

## A MESOPHYTIC FOREST ON THE UPLAND PRAIRIE

RICHARD HUDNUT

*Eastern Illinois State College, Charleston*

This study resulted from an interest in an oak-hickory-elm-ash-beech-maple-linden forest type on the upland prairie in east-central Illinois. A unique feature of this woods is a number of quite sizable American beech trees.

The land which includes this woods was purchased in 1910 from the Augustus family by the Foley family of Paris, Illinois. The Augustus family obtained it as an original land grant in 1831. When the Foleys bought this tract in 1910 much of the land which is now north of Route 16 as well as south and much of the crop land east of the woods was forest. Since the Foley people have owned the land they have been using the wood for lumber. The area is now known locally as Foley's Woods and is in R. 12 W., T. 12 N., S. part sec. 24, N. part sec. 25; it is 6 9/10 miles east of Kansas, Illinois, on Route 16, and the northwest corner of the woods is about 1/8 mile south of this point on Route 16. The woods is a rectangle one quarter of a mile wide and nearly three quarters of a mile long. It has a small area of cut-over, bushy, second growth extending out from its northeast and northwest corners. These second growth areas were not considered in the study. Only plants found in the more mature forest area were identified. A creek running through the northwest corner of the woods has built a small flood plain. A drainage ditch near the center of the length of the woods drains the fields to the east. It runs almost to the west side

of the woods where it turns north and then runs out through a grass and weed-covered open area.

### METHOD OF ANALYSIS

Essentially the work was divided into two parts. One part was a taxonomic study, the other an ecological examination. The taxonomic study consisted of an attempt to name all species of vascular plants found in the woods, including pteridophytes. This work included collecting and naming the herbaceous plants, and simply making a list of the woody plants. Herbaceous plants were named by use of floral keys and herbarium specimens. Many of the herbaceous plants have been mounted and are in the herbarium of Eastern Illinois State College. The woody plants were named by observation of their vegetative characteristics. Regular trips were made to the woods to collect plants for identification from April through October 1951. The plants were taken to the herbarium of Eastern Illinois State College where they were keyed, usually while the plants were still fresh, then dried and mounted.

The ecological study consisted of a statistical examination of the forest type of the woods. Thirty quadrats, 100 square meters or ten meters on each side, were laid out in the woods. To get a good representation of the woods, three imaginary lines were drawn along the length of the woods; one about sixty yards in from the west side of the woods, another about sixty yards in from the east side of

the woods, and one through the middle. The quadrats were laid out along these imaginary lines, each one hundred thirty-seven steps apart. This number was picked because arranging the quadrats that far apart would make ten quadrats cover the full length of the woods. After each quadrat was laid out, the trees within its bounds were listed as to size, kind, and number. The size classifications are as follows:

- 0 Seedlings
- 1 Transgressives — 1-3 inches in diameter
- 2 Understory—3-12 inches in diameter
- 3 Overstory—over 12 inches in diameter

Basal areas were determined for the trees of the number 2 and 3 classifications. Because, ecologically speaking, forest types are thought of in terms of beech-maple climax, oak-hickory climax, mixed mesophytic climax, etc., all of the oak trees were considered together in making the calculations for the study, although six different species are found in the woods. For the same reason all the hickories were considered together, even though there are three and possibly four species in this woods. In like manner, elms were grouped together, and the maples were grouped together.

#### ECOLOGICAL SURVEY

Although in 30 quadrats there are only 22 oak trees, they have a basal area of 5,068 sq. in. This is larger than the basal area recorded for any of the other trees in the 30 quadrats. There are 41 hickories to be found in the 30 quadrats which have a basal area of 4,170 sq. in. This is the

second highest basal area found. These two basal areas are much above the rest, the next highest being 1,884 sq. in. for 204 elms. More maple trees were found in these 30 quadrats than any other tree, there being 571. The basal area for these is 1,156 sq. in. The beech, which seems significant because of its appearance in this area, was found 15 times in the thirty quadrats; and has a basal area of 920 sq. in. Other trees of significant size are 20 basswoods having a basal area of 413 sq. in. and 58 ashes with a basal area of 975 sq. in. Although only seven hackberries were found, four of these were large, making a basal area of 827. In the 30 quadrats there was one large sycamore which had a basal area of 540 sq. in. (table 1).

These data show that the oaks and hickories, although few in number are large in size, indicating that in the past the woods was probably an oak-hickory climax. The history of the woods supports the theory that the forest type has been an oak-hickory climax. In 1921 and 1925 some walnut trees were cut for lumber. In 1935 a small amount of ash was cut. In 1938 some 7000 board feet of elm was taken from the woods. Thirty thousand board feet of oak were taken out in 1941, while in 1942, 67,000 board feet of oak, hickory, and walnut were cut. Again in 1948, 40,000 board feet of oak lumber were harvested. Of course the cutting of so much oak and hickory was conducive to the growth and development of the small, but more mesophytic forest climax trees which were present such as beech, maple, elm, hackberry, ash, and basswood. A factor which supports the assump-

TABLE 1.—DATA COLLECTED IN THIRTY QUADRATS RUN IN FOLEY'S WOODS

Name of tree	Basal area	No. of trees found in 30 quadrats	No. of quadrats occupied	Size classes encountered
Ash.....	875	58	22	0-1-2-3
Basswood.....	413	20	12	0-1-3
Bladdernut.....	....	307	6	0-1
Blue beech.....	13	14	5	0-1-2
Dogwood.....	....	1	1	0
Elms.....	1884	204	28	0-1-2-3
Hackberry.....	827	7	5	0-3
Hickory.....	4170	41	16	0-1-2-3
Oaks.....	5068	22	10	0-1-2-3
Sycamore.....	540	1	1	3
Walnut.....	58	2	1	0-2
Maples.....	1156	571	30	0-1-2-3
Beech.....	920	15	10	0-1-2-3
Mulberry.....	68	26	16	0-1-2
Redbud.....	151	14	5	0-1-2
Sassafras.....	104	8	5	0-1-2
Pawpaw.....	....	105	5	0-1
Wahoo.....	....	4	3	0-1
Cherry.....	....	2	2	0
Totals.....	16247	1422	173	

Trees found in Foley's Woods which did not occur in the thirty quadrats: Ironwood, Honey Locust, Kentucky Coffee Tree, Hawthorn.

tion that the woods is now a mixed mesophytic climax is the existence in the woods of many plants associated with a wetter, more mesophytic forest type. For instance 307 small bladdernut trees were found in the 30 quadrats, and also 105 young pawpaw trees. The spice bush, basswood, hackberry, walnut, mulberry,

and Kentucky coffee trees also occur in the woods. These plants are usually found in central Illinois only on the flood plain of a stream. The conclusion is then that because of lumbering and natural succession the woods has changed from an oak-hickory climax to a mixed mesophytic climax.

## TAXONOMIC SURVEY

The regular collecting trips made from April through October of 1951 have resulted in a list of 123 species. These together with those added from the list made by R. E. Evers of the Illinois Natural History Survey make a total of 151 species representing 60 families. The nomenclature used is that followed by G. N. Jones in his *Flora of Illinois*.

The occurrence of American beech (*Fagus grandifolia*), golden seal (*Hydrastis canadensis*), and the nodding trillium (*Trillium gleasoni*) in this woods are the most unusual records for this part of the state.

The taxonomic list is as follows:

Acanthaceae  
*Ruellia strepens*, Smooth Ruellia  
 Aceraceae  
*Acer saccharum*, Sugar Maple  
*A. saccharinum*, Soft Maple  
 Anacardiaceae  
*Rhus radicans*, Poison Ivy  
 Annonaceae  
*Asimina triloba*, Pawpaw  
 Araceae  
*Arisaema triphyllum*, Jack-in-the-Pulpit  
*A. dracontium*, Green Dragon  
 Aristolochiaceae  
*Asarum canadense*, Wild Ginger  
 Balsaminaceae  
*Impatiens biflora*, Spotted Touch-Me-Not  
 Berberidaceae  
*Caulophyllum thalictroides*, Blue Cohosh  
*Podophyllum peltatum*, May Apple  
*Berberis thunbergii*, Japanese Barberry  
 Betulaceae  
*Corylus americana*, Hazel  
*Carpinus caroliniana*, Blue Beech  
*Ostrya virginiana*, Ironwood  
 \*Bignoniaceae  
 \**Campsis radicans*  
 \*Boraginaceae  
 \**Hackelia virginiana*  
 Campanulaceae  
*Campanula americana*, American Bellflower  
 Caprifoliaceae  
*Sambucus canadensis*, Common Elder

Caryophyllaceae  
*Silene stellata*, Starry Campion  
 Celastraceae  
*Euonymus atropurpureus*, Wahoo  
*Celastrus scandens*, Bittersweet  
 Commelinaceae  
*Tradescantia virginiana*, Spiderwort  
*T. subaspera*, Spiderwort  
 Compositae  
*Erigeron annuus*, White Top  
*Lactuca canadensis*, Wild Lettuce  
*Prenanthes crepidinea*, Lion's Foot  
*Eupatorium rugosum*, White Snake-root  
*E. purpureum*, Joe-pye Weed  
*Ambrosia trifida*, Great Ragweed  
 \**Solidago ulmifolia*  
 Cornaceae  
*Cornus florida*, Flowering Dogwood  
 Cruciferae  
*Cardamine bulbosa*, Spring Cress  
*Dentaria laciniata*, Toothwort  
*Isodanthus pinnatifidus*  
 Cyperaceae  
*Carex squarrosa*, Sedge  
 \**C. grisea*  
 \**C. hirtifolia*  
 \**C. rosea*  
 Fagaceae  
*Fagus grandifolia*, American Beech  
*Quercus imbricaria*, Shingle Oak  
*Q. borealis*, Red Oak  
*Q. velutina*, Black Oak  
*Q. alba*, White Oak  
*Q. macrocarpa*, Bur Oak  
*Q. muhlbergii*, Chestnut Oak  
 Fumariaceae  
*Dicentra cucullaria*, Dutchman's Breeches  
 Geraniaceae  
*Geranium maculatum*, Cranesbill  
 Gramineae  
*Poa annua*, Low Spear Grass  
 \**Bromus purgans*  
 \**Cinna arundinacea*  
 \**Elymus villosus*  
 \**Festuca obtusa*  
 Grossulariaceae  
*Ribes* sp., Gooseberry  
 \**R. missouriense*  
 Hydrangeaceae  
*Hydrangea arborescens*, Wild Hydrangea  
 Hydrophyllaceae  
*Hydrophyllum appendiculatum*, Waterleaf  
*H. virginianum*, Waterleaf  
 Juglandaceae  
*Juglans nigra*, Black Walnut  
*Carya ovata*, Shagbark Hickory  
*C. cordiformis*, Bitternut Hickory  
*C. glabra*, Pignut Hickory  
 \**C. laciniata*

- Labiatae  
*Blephilia hirsuta*  
*Prunella vulgaris*, Selfheal  
*Scutellaria ovata*, Skullcap  
*Glechoma hederacea*, Ground Ivy  
 \**Agastache nepetoides*  
 Lauraceae  
*Lindera benzoin*, Spice Bush  
*Sassafras albidum*, Sassafras  
 Leguminosae  
*Cercis canadensis*, Redbud  
*Gleditsia triacanthos*, Honey Locust  
*Gymnocladus dioica*, Kentucky Coffee Tree  
*Desmodium nudiflorum*, Tick-clover  
 \**Trifolium repens*  
 Liliaceae  
*Trillium recurvatum*, Wake Robin  
*T. gleasoni*, Nodding Trillium  
*Smilax hispida*, Greenbrier  
*S. herbacea*, Carrion Flower  
*Erythronium albidum*, White Dog's Tooth Violet  
*Smilacina racemosa*, False Solomon's Seal  
*Uvularia grandiflora*, Bellwort  
 \*Limnanthaceae  
 \**Floerkea proserpinacoides*  
 \*Lobeliaceae  
 \**Lobelia inflata*  
 Menispermaceae  
*Menispermum canadense*, Moonseed Vine  
 Moraceae  
*Morus alba*, White Mulberry  
 \**M. rubra*  
 Oleaceae  
*Fraxinus americana*, White Ash  
 Onagraceae  
*Circaea latifolia*, Enchanter's Nightshade  
 Ophioglossaceae  
*Botrychium virginianum*, Rattlesnake Fern  
 Oxalidaceae  
*Oxalis cymosa*, Wood-sorrel  
 Papaveraceae  
*Sanguinaria canadensis*, Bloodroot  
 Phrymaceae  
*Phryma leptostachya*, Lopseed  
 Phytolaccaceae  
*Phytolacca americana*, Pokeberry  
 Platanaceae  
*Platanus occidentalis*, Sycamore  
 Polemoniaceae  
*Phlox divaricata*, Blue Phlox  
*Polemonium reptans*, Jacobs Ladder  
 Polygonaceae  
*Polygonum convolvulus*, Black Bindweed  
 \**P. hydropiper*  
 Polypodiaceae  
*Polystichum acrostichoides*, Christmas Fern  
*Onoclea sensibilis*, Sensitive Fern  
*Adiantum pedatum*, Maidenhair Fern  
*Cystopteris fragilis*, Bladder Fern  
*Dryopteris phegopteris*, Beech Fern  
 Portulacaceae  
*Claytonia virginica*, Spring Beauty  
 Primulaceae  
*Lysimachia lanceolata*, Loosestrife  
 \**L. ciliata*  
 \**Samolus parviflorus*  
 Ranunculaceae  
*Isopyrum biternatum*, False Rue  
*Anemone*  
*Ranunculus abortivus*, Small Flowering Buttercup  
*R. septentrionalis*, Swamp Buttercup  
*Actaea alba*, White Baneberry  
*Delphinium tricorne*, Larkspur  
*Ranunculus recurvatus*, Hooked Crowfoot  
*Hepatica acutiloba*  
 Rosaceae  
*Geum vernum*, Spring Avens  
*G. canadense*, White Avens  
*Agrimonia pubescens*, Agrimony  
 \**A. gryposepala*  
*Prunus pennsylvanica*, Wild Black Cherry  
*Rubus* sp., Raspberry  
*Crataegus* spp., Hawthorn  
 \**C. crusgalli*  
 \**C. mollis*  
 \**Rosa setigera*  
 Rubiaceae  
*Galium asprellum*, Rough Bedstraw  
*G. triflorum*, Sweet-scented Bedstraw  
*G. concinnum*  
*G. circaeazans*, Wild-licorice  
 \**G. obtusum*  
 Scrophulariaceae  
*Mimulus alatus*, Monkey Flower  
 Staphyleaceae  
*Staphylea trifolia*, American Bladder-nut  
 Tiliaceae  
*Tilia americana*, American Linden  
 Ulmaceae  
*Ulmus americana*, American Elm  
*U. fulva*, Slippery Elm  
*Celtis occidentalis*, Hackberry  
 Umbelliferae  
*Osmorhiza claytoni*, Sweet Cicely  
*Sanicula gregaria*, Black Snakeroot  
 \**S. canadensis*  
*Cryptotaenia canadensis*, Honewort  
*Erigenia bulbosa*, Harbinger-of-Spring  
 Urticaceae  
*Pilea pumila*, Clearweed  
*Laportea canadensis*, Wood Nettle  
 \**Parietaria pennsylvanica*  
 Violaceae  
*Viola striata*, Cream Violet  
*V. eriocarpa*, Yellow Violet

\**V. papilionacea*

\**V. sororia*

Vitaceae

*Vitis* sp., Grapevine

\**V. aestivalis*

*Parthenocissus quinquefolia*, Virginia Creeper

\* Plants collected from the Foley's Woods area by Robert Evers of the Illinois Natural History Survey, which were not incorporated into the original list of the author.

### SUMMARY

Located 6 9/10 miles east of Kansas, Illinois, Foley's Woods includes approximately 120 acres of mature forest. The woods is nearly surrounded by upland prairie farm land.

Regular collecting trips were made to the woods from April to October of 1951. From the plants collected on these trips, 123 species have been identified to date. These species represent 56 families. The most unusual records for this part of the state are American beech (*Fagus grandifolia*), golden seal (*Hydrastis canadensis*), and the nodding trillium (*Trillium gleasoni*).

The oaks and hickories on a whole are the larger trees in the woods, although there are fewer of them, indicating that this woods has at one time been an oak-hickory climax forest type. The presence of bladder-nut, pawpaw, spice bush, Kentucky coffee tree, mulberry, walnut, hackberry, and basswood species usually associated with the wetter more mesophytic forest type, indicates that

this woods is now a mixed-mesophytic forest type. Another significant thing is that a great many American beech trees, which are not found in other forested areas of central Illinois, are present in this woods. Some of these are quite sizable, being almost as large as the big beech trees of the beech-maple climax forests in Indiana and Michigan. Considerable lumbering during which much oak and some hickory were taken out of the woods has allowed the growth and development of the more mesophytic tree species. This has hastened the transition from the oak-hickory climax to the mixed mesophytic climax.

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