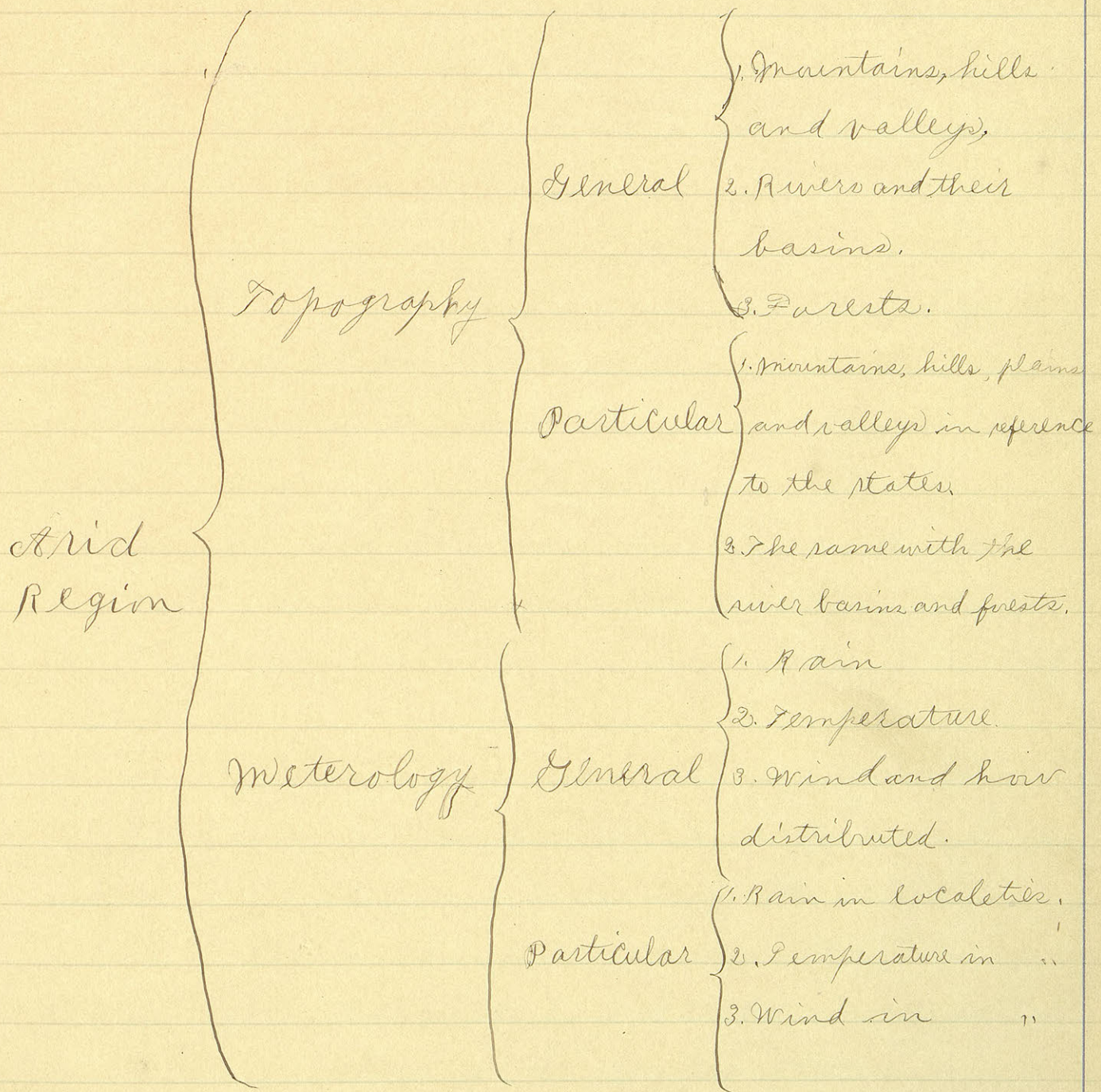


*The Topographical and Meteorological
Features of the Arid Region.*

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This subject will be considered under two principal heads.

1st the topography; and 2nd the meteorology of the Arid Region.

I. First let us consider its topography.

It would probably be best to give its boundaries and dimensions first in order that its extent and size may be well in mind.

It is included between the 100° and the 124° of west longitude, and north and south between the 43° and the 27° of latitude.

In other words it includes the western half of Kansas, Nebraska, the Dakotas, and the whole of California, Wyoming, New Mexico, Idaho, Utah, Arizona, and one third of Washington. Not including Alaska it amounts to about one third of the United States.

Its greatest width from East to West is about 1300 miles, and from north to south 1000 miles.

Considering it as a whole, we find that topographically it divides itself naturally into three grand divisions, which though not arbitrary may be used in describing its general

topographical features.

(a) The first is the plain region.

This is a region mostly made up of plains. It runs north, and south from the British line to the lower portion of the Rio Grande River in the state of Texas, and East, and West from the 100th to the 105th degree of longitude. Its altitude is greatest furthest north, and from there it slopes gradually downward toward the sea. It attains a maximum height of about 5000 feet above the level of the sea and 1500 feet as a minimum.

There are but few streams, and they all have their sources in the mountains.

(b) The second division includes the whole of the intramountain region, from the foot hills of the Rockies to the Sierras of California. This region lies between the 105th, and 120th degree of longitude, and north, and south from the British line to New Mexico.

We find this region is thickly interspersed with barren desert tracts. It consists largely of plateaus, and this is especially true of California, and Nevada.

Arizona is made up largely of tablelands.

(c) The Pacific Coast division embraces the

state of California between the 120th degree of longitude, and the Pacific coast, and between the 40th and the 31st degree of latitude. It embraces two great mountain regions; the Sierra Nevada, and the Coast Range running northwest, and southeast respectively. The former varies from 6000 to 8000 feet in height, and the latter from 1000 feet to 6000 feet in height, above the sea level. The Sierras extend along the East border of the state for about 460 miles. The Coast Range extends along the entire length of the West border. The average width of the Coast Range is about 65 miles, while the Sierras average only about 80 miles in width.

The valleys of ~~the valleys~~ the Coast Range are long, narrow, and shallow.

In the South Eastern part lies the Colorado desert, which is 170 miles long, and 70 miles wide.

This is essentially a lake region. There are many both small, and large in various parts of the state, and some of them are very high. About the base of the Coast Range are gently sloping table lands from 200 feet to 250 feet above the valleys in between.

The beds of the streams are actually higher than the surrounding country. Without reference to divisions of any kind the arid Region has the following

characteristics: as a rule the lowest lands lie furthest south. There is much land with but little vegetation all over this region.

There are also canon lands carved by numerous streams which have cut deep winding gorges like huge fissures in the earth's crust, and which vary from a few feet to hundreds of feet in depth. There is also a great extent of alluvial lands where every stream heads in a precipitous gulch. There is further a great area of mesa land, and plateaus which have their surfaces dotted with numerous buttes or fragments left by storms.

There are often lines of cliffs extending across the country on the margins of plateaus.

Rainfall.

The rain is very unequally distributed in the arid region. It is concentrated greatly in the mountains while the valleys, and plains usually have but very little. If the rainfall was equally distributed it would be fairly large. It varies from 3 inches on the plains to as high as 60 and 70 inches on the mountains. Generally the rain increases from north to south which is due to the configuration of the coast, and the ocean currents. It also increases from the low lands to the high lands as before stated. 20 inches would probably be a fair

average for the whole. The evaporation is greatest in California, and Arizona.

On the central part of the plain region there is not more than 18 inches of rain annually, and farther west it falls from 15 to 12 inches.

Temperature.

This varies in the whole from 40° below zero to 120° above in the shade. The temperature decreases from from the level of the sea to the summits of the mountains.

General Forestry.

There are two kinds of forests.

First, those which grow on the highest mountains.

Second those which grow on the plateaus.

Some of the principal varieties are pine, spruce, sequoi, and fir.

The area covered by these forests is about one tenth of the whole: but rarely are these forests dense. Large stretches of prairie often intervene so that one quarter of the space would hold them all.

Prison, cedar, and dwarf oak are also plentiful. It is estimated that there is nearly 130,000 square miles of these alone. Taken as a whole there is perhaps one fifth of the entire ~~and~~ region covered with scattering forests.

The plain region is practically without trees except

now and then a few clumps, and grooves along the streams. These clumps average from 100 feet to one half a mile in width. They are mostly cottonwood, elm, boxelder, and hackberry. This timberless region embraces about 400,000 square miles. There are however a few mountains, and hills within this region, which are usually wooded. It is estimated that not more than two percent of the plain region has timber. The mountains on the other hand are nearly always heavily timbered. For example of the 269,881 square miles embraced within the Rocky Mountains twenty two percent is estimated to be timbered.

II. The description of the rivers of a country, and their drainage systems, the general lay of the country through which they flow, etc is a great aid in describing its topographical features; so we will now observe the most important rivers, and give a topographical description of their basins or drainage systems.

1. Arkansas River. The banks are generally low, and the bed is constantly changing. The river rises in the Saguache Mountains in the central part of Colorado and flows in a southeasterly direction through the state. To the north of the river in Colorado is a wide extent of level plains. To the south there are a few short detached mountain ranges, but it is generally as on the north a great plain region. The Arkansas enters Kansas at

about the middle, and flows southeasterly cutting off a huge corner of the state. This portion of Kansas both north, and south is a vast plain region.

2. Missouri River. This river is formed by the union of the Madison, Galatian, and Jefferson rivers, which are all running west of our national park. The catchment areas in the main are similar in character.

The drainage system is generally mountainous the sides being steep but as a rule heavily timbered.

3. Yellowstone River. This river has its source in the northwestern mountains of Wyoming and flows southward through the national park.

4. Malheur River. This river is mostly in Eastern Oregon & it receives the drainage of the Stern mountains a range extending southward into Nevada. The river has two main tributaries, the Willow, and Bully creeks. The northern, and middle forks of the main river have their source in the same range of mountains with a low divide between them. Timber is abundant at the heads of all the forks.

5. Snake River. This and its tributaries received all the drainage of Wyoming west of the continental divide, of Idaho, below the 45th parallel of latitude, of southeastern Oregon, and northeastern Nevada. The river has two forks. The northeastern fork is divided into three areas.

(a) Henry Lake.

(b) Fall River basin.

(c) Teton River basin.

Henry Lake is the real head of the North Fork. This is a shallow lake about seven miles long, and one to three miles wide. Its elevation between its water shed and the Madison River in Montana is very low.

The South Fork flows into Jackson Lake, and from there it flows southwest through Wyoming receiving all the drainage between the Teton Range and the continental divide on the East. After leaving its canon, and entering Snake River valley it flows in several channels in time of floods.

d. The Truckee, and Carson Rivers.

These rivers rise in the Sierra mountains, and flow easterly. Lake Tahoe is in the drainage system of the Truckee. This is the highest lake of its size in the United States. It has a surface of 195 square miles. The drainage of the Truckee lies between Colorado and Nevada.

e. Sevier River.

The river Sevier rises north of the Grand Canon in the highest plateaus of Southern Utah at an elevation of from 7000 to 10000 feet above the sea level, and flows in a northerly direction through deep canons, and narrow valleys, for about 170 miles, when it turns due north.

8. Owyhee River.

This river has its source in three states. The Northeast fork rises in the southwestern corner of Idaho, and flows northerly uniting with the main river near the junction of the North, and Middle forks. The upper catchment of the Owyhee is broken, and rocky alternating with barren desert land.

Most of the time the river flows through rocky canons, and it has carved deep channels in the open valleys. The country adjoining the canons is wild, and rough with the mountains on the west, and lava beds on the east. It is but nine miles before entering the Snake River it leaves its canons, and enters the broad Snake River valley.

9. Weiser River.

The Weiser rises in Washington Territory. Its source is very close to the sources of the Payette, and Little Salmon rivers, a high divide separates the the Weiser from the Payette which forms the principal water sheds of both rivers. The Weiser as a rule is very high and rapid. Its lower portion however is only 2100 feet above the sea level.

10. Wood River.

The Wood river rises about forty miles above its confluence with the Little Wood. There is very little surface drainage into the Wood owing to the lay of the surrounding country.

From its source to its junction with the Little Wood on each side is a large bed one to five miles in width. Between Wood, and Paise cities there are eight small creeks, whose channels are nearly parallel to each other, and equally distributed throughout this area for a distance of eighty miles.

11. Colorado River.

This river rises in Wind River mountains, and runs in the main from north to south for 200 miles. It drains a large part of Wyoming, Utah, and Colorado. Four fifths of the upper drainage basin of the river rises from 5000 to 8000 feet above the sea level. About the rim of this basin are the Wasatch, and Uintah mountains on the west, and Wind River, and Rocky mountains on the east. Some of the canyons formed by the Colorado are from 2000 to 5000 feet in depth.

12. Salt, and Verde Rivers.

These rivers head in a range of cliffs which extend across Arizona from the Colorado River to the San Francisco mountains. They cut off the low lands on the south, and west from the plains above, south of the Colorado plateau. There are many high mountains on this plateau.

13. Fall and Seton Rivers.

These rivers have basins similar in extent and elevation.

Their catchment areas are separated by a spur of the Teton Range. Fall River has a decided, and continuous slope after leaving the foot hills while the slope of the Teton is very slight.

14. Bear River.

The Bear rises in the lofty Uintah Range of North-eastern Utah, and flows on through the South-western corner of Wyoming a high rolling country mostly devoted to grazing. During west it crosses the line again into Utah, and then again into Wyoming. From Wyoming it turns west into Idaho where it enters a large valley. On Idaho is a lake which acts as a equalizer for the Bear which flows into it. The Southern half of the lake lies in Utah.

III. In order to study the localities of this region more completely, and definitely let us next take one by one each of the states included in this region, and to localize its topographical characters as well as its forestry, and meteorological features.

The States on the Northeast boundary are made up largely of prairie, and plains. There are two main mountain systems, however, the Black Hills, and the Furtle Mountains, which are nothing more than hills. The Black Hills cover about 800 square miles while the Furtle mountains cover only about 800 square miles.

climate. The rainfall averages from 20 to 24 inches, and occurs mostly in the spring. The rainfall varies much in different parts.

The forests are very limited in extent.

Montana.

The eastern part of this state is mostly bench lands, but it is usually heavily timbered. The river valleys are usually long, and narrow. For example the Yellowstone River is 400 miles long, and only three miles wide, on the average. Such streams both large, and small usually present similar features.

From the valleys the rise is somewhat precipitous to the mesa lands from 600-1000 feet above the bottom lands. These table lands are usually covered with wild grasses. These mesas are mostly in the eastern part of the state, while the western part is more rugged, and mountainous. On the upper benches of the valleys are usually small hollow like depressions.

Forty five percent of the mountains of Montana are covered with forests.

The rainfall is mostly in showers of short duration. From November to the first of March the average rainfall is from three to four inches.

The temperature varies with the altitude as elsewhere. At 4000 feet above the sea level it averaged about sixty-eight degrees.

New Mexico.

This state is largely made up of mesas, much of which is high, and barren. The valleys along the streams are usually narrow with high bluffs overlooking them. About the bluffs are the mesas or table-lands. There are a large number of streams flowing east through the state which have their sources in numerous springs. The mountains cover a large portion of the northern part, and they are scattered all over the state in detached groups.

On the north, and south sides of the Rio Grande, which runs through the middle of the state, there are ranges of mountains extending nearly through the state.

About one sixth is covered more or less with forests. Over two thirds of this is in the mountains.

Most of the rain occurs in the latter parts of July and August.

Colorado.

The upper portion of this state is largely pastoral, with many lofty mountains, and high plateaus.

The drainage basin of the Arkansas River in this state varies from rough rugged mountains through broken foot hills to level plains. In the mountain region west of the Arkansas Valley is found three of the highest ranges in the state.

Some of their peaks reach 14 000 feet above the sea level, and there are very few below 10 000 feet.

The Wet, and Spanish Mountains all rise directly from the plains.

The Eastern part of the state is mostly plains while the Central, and Western parts is thickly interspersed with short detached mountain ranges, and numerous streams coming mostly from these mountains.

The timber is found almost entirely in the mountains. The best timber is quite high up in the mountains. As a rule it is thin, and scattered over a large area. Pine and spruce are the principal varieties.

To be more specific there is about 15 400 square miles of timber, and all of this is in the mountains, except about 1000 square miles.

The rainfall is mostly in the form of showers of short short duration. On the mountains the precipitation is much heavier than on the plains.

Nevada.

This state on the average is about 4000 feet above the sea level. As a whole it is somewhat like a bowl surrounded on all sides, by mountains, which are usually low.

• About one third of the state is covered with timber, about one third is pasturage, and a good part of the

rest is desert land. ~~as~~ in some of the other states the timber is very scattering, and confined to the mountains in the Central, and Northern parts.

The rainfall on the plains is very small, but up in the mountains it is plentiful.

California.

The upper lines of drainage of this state are through easy slopes, and valleys terminating in the deep, and rugged canons of the main river. Eastward of this the ground is more level, and sloping. It is in fact a great flat table land extending from the peaks of the Sierras, with an easy incline to the west. This table land is cut, and eroded by numerous streams, which flow far beneath the surface of the ground, in rugged canons, often several thousand feet in depth.

The Yosemite Valley at the Western edge of ^{this} region is a typical example. The valleys of this region are few, and very narrow. On the upper portion, and last belt of the Sierras, there are many natural lakes, swamps, and open meadows.

The peaks of this region often reach 10,000 feet above the sea level. ~~at~~ its lower altitude there are many narrow valleys, through which small streams flow. A large portion of the state west of the Sierra Nevada range, is forest clad. Firs are found on the

higher altitudes, and pines mostly on the lower. These areas of timber are frequently interspersed with rugged bare granite mountains.

When you leave the mountains for the first 100 miles perhaps there is not more than ten to fifteen inches of rain.

On the southern part the rainfall varies from twentyfive inches on the sea coasts, and mountains to three and four inches in the deserts. The rain in the deserts occurs mostly in summer.

Texas.

The northern part of the subhumid region of this state is usually of undulating plains broken by stretches of hilly land. On general the surface is a rolling prairie covered in places by timber. Low mountain ranges run all through the state, and many small streams have their origin in them. The plains have an altitude of from 2000 to 3000 feet above the sea.

The rainfall varies much in different parts of the state. Between the Pecos, and Rio Grande rivers, it is from 10 to 17 inches. In other places it averages from 17 to 30 inches annually.

The country is subject to many hot dry winds.

Arizona.

An extensive range of cliffs runs through

this state. There are also a number of detached ranges of hills, and mountains especially in ^{the} northern, and northwestern parts.

The eastern part is more of a plain region, and especially the east central part.

In southern Arizona, the streams are few, and small. In this state there are many uninhabitable deserts. There are some districts just below the sea level, and others just above it. There are many areas covered with sand, and stony fragments with but little vegetation.

The rainfall is very slight except in the highest mountains.

The rainfall varies from three and a half inches on the plains, to twenty four inches on the mountains.

Washington.

About one third of this state is subhumid, and the rest is arid. The Cascade range runs north and south through the western third. To the east of this region is mostly a plain region broken now, and then by a detached group of hills. The western part is more mountainous, and rugged.

The rainfall west of the Cascade Range is fairly heavy.

East of the Cascade mountains the winters are short, but often severe. There is seldom any snow.

before Christmas, and it usually melts in a few days, due to the Chinook winds.

Idaho.

The entire eastern boundary is bordered by the Bitter Root Mountains. There are also a number of detached mountain ranges, and groups of hills especially in the southern part.

The whole of this state is practically a desert region, which is mostly desert, and barren.

The timber area embraces about 9140 square miles, and lies mostly north of the Snake River in the mountains. South of the Snake River it is almost destitute. West of the Wahsatch Mountains, it is almost timberless, with the exception of a few mountain ridges, which are timbered.

The rainfall on the low lands, is about the same as in Eastern Washington. On the mountains there is much more.

Utah.

This Territory is very mountainous. The Uintah Mountain range runs through the Territory, from southwest to northeast. Besides this principal range there are a large number of smaller ranges, and detached groups, all over the Territory. On the southern part, is the Great Salt Lake the largest of its kind in the United States.

To the west of this lake, and extending over a vast area, is a barren desert land. There is a large number of small streams, especially in the Southern part, which mostly have their sources in the mountains.

The rainfall of Utah does not average more than eight inches per annum, but it is sometimes more or less than this.

West of Wahsatch mountains it is almost timberless, with the exception of a few mountain ridges. It is estimated that all told there is about 6000 square miles of timber which is mostly in canons, and inferior in quality.

Oregon.

The western third of this Territory is very similar to the western third of Washington, both as to climate, and topography. The same may be said of the eastern parts of these two territories.

The Southern part has a number of detached mountain ranges, and also a number of small lakes.

South of the Snake River the rainfall is not more than 15 inches. The average rainfall of the whole however is about 20 inches.

The average temperature is about 52°.

The timber area includes about 30,000 square miles, and is mostly in the western mountain ranges and the Blue Mountains of the northeast.

Wyoming

This is another very mountainous Territory. This is most marked in the southern, and western parts, while the plains lie in the central, and eastern parts. As in some of the other Territories there are a large number of detached mountain ranges. Between these mountain ranges the country spreads out in rolling plains cut in many places by streams both large, and small, which usually have their sources in the mountains.

The rainfall is similar to that of Oregon.

The forests embrace about one ninth of the Territory, and are nearly all in the mountains, covering a total of 11480 square miles out of a total of 12060 square miles in the Territory.

Having as yet taken up only the very general characters of this great Region it would be both interesting, and instructive to go further into details, but within the scope of the present work it is impossible to do this, so I must bring this most interesting of subjects to a close leaving its continuation.