CHAPTER V

TOPOGRAPHY AND GEOLOGY

Wood County is situated in the central part of Wisconsin. It is bounded on the north by Marathon County, on the east by Portage County, on the south by Adams and Juneau Counties, and on the west by Jackson and Clark Counties. It contains 22 political townships, namely: Lincoln, Cameron, Marshfield, Auburndale, Milladore, Sherry, Arpin, Richfield, Rock, Cary, Wood, Hansen, Sigel, Rudolph, Grand Rapids, Seneca, Dexter, Hiles, Remington, Cranmoor, Port Edwards and Saratoga. The approximate land area of the county is 517,760 acres.

On the basis of topography the county falls naturally into two divisions, separated by a line running nearly parallel with, but somewhat to the north of, the Green Bay and Western Railroad, which crosses the county from east to west. The region to the north of this line, comprising considerably more than one-half the county, consists of an undulating or nearly level to rolling country, throughout which the soils are heavy and of good or excellent quality for agriculture. Many communities here are as well improved and as highly developed as the best farming districts of southern Wisconsin. The most conspicuous surface features are the Marshfield Moraine, south and southeast of Marshfield, and Powers Bluff, which is a large quartzite southwest of Arpin.

To the south of the dividing line the county consists of nearly level sand plains, rising gradually in elevation from south to north. Projecting through the floor of this plain and rising to elevations which range from 20 to over 100 feet are a few sandstone and quartzite hills, which form the most picturesque features of the landscape. In a few places low dunes have been formed on the extensive sand flats, while in the southern and southwestern parts of the county large stretches of marsh occur, often dotted with innumerable small sand islands only one or two feet below the level of the lowlands. The fertility of the sands is low and agriculture is not well advanced. On the marshes hay is grown and cranberry production has been developed to considerable proportions. In many places large drainage projects have been constructed and efforts are under way to develop the region agriculturally.

In the northern two-thirds of the county, which is largely covered by drift from early ice sheets, the topography is much more mature than in those parts of the state covered by the late Wisconsin ice sheet. Most of the slopes are long and gentle. There are no lakes and comparatively few swamps. At Vesper the elevation above sea level is 1,090 feet, at Arpin 1,149 feet, at Marshfield 1,283 feet, and at Auburndale 1,213 feet. The highest parts of the Marshfield moraine probably rise only 100 to 150 feet above the surrounding lowland. Powers Bluff reaches an estimated elevation of 300 to 400 feet above the surrounding country, and probably includes the highest point of the county. The general elevation of the southern part of the county is 200 to 300 feet lower than that of the northern
division. The elevation at Port Edwards is 969 feet, at Nekoosa 959 feet, at Dexterville 994 feet, and at Babcock 977 feet.

The drainage of most of the county is into the Wisconsin River, which crosses the eastern part of the area. Nearly all the remainder of the county drains first into the Yellow River, which traverses the western part from north to south and joins the Wisconsin River at Necedah, in Juneau County, to the south. The East Fork of Black River receives drainage water from an area of about two townships in the west central part of the county. This stream is directly tributary to the Mississippi River.

Dr. Samuel Weidman, of the Wisconsin Geological and Natural History Survey, who made a general soil survey of north-central Wisconsin, published with map in 1906, had the following to say in regard to Wood County:

"In Wood County, sandstone occurs in isolated patches over the entire area of the county, being sparsely distributed over the northern part and fairly abundant over the southern portion. The occurrences in the northeastern part are generally quite small. They are also relatively of slight thickness. Sandstone is abundant in the southern part of the county. Outcrops of considerable extent occur along the Yellow River in the northeast quarter of Section 27 and in the southeast corner of Section 35 of Township 25, Range 2 East. It is abundant in low hills in the southern part of the townships of Hansen, Sigel, and Randolph. In the northeast quarter of Section 30 and the northwest quarter of Section 29 of Rudolph, the formation is a fairly hard, firm rock and is used to a considerable extent for building purposes. Sandstone is exposed in numerous places along the Wisconsin River from Biron's Mill to Nekoosa, overlying the residual clays and crystalline rocks. In the broad alluvial plain of southern Wood County only one noteworthy outcrop of sandstone occurs—the South Mound about six miles southwest of Babcock, in the vicinity of the northwest quarter of Section 25, Township 21 north, Range 2 east. South Mound is probably not more than 50 or 60 feet high, but is a feature of considerable prominence in the surrounding alluvial plain.

"There is an abundance of drift along the line of the Wisconsin Central Railroad from Marshfield as far southeast as the village of Sherry, farther east of which the surface deposits are those prevailing in the driftless area. The terminus, therefore, extends south from Rice Lake through Milladore, crossing the railroad in the vicinity of the village of Sherry, and thence extending southward to the vicinity three miles west of Grand Rapids.

The border lies approximately across the central parts of the towns of Milladore, Sherry, and Sigel, in Wood County. There are no ridges of drift in this vicinity and the border is somewhat obscure. In the vicinity about two miles west of Wisconsin Rapids, the border apparently makes a sharp turn to the west. The border in this vicinity is characterized by considerable drift apparent in the form of hills and ridges, the general composition of the drift being typical moraine. These drift ridges are in part, at least, merely drift remnants capping the sandstone, and owe their present form wholly to the work of erosion. Several of these drift covered hills lie in the western half of Section 10, Township 22 north, Range 5 east, and immediately west in the northern half of Sections 7, 8, and 9, in the same township. The elongated hills and ridges stand from 20 to 40 feet high, and are covered with sand, pebbles of granite, and various igneous rock, and large blocks
of the Powers Bluff fine-grained pink quartzite, and boulders of diorite and granite. The hills and ridges do not lie in parallel positions, but trend in various directions though several of the longest ridges trend northeast-southwest.

An especially long ridge, about a mile long, trends northeast-southwest from the northwest quarter of the northwest quarter of Section 8 to the northwest quarter of the southwest quarter of Section 7, Township 22, north Range 5 east. This ridge is from 15 to 30 feet high and from 150 to 300 feet wide. Most of the drift of this ridge consists of sand, with which is mingled many angular and rounded pieces of fine-grained Powers Bluff quartzite and of granite and diorite.

"About a mile and a half farther northwest in the vicinity of Altdorf postoffice there are several drift ridges and much drift present. There are drift-covered ridges also in the northern part of Section 31 and southern part of Section 30 of Township 23 north, Range 4 east. Three miles southwest of Pittsville, in Sections 8, 9, 16, and 17, a group of drift ridges were noted extending east and west and varying in elevation from 10 to 25 feet. Thus there appears to be a zone two or three miles wide marked by scattered drift-covered ridges extending east and west across Wood County from Grand Rapids westward. This belt lies immediately north of the Green Bay & Western Railroad and is approximately at the boundary of the flat, marshy portion of the county, on the south, and the well-drained land to the north.

"There is, therefore, a marked difference in the surface formations south of these drift ridges as compared with that to the north. The foundation overlying the sandstone to the south in the marshy area is sand and gravel capped with peat muck, the ground water level being approximately a few feet below the surface, while to the north boulders are abundant and coarse drift forms a mantle varying from 2 to 20 feet in thickness overlying the hard rock formation."

"The Second Drift Formation.—The cities of Marshfield, Wood County, and Neillsville, Clark County, are located (says Weidman) upon a pronounced thickening of drift which obviously represents the terminal moraine of one of the older sheets of the drift series. This ridge has been followed for a distance of about seven miles across southwestern Marathon, northwestern Wood, and through Clark County. Its continuance to the northwest has also been located in the adjacent area of Chippewa County, where it disappears beneath the late drift of the Wisconsin epoch, east of the Chippewa River."

Wood County, common with a considerable area in central Wisconsin, owes the general character of its soil material to several distinct processes of formation, namely, glacial, residual, alluvial, and possibly loessial. To these may be added the accumulation of organic or peat soils in low places.

Old glacial formations cover approximately 55 per cent of the county. The glacial debris in this area was deposited at a much earlier date than that covering northern and eastern Wisconsin. Geologically it is called the pre-Wisconsin drift, and it is recognized as comprising three periods of glaciation, two of which are encountered in Wood County. The glaciated region covers the greater part of the northern two-thirds of the county, with the exception of a narrow belt along the eastern border. The first or earliest drift covers the greater part of this section, but an area equivalent to about one township in the extreme northwestern corner of the county is covered by the second drift. Marshfield is situated on this area.
Marking the southern border of the second drift is a prominent range of hills known as the Marshfield Moraine. The topography over the glaciated region varies from level to rolling, and in a few places, hilly. The surface is largely characterized by long gentle slopes. The soil is comparatively free from stones and consists mainly of silt loam or clay loam. One of the most important characteristics of this old drift is the heavy compact nature and the pronounced mottling of the subsoil. This material has weathered to a much greater degree than the late Wisconsin drift, the topography is much more mature and there are no lakes and few peat marshes. With the exception of the Marshfield Moraine and a few other limited areas, the effects of glaciation in this region have been largely obliterated through erosion and weathering.

Along the eastern border of the county, in parts of Milladore, Sherry, Sigel and Rudolph Townships, the soils are considered to be largely of residual origin. The material forming the surface soil, and, more especially, the subsoil has been derived from the weathering of the underlying crystalline rocks. Angular rock fragments are scattered frequently over the surface and a few glacial boulders occur. It seems probable that parts of the region were traversed by an ice sheet, but in most instances this does not seem to have had any appreciable influence on the formation of the soil. The surface is in the main gently rolling, with long slopes and broad, rounded elevations. In the southern half of the county also there are a few areas in which the soil is residual, but here it has been derived from Potsdam sandstone instead of crystalline rocks.

The region of alluvial soils is confined to the southern third of the county, mainly to the south of Wisconsin Rapids and the Green Bay and Western Railroad. The country consists of a series of sand flats, associated with which, west of the Wisconsin River, there are extensive marshes. Some of these marshes contain numerous small sand islands only one or two feet higher than the level of the marshland. The greater part of the material throughout this sandy region is of alluvial origin, having been deposited by enlarged streams during preglacial or interglacial times. In a few places the underlying Potsdam sandstone comes to the surface and gives rise to a residual sandy soil. When a shaly phase appears with the sandstone the residual material is considerably heavier.

Over most of the county, except the southern sandy region, the surface shows a covering of extremely silty material which has the characteristics of loess, and it seems probable that much of the surface material making up the silt loam was deposited by wind action.

Throughout most of the northern half of the county and over isolated areas in the southern, crystalline rocks, mainly granite, make up the surface formation. In the vicinity of Milladore, Pittsville, and Wisconsin Rapids, and in a few other places, gneiss and schist appear as the surface rock. In the vicinity of Arpin and Powers Bluff conglomerate and quartzite occur. In Milladore and Sherry townships and at a few other points diorite-gabbro constitutes the surface rock. The depth to bedrock usually varies from four or five to over fifty feet. Outcrops of these various formations occur frequently. Over most of the southern part of the county and along the western border sandstone appears as the surface rock. In a few places the sandstone outcrops, though in most cases, especially near the Wis-
consin River, it is deeply buried by deposits of alluvial sand. All the rock forma-
tions have contributed to a greater or less extent in the formation of the soils. A
much larger proportion of the soil material has come from the crystalline rocks
than from the sandstone. Through transportation by glacial action, crystalline-
rock debris overlies sandstone over considerable areas, especially in the western
part of the county. Small patches of sandstone material occur over the crystalline
rocks in the northern and northeastern parts.

The soils of Wood County are classed in seven series, in addition to which three
miscellaneous types have been mapped.

The Spencer series comprises light-colored, timbered upland soils, chiefly within
the region of pre-Wisconsin glaciation. The surface soils are gray or grayish brown,
and are usually underlain by lighter brown or yellowish subsoils which are highly
mottled with brown, rusty brown, gray and yellow.

The Spencer silt loam, with a rolling phase, is a light-colored timbered upland
soil. It occurs with the region of pre-Wisconsin glaciation, where the material
has come largely from crystalline-rock formations, and where the subsoils are
compact, of impervious nature, and strongly mottled. This is the most extensive
type in the county, covering about 25.9 per cent of the total area. It is a good
soil for general farming and dairying, though over the typical soil is somewhat
deficient.

The Vesper silt loam, with a rolling phase, consists of a heavy surface soil, of
glacial or loessial origin, underlain by residual sand, sandstone, or in some in-
stances, granitic rock, at an average depth of 18 to 24 inches. Because of its level
surface the drainage of this soil is deficient and it is rather cold and backward in
the spring. It makes good hay and pasture land. It covers 15 per cent of the
total area of the county, being found in broad areas in Cary, Wood, Hansen and
Sigel townships, and in the western part of the county there are numerous areas
north of Township 23.

The Gloucester series comprises brown soils with light-brown or yellowish-
brown subsoils. They are derived by weathering from glacial drift composed
mainly of crystalline-rock material. The topography varies from gently to sharply
rolling. The soils are well adapted to general farming and dairying. They are
found chiefly in the northern part and in Rudolph Township.

The Whitman soils are dark-brown to black, low-lying, poorly-drained types,
occurring chiefly within or bordering marshes. The soils are non-calcareous.
They are used for agriculture to only a small extent.

The Plainfield soils are light-colored types of alluvial origin, derived mostly
from sandstone formations. These soils occur extensively in the southern part
of the county. They are differentiated as sand, fine sand, sandy loam and fine
sandy loam. The fine sandy loam is a good soil. The other types require more
care in management for profitable cultivation.

The Boone fine sand and fine sandy loam are light colored soils derived from
Potsdam sandstone. The fine sandy loam ranks as a fairly good agricultural soil.

The Genesee fine sandy loam and silt loam occur in overflow situations along
streams. Poor drainage is the principal factor limiting the utilization of these
soils.
Peat and Muck consist of decaying vegetable matter with which there is incorporated varying amounts of fine earthy material. These soils require drainage before they can be farmed. They are deficient in potash and phosphorous, and these elements must be supplied before profitable crops can be produced over a period of years. The supply of nitrogen is abundant. These types require treatment different from the upland soils. Peat occurs extensively in the south and southwestern parts of the county, and through the central and northern parts in numerous isolated areas. Much of it is now artificially drained. Cranberries are extensively cultivated, and a profit is derived from wire-grass which is sold to grass-matting companies, and sphagnum moss, which is shipped in considerable quantities to the florists in the cities.

The types of Sands and Peat (undifferentiated) consists of marshland in which low, flats and islands are numerous though of such small extent. All the included marshy land required drainage and careful management to make cultivation profitable. The marshy soil is deficient in phosphorus and potash but well supplied with nitrogen. The soil on the islands is usually low in all these elements.

Climate.—The climatic conditions in Wood County are fairly uniform, but vary somewhat from place to place with difference in topography. The winters are long and severe but the summers are pleasant. The most pronounced variations in climate are in the occurrence of frosts. The relative liability to frost is of vital importance to the cranberry industry, which is quite extensively developed in the marshy region in the southern and southwestern parts of the county.

The winters in Wood County are long and severe, but the summers are pleasant. The rainfall is normally well distributed throughout the growing season. The months of May, June, July and August each have on an average approximately three inches of rain, but in any of these months, especially July and August, there may be periods during which crops suffer considerably from drought.

The average date of the last killing frost in the spring, as recorded at Wisconsin Rapids is May 23, and that of the first in the fall is September 26. This gives an average growing season for the vicinity of the station of approximately 126 days. In the marshy region to the west and southwest the period free from frost is shorter, and summer frosts are not uncommon in the cranberry-growing districts.