

...WILD PLANTS IN FLOWER

The Prairie

Swell and Swale

from nature

by TORKEL KORLING

Botanical illustrations and prints
from nature by Torkel Korling

- 1958 Wild Flowers. Portfolio 16½ x 22 inches. 11 plates. Published and distributed by Container Corporation of America, Chicago. Out of print.
- 1960 Glory by the Wayside. Book 5 x 7½ inches. 21 plates. Published and distributed by R. R. Donnelley & Sons Company, Chicago. Out of print.
- 1963 Spring Wild Flowers. Classroom study prints 13 x 18 inches. 8 plates. Society for Visual Education, Chicago.
- 1963 WILD PLANTS IN FLOWER: plates xlii to xlix. Portfolio 16 x 22 inches. 8 plates.
- 1966 Second printing, for Field Museum of Natural History, Chicago. 4 plates. Out of print.
- 1972 WILD PLANTS IN FLOWER: habitat series.

The Prairie - Swell and Swale

In preparation:

The Boreal Forest and Borders

The Deciduous Woodland

The Prairie - High Plains

What is a Prairie? by ROBERT F. BETZ

Dundee, Illinois 1972



comparatively dry sandy swells condense in space the habitat conditions that support flowering species ordinarily found in stands more widely separated. All the plants illustrated here may be found in the lake shore prairies of the Illinois-Wisconsin border, in profusions of bloom that serve well to remind us of other prairies long vanished.

A perspective on the North American prairie as a whole is provided by Dr. Robert F. Betz, Professor of Biology at Northeastern Illinois University, and Research Associate in Botany of the Field Museum of Natural History, Chicago. Dr. Betz has drawn for these notes on more comprehensive materials he is presently incorporating into a major work on prairie history, composition, and preservation. His interest in prairie has broadened to encompass study of grasslands of the world. We hope his enthusiasm may prove catching.

Torkel Korling

The prairie flowers have strangely enough disappeared from open grounds, under the croppings of cattle and the clippings of the scythe. Only a half dozen sorts were seen in a ride of 30 miles, and these straggling at great distances.

Illinois 1847

What is
a Prairie?

It is surprising how quickly the Midwestern prairies disappeared after the coming of the settlers, and even more surprising that any prairie flowers still survive after nearly a century and a half of plowing and overgrazing. The hundreds of thousands of square miles once prairie, comprising most of the Middle West, are recognizable today only as "farmland." The destruction has been so complete that most of the farmers in this vast region have never seen a virgin prairie. Most prairie plants are so rare or uncommon today that field guides published to aid amateur naturalists in identifying plants do not even mention them.

The word "prairie" was taken directly from the French, and means "meadow". Originally, it seems to have been a corruption of the Latin *pratium*, presumably a treeless, grassy tract within the Mediterranean oak-pine forests. The first Europeans to see the large grasslands at the south end of Lake Michigan, near the present city of Chicago, were the French explorers who had access to the interior by way of the St. Lawrence and Great Lakes chain. Having no other experience of such expanses of grassland, they used their word for "meadow," i.e. *prairie*.

Almost three hundred years after the first French explorers described them, these prairies are only a memory. But still the word lingers on in the English language to describe any open treeless area,

even though it may have no native plants, and be covered with non-prairie grasses and weeds introduced from Europe and Asia. To some, "prairie" means a vacant lot between houses; to others it is the open land of our Western States.

While most botanists and ecologists know fairly well what a prairie is and can easily recognize one, there is no agreement on a definition. One ecologist defines it as "an extensive tract of level or rolling land, destitute of trees, covered with coarse grass, and usually characterized by a deep fertile soil." Another calls it "the grassland dominated by the tall prairie grass, as distinguished from the short grass plains." Although it is difficult to find a definition satisfactory to all ecologists, it is possible to describe a prairie in a general sense as *a natural North American grassland, composed of native perennial grasses and other herbaceous plants, in which the grasses contribute much of the vegetative cover.*

In fact, some relic prairies are very small in size – a fraction of an acre in an old settler cemetery, a short stretch along a railroad right-of-way or a tiny patch in the corner of a farmer's field. The term "prairie" then is still valid when it applies to those very rare relic grasslands, no matter how small, which have never been plowed or overgrazed. In short, these are remnants of the grasslands on which the Illinois, Kickapoo, and Miami Indians roamed and hunted the bison. Prairies of this nature, untouched by plowing and overgrazing and in their pristine state, are called *virgin prairies*. Prairies which have been modified in some way by man or his domesticated animals and which contain both prairie plants and introduced weedy plants are known as *degraded prairies*.

While this book illustrates some flowers of the Midwestern prairies (also known as the *tall-grass, eastern or true prairies*), it should be understood that there are other types of prairies in North America. The prairies of the high plains are known as the *mixedgrass prairies*. There are prairies in the Pacific Northwest (*palouse prairies*), California (*valley grassland*), on the Texas coast (*coastal prairies*), and even in the arid Southwest (*desert plains grasslands*).

Outside of North America and on every other continent there are grasslands similar to our North American prairies. Each has a

different name. In Eurasia they are known as *steppes*, while in South America they are collectively called *pampa*. South Africa has its *veld*, Australia its basalt plains, and New Zealand its *tussock grasslands*.

The line of flame rushed through the long grass with tremendous violence and a noise like thunder, while over the fire there hovered a dense cloud of smoke. The wind, which even previously had been high, was increased by the blaze which it fanned; and with such vehemence did it drive along the flames that large masses of them appeared actually to leap forward and dart into the grass several yards in advance of the line. It passed me like a whirlwind, and with a fury I shall never forget.

Ohio 1906

Climate,
Fire and Soil

Contrary to what has been suggested in some scientific texts, the presence of grasslands in the Middle West cannot be explained in terms of climate alone. There probably is no true "prairie climate." While hot summers and cold winters are the rule throughout the prairie region, with heat waves of over 90 F. and cold waves below zero not uncommon, this temperature regime is matched in other parts of North America. The total annual precipitation would even lead one to expect a forest region, as many parts of the Middle West receive more moisture than do many forested parts of western Europe. Probably more important to the existence of the prairies is the tendency to have periods of drought during the summer. But this in itself cannot account for the presence of the prairies, inasmuch as many forested regions elsewhere have similar drought conditions.

Even though prairies grow in this climate, trees and other woody plants also thrive. Prairie groves containing maple, oaks, and ash, many square miles in extent, were an integral part of the pre-settlement prairie landscape. Today hawthorns, wild cherries and dogwoods invade uncultivated fields, while introduced trees and shrubs do well when planted – in fact, just as well as they do in other forested regions of North America. It appears then that there are probably very few climatic differences between the forest and prairie regions.

Why, then, were prairies found in the Middle West? The reason, presumably, was the presence of *fire*. The relatively flat ground,

occasional drought, accumulation of dry litter and high winds at certain seasons of the year all combined to foster fires. Indians set many of these fires, but some probably had a natural origin. With fire as an ally, coupled with winds blowing toward the east, the prairie vegetation was able to maintain itself in lands that otherwise would have been forested. In managing and caring for relic prairies, it has been found that fire does not injure the *true* prairie plants, especially when burning takes place after they have died back in the fall. In contrast, the few tree seedlings that might establish themselves in the dense prairie sod are killed by prairie fires.

Although there appears to be very little difference between the *climates* of the Midwestern prairie and the Eastern forest regions, *soils* developed under prairie vegetation are much different than those formed under forest vegetation. These prairie soils, known as *brunizems* or, according to a more modern classification, as *udolls*, have a deep black or dark brown top layer which gradually merges into the subsoil below. Most of the virgin prairie remnants have fourteen to eighteen inches of top soil; while the top soil in surrounding cultivated fields frequently averages less than ten inches. This would indicate that six inches or more of top soil have eroded away since the introduction of farming.

One who has never looked upon the Western prairie in the pride of its blushing bloom can hardly conceive the surpassing loveliness of its summer flora; and, if the idea is not easy to conceive, still less is it so to convey. The autumn flowers in their richness I have not yet beheld; and in the early days of June, when I first stood upon the prairies, the beauteous sisterhood of spring were all in their graves; and the sweet springtime of the year it is when the gentle race of flowers dance over the teeming earth in gayest guise and profusion.

New York 1838

The Composition of the Prairies

To the uninitiated, the idea of a walk through a prairie might seem to be no more exciting than crossing a field of wheat, a cow pasture, or an unmowed blue-grass lawn. Nothing could be further from the

truth. To see a virgin Illinois prairie in the spring of the year covered with golden Alexanders and pink shooting stars; or to view the mid-summer prairies blanketed in grayish lead plants mingling with the wispy-awned porcupine grass; or, in autumn, to behold the tall waving expanse of big bleustem grass bedecked with asters, goldenrods and gentians, are all unforgettable sights.

Over two hundred different species of plants have been found on the Midwestern prairies. Most grow on the relatively flat or slightly undulating *mesic prairies* with good drainage. Smaller numbers are confined either to the excessively well-drained *dry prairies* of rocky and gravelly knolls, to *sand prairies*, or to the poorly drained *wet prairies* or *swales*. A few species are limited to the wet *alkaline fen prairies* found in low areas adjoining limestone bluffs or moraines containing limestone. Although each species of prairie plant tends to grow in a particular type of prairie, some also do well in the other kinds of prairie, and it is not uncommon to find a few specimens of the mesic prairies, for example, thriving in a wet prairie. (See *Notes on the Illustrations*, following.)

More than forty-five different plant families are found on the prairies. Many of these families are represented by only one or two species, others by a half dozen or more. The sunflower family (*Compositae*) with its various asters, sunflowers, goldenrods, cone flowers and blazing stars, has the largest number. The grass family (*Gramineae*) and pea family (*Leguminosae*) are also well represented on the Midwestern prairies.

With few exceptions, the prairie plants are relatively long-lived perennials. While the upper parts die back to ground level each autumn, the roots remain alive. There is indirect evidence that many prairie plants live for decades, or even centuries, just like the towering trees of an old forest. With the severe competition for light, water, and nutrients that occurs in the dense growth of the virgin prairies, it is advantageous for plants to maintain themselves year after year, rather than to start growth each spring as seedlings and then compete against well-established plants.

Weedy plants do not ordinarily occur on virgin prairies. It is only on degraded sites that weeds are found, the numbers and kinds

depending on the degree and nature of the degradation. Given time, if man does not interfere, the prairie plants in degraded prairies can usually out-compete and eventually drive out weedy invaders.

Prairie grass, it has been frequently repeated, was originally found growing "taller than a man on horseback." Or, "the settlers' cattle were lost amid the prairie grasses." These reports do not agree with the more reliable historical accounts, or with observation of our best prairie remnants. While native grasses on low prairies with their great available moisture do reach heights of six feet or more, most of the late-season grasses are only half that tall.

The height of wildflowers blooming among these grasses may be observed, as in the illustrations here, to increase as the season progresses. Plants blooming in the early spring are usually less than a foot in height; some, like the yellow star-grass (*Hypoxis hirsuta*), only a few inches. By late summer, the prairie reaches the peak of its development, with most of the plants in flower standing three or four feet tall. (See *Notes on the Illustrations* for average heights and blooming times.) Some plants, like the prairie dock (*Silphium terebinthinaceum*), reach heights of over six feet, towering in the surrounding sea of grass.

The first sight of a prairie with which we were greeted was... an extensive plain entirely destitute of all timber-trees, and stretching to a great distance both above and below the town. The Terre Haute prairie, however, has been all reclaimed, or rather, botanically speaking, desecrated by the hand of man, and no portion of it now remains in a state of nature. Corn, grass, small grain and other cultivated crops now occupy the hundreds of acres, which lately bloomed and blossomed with indigenous productions; and almost the only relics of these to be seen were occasionally on the road-side, or in fence-corners...

Kentucky 1845

The Destruction of the Prairies

For thousands of years the Indians roamed the prairies of the Middle West, probably doing little permanent damage to the vegetation. Their cultivated fields were along the floodplains of rivers and

streams, since it was much easier to dig and hoe in the soft alluvium than in the prairie sod with its dense tangle of roots. The little digging they did on the prairies was to obtain the roots and corms of prairie plants needed in medicinal potions, drinks, and dyes. Around Indian encampments, some of these useful plants may have been collected so heavily as to be exterminated. Trampling by man and his animals around villages and hunting camps could also have been destructive. However, when the villages and encampments were abandoned, the vigorous prairie vegetation would quickly become reestablished and cover the ground.

While the Indians did little damage, the coming of the early settlers to the Middle West during the Nineteenth Century presaged the end of the prairies. The primeval vegetation that had occupied the land for thousands of years was to be destroyed and the land planted with man's cultivated crops.

The first settlers to the prairies were the rugged backwoodsmen from Kentucky and Tennessee - descendants of the Scots-Irish immigrants from Northern Ireland. They were primarily forest people who knew how to clear out timber, erect log cabins, build rail-fences and make household utensils out of wood. True to their tradition, they stayed near the groves found on the prairies or the timber along the rivers. The open prairies were to them an alien environment, offering no wood, no protection from storms, and in some cases, no water. There was also a suspicion that soil that did not support trees was not good agricultural land; this was soon found to be untrue.

With the defeat of the Sauk and Fox Indians in the Black Hawk War of 1832, the last organized Indian resistance to settlement of the prairies disappeared. Gradually the thin line of settlers living on the edges of groves or river timber moved out onto the prairies. In addition, with the completion of the Erie Canal in 1825 and the subsequent development of steamship navigation on the Great Lakes, an all-water route from the East to the Middle West was opened. Soon Yankee farmers from New England and Germans from the Rhineland were disembarking at the ports of Chicago and Milwaukee and pouring out on the virgin prairies.

One of the many problems confronting these prairie farmers was the breaking of the tough prairie sod in the preparation of the soil for the planting of their crops. To "break prairie" a special plow was needed, mounted on wheels and with a wooden moldboard. Some were so large that eight to ten yoke of oxen were needed to drag them through the unbroken sod. Professional prairie breakers charged more per acre than the \$1.25 farmers paid for the land itself.

Once the prairie had been broken and sown to crops, the prairie farmers had another problem. Subsequent plowing of the broken prairie were made difficult by the stickiness of the rich prairie soil which clung to the moldboard of the plow. Even iron plows brought in from the eastern states would not "scour" in the prairie soil, i.e., they were not self-cleaning when in use. It was necessary to have a man run alongside the plow and scrape the prairie mud off the moldboard with a small paddle. This problem was finally solved with the invention of the steel-moldboard plow.

While plowing destroyed most of the prairies, some were ruined by overgrazing. For thousands of years these prairies had been grazed by herds of bison and other wild animals, with little injury. Most of the grazing by these wild creatures was widespread and intermittent, enabling the prairie plants to recover from having their aerial parts eaten off. But when large numbers of domestic animals were confined in fenced prairies, the prairie plants were killed by the continuous grazing and trampling. When this happened, the prairie farmers said that the prairie was "grazed out."

We have made several attempts, heretofore, to transplant the wild flowers from our beautiful prairies, into our garden, to preserve and domesticate... A few years will deprive us of these beautiful flowers in their wild state, and unless they are domesticated, the next generation will not know what they were.

Illinois 1844

The Preservation of Prairies

With the increase in the human population and the introduction of better plows, most of the better-drained prairies had been destroyed before the Civil War. Poorly drained wet prairies and prairie

fens lasted a little longer, but with the introduction of drain tile toward the end of the Nineteenth Century, even these were plowed and planted to crops and pasture grasses.

After one hundred forty years of farming there are very few prairies left in the Middle West. The largest remnants are found in eastern Kansas and Nebraska. Because of very shallow rocky soils in the Flint Hills of eastern Kansas, thousands of acres of prairie have never been plowed, but are still used for grazing cattle. Smaller tracts in the same region are used as "prairie hay meadows" and are mowed annually.

Remnant prairies can also be found along a few fenced railroad rights-of-way. Other small bits of prairie around farms may have remained unplowed because they were protected by a natural barrier, such as a creek or marsh. Very fine prairies have survived in some old settler cemeteries which were originally staked out on the open prairies. As the prairies surrounding the cemeteries were plowed and overgrazed into oblivion, the prairies within the cemeteries survived. Prairies are also found in some suburban areas of large cities, having escaped use for farmland or building sites because of the lack of clear titles or the difficulties in tracing owners or their heirs.

Each year many of these prairie remnants are being destroyed. Some are plowed up and planted to crops, others are sprayed with herbicides. Many of the larger prairies are being ruined by overgrazing; the smaller ones by continuous mowing. It is regrettable that so little effort is being made to preserve them. It has been through the initiative of a relatively few individuals and conservation groups that some remnant prairies have been saved. While the Federal and State governments have not usually taken the lead in preserving relic prairies, they have helped considerably in their purchase and acquisition.

Since so little prairie remains in some parts of the Midwest, efforts are being made to *reestablish* prairie on abandoned farmland. Seeds are collected from nearby prairie relics and planted in protected areas, either by hand or by use of an agricultural seed drill. The results of projects by the University of Wisconsin at Madison and the Morton Arboretum, Lisle, Illinois, show that with hard work and

luck (such as sufficient rainfall at the time of planting) fairly good prairies can be established within a few years on suitable land.

It is surprising how little is known about the natural world, especially with regard to degraded and polluted environments. In order to carry out meaningful research in this area, it is necessary to have relatively natural landscapes, such as virgin prairies, forests, and deserts, to serve as *standards* to evaluate the changes that have occurred elsewhere and their effects on men and other biological organisms.

Even if there were no scientific values in a prairie, its aesthetic appeal alone would warrant its preservation. It is one of our links with the past – a tie with the natural world. It seems immoral to destroy an integral and important part of the biological world from which mankind arose.

In our modern world with its artificiality, complexity and instability, wild prairies can provide us with places to go for peace and solitude. For this alone, prairies should be preserved and cherished.

Robert F. Betz

Suggestions for Further Reading

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