge broad, low ridges of reddish loam soil, gravelly near the hills, alternating with swales having a soil somewhat heavier and less deeply tinted, these undulations being perceptible far into the plain. When fresh, the lands of this plain produce 30 bushels of wheat per acre; they are, however, chiefly devoted to fruit culture. Southeast of Sacramento the red lands are underlaid by a porous and soft material at from 2 to 6 feet, and this by an impervious clay. The belt of foot-hills is rolling, interspersed with low hills, and its soils are red and gravelly clays, having a scattering growth of oaks. A few mountain spurs from the Sierra enter the county.

The lands of the county under cultivation average 304.6 acres per square mile, a number exceeded only by San Joaquin county. From the city of Sacramento railroads reach east, west, north, and south, and the river is navigated by steamers both above and below.

ABSTRACT FROM A DESCRIPTION BY GEORGE RICH, OF SACRAMENTO.

After passing the lowlands of the river, comprising rich black-loam soils, we reach a high bench of red land of various depths. Still eastward the country rises gradually, and we pass over various soils, such as red lands, adobe, clay loams, and sandy lands, with gravelly lands upon the higher plateaus of the foot-hills, until we reach the mountain ranges, interspersed with rich valleys.

The surface of the great valley is sloping, scarcely perceptible to the eye, and very open, with here and there a clump of oak trees. It is covered with a natural growth of grass, and in spring time is a bed of flowers. The soil is from 1 foot to 5 feet deep, resting on a hard-pan from 10 to 40 feet deep. The winter rains do not wash the lands much, and the surface is wavy, with little hillocks here and there, the water being carried off readily. In places the mounds are from 10 to 15 feet above the plain. There is little natural timber in the county. The chief crops are small fruit, vegetables, hay, barley, and wheat. Good virgin lands have produced 30 bushels of wheat, 25 bushels of oats, or 1½ to 2 tons of hay per acre. Alfalfa is raised in large quantities on the river bottoms.

## ABSTRACT FROM A DESCRIPTION BY DANIEL FLINT, OF SACRAMENTO.

The Sacramento valley is about 30 or 40 miles wide, and Sacramento city is about 75 miles from the summit of the Sierra mountains. The soil of the valley is of a reddish color, and overlies a hard-pan from 2 to 6 feet from the surface. The river lands are partly a clayey, sandy loam of great depth and richness. The native timber embraces several varieties of oak, willow, cottonwood, and sycamore. The Sacramento and American rivers are leveed to afford the city protection from overflow.

## SAN JOAQUIN.

*Population:* 24,349.

*Area:* 1,360 square miles.—Great valley, 1,210 square miles (including adobe, 310 square miles, and tule land, 320 square miles); lower foot-hills, 50 square miles; Coast Range mountains, 100 square miles.

*Tilled lands:* 460,342 acres.—Area planted in wheat, 201,461 acres; in corn, 2,333 acres; in oats, 130 acres; in barley, 32,669 acres; in vineyards, 674 acres.

The eastern portion of San Joaquin county lies in the foot-hills of the Sierra, while the extreme southwestern part rests upon the Coast Range mountains, the central and greater area being thus included in the great valley of the San Joaquin river, which stream flows northwestward, the Sacramento river forming the northwest boundary of the county. Other large streams, such as the Mokelumne, Calaveras, and Stanislaus rivers, all flowing westward, drain the eastern part of the county, and several streams occur on the west. The surface of the country, with the exception of the two extremes mentioned, is quite level, and is dotted over with a scattering growth of white oak and a few live oaks as far south as French Camp slough, beyond which there is but an open plain from the San Joaquin river eastward for 15 miles. The larger streams are mostly lined with a growth of cottonwood, willows, and sycamore.

This county, situated as it is at the point where the Sacramento and San Joaquin plains unite, or rather at the foot of each plain and in the center of the great valley, naturally possesses a variety in its agricultural features. The lands of each valley are to some extent represented, and we find on the west, along the rivers, a broad region of tule lands and marshes, on the east the foot-hill belt, extending through the county, while in the broad valley plain the alluvial loams of the Sacramento valley reach southward nearly to Calaveras river, and the sandy lands of the San Joaquin valley extend northward as far as French Camp slough, the two being separated by a broad belt of black loam and adobe lands reaching from the foot-hills westward to the tule lands.

*Tule lands.*—West of Stockton to the county-line, and from a point some fifteen miles south to the northwest corner, there is an immense tract of tule lands (estimated at 200,000 acres), through which the San Joaquin and Sacramento rivers find their way in many channels to their junction and to Suisun bay. Numerous islands occur in this region, but are subject to overflow from the rivers; they have rich soils, and when properly leveed are under cultivation. Robert's island, with its area of about 67,000 acres, is the largest. Eastward the tules are not so low, and by a system of levees they have been largely reclaimed and are under cultivation.

*The valley lands.*—A strip of sandy alkali lands, with a width in places of about  $1\frac{1}{2}$  miles, borders the tules on the east. It is covered with salt-grass and a scattering willow growth.

The northern part of the valley, from the county-line south to within 2 miles of Calaveras river, has a sandy loam soil, quite deep, and is watered by Mokelumne river, whose wide bottom land is timbered with willows, sycamores, and oaks. The surface of the country is very level, gradually rising eastward to the foot-hills, and is dotted over with a growth of white and some live oaks. This growth is said to have been originally very dense, but the entire country is now under fence and has been cleared. As the foot-hills are approached the lands become darker and richer and form a plateau some 15 or 20 feet above the river bottoms. The western part of this sandy loam country is the great watermelon region of the state, but small grain is produced abundantly. The eastern portion has been but recently furnished with transportation facilities by the building of the San Joaquin and Nevada railroad.

The central portion of the valley, as has already been stated, is a black loam or adobe region, and forms the divide between the two great valley regions, reaching from the foot-hills westward to the tule lands of the rivers. Its surface is very level, dotted over with scattered white-oak trees, is almost entirely under fence, and is largely under cultivation. The northern limit of the adobe region lies 2 miles north of Calaveras river eastward to the foot-hills; the southern limit is along French Camp slough for several miles, and thence southeast to Farmington and Oakdale, in Stanislaus county. The western part of the region has a width of about ten miles, in the middle of which is the city of Stockton. The adobe soil is said to be from 5 to 10 feet deep, and is interspersed with tracts of a light loam, which yields about 30 bushels of wheat per acre. A strip of alkali land reaches from the border of the tules, near Stockton, northeastward to the Calaveras river, a distance of about 14 miles. Its width is from 1 to 2 miles, though within this belt it occurs only in spots or small tracts a few inches below the general level of the adobe lands, often covered with salt-grass, and entirely unproductive.

The southern part of the valley, or that portion lying south of French Camp slough and west from the San Joaquin river to the black lands of Farmington, is level, sandy, and treeless, mostly unproductive unless irrigated, and is the extreme northern representative of the similar lands of the San Joaquin plains of the counties south. On the west of the river, to the Coast range, and south of the tules, these sandy lands also occur, interspersed with much black adobe, and from lack of irrigation facilities are also uncultivated.

The *foot-hills* form a narrow belt within this county along the eastern boundary, the change being so gradual from the valley proper into the undulations that are first observed that the line of separation is with difficulty defined. Clements, Bellota, and Farmington are, however, near this line, which thus makes a curve eastward, and, after passing Farmington, turns again southeastward into Stanislaus county. Its surface is rolling and mostly broken, its hills partly covered with trees and brush, and have red, gravelly soils; the valleys are mostly treeless, except along some of the creeks, and have soils varying from dark or light loams to red gravelly lands. Beds of rounded bowlders often fill the beds of the creeks. In the southern part of the region the red lands seem to predominate. This foot-hill region is but little under cultivation.

The county is comparatively well settled, the average being 17.9 persons per square mile, while in the percentage of lands under cultivation (52.8) it ranks highest in the state, with an average of 338.4 acres per square mile. Wheat and barley are the chief crops, and transportation is afforded by the Southern Pacific railroad to San Francisco and Sacramento, as well as across the continent to the Atlantic states.

## ABSTRACT FROM THE NOTES OF N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

The surface of the country around Lathrop is slightly rolling, with dark loam and hog-wallow lands. In low places there is some alkali soil. The greater portion of the country is underlaid by hard-pan at depths varying from 6 inches to 30 feet below the surface. The altitude of Lathrop is 25 feet above the sea. The natural vegetation is alfalfa, clover, wire and salt grasses. At Morano station, altitude 50 feet, the lands are slightly rolling, though generally level, and are quite sandy, drifting considerably, and very deep. They have a growth of clover, alfalfa, and some salt and bunch grasses. Southward to the Stanislaus river the country rises to an elevation of 70 feet, the lands being still sandy. The river lands have a growth of oak and willow. The rain winds of the county come from the southeast, and dry winds from the northwest.

## CONTRA COSTA.

(See "Coast Range region, south of San Pablo bay".)

## STANISLAUS.

*Population:* 8,751.

*Area:* 1,420 square miles.—San Joaquin valley, 925 square miles (including adobe, 100 square miles, and tule land, some); lower foot-hills, 140 square miles; Coast Range mountains, 355 square miles.

*Tilled lands:* 417,511 acres.—Area planted in wheat, 172,445 acres; in corn, 378 acres; in barley, 19,559 acres; in vineyards, 99 acres.

Stanislaus county lies across the great valley of the San Joaquin, its eastern border being among the foot-hills of the Sierra, and its western resting on the summit of the Coast Range mountains.

The great valley, which thus occupies the central portion of the county, has a width of about 35 miles. On its western side the San Joaquin river flows northwestward, being joined on the east by the Tuolumne river, occupying the central part of the county, and by Stanislaus river, which forms in part the northern boundary, both having their sources among the mountains of the east. The western slope is drained by several creeks. The San Joaquin river is bordered by a belt of tule lands from 1 to 2 miles wide, while the adjoining lands for a distance of from 1 to 5 miles on the east have adobe valley soils, more or less interspersed with alkali soils and salt-grass. The bottom land of the Tuolumne river is very sandy, while that of the Stanislaus is a dark and firm loam, bearing a luxuriant growth of grape-vines among the oaks. This bottom is about 300 yards wide. The plains are very level and without timber-growth, except narrow belts of cottonwood and oak along some of the large streams, whose bottom lands are generally quite narrow. The lands of the central part are sandy, especially south of the Tuolumne river, passing northward as well as westward into gray or blackish loams, from which there is a gradual transition to the heavier adobe soils of the immediate valley of the San Joaquin river, into which the plains fall off with a gentle slope and change to a brown sandy loam, sometimes with a deep orange-red subsoil, as they approach the foot-hills of the east. Oakdale is situated about 80 feet above the bed of Stanislaus river in the northeastern part of the county, and in a region of black lands which extend southward half way to Lagrange. The lands are not uniform in character, but are interspersed with tracts of red soils, and the depressions often contain cobble-stones. The last half of this foot-hill border region is undulating, and the soils are more generally a reddish loam.

The foot-hills of the Sierra extend but a few miles into this county, forming a narrow belt along the east, the soil of which is mostly a red clay, except on the north of Stanislaus river, or in the northeastern part of the county, where the lands are dark loams, with some adobe. An inferior pine growth is found in some places. The foot-hills of the Coast range on the west are rolling and broken and have a width of several miles. The soil is mostly sandy, and is under cultivation to some extent in the valleys.

The mountains of the Coast range rise to an elevation of over 2,000 feet, and are rough and much broken.

The crops of the county are chiefly wheat, barley, oats, and corn; the fruits comprise oranges, lemons, limes, pomegranates, olives, peaches, apples, pears, and almonds. Grapes and peanuts are also raised. The average yield of wheat is 15 bushels per acre when winter-sown.

The county is not thickly settled, the average being but 6.1 persons per square mile. More than 45 per cent. of its lands are, however, under cultivation, the average being 294 acres per square mile, thus placing the county seventh in the state in rank as a farming region. It claims to be the banner county for wheat production. The Southern Pacific railroad passes through the central part of the county from northwest to southeast, and affords transportation to San Francisco and Sacramento or to the Atlantic states.

## ABSTRACT FROM THE NOTES OF N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

The country around Salida station, in the northern part of the county, is generally level, and has a sandy loam soil, which extends to within a few miles of Modesto before a change takes place. Hard-pan underlies the lands at from 30 inches to 5 and 10 feet. Water is obtained in wells at from 18 to 50 feet. The elevation of this station is 75 feet above sea-level. The natural vegetation of the region is clover, alfalfa, and some bunch-grass; there is no natural timber nearer than Stanislaus river. The average yield of the soil is from 15 to 18 bushels of wheat per acre, and, when summer-fallowed, from 25 to 33 bushels.

Hog-wallow lands appear within a few miles of Modesto station, which has an elevation of 90 feet. The country is underlaid by hard-pan at from 30 inches to 5 feet, and water is obtained in wells at from 75 to 110 feet. There is no natural timber nearer than the Tuolumne river, on the south, on whose banks there is much willow, some oak, and ash. The vegetation embraces clover, alfalfa, bunch-grass, and wild oats. Wheat is the chief crop of this section, and yields, with summer-fallowing, from 30 to 60 bushels per acre. Around Ceres (95 feet elevation) the lands are generally level, with some hog-wallows on the south. The soil is a sandy loam, which continues southward to Turlock and the county-line.

MERCED.

Population: 5,656.

Area: 2,280 square miles.—San Joaquin valley, 1,740 square miles (including adobe, 320 square miles); lower foot-hills, 20 square miles; Coast Range mountains, 520 square miles.

Tilled lands: 277,689 acres.—Area planted in wheat, 67,975 acres; in corn, 574 acres; in oats, 25 acres; in barley, 10,181 acres; in vineyards, 178 acres.

Merced county, with its eastern border lying along the edge of the foot-hills and its western on the Coast range of mountains, is divided into two parts by the San Joaquin river, which flows nearly centrally through it in a northwest course, and to which the surface of the country slopes from either side. The chief stream of the county (besides the San Joaquin) is the Merced river, which, rising among the high Sierra, flows through Yosemite valley and the foot-hills of Mariposa county, and westward across the plains of this county, in a valley bordered by high banks for the greater part of the distance, to the San Joaquin river. Dry creek is one of its few tributaries. Bear creek, on which the county-seat is located, rises among the foot-hills of Mariposa county, and in its western course across the valley flows between high banks for a large part of the distance. On the south of this stream are Mariposa and Chowchilla rivers; the latter forming the southern boundary-line. Besides these there are numerous creeks and sloughs, all flowing westward and disappearing in the plains before reaching the San Joaquin river. Similarly, in the western part of the county, there are numerous creeks tributary directly to the San Joaquin that have their source in the Coast range, but are of no special importance, only reaching the river in time of flood. The San Joaquin river, in its course through this county, is bordered by a belt of tule lands reaching from the southern boundary northward nearly to the mouth of Merced river, and having a width of several miles, though lying almost entirely on the west side of the river. The surface of the entire county (except along the large streams, which are bordered by a growth of oak), is treeless, and presents great variety in its agricultural features. Immediately eastward of the San Joaquin river there is a region of drifting white sand reaching from the Stanislaus county line on the north southward nearly to Bear creek, and eastward beyond the railroad to the point where Dry creek unites with Merced river, while still eastward along the river the soil changes to a sandy loam more or less gravelly. The lands of the sand region are level or rather rolling, the soil usually very deep, and has a vegetation of alfalfa, some clover and tar-weed, and occasionally some rattle-weed. Wheat is chiefly cultivated, the yield being from 10 to 15 bushels per acre in ordinary seasons.

The lands of Bear river, from the foot-hills to its mouth, are chocolate-colored clays, more or less adobe in character, while southward to Mariposa river black adobe and hog-wallow lands prevail and contain some alkali in that portion of the region partly covered with sand, which extends from the railroad westward to San Joaquin river. This region is a level plain to the very foot-hills. South of Mariposa river the lands of what is known as the Chowchilla region, embracing that creek and the sloughs that are connected with it, are sandy, and, in places, of such a character as to be called "sand mush"; they are also largely alkali and hog-wallow in character, especially around Plainsburg and westward, where they are best suited to pasturage. Clover and alfalfa (except on the alkali soils, where the salt-grass occurs) comprise the vegetation.

In the northeastern part of the county, and east of the sand region first mentioned, the country is rolling and partly hilly, the Black Rascal hills being embraced in a belt of black adobe, hog-wallow, and gravelly lands reaching from Stanislaus county a little southeastward to Mariposa river, south of Bear creek, its continuity broken by the sandy border lands of the two rivers; its width east and west is from 1 to 2½ miles. The hills are from 100 to 200 feet in height, and are capped with about 25 feet of red gravelly clays, while on their sides and in the valley are the adobe lands, in whose swales, as well as in the creeks, there are cobble-stones. This belt passes about 6 miles northeast of Merced, the county-seat. To the eastward of the belt, and south of Merced river, the valley lands are red and gravelly to the foot hills. (a)

The Merced River valley, which at Hopeton is about 4 miles wide, is bordered on the south by a line of hills some 50 or 60 feet above it, which extend westward, gradually falling in elevation, nearly to the railroad at Cressy. The adobe lands mentioned occupy the landward slope of these hills, and are found to be underlaid by a whitish, fissured clay-stone, sandy and ferruginous, easily cut, and used for building low walls. The lands of this river valley are a sandy loam, interspersed with underground gravel ridges, which in many places spoil the lands for farming purposes. The soil of Dry creek is light and reddish, very deep, and yields 25 or 30 bushels of wheat per acre. The uplands north of Merced river are sandy and in part more gravelly than on the south, and will yield from 20 to 25 bushels of wheat per acre. Merced Falls is at the border of the foot-hills region, and here, as well as northward, are found partly metamorphosed slates standing almost vertically on edge. The foot-hills are sparsely covered with an oak growth, and their soils are chiefly red, gravelly, rocky, and rather stiff.

The crops of the county are chiefly wheat and other small grain. Cotton is planted in the Merced River valley quite extensively, and grows from 3 to 4 feet high, yielding an average of 1,200 pounds of seed-cotton per acre, 100 pounds of which make 30 pounds of lint. The crop is irrigated once, usually in June; a later time would cause much new growth, while another irrigation causes the plant to run too much to weed.

The Robla canal, carrying water from Bear creek, is 12 miles long, and is said to have a capacity of 120 cubic feet per second. The Farmers' canal takes water from Merced river 3 miles below Merced Falls; thence its route lies along a rolling side-hill, through a tunnel 4,000 feet long, a distance of 6 miles to Canal creek. The bed of this creek carries the water for 13 miles further, and thence it is distributed principally on the plains between the river and town of Merced.

The lands of the county are largely under cultivation, the general average being 121.7 acres per square mile, the county ranking thirteenth in the state in this regard.

The Southern Pacific railroad passes through the valley region of this county from north to south.

ABSTRACT FROM NOTES BY N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

The lands around Cressy and Atwater stations are slightly rolling in places, though generally level. The soil is sandy, from 2 to 3 feet deep, and is underlaid by clay and sand. The natural vegetation is alfalfa, some clover and tar-weed, and no natural timber growth. Wheat is the chief culture, and its yield is estimated at from 12 to 15 bushels per acre. There is a Dalmatian insect powder plantation

a Much of the above information was obtained from Mr. Kelsey, of Merced.

east of Atwater. The lands of this region can be irrigated by ditches from the canal that has been constructed through Cressy from Merced river, some 20 miles distant. At Merced, altitude 170 feet, the soils are a dark loam from 2 to 6 feet deep, overlying a hard-pan. The vegetation is alfalfa, clover, and salt-grass, with some rattleweed 10 or 12 miles distant. The banks of Bear creek are from 50 to 100 feet apart and 15 feet in depth, but they seldom overflow. Western trade winds bring in some fog. This kind of land extends northwest for some 3 miles and southeast the same distance. The lands at Plainsburg station (205 feet), reaching one and a half miles north and south for some distance, are sandy and hog-wallow, and are impregnated with alkali to a considerable extent; they are underlaid at from 1 to 30 feet by a hard-pan. Wheat and barley are the chief crops, the yield of the former being about 17 bushels per acre.

### FRESNO.

*Population:* 9,478.

*Area:* 8,000 square miles.—San Joaquin valley, 3,520 square miles (including tule land, 250 square miles); lower foot-hills, 500 square miles; higher foot-hills and mountains, 3,060 square miles; Coast range, 920 square miles.

*Tilled lands:* 291,087 acres.—Area planted in wheat, 20,474 acres; in corn, 414 acres; in oats, 9 acres; in barley, 9,504 acres; in vineyards, 471 acres.

Fresno, one of the three large counties that embrace the upper portion of the San Joaquin plains, reaches from the Sierra mountains westward across the plains to the summit of the Coast range, the elevations on each side being, respectively, above 10,000 feet on the east and about 3,000 feet on the west above the plains. The plains extend westward to the foot of the mountains on the extreme border of the county, and are separated from the Sierra on the east by a broad region of foot-hills.

The lowest portion of the county is in the central part of the plains from southeast to northwest, and embraces a belt of tule lands, marshes and sloughs extending from the border of Tulare county, on the southeast, to the point where the San Joaquin river makes its northwestward bend and thence becomes the central feature of the valley. This river is the largest stream in the county. It rises among the mountains and foot-hills of the east and flows in a westward course to the middle of the plains, thence turns northwestward toward the Sacramento valley, and has along its immediate border a timber growth of cottonwood, sycamore, willow, and large oaks.

King's river, emerging from the cañons about 40 miles eastward from Fresno, flows in an irregular course southwestward and traverses a region of undulating plains, until to the northward of Tulare lake it enters the Mussel Slough region, described under the head of Tulare county. Ordinarily the waters of King's river not diverted by the numerous irrigation ditches enter Tulare lake, but in time of high water they pass partially through Fresno slough into the San Joaquin river. A number of creeks, rising among the foot-hills on either side of the valley, flow out upon the plains, but disappear before reaching the river. Numerous sloughs also occur.

The eastern part of the county is extremely rugged, the western face of the Sierra Nevada mountains, as well as the higher foot-hills, being cut by tremendous chasms, through which flow King's, Fresno, and San Joaquin rivers and their tributaries. Some of the highest peaks rise to an altitude of more than 14,000 feet. An abundance of timber is found on the western slope of this mountain region, two large bodies of redwood being reported on the northeast and southeast. At the head of Fresno river there is a heavy growth of sugar and yellow pines, fir, Big Trees, and white cedar, with white ash in other places. The mountains of the west are partially timbered with oak and scrub pine.

The foot-hills are rolling and broken in a belt 20 or 30 miles in width, covered with scattered oaks, and are interspersed with high and prominent peaks and ridges. The narrow valleys of the streams alone are suitable for cultivation. The plains possess a variety of lands. The greater portion, however, is a sandy loam, with no timber growth, and requires irrigation to be productive. On the western side of the river the plain slopes gradually from the Coast range to the slough, and much of its land, even with irrigation, is said to be too poor and sandy for farming purposes. Along Fresno slough, for several miles in extent, there is much alkali land. Much of the valley land is of an ashen character in color. The plains, with a whitish calcareous loam soil (such as that of Central and Washington colonies, of which an analysis is given on page 28), extend eastward from the river to the railroad, beyond which the surface of the country rises a few feet to a slightly undulating plateau reaching to the foot-hills. This plateau is destitute of trees, and is traversed by low, sandy ridges, which lie between the creeks and from 15 to 20 feet above the level tracts adjoining the streams, or what may properly be called the general level of the plateau. These level lands have a brownish or reddish sandy loam soil, produced by the more or less admixture of the red foot-hill clays, and nearer the streams it is stiff enough to be locally designated as adobe. The ridges in the vicinity of King's river contain much white quartz gravel. The plateau region reaches from the San Joaquin river, near the railroad crossing, southward to 1 mile southwest of Fresno, and thence east to King's river.

On the west of the San Joaquin river the plains reach 20 miles to the foot-hills of the Coast range, which form a belt, about 10 miles wide, "of low hills, covered only with grass; thence to the summit the hills are more abrupt, covered with scrubby oak, and in many places with a dense growth of chaparral."

There are a number of colonies located within from 2 to 6 miles of Fresno city, and all of them are engaged in agricultural pursuits, and have their schools, churches, and social and literary societies. The county is sparsely settled, the average being but a little more than one person per square mile, while the lands under cultivation average 36.3 acres per square mile. The crops of the county embrace chiefly wheat, barley, corn, oats, potatoes, and alfalfa; but there are numerous orchards and vineyards in successful cultivation. Cotton has been grown with an excellent yield, but the cost of production and the small demand makes it rather unprofitable. The Southern Pacific railroad passes through the county from San Francisco on the north to the Atlantic states on the southeast.

From the great bend of the San Joaquin river two canals have been constructed, the Chowchilla and the San Joaquin and King's River. The Chowchilla canal has a length of about 30 miles, and lies on the east of the river, crossing in its course northward Cottonwood and Bereoda sloughs and the Fresno, Mariposa, and Chowchilla creeks. Its capacity may be taken at from 200 to 250 cubic feet per second. The San Joaquin and King's River canal, lying on the west side of the river, reaches to Orostimba creek, a distance of 67 miles, being longer than that of any other irrigating canal in the state. It commands an area of about 283,000 acres, which includes all the lands lying between it and the river, 130,000 acres of which are low, and naturally subject to overflow in seasons of ordinary flood. Its capacity is about 600 cubic feet per second.

Another small canal from the Fresno river on the south side is used upon land within 9 miles of the head-gates. Don Pales and Temple sloughs have also been converted into canals by deepening and enlarging their channels.

In the southern part of this county there are a number of canals and ditches taking water from Fresno river. The King's River and Fresno canal, from near the foot-hills, has a length of 22 miles, and supplies water to the scattered farms on the high plains north and east of the town of Fresno.

The Fresno Canal and the Irrigation Company's canal takes water a mile below the head of the last canal, and conducts it to the immediate neighborhood of the town of Fresno. Its total length, with branches, is 63 miles. The Centreville and Kingsburg canal, 26 miles long, conducts water to Kingsburg. Besides these there are several other smaller ditches and canals reaching to different parts of this county.

ABSTRACT FROM THE NOTES OF N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

The country around Minturn station (elevation 240 feet) is rather rolling, with compact sandy loam, hog-wallow soils, apparently "alkali" in character. Near Chowchilla creek there are a few scattering oak and cottonwood trees, but otherwise the vegetation embraces chiefly clover, alfalfa, salt-grass, etc. Thence to Berendo and Madera stations the sandy loam hog-wallow lands continue from 1 to 4 feet deep, containing more or less alkali, and underlaid by hard-pan at from 22 to 48 inches. There is no natural timber growth, and the lands are chiefly devoted to pasturage. Water for ordinary purposes is obtained from wells at a depth of from 18 to 20 feet, while for irrigating purposes it is brought by the Fresno canal to Madera station, where wheat is raised and grape-vines have been planted quite extensively. At Borden station (elevation 310 feet) the country is level, and has a coarse, sandy soil, some 10 feet deep to hard-pan. There is here no natural timber, and the vegetation embraces alfalfa and clover. Wheat is the chief crop, and yields about 20 bushels per acre. Water for irrigation purposes is brought by the Fresno canal. On the south of the San Joaquin river the hog-wallow lands again appear, the soil being a reddish loam, with a deeper-colored subsoil at 12 inches. Alfalfa predominates, though there is considerable pepper-grass. Sheep-raising is the chief pursuit. Around Fresno (elevation 290 feet) the country is generally level, with some hog-wallow places; the soil is a dark sandy loam, with no timber growth. The crops comprise wheat, barley, and alfalfa, the yield being about 25 bushels of the former per acre. Vineyards are being cultivated extensively, but entirely with irrigation, the water coming from King's river. There are five colonies in the vicinity of Fresno: Washington colony, located some 4 miles west, containing 5 sections, or 3,200 acres; Central colony, 2½ miles west, containing 6 sections; Church or Temperance colony, 4 miles northeast, containing 2 sections; the Scandinavian colony, 3 miles north, containing 3 sections; and the Nevada colony, 4 miles northeast, containing 3 sections. All of the above are divided into 20-acre lots, and the lands are subject to irrigation, the chief crops being grapes, fruits, and vegetables. Fowler station (elevation 310 feet) is situated in a level plain with white silty soils and without timber growth. Hard-pan is found in spots at all depths from the surface to 10 feet. There is comparatively little farming done in this section, or until near Kingsburg, toward which place the country becomes more rolling, the soil also changing to a gray sandy loam, some 4 feet in depth. The only timber growth is on King's river, and embraces oak, willow, cottonwood, sycamore, ash, and elder.

TULARE.

Population: 11,281.

Area: 5,610 square miles.—San Joaquin valley, 1,775 square miles (tules, 30 square miles); lower foot-hills, 390 square miles; higher foot-hills and Sierra mountains, 3,245 square miles; Coast range mountains, 200 square miles.

Tilled lands: 200,650 acres.—Area planted in wheat, 28,131 acres; in corn, 2,535 acres; in oats, 6 acres; in barley, 3,661 acres; in vineyards, 309 acres.

Tulare county, in common with the other two great counties of the San Joaquin valley, embraces within its area high Sierra mountains on the east which are 10,000 feet or more above the sea, a small region of low Coast Range mountains on the west, and a broad and low valley and foot-hills region between the two mountain ranges. A prominent feature of the county is Tulare lake, a large body of water, 33 miles long and 22 miles wide, lying on the western side of the valley, and having a somewhat alkaline water. This lake receives the drainage waters from the entire county, though many of the streams break up into sloughs and reach it through numerous channels. The chief of these streams are White, Tule, Kaweah, and King's rivers. The creeks and sloughs are many in number, and lie almost exclusively on the east.

All the streams named, heading in the Sierra, flow through deep and precipitous cañons until they reach the plains, when they meander through their broad and fertile bottoms, some of them separating into several channels, forming wooded islands. The Kaweah is thus divided up into eight or ten branches, though when first discovered, under the supposition that there were only four of these channels, the name of "Four creeks" was given to them collectively, a designation which they have ever since retained, though each has now an individual name of its own.

Most of these bottoms, as well as portions of the plains lying between them, are covered with scattered oak trees (sometimes dense forest) of large size, which, though they are not worth much for lumber, are serviceable for fencing, and supply an abundance of good fuel. All that part of the county lying west and southwest of the lake is destitute of timber, though the entire slope of the Sierra Nevada is covered with majestic forests of coniferous trees, even to its very summit.

About 46 miles northeast of Visalia, and at an elevation of between 6,000 and 7,000 feet, occur great numbers of Big Trees, not standing in groups and isolated groves as in Calaveras and Mariposa counties, but scattered throughout the forests all the way from King's river to the Kaweah, a distance of over 40 miles, and perhaps much further.—*Natural Wealth of California.*

The mountainous region covers more than one-third of the county area, and some of the peaks are the highest in the state, Mount Whitney being the highest on the Pacific coast (15,000 feet). The foot-hill region lying at the foot of the Sierra has a width varying from 9 to 12 miles. The surface is much broken with high and isolated hills and ridges, interspersed with many small valleys, which furnish the only lands suitable for farming purposes. Their soil is red, clayey, and gravelly. The lands of the valley are quite level and mostly destitute of trees. Visalia, the county-seat, is situated in the Kaweah delta, a region of oaks, which extends half way to Goshen on the west, 15 or 20 miles southwestward, and several miles northeastward. The soils of the valley vary from a light sandy loam to a light adobe; and a large tract of highly productive, dark alluvial loam occurs in the Mussel Slough region, north of the lake, and reaches eastward from within one mile of King's river to Cross creek, 6 miles from the Southern Pacific railroad. Tule lands, sometimes of large extent, occur on the borders of the lake and along the various streams and sloughs. The lands of the county are too dry to be successfully cultivated without irrigation, and

ditches have been dug many miles long from the larger streams to furnish the necessary water. The chief crops are wheat, barley, corn, potatoes, and hay, but fruits, comprising apples, pears, peaches, and grapes, are also raised. Lemons and oranges are grown in the foot-hills. Cotton also has been successfully produced in the county, the Matagorda variety doing best; and there seems to be little doubt that, with a demand for the staple and the erection of gins and mills, the crop would be made profitable.

Water has been obtained in artesian wells near Tulare at a depth of 295 feet, the flow being about 100,000 gallons in twenty-four hours and having a temperature of 70° F. Another well, at a depth of 330 feet, furnished nearly double that amount of water, and many more of similar yield have lately been obtained. This county is more thickly settled than Fresno, the average being two persons per square mile for the county at large. The lands under cultivation have an average of 35.7 acres per square mile, and are chiefly planted in wheat, barley, alfalfa, etc., the chief areas of production being the country around Visalia and the Mussel Slough country.

The Southern Pacific railroad passes through the central part of the county, connecting with San Francisco on the north and with the Atlantic states on the southeast. A branch road extends westward from Visalia, and to the Mussel Slough region on King's river.

From King's river there are six canals that take water below the crossing of the railroad and conduct it to the Mussel Slough country, their total length with main branches being 116 miles. There are also a number of small farm ditches in the same region taking water in the channels north. The region covered is about 155,000 acres.

#### ABSTRACT FROM A DESCRIPTION BY F. G. JEFFERDS, OF FARMERSVILLE.

The surface of this portion of Tulare county is generally level, the fall from the foot-hills to Tulare lake, a distance of about 30 miles, being 8 feet per mile. The streams do not run in deep channels, but frequently change their channels; and in flood years the old ones fill up with sand from the mountains. Water for irrigation in this region is taken from the Kaweah river, while for drinking purposes it is obtained from bored wells, at a depth of from 30 to 60 feet. Surface water is found in abundance at from 12 to 18 feet, but we prefer that from the gravel beds at from 30 to 60 feet. Our best lands yield 25 or 30 bushels of wheat or from 30 to 40 of barley per acre; alfalfa needs irrigation twice a year to do well.

Frosts seldom appear before December. Storms come from the southeast, showers from the northwest, and dry winds from the north. In dry seasons the winds follow the sun, coming from the east in the morning, from the south until about eleven o'clock, when it changes to the northwest, and in the evening to the north. Fog never appears, except in rainy seasons.

#### ABSTRACT FROM THE NOTES OF N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

The lands lying between King's river and Cross Creek station on the north are mostly light sandy loams with hog-wallow surface, while southward to Goshen they become more silty, with some hog-wallows, and throughout are more or less interspersed with alkali tracts. The natural vegetation is alfilerilla, salt-grass, and alkali weed. The elevation of the country is 275 feet above the sea, and its surface is without any timber growth. There is no farming done within the alkali belt, which extends several miles on either side of the railroad. Wells are from 40 to 80 feet deep, the water at 12 feet being strongly alkaline and unfit for use. The country westward from Goshen to Hanford is quite level, but has some hog-wallows for six miles, and then for a mile is cut up with sloughs, the lands thus far being covered with a fine growth of alfilerilla, spotted with salt-grass. The rest of the country to Hanford embraces better lands, and is generally under cultivation, its elevation being about 250 feet. To Lemoore (elevation 225 feet) the lands are sandy, with some alkali spots, and have no timber nearer than King's river, on whose banks are found oak, sycamore, and willow. Besides the alfilerilla and salt-grass, there is some wire-grass and wild sunflowers. Wheat, barley, and alfalfa are the chief crops of this region, the yield being from 20 to 30 bushels per acre. Water for irrigation purposes is taken from King's river. From Heinlin to the river there is scarcely anything growing other than salt-grass and an occasional willow tree, while beyond the river sage-brush predominates.

From Goshen south to Tulare station the level country has a sandy soil, with spots of alkali, and is partly timbered with a natural growth of large oaks, which cover an area of 75 or 80 miles, the average being some three or four trees per acre. The soil is about 20 feet deep, but southward to Tipton station (elevation 265 feet) the underlying hard-pan comes to within 4 feet of the surface, often cropping out in the soil. Most of the lands around Tipton are silty and ash-colored and are impregnated with alkali, especially in the immediate vicinity, where the vegetation is principally salt-grass. To Alila station (elevation 275 feet) the country continues perfectly level, and, with the exception of three miles of alkali belts, the whole surface as far as the eye can reach is covered with a luxuriant growth of grass, principally alfilerilla and clover, with a considerable amount of rattle or loco and milkweed. The soil is sandy, and is not under cultivation.

From Goshen to this point the farms lie several miles from the railroad. Wheat and barley are the chief crops, the former yielding from 20 to 30 bushels per acre in good seasons. There is an artesian well, 423 feet deep,  $1\frac{1}{2}$  miles from Tipton station, which flows 97,000 gallons in twenty-four hours, but in ordinary wells water is obtained at from 20 to 50 and 80 feet.

#### KERN.

*Population:* 5,601.

*Area:* 8,160 square miles.—San Joaquin valley, 2,590 square miles (tules, 290 square miles); lower foot-hills, 560 square miles; higher foot-hills and mountains, 1,955 square miles; desert lands, 2,180 square miles; Coast Range mountains, 875 square miles.

*Tilled lands:* 61,497 acres.—Area planted in wheat, 6,887 acres; in corn, 1,694 acres; in oats, 80 acres; in barley, 6,151 acres; in vineyards, 68 acres.

Kern is one of the largest counties of the state, and includes within its boundaries the extreme upper (southern) end of the San Joaquin valley, as well as parts of the Sierra mountains and Mojave desert on the southeast and south, and of the Coast range of mountains on the southwest. The two mountain chains unite on the south, and thus form a high border of from 2,000 to 4,000 feet above the valley on all sides except the north, their spurs often extending far into the plains. The lower ranges and hills on the east and south are generally covered with grasses and shrubbery, and often with oak, pine, and fir trees. The mountain region of the west is said to be valueless for farms; that of the south and east, on the contrary, has numerous high valleys, which are largely under fence and to some extent in successful cultivation. The Tehachapi valley, through which the Southern Pacific railroad passes, is about 12 miles long and 3 miles wide, surrounded by very high mountains, and in it there is a small salt lake. In this valley the *Yucca* first appears, which afterward becomes so predominant in the Mojave desert.

Cumming's valley, with a length of 6 and a width of 3 miles, and Bear valley, 3 miles long and 1 mile wide, nearly adjoin Tehachapi. Abundant timber is said to be easily accessible to all of the mountain valleys. The valley of the south fork of Kern river, 8 miles north of Havilah, contains about 40 square miles, and is well timbered. The surface of the plains is very level and treeless, and for the most part has a sandy-loam soil, which, with proper irrigation, is quite productive. From Bakersfield eastward for 10 miles to the foot-hills and cañons of Kern river there is a strip of undulating country elevated above the valley proper and having a sandy-loam soil. From Bakersfield southward a belt of tule marshes reaches to Kern and Buena Vista lakes (themselves now little else than marshes, connected by a slough 100 feet wide), and thence northward to Tulare lake, forming the outlet, in part, for the waters of Kern river. The lakes are gradually disappearing by evaporation, because of the shutting off of their supply by irrigating canals. The waters are strongly charged with alkali, and are totally unfit for use.

Kern River slough reaches from the north of Bakersfield westward toward the marshes and forms, as it were, a "cut-off", the country thus included between it and the old channel and the marshes of the east, south, and west being a delta region of rich sandy loams, originally having a willow and cottonwood growth, and embracing the chief farming lands of the county, known as "Kern island". Previous to 1875 this delta region, with the rest of the county, was considered almost worthless agriculturally, and was almost entirely uncultivated; but by means of an extensive system of irrigating canals Messrs. Haggin, Carr, and Livermore have shown that the lands are highly productive, and large ranches of thousands of acres each are now under cultivation on this island. Irrigation is, however, absolutely necessary, and a network of ditches and canals from 2 to 20 miles or more long and from 20 to 150 feet wide has been constructed, bringing the waters of Kern river into every portion of the county and carrying cultivation far into the plains. The following summary of irrigating canals is taken from the state engineer's report:

District No. 1, between old South Fork and Old river. Total area, 80,000 acres; number of canals, 5; aggregate capacity of canals, 895 cubic feet per second.

District No. 2, west of Old river, and south of New river. Total area, 64,000 acres; number of canals, 9; aggregate capacity, 348 cubic feet per second.

District No. 3, between New river and Goose Lake slough. Area, 70,000 acres; number of canals, 11; aggregate capacity, 1,924 cubic feet per second.

District No. 4, swamp lands south of Tulare lake. Area, 103,000 acres; number of canals, 2; aggregate capacity at head, 3,370 cubic feet per second.

District No. 5, north of Kern river and Goose Lake slough. Area, 360,000 acres; number of canals, 6; aggregate capacity, 645 cubic feet per second.

Total number of canals and ditches, large and small, 33; total length of main canals and branches, 275 miles. From the Kaweah river there are 16 canals; two carry water to the Mussel Slough region, the others to the region of Visalia.

Many artesian wells have been successfully bored on the north side of the two lakes, water being obtained at depths of from 200 to 300 feet. The artesian belt, as developed by the wells, has a length of about 18 miles and a width of 6 miles.

The principal ranches are the Livermore, about 12 miles south of Bakersfield, and the Belleview ranch, about 18 miles southwest, along Kern and Buena Vista lakes, each including about 7,000 acres, and nearly all under cultivation. "From Fort Tejou, on the southern extremity of the county, to Kern river, a distance of about 40 miles, along the western border, the county for 10 miles from the Coast range of mountains is covered with salt marshes and brine and petroleum springs."

The county is sparsely settled, the average being much less than one person (six-tenths) per square mile, while the average of lands under cultivation is 7.5 acres per square mile. The crops embrace wheat, barley, corn, etc. Cotton also has been successfully raised, but the want of a market has made its production less remunerative than other crops.

Transportation facilities are afforded by the Southern Pacific railroad, which passes through the county, connecting with San Francisco on the north and the Atlantic states on the southeast.

#### ABSTRACT FROM THE NOTES OF N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

The surface of the country from the northern county-line along the railroad to Pozo station (415 feet above the sea) is perfectly level with the exception of 3 miles of hog-wallow land. The soil is sandy, covered with alfilerilla, clover, and pepper grass, and underlaid with hard-pan at from 6 inches to 3 feet. The country is entirely devoted to pasturage, and no farms are found nearer than that of Haggin & Carr, 3 miles west of Pozo. From Pozo southward to within a couple of miles of Pampa station the country is very level, covered with a fine growth of alfilerilla, with some sage-brush, and is well adapted to pasturage for sheep. The surface rises to an elevation of 870 feet, and is without timber growth. The soil is sandy, though silty at Lerdo station, and there is no farming being done nearer than Bakersfield. In the immediate vicinity of Bakersfield the soil is quite sandy, which with a stiff wind drifts considerably, and it is estimated that 5 per cent. of the lands of this region are so strongly alkali in character as to be utterly worthless. They have only a salt-grass vegetation. Some of the land which a few years ago was apparently free from alkali is now impregnated to a considerable extent, and in some instances land that produced large crops of wheat three or four years ago will scarcely grow salt-grass now. On Kern river there is a natural timber growth of willow, cottonwood, elder, and a few sycamores. The chief crops are wheat, barley, alfalfa, corn, and potatoes; wheat yields from 20 to 40 bushels per acre, and alfalfa from 7 to 10 tons, being cut four or five times during the year. The yield of corn varies from 40 to 75 bushels. Tree-planting, embracing many varieties, has been tried quite extensively and with success where the trees had water, the only trouble being from gophers and frost. Grape-vines and fruit trees of all kinds do well with water. Good water is obtained in wells at 40 or 50 feet, but that nearer the surface contains alkali. Frost usually appears during November, and sand-storms sometimes cause considerable damage by uprooting grain unless this is firmly rooted before the winds occur.

Toward Pampa station the plains become narrow, and are lined on the east by rolling lands. The station itself (elevation 870 feet) is situated in a valley about half a mile wide, with high rolling hills running back to the mountains on either side. The soil is gravelly and full of cobble-stones, and is made up of the washings of Agua Caliente and Walker Basin creeks, the waters of which do not reach this far, but sink within a mile or so. During wet winters water has been known to stand more than a foot in depth all over this valley. The vegetation is chiefly alfilerilla, of which there is a fair growth, both in the valley and on the hills. There is also considerable sage-brush and some cottonwood trees. No farming is done except on Walker's creek, where a few acres of hay and also a few fruit trees are raised.

From Pampa to Caliente station there is a deep and narrow cañon, in which runs the Agua Caliente creek. The bottom of the cañon is little else than washed sand and gravel, cobble-stones and bowlders, but on the hills the soil is from 6 inches to 4 feet deep, and is underlaid with decomposed granite. On the hills there is a fine growth of alfilerilla, with scattering oak trees, while in the cañon there is some sage-brush, with willow, cottonwood, and sycamore trees. Milk- and rattle-weeds are plentiful.

From Caliente through the mountains to the desert region the railroad passes through grassy cañons, in part having but little timber growth, except on the hills. The soil is usually sandy and gravelly, and scarcely under cultivation. Beyond Tehachapi summit the soils of the cañons are sandy and dry and partly alkaline.

From the edge of the desert to Mojave station (elevation 2,700 feet) there is little else than sage-brush and creosote weeds, also some achioa or chollu. The soil is reddish and sandy, and not at all under cultivation. Water is brought from Cameron station by pipes. The prevailing wind is from the northwest, and blows a perfect gale almost continually. Thence across the desert, to Lancaster, the only vegetation is Yucca tree, sage-brush, and creosote weeds. There is a great deal of alkali land, with salt-grass and weeds.

## LOWER FOOT-HILLS REGION.

(Of the Sierra Nevada mountains and the northern Coast range.)

(This embraces the following counties and parts of counties: Of the Coast Range foot-hill counties—Shasta, Tehama, Yolo,\* and Colusa\*; of the Sierra foot-hill counties—Shasta, Tehama,\* Plumas,\* Butte,\* Sierra,\* Yuba,\* Nevada, Placer, El Dorado, a little of Sacramento,\* Amador, a little of San Joaquin,\* Calaveras, Tuolumne, a little of Stanislaus,\* and Merced,\* Mariposa, Fresno,\* Tulare,\* and Kern.\*)

### SHASTA.

*Population:* 9,492.

*Area:* 4,000 square miles.—Lower foot-hills, 1,525 square miles; higher foot-hills and Sierra mountains, 1,950 square miles; Coast Range mountains, 525 square miles.

*Tilled lands:* 55,915 acres.—Area planted in wheat, 6, 267 acres; in corn, 59 acres; in oats, 677 acres; in barley, 6,762 acres; in vineyards, 113 acres.

Shasta county, situated at the head of the great valley drained by the Sacramento river, is one of the best-watered counties of the state. The river has very many confluent, both from the mountains of the Sierra on the east and north and from the Coast range on the west, all uniting near the southern border. Chief among these is Pitt river, whose source is in the northeastern corner of the state.

The mountains that cover a large portion of the county on all sides but the south are rugged and lofty, rising more than 5,000 feet above the sea. On the east there are four peaks of special prominence that stretch far into the county from the Sierras, separated from each other by distances of 10 or 12 miles, Lassen's peak, the highest of these, having an altitude of 10,577 feet, and timbered for two-thirds of the way up, the rest being bald, and usually covered with snow. Other peaks and buttes occur everywhere, and all are of volcanic origin, as shown by extinct craters, cones, sulphur deposits, beds of lava, etc. Hot and boiling springs are also of frequent occurrence. The mountains of the north and west parts of the county are covered with forests of conifers of nearly every variety, except redwood, while on the lower hills live-oak is abundant, and ash occurs along the streams.

The southwestern portion of the county, embracing about one-third of its area, is a foot-hill region having an altitude of not more than 2,000 feet above the sea. Its surface is hilly and broken, and is interspersed with numerous valleys along the several streams.

The tillable lands are chiefly east of the Sacramento river; a broad region, comparatively level, lies between that stream and Stillwater and Cow creeks, a distance of about 12 miles. The river itself from Redding south to the county-line is bordered by a strip of good farming land, dotted over with white oaks, and having but little undergrowth. The soil of these valleys is a reddish sandy loam, more or less gravelly; but near the creeks it is more clayey. The soil of the hills in places is adobe in character, but for the most part it is red and gravelly. Immediately north of Redding are found clumps of manzanita and large oaks.

Very little farming is done in this county, the chief industry being stock-raising. The average of cultivated lands is 13.9 acres per square mile.

Redding, the county-seat, is connected with Sacramento by the Oregon division of the Central Pacific railroad.

### TEHAMA.

*Population:* 9,301.

*Area:* 3,060 square miles.—Sacramento valley, 265 square miles; lower foot-hills, 2,000 square miles; higher foot-hills and Sierra mountains, 420 square miles; Coast Range mountains, 375 square miles.

*Tilled lands:* 270,441 acres.—Area planted in wheat, 84,254 acres; in corn, 24 acres; in oats, 298 acres; in barley, 14,967 acres; in vineyards, 39 acres.

Tehama county is situated at the northern end of the great valley of the Sacramento river, and reaches from the Sierra on the east across this valley to the Coast range of mountains on the west, with an extreme width east and west of 86 miles and a length north and south of about 35 miles. The topography is greatly varied, the Sacramento river forming a central feature with its very level and open valley of from 7 to 15 miles width, bordered on the east, north, and west by a region of foot-hills, which extend back, with increasing altitudes, to the foot of the mountains. The valley, foot-hills, and mountains thus constitute three general divisions, and differ in their agricultural features.

"All the streams heading in the Sierra run in deep cañons, which open upon the Sacramento valley in gate-like chasms, the lava formation through which they flow terminating here with an abrupt edge. Below this is a barren, treeless belt covered with volcanic fragments, which, gradually sloping to the west, merges in the fertile bottom lands along the river."—*Natural Wealth of California*.

The *Sacramento valley* is the most important of these divisions, comprising, as it does, the chief grain-producing part of the county. The valley proper has its head a short distance above Red Bluff, on the river, on both sides of which it extends southward in a belt of a few miles width through the county, widening out rapidly to the westward below the county-line. Along the immediate banks of the river there is a narrow strip of bottom loam, very rich and productive, whose original growth was cottonwood and sycamore; but the soil of the valley proper is a reddish loam with no timber, the surface presenting a broad and open prairie plain.

The *foot-hills* are rolling, treeless, and usually much broken, but they are interspersed with narrow valleys, watered by streams flowing into the Sacramento river. The hills are generally too rocky and barren for the culture of grain, but are thought to be suitable for grapes. The soil is chiefly a red gravelly and rocky loam or clay. Near the foot of the mountains stock-raising is almost the only pursuit.

The *mountains* are too high and barren for agricultural purposes. Those of the Sierra are generally timbered with spruce and pine and covered with snow for most of the year; those of the Coast range are lower in altitude, and have a growth of inferior pine and oak. Lumbering is the chief industry in the mountains.

Wheat is the chief crop of the county, though fruits, grapes, etc., are now receiving more attention. The lands of the county under cultivation average 88.3 acres per square mile, the average of population being but 3 persons per square mile.

The agricultural or valley region is supplied with transportation facilities by the California Pacific and Central Pacific railroads, which pass through, west and east of the river, via Willows and Sacramento, to San Francisco.

#### YOLO.

(See "Great valley region".)

#### COLUSA.

(See "Great valley region".)

#### PLUMAS.

(See "Sierra mountain and higher foot-hill region".)

#### BUTTE.

(See "Great valley region".)

#### SIERRA.

(See "Sierra mountain and higher foot-hill region".)

#### YUBA.

(See "Great valley region".)

#### NEVADA.

*Population*: 20,823.

*Area*: 990 square miles.—Lower foot-hills, 440 square miles; higher foot-hills and Sierra mountains, 550 square miles.

*Tilled lands*: 25,207 acres.—Area planted in wheat, 304 acres; in corn, 32 acres; in oats, 1,165 acres; in barley, 543 acres; in vineyards, 107 acres.

Nevada, a long and narrow county, extending from the state-line westward across the high Sierra and southwestward into the foot-hills, is watered chiefly by south and middle Yuba rivers and Elk creek on the north, while Bear river marks the southern boundary, all flowing west toward the Sacramento river. Several small lakes occur among the mountains of the east, the largest being Donner lake, 2 miles from Truckee. The greater part of the county on the east is rugged, wild, and uninhabited (the mountains in places rising more than 8,000 feet above the sea), and is almost exclusively devoted to mining operations. The western part, or less than half the county area, lies within the "foot-hill region", and embraces the lands suitable for farming purposes. Its extreme altitude is not over 2,000 feet. Near the mountains its surface is very broken and hilly, the low spurs of the Sierra reaching far westward and forming a region "diversified with deep ravines, knolls and dales, rolling prairies, wooded mountains, and gently sloping hills. It has a mixed growth of oak and pines, occurring in clumps, and an undergrowth of buckeye, chamizal, wild lilac, and manzanita". Lumbering is the chief industry among the forests of pine, spruce, fir, sugar pine, and cedar. The extreme western part of the county is less broken, and the lands more in cultivation. The soils of the uplands comprise red loams, more or less gravelly, or gray sandy granitic lands; those of the bottoms and flats are often dark alluvial loams.

The county averages 2.1 persons per square mile. The cultivated lands average 25.6 acres per square mile for the county at large, or about 5.7 acres for the foot-hill and valley region.

The Nevada Central railroad connects with the Central Pacific at Colfax, the latter road also traversing the eastern part of the county.

## PLACER.

*Population:* 14,232.

*Area:* 1,480 square miles.—Sacramento valley, 220 square miles; lower foot-hills, 450 square miles; higher foot-hills and Sierra mountains, 810 square miles.

*Tilled lands:* 101,923 acres.—Area planted in wheat, 11,751 acres; in corn, 160 acres; in oats, 873 acres; in barley, 5,594 acres; in vineyards, 1,036 acres.

Placer, one of the narrow counties that extends from the state-line westward to the Sacramento valley, has Bear river for a part of its northern and the north and middle forks of the American river for the greater part of its southern boundary. A number of other large creeks, either tributary to the latter river or flowing independently toward the Sacramento, aid in supplying an abundance of water for mining or irrigation purposes. The forks of the American river flow through deep cañons and narrow gorges, which are from 1,800 to 2,000 feet below the general level of the country. Lake Tahoe covers a large surface on the high Sierra region on the east.

The county is naturally divided into the following general regions: (1.) The *high Sierra Mountain region*, on the east, rising from 7,000 to 10,000 feet above the sea, and embracing a wild and rugged country subject to heavy snow and land slides, well timbered with pine, fir, and cedar, and but little inhabited. (2.) An *upper foot-hill region*, from 2,000 to 4,000 feet, extending westward to near Auburn, and embracing a broken and very hilly country, well timbered, and devoted chiefly to lumbering and mining. (3.) A *lower foot-hill region* of less than 2,000 feet altitude, embracing a region of rolling lands and low hills, somewhat broken in character, and partly timbered with white, live, and black oaks, Sabin's pine, buckeye, manzanita, and chaparral. These hills are devoted chiefly to fruit culture, and the valleys to hay and alfalfa. That part of the region reaching from 2 miles west of Auburn to the higher hills has chiefly red gravelly lands, while the remainder is granitic in character, and its soils are lighter and partly sandy. Both are well adapted to fruits. Granite boulders and outcrops are abundant. This granitic belt extends through the county north and south with an average width of about 10 miles. (4.) The *Sacramento plain*, with an elevation of about 40 feet above the sea, and embracing a level or slightly undulating country, with swales or depressions, and almost treeless, except along the water-courses, where a few oaks vary the monotony. The line dividing the plains from the foot-hill region passes from Folsom (Sacramento county) to Rocklin, and thence eastward of Lincoln and Sheridan to Bear river, on the north.

The soil of the valley or plains is a red loam, with a stiff clay subsoil underlaid by a yellowish hard-pan; within the swales or depressions the stiff clay appears as an adobe, the county greatly resembling that of Sacramento. The lands under cultivation average 68.8 acres per square mile for the county at large, or about 152 acres for that part outside of the mountainous portion.

The Central Pacific railroad, with its Placerville branch, affords the western part of the county abundant transportation facilities, also passing near the northern border of the eastern or mountainous country.

## EL DORADO.

*Population:* 10,683.

*Area:* 1,800 square miles.—Lower foot-hills, 780 square miles; higher foot-hills and mountains, 1,020 square miles.

*Tilled lands:* 33,949 acres.—Area planted in wheat, 1,360 acres; in corn, 13 acres; in oats, 57 acres; in barley, 1,137 acres; in vineyards, 1,415 acres.

El Dorado county reaches from the state-line westward almost to the level plains of the great valley, and is watered by the American and Cosumnes rivers and their many tributaries. The former, rising in the extreme east, flows centrally through the county with a channel far below the general level of the country through which it passes. Lake Tahoe extends into the county on the northeast, while several smaller lakes occur within this mountain region.

The eastern part of the county, reaching westward to within 10 or 12 miles of Placerville, is high, mountainous, and rugged, embracing the high Sierra, which rises to an altitude of 8,000 feet and more. The western slope of this mountain region is heavily timbered, and lumbering is the chief industry.

The rest of the county, embracing a belt about 30 miles wide, is a region of foot-hills, and contains a scattered growth of white and black oak and pine, except in the extreme west, which is mostly destitute of timber. From its elevation of about 2,000 feet on the east the surface of the foot-hills falls westward to the plains, hilly and broken at first, but becoming more level, and embraces the only farming lands of the county. Many small valleys occur in the eastern foot-hills region, but these are said to have suffered very greatly by the washing away of their soils by placer mining.

The lands of the county are chiefly red gravelly loams and clays, and, along the streams, strips of alluvial loams. The cultivated lands average for the county at large 18.8 acres per square mile, while the average of population is not quite 6 persons.

The Sacramento and Placerville railroad runs from Sacramento to Shingle springs, 10 miles from Placerville.

## SACRAMENTO.

(See "Great valley region".)

## AMADOR.

*Population:* 11,384.

*Area:* 540 square miles.—Sierra mountains and upper foot-hills, 90 square miles; lower foot-hills, 450 square miles.

*Tilled lands:* 36,785 acres.—Area planted in wheat, 2,386 acres; in corn, 1,191 acres; in oats, 31 acres; in barley, 3,291 acres; in vineyards, 580 acres.

Amador county is very narrow, and lies east and west between the foot of the high Sierra and the Sacramento plain, being bounded on the north in part by a fork of the Cosumnes river, and on the south by the Mokelumne river. Numerous creeks, flowing independently of these rivers westward towards the Sacramento, aid in supplying the county with an abundance of water.

The eastern portion is very narrow, and for a distance of 25 or 30 miles is embraced within the upper foot-hills region, having an elevation of from 2,000 to 4,000 feet above the sea; its surface is rugged and broken (the streams finding their way through deep cañons) and well timbered. The rest of the county, or lower foot-hills region, is hilly and partly timbered, and is interspersed with numerous fertile valleys, varying in length from 3 to 6 miles and in width from 2 to 3 miles. Lone and Jackson valleys are each 12 or 15 miles long and from 2 to 5 miles wide. The soils are a red loam, more or less gravelly, with a scattered growth of oaks. The chief crops are wheat, barley, potatoes, and fruits. Irrigation is necessary, and water is brought in ditches from the large streams. The largest of these, the Amador canal, is connected with the north fork of the Mokelumne river, and has a length of 60 miles. The lands yield from 20 to 30 bushels of wheat and 25 bushels of barley per acre.

The western part of the county is connected with Sacramento and San Francisco by the Amador branch from Lone City to Gault, and thence by the Central Pacific railroad.

Lands under cultivation average 68.1 acres per square mile for the county at large, or about 81 acres for the foot-hills region.

### SAN JOAQUIN.

(See "Great valley region".)

### CALAVERAS.

*Population*: 9,094.

*Area*: 980 square miles.—Lower foot-hills, 800 square miles; higher foot-hills, 180 square miles.

*Tilled lands*: 29,414 acres.—Area planted in wheat, 807 acres; in corn, 206 acres; in oats, 13 acres; in barley, 1,926 acres; in vineyards, 328 acres.

Calaveras county is bordered on the north and south respectively by the Mokelumne and Stanislaus rivers, which, rising not far from each other in the Sierra, rapidly diverge as they flow southwestward and give to the county a triangular shape. These two rivers, with Calaveras river, which rises near the center of the county and flows westward, are the principal streams, and have numerous small tributaries. The surface of the county is hilly and broken throughout, the western boundary resting among the lower foot-hills near the great valley. The general level rises rapidly to the summit of the high Sierra on the east.

Bear mountain, a rocky, wooded range, a little more than 2,000 feet high, strikes northerly across the middle of the county from the Stanislaus to the Calaveras river, dividing this central portion into two sections, the lower composed of abrupt foot-hills, that gradually subside into low, rolling prairies as they stretch west toward the great San Joaquin valley, while the upper grows more rugged and broken as it extends eastward into the main Sierra. \* \* \* The upper and steeper slopes of the foot-hills are covered with scattered groves of oak, interspersed with an inferior species of pine, buckeye, manzanita, and other shrubby trees. Large patches are covered wholly with the chamisal (*Adenostoma*), an evergreen shrub with a delicate leaf, which, seen from afar, gives to the mountains a beautifully dark, umbrageous appearance.

One of the greatest curiosities in California consists of the Big Tree grove, situated on the divide between the middle fork of the Stanislaus and the Calaveras river, about 20 miles east of Mokelumne hill, and at an elevation of 4,759 feet above the level of the sea. The trees range in height from 150 to 327 feet, and in diameter from 15 to 30 feet.—*Natural Wealth of California*.

Mining is the chief industry of the county, and comparatively little farming is carried on. The lands under cultivation average but 30 acres per square mile for the county at large, being chiefly embraced in the lower foot-hill region. Fruits comprise the principal crop. The soils are chiefly the "red foot-hills", similar to those of Tuolumne county. Numerous canals have been dug from the rivers to convey water for hydraulic mining and other purposes, the two largest of these, the Mokelumne Hill and Seco canal on the west, connecting with the Mokelumne river, and the Murphy canal, in the eastern part of the county, taking its water from the Stanislaus river.

Transportation facilities are afforded the western part of the county by the San Joaquin and Nevada railroad, which extends westward through San Joaquin county, along the south side of Mokelumne river, to Brack's landing, where a line of boats connects with San Francisco; also by the Stockton and Copperopolis railroad, reaching from the southwest part of the county west to Stockton, and thence by railroad or boat to San Francisco or Sacramento.

### TUOLUMNE.

*Population*: 7,848.

*Area*: 1,980 square miles.—Lower foot-hills, 520 square miles; higher foot-hills and Sierra mountains, 1,460 square miles.

*Tilled lands*: 23,861 acres.—Area planted in wheat, 4,055 acres; in corn, 24 acres; in oats, 69 acres; in barley, 2,558 acres; in vineyards, 418 acres.

Tuolumne, one of the foot-hill counties, is separated from Calaveras on the northwest by the north fork of the Stanislaus river, which, with its tributaries, drains that portion of the country. The greater part of the county is, however, watered by the Tuolumne river and many tributaries, that, rising in the Sierra, flow westward, its drainage basin being entirely within the county until the western boundary-line is reached. The surface of the country is hilly and broken, rising rapidly from the lower foot-hills, near the San Joaquin plains, eastward to the high Sierra mountains, 14,000 feet above the sea. The greater part of the county, because of its hilly and broken character and its elevation, is untillable. The lower foot-hills in the west, where not too broken, are being successfully cultivated in grapes and fruits, while the narrow valleys are planted in alfalfa and grasses for hay. This western region, and especially the valley of the Stanislaus river, has been occupied chiefly with mining camps, quartz mining being a large industry. Lumbering is also carried on extensively in the timber region of the Sierra, "which is located

about centrally with reference to the eastern and western boundary-lines of the county, and extends the entire breadth, its area being about 50 miles long and 25 wide." The timber comprises pine, fir, and cedar, and a number of saw-mills are located upon the western limit of the region. In the mountainous portion of the county, on the east, there are many lakes at the heads of the tributaries of Tuolumne river. Lake Elnor, the largest of these, is situated in a valley 4 miles long, and averages  $1\frac{1}{2}$  miles in width. The land bordering it is a sandy loam, producing a luxuriant growth of native grasses. A portion of the valley is well wooded, and the gentle slopes and ridges on both sides are covered with a giant growth of pines and firs. Numerous canals have been constructed, mainly for nursery purposes, to carry the waters of the rivers to many points in the county. The Big-Oak Flat canal is some 40 miles long, and that of the Tuolumne County Water Company (the "Tuolumne ditch") about 35 miles.

The cultivated lands average 12 acres per square mile for the county at large, the average population being but about 4 persons per square mile.

The San Joaquin and Nevada railroad, when completed, will give the county good transportation facilities. At present communication is by way of the Southern Pacific railroad in Stanislaus county.

#### ABSTRACT FROM A DESCRIPTION BY JOHN TAYLOR, OF CAMPO SECO.

There is a belt of granite passing through this county in a course parallel with the Sierra mountains and separated from it by slates. Sonora, the county-seat, is situated upon the divide between these granite and slates. The timber of the county also occurs in parallel belts. From the summit of the Sierra westward for about 40 miles in width toward the foot-hills is the belt of sugar pines. This then gives place to a belt of live-oak and the yellow or nut pine trees, the region being characterized as being the poorest in the county except in minerals. Nothing can be more barren than these pine and chaparral hills, some of which are quite high and conical in shape. The small valleys that intervene are the only portions suitable for settlement. Their soils vary from light to dark, and with irrigation can be made to produce well. The area suitable for farming purposes is quite extensive north of Sonora, and a great quantity of hay is produced. On the western side of the county the great plains are skirted by a belt of scrub oak some 10 or 12 miles in width. The soil is of a brownish color, and is used mostly for pasturage, but by cultivation it is capable of producing cereals.

#### STANISLAUS.

(See "Great valley region".)

#### MERCED.

(See "Great valley region".)

#### MARIPOSA.

*Population*: 4,339.

*Area*: 1,560 square miles.—Lower foot-hills, 530 square miles; higher foot-hills and Sierra mountains, 1,030 square miles.

*Tilled lands*: 15,125 acres.—Area planted in wheat, 337 acres; in corn, 30 acres; in oats, 12 acres; in barley, 1,314 acres; in vineyards, 43 acres.

Mariposa county reaches eastward from the edge of the San Joaquin plains, across the foot-hills, far into the Sierra mountains, its altitude thus varying from about 300 to from 10,000 to 13,000 feet, that of mount Dana being 13,227 feet. The largest stream of the county is the Merced river, which rises on the extreme east and flows westward to the plain. On the south Chowehilla river forms part of the boundary between this and Fresno county, while numerous smaller streams flow westward into Merced county. The eastern part is timbered with pine, spruce, and cedar, the central with oak and pine, while the western is sparsely timbered, and the extreme west is almost treeless.

The most prominent point of interest in the county is the celebrated Yosemite valley, situated on the east at an elevation of 4,060 feet above the sea. The valley proper is about 8 miles long and from one-half to one mile wide, the greatest breadth being 3 miles. The Merced river flows through it, while on either side are very high cliffs, rising in places thousands of feet above the valley. On the lower mountain slopes and in the valley are groves of pine, with some oak, willow, and cottonwood. This valley is famous for the grandeur of its mountain scenery and waterfalls, and is under state control as a place of resort for tourists. Its further description lies outside of the province of this report.

The mountainous portion of the county, too high and broken for cultivation, extends westward to within a few miles of Mariposa, the county-seat. A region of foot-hills of from 2,000 to 4,000 feet altitude then crosses the county from northwest to southeast, and reaches westward about 15 miles beyond the county-seat and into the southern part of the county. It is hilly and broken, interspersed with prominent mountain chains, and is well timbered with pine and oak, the source of supply for the mining camps of the region. Very little farming is done in this part of the county, except on a small scale in the valleys. The extreme western part is more level, its hills being susceptible of cultivation, and is but sparsely timbered with white and blue oaks. The soil of the hills is mostly a reddish clay, that of the valleys or lower lands being chiefly a dark loam with red subsoil. Some farming is done in this lower foot-hill region, small grain, fruits, and vegetables being produced. The county is, however, chiefly engaged in mining, and these supplies are produced mostly for home consumption. Lumbering is also carried on in the higher foot-hills and mountain region.

The average acreage of tilled lands per square mile of the county at large is but 9.6 acres, but, assuming that the lower foot-hills embrace nearly all of the lands under cultivation, the average for that region is nearly 30 acres. Merced is the nearest railroad point for transportation facilities.

## FRESNO.

(See "Great valley region".)

## TULARE.

(See "Great valley region".)

## KERN.

(See "Great valley region".)

## SOUTHERN AND DESERT REGIONS.

(Embracing the counties of Los Angeles, San Bernardino, and San Diego.)

## LOS ANGELES.

*Population*: 33,381.*Area*: 4,750 square miles.—Coast Range mountains, 2,305 square miles; valley lands, 1,480 square miles; desert, 965 square miles.*Tilled lands*: 195,055 acres.—Area planted in wheat, 29,349 acres; in corn, 22,771 acres; in oats, 78 acres; in barley, 38,823 acres; in vineyards, 4,161 acres.

Los Angeles, the most populous of the counties of the southern region, borders the ocean on the south, while its northern boundary lies in the Mojave desert. A range of high mountains, the San Fernando and Sierra Madre, passes through the county with a course a little south of east and an extreme width of about 30 miles, separating the Mojave desert from the southern region of large valleys and hills, which comprise the inhabited and cultivable portion of the county, and which alone is well watered by numerous streams rising among the mountains and flowing into the ocean. Of these the most important are the Los Angeles river, rising on the northwest in the San Fernando mountains and valley; the San Gabriel, rising on the northeast, and uniting with the former a few miles from the ocean; and the Santa Ana river, which, also rising on the northeast in the San Gabriel range and flowing through San Bernardino county, enters this county from a cañon in the Santa Ana mountains of the southeast.

The Mojave desert region, on the north, elevated more than 2,000 feet above the sea, is a desolate sandy plain without permanent streams of water and little vegetation other than, locally, *Yucca*, sage-brush, some creosote plant (*Larrea*), and occasionally juniper and scanty grass. Water may be obtained in wells, but the region, because of the high and hot winds, which stunt or prevent the growth of vegetables or crops, save in protected spots and with irrigation, is hardly inhabited. There is said to be some good land, well adapted to fruits and small grain, in the foot-hills around Lake Elizabeth, on the western border of the desert, but the same causes have thus far prevented their utilization or occupation. There is also a large amount of alkali land in the low grounds of this section.

The mountain region that passes through the county is the continuation of the Coast range, and is made up of high chains, trending in every direction, and, except in some of the passes, too rough and broken for tillage. The eastern and northern slopes are said to have many rich and fertile cañons, which are well timbered with oaks, but are not under cultivation. The Soledad pass, through which the Southern Pacific railroad has been built, trends westward to the Santa Clara river, and its lands are mostly sandy and gravelly, and have a vegetation comprising, in places, oak, willow, cottonwood, and sycamore, with alfilerilla, clover, bunch-grass, and sage. The adjoining mountains are largely covered with chamisal brush. The agricultural region proper of the county, embracing that part lying between the mountains and the coast, is from 15 to 30 miles wide, and is divided into three large valleys: the San Fernando valley on the northwest, separated from the coast and Los Angeles plain by the Santa Monica mountains; the Los Angeles valley, which reaches from the Santa Monica mountains southeast along the coast to the San Diego county-line; and the San Gabriel valley and its eastward continuation into San Bernardino county, separated from the Los Angeles valley and the coast by the Santa Ana range of mountains. The two latter valleys form what is known as the Los Angeles plain, itself divided into an upper and lower, the latter reaching from the coast inland for 10 or 15 miles. These valleys have been somewhat fully described in the regional descriptions on page 37 of this report. The lands embrace dark and rich loams, black adobes, reddish mesa lands, and belts and tracts of alkali land, the latter occurring chiefly in the lower plain.

The lower plain, along the coast, is the corn-growing region of this part of the state, its moist lands needing no irrigation and producing fine crops. Gospel swamp, southeast from Westminster, comprising a very low tract on either side of the Santa Ana river, reaches 10 or 12 miles from the mouth, and has a width of 6 or 8 miles. This tract is especially noted, its yield being from 80 to 100 bushels per acre. Here also "pumpkins forget to stop growing".

The crops of the county embrace corn, wheat, barley, and rye, while oranges, lemons, olives, figs, grapes, and other fruits are also grown. Irrigation is, however, generally necessary, and to secure all the advantages possible farmers have organized themselves into colonies in the several regions and have constructed ditches from the streams to supply the needed water. The ditches from the Los Angeles river have a total length of 72 miles, and bring water chiefly to the region of the city of Los Angeles. Two ditches are taken from the San Gabriel river at the point where it leaves the mountains. One of these, the Azusa ditch, is, with its branches, about 30 miles long, but its supply is limited. The Duarte ditch is 12 miles long, and its supply is also limited.

From the two branches of the lower portion of the San Gabriel, between the Coast range and the sea, there are at least twenty-three ditches of more or less importance, the largest of which is the Arroyo, which is 9 miles long. The beds of the streams are so shallow that water is diverted from them without difficulty by means of simple and inexpensive dams of brush and sand.

The Santa Ana river supplies water to two important canals, as well as to a number of small ones. The Anaheim canal is 8 miles long; but much water is lost in the coarse sandy soil, and its banks are protected against erosion by willow trees. The Cajon canal heads at Bedrock cañon in the Coast range, and follows along the face of the broken hills for 8 miles before reaching the plateau overlooking the valley. Its total length is 14 miles, and 25 miles of main distributing ditches have been constructed.

The Santa Ana canal has a total length of 20.5 miles. At 8 miles from its head it divides, one ditch skirting around the rim of the valley, and the other passing across the valley, through Orange, to Santa Ana.

The average of lands under cultivation for the county at large is 41 acres per square mile; but on the supposition that nearly all the lands are included in the valleys south of the mountains we find the average to be about 131 acres per square mile.

The county is connected by the Southern Pacific railroad with San Francisco on the north and with the Atlantic and Gulf ports on the southeast. Branch railroads also run south to the coast from the city of Los Angeles, and there connect with the Pacific coast line of steamers for the north and south.

#### ABSTRACT FROM THE NOTES OF N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

In the desert region along the railroad, altitude 2,350 feet above the sea, in the northern part of the county, the lands are sandy, with much alkali, and have a vegetation embracing yucca, juniper, sage-brush, and salt-grass. There are no habitations. At *Alpine station* (2,320 feet), in Soledad pass, the soil is a coarse red sand, with alfilerilla, sage, and juniper, and the winds are too severe here for even vegetable crops. To the westward the elevations of the stations diminish, the pass being in places quite wide and bordered by high, steep, and rocky mountains. Oak, willow, cottonwood, alder, and manzanita trees, together with Spanish bayonet, yerba santa, and wild sunflower, alfilerilla, clover, bunch and salt grass, sage, and wild buckwheat, are first seen at Rowena. The soil is gray, sandy, gravelly, and rocky, becoming more loamy at Kent station, and a few acres are under cultivation in hay, corn, and vegetables; fruit trees do not thrive. At *Kent station* the Soledad cañon runs out into the Santa Clara valley, which here is about a mile wide. The hills are covered with sage and chaparral brush. At *Newhall station*, on the north side of the San Fernando mountains, the valley is very open, with a few cottonwood, oak, sycamore, and willow trees, while on the mountains there is a heavy growth of chamisal and other brush. The soil is a sandy loam, and has been under cultivation in wheat, yielding 1,124 pounds per acre. The blossoms of fruit trees are liable to be killed by frost. Water is obtained from the artesian well of the California "Star" oil (petroleum) works. The soil at the stations in *San Fernando valley*, the first of the great valleys of the county, is a sandy loam, without timber growth, the only vegetation being alfilerilla, clover, sage-brush, some tar-weed, cactus, and scrub oaks. Water is obtained usually from wells, though some wells have been sunk 100 feet without success. Some of the lands are under cultivation, the chief crops being wheat and barley, the yield of the former being 30 bushels per acre. Fruit trees and grape-vines do well. Hot, dry winds are liable to blow at any time after the middle of March, and fog is occasionally driven into the valley as far as San Fernando station, in the upper part of the valley, which has an elevation of 1,060 feet.

*Santa Monica* is situated on the coast southwest of Los Angeles, and on a plain which is some 75 feet above the sea. The land to the north and east is level, and has a dark loam soil, while on the southeast the land is rolling and soil sandy. There is no natural timber growth, but some 3 or 4 miles north there are sycamores, and on the hills oaks and a small tree whose root is as large as a barrel and is used for fire-wood (mesquite). Wheat and barley are the chief crops, and orange, lemon, lime, and other fruit trees grow well.

At *Compton*, south of Los Angeles, the lands are quite level, with slopes to the south and east, and without timber, except on the river. The soil is a sandy loam 3 inches deep, changing half a mile to the west to a dark micaceous loam, while to the eastward it soon reaches a depth of 4 feet. The natural vegetation is alfilerilla, clover, "mabra," squirrel-grass, and salt-grass. There is some alkali land in the low places and some mesa lands near the coast which are free from the alkali which makes much of the coast lands unproductive.

Eastward, at Downey, Norwalk, and Anaheim stations, the country is comparatively level, naturally treeless, and largely under cultivation, the soil being the dark and fine micaceous and mouse-colored loam that occurs near Compton station, and in the low places contains alkali, with salt-grass. Still eastward, at *Santa Ana*, 135 feet altitude, the lands are of a sandy, light-colored loam character, extending east, north, and west, while to the south they are more gravelly. The river growth is willow and elder, and in the valley there is a growth of sycamore. Alkali lands occur  $1\frac{1}{4}$  miles on the southwest. The crops of this southern region are corn, wheat, barley, etc., with fruits of many varieties; grapes also do well. Cotton has been tried, and, while growing well, the bolls do not open, and the crop is therefore a failure. The yield of corn is about 40 bushels, and that of barley 35 bushels per acre. From April to November southwest trade winds prevail during the day, and during the nights fogs roll in from the coast. From November to March several spells of northeast dry desert winds usually occur, but last not more than a day, doing little damage. A few sand-storms also come from the southwest as well as from the east, at times doing some damage. In the region of *Monte station*, east of Los Angeles city, there are two kinds of lands, known as the upper and lower, or moist lands, the former being devoted to small grain, the lower to corn and potatoes. The soil is sandy, and has a natural vegetation of alfilerilla, clover, mustard, and tar-weed; and there is considerable underbrush (principally elder, wild grapes, gooseberries, and blackberries), which is very thick in places; also some willow, cottonwood, and a few sycamore trees. Wells are from 8 to 10 feet deep, and furnish an inexhaustible supply of water.

*Puente station* is situated at the western or lower end of the San José valley, where it opens out into the Azusa and La Puente valleys at an elevation of 320 feet. The lands here are black and stiff clays or adobe, while that of Azusa valley is a reddish and fine loam. The vegetation is alfilerilla, clover, and some pepper-cress; the natural trees are the willow, and on the hills to the south oak and some black walnut. The principal industry is sheep-raising.

*Spadra station* is situated in San José valley at an elevation of 700 feet. This valley will average 1 mile in width, and extends nearly to Pomona station. The soil at this station is a dark loam, and is largely under cultivation, yielding from 30 to 50 bushels of barley per acre. The lands are irrigated by ditches from the creek. There is some little alkali land throughout various portions of the valley. Considerable fog is brought in by the trade winds.

Around *Pomona station* and eastward the lands are chiefly light, sandy loams, rather dark in color, and without trees, except an occasional sycamore. The crops are wheat, barley, alfalfa, corn, potatoes, etc. The lands are irrigated from springs and wells. Trade winds blow through the San José valley and occasionally bring in fog. Several artesian wells have been bored a short distance north of Pomona, but attempts in other places have been unsuccessful. Water for ordinary purposes is obtained from wells at a depth of about 45 feet; but in many instances the wells have gone dry, but are recovered by sinking a little deeper. The planting of grapes and citrus fruits has been extensively begun in this region of late, and land is held at high prices.

## ABSTRACT FROM A DESCRIPTION BY WILLIAM R. OLDEN, OF ANAHEIM.

The great valley of Los Angeles county, lying between the foot-hills and the coast, is about 40 miles long and 20 wide from northeast to southwest, of which width 15 miles is bottom land and 5 miles mesa or table-land, lying adjoining the foot-hills of the Santa Anita range. The mesa lands have a soil of great fertility and depth, which, when moist, is of a dark chocolate color, very easy to cultivate, and absorbs and retains moisture to a remarkable extent.

The valley lands are alluvial in character. Traces of old river channels are found crossing the valley, generally parallel, a mile apart, and are invariably ridges coarse sand from 50 to 100 yards in width. Between these ridges are broad swales of rich soil from 5 to 10 feet in depth, underlaid by quicksand and pipe-clay. The slope of the valley from the foot-hills to the sea averages 13 feet per mile, the pipe-clay being the same, thus accounting for the natural moisture and perpetual verdure that prevails throughout the valley. The only natural timber in this valley region is sycamore, cottonwood, and willow, with live-oak in the hills and pine and fir on the mountains. The crops embrace wheat, rye, barley, oats, corn, and alfalfa, besides oranges, lemons, limes, figs, bananas, olives, grapes, and berries. The valley lands comprise *heavy sandy loams*, slightly alkaline, with a natural growth of burs, clover, alfilerilla, and mustard; *light sandy loams*, with the same growth; and rich *sediment soil*, always covered with green vegetation. All are easy to cultivate, and yield fine crops.

## ABSTRACT FROM A DESCRIPTION OF THE SANTA ANA VALLEY BY J. D. TAYLOR, OF ANAHEIM.

The Santa Ana river leaves the foot-hills from a cañon about 20 miles from the coast. The northern or upper half of this valley is not productive in dry seasons without irrigation; but the lower half is more moist and generally covered with green vegetation, and is interspersed with sand streaks and alkali or salt spots. The central, east, and west portion of this valley embraces an artesian belt, in which a number of wells have been successfully bored to a depth of about 200 feet. The high lands on the foot-hills adjoining the valley are generally sloping, and considerable of this can be used for grain in wet seasons, but is better adapted to pasturage. The mesa lands on the coast are, if anything, better for grain, because of the heavy fogs and dews, which are more frequent there.

## SAN BERNARDINO.

*Population*: 7,786.

*Area*: 23,000 square miles.—San Bernardino mountains, 2,950 square miles; valley, 465 square miles; desert, 19,585 square miles.

*Tilled lands*: 25,601 acres.—Area planted in wheat, 2,558 acres; in corn, 774 acres; in barley, 4,076 acres; in vineyards, 1,215 acres.

San Bernardino is the largest county in the state, and reaches from the eastern state-line southwestward to within a few miles of the coast, the Colorado river, forming a part of the eastern boundary, separating it from Arizona. It is chiefly a part of the great Mojave desert, and the habitable portion of the county is very small, and is included in the south western corner, on the coast side of the San Bernardino range of mountains.

Mojave desert is described as a sandy and barren waste, interspersed with volcanic mountain ridges and peaks, salt lakes and alkali tracts, destitute of all growth except Yucca, small nut pines, and juniper, and having but one or two streams. The Mojave river rises in the San Bernardino mountains, on the south, and flows for about 100 miles out on the desert and suddenly disappears.

The San Bernardino mountains of the southwest are thickly timbered with pine, cedar, hemlock, and maple, and are high and impassable, except through a few passes. These mountains are separated from the Temescal and Santa Ana range on the southwest by a broad valley, which embraces the only agricultural lands of the county, and is a part of the valley region that covers a large part of Los Angeles county. Santa Ana river, the chief stream of this part of the county, rises in the San Bernardino mountains, and, with many small tributaries, flows southwestward across the valley and across the Santa Ana mountains to the ocean. It is timbered with cottonwood and willows. Santa Ana valley is divided by a chain of buttes into two parts, the northern receiving the name of the county. The San Jacinto mountains inclose the valleys on the east, the chief outlet thus being on the west into the Los Angeles plains and to the coast. This valley has, until the past few years, been occupied solely by stock-raisers; at present, however, its agricultural value is being rapidly developed by a system of irrigation by waters from the mountains and from artesian wells, of which a number have been bored. A number of colonies have been established, and large areas have been planted and made to produce large crops of grapes and fruits of many varieties, prominent among which are raisin grapes, oranges, and lemons. The Cucamonga colony, not far from San Bernardino, and the Riverside colony, occupying a plateau on the south of the chain of buttes, are well known for their excellent fruits.

The surface of Santa Ana valley presents a gently undulating or level plain, gradually rising toward the hills from the river, and in places is studded with trees. The soil is a reddish-gray, gravelly loam, rather stiff in the center of the valley, becoming more and more sandy, and in part gravelly, as the hills are approached; but that at Riverside is red and clayey in character and of great depth. The lands are free from stones, and are said to produce, when fresh, as much as 35 bushels of wheat or 50 bushels of corn per acre.

The foot-hills have a red gravelly soil, and, with the mesa or bench lands, are excellent for fruits. The valley, surrounded as it is by high mountains, is thus partially protected from the hot and parching winds of the desert, except in the early part of the season, when north winds prevail. The dryness of the climate adapts the valley region especially to raisin making, and Cucamonga is noted for its sweet wines.

The lands under cultivation in the county, if referred entirely to this valley region (as they probably should be), average 55 acres per square mile; but for the county at large the average, if distributed, would be only 1.1 acres per square mile. Barley and wheat are the chief field crops, but vineyards and citrus orchards are being rapidly brought into prominence.

The valley is supplied with many canals and ditches, which take water either from the Santa Ana river or directly from the mountains. From the river there are two ditches, the north fork and the south fork, each 8 miles long, and taking water where the river emerges from its cañons. Two canals supply the Riverside settlement. They are the largest in the county, and are, respectively, 12 and 14 miles in length, and take the waters from the mountains. Cucamonga and other districts are supplied with ditches of less length from mountain streams.

The Southern Pacific railroad passes through the San Bernardino valley, thus connecting their agricultural portion of the county with San Francisco on the one hand and with the Atlantic states on the other.

## ABSTRACT FROM NOTES OF N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

The surface of the country west of *Cucamonga station* is very level, with sand belts aggregating some 3 or 4 miles in width, having a growth of sage and other brush. With these exceptions there is a fine growth of alfalfa and some bunch-grass. No farming is done; some trees are planted at the station. Cucamonga ranch is 3 or 4 miles north of the station, and from there water is brought in pipes to Colton. The soil is very sandy, in some places pure sand, which drifts with light winds. There is a fair growth of grass in places, but as a general thing sage and other brush predominate.

Around *Colton* (960 feet) the land is generally level, though there are places slightly rolling. The soil is sandy, and has a growth of alfalfa, clover, and pepper-grass, and sage-brush is plentiful. The only natural trees are on the Santa Ana river, and comprise willow, cottonwood, and alder. In this vicinity and near San Bernardino there are upward of 350 artesian wells from 60 to 300 feet deep. Other irrigating water is brought from Santa Ana river. Wheat is the most important crop, and yields some 30 bushels per acre. At times grain is troubled with frost, and dry north winds blow occasionally and do a great deal of damage to crops. Some fog is blown in, but not enough to do harm.

The San Mateo valley, or *San Gorgonio pass* (elevation 1,850 feet), extends from near San Gorgonio to within a mile of Mound City, or old San Bernardino, and will average one-fourth of a mile in width. It is cultivated from a short distance southeast of Mound City to 3 miles above El Casco. The soil is a sandy loam, overlying gravel at about a foot, and has a growth principally of alfalfa, some clover and salt-grass, and some cottonwood and willow on creek bottoms. The hills on either side are covered with a heavy growth of low brush, and in the lower end of the valley some cholla, yerba santa, sage, etc. The chief crops are wheat, corn, barley, alfalfa, and potatoes, but some fruit is successfully raised. Considerable trouble is experienced from dry winds in the upper end of the valley. *San Gorgonio station* or summit is 2,950 feet above the sea; the land around it is rolling, and approaches the hog-wallow character. There is some alfalfa and bunch-grass, sufficient for fair pasturage from January to June or July. The only water is from a well about 250 feet deep. No farming is done.

## SAN DIEGO.

*Population*: 8,618.

*Area*: 14,600 square miles.—Coast Range mountains, with many small valleys, 7,950 square miles; desert, 6,650 square miles.

*Tilled lands*: 38,247 acres.—Area planted in wheat, 8,929 acres; in corn, 440 acres; in oats, 77 acres; in barley, 3,573 acres; in vineyards, 224 acres.

San Diego, the extreme southern county of the state, reaches from the Pacific ocean eastward to the Colorado river, and ranks as second in size among the counties. More than one-half of its large area is, however, but a barren desert, embracing a portion of the Mojave desert on the northeast and the Colorado desert, or Coahuila valley, in the middle, the two being separated by the San Bernardino range of mountains, which trends northwest and southeast. The Mojave desert lands are interspersed with abrupt mountain chains, and are mostly above sea-level, while the surface of the Colorado desert is quite level, free from these mountains, except on the border, and is in many places from 100 to 250 feet below the level of the sea. Both are covered with sand-hills, alkali lands, dry lakes, and a sparse desert growth of Yucca, cactus, sage, and creosote bushes, and are destitute of water. The winds often blow with great violence, and sand-storms are produced by even moderate winds. This region is uninhabited, except by a few railroad station hands, and therefore is not under cultivation; but on the border of the Colorado desert there is a little land planted in fruits, vegetables, and alfalfa, as stated by Mr. Willson in the notes given on page 109.

The rest of the county west of the desert is mountainous, broken, or hilly, and is divided into two natural divisions, viz, the San Jacinto and Coast range mountainous region and that lying between the Coast range and the coast, embracing hills, mesa lands, and valleys. The San Jacinto mountains, which border the desert, have an altitude of about 5,500 feet. Between them and the Coast range there is a lower region of valleys and hills or tablelands about 3,000 feet above the sea, which is watered by several streams which flow westward into the ocean. The mountains are timbered with oak, cedar, pine, and fir. This valley region is chiefly devoted to stock-raising, and the population is very sparse.

The coast region, embracing a belt of country along the coast about 25 or 30 miles in width, is rather rolling or undulating near the coast, but becomes more and more hilly and broken eastward to the mountains. This region contains nearly all of the population and the chief farming lands of the county. Within this and the mountain region there are said to be more than thirty valleys varying in length from 3 to 15 or 20 miles, and embracing from a few hundred to upward of 20,000 acres. They are well watered by numerous rivers and their tributaries, except during a portion of the summer months; their land is a dark loam, that of the hills and uplands being a red loam or clay, underlaid generally by adobe. Comparatively little of the land of this section is under cultivation, the average probably not being as much as 10 acres per square mile. The crops comprise chiefly wheat and barley, with grapes, oranges, lemons, and other fruits.

San Diego river, in its course among these hills, is bordered by a number of valleys of various extent, Mission valley, near the mouth of the river, being from one-half to 1 mile wide, its surface having a loose sandy soil, destitute of trees, but with a thick growth of bushes. The side hills are clayey and gravelly, and are about 100 feet high.

Cajon valley, 15 or 20 miles from San Diego, is about 6 miles long and 4 wide, and has the appearance of a great basin or box (as its name indicates) hemmed in by high, gently-sloping hills, and is somewhat difficult to reach. The river finds its way out through narrow cañons toward the coast. The surface is level and treeless, except along the river, where there is a growth of cottonwood, willow, and sycamore. The soil, of no great depth, is sandy and gravelly, and is largely cultivated in wheat and other crops. The upper or northern part of the valley is very narrow, and is bounded by lofty hills and covered with a dense growth of willows, with some sycamore.

The Southern Pacific railroad passes through the Colorado desert in the eastern part of the county, while the western part is connected with it at Colton by the California Southern railroad, which extends from San Diego northward. The Pacific coast line of steamers also connects San Diego with San Francisco, the bay of San Diego, with its port, affording anchorage for the largest vessels.

ABSTRACT FROM NOTES BY N. J. WILLSON, OF THE SOUTHERN PACIFIC RAILROAD.

*Gorgonio pass*, 2,315 feet above the sea, and known as the "Jumping-off place", extends east as far as Whitewater station, and at this point is about 2 miles wide. Its natural vegetation is alfilerilla, clover, and bunch-grass. In the cañons there are willow, cottonwood, sycamore, etc., and on the mountains pine, fir, and cedar. Water for ordinary use and for irrigating a few trees is obtained from a V flume 12 miles in length, which was built for floating wood to the railroad. In this vicinity there are probably about 1,000 acres in wheat and barley. Dry east winds from the desert are pretty bad here, but do not generally blow while crops are in a condition to be injured. Fogs come in occasionally. To *Cabazon station* the country is very dry, and has very little vegetation, except alfilerilla, sage, chollu, prickly pear, and creosote plant. Thence to within 2 miles of Whitewater station it is rocky and gravelly, and beyond this the desert opens up with sand-hills, 3 or 4 feet high, formed by the sand drifting around the bushes. Whitewater river at this place passes into the desert and disappears. There is a small ranch about 1½ miles west, known as Widow Smith's ranch, which was originally a stage stand, where some 30 acres are planted in alfalfa and vegetables. At *Seven Palms*, 580 feet altitude, the sands are underlaid by a hard, compact sediment, the only growth being a little creosote and sage. A stiff wind produces sand-storms, and may come from any direction. The sand-hills extend to within 2 miles of *Indio station*, which is at sea-level. The lands here are quite level. The vegetation is sage, arrow-weed, yerba santa, and mesquite. The latter is very plentiful, and attains a growth sufficient to warrant its being cut and shipped for firewood. Water is obtained at 30 feet. At *Walter's station*, 200 feet below sea-level, the soil is a fine grayish micaceous loam, covered in places with shells. Water is found at 14 feet. Alkali lands give some trouble, and to midway between this and *Dos Palmas* the country is rolling and has no vegetation other than alkali- or salt-weed. Five miles west of *Dos Palmas*, where the railroad reaches its lowest point, 268 feet below sea-level, there are salt springs, and the ground is white with alkali. From *Dos Palmas* to *Flowing Well station* there is scarcely any vegetation, but there are some miles of sand, then salt flats, and pumice is quite plentiful. Near *Flowing Wells*, at sea-level, the land is better, though sandy, with streaks of gravel, and has a growth of sage and creosote plant. About one mile northeast are dark-red clay hills covered with a compact sand. The clay was cut up in fissures, and these were filled with salt. An ironwood tree occasionally is found here, and a salt-water well has been bored. From here to *Pilot Knob station* the lands are sandy and are covered to some extent with giota grass, creosote plant, sage, chollu, candlewood, and ironwood. Mesquite does not occur. At *Pilot Knob station* (altitude 280 feet) the surface is gravelly in places, with sand streaks, all of which is underlaid with red soils. Thence to *El Rio station*, near the Colorado, the country is quite rough, being a continuation of rolling hills, some of which appear to be 100 feet high. These hills are made up of compact sand, and are covered with about 6 inches of coarse gravel or pebbles. The vegetation is very sparse. Between the last station and the river the bottom is covered with a heavy growth of mesquite and arrowroot, while on the Arizona side of the river there is a heavy growth of creosote (*Larrea Mexicana*), some of which is at least 15 feet high. The altitude of *El Rio* is 150 feet, and that of the river bottom about 130 feet.

There is no one living at the various stations throughout the desert, except, perhaps, a few section hands at a few points, and there is none of the land under cultivation.

COAST RANGE REGION.

(South of San Pablo bay.)

(Embraces the following counties and parts of counties: San Francisco, San Mateo, Contra Costa, Alameda, Stanislaus,\* San Joaquin,\* Santa Clara, Santa Cruz, Monterey, San Benito, Fresno,\* Merced,\* San Luis Obispo, Santa Barbara, Kern,\* Tulare,\* and Ventura.)

SAN FRANCISCO.

Population: 233,959.

Area: 40 square miles.—Coast Range mountains or hills, 40 square miles.

Tilled lands: 2,298 acres.—Area planted in oats, 44 acres; in barley, 349 acres; in vineyards, 1 acre.

San Francisco county, the smallest in the state, and embracing little else than the city and suburbs, is bounded on the west by the ocean and on the east by the bay of San Francisco, and is separated from the counties on the north by the Golden Gate. Its position is thus near the end of a peninsula whose surface is little else than a region of sand-hills on the west and rocky ridges on the east, originally covered with a brush growth, and rising high above the waters of the bay. Sandstone and serpentine rock formations underlie the hills and outcrop on some of the highest points, as well as at cliffs and bluffs along the shore lines. The county is not an agricultural one, and very little of its land is under cultivation, except in vegetable or "truck" farms. The even temperature permits the cultivation of temperate-zone vegetables throughout the year, while the average is too low for the ripening of fruits. Heavy fogs, brought in by the trade-winds from the ocean, prevail during the summer months, and on the seaward slope more or less throughout the year. The city is situated upon the hills and flats that border the bay on the eastern side of the county, and has a population of 247,000, comprising representatives from almost every nation on the globe. With its extensive wharfage along the bay, its capacious harbor extending far inland through other connected bays, opening out through the Golden Gate upon the great highway to Asia, and affording safe anchorage for the largest vessels, it may well be called the metropolis of the West.

SAN MATEO.

Population: 8,669.

Area: 440 square miles.—Some redwood; Coast Range mountains, 390 square miles; valleys, 50 square miles.

Tilled lands: 73,986 acres.—Area planted in wheat, 10,767 acres; in corn, 118 acres; oats, 7,376 acres; in barley, 16,705 acres; in vineyards, 39 acres.

San Mateo county, bordered on the east by San Francisco bay and on the west by the ocean, is mostly mountainous, the north end of the Santa Cruz range running the entire length north and south and having an altitude in some places of 3,000 feet. On the south this range is very steep and rugged, and is covered with redwood, oak, pine, and other timber. The natural growth of the lower hills is chamisal brush, manzanita, poison-oak, hazel, etc.

Along the bay shore, on the east, there is a strip of level country from 1 to 5 miles wide, embracing, it is thought, about 69,000 acres, of which 40,000 are tillable; but a salt marsh, whose extreme width is about 2 miles, forms the immediate border of the bay in the southern part of the belt. The soil of the plain around Redwood city, the county-seat, is an adobe, covering about 3,000 acres; but elsewhere, until the sand-hill region is reached, sandy loams prevail, changing to the northward to more sandy soils.

On the ocean shore there is around Half Moon bay another belt of comparatively level farming land about 1 mile wide and 10 miles in length, rising rapidly into the hills and cañons of the interior; also to the southward, at Pescadero, where, at the mouth of a creek of the same name, there is a valley containing about 4,500 acres of good lands, surrounded on all sides, except the west, by high mountains. Here is the famous pebble beach where agates, opals, jaspers, carnelians, etc., are found in great abundance. Elsewhere along the coast the hills reach the water's edge, forming high cliffs and bluffs.

Among the mountains and hills there are many small valleys, which, with the adjoining hills, are chiefly used as pasturage for stock and dairy farms, the principal industry of the county.

In the northern part of the county fogs and cold winds prevail to a considerable extent during the six months from April to October. From the neighborhood of mount San Bruno it grows milder and the severity of the winds is rapidly diminished, until, south of Belmont, they become mild and refreshing breezes, just sufficient to allay the heat of the interior and render the climate healthy, bracing, and delightful. On the ocean coast the thermometer ranges slightly lower than on the bay coast, but the climate is rather more equable, owing to oceanic influences and the fogs which prevail in summer. In the summer dense fogs at times drench the summit of the mountains, and snow falls on them at intervals during most winters, but seldom remains on the ground more than a few hours.—*California As It Is*.

The average of lands under cultivation for the county at large in 1880 was 168.1 acres per square mile, or 26.3 per cent. of the area. The chief crops are wheat, barley, and oats. Potatoes have been produced extensively, but are very liable to blight. At Pescadero much flax is grown. In this county, as in Santa Clara, portions of the mountain slope are known as "thermal belts", on account of their exemption from frosts, as well as from the direct inflow of the sea fog.

The county is connected by railroad with San Francisco.

ABSTRACT FROM A DESCRIPTION OF PESCADERO REGION BY MESSRS. J. H. OSGOOD, E. C. BURCH, B. V. WEEKS, AND W. G. THOMPSON:

The general conformation of the land in the neighborhood of Pescadero is a series of low hills intersected by narrow valleys. The hills to their tops are generally fit for either cultivation or pasturage, and the natural growth is chamisal brush, barberry (a cherry—*Cerasus aquifolium*), manzanita, hazel, poison-oak, wild lilac (*Ceanothus*), and elder. The soil of the north hillsides is deep and fertile, while that on the south sides is comparatively shallow and unproductive, and is susceptible to washing and gulying in rainy seasons. The valleys, less than a mile wide and sometimes only a few rods, are level, and the soil is in layers or strata as washed down from the hills.

The natural timber of the mountains is redwood, pine, oak, madrona, alder, and buckeye. Abundant water for ordinary purposes is supplied by springs. Wells are usually dug from 20 to 60 feet deep. The crops embrace potatoes, oats, and barley, the yield of the two latter being about 4,000 pounds per acre. Dairying is extensively practiced. Northwest winds mostly prevail for three-fourths of the year.

CONTRA COSTA.

*Population:* 12,525.

*Area:* 800 square miles.—Great valley, 105 square miles (tules, 25 square miles); Coast Range mountains, 625 square miles; valleys, 70 square miles.

*Tilled lands:* 232,794 acres.—Area planted in wheat, 71,870 acres; in corn, 55 acres; in oats, 1,280 acres; in barley, 19,674 acres; in vineyards, 325 acres.

Contra Costa county is bounded on the east by the San Joaquin river, and on the north and northwest by Suisun and San Pablo bays. The chief streams are San Pablo, Pinole, and San Ramon creeks, the latter being the largest, and giving its name to one of the principal valleys of the county. These streams flow northward into the bays.

The surface of the county is largely mountainous, having the Coast or Contra Costa range proper on the west, and the Mount Diablo range in the center and on the east. Mount Diablo itself, with its rounded summit, is the highest point in the county (3,896 feet above the sea), and, isolated as it is from other mountains, is the most prominent object. The slopes and higher portion are mainly treeless and afford fine pasturage, but a forest growth, consisting of a great variety of oaks, covers the ravines of the lower portion, while in the higher the nut pine, juniper, and a chaparral consisting largely of scrubby oaks covers large areas. The mountain is nearly treeless on the north side. San Ramon valley, which separates the mountain from the Coast range, reaches from Suisun bay southward across the county, under different names, into Alameda county, where it connects with Livermore valley. Between the bay and the foot-hills of mount Diablo, a distance of about 15 miles, the valley has a width of about 6 miles, but afterward becomes very narrow, averaging from 1 to 2 miles. The soil is chiefly a stiff adobe, and in some cases is exceedingly waxy and black. When fresh, this soil yields about 30 bushels of wheat or 40 bushels of barley per acre.

A number of large valleys, such as that of Walnut creek, flanked by rolling, sloping land, are connected with this on either side, and are also rich and productive. The lands around mount Diablo are partly reddish and more or less gravelly and partly gray loams. Mount Diablo valley, which extends from the foot of the mountain 8 or 10 miles northwestward with a width varying from half a mile to 3 or 4 miles, is very level, and is drained by small streams. Its soils are gravelly loams, with some adobe, and produce fair crops of grain and fruits. Small valleys are found among the Coast Range mountains, and are usually occupied by dairy and fruit farms; but on the east of the Mount Diablo range, sloping gently away from its foot toward the river and reaching north to the bay, there is a large tract of farming land, having a width of from 3 to 6 miles for a distance of 23 miles, which is chiefly given to grain-growing. Still eastward of these, and bordering the bay, are large areas of tule lands, covering, it is estimated, about 75,000 acres. Some of these lands have been protected from overflow by levees, and are under cultivation. The tule region is separated from the San Joaquin river by a narrow Tertiary ridge running northward from the southern part of the county and elevated from 30 to 40 feet above tide-water. This ridge has a sandy soil, and affords fine locations for towns.

Within a few miles around the base of mount Diablo there is a great variation of rainfall. On the west the clouds are apparently caught by the high peaks, with a resulting heavy precipitation, while on the east and south there is but little rain; *e. g.*, at Antioch only from 12 to 14 inches. Some of the valleys running westward into the Coast range are remarkable for their exemption from frost, so that the orange, pomegranate, etc., ripen to perfection.

The lands under cultivation in the county average about 291 acres per square mile, thus placing Contra Costa eighth in the state in this regard. Transportation facilities are afforded both by rail and by boat to San Francisco.

#### ALAMEDA.

*Population*: 62,976.

*Area*: 660 square miles.—Coast Range mountains, 415 square miles; valley, 225 square miles; tule lands, 20 square miles.

*Tilled lands*: 200,360 acres.—Area planted in wheat, 36,032 acres; in corn, 1,139 acres; in oats, 1,458 acres; in barley, 39,075 acres; in vineyards, 344 acres.

The county of Alameda lies immediately east of San Francisco bay, its shore-line reaching south from San Pablo station to the limit of the bay. Thence the county extends eastward to the summit of the Contra Costa range, and on the south, still eastward, to the Mount Diablo range, inclosing within its limits the valleys of Livermore, Suñol, Amador, and others. The two mountain ranges are nearly parallel with each other, and rise to altitudes of 2,000 feet or more. They are now treeless on the western and southern slopes (except in the cañons, where there are clumps of oak, laurel, madrone, alder, etc.), though originally having some redwood growth, while on the northern and eastern slopes, besides an abundance of chaparral, there is a scattered growth of both live and white oaks, with maple and madrone.

The largest stream of the county is Alameda creek, which drains Livermore valley, and, traversing the Coast range and entering the bay-shore, or "Alameda plains", flows westward to the bay. Its banks are mostly timbered with sycamore and willows. San Antonio and other creeks are tributary to this from the south. Northward from Alameda creek are San Lorenzo, San Leandro, and other small streams, which have their source in the mountains that bound the Alameda plain and flow westward into the bay. On some of these creeks there is a natural growth of oak, willow, sycamore, laurel, madrone, and buckeye.

Reaching back from the shore with a gradual rise to the hills is a broad and nearly level region, the plain of Alameda. This plain extends through the county along the bay with a width averaging about 5 miles, though becoming quite narrow on the north, and is said to have been originally covered with an oak growth; but now there are only a few scattered groves of this timber in addition to the eucalyptus tree, which has been extensively planted in some localities. Nearly if not all of the plain is now improved and largely under cultivation in small grain and orchard fruits, including excellent currants; and in the southern part, especially near Mission San José, vines as well as other fruits flourish. The creeks coming from the Coast range are bordered by tracts of light alluvial soil, cultivated by preference in barley and "garden truck", the latter mainly by Portuguese. The bay shore is bordered by tracts of salt marsh lands, altogether estimated at 35,000 acres, having the usual salt grasses, and penetrated in every direction by lagoons or salt-water creeks, which receive the waters of high tides. At some points the bay shore embraces a narrow strip of sandy soil extending along the beach, while inland of this is a level belt of black adobe or, in places, salt marshes. Toward the hills the lands become more gravelly and lighter colored, and are mingled with bowlders and rock fragments, and there are occasional tracts of adobe lands at the foot as well as on the hills. The region is thickly populated, and numerous towns and villages dot its surface. Oakland, with its population of 34,555, and situated opposite San Francisco, is connected with it by regular half-hourly trains to the end of a long pier or mole (built by the railroad company), and thence by ferry-boats. Berkeley and Alameda also enjoy similar facilities for reaching San Francisco.

The mountain range that borders this plain has mostly rounded summits, but is traversed and cut up by numerous cañons, though well covered with grasses and suited to pasturage and to wheat-growing. The hill soils are usually adobe. The hillsides are partly covered with a chaparral of scrub oaks, poison-oak, groundsel tree (*Baccharis*), bramble, etc., with manzanita on the highest points. From Grizzly and Bald peaks, near Berkeley, probably the highest points in the north part of the range, fine views may be obtained of the bay and city of San Francisco, the Golden Gate, the mountains of the Coast range on either side, and the distant Sierra—Mission peak, near Mission San José, is the highest point in the southern part of the county.

The valleys lying between the two ranges of mountains are accessible from the plains by Stockton pass, a winding ravine leading from the San José valley to Suñol valley, the western third of which shows rather abundant and heavy adobe soil of the hills, the slopes being devoid of trees. Eastward the character of the soil changes, becoming of a lighter hue and containing more loam, sand, and gravel, especially in the bottoms. Oak trees occur in some places. The lands of these hills are partly under cultivation, wheat being the chief crop. Suñol valley, into which the pass opens, is circular in outline, surrounded by hills, and was originally dotted over with oaks; it contains much good farming land. The Vallecitos valley, separated from Suñol only by a low ridge, is rather narrow, being surrounded by high hills, and its surface is mostly level, interspersed with some hills, and is largely under cultivation.

Livermore valley, to the eastward of these, is about 14 miles long and from 5 to 8 miles wide, and is surrounded by rolling foot-hills and mountains. The northern and eastern part of its surface is a plain, the southern and western a region of rolling hills, and all is dotted over with oak trees. It is watered by numerous streams tributary to Alameda creek, and along these there is usually a growth of sycamore. The soil of this and of the other valleys that adjoin it is a gravelly loam, very productive, yielding good crops of grain and fruit, among the latter the vine becoming prominent in the upland or hill portion, the level part being too much swept by coast winds for full success.

Amador valley, on the southeast, is about 8 miles in diameter, and is nearly surrounded by grassy hills, the spurs of the two mountain ranges. Its soil is a sandy loam, and produces good crops of wheat.

The lands of the county under cultivation embrace 47.4 per cent. of the total area and average about 303.5 acres per square mile, the county ranking third in the state, the counties of San Joaquin and Sacramento alone having a greater average.

## STANISLAUS.

(See "Great valley region".)

## SAN JOAQUIN.

(See "Great valley region".)

## SANTA CLARA.

*Population*: 35,039.*Area*: 1,400 square miles.—Coast Range mountains, 995 square miles; Santa Clara valley, 405 square miles.*Tilled lands*: 166,184 acres.—Area planted in wheat, 38,623 acres; in corn, 261 acres; in oats, 260 acres; in barley, 29,613 acres; in vineyards, 1,532 acres.

Santa Clara county, with its eastern boundary-line upon the Coast range of mountains and its western upon the Santa Cruz range, includes within its limits mountains, hills, and valleys which are watered by many small streams flowing partly to the north and emptying into the bay of San Francisco and partly south to the Pajaro river, and thence to the bay of Monterey. The most important of these streams are Gaudalupe and Coyote creeks, on the north. The mountains on the west are mostly heavily timbered, while the lower hills are covered with grasses, and well suited to pasturage, especially on the west side, where the fogs from the ocean keep the grass green through a great part of the year. The eastern mountains are treeless, save in the cañons. The prominent feature of the county is the Santa Clara valley, well known for its productiveness and mild climate. With a width of 20 miles on the north, at the southern extremity of San Francisco bay, this valley reaches southward to about 11 miles south of San José, where it becomes only about 100 yards wide, then opens out to several miles in width, and passes into San Benito county. Its surface is somewhat undulating, with low, rounded hills on the margins, and is dotted with clumps and groves of oak. Its lands embrace black adobes on the northern or lower portions and lighter sandy or gravelly loams on the higher lands. The chief crops are wheat, barley, corn, potatoes, and vegetables, and in the neighborhood of San José fruit (especially plums, prunes, and grapes), for which culture the climate and exemption from fogs specially adapt the region. (See further description and analyses of soils on pages 47 and 52.)

The lands under cultivation average for the county at large 118.7 acres per square mile, the average of population being 25 persons per square mile.

Branches of the Southern Pacific railroad, on either side of the bay, connect San José with San Francisco and Oakland; in addition, the South Pacific Coast railroad skirts the western shore of the bay.

## SANTA CRUZ.

*Population*: 12,802.*Area*: 420 square miles.—Redwood lands, 195 square miles; Coast Range mountains, with some valley lands, 225 square miles.*Tilled lands*: 40,205 acres.—Area planted in wheat, 12,060 acres; in corn, 1,768 acres; in oats, 934 acres; in barley, 5,945 acres; in vineyards, 346 acres.

Santa Cruz is one of the most mountainous counties on the southern coast, the ranges, however, being neither high nor much broken. The eastern boundary-line rests upon the summit of the Santa Cruz branch of the Coast range at an elevation of 2,000 feet or more above the sea, extending south to the Pajaro river, while to the west, and separated by the San Lorenzo valley, is another mountain range reaching southward to the bay of Monterey at Santa Cruz. Still westward to the coast the country is hilly and broken often to the water's edge. In the southern part of the county the Pajaro river forms the boundary-line, and is bordered by a valley region extending east and west and embracing rich dark loam and adobe lands, which are well adapted to wheat and barley. This part of the valley, however, is not wide, as the river flows not far from the hills, thus giving the greater part to Monterey county. Northwestward from this there is another valley region lying east of the town of Santa Cruz, and at the mouth of the San Lorenzo river. It embraces several terraces or benches, which are from a mile to two miles wide and extend through the valley, the first 30 feet above the level of high water, the second 34 feet higher, and the third 199 feet higher still, showing a total rise of 263 feet. The town of Santa Cruz is located upon the lowest of these benches, extending southward by Soquel and Aptos to the Salinas marshes. It has been estimated that the bottom lands of the county embrace 40,000 and the terraced plateaus 50,000 acres.

The county is watered by the San Lorenzo and Pajaro rivers and numerous small streams that flow from the coast mountains to the sea. The mountains are generally heavily timbered almost to their very base with redwood, pine, and chestnut oak, probably to the extent of one-third of the county area, while the lower hills are covered to some extent by hazel bushes. The redwood trees of this county are noted for their great size, many of them attaining a height of from 200 to 300 feet and a diameter of 15 feet. The lands of the San Lorenzo valley north of Santa Cruz have a sandy loam soil, derived from a fine-grained calcareous sandstone, the prevailing rock of the hills, although granite occurs northward of the town of Santa Cruz. The soil is deep in the flats, but easily washes away, and on the hills much rock is exposed. This valley is about 20 miles long, and is most generally used for pasturage, though there are a number of vineyards near Vine Hill, about 10 miles north of Santa Cruz. The valley is very narrow, the river often flowing between high hills, while in other places it opens out into wide plateaus; but the hills on either side are sufficiently low for cultivation, and the Santa Cruz mountains generally are being rapidly occupied for orchards and vineyards. The town of Santa Cruz is a popular summer resort by the seaside. The average of lands under cultivation is 95.7 acres per square mile, and the crops embrace wheat, barley, corn, potatoes, and fruits of several kinds; lumbering is also one of the chief industries. The town of Santa Cruz is one of the great summer resorts for the people of this coast.

Transportation facilities are abundantly afforded by the vessels of the Pacific Coast Steamship Company that touch at numerous wharves on the coast; also by the South Pacific railroad and the Santa Cruz branch of the Southern Pacific railroad, which passes through the county to San Francisco.

## MONTEREY.

*Population*: 11,302.

*Area*: 3,520 square miles.—Coast Range mountains, 2,420 square miles; Salinas valley, 700 square miles; other valleys, 400 square miles.

*Tilled lands*: 168,862 acres.—Area planted in wheat, 69,022 acres; in corn, 488 acres; in oats, 3,363 acres; in barley, 35,426 acres; in vineyards, 10 acres.

Monterey county is divided into valley and mountain regions by two branches of the Coast range, which extend northwestward through almost its entire length. The Gabilan range separates the county from San Benito, while the Santa Lucia range of almost unbroken, lofty mountains extends along the coast, separated from the former range by a broad valley watered by the Salinas river. This river (the most important of this region) rises in San Luis Obispo county and flows northwestward for nearly 200 miles to the bay of Monterey. The Pajaro, in the northern part of the county, flows westward, also into the bay, but is not a long stream.

The Santa Lucia mountains are in places heavily timbered on their lower slopes and in the cañons with Monterey pine, cypress, and redwood. The Gabilan mountains of the east are low and rounded for 18 miles southward from the Pajaro river, and are timbered; but for the next 30 miles, reaching to San Lorenzo, they are high and rough, again sinking to a range of low and rolling hills at the county limit. The range contains much limestone, and among the hills there are a number of small valleys.

The most important agricultural region of the county, although not the largest, is the Pajaro valley, on the northern border, which has a length of about 10 miles and a width of 6 or 8 miles, extending into Santa Clara county on the east and Santa Cruz on the north. Its surface is quite level, and embraces three varieties of soils: *dark loam land* of the plains, well adapted to wheat and barley; *adobe lands*, comprising one-third of the valley or bottoms of Pajaro river, and lying several feet below the plains; and *clayey loams*, comprising the rest of the river lands, and known as the sugar-beet soils. The valley is bounded on either side by a range of smoothly rounded hills, those on the south reaching to within 1 mile of Pajaro station, and being too steep for cultivation. The western part of this southern range consists of sandy and untimbered hillocks, while the eastern is more broken, better timbered, and has an abundant growth of white sage. The small valleys or hollows among these hills are mostly swampy, with either willow or tule, and often hold small lakes or ponds of water. This region of hills is several miles in width, and separates Pajaro valley from that of Salinas river on the south.

The Salinas valley, traversed by the river of that name, and the largest in the county, reaches from the bay of Monterey southeastward between the two mountain chains toward San Luis Obispo county for a distance of 90 miles, where it is very narrow and considerably elevated above the sea. The width varies for the first 50 miles from the coast from 12 to 8 miles, gradually rising inland. The valley presents a terraced and almost treeless plain, the only growth being some live-oak on the northeast and sycamores on the streams. It is described in detail on page 48. Near the upper end of the valley, within the county, are several small valleys, connecting with it or separated by narrow and low hills. *Long valley* is about 10 miles long and half a mile wide, and is partly cultivated. Its soil is an adobe, covered partly with bunch-grass, and the hills bordering it are low, rounded, and treeless, and contain much limestone. *Peach Tree valley*, separated from the last by a range of hills some 300 feet high and timbered with some oak and pine, is 22 miles long and three-fourths of a mile wide, and has, except over an extent of 5 or 6 miles at the lower end, a scattering growth of white oaks. Its soil is a dark loam, deep and rich. The Coast range, on the northeast, rises some 1,600 feet above the valley.

The arable land along the coast for about 15 miles south Carmel of bay is nowhere more than one-fourth of a mile wide. *Carmel valley* is parallel to and lies west of Salinas valley, and its lower foot-hills afford very good pasturage. Comparatively little of the county is under cultivation, the average being 48 acres per square mile. These lands, however, are mostly confined to Pajaro valley, and are planted in small grain; potatoes, etc. Experiments have been made with cotton, but after growing about 12 inches high and blooming the plant suddenly died. The town of Monterey, on the bay of the same name, is the most popular summer resort of the coast.

A railroad from Soledad and Monterey northward to San Francisco affords transportation facilities to the greater part of the valley portion of the county.

## ABSTRACT FROM A DESCRIPTION OF CARMEL VALLEY BY ED. BERWICK.

Carmel is a narrow valley lying east and west parallel to Salinas valley. The river drains a scope of country perhaps 30 miles by 5. The mountains in many places are abrupt, rocky, and brush covered; in others, gently rolling and affording good pasturage. Wild oats, alfalfa, with various kinds of bunch-grass, form the best natural pasturage. The trees most common are the redwood in the cañons, Monterey pine, and cypress; more inland, live oak, white oak, soft maple, buckeye, sycamore; on the creeks, black and red willow and Oregon alder. Poison-oak and southern wood abound. The soil is liable to gully in winter, and the river deposits the soil where the current runs slowly. There is scarcely any level land of more than half a mile in width, as the valley slopes toward the river from either side. There are occasionally small mesa lands, the soil of which is more gravelly than that of the valley, which is a sandy loam resting on a subsoil of coarse sand.

## SAN BENITO.

*Population*: 5,584.

*Area*: 990 square miles.—Coast Range mountains, 875 square miles; valleys, 115 square miles.

*Tilled lands*: 90,590 acres.—Area planted in wheat, 32,225 acres; in corn, 299 acres; in oats, 41 acres; in barley, 10,469 acres; in vineyards, 62 acres.

San Benito is a long and narrow county. Its northeast and southwest boundary-lines lie respectively on the summit of two branches of the Coast range (viz: the Gabilan and the inner Coast range), whence the surface slopes abruptly to the valley of the San Benito river, which flows northwestward through the middle of the county and unites with the Pajaro river. A few small streams, of little importance, are tributary to the San Benito.

The lands suitable for cultivation comprise but a small portion of the county area, and lie chiefly on the northwest, forming the southern end of *Santa Clara valley* to Los Pinos, and are drained by the San Benito and Tres Pinos rivers. This valley land is said to embrace about 25,000 acres of light sandy loam, 34,300 acres of black sandy loam or adobe, the valley land proper, and 46,000 acres of what is termed second-class land, partly sandy loam and partly adobe, lying on the foot-hills. In addition, there is a large amount of hill pasture land.

The lower part of this valley, in a "strip reaching from Pajaro river to within 3 miles of Hollister, is a low, flat, wet, partly tule land, with a black soil, used entirely for pasturage".

The valley is from 10 to 12 miles wide below, but a few miles southeast from Hollister it terminates in a kind of rolling bench-land, extending across the valley, and known as *Poverty hill* or *Hollister valley*. This Poverty hill region is treeless, its elevations being adobe in character, and in the depressions a sandy loam covers the adobe. At about 4 feet depth the earth is charged with alkali. Still southeastward the valley becomes very narrow and elevated, and to its source it is rarely one-half a mile wide, and often but a few rods. It is here very much cut up, and is almost wholly occupied by the San Benito river. A few white oaks in the valley and live oaks near the hills, with occasional groups of cottonwood on the river, comprise the only timber. The soil of the valley is yellowish and silty; that of the hill-sides usually an adobe, and scarcely under cultivation. The hills bordering the valley are but thinly covered with a scrub growth of oaks. *Bitter Water valley*, on the south, a continuation of Peach Tree valley, of Monterey county, is said to be 7 miles long and from three-fourths to one mile in width. This valley is treeless, and the hills that border it have a scanty oak growth. Its soil is a yellowish and stiff clay loam, and is tilled with some difficulty, except when moist.

*Dry Lake valley* or basin, about 4 miles long, has a dark clayey loam soil, partly timbered on both hills and in the valley with oaks, and is thickly settled.

*Santa Ana valley*, lying eastward of Hollister, has an area of about 15 square miles. Its soil is a dark gravelly loam, underlaid by adobe, and partly covered with scrubby white oak. This valley opens out into San Benito valley, and with it is very generally under cultivation in the cereals, hay, potatoes, etc.

The first-class or valley lands of the county are said to yield from 30 to 40 bushels of wheat per acre, the higher or second-class lands from 20 to 30, while the rolling hill lands produce from 15 to 20 bushels per acre.

The average of tilled lands for the county at large is 91.5 acres per square mile; but, as already stated, the entire acreage is confined almost exclusively to the northern part of San Benito valley, where the average is much higher. The Southern Pacific railroad affords transportation facilities to and from San Francisco.

#### FRESNO.

(See "Great valley region".)

#### MERCED.

(See "Great valley region".)

#### SAN LUIS OBISPO.

*Population*: 9,142.

*Area*: 3,460 square miles.—Coast Range mountains, 2,370 square miles; valleys 1,090 square miles.

*Tilled lands*: 177,598 acres.—Area planted in wheat, 10,618 acres; in corn, 458 acres; in oats, 937 acres; in barley, 9,658 acres; in vineyards, 56 acres.

San Luis Obispo county is bounded on the south by the Santa Maria river, which flows westward, reaching the ocean through the Guadalupe lagoon, the eastern boundary lying along the summit of the Coast Range, which borders the great San Joaquin valley on the west. The county is divided diagonally into two valley regions by the Santa Lucia range, which enters on the northwest, passes through and unites with the Coast Range in the southeast corner, and has elevations varying from 3,000 feet to that of low hills.

The eastern valley region presents a series of low, rolling hills, interspersed with valleys watered by Salinas river and San Juan creek and other streams, all of which flow northwestward. During the summer months the waters of these streams do not flow continuously in their channels, but rise and sink alternately at short distances. Salinas valley, the chief valley of the region, is about 9 miles wide, and has an elevation of about 1,000 feet above the sea. The surface rises on the southeast into a level plateau some 300 feet above the valley proper and soon terminates against the mountains.

Paso Robles, noted for its medicinal springs, is situated in a plain about 10 square miles in the lower part of the valley, surrounded by a live-oak grove. North of this locality there is but little timber, either in the valley or on the hills, except southward, where the hills are timbered with considerable oak, and, near the mountains, with pine. Manzanita is also abundant in many localities, and chamisal occurs on the hills north of Paso Robles. The soil along the streams is mostly a dark loam covered with alfilerilla and burr clover; that of the uplands is generally a stiff clayey loam, more or less gravelly, easily tilled, interspersed with some adobe tracts, and is covered with alfilerilla, burr clover, bunch-grass, and wild oats, the latter chiefly on the higher hills. There is some loam land on the Santa Margarita and San José lying contiguous to the Santa Lucia mountains, while the lands of the Salinas plains are red in color. The valley of Estrella creek is rolling and partly timbered with very scattering scrub oaks. Its soil is a dark gravelly loam, with some adobe.

The lands of the higher plateau of the southeast, or Carisa plains, are very level, bounded on either side by high and abrupt mountains, and have mostly adobe lands, covered with grasses and devoted to grazing purposes. The entire eastern valley is chiefly a sheep and cattle range, though cereals are successfully grown near the foot of the Santa Lucia mountains; and "fruit trees have done well in some cases, and the grape thrives to an extraordinary degree".

The coast valleys on the west of the Santa Lucia mountains are narrow on the north, but toward the south widen out to many miles, and are rolling and interspersed with many high ridges and hills. The San Luis Obispo plain has an elevation of about 150 feet above the sea. The Osos, Laguna, and Chorro valleys run parallel with

each other as far south as what is known as the mission lands around the city of San Luis Obispo. Thence the Corral de Piedra valley continues south until it intersects the valley of the Arroyo Grande. Beyond this is the Nipomo (more properly an elevated plain) and that portion of the Santa Maria valley, situated on the right bank of the Santa Maria or Cuyamas river, which forms the southern boundary of the county. This region is watered by numerous streams flowing from the Santa Lucia mountains to the ocean, which are bordered with a timber growth of willows, cottonwood, sycamore, laurel, and live-oaks. The hills are sparsely timbered with sage-brush and chamisal. A chain of highlands or hills line the coast, rising in many places directly from the water's edge. These begin just south of Santa Rosa creek and extend to within a few miles of Cayucos, where a break occurs. Immediately south of Morro or Estero bay they again follow the coast line to within a few miles of the southern boundary of the county. The northern section, lying between Santa Rosa creek and Cayucos, does not exceed 250 feet in height, but south of the Morro they attain in places an altitude of 2,000 feet, protecting the valleys from the too direct and unintermitting influence of the sea wind. The protection thus afforded by this natural barrier enables the farmer to raise fine grades of wheat, the most valuable of all the cereals.

The coast region is the chief farming portion of the county. Its lands are of three grades: *Dark loams of the bottoms*, suitable for vegetables, etc.; *dark or reddish sandy loams of the valleys*, resting on heavy clays, and *lighter and gravelly soils* of the hills and rougher portions of the valley. The crops of this region comprise wheat, barley, corn, potatoes, and several varieties of fruits and grapes. In the summer months the prevailing northwest winds occasionally blow with some violence immediately along the coast and through the valleys which open fairly to the sea, and drive through them great fog drifts, which rise from the ocean in the evenings and settle down at night close to the earth. But at sunrise the fog rises and, rolling up the mountain sides, disappears. The valleys lying closer to the western slope of the Santa Lucia range are comparatively exempt from these winds and fogs.

The lands of Corral de Piedra valley have a heavy loam soil, with streaks of adobe, and are said to yield 40 bushels of wheat per acre.

The average of lands under cultivation in the county is 51.3 acres per square mile, while the average of population is but 2.6 persons per square mile. Dairying and cheese-making is extensively carried on in the county.

A short line of railroad connects San Luis Obispo with Port Harford, where the steamers of the Pacific Coast Steamship Company touch regularly.

#### ABSTRACT FROM A DESCRIPTION OF THE WESTERN PART OF THE COUNTY BY D. F. NEWSOM, OF NEWSOM SPRINGS.

The west side of the Santa Lucia mountains is well watered, and is a succession of valleys, with bottom and table-lands very productive, and a great part susceptible of irrigation, from which two and sometimes more crops can be raised in one year. It is estimated that 30,800 acres of first-class lands on this side of the mountain can be irrigated by co-operation among the farmers interested and without any very great expense. The larger valleys are liable to frosts from October to April, while the small cañons in the hills are in a great measure exempt from frosts. Dairying and farming are the chief occupations on the coast side of the mountains, and stock raising on the east side, but this will eventually be a wheat-growing section.

#### SANTA BARBARA.

*Population*: 9,513.

*Area*: 2,200 square miles.—Coast Range mountains, 1,900 square miles; valleys, 300 square miles.

*Tilled lands*: 108,749 acres.—Area planted in wheat, 18,492 acres; in corn, 3,167 acres; in oats, 24 acres; in barley, 13,598 acres; in vineyards, 77 acres.

Santa Barbara county is hilly and mountainous, a large proportion being too high and broken for cultivation. The San Rafael mountains cover more than one-third of the county on the northeast, while on the southeast the Santa Inez rises as a narrow range parallel with the coast to an altitude of 3,000 or 4,000 feet.

The western coast line of the county has a north and south trend to point Concepcion, where it turns abruptly to the east. Lying parallel with this latter portion, and at a distance of about 30 miles, are a number of islands, also mountainous, rising as high as 1,500 feet above the sea. The county is watered by the Santa Maria river on the north and by the Santa Inez on the south, both flowing westward into the ocean and bordered by important valleys.

Santa Maria valley is about 30 miles long and 10 wide, and lies partly in San Luis Obispo county. The soil is sandy, dotted over with oaks, and has a vegetation of clover and alfalfa. This valley is chiefly devoted to grazing purposes. The Santa Inez valley is about 30 miles long, and averages 2 miles in width, the width in both this and Santa Maria valley being greatest some 15 miles from the coast, which they reach through narrow cañons. The valley soil is chiefly a loam, and was originally timbered with oaks. The surface presents a series of terraces of 25, 45, and 95 feet elevation, respectively, above the river, and is timbered partly with oaks and sycamores. The valley is chiefly used for pasturage. The Santa Inez range of mountains lies on the south, separating this valley from the coast valley, in which the county-seat is situated. This range is steep and rugged, and is covered with chamisal brush; but there are some oaks in sheltered places. The coast valley, extending from Gaviota pass, east of point Concepcion, to the Ventura county-line, and varying in width from 2 to about 6 miles in the central part, has a rise of 300 feet inland, and is divided into an upper and lower valley, the former being known as the Santa Barbara valley, or plain, from the town of that name, from whose southern edge the valley slopes to the coast, forming the lower valley to the eastward. West of the town, and reaching to the Gaviota pass, the coast line forms a terrace about 80 feet high, sloping landward, and inclosing between it and the mountains the upper valley. The soil of the valley is a sandy loam, and is largely under cultivation in grain. Irrigation is necessary in the higher lands only.

Carpenteria valley, lying east of Santa Barbara, is also a coast valley opening south, and surrounded on the other sides by high mountains, its surface gradually rising to the bald hills. The valley was originally well timbered with live-oak and some sycamore and walnut. It is well watered with small streams, in whose alluvial lands strawberries and other fruits are raised. The crops are corn, beans, and potatoes. The foot-hills and mesa lands bear naturally the wild oat.

On the coast from point Concepcion northward to point Purisima lies the Lompoc valley, its length being about 37 miles. This valley is thought to contain about 35,000 acres of arable land, and has been mostly devoted to pasturage.

The Los Alamos valley, lying along the arroyo of that name, reaches from the mountains to the coast and between the Lompoc and Santa Maria valleys, its length being about 40 miles and its greatest width 2 miles. The largest portion of this valley lies about 25 miles from the coast, and has a soil varying from an adobe to sandy loam, partly under cultivation. On either side are low rolling hills and connecting valleys.

The lands under cultivation in the county average 49.4 acres per square mile, but, omitting the general mountain districts from the area, we find the average to be about 100 acres per square mile. The county is connected with San Francisco by the Pacific Coast steamship lines.

#### KERN.

(See "Great valley region".)

#### TULARE.

(See "Great valley region".)

#### VENTURA.

*Population:* 5,073.

*Area:* 1,690 square miles.—Coast Range mountains, 1,520 square miles; valleys, 170 square miles.

*Tilled lands:* 81,107 acres.—Area planted in wheat, 8,479 acres; in corn, 9,121 acres; in oats, 40 acres; in barley, 28,171 acres; in vineyards, 134 acres.

Ventura county is mostly hilly and mountainous, the northern half rising to an elevation of more than 4,000 feet above the sea and forming a part of the Coast range. The southern part, while hilly and broken with mountain ridges, is interspersed with numerous valleys, which are well watered and afford fine farming lands.

The Santa Clara and Buenaventura rivers are the chief streams of the county, both rising among the mountains and flowing to the ocean. The former is the longest, and is bordered throughout its length by a valley which, from near Newhall, in Los Angeles county, varies in width from a mile and less as far as Santa Paula, then widens gradually, until within about 12 miles from the coast it suddenly expands to about 16 miles on the coast. This is the largest valley region of the county, and contains considerable land under cultivation in wheat, barley, corn, and beans. Above Santa Paula the soil is generally sandy; below, to the coast, it is dark-gray silty loam of great depth and remarkable for its retention of moisture near the surface. Saticoy plain, or delta of the Santa Clara river, is noted for its high production of corn and beans, a large part of the state's marketable supply being grown here. Hogs are also extensively raised.

Buenaventura river is bordered by a valley about 20 miles long and one-fourth of a mile wide, which has sandy soils and is largely under cultivation. The mountain valleys usually have an adobe soil, with much vegetable matter. Those valleys whose elevation is less than 2,000 feet are partly under cultivation in wheat and other grain. Of these the Ojai is most noted, and lies along the Canada Larga. It has an elevation of from 800 to 1,000 feet, and is divided into an upper and lower valley. This valley is about 6 miles long and about 1½ miles wide, and is largely timbered with live and white oaks and some cottonwood. The soil of upper Ojai is a rich black adobe, yielding 50 or 60 bushels of wheat per acre, while that of the lower valley is a reddish-gray, sandy loam, much under cultivation.

The Sulphur Mountain range, between Ojai and Santa Clara valleys, is remarkable for its extensive deposits of asphaltum, which substance oozes out at certain levels throughout the range, and at times forms bubbling springs and flowing streams of thick petroleum. In the Sespe valley a flowing petroleum well of high production has been obtained, and numerous others of moderate yield exist in other parts of the county.

The soil of the mountains is a reddish loam, largely timbered with fir and pine. Cotton has been successfully raised in this county, but only in very small patches and with extra attention, it being too much exposed to trade winds and fogs from the ocean.

The county is connected with San Francisco by the Pacific Coast line of steamships.

### COAST RANGE REGION.

(North of San Pablo bay.)

(This region embraces the following counties and parts of counties: Marin, Sonoma, Napa, Solano,\* Yolo,\* Lake, Colusa,\* Mendocino, Tehama,\* Shasta,\* Trinity, Humboldt, Siskiyou,\* and Del Norte.)

#### MARIN.

*Population:* 11,324.

*Area:* 580 square miles.—Nearly all Coast Range mountains.

*Tilled lands:* 21,357 acres.—Area planted in wheat, 2,603 acres; in oats, 1,031 acres; in barley, 1,499 acres; in vineyards, 40 acres.

Marin county is bounded on the west by the ocean, and on the east, in part, by San Francisco and San Pablo bays, the Golden Gate separating it from the county of San Francisco on the south. A range of mountains passes through it in a northwest direction, mount Tamalpais, with an altitude of 2,597 feet, being the highest point. The rest of the county embraces high hills and small valleys, watered by numerous streams, flowing chiefly to the bay on

the east. Both the east and the west shores are abrupt and deeply indented by bays, of which Drake's and Tomales are the chief, that of Tomales, on the northwest, being the largest, reaching inland for 16 miles with a width of 2 or 3 miles, and occupying a valley between two or more mountain ridges. Point Reyes is a narrow, prominent headland. There is but little level land in the county, the valleys along the streams being quite narrow, and the hills approaching close to the shore lines. The mountains were originally timbered with redwood and pine, but the greater part has been cut away; the lower hills and many of the valleys have a sparse growth of oak. The soil of the hills and rolling lands is usually a black adobe, more or less gravelly; that of the valleys a dark sandy loam, rich and productive.

There is a large area of salt marsh along the eastern shore, some of which has been reclaimed by levees, and is now termed meadow lands. Dairying is the chief occupation of the people of the county, for which the valleys and hills, with their abundant vegetation, afford excellent pasturage. The lands under cultivation average 36.8 acres per square mile for the entire county.

Under the lee of mount Tamalpais, near San Rafael, the climate of San Francisco bay is sufficiently tempered to allow the grape and the fig to ripen regularly.

Transportation facilities are furnished by two lines of railroad, which connect by steamer with San Francisco. San Rafael being practically a residence suburb of the former city, is much frequented on account of its milder climate.

### SONOMA.

*Population*: 25,926.

*Area*: 1,520 square miles.—Coast Range mountains, 1,170 square miles (redwood lands, 300 square miles); valleys, 350 square miles; tule lands, some.

*Tilled lands*: 178,954 acres.—Area planted in wheat, 39,820 acres; in corn, 5,961 acres; in oats, 2,615 acres; in barley, 11,126 acres; in vineyards, 8,540 acres.

The surface of Sonoma county is hilly and mountainous, interspersed with numerous fertile and well-watered valleys. The principal stream is Russian river, which, entering the county from the north, flows southeastward for a distance of about 25 miles, and then turns westward to the coast. It has many small tributaries, which drain the greater part of the county, each bordered by narrow valleys. The northern part of this county is the most mountainous, some of the spurs of the Coast range being from 2,500 to 3,000 feet high. Many of the mountains and some of the lower hills are covered with a growth of redwood, pine, and fir; but in some of the valleys, and on the northeastern slopes of the hills, there is a scattered growth of oak, madrona, large manzanita, buckeye, etc., with some willow and sycamore along the streams. The southern part, "from the coast inland to Santa Rosa valley, is a succession of low, well-watered valleys, bare of trees, and covered by a good depth of soil and a rich sward of natural grasses, which are kept green for most of the year by the sea mists which roll over them during the dry summer months." The low mountain ridges eastward to Napa county are partly covered with a chaparral of chamisal, manzanita, and other growths.

The principal valleys are Russian river and Santa Rosa valleys on the north and central portions of the county, and Petaluma and Sonoma valleys on the south, the latter being separated by low mountains. The first two, with Petaluma valley, form a central valley through the county from north to south, through which the San Francisco and North Pacific railroad runs to Cloverdale, a distance of 50 miles. *Russian River valley* is narrow, and for 15 miles from its mouth was originally covered with a heavy growth of redwood, but otherwise, with the exception of scattered groves of oaks, it is almost destitute of trees. Its lands are alluvial loams, very rich and productive. The valley of *Santa Rosa* is about 10 miles long and 6 wide, bordered by low mountains on the west and a higher range on the east, and is generally under cultivation. The county-seat, located here, is surrounded with oak and other trees. *Bennett valley*, 8 miles long and 3 miles wide, unites with this valley near the town, and its soil varies from a red loam to dark adobe, and is largely under cultivation in grapes. The timber growth of the valley and the adjoining hills is white, black, and live oaks, madrona, etc. *Petaluma valley*, on the south, is about 20 miles long and 3 miles wide, and its soils are rich and moist and well adapted to the cultivation of fruit, corn, and wheat. There is much salt marsh bordering the bay on the south, the tract being estimated to contain about 17,000 acres; but it is partly reclaimed and under cultivation, two or three years being required before it is made ready for planting.

*Sonoma valley*, to the eastward of Petaluma, and separated by a mountain range, reaches about 16 miles northward from San Pablo bay, and has a width of about 2 miles. At its northern end it forks, passing into Guillocos valley on the east, while northward it connects with Santa Rosa valley through Bennett's valley. Its southern portion is occupied by marsh and tule lands to within a few miles of the town of Sonoma, the rest of the valley having a light gravelly loam soil, with water not far below the surface. It is almost exclusively devoted to the cultivation of the grape and fruits, transportation facilities being afforded by the Sonoma Valley narrow-gauge railroad. There are valleys of greater or less extent among the hills in the western part of the county, two of considerable size extending through this region—one, the valley of the Estero Americano, running from west to east through Bodega township, terminating at Tomales bay; the other, Green valley, extending from north to south, the stream from which the valley takes its name emptying into Russian river. Green valley is almost exclusively devoted to fruit culture.

The land of the county is classified by the assessor into four grades. The first and least valuable grade is the mountain, brushy, and bare hill land, estimated at 300,000 acres, and utilized only for pasturage. The second grade, timber lands and hillside pasturage, is estimated at 200,000 acres. The third grade is mainly rolling lands, denuded of timber, lying along or near the sea-coast, used for dairy purposes, and estimated at 200,000 acres. The fourth grade, rich bottom lands, is estimated at about 150,000 acres.

Along the mountain and hill sides, some 300 or 400 feet above the valley, there is a "thermal belt" elevated above frost limits, where many tender fruits may be successfully grown.

The North Pacific Coast-narrow-gauge railroad runs through the region to Russian river, affording convenient transportation. There are also good shipping points by sea from Tomales and Bodega bays. The Sonoma valley is connected with San Francisco by rail and steamers.

## ABSTRACT FROM A DESCRIPTION OF BENNETT VALLEY BY G. N. WHITAKER, OF SANTA ROSA.

Bennett valley possesses all the features of other valleys of the county. It has a length of 8 miles and an average width of 3 miles, and joins Santa Rosa valley near the town of that name, extending back in a southeast course. The northwest half of the valley is a fine farming country; the southeast half lies quite elevated in the thermal belt, and is well adapted to the culture of fruits, grapes being a specialty. There is a high range of hills west of and parallel with this valley, which is fertile to the summit; but that on the opposite side is not so sloping or so fertile. Both valley and hills have a natural growth of wild oats, bunch grass, etc., and a timber growth of white and live oaks, laurel, madrona, and some spruce pine and redwood. The soil of the valley varies from dark and light to red sandy loams and adobe, and in depth from 6 inches to 5 or 6 feet, and is underlaid by soft shaly rock and yellow clay. The chief crops are wheat, barley, and grapes, and when fresh the lands have yielded from 30 to 40 bushels of wheat and from 30 to 50 bushels of oats and barley per acre.

## NAPA.

*Population:* 13,235.

*Area:* 840 square miles.—Coast Range mountains, 620 square miles; Napa valley, 145 square miles; other valleys, 40 square miles; tule lands, 35 square miles.

*Tilled lands:* 81,045 acres.—Area planted in wheat, 33,653 acres; in corn, 1,664 acres; in oats, 1,014 acres; in barley, 5,753 acres; in vineyards, 6,671 acres.

Napa county, lying in the eastern part of the Coast range, is a region of mountains, hills, and valleys, one-half of its surface, however, being suitable for cultivation. The mountains on the north, culminating in the volcanic peak of Saint Helena, have their highest elevation within the county, and are heavily timbered with fir, pine, and cedar. To the southward they diminish in height, occasionally flattening out into timbered plateaus 1,500 or 2,000 feet above the sea, and well adapted to cultivation, but in the southern part of the county they sink into low, grassy, and broken hills. The eastern, western, and northern boundary-lines rest on the summit of the mountains, while the southern is formed in part by the shore of San Pablo bay. The principal topographical feature of the county is *Napa valley*, which occupies centrally a northern and southern position, reaching from the bay 35 miles inland, and having an average width of 4 or 5 miles, except in the northern part (above Yountville), which is only about 1 mile wide. The general surface has a gentle slope southward to the tule lands, and is watered by Napa creek, which, though small, is a tide-water stream, navigable to Napa City for small craft, and is the largest in the county. Along the lower portion of Napa slough there is quite an extensive belt of tule lands, some of which have been successfully reclaimed, proving very productive. The soil of the upper valley is a gravelly loam, while that of the southern or lower is a sandy loam, rich and productive, and largely under cultivation.

*Knight's valley*, on the north, forms a connecting link between Napa valley and that of Russian river, in Sonoma county, and is about 7 miles long and 2 miles wide, surrounded by high and heavily timbered mountains. The rest of the county consists of a series of mountain ridges and narrow valleys watered by small streams, those on the northeast being included in the basin of Putah creek. "East of Napa valley is Conn valley, half a mile wide by 6 miles long. South of this is Wooden valley, 3 miles long by 1 mile wide. North and east of Chiles is Pope valley, 8 miles long by 1 mile wide. South of Pope is Capelle valley, 2 miles long and half a mile wide. East of Pope is Berryessa valley, 7 miles long by 1½ miles wide, and bordered on the east by the high range of mountains that forms the boundary-line of the county (*California As It Is*).

The *Berryessa valley* is an agricultural region, and is largely under cultivation. It is surrounded at first by low hills, and further back by high mountains, timbered with pine, fir, and some cedar. The lower ranges are covered with thickets of hazel, buckeye, California bay and lilac, oak and ash, and an undergrowth of grasses, wild clover, etc. The valley is dotted with oaks, and is devoted to wheat, which yields about 30 bushels per acre; the lower hills are planted in vineyards. Conn valley is also planted in vines and wheat; but at the head there is a plateau of rolling country heavily timbered with pine and black oak.

The assessor of the county has estimated that there are 69,051 acres of the best valley land, 38,287 acres of best hill land and poorest valley land, suitable for grazing, 45,891 acres of hill land adjoining the grazing lands, and 31,711 acres of the poorest quality of hill lands.

Cotton has been grown in Napa county at an elevation of 1,500 feet above sea-level.

Grape culture is one of the chief industries of the county. The vineyards begin a short distance below Napa, city and extend either side up into the foot-hills. As we go northward they increase, until in Saint Helena valley, separated from lower Napa valley proper by a narrow pass near Yountville, we find one of the great wine-making centers of the state, and the point where the grape production per acre has been as high as 13 tons, the entire valley and a portion of the slopes, as well as the adjoining plateaus, being occupied by vineyards, wine-cellars, etc.

Transportation facilities are afforded by the Napa branch of the California Pacific railroad, which connects at Vallejo with steamers for San Francisco.

## ABSTRACT FROM A DESCRIPTION OF LANDS OF HOWELL MOUNTAIN REGION, IN THE NORTHERN PART OF THE COUNTY, BY JOHN MAVITY, OF SAINT HELENA.

The summit of Howell mountain is a broad plateau of about 8,000 acres, or rather a plain broken up into small elevations and little vales, the hills varying in height from 100 to 200 feet. The higher points are generally very rocky, with slopes of reddish soil. The plateau has an elevation of from 1,600 to 1,800 feet above the sea, and is covered with a growth of black oak (or what is here known as mountain oak), white oak, yellow pine, nut pine, a very little fir, and manzanita. The land has a red and somewhat gravelly clay soil, well adapted to the growth of fruit trees and grape-vines.

## SOLANO.

(See "Great valley region".)

## YOLO.

(See "Great valley region".)

## LAKE.

*Population:* 6,596.

*Area:* 1,100 square miles.—Coast Range mountains, 1,000 square miles; valleys, 100 square miles.

*Tilled lands:* 33,564 acres.—Area planted in wheat, 8,296 acres; in corn, 755 acres; in oats, 352 acres; in barley, 4,551 acres; in vineyards, 54 acres.

Lake county is included between the summits of two branches of the Coast range, which unite at mount Saint John's on the north, and have an altitude of from 3,000 to 4,000 feet. The valley thus formed has a length of about 40 miles and a width of nearly 15 miles, the sides of which are bordered "by narrow ridges of broken mountains, separated by deep gorges and narrow cañons, covered with timber, underbrush, wild oats, and wild grapes". Clear lake is a central feature of the county, covering an area of nearly one-third of the valley, and has an altitude of over 1,000 feet above the sea. Its length is about 25 miles, while its width varies from 10 miles on the north to 2 miles on the south, being divided into what are known as *upper* and *lower* lakes by Uncle Sam mountain, which reaches into it and rises abruptly from the water's edge to an elevation of about 2,500 feet. The lake receives the greater portion of the drainage of the county, and has for its outlet Cache creek, which flows from the southern point eastward through Yolo county. There are no large streams in the county. On the extreme north, and separated from the valley by a range of high mountains, are the headwaters of Elk river, which flows northwestward through Mendocino county.

The mountains are largely timbered with pine, the sugar pine occurring in extensive forests on the north; the hills have an abundant growth of oak and fir. A feature of the southern mountains are the extensive tracts of the chamisal brush, which has been found valuable for sheep.

The farming portion of the county is embraced within the central valley region, lying on the west of Clear lake and among the hills along the streams. The eastern shore of the lake is mountainous, but on the west and north of Uncle Sam mountain there is much level or undulating alluvial loam land from 2 to 5 miles in width, reaching northward above the head of the lake and southwestward for 15 miles from Lakeport. It is dotted over with oaks and willow. Other valleys are also partially timbered with white oak, and have red sandy and gravelly soils. Coyote valley is 10 miles long and 3 miles wide, and long valley 6 miles long and 2 miles wide. Scott's valley has a sandy loam soil, and is said to yield 8 tons of potatoes, 30 bushels of wheat, or 50 bushels of corn per acre.

The crops of the county embrace chiefly wheat and barley, but from the luxuriance of the growth of the native grape-vine it is presumed that this county will hereafter become an important grape-growing district.

Cloverdale, in Sonoma county, on the San Francisco and North Pacific railroad, is the shipping point for the north and middle portions of the county, and Calistoga, in Napa county, on the California Pacific railroad, receives freight for and from the southern part.

## COLUSA.

(See "Great valley region".)

## MENDOCINO.

*Population:* 12,800.

*Area:* 3,780 square miles.—Coast Range mountains, 3,655 square miles (redwood lands, 745 square miles); valleys, about 125 square miles.

*Tilled lands:* 58,164 acres.—Area planted in wheat, 8,899 acres; in corn, 884 acres; in oats, 2,843 acres; in barley, 3,544 acres; in vineyards, 77 acres.

Mendocino is a mountainous coast county, its prominent topographical feature being two chains of Coast range mountains running nearly parallel and separated by the valleys of Eel and Russian rivers. The headwaters of these streams rise near the center of the county, on opposite sides of a ridge lying east and west, Eel river flowing thence northward through Humboldt county to the coast, receiving the waters of many tributaries along its course, while the Russian river flows southward through Sonoma county and drains a smaller basin. Many small streams flow from the western Coast range of mountains directly and independently into the sea, affording facilities for floating logs, etc., from the mountains and adjoining valleys to the coast.

The Coast range is covered from one end of the county to the other by a dense growth of redwood, pine, fir, oak, and madrona, with some dogwood, maple, and bay. The tops of the highest peaks, which rise to an elevation of some 6,000 feet, are bare of timber and rugged, and covered only with chaparral. This region is almost exclusively devoted to lumbering. The eastern range of mountains is mostly treeless and is known as the Bald Hills. There is, however, an abundant growth of clover, wild oats, etc., and the region is largely used as a sheep pasture.

The lands of the county suitable for cultivation have been estimated to cover about 900,000 acres, and lie chiefly in the valleys adjoining the two rivers and their larger tributaries. Two hundred thousand acres more are good grazing lands, while the rest of the county area is rugged and mountainous.

Lying between the main ranges of mountains are several extensive and fertile valleys within the limits of this county. In these valleys most of the farming population resides, and here three-fourths of the grain, fruits, and vegetables produced in the county are raised. Commencing with Ukiah, a part of the main Russian River valley, and which extends south 15 miles into Sonoma county, we have adjoining it on the north *Coyote valley*, 3 miles long by  $1\frac{1}{2}$  miles wide, connecting with *Potter's valley*, 6 miles long and 2 miles wide. Twenty miles north of Ukiah is *Little Lake valley*, beyond which to the north is *Sherwood's valley*, and 9 miles farther on *Long valley*, all containing a considerable area of good land. *Round valley*, 60 miles from Ukiah, lies in the northern part of the county, extending into Humboldt county.—*Natural Wealth of California.*

Sherwood valley, at an elevation of 2,500 feet, is 5 miles long and 1 mile wide. The soil of this valley is mostly a dark sandy loam, and is well adapted to the growth of cereals and fruits.

Shipments of supplies to and from the southern part of the county are made by wagon to Cloverdale, in Sonoma county, and thence by railroad to San Francisco. Coasting vessels carry on an extensive trade between the coast towns and the city of San Francisco.

## TEHAMA.

(See "Lower foot-hill region".)

## SHASTA.

(See "Lower foot-hill region".)

## TRINITY.

*Population:* 4,999.*Area:* 2,490 square miles.—Coast Range mountains, nearly all.*Tilled lands:* 4,830 acres.—Area planted in wheat, 1,071 acres; in corn, 30 acres; in oats, 165 acres; in barley, 14 acres; in vineyards, 3 acres.

Trinity, lying east of Mendocino county, is a long and narrow county, whose eastern and northern boundary-lines rest upon the summits of two of the chains of the Coast range, and whose surface is made mountainous and broken by many other spurs and lofty ridges of the same range. It is watered by numerous streams, all having their sources in the county and flowing eventually into the ocean on the west. Trinity river, the largest of these, rises on the northeast in the acute angle formed by the two mountain boundaries, flows southwest for many miles, and then turns sharply to the northwest, receiving in its course the waters of many tributaries. The southern part of the county has but very few streams, and is little else than a mass of high rugged mountains, with some good grazing lands. Some points are said to rise to an elevation of 11,000 feet, and are often covered with snow through the summer months. They are granitic in character, and their sides are cut up into chasms and canyons. The mountain timber-growth is for the most part pine, spruce, fir, and oak, with maple in the lowlands. The valleys along the streams are very narrow, and afford comparatively little land suitable for cultivation. The entire arable area in the county is estimated to be not more than 15,000 acres, and is mostly confined to the Trinity river and its tributaries, occurring in small tracts and being partly under cultivation. The valleys and foot-hills that often border them are sparsely timbered with oak and pine, while on the streams there is some sycamore, cottonwood, maple, laurel, and ash.

Gold mining is the chief and almost exclusive industry of the county. The crops comprise hay and wheat, for which there is a home market. Supplies are mostly brought by wagon across the mountains from Redding, in the Sacramento valley, on the east.

## HUMBOLDT.

*Population:* 15,512.*Area:* 3,750 square miles.—Coast Range mountains, nearly all (redwood lands, 1,000 square miles).*Tilled lands:* 69,025 acres.—Area planted in wheat, 3,437 acres; in corn, 624 acres; in oats, 8,817 acres; in barley, 2,629 acres; in vineyards, 10 acres.

Humboldt, a coast county, is very hilly, mountainous, and rugged, and is watered by the Trinity, Mad, Bel, Mattole, and other smaller rivers, all flowing northwestward into the ocean. These rivers are bordered by some narrow valleys, but are not navigable for small sailing vessels for more than a few miles from the sea. From Eureka eastward to the mountains proper, a distance of about 25 miles, the country is hilly and broken. Much of the county is occupied by the outlying spurs and more westerly ranges of the Coast mountains, which, near the coast, are covered with heavy forests of redwood, spruce, and pine. The timber belt, varying in width from 8 to 10 miles, recedes from the coast in some places in this county a distance of several miles, leaving at these points an elevated terrace or sandy beach destitute of timber. The most westerly branch of the Coast range is rugged and broken within the limits of the county, mount Pierce, one of its highest peaks, being 6,000 feet high. The more easterly ridge, forming the boundary between this and Trinity county, also rises in some places to a considerable height, mount Bailey, one of its peaks, being 6,357 feet high. There is much chestnut oak (valuable for tanbark) in this region.

Among the mountains there are small valleys watered by the various streams, but the largest tract of level land lies around Humboldt bay. The timber growth on the streams is willow, alder, cottonwood, maple, ash, and bay, and the soil is chiefly an alluvial loam, deep, dark, and rich. That of Bel river is so black that with its growth of tussock grass it has received the name of "nigger-head" soil. Around the bay and near tide-water there is much overflowed or swamp land, separated from the coast-line by a low sand-hill region covered with a stunted growth of trees. The hills have usually a dark sandy loam soil, and on the east are covered with grasses, clover, and wild oats, affording an excellent grazing country. The hills around Ferndale are covered with the eagle fern, which often grows to a height of 12 feet; and the valley of Mattole, in which the town is situated, is 12 miles long and from 4 to 8 miles wide, and also contains much of this growth.

The lands under cultivation lie chiefly in the river valleys on the western side of the county, the soils of which are dark sandy loams, easily tilled, and produce good crops of oats, barley, potatoes, and pease. Lumbering is the chief industry of this western section. The eastern part of the county is chiefly devoted to stock-grazing. It has been estimated that of the county area there are 921,600 acres of timbered lands, of which 200,000 acres are of madrona, black and white oaks, and laurel, 450,000 acres are adapted to agricultural purposes, and 500,000 acres suitable only for grazing lands.

The county is at present dependent upon coast steamers and vessels for transportation facilities. Humboldt bay, 12 miles long and from 2 to 5 miles wide, is one of the largest harbors on the coast, and is almost landlocked.

## SISKIYOU.

(See "Sierra mountain and higher foot-hills region".)

## DEL NORTE.

Population: 2,584.

Area: 1,540 square miles.—Coast Range mountains, nearly all (redwood lands, 150 square miles).

Tilled lands: 10,678 acres.—Area planted in wheat, 56 acres; in corn, 42 acres; in oats, 200 acres; in barley, 54 acres; in vineyards, 4 acres.

Del Norte, the extreme northwesterly county of the state, has a mountainous and broken surface, watered on the east by Klamath river, which crosses it in a southwesterly course, and on the west by Snake river and other streams, which flow to the sea. The Siskiyou chain of mountains, having a general though irregular northeast and southwest trend, forms the divide between the two water-sheds, and from this other mountains extend almost at right angles, thus giving to the eastern portion of the county a rugged character. The coast is bordered by a range of hills some 600 feet in altitude, while still inland another range rises to a height of 3,000 feet. Most of the county is well timbered with redwood, fir, spruce, pine, some cedar, hemlock, and myrtle, and there is also a considerable amount of open prairie land. The streams usually have small and narrow valleys, together with swamp and overflowed lands, whose area is estimated at 3,500 acres. The chief industries of the county are dairying, lumbering, and to some extent mining. Comparatively little land is under cultivation, the average being but 6.9 acres per square mile. Steamers and sailing vessels run between Crescent City, the county-seat, and San Francisco.

### HIGHER FOOT-HILL (OVER 2,000 FEET) AND SIERRA MOUNTAIN REGIONS.

(Embraces the following counties and parts of counties: Siskiyou, Modoc, Lassen, Shasta,\* Tehama,\* Plumas, Sierra, Nevada,\* Placer,\* El Dorado,\* Amador,\* Alpine, Calaveras,\* Tuolumne,\* Mariposa,\* Mono, Inyo, Fresno,\* Tulare,\* and Kern.\*)

## SISKIYOU.

Population: 8,610.

Area: 5,660 square miles.—Sierra mountains, 2,550 square miles; Coast Range mountains, 2,210 square miles; valleys, 900 square miles.

Tilled lands: 50,777 acres.—Area planted in wheat, 6,330 acres; in corn, 112 acres; in oats, 3,268 acres; in barley, 3,598 acres; in vineyard, 10 acres.

Siskiyou, one of the most northern counties of the state, embraces a region of mountains and high valleys and broad plateaus. The Sierra Nevada and Coast ranges meet in this county, the culminating point being mount Shasta, near the southern limit. This celebrated mountain has an elevation of 14,440 feet above the sea, its upper 4,000 feet being covered with snow throughout the year, while its lower 7,000 or 8,000 feet has heavy forests of sugar and pitch pine on all sides but the north, which has only a stunted growth of cedar and oak.

"The Coast range is most picturesque in this county, the summits being very unlike the rounded hills surrounding the bay of San Francisco, for they rise with their rocky formations of granite and slate into rugged and precipitous peaks. The Sierras also consist in great part of rough and rugged buttes, much of the country thus comprising cañons, gorges, ravines, abrupt mountain walls, precipices, and sudden little valleys. This wild country is covered with forests of redwood, fir, and sugar pine" (*California As It Is*). The eastern part of the county is a high plateau of lava beds from 3,000 to 4,000 feet above the sea, interspersed with mountains and volcanic peaks, rising many thousand feet higher. A large part of the county is without drainage; but the Klamath river crosses the northwestern corner from Oregon, receiving from the south the waters from Scott's and the upper part of Shasta valley. In the southern part of Shasta valley the Sacramento river has its source, flowing southward, while on the east of the mountain McCloud river rises, flows southeast into Shasta county, and finally empties into the Sacramento.

The chief agricultural lands of the county are embraced within Shasta and Scott's valleys on the west, though there are a few smaller ones that have some good farming land. *Scott's valley* is 40 miles long and 7 miles wide, and lies between Trinity and Salmon mountains, of the Coast range, which rise to elevations of nearly 6,000 feet, the valley itself being about 3,000 feet. It is largely under cultivation, yielding grain, fruits, and vegetables. Owing to its elevation, the harvests are late, the grain not being reaped until August or September. Frosts are frequent during the spring, and even in the summer months. The weather in the summer is warm, with cool nights; in the winter often severe, especially on the mountains, where the snow falls to a great depth. Snow also lies to the depth of a foot or two, often for several weeks, in most of the valleys, rendering the use of snow-shoes and sleighs a general necessity. *Shasta valley* is a barren lava plain, containing, however, a few fertile spots. The whole county is particularly adapted to stock-raising, hay for winter being raised upon the meadows along the water-courses, while the hillsides are covered with bunch-grass and other nutritious food. Lumbering and mining are the chief industries of the county.

The average of lands under cultivation is 9 acres per square mile. Supplies are hauled to and from Redding, in Shasta county, the nearest railroad station.

## MODOC.

Population: 4,399.

Area: 4,260 square miles.—Sierra mountain lands, 3,685 square miles; Surprise valley, 400 square miles; other valleys, 175 square miles.

Tilled lands: 20,017 acres.—Area planted in wheat, 4,301 acres; in corn, 18 acres; in oats, 774 acres; in barley, 3,956 acres.

Modoc county, in the extreme northeastern corner of the state, has a mountainous and broken surface, drained chiefly by Pitt river, which flows southwestward through the county from Goose lake, on the northern border. The tributaries of this river are chiefly on the south and east, the northwestern part of the county having no drainage system. The only lands suitable for cultivation are embraced in a few of the valleys in the eastern and southern parts of the county, and of these *Surprise valley* is the most important. This valley, lying on the extreme east, extends from north to south, and includes in its eastern side three large lakes, whose lengths are respectively 16, 20, and 15 miles, with widths of from 3 to 5 miles. These lakes have no outlet, and sometimes are dry by evaporation. The length of the valley is about 60 miles and width 15 miles, and it is skirted on two sides by lofty and timbered mountains. It is watered by numerous streams, and is covered with clover and grasses. Its soil is a rich black loam, occupying a strip from 2 to 6 miles in width, whose surface gently slopes toward the lakes. The valley is settled up in neighborhoods, and is partly under cultivation, wheat, barley, and vegetables being the chief crops. Dairying, stock-raising, and lumbering are also carried on to a considerable extent.

The valley of *Goose lake* lies mostly on the eastern side of the lake (which is 30 miles long and 15 miles wide, extending into Oregon), reaching back some 4 or 5 miles, and is watered by numerous small streams. Its lands are good for farming purposes, being covered with bunch and other grasses, and are partly under cultivation, yielding crops of wheat, barley, oats, etc. The adjoining mountains, Warner's range, are heavily timbered with cedar and pine, while on the hillsides and around the lake is an abundant growth of wild plums. On the western side of the lake there is a narrow strip of valley devoted mostly to dairying. *Big or Round valley*, on Pitt river, in the southwestern part of the county, and reaching into Lassen county, is 30 miles long and 18 miles wide, and is mostly covered with sage-brush. Its soils are varied in character, from red clays to dark loam and gravelly lands, and spotted with alkali tracts. Surrounding the valley are several creeks, whose rich bottom lands are to some extent under cultivation. Stock-raising is the chief industry. The lands under cultivation average but 4.7 acres per square mile for the county at large.

#### LASSEN.

*Population:* 3,340.

*Area:* 5,000 square miles.—Sierra mountains, 4,425 square miles; valleys, 575 square miles.

*Tilled lands:* 29,161 acres.—Area planted in wheat, 4,773 acres; in corn, 15 acres; in oats, 1,465 acres; in barley, 1,950 acres.

Lassen county embraces a region of rugged mountains, arid and sandy sage plains, vast areas of alkali flats, and clusters of broken hills, with narrow valleys, and lies on the north and east of the Sierra Nevada mountains, which trend northwest. The Diamond Mountain range, 8,200 feet high, and covered with spruce, pine, and fir, separate it from Plumas county on the south. The other mountains of the county trend in various directions, and have only a few scattered groves of scrubby pitch pine, or "piñon", and dwarf cedar. The only streams of importance are Susan river, in the south, and Pitt river, which crosses the northwestern part of the county, the former, with several tributaries, flowing eastward into Honey lake, while the latter is one of the principal tributaries of the Sacramento. The rest of the county is almost entirely without streams, and includes what is termed the Madaline plains, 5,300 feet above the sea, which is covered with sage-brush. There are several lakes in the southern part of the county covering areas from 12 to 15 miles long and from 8 to 10 miles wide. Comparatively little of the county surface is suitable for cultivation, the chief bodies of arable land being found in Honey Lake valley and in Long valley, farther south.

The lands of the eastern side of Honey lake are dry and barren, but on the western side there is a strip of rich sandy loam soil about 2 miles in width and largely under cultivation, yielding from 25 to 30 bushels of wheat per acre with irrigation, which is found to be very necessary. The elevation of the valley is about 4,200 feet. The land on the streams is a dark loam, and is mostly covered with plums, poplars, and willows.

*Long valley* reaches southeastward to within 15 miles of Reno, in the state of Nevada, and is quite narrow, except near Honey lake, "its south side being formed by a very high, heavily timbered ridge, while the rise in the north is gradual and the country dry, timberless, and open. The valley is about 40 miles in length, but is very narrow, having an average breadth of only 2 or 3 miles. The principal business of its settlers is the raising of stock and dairying. \* \* \* In the extreme northwestern part of the county, and extending into Modoc county, lies *Big valley*, a large stretch of agricultural lands, comprising in this county about 75,000 acres. \* \* \* The mountains that border the valley on the south and west are timbered with oak, cedar, and pine, while the country on the east consists of long, oval hills and table-lands stretching away to what is known as *Madaline plains*. These hills and table-lands are interspersed with small valleys, which are adapted to grazing purposes. The small valleys are preferred by settlers as locations because of the proximity of timber, and also of the adjacent hills, which constitute a range for stock. \* \* \* Between Big and Honey Lake valleys lie Grasshopper, Willow Creek, Eagle Lake, and Horse Lake valleys, separated from each other and the main valleys by intervening ridges of various heights. Each of the last-named valleys are very small, and contain but few ranches, and are mostly occupied by the bodies of water from which they derive their names (*California As It Is*).

The crops comprise wheat, barley, oats, rye, corn, etc., for which there is a home market. Supplies for the Pitt River region are hauled from Red Bluff in the Sacramento valley; those for the Honey Lake region are hauled from Reno, a railroad station in the state of Nevada.

#### SHASTA.

(See "Lower foot-hill region".)

#### TEHAMA.

(See "Lower foot-hill region".)

## PLUMAS.

*Population:* 6,180.

*Area:* 2,760 square miles.—Lower foot-hills, 100 square miles; higher foot-hills and Sierra mountains, 2,660 square miles.

*Tilled lands:* 15,791 acres.—Area planted in wheat, 1,129 acres; in oats, 2,574 acres; in barley, 16 acres.

Plumas county is mountainous and very broken, the greater part having an elevation of 3,000 or 4,000 feet above the sea. It is watered by the headwaters of Feather river, which, spreading out toward the northeast and northwest, unite on the southwest and flow toward the Sacramento river. Both these streams have cut their way through gorges and cañons from 300 to 500 feet below the general level of the country, that of Feather river being the deepest in the state. While the central and southwestern part of the county is thus divided into cañons separated by high ridges, the eastern and northern portions rise into the high Sierras over 6,000 feet above the sea.

The surface of the country is well timbered with sugar and yellow pines, spruce, fir, and cedar, the forests being denser upon the slopes of the Sierras than in the lower country on the west and south. Many valleys occur among the high hills of the upper foot-hill region at the base of the Sierra, and are to some extent suited to farming, but especially to grazing purposes, and most of them are covered with grass. The soil is chiefly coarsely sandy and gravelly, producing but little dust in dry seasons.

A series of grassy and well-watered but treeless valleys stretch across the county for 100 miles in a southeastern direction, connected with each other by cañons, passes, or low divides. The first, in the northwestern part of the county, is Big Meadows, comprising some 30,000 acres of fertile land, mostly covered with grasses, and capable of producing crops of grain without irrigation. This, with Mountain Meadows, 15 miles northeastward, and of small area, is mostly devoted to stock-grazing. Butte valley, 5 miles south of Big Meadows, is 3 miles long and 1 mile wide. Greenville is in a small valley 15 miles southeastward of this. Passing southeastward out of this valley, across a well-wooded divide of 4 miles, we come into Indian valley, which has a length of 8 miles and a width of 4 miles, the whole consisting of first-class farming and grazing land, the chief crop of which is oats. Eleven miles southeastward is Genesee valley, distinguished for the large amount of vegetables produced by the few settlers. Clover valley, on the north fork of Feather river, is a long, gorge-like depression, narrow at its lower end, but spreading out as we ascend till it reaches a width of a mile or more. Dairying is the chief pursuit in this valley. A few miles southeastward, over another low wooded divide, brings us to the lower end of Sierra valley, a depression some 20 miles long and 10 miles broad, neither so fertile nor so well watered as the others.—*Pacific Rural Press.*

Oroville, in Butte county, and Reno, in the state of Nevada, are the nearest railroad points from the western and eastern parts of the county, and thence supplies are hauled in wagons.

## SIERRA.

*Population:* 6,623.

*Area:* 880 square miles.—Lower foot-hills, 200 square miles; higher foot-hills and Sierra mountains, 680 square miles.

*Tilled lands:* 6,269 acres.—Area planted in wheat, 308 acres; in oats, 1,082 acres; in barley, 391 acres.

Sierra county embraces a region of high mountains and table-lands, only a small portion of its area having an altitude of less than 2,000 feet. The western part is watered by the headwaters of Yuba river, flowing toward the Sacramento valley through deep cañons; the eastern by a few small streams which enter the state of Nevada. A number of small mountain lakes occur on the high table-lands where the Sierra spread out into flats or depressions. Gold lake, with a length of 4 miles and a width of 2 miles, being the source of the middle fork of Feather river.

The eastern half of the county, embracing the Sierra proper, has an elevation of over 4,000 feet, and some of its peaks and buttes rise to 6,000 or 8,000 feet, and are covered with snow for several months of the year, the chief mode of winter travel being with snow-shoes. *Sierra valley* situated among these mountains, is 20 miles long and 10 miles wide, and contains a number of small farms. Owing to its elevation the climate is too severe for ordinary grain crops, but rye and the hardier forage grasses succeed, and stock-breeding is pursued with fair success. The inroads of the grasshopper (*Oedipoda atrox*) are sometimes severely felt in this region. The valley is not well watered. Produce is hauled to Truckee for sale or shipment. The upper foot-hills on the west, with their elevation of from 2,000 to 4,000 feet, cover the larger part of the western half of the county, and embrace a rugged and broken country, and, together with the small area of lower foot-hills, is interspersed with small red and gravelly valleys, which afford the only farming lands.

The county is well timbered with sugar and yellow pines, fir, cedar, spruce, and much wild plum; but the lower foot-hills have chiefly a growth of scrubby oaks. The chief industry of the county is mining and lumbering.

The nearest railroad point to the western section of the county from which supplies may be obtained is Nevada City, in Nevada county, on the south, which is connected by the Northern California railroad with Colfax, and thence by the Central Pacific railroad with Sacramento and other points.

## NEVADA.

(See "Lower foot-hill region".)

## PLACER.

(See "Lower foot-hill region".)

## EL DORADO.

(See "Lower foot-hill region".)

## AMADOR.

(See "Lower foot-hill region".)

## ALPINE.

*Population:* 539.

*Area:* 730 square miles.—All Sierra mountain region.

*Tilled lands:* 790 acres.—Area planted in wheat, 179 acres; in corn, 8 acres; in oats, 236 acres; in barley, 113 acres.

Alpine county lies upon the summit of the Sierra range and eastward to the state line, and its surface is described as being but a mass of mountain ranges rising as high as 10,000 feet above the sea, the general level being above 4,000 feet. The eastern half of the county embraces almost the only habitations, and is watered by a number of small streams, the headwaters of Carson river, of Nevada. The Mokelumne and Stanislaus rivers rise among the mountains on the west and flow westward through the foot-hill counties into the great valley. Forming the sources of those several streams (on the east) are numerous small lakes, the most of them situated on the summit of the mountain, where it spreads out into a sort of table-land. Many of them are wild and beautiful, being skirted by belts of grass or bordered by plats of lawn-like meadow lands. In some instances they are destitute of these grassy surroundings, being closely hemmed in by dark forests or shadowed by impending cliffs of granite. There are also in this county many grassy, well-watered valleys, rendered the more attractive by their rugged and desolate surroundings. Into these the herdsmen from either side drive their cattle for pasturage during the summer, removing them as winter approaches, the snows in the higher of these valleys always falling to an immense depth.

Alpine county abounds in spruce and pine forests, the timber on the higher Sierra being of large size, while that on the eastern slope and beyond is of inferior quality; three-fourths of the county is thus heavily timbered. Mining and lumbering are the chief industries, and there is very little farming done in the county. Diamond valley, in the northeast, seems to be the only one in which lands are cultivated, even to a small extent, the crops being wheat, barley, hay, oats, and potatoes. The Faith, Hope, and Charity valleys, of the northwest, are inhabited by stock-raisers and dairymen during the summer months, and have an elevation of 7,500 feet above the sea.

## CALAVERAS.

(See "Lower foot-hill region".)

## TUOLUMNE.

(See "Lower foot-hill region".)

## MARIPOSA.

(See "Lower foot-hill region".)

## MONO.

*Population:* 7,499.

*Area:* 3,400 square miles.—Sierra mountains, with some valleys, all.

*Tilled lands:* 1,190 acres.—Area planted in wheat, 11 acres; in oats, 12 acres; in barley, 295 acres.

Mono county lies along the eastern border of the state, and is separated from other counties by the high Sierra chain of mountains on the west, which, with an elevation of 13,000 feet, forms a most effectual barrier to transportation in that direction. A central feature of the county is Mono lake, covering a length of 14 miles and a width of 9 miles, whose water is extremely bitter and saline. The northern part of the county is scantily watered by two or more forks of Walker's river, which here have their rise and unite in Nevada, after flowing through deep cañons. On the south are the headwaters of Owen's river, which is the most prominent stream of the county in that portion.

The general altitude of the county is about 6,000 feet, and, besides the Sierra on the west, the eastern part is traversed by the White and Inyo chain of mountains.

The only lands suitable for tillage are situated in the valleys among the Sierra, in small alluvial tracts along Owen's river, and on the two forks of Walker's river. The valleys chiefly in cultivation are Big Meadows and Antelope, each about 15 miles long and 5 miles wide. There is also a little land on the small streams of Mono lake and at the foot of the Sierra, where the streams have formed an alluvial delta extending a short distance out on the plain. Irrigation is necessary to insure good crops on all of the lands. The country, however, east of the Sierra to the state line, is a desert, volcanic in character, abounding in alkali beds, salt pools, and barren table-lands, and destitute of timber, excepting a few scattering willow trees. There is much spruce and pine on the high Sierras, the slopes being well timbered.

Mining is the chief industry of the county, and several large camps are located at the most important mines. There are comparatively few roads as yet in the county. One, by way of which the mail is carried, leads from Aurora, Nevada, through Blind Springs and Owensville, in Mono county, to Independence, in Inyo county. A wagon-road which cost a large amount of money has been constructed from Bridgeport, the county-seat, over the mountains, by way of the Sonora pass, to Stockton. Bridgeport may also be reached by way of the Central Pacific railroad and Aurora.

## INYO.

*Population:* 2,928.

*Area:* 8,120 square miles.—Sierra mountains, 1,950 square miles; valleys, 640 square miles; desert lands, 5,530 square miles.

*Tilled lands:* 13,864 acres.—Area planted in wheat, 1,525 acres; in corn, 1,682 acres; in oats, 791 acres; in barley, 1,686 acres; in vineyards, 22 acres.

Inyo county lies between the state line and the high Sierra Nevada mountains, the western boundary being along the summit of the latter, at an elevation of several thousand feet above the general level of the rest of the

county and 8,000 or 10,000 above the sea, some of the peaks rising to 14,000 and 15,000 feet. Parallel with the Sierra is the White and Inyo chain, lying centrally in the county, and still eastward the shorter chains of Telescope, Panamint, Armargosa, and others. The only stream of importance is Owen's river, on the west, watering a long valley of the same name lying between the Sierra and Inyo mountains. This river has its source in Mono county, on the north, and flows for nearly 100 miles southward into Owen's lake, a large body of salt water about 22 miles long, 8 miles broad and of great depth, which has no outlet. The Armargosa river, on the southeast, rises in Nevada, flows southward at first across this county into San Bernardino county for a short distance, and then turns northwest and disappears in Death valley.

The only tillable lands in the county are embraced in the valleys along Owen's river, at the foot of the Sierra, in a belt varying from a few rods to a mile or more in width and having an alluvial soil, which is very productive under irrigation. *Round valley*, on the extreme north, was first cultivated in 1865, and now produces wheat, oats, barley, etc.; it lies at the foot of the Sierra at an elevation of 4,000 feet, and is 6 miles long and 3 miles wide. *Long valley* has a length of 15 miles, and is chiefly a stock range; but numerous farming settlements occur southward to Independence. All of the country southward from Lone Pine post-office (15 miles south of Independence) and eastward from Owen's river, and embracing the greater part of the county, is a treeless and sandy desert, without water and almost destitute of grass, and is the upper part of the great Mojave desert of the south. It is interspersed with isolated mountain chains and peaks, containing patches of piñon and juniper trees, but otherwise barren. Their valleys have no meadow lands, but several contain extensive alkali flats, beds of salt, and saline and hot springs. A prominent and well-known feature of the southeastern part of the county is the Death valley, which has a length of 45 miles and a width of 15 miles, and sinks to from 150 to 200 feet below the level of the sea. This valley is described more fully on page 43. There is but comparatively little land in the county under cultivation.

Supplies are transported across the desert from Mojave, the nearest railroad station, by means of the peculiar wagon of the West known as the "prairie schooner".

#### FRESNO.

(See "Great valley region".)

#### TULARE.

(See "Great valley region".)

#### KERN.

(See "Great valley region".)

### REFERENCE TABLE OF CORRESPONDENTS.

*Alameda*.—SHERMAN DAY, of Berkeley.

*Colusa*.—W. S. GREEN, of Colusa.

*Fresno and Kern*.—N. J. WILLSON, of the Southern Pacific railroad.

*Los Angeles*.—W. R. OLDEN, J. D. TAYLOR, of Anaheim, and N. J. WILLSON, of the Southern Pacific railroad.

*Merced*.—H. KELSEY, of Merced, and N. J. WILLSON, of the Southern Pacific railroad.

*Monterey*.—ED. BERWICK, of Carmel valley.

*Napa*.—JOHN MAVITY, of Saint Helena.

*Sacramento*.—DANIEL FLINT and GEORGE RICH, of Sacramento.

*San Bernardino and San Diego*.—N. J. WILLSON, of the Southern Pacific railroad.

*San Luis Obispo*.—D. F. NEWSOM, of Newsom Springs.

*San Mateo*.—J. H. OSGOOD, E. C. BURCH, B. V. WEEKS, and W. G. THOMPSON, of Pescadero.

*Solano*.—J. M. DUDLEY, of Dixon, and G. C. PEARSON, of Vallejo.

*Sonoma*.—G. N. WHITAKER, of Santa Rosa.

*Stanislaus*.—N. J. WILLSON, of the Southern Pacific railroad.

*Sutter*.—GEORGE OHLEYER, of Yuba City.

*Tulare*.—F. G. JEFFERDS, of Farmersville, and N. J. WILLSON, of the Southern Pacific railroad.

*Tuolumne*.—JOHN TAYLOR, of Campo Seco.

*Yolo*.—R. B. BLOWERS, of Woodland.

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REMARKS  
ON  
COTTON CULTURE IN NEW MEXICO, UTAH, AND ARIZONA,  
BY  
E. W. HILGARD, PH. D.,  
WITH A  
REPORT ON THE CULTURE OF COTTON IN MEXICO,  
BY  
DAVID H. STROTHER,  
CONSUL-GENERAL.

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# COTTON CULTURE

IN

## NEW MEXICO, UTAH, AND ARIZONA.

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Since the culture of cotton in Texas has extended westward nearly to the foot of the Llano Estacado, the question of its farther progress into New Mexico naturally arises. Inquiry on the subject has elicited no definite statement that cotton is now actually grown within the limits of that territory. There can, however, be little doubt that in the southern portion, and especially in the valley of the Rio Grande, the growing season is long enough and the summer heat is sufficiently high to mature cotton and render its production, at least for local consumption, remunerative. Irrigation is of course required for this as for all annual crops in that region of scanty rainfall.

As regards Utah, the successful cultivation of cotton has been reported from its southwestern portion, near Saint George, in the valley of the Virgin river. Beyond the general statement given above, no information on the subject is available. The inhabitants of the region in question may hereafter find in cotton a crop that can be successfully grown on land too much charged with "alkali" to be utilized for the production of broadcast or less deeply-rooted crops.

Regarding cotton culture in Arizona, some interesting data have been obtained through the courtesy of Governor John C. Frémont, who, upon request, gathered all available information through officers of the army and through intelligent citizens.

It appears from the subjoined abstracts of letters received that cotton has long formed one of the crops of the Pima Indians, who used it in place of wool for making their blankets, but abandoned the culture upon the advent of the Americans, from whom they could procure better blankets in exchange for wheat. Subsequent culture experiments by white settlers have also been successful, so that the subject has passed beyond the experimental stage; and it appears, from the report of Lieutenant Hyde, that near Yuma cotton-plants grow for several years without any special care—a state of things obtaining also in southern San Diego county, California. In the Laguna district of Coahuila, Mexico, the cotton-plant, according to the report of Consul Strother, bears crops for ten years without replanting; and it is obvious that a similar system could be followed in southern Arizona. This, of course, diminishes the cost of cultivation not immaterially, and on this ground Arizona might compete with other cotton-growing states, provided the staple be of acceptable quality. The two samples of fiber from two-year-old plants given in the table of measurements point to the conclusion that such fiber is shorter, and probably coarser, than that from the first year's crop, but that the strength is high. In regard to the proportion of seed to lint, the two determinations give diametrically opposite results, the Yuma cotton having given only 24.16 per cent. of lint, while that from National City gives 39.78 per cent. It is extremely desirable that these points should be farther investigated. It does not seem quite easy to obtain full information as to the relative merits of cotton from annual and older plants, which is doubtless in possession of the planters of Coahuila.

Irrigation is needed for cotton in Arizona as well as in southern California; but it must be borne in mind that cotton, on account of the great depth to which its tap-root goes for moisture, will do with less water than most other crops, especially after the first year. Since, moreover, it is not at all sensitive to alkali, it is probable that much land not available for grain could be used for cotton production in Arizona as well as in California. The exact scope of profitable agriculture in the territory is, as yet, too uncertain, both as to quality and quantity, to warrant confident predictions, the more as the opening of Mexico to railroad communication will bring into competition factors as yet unknown; but it can hardly be doubtful that, among culture plants deserving of earnest attention, cotton occupies no unimportant place.

### ABSTRACT FROM A LETTER OF CHARLES T. HAYDEN, HAYDEN FERRY, MARICOPA COUNTY, ARIZONA.

Many farmers in this (Salt River) valley have in different years planted a little cotton, and they and others who have examined it are satisfied that it could be successfully raised. With the abundant water-power I have here (24 feet fall and an abundance of water) a mill to manufacture heavy cotton cloth, such as goes so largely into consumption in this part of the territory, would enable planters and mills to be successful without doubt if conducted with ordinary economy and intelligence.

The Pima Indians, before Americans occupied this territory, and for a few years after, raised cotton on the Pima reservation, enough to make many blankets for their own use, woven after the style of the Nayajo blanket, substituting cotton for wool. The facility for buying American blankets with wheat after the occupation of Arizona by our government caused the discontinuance of raising cotton by said Indians.

## ABSTRACT FROM A LETTER OF LIEUTENANT M. E. HYDE, EIGHTH INFANTRY, FORT YUMA.

Mr. David Neahr, one of the oldest merchants of Yuma, raised in 1860 about 200 cotton-plants on the flat below the mouth of the Gila river, on the Arizona side. Some seed were planted in February and some in March, the latter doing best. The plants grew rank and luxuriant, and the crop was ready to pick by July 4. Of course irrigation was necessary. This was a family experiment. The sample sent to you is from a plant in the quartermaster's department grounds, which has been growing for two years, and possibly longer, without any special attention.

## REPORT ON THE CULTURE OF COTTON IN THE REPUBLIC OF MEXICO.

[The subjoined report on the cultivation of cotton in Mexico was obtained through the state department at the request of the Superintendent of Census.]

The cotton-plant is supposed to be indigenous on the gulf coast of Mexico, as Cortes, on his first landing, found the natives clothed in cotton fabrics of their own manufacture. It is said to be an exotic on the Pacific side, but the reasons for this opinion are not so satisfactorily stated. Its culture has been continued to the present day throughout the country, but with very little improvement in the modes and methods which existed at the time of the conquest. The principal cotton-producing states are Vera Cruz, Guerrero, Jalisco, Sinaloa, Chiapas, Oaxaca, Colima, Michoacan, Sonora, Chihuahua, Durango, and Coahuila.

From the states of Chiapas, Oaxaca, Michoacan, and Chihuahua I have not been able to obtain any reports whatever.

While this leaves us without a basis for even a conjectural estimate of the whole amount produced in the republic, we may nevertheless suppose that the general conditions of production and preparation for market are very nearly the same in these states as in those from which we have heard. In regard to the question of wages, it should be observed that the figures named in the majority of the reports represent the prices paid in or near the maritime cities, or in the northern districts where the wages of laborers are affected by their propinquity to the United States. In the interior and remote towns and districts of the republic the wages of labor seldom exceed a real (12½ cents) per day, sometimes without food, and sometimes with the addition of a small measure of corn (cuartillo), equivalent to about three pints, and worth about 6½ cents. It would therefore be safe to estimate the average cost of labor in Mexico at 20 cents per day. From the foregoing figures it is evident that the condition of the common laborer in Mexico is very humble; yet, in view of the cheapness of living and the small requirements of life in this climate, this per diem is adequate to his maintenance, and, considering the inefficient and primitive methods used, his labor is not worth more than the wages paid.

The native operatives in the factories are better paid, and, under the superintendence of Europeans or directors of experience, are esteemed excellent factory hands, quite equal to the average of those employed in England or the United States. Indeed, they seem to possess a special aptitude for all work requiring patience and delicate manipulation, and exhibit a high degree of the imitative faculty which characterizes the Chinaman. What they seem to lack is the capacity (or habit) of organization and the ability to manage fine and complicated machinery. For the rest, the childlike improvidence and recklessness of the future which characterizes the laboring masses of this country is the principal barrier to their intellectual and material improvement.

The usual time for planting cotton is in June and July, according to the greater or less amount of moisture contained in the soil selected, and they begin to gather the crop in February.

In this brief report I have embodied all the information I have been enabled to gather on the culture of cotton in this country, regretting that my report is necessarily so vague and imperfect.

## VERA CRUZ.

The product of this state is estimated at about 8,000,000 pounds per annum. There are no data to enable us to estimate the product per acre, as land in this state is not measured by the acre, but rudely estimated by the square league, or by the still more unreliable standard of the "caballeria", which signifies as much as a horse can travel round in a day.

The plant, however, grows so vigorously that each stalk yields from two to five hundred pods, and it is calculated that the average yield to the acre is about 15 per cent. more than in the United States.

After selecting sufficient seed for the next year's sowing, the remainder is used as fuel, cattle feed, or to manure the land. The seeds are separated from the lint almost universally by the steam cotton-gins from the United States.

The field labor in the cultivation of cotton is performed in the most primitive manner and entirely without the aid of modern improved implements. The wages paid a laborer in the vicinity of Vera Cruz is fifty cents a day and maintenance, or sixty-two and a half cents without. In remoter sections of the state these figures may be reduced to one-half.

## GUERRERO.

It is estimated that this state produces 5,300,000 pounds of cotton in the seed, about one-third of which, 33½ per cent., is pure fiber. We have no data to calculate the average produce per acre and no means of even approximating the amount of land under culture.

Under the present system the great proprietors do not find cotton culture profitable, and consequently it is chiefly raised by small renters, who cultivate it in irregular patches by their own labor and the assistance of their families.

In view, however, of the fertile soil and favorable climate of this region, it is believed that in the hands of more enterprising and intelligent cultivation the states of Guerrero and Oaxaca could be made to produce more cotton than all the southern states of the American Union combined.

The cotton crop of Guerrero is cleaned by 13 American steam gins, 2 water-power and 3 horse-power gins. The seed is used for fuel and cattle feed.

The average pay of laborers is 37½ cents per diem.

There is one cotton-mill in the state, with forty-eight looms, manufacturing goods for local use. There is also a considerable amount manufactured by hand looms. The remainder of the crop is sold for the mills of Michoacan, Jalisco, Colima, and Sinaloa. The pure lint brings 15 cents per pound, and is packed in bales weighing 150 or 160 pounds each.

## JALISCO.

The crop in this state is about 2,000,000 pounds per annum. There is no conjecture as to the acreage under cultivation.

It is estimated that an acre will produce 1,000 pounds of seed-cotton, of which one-third is pure fiber. The wages of laborers are from 37½ to 50 cents per diem. The seed is used for fuel, cattle feed, and manure.

American steam cotton-gins are generally in use to prepare the crop for market.

## COLIMA.

The annual crop of this state is stated at 257,000 pounds. Replies in response to all other questions are the same as for Jalisco.

## SINALOA.

The estimated annual crop of this state is 1,750,000 pounds. The average yield per acre is estimated at 1,050 pounds; of seed, 700 pounds; of pure fiber, 350 pounds. The seed is used for fuel at the gas works—one-third cotton seed and two-thirds coal. It is also used for cattle feed, and is sold at 75 cents per quintal. The average wages of laborers are 50 cents per diem, and in remote localities 25 cents per diem and maintenance.

The American steam cotton-gin called the Eagle, is the only machine used in this district. There are three cotton factories in operation in Sinaloa, but the whole crop of this state, two-thirds of that of Sonora, and considerable importations from Guerrero, all combined, do not suffice fully to supply the mills.

The crop in this region suffers from superabundance of rain and from insects, and is considered very uncertain.

## SONORA.

The crop of this state averages about 1,000,000 pounds per annum, and the responses to other questions are the same as in Sinaloa. Three years ago the culture of cotton was introduced into Lower California, and the crop is reported at 500,000 pounds. The crop is said to be more certain there than elsewhere in Mexico, and is of decidedly superior quality. Its culture is now engaging the attention of landholders in that section, and great hopes are entertained of its future.

## DURANGO.

The annual product of this state is estimated at 4,000,000 pounds; the product per acre at 1,500 pounds, yielding 420 pounds pure lint. The American steam gin and some few horse-power gins are some of the machines used for cleaning the cotton. The seeds are used for heating steam-boilers and for feeding cattle.

Laborers' wages are nominally 75 cents per diem, but, being paid in high-priced goods, they are equivalent to not more than 30 cents in cash.

Cotton gatherers are paid from 12½ to 25 cents per aroba (25 pounds), and an active man can gather six arobas in a day. The crops suffer very seriously from the attacks of vermin, such as worms, locusts, and pocks (*viruela*).

## COAHUILA.

The annual production of this state is estimated at 3,000,000 pounds; last year's crop, being a partial failure, did not probably exceed 1,250,000 pounds. Machinery, wages, and other details are the same as in Durango. In the Laguna cotton is perennial and does not require to be planted oftener than once in ten years. This district, containing about 1,200,000 acres, lies partly in Coahuila and partly in Durango. It is of extraordinary fertility and well adapted to cotton, but is very little cultivated, and the cotton product of Coahuila is diminishing yearly.

# INDEX TO COTTON PRODUCTION IN CALIFORNIA.

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