CHAPTER I

THE LAND

The imposing geographic arch formed by the Mississippi lands on the one hand and those of the Great Lakes and the St. Lawrence basin on the other has for its keystone the territory embraced within the boundaries of Wisconsin. Resting lightly on Lake Superior but with a long shore line on both Lake Michigan and the Father of Waters, that territory also holds the most convenient line of communication between the two systems, the Fox and Wisconsin rivers, separated by a single short portage. This explains why so much of the early history of the state not only connects but mingles and blends with the French history of Canada and Louisiana, while its Indian lore holds in one all-embracing story the traditions of the Winnebago, the Six Nations, the Hurons, the Menominee, Potawatomi, Sauk, Foxes, Chippewa, and the Sioux.

Wisconsin, on the small-scale physiographic map of the United States here reproduced (Fig. 1), seems almost featureless so far as surface is concerned. A little less than one-half its total area, the northern and northwestern portions particularly, is shown to have an altitude of between 1000 and 2000 feet, while the southern and eastern portions lie at an elevation of less than 1000 feet. A few small tracts in each of these divisions vary from the mass. There is no land in the state that rises above the 2000-foot limit or falls below that of 500 feet.

From such indications one might infer that the land of Wisconsin is a vast, uniform plain like that of Illinois to the south or of Iowa to the west. But a closer examination of surface characteristics shows this to be an error. Wisconsin has a topography which, within the elevation limits specified, is very attractively diversified. This is brought out in a meas-
ure by the large-scale relief map of the state (see pocket map). It represents along the Mississippi a belt of unequal width, narrower at the north and broader at the south, which is much divided and dissected by eroding streams—a genuinely "hilly" land. In the middle and northern portions are isolated ranges, ridges, and hills which stand out conspicuously—like Penokee Range, Flambeau Ridge, Barron Hills, Rib Hill, and McCaslin Mountain—with innumerable inequalities.

FIG. 1. MAP OF THE UNITED STATES SHOWING THE LOCATION OF WISCONSIN

Courtesy of Wisconsin Geological Survey

not distinguished by special names. Even the southeast portion of the state, the plain-land par excellence, has only restricted areas where the surface is flat. For the most part it is rolling and uneven, with well defined depressions controlling the flow of the water courses in addition to numerous lakes, ponds, and marshes. The lakes of northern and northwestern Wisconsin, also, are an impressive feature of the topography.
There is but one large area which from the map one rightly judges to be flat. It lies on both sides of Wisconsin River nearly in the form of an equilateral triangle, with one angle on the river near Kilbourn, another on the boundary of the Driftless Area east of Stevens Point, and the third about the same distance east of Black River Falls. This region embraces most of Adams and Juneau counties, with smaller portions of Wood, Portage, Jackson, and Monroe, and a wedge-shaped slice of Waushara. Yet, even within that generally undiversified region occur the castellated rocks near Camp Douglas, Necedah Hill, and other interesting features of surface relief.

If, with the geologist, we penetrate beneath the mantle of soil to bedrock, which is the foundation of the land, we find underlying Wisconsin a series of varying rock formations. The principal ones of these have been described as crystalline (or Archean) rocks, upper Cambrian (Potsdam) sandstone, and limestone (the last-named of several distinct kinds). The accompanying map (Fig. 2) shows the state divided geologically into three main provinces determined by the prevailing character of the foundation rock, as follows: First, occupying nearly the whole northern part and extending down somewhat below the latitude of Green Bay, especially in Waupaca, Wood, and Portage counties, is the region of crystalline rocks; second, sweeping around this on the south, west, and east, and extending south well below the great westward bend of the Wisconsin, also along the river valley, is the region in which the bedrock is upper Cambrian sandstone; third, the portions of the map shaded deeper, namely, the whole of the eastern part of the state, the southern part, and areas along the Mississippi separated by stretches of upper Cambrian, represent the limestone sections of the state.

The three kinds of limestone are represented by three distinct ways of parallel-lining (or hatching) the map. Where the lines are drawn northwest and southeast the rock immediately below the soil is the Niagara limestone. This lies on
GEOLOGICAL MAP
OF
WISCONSIN
COMPILED BY LAWRENCE MARTIN

FIGURE 2

Courtesy of Wisconsin Geological Survey
top of other formations from the lake to the ridge escarpment shown as running from the south line of the state to Green Bay and along the southeast shore of the bay. From that line westward the Niagara has been removed by erosion, and so we come to the next lower distinct limestone formation, which is called the Galena-Blackriver (Galena-Trenton) and is represented by lines drawn northeast and southwest. A still lower deposit of limestone appears under the soil wherever both the Niagara and the Galena-Blackriver have been worn away. This is called lower magnesian limestone. The symbol for this formation is the horizontal ruling. It is seen as a narrow belt running on the south side of Wisconsin River from its mouth to the great bend, and northeasterward to the Michigan boundary, with islands and headlands of the same formation in the south central counties and several large but interrupted masses north of Wisconsin River. The most prominent single mass of lower magnesian is the one which underlies the counties of Pierce and St. Croix. Both north and south of the Wisconsin the lower magnesian is in many places, especially along the streams, worn through so that the upper Cambrian sandstone, which underlies it in turn, appears as the bedrock. The blotches of white shown on the map represent the St. Peter sandstone, which is a thin layer usually found lying between the Galena-Blackriver and the lower magnesian. The St. Peter is soft, and in most places where its protecting cover of Galena has been removed it has also been eroded away. But occasionally it remains as the formation just beneath the soil over considerable areas, as in parts of Rock, Green, Jefferson, and Dodge counties in the east, also in Vernon near Wisconsin River, and in Pierce and St. Croix in the north.

All of these rock formations except the crystalline are regularly stratified, suggesting that they are the results of submarine activity in rock building. The limestones, it is supposed, were made by a process of consolidation from the ooze which forms on the sea-floor and which often includes a vast
amount of calcareous material derived from the shells of sea animals. In the area of crystalline rocks are found intruded masses of volcanic origin which perhaps formed the basis of one-time mountains, now eroded down until the area is nearly a plain—what is called by geographers, a *peneplain*.

One of the main forces which affected the Wisconsin region in recent geologic times, tending to even the surface, to fill the valleys and plane down the ridges, incidentally forming lakes and marshes, changing the courses of streams, etc., was the great continental glacier. It moved over the whole state (except one section to be described later), retreated, advanced, retreated and advanced yet again, before it was finally forced, by the moderating climate, to retire into the far north. When the glacier had done its work, the surface of Wisconsin was approximately as we know it today. Vegetation came forward as the climate grew milder, and conditions gradually became suitable for animal and human life.

For preparing Wisconsin to be the abode of a great civilization the glacial action was significant in several ways. It tended to "iron out" the rougher, hilly surfaces; it made the flat lands more rolling by creating elevations of glacier-borne materials upon them; it made soil and distributed it over vast areas. As the glacier moved athwart the ridges it acted like a colossal earth planer, carrying with it their rounded tops, dirt, loose rocks, and rock strata often to the depth of many feet, depositing part of this material in adjacent depressions and carrying the rest farther. The result was a rolling terrain where formerly were high hills and deep valleys. In that manner much of what otherwise must have been waste land, because of being too steep and rugged for cultivation, was modified by the glacier into cultivable surface. Admirable examples of this process are available in southwestern Wisconsin where the *Driftless Area*, which was never

1 There is limestone, as we have seen, both in the glaciated and in the unglaciated lands. But limestone caves occur only in the unglaciated, running down into the rock formation often many feet. It is believed that the glacier, wherever it passed, disturbed the rock formation deeply enough to erode the cave-bearing upper portions.
invaded by the ice sheet, joins the drift or glaciated region. The proportion of waste land in the Driftless Area is much higher on the average than in the drift. This is true notwithstanding that the glacier, in one way, created waste land by making lakes, ponds, and marshes through the uneven grading of valleys or by scooping and gouging out rock masses. It has been said that the glacier must be held responsible for most of the 2,500,000 acres of marsh land in Wisconsin.²

For the purpose of agriculture it was almost as fortunate that the flat lands were made more uneven as that the rough lands were made more smooth. A gently rolling surface affords natural drainage, for the want of which much flat land becomes waste in unfavorable seasons. Besides, the glacial hills and hillocks—the moraines, drumlins, kames, and eskers (to borrow the geologist’s terms)—diversify the surface, vary the tree growth, and account for much of the natural beauty for which Wisconsin is so justly famed.

The soil, which in most places covers the bedrock, is called residual when it has been made “on the spot” out of the native rock by the process of weathering. It becomes alluvial when produced by stream deposition; and when laid down, in fine particles, by the wind it is called loess. The above are the principal soils, classified according to derivation, which are found in unglaciated (driftless) regions. But wherever the glacier has passed over a given surface its single agency in producing and distributing soil has usually been superior to all others, and the soil of the region is called glacial, or drift, soil. These terms do not mean that the glacier necessarily made all there is of the soil, for the process of weathering and the other processes have been going forward and producing results both before and since glacial times. But the glacier has affected the soil wherever it passed. In the first place, it carried with it, often for hundreds of miles, some of the soil

²Much of that land, however, need not remain waste. A part of it could be drained by individual farmers whose farms embrace small tracts of it, and sometimes extensive tracts could be drained by the cooperative method, under a law for creating drainage districts. When drained and properly subdued by cultivation, most of the marsh lands become exceptionally productive.
material which it spread over Wisconsin rock formations. Secondly, it ground up much native rock and spread it over the surface in the vicinity. And in the third place, it mingled together materials from various sources before they were finally deposited where they could grow the crops of our own day.

It has been estimated that seventy-five to eighty per cent of the soil in most glaciated localities in Wisconsin was derived from materials of the neighborhood. The rest may have been carried great distances. No doubt Wisconsin has much soil which originated in the Canadian provinces. Certainly many of the bowlders which were carried in the glacier and dropped here and there as drift over the whole glaciated area are properly assigned to the rock formations of a far northern latitude.

Sometimes the twenty or twenty-five per cent of soil derived from a distance becomes an exceedingly important element, as in a region which is underlain by a sandstone formation the soil of which is too light, porous, and deficient in plant food to possess high fertility. Thus the mixing of material derived from the crystalline rocks and from the limestones with the soil native to the great upper Cambrian region in middle Wisconsin rescued a large share of that region from comparative poverty. The largest continuous body of light sandy soil in Wisconsin is in the flat triangle described above, which begins near Kilbourn on the river and extends northeast and northwest to the neighborhoods of Stevens Point and Black River Falls. But that is precisely the portion of the upper Cambrian region which received no glacial drift and, except immediately along the trench of Wisconsin River, no river drift or alluvium either. Its soil is weathered sandstone. To the east of the triangle are several counties whose bedrock is the same, but having been visited by the glacier and generously treated to a portion of its load of silt brought from the north and east, their soil, while still light, is much more fertile. Besides, the glacial hillocks diversify their surfaces. To the
west of the triangle is a territory of considerable size, resting on the upper Cambrian formation, to whose lower valleys farflowing rivers have carried silt from the north, which mingling with the sand makes a productive soil. What sand was carried down from the middle region over the limestone farther south served generally, by mixing with the stiff clay of that region, to improve its soil there.

FIG. 3. THE DRIFTLESS AREA OF SOUTHWESTERN WISCONSIN AND ADJACENT STATES

Courtesy of Wisconsin Geological Survey

As already stated, there is one large section of western Wisconsin which (with adjacent portions of Illinois, Minnesota, and Iowa) was unvisited by the glacial ice sheet—the Driftless Area. This region is in character like parts of the
South to which the glacier did not reach, but as a northern land it is unique from the fact that it forms an island of unglaciated land in a vast sea of glaciated. The continental glacier, geologists have decided, split somewhere in the northwestern part of the state, one lobe driving for a time southward and the other southeastward, thus missing the area in question. At one or more periods other forces finally brought the two lobes together again. This behavior on the glacier’s part was so striking as to make Wisconsin’s driftless area a subject of interest to geologists the world over. The map (Fig. 3) will show the relation of that area to the rest of the state, also to the neighbor states. Its surface is estimated to include 15,000 square miles (about the size of Denmark), of which 13,360 are in Wisconsin. It is wider in the north and narrower in the south. The Wisconsin counties of Grant, Lafayette, Iowa, Crawford, Richland, La Crosse, Monroe, Juneau, Jackson, Vernon, and Trempealeau lie within the Driftless Area, while Green, Dane, Sauk, Portage, Wood, Marathon, Buffalo, and Eau Claire are partly driftless and partly glaciated.

By comparing the last map with Fig. 2, it is seen that the Driftless Area embraces a large territory underlain by the Galena-Blackriver limestone in the southwestern counties, while north of Wisconsin River the formations beneath the surface are the lower magnesian limestone, the upper Cambrian, and the crystalline, with some patches of St. Peter sandstone. The character of the country has been influenced the more by these rock formations because they do not lie quite horizontally but rise gradually toward the west and the north (though again sinking somewhat toward the Mississippi), making a large portion of the Driftless Area an upland. Its elevation varies from 1280 to 900 feet, while the lands nearer Lake Michigan are about 700 feet above sea level and those in central Wisconsin still lower. The larger rivers, especially the Mississippi and the Wisconsin, have eroded deep trenches, cutting through the limestone formation and well
down into the upper Cambrian sandstone. The ridges along the Mississippi sometimes attain a height of 500 feet, which is one measure of its cutting, while the hills on both sides of the Wisconsin in its lower reaches are nearly as high.

Because of these deep river trenches, the smaller streams flowing into the Wisconsin and the Mississippi from the western upland have likewise dissected the land deeply. Wherever these streams flow parallel to one another and near together the upland is much cut up and the bluffs are rounded. Sometimes the latter are worn down to the hog-back form, or even reduced to mere flattened watersheds. But mostly the streams have eroded deep valleys, the lower courses of which are partly filled with alluvium brought from higher up, and the bluffs vary in elevation from about 400 feet near the streams’ junction with the great rivers to a few feet at their head-springs. The soil in these valleys, for the most part, is of limestone origin, though sand from the upper Cambrian formation, often cut into by the streams, is mingled therewith. The tops of the ridges are covered with weathered limestone, save where this has eroded away to the limestone bedrock. In places outcrops of St. Peter sandstone are left on the highlands.

There are no lakes in the Driftless Area and very few marshes, the drainage almost everywhere being complete. Creeks, rivulets, and rills uniting with each other and joining the main stream make a very perfect tree-like (dendritic) river system. In the older, lower portions of the valleys the streams flow sluggishly through the alluvial deposits of silt, while in their upper courses they are always swifter and sometimes have the character of mountain torrents. There they still are cutting trenches in the limestone or St. Peter sandstone, while every freshet carries down and distributes over the lowland a quantity of fine silt abstracted from the upland clays.

The steep sides of the bluffs in the Driftless Area usually appear, from a distance, to be parallel-lined by the exposure of rock strata. Sometimes, when more rounded, they are cov-
ered thinly with soil and grow grass and trees successfully. The tops vary in character from the useless hog-back to fine, spacious levels capable of being cultivated and made into excellent fields. In some portions these are called ridge fields. They are reached by steep ridge roads built along the sides of the ravines from the lowlands.

That portion of the Driftless Area which lies south of the Wisconsin is sometimes said to be divided by the "Military Ridge." It is more exact to say that the streams flowing north to the Wisconsin have deeply eroded the upland toward the river, reducing it to a succession of valleys and bluffs reaching back in some places only four or five miles, in others as much as thirty miles. There is also a series of south flowing streams which have eroded the surface far less deeply and usually flow at greater distances from one another. These south flowing streams have their sources near those of the north flowing streams, and the watershed between them is what is known as the Military Ridge. This ridge, with a considerable body of land on its southern and northern slopes, was one of the notable prairies of southern Wisconsin. It reaches practically from near Prairie du Chien to the Four Lakes region.

The southern part of this region differs widely from the northern. In the north the valleys are the more important, in the south the ridges. This is due to the comparative narrowness of the southern valleys and the width and flatness of the lands between. A comparison of the Pekatonica region with the Blue River region will make the difference clear. One thinks of the former as a part of the plain country, which it is; the latter is distinctly a part of the hill country. The Pekatonica is a land with a stream flowing through it to furnish water and power. The Blue River is a valley made and domi-

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3 These ridges grew wheat successfully for some years after that cereal had ceased to be grown on the lowlands.

4 Because the United States Military Road from Forts Howard (Green Bay) and Winnebago (Portage) to Fort Crawford (Prairie du Chien) was built in 1835 along the top of this ridge. It is now the line of a branch of the Chicago and Northwestern Railway.
nated by a river system. The ridges between the south flowing streams are all extensive, sometimes eight or twelve miles wide; the ridges between Blue River and the Fennimore are so narrow as to show but little flat surface, while the best of the north trending ridges are only two or three miles in width and much of their surface is uneven, often steep. On the Military Ridge and portions of its slopes appear certain very fine silt loams supposed to have been deposited by the winds and called loess. These loams are generally mingled with weathered material.

Whether the whole of Wisconsin was at some time or times covered with forest growth we do not certainly know. But between the several advances of the ice sheet there was always time enough for soil to be prepared and for forests to spring up. A buried forest found in Manitowoc County and the lower Fox River valley is proof at least that such a growth occurred between the second and third glacial advances in that region. The remains consist of "logs, branches, and upright stumps."

When settlers began to arrive in Wisconsin they found the southern part of the territory divided between forest and prairie, the former predominating. The two maps, Figs. 4 and 5, show how these features were intermingled. These forests are described as either maple, pine, or oak, according to the kind of tree which predominated in a given area (Fig. 6). The principal maple area stretched northward from the south line of the state, along Lake Michigan to Green Bay. It was a narrow belt through Kenosha and Racine counties, but widened out across Milwaukee, Waukesha, and Jefferson counties, and occupied most of Ozaukee, Dodge, Fond du Lac, Winnebago, Calumet, together with portions of Sheboygan, Brown, and Outagamie. This forest, with the lower Fox River

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6 The question of the origin of the prairies is still unsolved. Probably forests covered the land fully at one time, and the absence of timber anywhere may be taken as proof of its destruction (1) by fire, or (2) by root boring insects, leaf destroyers, or other pests.

7 Martin, *op. cit.*, 126, 277.
FIG. 4. THE ORIGINAL AREAS OF PRAIRIE—SHOWN IN WHITE—IN SOUTHEASTERN WISCONSIN

Courtesy of Wisconsin Geological Survey
FIG. 5. THE DISTRIBUTION OF PRAIRIES—SHOWN IN WHITE—IN THE WESTERN UPLANDS OF WISCONSIN

Courtesy of Wisconsin Geological Survey
FIG. 6.  FOREST MAP OF WISCONSIN

After Wisconsin Geological Survey, 1882
and Green Bay, enclosed a flattish triangle of land fronting on Lake Michigan which constituted the only considerable pine forest of southern Wisconsin. It began on the lake shore just south of the Sheboygan County line in Ozaukee County, extended northwest to Lake Winnebago, thence northeast to Green Bay and throughout the Door Peninsula, covering Door County, Kewaunee County, Manitowoc County, with portions of Brown and Sheboygan. That forest, because of its convenient location, constituted one of the earliest of the pine lumbering regions of eastern and southern Wisconsin. A second maple area lay north of the Wisconsin and occupied most of Richland County, also the southern part of Sauk and the western third of Crawford. A third maple area lay in a straggling, blotchy manner over portions of Buffalo, Pepin, and Pierce counties, and a fourth covered parts of Polk and Burnett.

Aside from the regions just described, all the rest of southern Wisconsin (and the limestone sections of western Wisconsin) was either oak forested, studded with oaks in the form of openings, or treeless, in which case it was called prairie when dry and swamp, swale, or marsh when wet. The oak forests, like the maple and pine forests already described, had various other kinds of trees mingled with them—maple, hickory, walnut, lynn (linden), aspen, etc. In the openings, however, which were extensive and numerous, fires seem to have destroyed all of the other growths, leaving only the oaks, which are more resistant. Undergrowth, too, was burned away, so that the oak trees, set at varying distances apart on grass covered slopes or plain-land, lent to the landscape the appearance of a beautiful natural park within which, not infrequently, travelers saw herds of deer quietly feeding till startled by the human invaders of their paradise. The oak openings were easy to clear, they yielded some wood, and the soil was at first considered to be superior to that of the prairies. Therefore, the trend of early immigration set strongly toward the openings.
The prairies of southern Wisconsin were grouped somewhat peculiarly within a broad belt along the southern and western portions of the great triangle formed by Lake Michigan, Illinois, and the Fox-Wisconsin line. If one were to draw a line from Fond du Lac at the south end of Lake Winnebago to Stoughton on Lake Kegonsa (First Lake), thence due east to Lake Michigan, practically all of the prairie lands would fall outside of that line. In the south, beginning at the lake, was an extensive prairie which occupied much of Kenosha and Racine counties; Walworth County had a number of small prairies, of which the most considerable was Elkhorn Prairie; Rock Prairie in the county of Rock was one of the largest and most famous of the southern prairies, and there were three other prairies worthy of mention in that county; while the neighbor county of Green had a prairie covering a large tract in the southeast and east, also one occupying much of the south and southwest. Small prairie tracts—a section or two, sometimes three or four in a body—were distributed in an east-and-west line to the north of those already described. West of Green County the "big prairie" was the one which, beginning near the Mississippi, followed the Military Ridge with several short breaks to Madison, and from the central part sent out lobes south to Hazel Green in Grant County, to the Illinois line, and to Argyle in Lafayette. The prairie just described could be followed again northeastward by way of Waunakee, Sun Prairie, Lodi, Waupun, and Ripon to the vicinity of Lake Winnebago west of Fond du Lac. The breaks which appear on the map between the distinct prairie areas on that line were mostly occupied with oak openings. It was therefore a very simple matter to open a military road from Lake Winnebago via these prairies and the Military Ridge to the Mississippi.

We have now accounted for most of the prairie districts of southern Wisconsin and, indeed, of the state. To the north of the Wisconsin, on the limestone foundation, there are but three areas requiring attention—the one in Crawford, Vernon,
and La Crosse, terminating in what was long known as Prairie la Crosse; the second along the Mississippi in Trempealeau County (this is principally on the upper Cambrian formation); and the third in St. Croix County. The large prairie with small outlyers east of this in Dunn County, on the crystalline formation, was also important as affecting the settlement of that region.

It appears from a comparison of the forest map of the state with the geological map, that while the hardwoods were not confined to the limestone areas, yet, with inconsiderable exceptions, the limestone areas were actually covered, when forested at all, with forests of hardwood. The main exceptions were the Manitowoc region already described as pine bearing, and the limestone strip projecting south from the Michigan boundary to Fox River along the west coast of Green Bay, which was also a pine region.

Allied to the prairies by reason of their freedom from the incumbrance of timber, so their surfaces could be mowed for hay as the prairies could be plowed without the previous labor of clearing, were the swamps or marshes. These sometimes supported groves of tamarack, cedar, or even pine, but were more commonly open land, heavily grassed, and when not too wet by nature or when partially drained, yielded an excellent quality of wild hay. The accompanying map (Fig. 7) shows the distribution of swamp land, and proves in a striking manner that both the Driftless Area and the region of older drift were free from swamps. They are found only in those sections of the state which received the last drift, called the Wisconsin drift; in other words, it was the third and last visitation of the ice sheet which left the marshes and lakes in its train. From this it is easily seen that such features are but temporary at best. The processes of erosion and deposition are tirelessly at work cutting down the stream levels here, filling in depressions there, so that area after area is being rescued from its swampy character and made into cultivable land. In due time, even without the powerful aid of man
FIG. 7. THE SWAMPS OF WISCONSIN—DOTTED AREAS

Courtesy of Wisconsin Geological Survey
acting individually and coöperatively, the swamps and lakes of Wisconsin will as certainly disappear as does the winter's snow before the ardent rays of an April sun.

Summarizing the agricultural possibilities of the land in Wisconsin when settlement began, we may say: First, the region of the hardwoods and the prairies which, as has been shown, corresponded closely to the area underlain by limestone was decidedly the most available for immediate use. That was true for several reasons. For one thing, the surface, while diversified and in part hilly, was predominantly of a character to make it fit for farming purposes. The soil was generally fertile and under proper tillage capable of growing successfully all crops adapted to the climate. The swamp meadows of the glaciated portion, and the unforested hills of the driftless, supplied, the one an abundance of hay and pasture, the other ample out-range for cattle, thus offering encouragement for a livestock industry, which was further favored by the wide and general distribution of a natural water supply in springs, creeks, and larger streams. These streams also furnished the necessary water power for sawmills and gristmills, upon which new communities are so largely dependent, and some of them gave promise of a future great manufacturing development. This possibility, and especially the exceptionally favorable opportunities for transportation by inland rivers, by the Mississippi and the Great Lakes, captivated the imaginations of home seeking Americans and later helped to draw to this region many thousands of thrifty, intelligent farmers of foreign birth. The limestone region, except in the northeastern lobe, which was a pinery, was all fully populated by the year 1870. The rest of the state had then only scattering settlements. Here is sufficient proof of the preference shown by early settlers for the hardwood and prairie limestone lands. Second, the number and extent of the oak openings and of small prairies sheltered by forests made opportunities for opening farms with both ease and safety, plowland cleared or almost cleared being intermingled
with woodland, which at first all American settlers deemed to be indispensable. Third, where the forest covering was heavy, as in most of the maple areas, clearing after all was not an impracticable task, although it involved hard and persistent labor, because, the trees once cut off or girdled, the stumps quickly rotted away. Besides, the heavy forest lay near the lake coast, where growing cities were sure to call for fuel wood, charcoal, pot and pearl ashes, and railroad ties, all of which gave the settlers some small compensation for the labor of clearing.

The farming resources of northern Wisconsin, which now are so large and varied, will be discussed in a later chapter. It is only necessary to point out here that it was not exclusively the conditions of soil and surface which deterred settlers from taking the pine lands of the limestone area as readily as the hardwood lands. There was a widespread belief that hardwood trees were a guaranty of fertile soil, and it was also well known that pine stumps would remain in the ground indefinitely to hamper cultivation after the trees were slashed or girdled, while stumps of the hardwoods quickly rotted away, leaving the fields fully cleared and subject to the plow.

Sources

In preparing this chapter the most helpful single source was Lawrence Martin, *The Physical Geography of Wisconsin*. Other numbers in the publications of the Wisconsin Geological and Natural History Survey which afforded much aid were Ray Hughes Whitbeck, *The Geography and Industries of Wisconsin* (1913), *The Geography of Southeastern Wisconsin* (1921), and *The Geography of the Fox-Winnebago Valley* (1915); also, Leonard S. Smith, *The Water Powers of Wisconsin* (1908). Some use was made of the several Soil Surveys, and much of Hotchkiss and Thwaites, *Model* of the map of Wisconsin.