THE VEGETATION OF AN ABANDONED ROAD AFTER A HALF CENTURY OF DEVELOPMENT

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ABSTRACT.—After 85 years as a country road, a portion of a highway in Ogle County was abandoned in 1922, leaving it to successional development. Changing from an open road with only a few small fencerow trees, the roadway is now a pathway covered with a canopy of trees. An analysis of the trees in 420 feet of roadway reveals an *Acer negundo-Juglans nigra* association comprising 59.8% of the total tree population. The remainder of the trees include ten species, with *Celtis occidentalis* the most abundant of the younger trees. The thirteen species of shrubs and vines present are nearly all commonly found in open woods or along unmowed roadways. About 50 species of herbs comprise the dense ground cover. With one exception, all are common plants of northern Illinois. They represent several variations in woodland habitats. Such an abandoned area as this becomes a refuge for plants and animals and offers opportunities for successional study as well as a place for the enjoyment of natural phenomena.

Roadways are not usually of ecological interest except when their construction destroys natural habitats or covers valuable agricultural land. After modern highways are built, their roadsides are regularly mowed and sprayed, so that few species of plants are to be found there.

In this study we consider the role of ecological succession in vegetating an old roadway after it had been used for about 85 years and then abandoned in favor of a new route. This is an uncommon occurrence in northern Illinois.

Early in 1837 a petition was presented in the Court of Ogle County for permission to establish a road which would begin at Dixon, pass through Grand Detour and Oregon, and continue to Byron. Its route from Grand Detour to Byron was on the west side of the Rock River (Boss, 1859). The petition was granted and the road was laid out shortly afterwards. This road became the principal highway up the Rock River valley. It apparently was surfaced with gravel until it was paved with concrete about 1922. It then became Illinois Highway 2.

At the site of this study the highway was rerouted about 100 yards to the east, leaving a section of the old road abandoned. This strip became a part of the adjacent farm property under private ownership. For many years it was used as a pathway for foot travel and the movement of farm vehicles. During the past decade the center of the road has been kept open as a footpath by occasional mowing.

The site is located near the center of section 33 of Rockvale Township

FIGURE 1.—The study area at The Stronghold, Oregon, Illinois.

FIGURE 2.—The south entrance to the abandoned roadway at The Stronghold. The beginning of the study area is indicated by the line across the upper part of the mowed area. The blue spruce at the left is a part of the landscape plantings of the adjacent homesite.

(T24N., R1OE.), Ogle County, Illinois. Figure 1 shows the relationship of the study site to adjacent areas. It is a part of the property known as The Stronghold, now owned by the Presbyterian Camping Association of Northern Illinois. The old right-of-way appears to have been 56 feet wide. Exact boundaries are difficult to determine because old fences were removed long ago. The portion studied, located between two homesites, is 420 feet long. It covers approximately 23,520 square feet, .54 acre.

A photograph published in 1904 (Newton, 1904) shows the road in use by horsedrawn vehicles. Pasture and a cultivated field were on the west and east sides respectively. Only a few clumps of small trees were present along the fences separating road and fields at that time.

We can assume that there was unrestricted growth of vegetation along the road after abandonment in 1922. A United States Department of Agriculture aerial photograph of 1939 showed the center of the road as an open and apparently used lane. The canopy of fencerow trees had not yet closed over the center. Small groups of trees and individuals were quite distinct along the fences on both sides. A 1951 aerial photo showed the fencerow trees as a solid line on each side of the central lane, which was partially covered by the overhang of trees. In a later photo of 1964, the central lane was almost totally obscured by the tree canopy. Figure 2 indicates the appearance of the road today as one enters the central pathway from the south end.

PROCEDURE

A complete survey of the woody vegetation was made in October of 1970. Measurement and identification of all the trees on the 420 feet of roadway were carried out separately on each side of the central pathway in successive plots 10 feet in width. Because of the small size of the area, it was studied in entirety rather than by sampling techniques. All trees were identified, measured, and recorded (Table 1). Only the presence of shrubs and vines was noted. (Appendix 1). The herbaceous plants were identified in several reconnaissance surveys in the spring and autumn of 1970 and 1971. Their listing in Appendix 2 is not intended to be a complete or final compilation of the flora of the plot. The infrequency of visits to the site precluded a thorough and complete analysis of herbs. Some identifications have been indicated as incomplete or tentative. Future visits are likely to reveal a gradual change in the herbaceous ground cover.

DISCUSSION

The tree populations of the adjacent Strong field and gully (see Figure 1 for location) have been reported previously (Bullington, 1970, 1971). There is greater diversity of

TABLE 1.—Analysis of trees in 420 feet of roadway.

Size categories	Under 1 inch dbh		1-6 inches dbh		6-12 inches dbh		Over 12 inches dbh		Totals			
Species	West side	East side	West side	East side	West side	East side	West side	East side	West side	East side	Combined	%
Acer negundo L.	34	21	16	27	15	11		4	65	63	128	34.5
Carya ovata K. Kock							2		2		2	0.5
Celtis occidentalis L.	8	16	40	18					48	34	82	22.1
Fraxinus sp.			1						1		1	0.3
Juglans nigra L.	2	4	22	48	2	5	9	2	35	59	93	25.3
Pyrus ioensis Bailey			1						1		1	0.3
Morus sp.			1						1		1	0.3
Prunus serotina Ehrh.	1	8	3	6			1		5	14	19	5.1
Prunus virginiana L.		2		2						4	4	1.1
Ulmus americana L.	1		13	4	1				15	4	19	5.1
Ulmus pumila L.	1								1		1	0.3
Ulmus rubra Muhl.		5	6	8					6	13	19	5.1
Totals	47	56	103	113	18	16	12	6	180	191	371	100.0

species in each of these locations than in the roadway area. Twenty-six species of trees were reported from the field and 22 from the gully, compared with only 12 in the roadway. The small number of tree species in the roadway is due to the smaller area and to less diversity of habitat.

Acer negundo was the principal pioneer of the old field and it is also the most abundant tree of the roadway with 34.5% of the total tree population (Table 1). Thirty of the 128 box elders are over six inches in diameter at breast height. Four of these are over 12 inches dbh. Fifty-five of the box elders are under one inch. However, most of these are basal sprouts from mature trees and do not represent new invasion. Undoubtedly, box elder was one of the two most abundant trees of the first invaders, but experience with the rapid demise of this species in the nearby gully would indicate that it will decline in importance in the roadway. Some of the older trees are now deteriorating, and the closed canopy will prevent new reproduction.

The other early invader of importance was *Juglans nigra* which now has 94 individual trees comprising 25.3% of the total. Eleven of the walnuts are over 12 inches dbh and seven more are between six and 12. The largest specimen is 31 inches dbh and is a handsome open-grown tree that must have started its growth early in the century. However, it cannot be seen in the early photograph (Newton, 1904) The adundant seed source from nearby forests, as well as from the older invaders, has resulted in considerable reproduction of walnuts, with 76 trees under six inches dbh present. The present roadside forest is essentially an association of walnut and box elder.

Few other trees are represented by specimens over six inches dbh. There are two large *Carya ovata* trees, with no younger ones. *Prunus serotina,* usually a common fencerow tree, is represented by only one large tree and 18 others under six inches dbh. There is only one other tree over six inches, an *Ulmus americana.* This species has 18 smaller trees. Because of the prevalence of the Dutch elm disease in adjacent areas, where it has decimated one half of this species in the gully (Bullington, 1971), the survival of the present living American elms is in doubt. Nineteen small *Ulmus rubra* are present.

The most significant development of young trees in the study area is the 82 *Celtis occidentalis,* comprising 22.1% of the tree population. Its third place rank in the roadway corresponds with a similar rank among the trees of the Strong field in 1969 (Bullington, 1971). It is less abundant in the gully and forest sites nearby. It seems that this species is introduced into a successional area after pioneer trees have been established. No doubt its seeds are brought in by tree-inhabiting birds.

Single specimens of two species of small trees, not previously reported from old field or gully, have been tentatively identified as *Morus rubra,* the red mulberry, and *Fraxinus pennsylvanica subintegerrima,* the green ash. Fruits of neither have been found for verification of identity. Both species are present elsewhere in the vicinity.

In the tally of trees, separate records were kept for the east and west sides of the roadway. A total of 191 was found on the east side and 180 on the west (Table 1). *Acer negundo* was equally abundant on each side. Somewhat more abundant on the east than on the west were *Juglans, Prunus,* and *Ulmus rubra.* On the west *Celtis* and *U. americana* were more common than on the east. No importance is attached to these appar-

ently chance differences in distribution.

Some species of trees are notable because of their absence. Prominent in various places in adjacent forest, old field, or gully, but totally absent from the roadway are species of *Quercus, Juniperus, Populus, Crataegus, Ptelea, Pyrus,* and *Prunus americana.* Since all except *Quercus* are pioneer species in secondary succession, they are unlikely to become more than chance invaders of the already occupied area of the roadway. *Quercus* species may enter with future successional development, especially *Q. velutina,* which is a prominent component of adjacent old field and forest areas, although the closed canopy may inhibit oak development.

Most of the thirteen species of shrubs and vines listed in Appendix I are plants commonly found along fencerows of unmowed country roadways. Three, *Corylus americana, Rubus occidentalis,* and *Rhus radicans,* are frequent components of such habitats. The fruits of eight or nine of the thirteen are usually eaten by birds and then may be deposited along fences. Several species in the roadway are common inhabitants of open woods and so would be expected to be found with the pioneer trees of the developing woodland. These include *Parthenocissus quinquefolia, Ribes missouriense, Smilax tamnoides, Sambucus canadensis,* and *Vitis riparia.* Two are chance invaders from horticultural plantings, namely, *Lonicera tatarica* and *Philadelphus coronarius.* There is a single mature specimen of each.

All of the species of herbaceous plants identified to date and listed in Appendix II are common plants of northern Illinois, present in most of the northeastern counties of the state (Swink, 1969), with one exception noted below. Although Ogle County was not included in Swink's study, it is adjacent to DeKalb County which is, and the flora would be expected to be similar. Continuing study will no doubt add new species to those discovered so far in the roadway. Some of the less abundant ones may disappear.

The herbs present represent several variations of natural habitat. A few are survivors of the open roadside days, such as *Poa pratensis, Pastinaca sativa,* and *Solidago* sp. The mowed central strip is similar to a degraded lawn, with *Taraxacum officinale* and *Cerastium vulgatum* being widely distributed.

Introduced weeds of disturbed woodlands and waste areas are common. Some of the more typical ones are *Arctium minus, Leonurus cardiaca,* and *Polygonum convolvulus.* Other herbs typical of such habitats are *Eupatorium rugosum, Geranium maculatum, Phryma leptostachya,* and *Ranunculus abortivus.*

The tree components of the roadway have developed sufficiently to make the habitat suitable for herbs common to northern Illinois deciduous forests. Of common occurrence are *Elymus villosus, Galium aparine, G. circaezans, Sanicula gregaria, Viola papilionacea* and *V. pennsylvanica.* Still uncommon, but serving to indicate the development of forest characteristics are *Eupatorium purpureum* and *Podophyllum peltatum.*

Near the north end of the roadway, sediments from the outlet of an old gully have been deposited. (See Bullington, 1971, for a report on succession in this gully). Active erosion has ceased, but the drainage from the gully still supplies water to this portion of the site, producing conditions similar to a floodplain. Here are found plants common to floodplains and moist woods, including *Campanula americana, Dioscorea villosa, Impatiens pallida, Laportea canadensis,* and *Rudbeckia laciniata.*

In one wet area, a colony of *Mertensia virginica* has been thriving for many years.

In this location near landscaped homesites and gardens, one would expect to find some introduced cultigens that have spread from their original setting. Two such shrubs, *Lonicera* and *Philadelphus,* were mentioned above. A recent discovery was a few specimens of *Chelidonium majus,* reported by Fernald (1950) as naturalized from Europe and by Swink (1969) as an occasional escapee from flower gardens. According to Fell (1955) it is rare in northern Illinois. *Chelidonium majus* is the only unusual species found in the roadway so far.

Summary and Conclusions

There is considerable diversity of flora in this abandoned half-acre of old roadway that has undergone secondary successional development for half a century. Twelve species of trees, thirteen of shrubs and vines, and nearly 50 of herbaceous plants have been identified. The present dominant trees are those that invaded the roadside first, *Acer negundo* and *Juglans nigra.* The only other tree with considerable numbers is *Celtis occidentalis,* a secondary invader represented by numerous small trees. The shrubs and vines are mostly fruit-bearing species commonly introduced by birds.

The development of the tree canopy has made possible the invasion of a dense ground cover of numerous species of herbs typical of woodlands. Some weedy species common to roadsides and fencerows are still present.

This study shows that a small abandoned area of little economic value can serve useful scientific purposes. Its successional development offers a clue to the expectations of recovery of badly used or deteriorated plots of ground. It is evident that such an area can be revegetated within a few decades with typical plants. As a refuge for a large variety of organisms, it provides a useful site for successional and taxonomic studies.

Furthermore, the plot has aesthetic value as a place for the enjoyment of nature, a mini-park where the recreational values of being close to nature can be pursued.

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Appendix I.—Shrubs and Vines of Roadway

Key: r = rare, one or very few specimens found
a = abundant, widely distributed
* = not previously found elsewhere in Strong Field
? = identification tentative

r * *Celastrus scandens* L. — climbing bittersweet

r * *Corylus americana* Walt. — American hazelnut

r * *Hamamelis virginiana* L. — witch hazel

r *Lonicera prolifera* (Kirchn.) Rehd. — grape honeysuckle

r * *Lonicera tatarica* L. — Tatarian honeysuckle
Parthenocissus quinquefolia Planch. — Virginia creeper
r * *Philadelphus coronarius* L. (?) — mock orange
Rhus radicans L. — poison ivy
Ribes missouriense Nutt. — Missouri gooseberry
a *Rubus occidentalis* L. — black raspberry
a *Sambucus canadensis* L. — common elderberry
Smilax tamnoides L. *hispida* (Muhl.) Fern. — bristly greenbrier
Vitis riparia Michx. — riverbank grape

Appendix II.—Herbaceous Plants of Roadway

Key: r = rare, one or very few specimens found
a = abundant, widely distributed
* = not previously found in Strong Field
? = identification tentative

r * *Agastache nepetoides* (L.) Ktze. — yellow giant-hyssop
Agrimonia gryposepala Wallr. — tall agrimony
Arctium minus (Hill) Bernh. — common burdock
* *Aster pilosus* Willd. — hairy aster
* *Aster sagittifolius* Wedemeyer — arrow-leaved aster
Brassica nigra (L.) Koch — black mustard
Carex sp. — sedge
Campanula americana L. — tall bellflower
* *Cerastium vulgatum* L. — mouse-ear chickweed
r * *Chelidonium majus* L. — celandine
Cirsium altissimum (L.) Spreng. (?) — tall thistle
* *Cryptotaenia canadensis* (L.) DC. — honewort
Desmodium glutinosum (Muhl.) Wood — pointed tick-trefoil
r * *Dioscorea villosa* L. — wild yam
* *Elymus villosus* Muhl. — wild rye
r *Eupatorium purpureum* L. — Joe-pye-weed
Eupatorium rugosum Houtt. — white snakeroot
a *Galium aparine* L. — bedstraw
Galium circaezans Michx. — wild licorice
Geranium maculatum L. — wild cranesbill
Geum canadense Jacq. — white avens
* *Hackelia virginiana* (L.) I.M. Johnston — beggar's lice
r *Impatiens pallida* Nutt. — pale touch-me-not
Lactuca floridana (L.) Gaerntn. (?) — blue lettuce
Laportea canadensis (L.) Wedd. — wood nettle
r * *Leonurus cardiaca* L. — motherwort
Mertensia virginica (L.) Pers. — Virginia bluebells
Osmorhiza Claytoni (Michx.) C. B. Clarke — hairy sweet cicely
* *Oenothera* sp. — evening primrose
Pastinaca sativa L. — parsnip
* *Phryma leptostachya* L. — lopseed
a *Poa pratensis* L. — Kentucky bluegrass
r *Podophyllum peltatum* L. — mayapple
r * *Polygonatum canaliculatum* (Muhl.) Pursh — smooth Solomon's seal
* *Polygonum convolvulus* L. — black bindweed
Ranunculus abortivus L. — kidneyleaf buttercup
Rudbeckia laciniata L. — golden-glow
Sanicula gregaria Bickn. — black snakeroot
r *Scrophularia marilandica* L. — late figwort
r *Senecio aureus* L. (?) — golden ragwort
r *Smilacina stellata* (L.) Desf. — false Solomon's seal
Solidago sp. — goldenrod
r * *Stachys palustris* L. *homotricha* Fern. (?) — woundwort
Taraxacum officinale Weber — common dandelion
r * *Thalictrum revolutum* D.C. — purple meadow rue
r * *Tovara virginiana* (L.) Raf. — jumpseed
r * *Urtica gracilis* Ait. — tall nettle
Viola papilionacea Pursh — common blue violet
Viola pennsylvanica Michx. — smooth yellow violet