CHAPTER XII.

STATES OF THE SEMIARID REGION.

THE location of the semiarid region has been shown in Fig. 2 (page 14), and a definition has been given of the location of the area. There are also in western Oregon and Washington narrow belts which may be designated semiarid; but the transition between arid and humid conditions in those states is so quickly made that these regions are not generally recognized.

There has been no careful distinction made between the use of the words "semiarid" and "subhumid," and they are considered as practically synonymous, since both are relative, the term "semiarid" implying a little drier condition than "subhumid." As shown on the map (Fig. 2), the semiarid region extends in a broad belt across the United States, in a general northerly and southerly direction, and is included mainly within the states of North Dakota and South Dakota, Nebraska, Kansas, Texas, and the Territory of Oklahoma.

FLUCTUATIONS IN WATER SUPPLY.

The broad belt east of the arid region and forming the debatable ground between it and the humid

lands of the Mississippi Valley presents conditions so nearly uniform that it may be considered as a geographic unit. No definite boundaries can be assigned, because of the fact that for a number of years in succession summer rains may be above the average and the vegetation will be luxuriant, so that in driving across this land it seems to be a perfect flower garden and a paradise for cattle; while again the rainfall may be deficient year after year, vegetation become parched and almost disappear, and the traveller will apply to it the old term, the "Great American Desert." Thus it has happened that one or another of the early pioneers has spoken in glowing terms of the fertility and beauty of these high plains, and others with equal sincerity have described the horrors of the long, thirsty drives across the sterile wastes.

The alternations in the amount of moisture are best marked by small, shallow lakes which sometimes dot the plains, especially toward the north. After a cycle of wet years these are found scattered here and there; but they disappear again, and leave no trace of their existence except by muddy flats or stretches of hard-baked adobe. Another way of describing the conditions is to say that the arid conditions at times creep down the slopes of the high plains and extend far eastward, and again retreat to the base of the Rocky Mountains, swinging backward and forward without any known rule or regularity. As the soil is

very fertile, there is constant temptation for the settler to push westward from the humid East during seasons of abundant rainfall, with the result that after he has begun to make a home he is overtaken by the reverse swing of climatic conditions, and suffers from successive droughts. These usually force him to abandon his farm and improvements, through continual loss of crops.

This peculiar condition of rich soil and fickle rainfall is common to all regions of the globe where great famines have occurred. The extreme productiveness of the soil after a heavy rain encourages an extension of agriculture and a general lack of thrift, so that often when the crops do fail population has increased rapidly and little provision has been made for meeting continued losses. In the popular mind nearly every probable and improbable cause has been assigned for this change of climatic conditions, and with limited range of observation it has sometimes been assumed that the rainfall is continuously increasing or diminishing. By selecting periods of five or even ten years it has been possible to support either theory.

It has been for the interest of speculators in land and of transportation companies to adopt the theory of gradual increase of available moisture on the Great Plains, and the results attained from about 1880 to 1886 seemed to support the conclusions. It was asserted that the rainfall was increasing as settlement advanced westward, or, in other

words, that rain came with the breaking of the sod, the building of railroads, telegraph lines, and other works. The people who adopted this theory were locally known as "rain-belters." They showed their confidence in the theory by taking up land in advance of permanent settlement, far out on the plains, confidently believing that the rain-belt would reach them before long. They were disappointed, however, and as year after year rolled by without perceptible increase in moisture, and with continually recurring losses of crops, they became discouraged or literally starved out. The homes of some of the rain-belters are shown on Pls. I, III, and LIX, *A*.

There has been a succession of waves of settlement following years of unusual rainfall, and time and again men have pushed forward, getting a foothold and raising one or two crops, and then dropping back. This is shown by the statistics of population of western Kansas, the numbers rising and falling through series of years.

One of the results of climatic oscillation in the subhumid region, and of the ruin wrought by lack of knowledge of the facts, was the speculation in Western mortgages, which affected not merely the plains region, but also citizens resident in all parts of New England and the East. As the rain-belters marched triumphantly westward, they found that their movements were facilitated by companies formed to place loans and take mortgages on real

estate. The profits of these loan agencies became so great that large numbers of them were formed, and competition for business became so keen that ordinary prudence was thrown aside, and the settler no longer sought for a person to make small advances of capital by which he could procure tools and seeds. No sooner had he located than rival agents hunted him up, to bid against one another for the privilege of placing a mortgage upon his farm. These mortgages, being for a few hundred dollars, were then peddled out to small investors throughout the country, being purchased by schoolteachers, clerks, and mechanics, who had laid up a small amount of money and were seeking the largest possible interest.

Although the crop from one of these farms would, in a year of abundant rainfall, pay off the mortgage, this was not done, because of the desire of the settler to purchase more farm implements or obtain additional land; and when a series of dry years came and no crops were had season after season, the landowner, appreciating that the mortgage and interest amounted to more than the farm was worth, simply abandoned everything, and thus whole counties were practically deserted; about the only inducement to maintain the county organization being the fees obtained by the officials in connection with the mortgage business. This business has continued because of the fact that Eastern mortgagees, not knowing the true conditions, have often foreclosed, or transferred their interest, or continued to pay taxes in the vain hope that the land may some time be worth what has been loaned.

It should not be assumed that every one has left the subhumid region; on the contrary, among those who have tried their fortunes there are some who have clung with great tenacity, and who have been able to adapt themselves and their methods of farming to the conditions. They have introduced irrigation, as shown on Pls. II. and IV., or have practised tilling of the soil in such a way as to conserve the moisture, and have usually been able to cut and stack sufficient hay to maintain their cattle throughout the short winter. The vacant public lands and the abandoned holdings about them have furnished ample grazing for small herds, and by planting sorghum and hardy varieties of small grains they have been sure of a fair return for their labor. When the years of abundant rainfall occurred, they have sometimes been able to secure a large crop of wheat, or even corn, whose value has reimbursed them for all of the previous outlay.

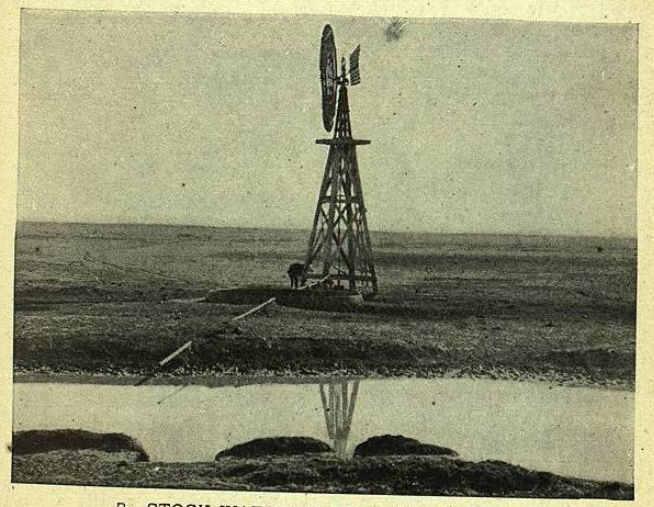
These sturdy pioneers have sometimes displayed great ingenuity in utilizing the resources about them; such, for example, as seen in the construction of homemade windmills, shown on Pl. XLII and described on page 266. By means of these mills water has been pumped to the surface and

held in small reservoirs, or dams have been built across ravines, impounding storm waters. The experiments and success attained have shown that it is possible for farmers of a high order of intelligence and perseverance, not only to make a living, but even to secure a competence, in this region of uncertain rainfall.

Although it is now well known that the amount of rainfall cannot be influenced by human agencies, yet it is possible to greatly increase the available supply for plant life by storing the water in the soil through careful cultivation and by preventing evaporation losses through planting wind breaks. It is estimated that every foot of height of compact trees protects 1 rod of ground; hence a Lombardy poplar wind break of an average height of 60 feet, properly set out, has a beneficial influence extending practically 1000 feet to the leeward. For these breaks poplars, cottonwoods, or locusts are serviceable. By practising all these economies, shutting off the wind as much as possible from the fields and using it for pumping water, storing the scanty supply in reservoirs or in the soil itself, the observing, careful farmer wins success where others fail.

For convenience the boundary of the subhumid or semiarid region has been placed on the east at the 97th meridian and on the west at about the 101st. It is a region of extremely fertile soil, the erratic rainfall being followed by rapid growth of

A. IRRIGATION IN SOUTH DAKOTA BY USE OF WATER FROM AN ARTESIAN WELL.



B. STOCK-WATERING PLANT ON UPLAND.

grasses and other plants valuable for forage. The ground is almost everywhere covered with a tough sod (Pl. LXII), which thins out toward the arid region, gradually breaking into small patches and finally forming what is known as bunch grass, each tuft being surrounded by bare soil.

The water supply of this region is for the most part concentrated in a few rivers, from which irrigation canals can be taken. The principal exception to this is the Missouri River, which flows across the northern end of the subhumid belt. The fall of this stream is so slight that it is impracticable to divert water by gravity. Some of it may be had by pumping, but the increase in value of the bottom lands would not be sufficient to justify the expense, as many of these are kept moist by seepage. The bench lands, having in general a better soil, cannot be reached by a canal from the Missouri River.

Southward from the Missouri, in North Dakota, the principal rivers are its tributaries in South Dakota, also the Platte in Nebraska, the Republican, Smoky Hill, and Arkansas in Kansas, and the Canadian in Texas and Oklahoma. The Platte and Arkansas have cut their way entirely across the subhumid region and receive the drainage from the Rocky Mountains. Some of this water succeeds in finding its way from the mountains to the Mississippi River, but during the summer the entire supply is needed for lands

within the arid region, and for several hundred miles these streams are nearly or quite dry. Extensive irrigation systems have been built in western Kansas, notably in the vicinity of Garden; but the chances of obtaining water are so precarious that the owners of the canals have become discouraged, and neglect to keep them in repair.

During the time of abundant rainfall irrigating ditches in the subhumid region fall into disuse, and the irrigator, for lack of practice, becomes indifferent. As a result, when the rains no longer come, and day after day passes without relief, and attention is drawn to the necessity of irrigation, it is usually found that, even if there is water in the river, there are a number of repairs to be made to the canals and the flumes are leaking or defective; and, in short, before water can be brought to the field the crop has already been greatly injured or destroyed. It is extremely difficult for a community raising an occasional good crop without irrigation to maintain the necessary works and expend labor in repairs when there is no immediate necessity for an outlay, and when optimistic members of the community claim that the rainfall is increasing and irrigation ditches are no longer needed.

There is a strong opposition to letting the fact be known that a certain region needs irrigation. The short-sighted policy is practised of attempting to conceal the deficiencies of climate from the

would-be purchasers or investors, and, instead of regarding the possibilities of irrigation in the light of an insurance to the crops, it is considered as a burden to be avoided. This is due to the fact that most of the newcomers in the semiarid region have practised farming in humid localities, and, not having had experience in irrigation, are afraid or suspicious of any proposition necessitating the artificial application of water to the soil; thus the attempt is sometimes made to discourage any movement in favor of irrigation construction, for fear of frightening away the men who are seeking homes. As the public becomes better enlightened upon the subject, it will come to be generally known and acknowledged that irrigation greatly benefits a locality.

ARTESIAN AND DEEP WELLS.

The streams which cross the semiarid region flow in a general easterly direction, and occupy narrow valleys trenched in the plains. A traveller driving across country in a northerly or southerly direction finds a rapid alternation of plain and ravine; but if he is going east or west on the flat uplands between the streams, the country will appear to his eye as perfectly level, the narrow valleys not being visible. Out on these broad expanses, unscarred by running water, are the best soils, surpassing even those of the bottom lands. For these areas the problem of water supply is