The "Walnut Woods" on Shady Lane, within the University of Kentucky's Arboretum.
Julian Campbell, Jan 2014.

This paper was initially based on notes assembled during 1977 to 1982 (Campbell 1981), before the Arboretum was founded in 1991, plus more recent observations. The University of Kentucky's Arboretum—now a partnership with the City of Lexington—lies on about 100 acres at the south side of the main campus. In the western corner of this land there are about 15 acres of woodland, which form the only obvious remnant of original native vegetation on the whole campus. Indeed, there are few other patches of woods larger than an acre anywhere else within central Lexington. Even as far out as New Circle Road, within about 110 square miles, there are just four additional sites of comparable interest, each covering 5-20 acres: Lansdowne Woods (by the Country Club), Lakeview Woods (by Henry Clay High School), McConnell Springs and Preston Springs (Campbell 2012).

These Arboretum Woods have been previously known locally as Shady Lane Woods, Walnut Woods, Walnut Grove, Glendover Woods or Snake Woods. They are are bordered on the south side by Shady Lane, a paved city street, and on the southeast and west by private yards. To the north, these woods adjoin mowed areas around some University apartments, and to the east they merge into the rest of the Arboretum. There has been some slight extension of native vegetation into formerly mowed areas on the campus during the past decade or so.

The soil within these woods has been mapped by NRCS (Sims et al. 1968) mostly as Maury silt loam, with slopes of 2-12%. This soil series is a typic paleudalf, largely derived from residuum of phosphate-rich limestone of Middle Ordovician age, which lies at about 5-10

feet below the surface. In addition, the upper 10-20+ inches of original soils have much loess—silty dust blown in from western regions during dry glacial periods (Barnhisel et al. 1971). During recent years, the USDA's NRCS (unpublished) has been segregating the new "Bluegrass" soil series from Maury, based on its deeper covering of silty material in the topsoil (A to upper B horizon), and less than 35% clay in the "particle size control section" (website). In recent mapping by USDA (2014), their Maury of 1968 is now redefined as a mixture of Maury and Bluegrass, with the latter increasing on higher ground with less slope. The Bluegrass series here was formerly mapped as "Hagerstown silt loam" (Higbee & Venable 1931). In the south-central lowland of the woods, there is an area mapped as Newark silt loam, which is similar to Maury except for being somewhat poorly drained. The Newark series here was formerly mapped as an "imperfectly drained" variant of Maury.

When initially surveyed in 1977-80, about 68% of trees over 20 cm dbh were black walnut. Other native trees that were at least locally frequent included ashes, coffeetree, black locust, cherry, hackberry and elm. Minor species, with less than 1% of total numbers, included oaks, hickories, sugar maples, boxelder, buckeye, basswood and mulberry. But, although few in numbers, the oaks included some of the largest trees in the woods, at 100-120 cm dbh (a bur oak and a chinquapin oak). In 2014, coffeetree has now declined much, while hackberry has increased in the understory. Some of the largest trees have died, including two blue ashes, the largest bur oak and the largest elm.

Most of the canopy trees, especially the walnuts, appear to date from about 1930-40, based on ring-counts and historical information. Thomson R. Bryant [1885-1979], a retired professor of the Kentucky Agriculture Experiment Station, recalled that these walnuts grew up during a

period of reduced mowing and grazing. The woods have been studied by University faculty and students since the 1940s or perhaps earlier, although records are lacking. James A. Newman (pers. comm.) stated that Oscar M. Davenport, chairing the Dept. of Forestry in 1950, had a fence put around the northwestern third of the woods so that undisturbed growth could be observed. In order to increase the proportion of walnut, these foresters also removed some of the less valuable stems of elm, hackberry, coffeetree and senescing oaks. In one gap left by an old oak, several tulip poplars were planted, and some survive here today. In 1980, these poplars appeared to be the only trees planted in the woods. Newman (1961, 1979) published notes on "yellow poplar" (= tulip or *Liriodendron*) and promoted management of small farm woodlots for timber production across the state. These woods at the Arboretum became used for regular demonstration and education about such management. However, no further harvesting of the timber appears to have occurred.

Within the area fenced since 1950, four plots of 25 × 25 m were established in 1977. In addition to the dominant walnuts (mostly 20-45 cm dbh), these plots included some planted tulip trees plus single large trees of cherry (63 cm), basswood (80 cm) and chinquapin oak (104 cm). There were no walnuts (or oaks) less than 20 cm dbh. The understorey was dominated by hackberries, all under 15 cm dbh, with lesser numbers of cherry and, especially on lower ground, ashes (white and perhaps red ash). Other stems less than 15 cm dbh were mostly sugar maple (or perhaps transitions to black maple), buckeye and basswood, plus a few elms, coffeetrees and (just outside plots) bitternut hickories. The only shrubs in these plots were elderberry and coralberry, plus two alien invasives: burning bush (*Euonymus alatus*) and bush honeysuckle (*Lonicera maackii*).

The other two-thirds of the woods were grazed until about 1970, and then mowed several times a year until the spring of 1980, when a campaign by some people from the neighborhood urged the University to allow succession in the woods. By 1982, after two growing seasons since release from mowing, the following species of regenerating stems, up to a meter tall, were most common: white/red ash, bitternut hickory, coffeetree, red mulberry, white mulberry and pin oak—the latter two are aliens spread by animals from trees outside the woods. Less common species were black locust, cherry, walnut and hackberry. Some of these stem were not new colonists. Coffeetree, especially, had been able to resprout repeatedly during the previous mowing and grazing. The overall density of these tree seedlings and sprouts, including all species, was about 1 per 10 square meters. There were few stems intermediate in size between these small regenerating stems and the canopy trees of 20-50+ cm dbh. The only stems that could grow up continually during the mowing of 1970-1980 were located close to canopy trees, which were usually avoided by the mowing machines.

A complete list of vascular plants found in the woods is presented below. Further notes on varied life-forms are as follows.

Shrubs and vines. Although 22 species of shrub and vine occur in the woods, most of these are alien, and some of the natives have been planted (*Arundinaria, Asimina, Cornus, Lindera*). Historical accounts indicate that the understoreys of woodlands around Lexington were greatly reduced after settlement due to cutting and grazing (Campbell 1980, 1989). In addition to coralberry and elderberry, which are locally frequent, the only other non-planted natives are spindle (*Euonymus atropurpurea*) and raspberry (*Rubus occidentalis*).

Vernal herbs of deeper shade. Some native species appear to be remnants from the original woods, and these are now rare to absent on uplands in the Lexington area: running white violet

(*Viola striata*), wake robin (*Trillium sessile*), white trout lily (*Erythronium albidum*), wild hyacinth (*Camassia scilloides*), squirrel corn (*Dicentra canadensis*) and fragile fern (*Cystopteris protrusa*). These occur only in a few patches of less than 10 square meters, and they are mostly restricted to the section that was fenced from cattle in 1950, but the white trout lily occurs at the edge of the wetter area, which was formerly mowed during summer and fall.

Native species of transitional woods. Several natives became locally abundant in the woods during 1970 to 1990, before the overwhelming spread of alien competition from *Lonicera maackii* and *Euonymus fortunei*. These species include grasses (*Elymus, Tridens*), sedges (*Carex*), Miami mist (*Phacelia*), cicely (*Osmorhiza*), lobelia and composites (*Elephantopus, Aster, Vernonia, Bidens*—with lesser amounts of *Lactuca, Solidago, Ambrosia* and *Eupatorium*).

Alien species of more open ground. In 1980, most alien herbs and grasses were concentrated in the mowed areas, where there was a typical woodland pasture with fescue (*Festuca*), orchard grass (*Dactylis*), bluegrass (*Poa*), white clover and red clover (*Trifolium*).

In 1981, this author wrote: "Most of the species that increased rapidly since mowing ceased will probably decrease when shady conditions eventually develop as the tree seedlings and sprouts grow up. However, it is unlikely that the vegetation (woody or herbaceous) will become the same as in the area unmowed since 1950. The effects of the extra 30 years of mowing and some grazing in the rest of the woods will be a major focus of research during the coming decades." It is now time to conduct that research!

Fig. 1

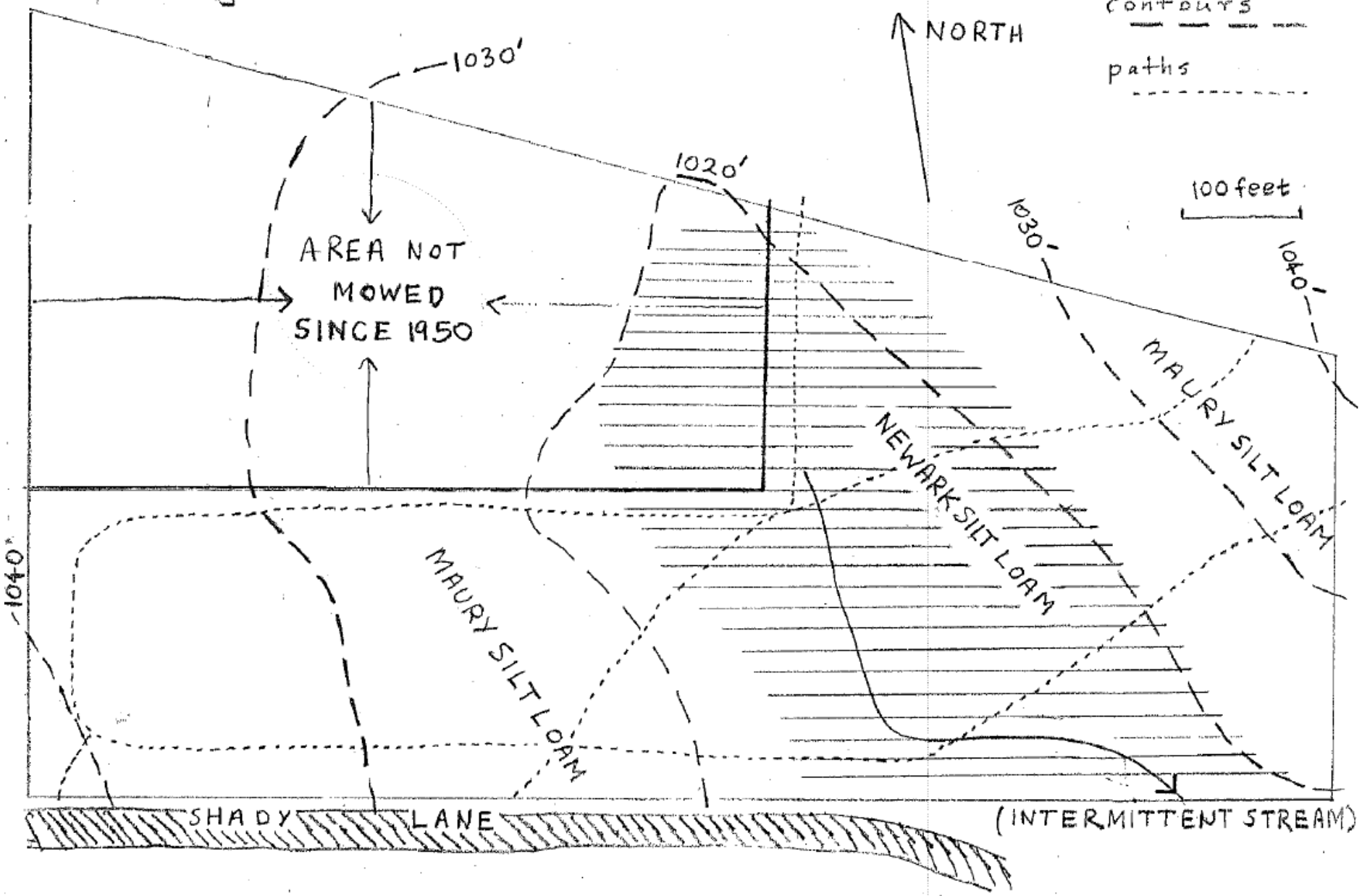
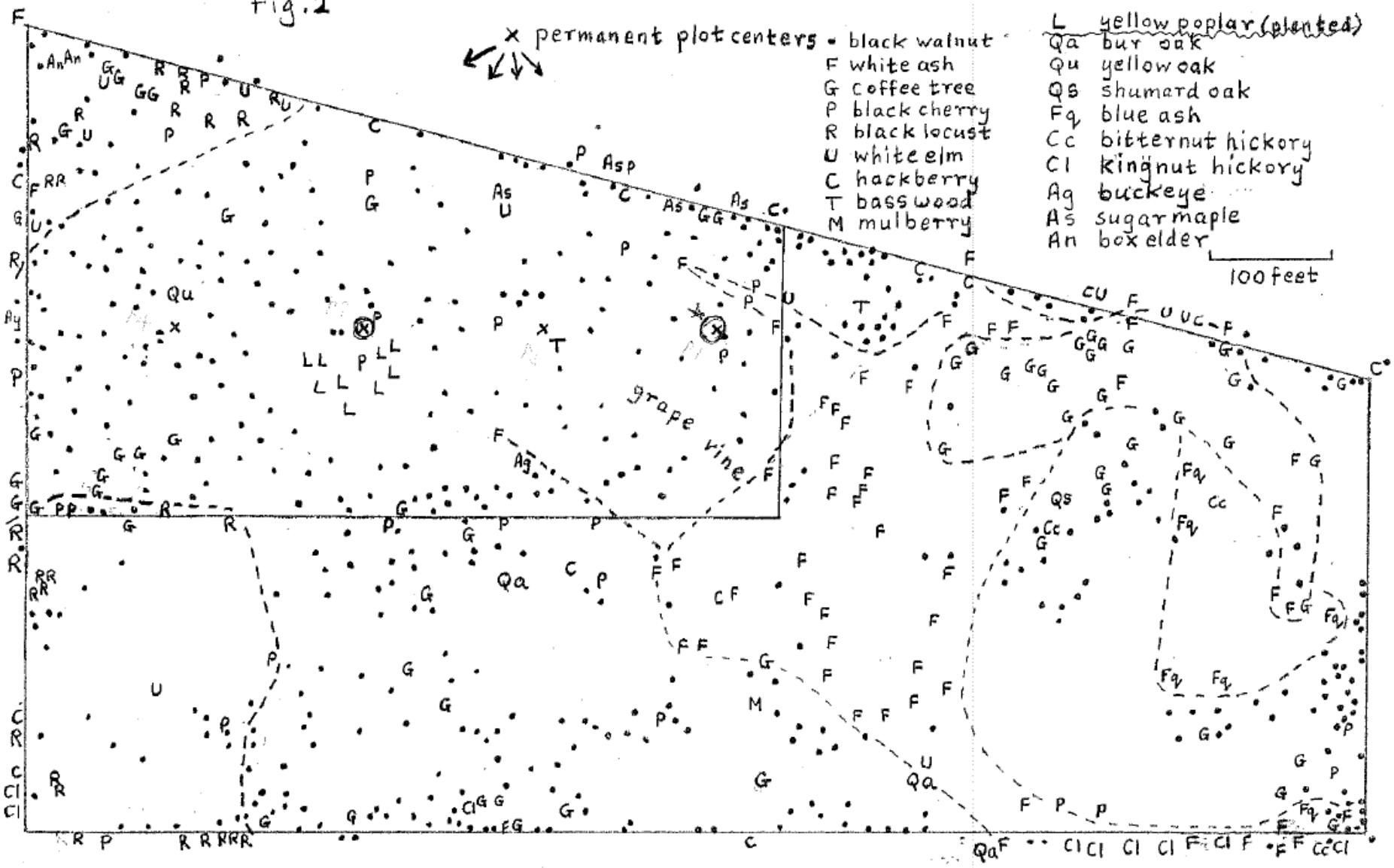

NORTH
contours
paths
100 feet
1030'
1020'
1030'
1040'
1040'
AREA NOT MOWED SINCE 1950
MAURY SILT LOAM
NEWARK SILT LOAM
MAURY SILT LOAM
SHADY LANE
(INTERMITTENT STREAM)

Fig. 2


× permanent plot centers
• black walnut
F white ash
G coffee tree
P black cherry
R black locust
U white elm
C hackberry
T basswood
M mulberry
L yellow poplar (planted)
Qa bur oak
Qu yellow oak
Qs shumard oak
Fq blue ash
Cc bitternut hickory
Cl kingnut hickory
Ag buckeye
As sugar maple
An box elder
100 feet
grape vine

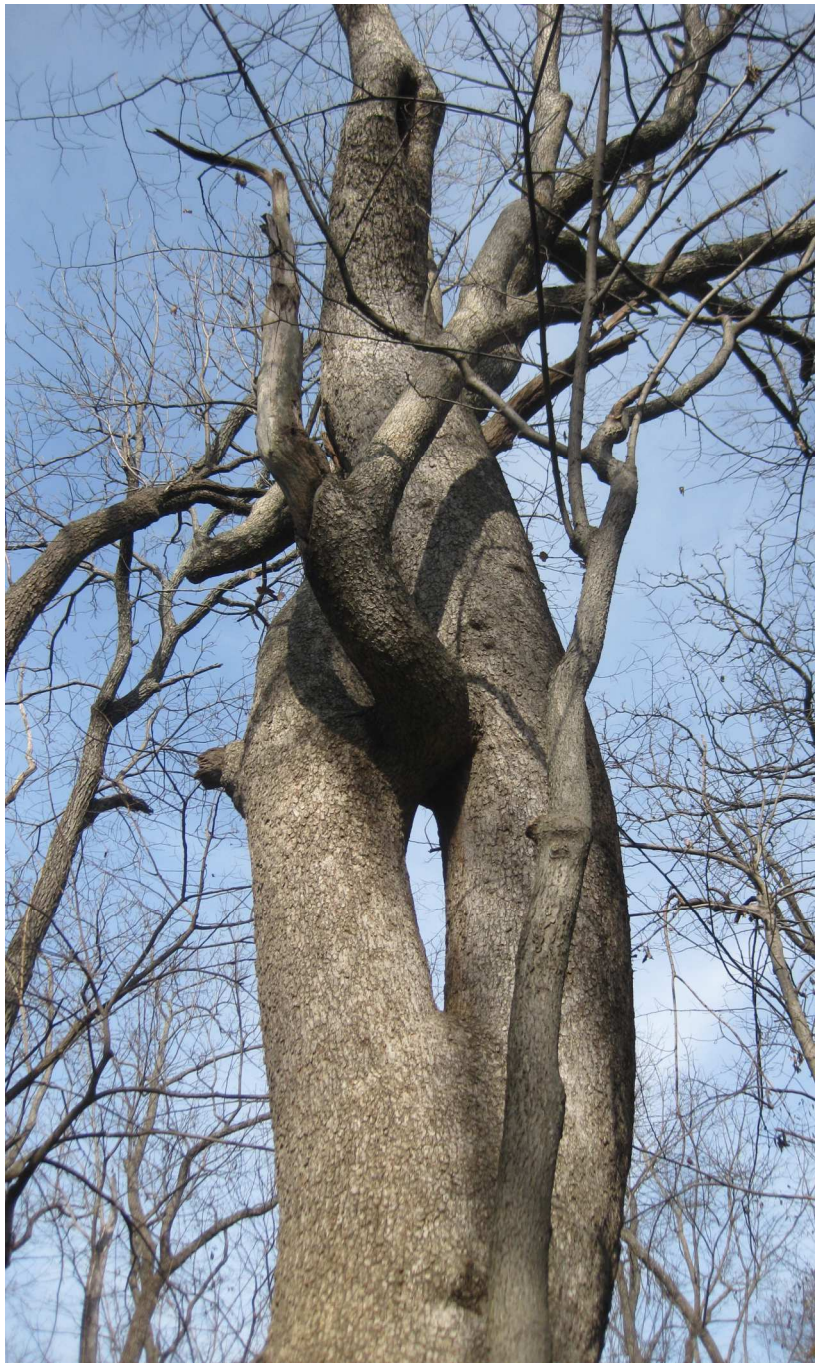


Table 1. Vascular Flora of the Arboretum Woods.

*** Alien at continental level: native to Europe or Asia.
** Alien at regional level: native to states further west or south.
* Alien at local level: native to habitats elsewhere in Central Ohio Valley.

abu = abundant; com = common; cut = mostly cut out by arboretum staff and volunteers; dom = dominant; fre = frequent; loc = local/locally; occ = occasional; pla = planted (after 1990 except for *Liriodendron*); pre = present (probably occ/rar); rar = rare.

Upper case codes in right column.

Forest type: A = mostly in ash type; B = both types; W = mostly in walnut type.
Open versus shade: O = mostly in open, under canopy gap; P = mostly in partial shade; S= mostly in deeper shade.
Mowed versus unmowed: M = mostly in mowed or trampled (or grazed) areas;
T = temporarily increasing in transition from mowed to unmowed conditions;
U = mostly in unmowed areas.
For trees, these codes refer to conditions for regeneration, based on general experience in the region as well as observations at these particular woods.

SCIENTIFIC NAME	COMMON NAME	Arboretum Woods: 1982 abundance	Arboretum Woods Codes (see text)
TREES		-	-
Acer negundo L.	boxelder	occ; loc fre	BPU
Acer nigrum Michx. f.	black maple	pre?	-
Acer saccharum Marsh.	sugar maple	occ; loc fre	WSU
Aesculus glabra Willd.	stinking buckeye	occ; loc fre	WST
Carya cordiformis (Wangenh.) K. Koch	bitternut hickory	occ	WST
Carya laciniosa (Michx. f.) G. Don	shellbark hickory	occ	APM
Celtis occidentalis L.	common hackberry	com	BST
Fraxinus americana L.	northern white ash	occ	WPT
Fraxinus biltmoreana	southern white ash	occ?	-
Fraxinus pennsylvanica Marsh. var. pennsylvanica	red ash	loc com?	APT
Fraxinus quadrangulata Michx.	blue ash	occ; loc abu	WPU
Gymnocladus dioicus (L.) K. Koch	coffeetree	occ; loc fre	WOM
Juglans nigra L.	black walnut	abu; loc dom	WOM
Liriodendron tulipifera L.*	tuliptree	loc; pla	WOU

Morus alba L.***	white mulberry	occ; cut	BOT
Morus rubra L.	red mulberry	occ	WPT
Prunus serotina Ehrh.	black cherry	occ; loc fre	WPT
Quercus macrocarpa	bur oak	occ	BOT
Quercus muehlenbergii Engelm.	chinquapin oak	rar	WOU
Quercus palustris Muenchh.*	pin oak	occ; cut	AOT
Quercus shumardii Buckl.	western red oak	rar	WOT
Robinia pseudoacacia L.	black locust	occ; loc fre	WOM
Tilia heterophylla Vent.	mountain basswood	occ; loc fre	WSU
Ulmus americana L.	white elm	occ	BPT
SHRUBS		-	-
Arundinaria gigantea (Walt.) Muhl.	cane	loc abu; pla	-
Asimina triloba (L.) Dunal	pawpaw	occ; pla	-
Cornus drummondii C.A. Mey.	rough-leaved dogwood	loc fre; pla	-
Euonymus alatus (Thunb.) Sieb.***	burning-bush	occ; cut	WPT
Euonymus atropurpurea Jacq.	spindle	occ	WSU
Ligustrum sinense Lour.***	Chinese privet	rar; cut	WPT
Lindera benzoin (L.) Blume	spicebush	occ; pla	-
Lonicera maackii (Rupr.) Herder***	Amur honeysuckle	occ; CUT	BSU
Rosa multiflora Thunb. ex Murr.***	multiflora rose	rar; cut	WOT
Rubus occidentalis L.	wild raspberry	rar; now loc	-

		fre	
Sambucus canadensis L.	elderberry	occ; loc fre	BPT
Symphoricarpos orbiculatus Moench	coralberry	loc com	APT
Viburnum opulus L.***	guelder rose	rar; cut	WOU
VINES		-	-
Celastrus orbiculatus Thunb.***	Asian bittersweet	rar; cut?	-
Euonymus fortunei (Turcz.) Hand.-Maz.***	purplish winter-creeper	loc dom	WSU
Hedera helix L.***	English ivy	occ; cut	WPU
Lonicera japonica Thunb.***	Japanese honeysuckle	occ; loc fre	BOT
Parthenocissus quinquefolia (L.) Planch.	Virginia creeper	occ; loc com	WPU
Phoradendron leucarpum (Raf.) Reveal & M.C. Johnston	mistletoe	rar	WO
Smilax bona-nox L.	saw greenbrier	rar	WPU
Smilax hispida Raf.	bristly greenbrier	rar	WPU
Toxicodendron radicans (L.) Kuntze	poison ivy	fre; cut?	BPU
Vitis vulpina L.	common smooth-grape	loc com; cut	BOU
HERBS		-	-
Acalypha rhomboidea Raf.	greater mercury	fre	WOT
Agrimonia pubescens Wallr.	hairy agrimony	occ	BPT
Ajuga reptans L.***	common henbit	occ	WPM

Allium vineale L.	weed onion	occ	-
Ambrosia artemisiifolia L.	common ragweed	occ	BOT
Ambrosia trifida L.	giant ragweed	occ	BOT
Arctium minus Bernh.***	burrdock	occ	BPT
Asclepias incarnata L.	swamp milkweed	occ	AOT
Aster cf. racemosus	soft little-white-aster	fre; id?	AOT
Aster lateriflorus (L.) Britt.	purplish little-white-aster	fre	APT
Aster ontarionis Wieg.	soft little-white-aster	fre	APT
Bidens bipinnata L.	upland bur-marigold	fre	BOT
Bidens frondosa L.	small discoid bur-marigold	occ	WOT
Camassia scilloides (Raf.) Cory	wild hyacinth	occ	BPU
Cardamine bulbosa (Schreb. ex Muhl.) B.S.P.	bulbous bittercress	fre	ASM
Cardamine concatenata (Michx.) Sw.	laciniate toothwort	fre	WSU
Cardamine hirsuta L.***	common bittercress	occ?	-
Carex aggregata Mackenz.	rich meadow spike-sedge	fre; id?	APT

Carex blanda Dewey	weedy lax-sedge	fre	WSU
Carex oligocarpa Schkuhr ex Willd.	lesser wrinkled-sedge	fre	-
Chaerophyllum procumbens (L.) Crantz	smooth wild chervil	fre	WPU
Claytonia virginica L.	common spring-beauty	fre	BPM
Commelina communis L.***	common dayflower	occ	WOT
Cystopteris protrusa (Weatherby) Blasdell	common fragile fern	occ	WSU
Dactylis glomerata L.***	orchardgrass	fre	BOM
Dicentra canadensis (Goldie) Walp.	squirrel corn	occ	WSU
Duchesnea indica (Andr.) Focke***	false strawberry	occ	BPM
Elephantopus carolinianus Raeusch.	common elephant's-foot	com	WPT
Eleusine indica (L.) Gaertn.***	goose-grass	fre	BOM
Elymus macgregorii J. Camp. & R. Brooks	early wild-rye	fre	-
Elymus villosus Muhl. ex Willd.	upland nodding wild-rye	occ	WPT
Elymus virginicus L. var. virginicus	smooth common wild-rye	fre	WPT
Eragrostis pectinacea (Michx.) Nees	common love-	occ	-

ex Steud.	grass		
Erigeron annuus (L.) Pers.	common daisy-fleabane	occ; id?	-
Erigeron philadelphicus L.	early daisy-fleabane	occ	BOT
Erythronium albidum Nutt.	white trout-lily	occ	APM
Eupatorium coelestinum L.	blue mistflower	occ	APT
Festuca arundinacea Schreb.***	tall fescue	com	BOM
Galium aparine L.	cleaving bedstraw	fre	WPU
Geum canadense Jacq.	white avens	fre	BPT
Geum vernum (Raf.) Torr. & Gray	spring avens	fre	WPU
Glechoma hederacea L.***	gill-over-the-ground	fre	BPM
Iodanthus pinnatifidus (Michx.) Steud.	purple-rocket	occ	APT
Juncus dudleyi Wieg.	greater path-rush	occ; id?	
Juncus tenuis Willd.	common path-rush	fre	BPM
Lactuca biennis (Moench) Fern.	common wild lettuce	occ	WPT
Lamium purpureum L.***	common henbit	occ	-
Lobelia siphilitica L.	great blue lobelia	fre	APT
Muhlenbergia schreberi J.F. Gmel.	nimblewill	com	BOM
Osmorhiza longistylis (Torr.) DC.	smooth cicely	com	WPT

Oxalis dillenii Jacq.	lesser yellow sorrel	fre; id?	BOM
Oxalis stricta L.***	tall wood-sorrel	occ; id?	-
Panicum clandestinum L.	dotted broadleaf panic-grass	occ	AOT
Phacelia purshii Buckl.	blue/Miami mist	com	WPT
Phryma leptostachya L.	lopseed	occ	WPU
Physalis subglabrata Mackenzie & Bush	smooth groundcherry	occ; id?	AOT
Phytolacca americana L.	pokeweed	occ	BOT
Pilea pumila (L.) Gray	clearweed	fre	WPT
Plantago lanceolata L.***	English plantain	occ	AOM
Plantago rugelii Dcne.	broad-leaf plantain	fre	BOM
Poa annua L.***	common annual bluegrass	occ	-
Poa pratensis L.**	common bluegrass	fre	BPM
Polygonum aviculare L.***	lowly knotweed	fre; id?	BOM
Polygonum cf. scandens L.	climbing knotweed	occ; id?	AOT
Polygonum longisetum de Bruyn***	Asian pink smartweed	fre	BOT
Polygonum punctatum Ell.	common white	fre	BOT

	smartweed		
Polygonum virginianum L.	wood knotweed	fre	WPT
Portulaca oleracea L.***	purslane	occ	-
Prunella lanceolata W. Bart.	lance-leaved selfheal	occ	-
Ranunculus abortivus L.	smooth little-buttercup	occ	-
Ranunculus micranthus Nutt.	hairy little-buttercup	occ	-
Ruellia strepens L.	lowland petunia	occ	APT
Rumex obtusifolius L.***	broadleaf dock	occ	-
Sanicula canadensis L.	common sanicle	fre	WPU
Setaria pumila (Poir.) Roemer & J.A. Schultes***	yellow foxtail	fre	BOM
Solanum ptychanthum Dunal	wild nightshade	occ	APT
Solidago altissima L.	old-field goldenrod	occ	BOT
Taraxacum officinale G.H. Weber ex Wiggers***	common dandelion	occ	-
Tridens flavus (L.) A.S. Hitchc.	purpletop-grass	com	BOT
Trifolium pratense L.***	red clover	occ	BOM
Trifolium repens L.***	white clover	fre	BOM
Trifolium stoloniferum Muhl. Ex Eat.	running buffalo clover	rar	WPM

Trillium sessile L.	small sessile-trillium	fre	WSU
Vernonia gigantea (Walt.) Trel.	common ironweed	com	BOT
Veronica arvensis L.***	hairy sessile speedwell	occ	-
Veronica hederifolia L.***	ivyleaf speedwell	occ	-
Viola bicolor Pursh**	common field-pansy	occ	WOM
Viola papilionacea Pursh p.p.	common blue-violet	com	BSU
Viola striata Ait.	creamy spreading-violet	occ	WPU

Literature Cited

Barnhisel, R.I., H.H. Bailey & S. Matondang. 1971. Loess distribution in central and eastern Kentucky. Soil Science Society of America Journal 35: 483-487.

Campbell, J.J.N. 1980. Present and presettlement forest conditions in the Inner Bluegrass of Kentucky. Ph.D., Univ. of Ky., Lexington. 209 pages.

Campbell, J.J.N. 1981. The Shady Lane Woods: the best remnant of primeval wilderness within the city of Lexington, Kentucky. Manuscript on file at the Arboretum office, University of Kentucky. 8 pages plus maps and tables.

Campbell, J.J.N. 1989. Historical evidence of presettlement forest composition in the Inner Bluegrass of Kentucky. In G. Rink & C.A. Budelsky (eds.). Proceedings of the Seventh Central Hardwood Forest Conference, p. 231-246. North Central Forest Experiment Station, USDA Forest Service.

Campbell, J.J.N. 2012. Restoring native vegetation in Lexington, Kentucky. Published by the author at http://bluegrasswoodland.com/uploads/Restore_Lexington.pdf.

Higbee, H.W., & K.S. Venable. 1931. Soil survey of Fayette County, Kentucky. U.S.D.A. Bureau of Chemistry and Soils, in cooperation with Kentucky Agricultural Experiment Station. 45 pages. [Discarded from library at University of Kentucky.]

Newman, J.A. 1961. Yellow poplar: Kentucky's State Tree. Cooperative Extension Service, University of Kentucky. Misc. Publ. 180, 3 pages.

Newman, J.A. 1979. Growing trees grow dollars. University of Kentucky, Department of Forestry Publication FOR-06.

Sims, R.P., D.G. Preston, A.J. Richardson, J.H. Newton, D. Iskrig & R.L. Blevins. 1968. Soil survey of Fayette County, Kentucky. U.S.D.A. Soil Conservation Service in cooperation with the Kentucky Agricultural Experiment Station. 68 pages.

U.S.D.A. Natural Resource Conservation Service. 2014. Web Soil Survey. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.