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## Vascular Flora of eastern Middlesex County, Virginia

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VASCULAR FLORA OF  
EASTERN MIDDLESEX COUNTY, VIRGINIA

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A Thesis

Presented to

The Faculty of the Department of Biology  
The College of William and Mary in Virginia

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

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by

Gretchen Barrow North

1983

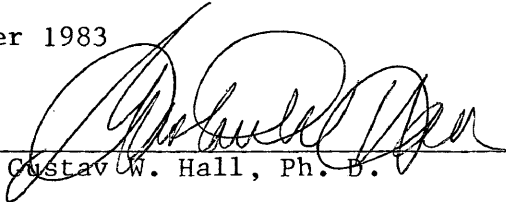
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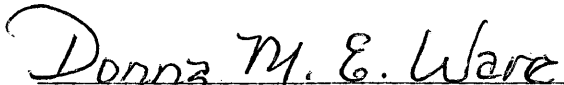
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Master of Arts

  
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## ABSTRACT

A study of the vascular flora of eastern Middlesex County, Virginia was conducted from March, 1981 through October, 1982. The study area, covering approximately 70 square miles, is bordered on the east by the Chesapeake Bay, on the north by the Rappahannock River, on the south by the Piankatank River, and on the west by U. S. Route 17. Principal habitats include salt and freshwater marshes, coastal strands, dry pine woods, swamp woods, hardwood stands, disturbed areas, and calcareous ravines. Eight hundred and nineteen taxa were collected and identified, notable among them being Lechea maritima var. virginica, a species listed by the U.S. Fish and Wildlife Service as threatened with extinction; Anoda cristata and Cardamine pratensis var. palustris, both found in only three other Virginia counties; and five species apparently at or near their northernmost limits, Ponthieva racemosa, Malaxis spicata, Crataegus flava, Eupatorium saltuense, and Rhexia nashii. Of the remaining taxa, 252 are newly recorded for Middlesex County, 45 are newly recorded for the Middle Peninsula, and 13 are newly recorded for the Outer Coastal Plain.

The phytogeography of the area is discussed, noting the percentages of circumboreal, eastern Asian, tropical, cosmopolitan, and introduced species, as well as the distribution patterns of U.S. species. Comparisons are made between the phytogeographical affinities of the floras of four Coastal Plain regions: the Northern Neck, Middle Peninsula, and the Peninsula of Virginia, herein referred to as the Upper, Middle, and Lower Peninsulas, respectively, and the area south of the James River, with particular emphasis on species attaining their northernmost limits in these regions. Significant floristic and climatic differences are found between the Upper and Middle Peninsulas and between the Lower Peninsula and the area south of the James, but not between the Middle and Lower Peninsulas. The implication is that both the area south of the James and the Middle Peninsula play transitional roles in the distribution of southern species.

VASCULAR FLORA OF  
EASTERN MIDDLESEX COUNTY, VIRGINIA



## INTRODUCTION

Middlesex County is a long, comparatively narrow strip of land bordered on the north by the Rappahannock River, on the south by the Piankatank River, on the east by the Chesapeake Bay, and on the west by Essex County. Together with Essex, Mathews, Gloucester, King and Queen, and King William Counties, it constitutes the Middle Peninsula of Virginia. The study area, of approximately 70 square miles, comprises only the eastern half of Middlesex, with U.S. Route 17, its western boundary, roughly corresponding to the point on the Piankatank River where salt marsh yields to freshwater marsh. The western boundary was chosen partly because of this tidal transition and partly because a floristic analysis of the Middlesex portion of Dragon Swamp, to the east of the study area, was done in 1977-78 (Train, 1978). In addition to complementing Train's work in Dragon Swamp, the present study helps to complete floristic investigation of the outer Coastal Plain portion of the Middle Peninsula, following studies done in Gloucester County (Greaves, 1982) and in Mathews County (Van Montfrans, 1980).

As the northeasternmost county on the Middle Peninsula, Middlesex is of phytogeographic interest because several species appear to attain their northern limits on the Middle Peninsula (Harvill, 1966). Consequently, the species collected in the present study first were categorized according to their regional affinities (e.g., to eastern Asia, to tropical America, etc.). Then, partly to

determine the role of the Middle Peninsula in the north-south distribution of species and partly to provide more general phytogeographic information, the floras of the Upper Peninsula (from the Potomac to the Rappahannock), the Middle Peninsula (from the Rappahannock to the York), and the Lower Peninsula (from the York to the James) were compared as to regional affinities and numbers of species held in common. In addition, the numbers of species attaining their northern limits in each of the three peninsulas and in the Coastal Plain south of the James were computed to shed light on the region where the northward migration of many species comes to a halt.

## HISTORY

Although the date is in some dispute, court records indicate that Middlesex was established as a county as early as 1668, formed from what had previously been part of Lancaster County (Sydnor, 1934). While parish records for Middlesex are excellent, dating from the mid-seventeenth to the early nineteenth centuries, information about the county apart from the vital statistics of its inhabitants is hard to find. Assuming that past land use practices and methods of making a livelihood did not differ greatly from those at present, Middlesex has been predominantly rural in character since its founding, with a current population of 7553 (Va. Dept. of Highways, 1981). One locally famous institution, Rosegill Farm, has been in existence in one form or another since 1649; it is now a thriving duck farm. Apart from the three principal towns in the study area, Urbanna, Saluda, and Deltaville, most of the developed land is devoted to small farms growing corn, wheat, and soybeans. Deltaville, situated near the Chesapeake Bay, and Urbanna, on the Rappahannock River, continue to support active seafood operations, though many areas along the water are increasingly given over to vacation-home developments and small tourist establishments. During the course of this study, one fairly extensive new subdivision was being developed near the Piankatank River, and parcels of woodland elsewhere continued to be cleared for farming and for the use of a large paper company.

The early botanical history of Middlesex County is largely a blank ledger, with one notable exception. From 1732 to 1746, Urbanna was the home of Dr. John Mitchell, a Fellow of the Royal Society of Great Britain and friend to the botanists John Clayton (who lived in Mathews County), John Bartram, Peter Collinson, and Mark Catesby. Edmund and Dorothy Smith Berkeley write in The Life and Travels of John Bartram that Mitchell "was busy studying the colony's flora and fauna." In addition, they refer to his collecting mosses for John Jacob Dillenius, the author of Historia Muscorum (Berkeley and Berkeley, 1982). Presumably, at least some of these mosses must have come from Middlesex County. Since the time of Mitchell and Clayton, little systematic collecting was done in the county until Train's work in Dragon Swamp. Her results, along with those of the present study, assure that the flora of Middlesex County is now fairly well documented.

## CLIMATE

The climate of Middlesex County is mild, owing not only to latitude but also to the presence of large bodies of water on three sides. The climatological data in Table 1 are from three stations: Urbanna, in Middlesex County, and Bohannon and Mathews, both in Mathews County, just south of Middlesex. Unfortunately, the Middlesex station was closed in 1974, but the data from the Mathews stations should not vary significantly from what would have been recorded at Urbanna.

Rainfall is fairly evenly distributed throughout the year, with a mean for the 15-year period of 1967-1981 of 42.38 inches. The year 1981, with its 35.65 inches, was rather dry, particularly in the summer when the bulk of the collecting for this study was done. The mean temperature for the 15-year period was 58.6, and the mean number of frost-free days was 210.7. Table 1 can be compared to Table 12 to relate the climate of Middlesex County to that of the southern Virginia Coastal Plain as a whole.

TABLE 1

Summary of the climatological data,  
Urbanna, Middlesex County, Virginia  
and Bohannon and Mathews, Mathews  
County, Virginia<sup>a</sup>

	<u>TEMPERATURE (°F)</u>			<u>PRECIPITATION</u>			
	<u>MEAN</u>	<u>HIGH</u>	<u>LOW</u>	<u>ANNUAL (in.)</u>	<u>LAST SPRING MIN. OF 32</u>	<u>FIRST FALL MIN. OF 32</u>	<u>DAYS BETWEEN THESE DATES</u>
1967	57.2	93	11	34.57	3/30	11/6	221
1968	58.2	96	8	35.08	4/7	11/11	218
1969	-----	97	13	42.03	4/1	11/15	228
1970	58.7	94	1	40.60	3/30	11/18	233
1971	59.1	92	5	44.61	-----	11/8	---
1972	-----	95	2	48.96	4/10	10/21	194
1973	59.2	95	10	44.13	4/15	11/6	205
1974 <sup>b</sup>	59.9	97	18	45.62	4/10	10/4	177
1975	59.9	97	17	54.23	4/14	11/15	215
1976	58.5	98	11	45.23	4/12	10/29	200
1977	59.5	103	0	37.73	4/10	11/23	217
1978	-----	97	10	51.14	3/31	12/2	246
1979 <sup>c</sup>	-----	99	--	-----	4/7	10/27	203
1980	57.6	100	6	33.69	4/2	10/31	212
1981	57.0	95	2	35.65	4/22	10/20	181

<sup>a</sup>Adapted from U. S. Dept. of Commerce, Weather Bureau. Climatological Data (Annual Summaries 1967-1981 for Virginia). Vol. 77-91.

<sup>b</sup>Reporting station moved to Bohannon, Mathews County.

<sup>c</sup>Reporting station moved to Mathews, Mathews County.

## GEOLOGY

The Suffolk Scarp passes through the eastern part of Middlesex County; land to the east of this morphologic feature lies below 50 feet in altitude and is considered part of the Outer Coastal Plain, and land to the west, the Inner Coastal Plain. From the Chesapeake Bay westward to the limit of the study area at U.S. Route 17, the altitude of the land increases gradually from an average high of 5-10 feet at Stingray Point and Deltaville to one of 80-90 feet near Saluda. Along with this rise in altitude, the topography of the county becomes more complex, with the relatively unbroken flatness of the easternmost portion giving way to ravines that become steeper and more numerous as one moves west.

Even in the western half of the study area, however, along the Rappahannock and Piankatank Rivers there are isolated Pleistocene terraces containing sediments which correlate with the geologic units around Deltaville. These regions, geologically the youngest in the county, correspond to the Tabb Formation, which dates from the Quaternary. Within the Tabb, three subdivisions are represented: the Poquoson Member, from sea level to about 10 feet in elevation; the Lynnhaven Member, from about 10 up to 20 feet; and the Sedgfield Member, from about 20 to 30 feet. Generally to the west of the Tabb and just above it in elevation is the Shirley Formation, dating from earlier in the Quaternary, which is present at elevations up to 45 feet (C. R. Berquist, pers. com., 1983).

Between 45 and 125 feet, a number of formations may be represented, including the Chuckatuck, Charles City, and Windsor, in addition to the "Moorings Unit," but the one that predominates in the county, as in the Middle Peninsula as a whole, is the Barhamsville Formation, in evidence at elevations up to 160 feet and generally encountered at 80-90 feet. It is characterized by feldspathic sandy mud, muddy sands, and laminated clay and silt which are distinctly reddish to reddish-brown, as can be seen easily in several sandpits near the center of the study area. The Barhamsville, dating from the Late Tertiary, is older than the previously mentioned formations. Underlying it is a still older Tertiary formation, the Yorktown, which is distinguished primarily by the presence of sand and Miocene shell deposits, usually overlain by a dark brown mud. The Yorktown Formation surfaces most commonly and prominently in steep ravines in the western portion of the study area that run north and south, opening ultimately on the Rappahannock River. Wherever younger material is absent due to the steepness of the topography, the shell deposits of the Yorktown Formation have had a pronounced effect on the composition of the immediate flora (C. R. Berquist, pers. com., 1983).

Little can be said about the specific composition and nature of the soils in eastern Middlesex since a systematic soil survey of the county has not been done. General, untrained field observations suggest that the soil is quite sandy and well-drained near the Bay and along the Rappahannock and Piankatank Rivers, while further upland and inland, at least in level areas, clayey soils which formed on the Barhamsville Formation predominate, with little organic matter apparent. There is evidently a greater amount of humus in the soil



within the ravines, and along streambeds and in swamps the soil is often almost peaty. Another soil type is represented in periodically inundated mudflats and salt marshes that are abundant along the two tidal rivers. Thus, from calcareous ravines with high pH to sphagnous stream borders with low pH and from well drained sandy points to poorly drained clay fields and tidal flats, a wide range of soil conditions exists in Middlesex County. Table 2 gives the results of a laboratory analysis of soil samples taken from six representative habitats in the study area.

TABLE 2  
Results of soil analysis<sup>a</sup>

Habitat	pH	N <sup>b</sup>	P	K	Ca	Mg	Soluble salts	Organic <sup>c</sup> matter
Salt marsh	4.1	20	9	129	276	120	6400	15.0
Swamp woods	5.1	8	7	42	288	39	179	6.5
Calcareous ravine	7.9	8	3	15	1200	33	269	4.8
Disturbed area	5.5	3	3	26	420	38	128	1.1
Cultivated field	5.2	10	22	50	264	39	141	3.6
Dry pine woods	3.8	3	7	20	60	9	166	3.3

<sup>a</sup>Soil analysis done by the Cooperative Extension Service Soil Testing and Plant Analysis Laboratory, Virginia Polytechnic Institute and State University.

<sup>b</sup>N, P, K, Ca, Mg, and Soluble salts measured in parts per million.

<sup>c</sup>Organic matter measured in per cent.

## METHODS

Forty-six collecting trips to Middlesex County were made from March, 1981 through November, 1982, approximately once weekly through the first growing season and more sporadically during the second. Promising habitats were identified through the use of topographic maps, and sites representative of as many habitat types as possible were visited on each outing. Specimens were collected in triplicate whenever possible, numbered with the author's collection number, and noted as to location, habitat, and relative abundance. A voucher set of specimens is to be deposited at the Herbarium of the College of William and Mary (WILLI).

Specimens were identified by consulting one or more of the following manuals: Radford, Ahles, and Bell (1968), Gleason and Cronquist (1963), Gleason (1952), Fernald (1950), Bailey (1949), Hitchcock (1950), Small (1933), and Gould (1975). Species nomenclature follows that used in the Atlas of Virginia Flora, Parts I and II (Harvill et al., 1977, 1981), with exceptions noted in the Annotated Checklist. The Atlas was also used as the source for county and regional distribution records and as a checklist of the floras of the Upper, Middle, and Lower Peninsulas. To determine the range and phytogeographical affinities of the specimens collected and of other taxa in the three peninsulas, the following works were consulted: Gleason and Cronquist (1963), Fernald (1950), Small

(1933), Little (1953), Hitchcock (1950), Li (1952), and Hultén (1958, 1962).

## HABITAT ANALYSIS

Eastern Middlesex County has both Inner and Outer Coastal Plain habitats and the typical plant communities associated with them. As the slope and relief of the land increase, so does the number of species not commonly encountered in the Outer Coastal Plain. In particular, a series of relatively steep, calcareous ravines in the western portion of the study area yield a number of unusual species that add much diversity to the flora as a whole.

Though much of the land bordering the bay and the two rivers is the most heavily developed in the county, it continues to support several relatively unspoiled pockets of coastal strand and dune plant communities. The outer dunes are populated chiefly by grasses such as Ammophila breviligulata, Cenchrus tribuloides, Panicum amarum, P. amarulum, and Triplasis purpurea. The introduced sedge Carex arenaria is often the first plant encountered past the high water mark in areas where it occurs. Salsola kali, Cakile edentula, Euphorbia polygonifolia, and Strophostyles helvola also grow on the outer dunes, while further inland Panicum virgatum, Oenothera humifusa, Opuntia compressa, Solidago sempervirens, Myrica cerifera, and Smilax bona-nox are common to abundant.

Beyond the strand communities and elsewhere along the Rappahannock and Piankatank Rivers are fairly extensive stands of salt marsh, though some of this habitat has been lost to dredging and

filling operations. In the salt marsh proper, Spartina spp. predominate, joined by Distichlis spicata, Salicornia europaea, Atriplex patula, Setaria geniculata, Fimbristylis castanea, Scirpus americanus, S. robustus, and Juncus roemerianus. Another rush, Juncus gerardi, at its southern limit in southeastern Virginia, forms dense stands in one location near the Rappahannock River. Beyond the Spartina-rush stands is a slightly more dramatic and colorful mix of plants such as Hibiscus moscheutos, Kosteletzkya virginica, Iva frutescens, Baccharis halimifolia, Limonium carolinianum, Aster tenuifolius, and A. subulatus. Still further back from the water, Pluchea purpurascens, Samolus parviflorus, Amaranthus cannabinus, and Asparagus officinalis are often found.

Since the two tidal rivers are brackish at least to the western limit of the study area, freshwater marshes are much less extensive than their saltwater counterparts. This kind of habitat is found chiefly upstream from the salt marshes along both rivers, although powerline cuts and other clearings through swamps have created additional marsh-type communities throughout the county. In a few thoroughly disturbed areas, Phragmites communis dominates; otherwise, Typha latifolia and T. angustifolia are the most frequently encountered freshwater marsh species. Also common are umbellifers of several kinds, including Hydrocotyle spp., Oxypolis rigidior, and Cicuta maculata; many grasses, such as Glyceria striata, Echinochloa walteri, Leersia oryzoides, and Zizania aquatica; members of the Aster family, including Aster puniceus, Bidens spp., Vernonia noveboracensis, Eupatorium fistulosum, E. perfoliatum, and Mikania scandens; and members of the Cyperaceae in

abundance. Impatiens capensis, Thelypteris palustris, and Apios americana are also abundant, while Asclepias incarnata, Alisma subcordatum, Mimulus ringens, Sparganium americanum, Hypericum walteri, H. virginicum, and H. mutilum are occasional. On the surface of relatively quiet, shallow water in marshes, as well as on farm and beaver ponds, is a rather inconspicuous plant community whose members can include Lemna minor, Spirodela polyrhiza, Wolffia papulifera, Azolla caroliniana, Potamogeton diversifolius, P. foliosus, and P. pulcher.

Bordering both salt and freshwater marshes in the easternmost portion of Middlesex and further west jutting out into both rivers are strips of sandy, xeric woods that could almost be characterized as pine barrens. As can be seen in Table 2, the soil in this habitat is notably nutrient-poor. Pinus taeda predominates, with occasional admixtures of Pinus virginiana, Juniperus virginiana, Ilex opaca, Quercus marilandica, Q. stellata, and, somewhat anomalously, Q. falcata var. pagodaefolia. The shrub layer is composed of Vaccinium spp., Gaylussacia spp., and Myrica cerifera, with M. heterophylla making an occasional appearance. Smilax spp. twine throughout, in particular, S. glauca and S. bona-nox, occasionally joined by Gelsemium sempervirens, a vine near its northern distributional limit. Mitchella repens, Chimaphila maculata, Cypripedium acaule, Lycopodium flabelliforme, Liatris graminifolia, Tephrosia spicata, and Clitoria mariana comprise the rather depauperate herbaceous layer, along with the grasses Stipa avenacea, Andropogon scoparius, and Gymnopogon ambiguus.

At the other hydrologic extreme from the dry pine stands, low

swamp woods can be found upstream from most freshwater marshes and along most good-sized streams in the county, although there is no stretch of uncut swampland in the study area to rival Dragon Swamp further west. The dominant trees encountered are Quercus michauxii, Fraxinus spp., Ulmus americana, and Acer rubrum, followed by Magnolia virginiana, Liquidambar styraciflua, Salix nigra, Carpinus caroliniana, and Nyssa sylvatica. At one location near the western border of the study area a few Taxodium distichum were seen, but the true cypress-swamp habitat is not represented in eastern Middlesex. Common understory trees and shrubs are Alnus serrulata, Itea virginica, Ilex verticillata, Cornus foemina, Leucothoe racemosa, and Lindera benzoin. One individual of Rhus vernix was encountered in a particularly sphagnous area. Smilax laurifolia, Dioscorea villosa, Bignonia capreolata, and Campsis radicans are occasional to common in the understory. The spring herbaceous layer is particularly active, with ferns in abundance and thriving colonies of Symplocarpus foetidus, Caltha palustris, Orontium aquaticum, and Claytonia virginica. Carex spp., Luzula spp., Ranunculus abortivus, R. recurvatus, and Sphenopholis nitida are regular inhabitants; not so frequently seen are Cardamine bulbosa, C. douglassii, and C. pratensis var. palustris, the latter two near their southern limits in southeastern Virginia. Later in the season herbs of note are Decodon verticillata, Saururus cernuus, Lobelia cardinalis, and Chelone glabra. Also noteworthy though infrequent are Chelone obliqua, Lilium superbum, Habenaria lacera, H. cristata, Liparis lilifolia, Bartonia paniculata, and B. virginica.

Upland from the swamp woods, the lower slopes are



characteristically dominated by Fagus grandifolia, along with Acer rubrum and an occasional Quercus nigra. Further up slope, conditions become less mesic and Quercus alba, Q. rubra, Q. velutina, Q. coccinea, and Q. falcata take over, in addition to the hickories Carya pallida, C. tomentosa, C. ovalis, and C. glabra. Quercus prinus forms extensive stands along particularly well drained ridges. Cornus florida is the most common understory tree, occasionally joined by Castanea pumila, sprouts of C. dentata, Ilex opaca, and, usually at the margins of clearings, Sassafras albidum, various Prunus spp., and Malus spp., including M. angustifolia. The shrub layer typically includes Kalmia latifolia, Rhododendron nudiflorum, R. viscosum, and, less typically, Hydrangea arborescens. Hexastylis virginica is ubiquitous in the herbaceous layer, while Epigaea repens, Galax urceolata, Isotria verticillata, and Gentiana villosa are encountered infrequently or rarely.

Upland woods habitats are commonly flanked by cultivated fields and other more or less disturbed areas that account for most of the introduced species in the county flora. In spring the mustard family is well represented in both cultivated and abandoned fields, along with Veronica spp., Poa spp., Viola spp., Ranunculus bulbosus, and R. sardous. In early summer the grass genera Dichanthelium, Panicum, and Paspalum are widespread throughout the area. In less disturbed sites, such as infrequently mowed roadsides and woodland borders, members of the Aster family are prominent from midsummer on, including Solidago spp., Aster spp., and Eupatorium spp. in abundance. Three introduced species encountered along roadsides and not previously reported from the Outer Coastal Plain are Agropyron

repens, Coronilla varia, and Aster tataricus. Other interesting taxa found largely in wetter areas of this habitat are Polygala spp., including P. mariana, P. incarnata, and P. curtissii; and the orchid Spiranthes grayi, also newly recorded for the Outer Coastal Plain.

In the northwest corner of the study area a number of fairly steep ravines that open onto the Rappahannock River encompass habitat types from sandy, well drained ridges to swamps and marshes, yet the plant associations found therein differ somewhat from those encountered elsewhere in the county, perhaps chiefly because of the presence of Miocene shell deposits at or near the soil surface (see Table 2). Several of the constituent species are known calciphiles, most are described as occurring in "rich woods," and a few are more frequently found in the mountains than in the Coastal Plain. On the slopes, Fagus grandifolia is the dominant tree, with Quercus spp., Carya spp., and Liriodendron tulipifera intermixed. Common in the understory are Cercis canadensis, and Viburnum acerifolium, not found elsewhere in the county. Along streams at the ravine bottoms, under the canopy of Fraxinus spp., Ulmus americana, and Acer rubrum are Asimina triloba, Viburnum prunifolium, and Lindera benzoin. In the spring the herbaceous layer is most strikingly composed of Hepatica americana, Sanguinaria canadensis, Dentaria laciniata, and three orchids in relative abundance: Orchis spectabilis, Cypripedium calceolus, and Aplectrum hyemale. Other species not represented elsewhere in the county are Selaginella apoda, Adiantum pedatum, Pedicularis lanceolata, Lobelia siphilitica, Prenanthes altissima, and Stellaria pubera, the last two not previously recorded in the

Outer Coastal Plain. Four species that are characteristic of areas with Miocene shell deposits (Harvill et al., 1977, pp. 13-14) were found near streams in one or more of the ravines: a few plants of Carex prasina, Scirpus lineatus in abundance, one colony of at least 50 blooming and 100 sterile individuals of Ponthieva racemosa, and three individuals of Malaxis spicata.

## PHYTOGEOGRAPHICAL ANALYSIS

The flora of eastern Middlesex County is of phytogeographical interest in part because of the role of the Middle Peninsula as the apparent northern terminus for several species (Harvill, 1966). As the peninsula's northernmost piece of land that, by its position on the Chesapeake Bay, is climatically buffered by a large body of water, eastern Middlesex County would seem a natural endpoint for a number of southern species. Another reason for undertaking a phytogeographical analysis of the area's flora is to complement and extend the work of Corcoran (1977) and Greaves (1982) by providing additional information on the regional affinities of plants in Virginia's Coastal Plain.

To facilitate comparisons, the plants collected in the present study were classified according to the following range designations used by Corcoran (1977) and Greaves (1982), which were in turn adapted from Harvill (1973b):

Range 1: Circumboreal (totally circumboreal or interrupted)

Range 2: Native to North America and eastern Asia

Range 3: Ranging west to the Pacific Coast

Range 3a: Uninterrupted from eastern N. America to  
the Pacific Coast

Range 3b: Ranging from eastern N. America west  
beyond the Mississippi River, and found on  
the Pacific Coast; interrupted

- Range 4: Ranging south beyond the United States
- Range 5: Ranges extending from eastern N. America west  
beyond the Mississippi River, but not to the  
Pacific Coast
- Range 5a: Generally distributed north and south
- Range 5b: Generally northern in distribution
- Range 5c: Generally southern in distribution
- Range 5d: Generally distributed along the Coastal  
Plain and Mississippi Valley, extending west  
beyond the Mississippi in the north
- Range 5e: Generally distributed along the Coastal  
Plain and Mississippi Valley, extending west  
beyond the Mississippi in the south
- Range 6: Ranges limited to N. America east of the  
Mississippi River
- Range 6a: Generally distributed north and south
- Range 6a1: Extending widely beyond the Coastal Plain
- Range 6a2: Mostly limited to the Coastal Plain
- Range 6b: Generally northern in distribution
- Range 6c: Generally southern in distribution
- Range 7: Introduced species
- Range 8: Cosmopolitan and nearly cosmopolitan species

For Ranges 5b and 6b, North Carolina and points west were used as the southern boundary. Similarly, for Ranges 5c and 6c, Delaware and points west were used as the northern boundary. Species were assigned to ranges on the basis of their geographic distribution as given in the following works: Gleason and Cronquist (1963), Fernald

(1950), Small (1933), Little (1953), Hitchcock (1950), Li (1952), and Hultén (1958, 1962). When these sources were not in agreement, the range assigned is the broadest given, although Hultén was accorded most weight in assigning a species to Range 1, as was Li in assigning a species to Range 2.

Eighteen of the 819 taxa collected, or 2.20%, have circumboreal or amphi-Atlantic distributions (for a list, see Table 3). Of these, Botrychium virginianum, Ophioglossum vulgatum, Osmunda regalis, and Pteridium aquilinum are broadly adapted, wide-ranging pteridophytes, while Atriplex patula, Juncus gerardi, and Salicornia europaea are restricted to salt marshes. Two others, Ceratophyllum demersum and Spirodela polyrhiza, are found wherever there is quiet water.

Like the plants in Range 1, those with North American and eastern Asian distributions are long-established, generally ancient taxa. Although only 7 species, or 0.86% of the total, fall into this category, the many genera held in common illustrate the phytogeographic similarity of the two regions (Li, 1971). The species found in eastern Middlesex County with eastern Asian counterparts are listed in Table 4.

Those species that range across the continental United States with either uninterrupted or interrupted distributions are listed in Table 5. Once again, their range indicates the wide adaptability of these plants; of the 31 species (3.79% of the total), 9 are members of the family Cyperaceae, 3 are Poaceae, and 5 are weedy members of the Asteraceae.

As identified in the Annotated Checklist, the group of 103 plants (12.59% of the total) that falls into Range 4 is a rather mixed lot, for though all of them extend as far south as Mexico, the

TABLE 3  
 RANGE 1  
CIRCUMBOREAL SPECIES

<u>Atriplex patula</u>	<u>Chimaphila umbellata</u>	<u>Leersia oryzoides</u>
<u>Botrychium virginianum</u>	<u>Circaea lutetiana</u> ssp. <u>canadensis</u>	<u>Ophioglossum vulgatum</u> var. <u>pycnostichum</u>
<u>Caltha palustris</u>	<u>Cypripedium calceolus</u>	<u>Osmunda regalis</u>
<u>Calystegia sepium</u>	<u>Galium aparine</u>	<u>Pteridium aquilinum</u>
<u>Cardamine pratensis</u> var. <u>palustris</u>	<u>Galium triflorum</u>	<u>Salicornia europaea</u>
<u>Ceratophyllum demersum</u>	<u>Juncus gerardi</u>	<u>Spirodela polyrhiza</u>

TABLE 4  
RANGE 2  
SPECIES WITH EAST ASIAN AFFINITIES

Adiantum pedatum

Lycopodium obscurum

Monotropa uniflora

Onoclea sensibilis

Phryma leptostachya

Polygonum virginianum

Symplocarpus foetidus



TABLE 5  
 RANGE 3  
SPECIES RANGING WEST TO THE PACIFIC COAST

RANGE 3a: UNINTERRUPTED DISTRIBUTION

<u>Apocynum cannabinum</u>	<u>Erigeron strigosus</u>	<u>Oenothera biennis</u>
<u>Bidens frondosa</u>	<u>Festuca octoflora</u>	<u>Plantago aristata</u>
<u>Cardamine pensylvanica</u>	<u>Fragaria virginiana</u>	<u>P. virginica</u>
<u>Carex vulpinoidea</u>	<u>Geranium carolinianum</u>	<u>Ranunculus abortivus</u>
<u>Cyperus erythrorhizos</u>	<u>Gratiola neglecta</u>	<u>Scirpus validus</u>
<u>Danthonia spicata</u>	<u>Juncus tenuis</u>	<u>Scutellaria lateriflora</u>
<u>Dulichium arundinaceum</u>	<u>Lactuca canadensis</u>	<u>Solidago gigantea</u>
<u>Erigeron annuus</u>	<u>Lepidium virginianum</u>	<u>Teucrium canadense</u>

RANGE 3b: INTERRUPTED DISTRIBUTION

<u>Aristida oligantha</u>	<u>Cyperus strigosus</u>	<u>Rhynchospora capitellata</u>
<u>Cakile edentula</u>	<u>Eleocharis obtusa</u>	<u>R. globularis</u>
<u>Carex comosa</u>		

West Indies, Central America, or South America, many of them range northward into Canada while others get no further north than southeastern Virginia. Thus, to label the group as a whole "southern" would be misleading. It is interesting to note, however, that the proportion of plants in Range 4 decreases from the Coastal Plain westward across the state, from 12.59% in eastern Middlesex County and 15.9% in Ft. Eustis, both in the Coastal Plain, to 10.8% in Powhatan County in the Piedmont, down to 6.2% in Hone Quarry in the mountains (Corcoran, 1977). This pattern reinforces the suggestion that a number of species with southern affinities are moving or have moved north along the corridor of the Coastal Plain (Pielou, 1979, p. 221).

The greatest number of species, 405, or 49.51% of the total, are in Range 5, extending west of the Mississippi River but stopping short of the Pacific Coast. The majority of these, 331 plants (40.46% of the collection as a whole) are generally distributed north and south and are cited in the Annotated Checklist. While the plants in Range 5a are broadly adapted to the climatic and edaphic conditions that prevail in the eastern U.S., those that fall into the categories 5b, 5c, 5d, and 5e are more specialized. Only 9 species, or 1.10% of the total, can be considered northern, or within range 5b. These plants, including two Carex and two Rubus species, are listed in Table 6, as are the species in Ranges 5c and 5e. There are more than twice as many species that can be considered southern, or in Range 5c: 19, or 2.32% of the whole. This north-south pattern is reversed beyond the Coastal Plain: in Powhatan County and Hone Quarry, the percentages of the floras in Range 5b are 2.1% and 3.2% respectively, and the percentages in 5c are 1.0% and 0.0% (Corcoran,

TABLE 6

RANGES 5b, 5c, 5e  
SPECIES EXTENDING WEST BEYOND THE MISSISSIPPI RIVER  
BUT NOT TO THE PACIFIC COAST

Range 5b: SPECIES GENERALLY NORTHERN IN DISTRIBUTION

<u>Cardamine douglassii</u>	<u>Cirsium discolor</u>	<u>Rubus pensilvanicus</u>
<u>Carex annectens</u>	<u>Pedicularis lanceolata</u>	<u>Sisyrinchium mucronatum</u>
<u>C. swanii</u>	<u>Rubus flagellaris</u>	<u>Viola sororia</u>

Range 5c: SPECIES GENERALLY SOUTHERN IN DISTRIBUTION

<u>Arundinaria tecta</u>	<u>Juncus roemerianus</u>	<u>Rhynchospora inexpansa</u>
<u>Bignonia capreolata</u>	<u>Matelea carolinensis</u>	<u>Rubus argutus</u>
<u>Chaerophyllum tainturieri</u>	<u>Mecardonia acuminata</u>	<u>Tephrosia spicata</u>
<u>Cornus foemina</u>	<u>Melica mutica</u>	<u>Verbesina occidentalis</u>
<u>Elephantopus tomentosus</u>	<u>Paspalum floridanum</u>	<u>Vitis rotundifolia</u>
<u>Erianthus contortus</u>	<u>Passiflora incarnata</u>	
<u>Hypericum walteri</u>	<u>Pyrrhopappus carolinianus</u>	

RANGE 5e: SPECIES GENERALLY DISTRIBUTED ALONG COASTAL PLAIN AND  
MISSISSIPPI VALLEY, EXTENDING WEST BEYOND MISSISSIPPI  
RIVER IN THE SOUTH

<u>Andropogon ternarius</u>	<u>Dichantherium lanuginosum</u>	<u>Galium obtusum</u> var. <u>obtusum</u>
<u>Carex abscondita</u>	var. <u>lanuginosum</u>	<u>Gratiola pilosa</u>
<u>Clethra alnifolia</u>	<u>Eleocharis tortilis</u>	<u>Hypericum gymnanthum</u>
<u>Cyperus retrorsus</u>	<u>Elephantopus nudatus</u>	<u>Itea virginica</u>

TABLE 6 cont.

<u>Iva frutescens</u>	<u>Myrica heterophylla</u>	<u>Quercus phellos</u>
<u>Juncus coriaceus</u>	<u>Panicum amarulum</u>	<u>Scutellaria integrifolia</u>
<u>J. dichotomus</u>	<u>P. amarum</u>	<u>Senecio tomentosus</u>
<u>Lespedeza angustifolia</u>	<u>Polygala mariana</u>	<u>Smilax laurifolia</u>
<u>Leucothoe racemosa</u>	<u>Polygonum setaceum</u>	<u>Spartina alterniflora</u>
<u>Lycopus rubellus</u>	<u>Potamogeton pulcher</u>	<u>S. cynosuroides</u>
<u>Lyonia mariana</u>	<u>Quercus falcata</u> var. <u>falcata</u>	<u>Strophostyles umbellata</u>
<u>Magnolia virginiana</u>	<u>Q. falcata</u> var. <u>pagodaefolia</u>	<u>Taxodium distichum</u>
<u>Malus angustifolia</u>	<u>Q. michauxii</u>	<u>Uniola laxa</u>
<u>Monarda punctata</u>	<u>Q. nigra</u>	<u>Viburnum nudum</u>

1977). Four species, or 0.49% of the collection, are in Range 5d: Ammophila breviligulata, Euphorbia polygonifolia, Stipa avenacea, and Chelone obliqua, with the first two being restricted to sand dunes along both the Atlantic Coast and the Great Lakes. The final subset of Range 5, Range 5e, contains 42 species, or 5.13% of the total. It should be noted that while the species in Range 5e are confined to the southern portions of the Mississippi Valley and the Coastal Plain to the west, they extend at least as far north as New Jersey and occasionally as far as Maine and Nova Scotia on the east Coast; thus, they should not be considered strictly southern.

Range 6 (see Table 7) accounts for 57 species (6.97% of the total) and is subdivided much like Range 5. The pattern of percentages is also like that of Range 5, with 4.03% of the total being generally distributed north and south in Range 6a1, 1.10% restricted to the Coastal Plain in Range 6a2, 0.12% in Range 6b, and 1.71% in Range 6c. While the Piedmont and Mountain locales have slightly higher percentages of northern plants than does Middlesex County, they are like Middlesex in that more of their species are in Range 6c than in Range 6b (Corcoran, 1977).

The flora of eastern Middlesex County is also much like those of Ft. Eustis and Powhatan, Gloucester, Fluvanna, and Rockingham Counties in that approximately one-fifth of its species are introduced (Greaves, 1982). That is, 178 species, or 21.76% of the total, fall into Range 7 and are identified as such in the Annotated Checklist.

Range 8 contains a number of species whose distribution is problematic. While all of the taxa assigned to this range have populations in the New and Old Worlds and in both temperate and

TABLE 7  
 RANGE 6  
SPECIES LIMITED TO THE EASTERN UNITED STATES

RANGE 6a1: SPECIES GENERALLY DISTRIBUTED NORTH AND SOUTH, EXTENDING  
 WIDELY BEYOND THE COASTAL PLAIN

<u>Ageratina aromatica</u>	<u>Juncus platyphyllus</u>	<u>Rubus cuneifolius</u>
<u>Aster gracilis</u>	<u>Lobelia nuttallii</u>	<u>Senecio anonymus</u>
<u>A. subulatus</u>	<u>Luzula echinata</u>	<u>Sericocarpus asteroides</u>
<u>Aureolaria virginica</u>	<u>Penstemon laevigatus</u>	<u>Silphium trifoliatum</u>
<u>Carex prasina</u>	<u>Pinus virginiana</u>	<u>Solidago erecta</u>
<u>Chimaphila maculata</u>	<u>Poa cuspidata</u>	<u>S. microcephala</u>
<u>Eupatoriadelphus dubius</u>	<u>Prenanthes serpentaria</u>	<u>Stellaria pubera</u>
<u>Eupatorium pilosum</u>	<u>Pycnanthemum incanum</u>	<u>Thalictrum pubescens</u>
<u>E. rotundifolium</u> var. <u>ovatum</u>	<u>Quercus prinus</u>	<u>Vaccinium corymbosum</u>
<u>Gaylussacia frondosa</u>	<u>Rhododendron nudiflorum</u>	<u>Vernonia noveboracensis</u>
<u>Hypericum virginicum</u>	<u>R. viscosum</u>	<u>Vitis labrusca</u>

RANGE 6a2: SPECIES GENERALLY DISTRIBUTED NORTH AND SOUTH, MOSTLY  
 LIMITED TO THE COASTAL PLAIN

<u>Amaranthus cannabinus</u>	<u>Cyperus grayi</u>	<u>Orontium aquaticum</u>
<u>Aster tenuifolius</u>	<u>Danthonia sericea</u>	<u>Rhynchospora chalarocephala</u>
<u>Carya pallida</u>	<u>Liatris graminifolia</u>	<u>Solidago tenuifolia</u>

## TABLE 7 cont.

RANGE 6b: SPECIES GENERALLY NORTHERN IN DISTRIBUTIONCarex baileyiRANGE 6c: SPECIES GENERALLY SOUTHERN IN DISTRIBUTIONAster grandiflorusHelianthus atrorubensRhexia nashiiCrataegus flavaHexastylis virginicaR. ventricosaEupatorium saltuenseHibiscus moscheutos  
ssp. moscheutosSolidago pinetorumGalax urceolataLechea maritima var.  
virginicaYucca filamentosaGalium obtusum var.  
filifoliumPolygala curtissii

tropical climates, their centers of origin are frequently in dispute. Thus, the 18 species in Table 8, 2.20% of the total collection, represent a diverse and broadly adapted if not altogether satisfactory grouping.

With the hope of further elucidating patterns of plant distribution in Virginia's Coastal Plain, the analytical methods applied to the flora of eastern Middlesex County were similarly applied to the floras of the Upper, Middle, and Lower Peninsulas, with each peninsula consisting of those counties that lie entirely east of the fall line. The floras themselves were determined from the composite county records contained in the Atlas of Virginia Flora, Parts I and II (Harvill et al., 1977 and 1981). A few of the range categories were consolidated for the sake of greater simplicity and clarity; specifically, plants in Ranges 3a and 3b were treated as belonging to Range 3 and plants of Ranges 5d and 5e were put into Range 5a. As a starting point for comparison, the floristic similarities between the three peninsulas were calculated using Sorensen's coefficient, defined as follows:  $2a/(2a+b+c)$ , where a is the number of species held in common by two regions and b and c respectively are the numbers of species occurring in only one of the two regions (Pielou, 1979, p. 25). These results are summarized in Table 9, and the summary of the range assignments for the three peninsulas appears in Table 10.

As can be seen in Table 9, and as might be expected, the three peninsulas are much alike in terms of floristic composition. It is also not surprising that, of the three possible pairs, the Upper and Lower Peninsulas are least alike. Less expected is that the Middle and Lower Peninsulas have a much higher coefficient of similarity



TABLE 8  
 RANGE 8  
COSMOPOLITAN AND NEARLY COSMOPOLITAN SPECIES

<u>Cyperus odoratus</u>	<u>Lemna minor</u>	<u>Scirpus americanus</u>
<u>C. compressus</u>	<u>Ludwigia palustris</u>	<u>Spartina patens</u>
<u>Equisetum arvense</u>	<u>Myosotis laxa</u>	<u>Thelypteris palustris</u>
<u>Eclipta alba</u>	<u>Osmunda cinnamomea</u>	<u>Typha angustifolia</u>
<u>Juncus bufonius</u>	<u>Phragmites communis</u>	<u>T. latifolia</u>
<u>J. effusus</u>	<u>Salsola kali</u>	<u>Veronica anagallis-aquatica</u>

TABLE 9

FLORISTIC SIMILARITIES BETWEEN THE THREE PENINSULASTOTAL NUMBER OF TAXA

Upper peninsula:	946
Middle peninsula:	1274
Lower peninsula:	1508

NUMBER OF TAXA HELD IN COMMONCOEFFICIENTS OF SIMILARITY

Upper and Lower:	886	Upper and Lower:	72.21%
Upper and Middle:	864	Upper and Middle:	77.84%
Middle and Lower:	1176	Middle and Lower:	84.54%

TABLE 10  
PERCENTAGES OF FLORA IN PHYTOGEOGRAPHIC RANGES  
IN THE THREE PENINSULAS

<u>RANGE</u>	<u>UPPER PENINSULA</u>	<u>MIDDLE PENINSULA</u>	<u>LOWER PENINSULA</u>
1	3.28%	2.83%	2.79%
2	0.63%	0.55%	0.46%
3	4.13%	4.00%	3.78%
4	12.26%	12.24%	11.74%
5a-5d-5e	42.28%	39.87%	40.18%
5b	1.90%	2.20%	2.32%
5c	2.96%	5.42%	6.03%
6a	6.45%	6.36%	6.10%
6b	0.53%	0.71%	0.80%
6c	1.69%	2.35%	2.45%
7	21.35%	21.11%	20.89%
8	2.54%	2.35%	2.19%

(84.54%) than do the Upper and Middle Peninsulas (77.84%). Simply stated, the flora of the Middle Peninsula overlaps to a greater extent with that of its southern neighbor than with that of its northern neighbor.

A careful examination of Table 10 suggests that the distinction between the Upper Peninsula and the other two peninsulas is based not only on numbers of species held in common but also on the ranges into which those species fall. Of course, the most obvious conclusion to draw from Table 10 is that the range patterns of the three peninsulas are remarkably similar. In only two categories, 5a and 5c, does the difference between the highest percentage and the lowest exceed two points. Because the point spread is greatest in range 5c, and because the plants in range 5c are generally southern, further testing was done to see if the differences in range patterns are linked to differences in locale. The number of species in range 6c was added to the number of species in 5c to take into account both strictly southern ranges. Then, the three peninsulas were compared as to their southern and non-southern floristic elements by means of an RxC test of independence (Sokal and Rohlf, 1981, pp. 744-746). The significance of the G-value ( $P < 0.001$ ) indicates that the distribution of southern species is not independent of the geographical differences between the three peninsulas. Subsequent pairwise testing further reveals that while the difference between the Middle and Lower Peninsulas as to the southern elements in their floras is not significant, a significant difference ( $P < 0.05$ ) does exist between the Upper and Middle Peninsulas. This finding confirms and helps to explain the differences between the peninsulas' coefficients of similarity discussed above.

Two other RxC tests of independence were carried out to help determine whether the floras of the three peninsulas differ significantly aside from their proportions of southern species. Since the percentages in Range 5a show the second highest amount of variation, the numbers of species in 5a versus the numbers of species not in that range were compared for the three peninsulas. The result was not significant. Similarly, the total numbers of northern species (those in Ranges 5b and 6b) versus non-northern species in the three peninsulas were compared, and again, the result was not significant. The implication is that the only significant phytogeographical variability between the three regions derives from the differing contributions made to their respective floras by southern species.

The Coastal Plain of Virginia south of the James River has long been famous as an area where many southern species attain their northern limits (S. Ware, pers. com., 1983). Specifically, the James River is the northern boundary for more than half of the species (excluding introduced species) that drop out in southeastern Virginia, or 80 out of 152. Of the remaining species, 29 do not get north of the York River, 34 do not get north of the Rappahannock, and 9 do not get north of the Potomac (Table 11 gives a list of these species). While there is no marked discontinuity between any of the peninsulas comparable to that represented by the James River, these numbers suggest that species do not drop out at a perfectly even rate along the north-south transect comprising the three peninsulas. Once again, the Upper Peninsula is distinct from the other two in seeming to have less than its share of the southern element in its flora. However, this deficiency may be accounted for in part by the fact

TABLE 11

SPECIES AT THEIR NORTHERN LIMITSUPPER PENINSULA

<u>Agalinis tenella</u>	<u>Gelsemium sempervirens</u>	<u>Matelea suberosa</u>
<u>Borrichia frutescens</u>	<u>Houstonia pusilla</u>	<u>Melothria pendula</u>
<u>Eupatorium recurvans</u>	<u>Matelea decipiens</u>	<u>Rhynchosia difformis</u>

MIDDLE PENINSULA

<u>Aster grandiflorus</u>	<u>Echinodorus cordifolius</u>	<u>Ponthieva racemosa</u>
<u>Carex oxylepis</u>	<u>Eryngium prostratum</u>	<u>Quercus virginiana</u>
<u>C. reniformis</u>	<u>Eupatorium pinnatifidum</u>	<u>Rhexia nashii</u>
<u>Carya aquatica</u>	<u>E. saltuense</u>	<u>Rhynchospora caduca</u>
<u>Chelone cuthbertii</u>	<u>Fraxinus caroliniana</u>	<u>R. inexpansa</u>
<u>Crataegus flava</u>	<u>Galium uniflorum</u>	<u>Tetragonetheca helianthoides</u>
<u>C. viridis</u>	<u>Leptochloa filiformis</u>	<u>Tragia urens</u>
<u>Cynoctonum mitreola</u>	<u>Lilium michauxii</u>	<u>Verbesina virginica</u>
<u>Decumaria barbara</u>	<u>Ludwigia glandulosa</u>	<u>Viburnum rufidulum</u>
<u>Desmodium fernaldii</u>	<u>Malaxis spicata</u>	<u>Xyris difformis</u> var. <u>curtissii</u>
<u>Dichondra carolinensis</u>	<u>Nothoscordum bivalve</u>	
<u>Drosera capillaris</u>	<u>Penstemon australis</u>	

LOWER PENINSULA

<u>Axonopus furcatus</u>	<u>Berchemia scandens</u>	<u>Bumelia lycioides</u>
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TABLE 11 cont.

<u>Cyperus haspan</u>	<u>Hydrolea quadrivalvis</u>	<u>Stylisma humistrata</u>
<u>Desmodium tenuifolium</u>	<u>Hypericum nudiflorum</u>	<u>Styrax americana</u>
<u>Dichromena colorata</u>	<u>Iva imbricata</u>	<u>Tridens strictus</u>
<u>Drosera leucantha</u>	<u>Lipocarpa maculata</u>	<u>Uniola sessilifolia</u>
<u>Elephantopus elatus</u>	<u>Lythrum lanceolatum</u>	<u>Vaccinium arboreum</u>
<u>Erigeron vernus</u>	<u>Nuphar sagittifolium</u>	<u>Viola esculenta</u>
<u>Eupatorium semiserratum</u>	<u>Nyssa aquatica</u>	<u>Wisteria frutescens</u>
<u>Euphorbia ammannioides</u>	<u>Plantago heterophylla</u>	<u>Zanthoxylum clava-herculis</u>
<u>Helenium brevifolium</u>	<u>Quercus incana</u>	

that the flora of the Upper Peninsula has been less well collected, and thus species rare or sporadic in occurrence, as species frequently are at the limits of their ranges; are underrepresented in collections. Conversely, the Middle Peninsula seems to have slightly more than its share of species at their northern limits, at least relative to the Upper and Lower Peninsulas.

Although adequate biological explanation of why southern species drop out where they do is well beyond the scope of this study, selected temperature data for the four regions under consideration were examined to see if any obvious climatic cutoff points exist. Table 12 lists mean, high, and low temperatures and the number of frost-free days per year for 10 years at two stations in each of the four regions, the first near the Bay and the second inland. The length of the frost-free growing season was chosen as the climatic variable for further statistical analysis for two reasons: the records on it are slightly more complete than on the other variables, and in itself it seems to contain more information than simpler variables such as annual high, annual low, or even mean temperatures. A two-way analysis of variance was done on 8 years' worth of data from a single station in each region, and, as might be expected, the results were highly significant ( $P < 0.001$ ). More to the point are the results of paired comparison tests (Sokal and Rohlf, 1981, pp. 354-359) involving the three pairs of adjacent regions. The pair that shows no significant difference between numbers of frost-free days is that of the Middle and Lower Peninsulas; similarly, these two regions show little difference in the numbers of species attaining their northern limits within their borders. That significant differences exist between the Upper and Middle Peninsulas



( $P < 0.01$ ) and between the Lower Peninsula and the area south of the James ( $P < 0.05$ ) suggests a possible correspondence between the length of the growing season and the ability of certain southern species to migrate north. A further suggestion is that the transitional roles played by both the area south of the James and the Middle Peninsula in the north-south distribution of species are real and based, at least in part, on climatic differences between these regions and their northern neighbors.

TABLE 12

SELECTED CLIMATOLOGICAL DATA FOR TIDEWATER VIRGINIA<sup>a</sup>

<u>YEAR</u>	<u>REGION</u>		<u>MEAN</u>	<u>HIGH</u>	<u>LOW</u>	<u>NUMBER OF DAYS BETWEEN LAST &amp; FIRST FROST</u>
1972	Upper	Bay	---	---	---	---
	Peninsula:	Inland	56.6	95	0	175
	Middle	Bay	58.7	100	3	194
	Peninsula:	Inland	56.9	94	3	166
1973	Lower	Bay	---	96	---	194
	Peninsula:	Inland	58.4	96	3	193
	South of	Bay	59.5	95	8	227
	the James:	Inland	58.7	96	5	220
1974	Upper	Bay	---	---	---	---
	Peninsula:	Inland	58.6	96	4	205
	Middle	Bay	---	102	10	206
	Peninsula:	Inland	58.2	96	-3	187
1974	Lower	Bay	60.3	97	8	---
	Peninsula:	Inland	59.7	94	8	205
	South of	Bay	60.9	95	12	214
	the James:	Inland	60.4	94	10	207
1974	Upper	Bay	---	---	---	---
	Peninsula:	Inland	58.4	96	16	167
	Middle	Bay	59.9	97	18	177
	Peninsula:	Inland	58.2	97	12	167
1974	Lower	Bay	---	94	18	---
	Peninsula:	Inland	59.6	97	18	176
	South of	Bay	60.9	97	23	236
	the James:	Inland	60.2	95	20	208

<sup>a</sup>Adapted from U. S. Dept. of Commerce, Weather Bureau. Climatological Data (Annual Summaries 1972-1981 for Virginia). Vol. 82-91.

TABLE 12. cont.

<u>YEAR</u>	<u>REGION</u>		<u>MEAN</u>	<u>HIGH</u>	<u>LOW</u>	<u>NUMBER OF DAYS BETWEEN LAST &amp; FIRST FROST</u>
1975	Upper	Bay	---	95	---	199
	Peninsula:	Inland	58.5	96	15	200
	Middle	Bay	59.9	97	17	215
	Peninsula:	Inland	57.9	97	13	192
1976	Lower	Bay	60.2	100	---	201
	Peninsula:	Inland	59.5	98	16	200
	South of	Bay	60.8	96	19	240
	the James:	Inland	60.9	96	17	223
1977	Upper	Bay	---	94	---	187
	Peninsula:	Inland	57.3	95	6	189
	Middle	Bay	58.5	98	11	200
	Peninsula:	Inland	56.6	97	3	173
1976	Lower	Bay	---	98	16	210
	Peninsula:	Inland	58.3	96	8	157
	South of	Bay	59.7	95	16	224
	the James:	Inland	58.9	95	12	224
1977	Upper	Bay	---	99	---	218
	Peninsula:	Inland	58.3	101	-4	191
	Middle	Bay	59.5	103	0	217
	Peninsula:	Inland	57.6	101	-4	191
1977	Lower	Bay	60.1	101	4	234
	Peninsula:	Inland	58.7	100	0	191
	South of	Bay	60.6	102	5	268
	the James:	Inland	59.5	99	4	191

TABLE 12 cont.

<u>YEAR</u>	<u>REGION</u>		<u>MEAN</u>	<u>HIGH</u>	<u>LOW</u>	<u>NUMBER OF DAYS BETWEEN LAST &amp; FIRST FROST</u>
1978	Upper	Bay	---	95	---	---
	Peninsula:	Inland	56.7	97	8	205
	Middle	Bay	---	97	10	246
	Peninsula:	Inland	56.1	97	1	164
1979	Lower	Bay	58.9	100	13	267
	Peninsula:	Inland	56.9	95	9	200
	South of	Bay	58.7	96	15	274
	the James:	Inland	58.0	96	12	252
1979	Upper	Bay	---	96	1	187
	Peninsula:	Inland	57.0	93	-1	188
	Middle	Bay	---	99	1	203
	Peninsula:	Inland	56.6	94	-9	191
1980	Lower	Bay	59.5	96	12	263
	Peninsula:	Inland	57.9	97	3	203
	South of	Bay	58.4	98	14	255
	the James:	Inland	---	96	7	203
1980	Upper	Bay	56.0	101	-1	157
	Peninsula:	Inland	57.3	101	4	193
	Middle	Bay	57.6	100	6	212
	Peninsula:	Inland	---	101	---	180
1980	Lower	Bay	59.9	102	11	221
	Peninsula:	Inland	58.0	102	5	193
	South of	Bay	59.4	104	9	257
	the James:	Inland	56.9	98	6	201

TABLE 12 cont.

<u>YEAR</u>	<u>REGION</u>	<u>MEAN</u>	<u>HIGH</u>	<u>LOW</u>	<u>NUMBER OF DAYS BETWEEN LAST &amp; FIRST FROST</u>
1981	Upper Bay	56.3	95	1	181
	Peninsula: Inland	56.8	96	1	187
	Middle Bay	57.0	95	2	181
	Peninsula: Inland	56.2	97	-3	165
	Lower Bay	58.8	100	7	241
	Peninsula: Inland	57.2	100	1	187
	South of Bay	58.6	99	12	241
	the James: Inland	57.7	98	2	208

DISTRIBUTION RECORDS AND ANNOTATED CHECKLIST  
OF THE VASCULAR FLORA

Eight hundred and nineteen taxa, drawn from 419 genera and 113 families, were collected in the present study. Of these, 252 are newly recorded for Middlesex County, 45 are new for the Middle Peninsula, and 13 are new for the Outer Coastal Plain (that is, the counties bordering the Chesapeake Bay or the Atlantic Ocean). A number of species here reported are noteworthy because of their distributions either within the state or overall. The southern weed Anoda cristata and the northern swamp plant Cardamine pratensis var. palustris were each previously reported from only three Virginia counties. Viola conspersa, found in a calcareous ravine swamp, apparently has a disjunct distribution, occurring in four other Coastal Plain and thirteen Mountain counties but not in the Piedmont. Five species appear to be at their northern limits in Middlesex County: the southeastern endemics Rhexia nashii and Eupatorium saltuense; two orchids with tropical American affinities, Ponthieva racemosa and Malaxis spicata; and Crataegus flava. One final taxon, Lechea maritima var. virginica, observed growing on a sand dune near the Rappahannock River, is worthy of note because it is listed by the U. S. Fish and Wildlife Service as threatened (Porter, 1978).

The Atlas of the Virginia Flora, Parts I & II (Harvill et al., 1977, 1981) was used for species nomenclature and distributional

records. Nomenclature for those species not included in the Atlas (and identified as such in the checklist) follows Fernald (1950) with two exceptions: Eragrostis curvula, after Radford, Ahles, and Bell (1968) and Euphorbia epithymoides, after Bailey (1949). Generally, those species herein indicated as not included in the Atlas are widely recognized by other authors or are escapes with perhaps increasing claim to inclusion in the Virginia flora. Occasionally, varieties not appearing in the Atlas are cited when considered by one or more authors as being quite distinct, and, with the exception of Xanthium strumarium varieties (after Radford et al., 1968), also follow Fernald (1950). Species newly recorded for Middlesex County are preceded by a single asterisk (\*); Middle Peninsula records by a double asterisk (\*\*); and Outer Coastal Plain records by a triple asterisk (\*\*\*). The relative abundance of the species is noted immediately after the species name, abbreviated as follows: A (abundant), C (common), O (occasional), and R (rare). A species abundant or common at only one or two locations is described as locally abundant (LA) or locally common (LC). After the abundance notation there is a short description of the habitat where the actual specimen was collected, followed by a number indicating the species' distributional range as categorized in the Phytogeographical Analysis. The final descriptive element in the checklist is an initial signifying whether the species occurs in the Upper Peninsula (U), Middle Peninsula (M), and/or Lower Peninsula (L). This information is followed by the author's collecting number. A complete set of voucher specimens is to be deposited in the Herbarium of the College of William and Mary (WILLI).

## ANNOTATED CHECKLIST

PTERIDOPHYTA

EOUISETACEAE: \*Equisetum arvense L., 0, disturbed area, 8, U, M, L; 109.

LYCOPODIACEAE: Lycopodium flabelliforme (Fernald) Blanchard, C, dry woods, 5a, U, M, L; 823. L. obscurum L., 0, mixed woods, 2, U, M, L; 7, 628.

OPHIOGLOSSACEAE: Botrychium dissectum Sprengel, 0, wooded streambank, 5a, U, M, L; 504, 550, 785. B. virginianum (L.) Swartz, 0, ravine woods, 1, U, M, L; 80. Ophioglossum vulgatum L. var. pycnostichum Fernald, R, rich woods, 1, U, M, L; 979.

OSMUNDACEAE: Osmunda cinnamomea L., C, swamp woods, 8, U, M, L; 69. O. regalis L., 0, swamp woods, 1, U, M, L; 100.

POLYPODIACEAE: \*Adiantum pedatum L., R, calcareous ravine, 2, U, M, L; 994. Asplenium platyneuron (L.) Oakes, C, roadside, 5a, U, M, L; 53. Athyrium asplenioides (Michx.) A. Eaton, C, swamp woods, 5a, U, M, L; 68, 419. Dennstaedtia punctilobula (Michx.) Moore, 0, steep roadside bank, 5a, U, M, L; 1016. Lorinseria areolata (L.) Presl, 0, low damp woods, 5a, U, M, L; 101. Onoclea sensibilis L., C, swamp woods, 2, U, M, L; 47. \*Phegopteris hexagonoptera (Michx.) Fee, 0, rich woods, 5a, U, M, L; 538. Polystichum acrostichoides (Michx.) Schott, C, ravine woods, 4, U, M, L; 79. Pteridium aquilinum (L.) Kuhn, C, dry woods, 1, U, M, L; 56. Thelypteris noveboracensis (L.) Nieuwland, C, swamp woods, 5a, U, M, L; 989. T. palustris Schott, C, freshwater marsh, 8, U, M,



L; 576.

SALVINIACEAE: \*Azolla caroliniana Willd., R, LC, surface of pond, 4, M, L; 1076.

SELAGINELLACEAE: Selaginella apoda (L.) Spring, R, calcareous ravine, 5a, M, L; 773.

#### CONIFEROPHYTA

CUPRESSACEAE: Juniperus virginiana L., C, roadside, 5a, U, M, L; 479.

PINACEAE: Pinus taeda L., C, upland woods, 5a, U, M, L; 801. P. virginiana Miller, C, sandy point by river, 6a1, U, M, L; 480.

TAXODIACEAE: Taxodium distichum (L.) Richard, R, swamp woods, 5e, U, M, L; 516..sk 1

#### ANTHOPHYTA

#### MONOCOTYLEDONEAE

ALISMATACEAE: Alisma subcordatum Raf., LC, standing water in swamp, 4, M, L; 632. Sagittaria latifolia Willd., O, freshwater marsh, 4, M, L; 1081. \*S. longirostra (Micheli) J. G. Smith, O, standing water in swamp, 5a, M, L; 534.

AMARYLLIDACEAE: Hypoxis hirsuta (L.) Coville, R, dry woodland path, 5a, M, L; 1014. \*Narcissus pseudo-narcissus L., O, grassy roadside, 7, M, L; 6. \*\*N. tazetta x poeticus, O, grassy roadside, 7, M; 928.

ARACEAE: Arisaema triphyllum (L.) Schott, C, ravine woods, 5a, U, M, L; 77. Orontium aquaticum L., LC, swamp woods, 6a2, U, M, L; 889. Peltandra virginica (L.) Schott & Endlicher, C, standing water in swamp, 5a, U, M, L; 491. Symplocarpus foetidus (L.) Nuttall, O,

swamp woods, 2, U, M, L; 900.

COMMELINACEAE: Commelina communis L., C, streambank, 7, U, M, L; 249. \*C. erecta L., C, disturbed sandy area, 4, M, L; 743B. C. virginica L., O, streambank, 5a, U, M, L; 712.

CYPERACEAE: \*Bulbostylis capillaris (L.) Clarke, O, gravel roadside, 4, U, M, L; 788. Carex abscondita Mackenzie, O, streambank in sphagnum, 5e, U, M; 987. \*C. alata Torrey, O, shallow water of beaver pond, 5a, U, M, L; 1050. C. albolutescens Schw., C, roadside ditch, 4, U, M, L; 1037. C. annectens (Bicknell) Bicknell, O, roadside ditch, 5b, U, M, L; 128. \*\*C. arenaria L., LA, in sand dunes along Rappahannock R., 7, M, L; 1040. \*\*C. artitecta Mackenzie, LC, upland in calcareous ravine, 5a, U, M, L; 904. \*C. atlantica Bailey var. incomperta Bicknell, O, swamp woods, 5a, U, M, L; 107, 137. \*\*\*,\*\*C. baileyi Britton, LC, streambank, 6b, U, M; 375. \*\*C. blanda Dewey, C, swamp woods, 5a, M, L; 940, 996. \*C. comosa Boott, LC, shallow water of pond, 3b, U, M, L; 1043. C. complanata Torrey & Hooker, C, sandy woods clearing, 5a, U, M, L; 331, 395. C. crinita Lam., O, streambank, 5b, U, M, L; 182. C. debilis Michx., O, cut-over swamp woods, 5a, U, M, L; 961. \*C. digitalis Willd., C, slope of calcareous ravine, 5a, U, M, L; 983. C. festucacea Willd., C, grassy field, 5a, U, M, L; 226. \*\*C. gracillima Schw., O, streambank in calcareous ravine, 5a, M, L; 939. C. grisea Wahl., C, swamp woods, 5a, M, L; 954. C. intumescens Rudge, C, streambank, 5a, U, M, L; 160. C. laevivaginata (Kukenthal) Mackenzie, C, marshy area, 5a, U, M, L; 949. \*\*C. laxiculmis Schw., LC, streambank in calcareous ravine, 5a, U, M, L; 942, 995. C. lupulina Willd., O, swamp woods, 5a, U,

M, L; 1049. C. lurida Wahl., A, swamp woods, 4, U, M, L; 698, 807. \*\*\*, \*\*C. prasina Wahl., R, streambank of calcareous ravine, 6a1, M, L; 997. C. rosea Willd., O, streambank of calcareous ravine, 5a, M, L; 769, 984A. \*\*C. styloflexa Buckley, C, streambank in calcareous ravine, 5a, U, M, L; 106, 938, 1004. C. swanii (Fernald) Mackenzie, C, dirt road, 5b, U, M, L; 965, 990. C. vulpinoidea Michx., C, roadside, 3a, U, M, L; 340. \*Cyperus compressus L., R, cultivated field, 8, U, M, L; 856B. \*\*C. erythrorhizos Muhl., O, standing water in swamp, 3a, M, L; 533, 707. C. filicinus Vahl, O, sand by salt marsh, 4, U, M, L; 738. C. filiculmis Vahl, O, cut-over field, 5a, U, M, L; 367. C. grayi Torrey, O, sand dune, 6a2, U, M, L; 683. \*C. iria L., R, disturbed area by stream, 7, U, M, L; 600. C. lancastrimensis Porter, O, disturbed area near stream, 5a, U, M, L; 342. C. odoratus L., C, shallow water in swamp, 8, U, M, L; 736. C. ovularis (Michx.) Torrey, O, sandy cultivated field, 5a, U, M, L; 311. \*C. plukenetii Fernald (not in Atlas of the Virginia Flora), R, grassy roadside, 5a; 1069. C. polystachyos Rottboell var. texensis (Torrey) Fernald, R, grassy strip by pond, 4, U, M, L; 1075. C. pseudovegetus Steudel, C, roadside ditch, 4, U, M, L; 397. \*C. retrofractus (L.) Torrey, O, border of mixed woods, 5a, U, M, L; 636. C. retrorsus Chapman, O, sand dune, 5e, U, M, L; 653. C. strigosus L., A, edge of salt marsh, 3b, U, M, L; 658, 669. \*Dulichium arundinaceum (L.) Britton, LC, roadside by swamp woods, 3a, U, M, L; 601. \*Eleocharis obtusa (Willd.) Schultes, LA, disturbed slough, 3b, U, M, L; 517, 692, 704. \*E. tenuis (Willd.) Schultes, LA, woods clearing, 5a, U, M, L; 329, 518. \*E. tortilis

(Link) Schultes, O, low woods, 5e, M; 648. \*Fimbristylis autumnalis (L.) R. & S., LC, sandy cultivated field, 4, U, M, L; 1088. \*F. castanea (Michx.) Vahl, C, edge of salt marsh, 5e, U, M, L; 509, 684A. \*Rhynchospora capitellata (Michx.) Vahl, O, cut-over area, 3b, U, M, L; 816A. \*R. chalarocephala Fernald & Gale, O, low woods clearing, 6a2, M, L; 506. \*R. globularis (Chapman) Small, C, disturbed slough, 3b, M; 457. \*\*R. glomerata (L.) Vahl, O, seepage area by roadside, 5a, U, M, L; 620, 724. \*R. inexpansa (Michx.) Vahl, LC, ditch in woods clearing, 5c, M, L; 1057. Scirpus americanus Persoon, C, salt marsh, 8, U, M, L; 225. Scirpus cyperinus (L.) Kunth, C, freshwater marsh, 5a, U, M, L; 575. \*Scirpus lineatus Michx., LA, calcareous ravine swamp, 5a, M, L; 1032. S. robustus Pursh, O, salt marsh, 4, U, M, L; 684B. Scirpus validus Vahl, LC, freshwater marsh, 3a, U, M, L; 1054.

DIOSCOREACEAE: Dioscorea batatas Dcne., O, thicket at edge of pond, 7, M, L; 438. \*D. villosa L., C, mixed woods near stream, 5a, U, M, L; 220, 289.

IRIDACEAE: \*Sisyrinchium angustifolium Miller, O, clearing by wooded ravine, 5a, U, M, L; 948. S. mucronatum Michx., C, ditch by cultivated field, 5b, U, M, L; 130.

JUNCACEAE: Juncus acuminatus Michx., O, seasonal pool in woods clearing, 4, U, M, L; 1035. \*J. biflorus Ell., C, wet disturbed area, 5a, M, L; 382. J. bufonius L., C, damp soil at woodland margin, 8, U, M, L; 363. \*J. canadensis La Harpe, R, swamp woods, 5a, U, M, L; 597. J. coriaceus Mackenzie, O, standing water in swamp, 5e, U, M, L; 499. J. debilis Gray, C, mucky soil at edge of low woods, 5a, U, M, L; 338, 339. J. dichotomus Ell., O, sand near

salt marsh, 5e, U, M, L; 1010. J. effusus L., A, disturbed area, 8, U, M, L; 196. \*J. gerardi Loiseleur, LA, tidal brackish ditch, 1, U, M, L; 1011. \*J. marginatus Rostk., C, cut-over wet area, 5a, U, M, L; 519. J. platyphyllus (Wiegand) Fernald, C, powerline cut, 6a1, U, M, L; 1029. J. roemerianus Scheele, LC, edge of salt marsh, 5c, U, M, L; 730. J. scirpoides Lam., O, newly cut-over woods, 5a, U, M, L; 328, 332. J. tenuis Willd., C, streambank, 3a, U, M, L; 190, 376. \*Luzula acuminata Raf., R, upland in calcareous ravine, 5a, M, L; 909. L. bulbosa (Wood) Rydb., C, grassy cemetery, 5a, U, M, L; 906A. L. echinata (Small) Hermann, O, swamp woods, 6a1, U, M, L; 898.

LEMNACEAE: \*Lemna minor L., LA, surface of beaver pond, 8, M, L; 812. Spirodela polyrhiza (L.) Schleiden, O, surface of beaver pond, 1, U, M, L; 1024. \*\*\*Wolffia papulifera Thompson, LC, surface of pond, 4, M, L; 884.

LILIACEAE: Allium vineale L., C, grassy field, 7, U, M, L; 227. \*Asparagus officinalis L., O, sandy soil near Rappahannock R., 7, U, M, L; 230. Hemerocallis fulva (L.) L., C, edge of cultivated field, 7, U, M, L; 254. Lilium superbum L., R, low woods near stream, 5a, M, L; 1060. Medeola virginiana L., C, low mature woods, 5a, U, M, L; 138. Muscari racemosum (L.) Miller, O, grassy roadside, 7, U, M, L; 22. \*Ornithogalum nutans L. (not in Atlas of the Virginia Flora), R, edge of cultivated field, 7; 30. O. umbellatum L., O, cultivated field, 7, U, M, L; 74. Polygonatum biflorum (Walter) Ell., O, rich woods, 4, U, M, L; 83. Smilacina racemosa (L.) Desf., C, wooded ravine slope, 5a, U, M, L; 167.

Smilax bona-nox L., C, sand dune, C, 4, U, M, L; 231, 780B, 781. S. glauca Walter, R, pine woods, 5a, U, M, L; 719. S. herbacea L., O, streambank in cut-over woods, 5a, M, L; 461, 1000. S. laurifolia L., O, streambank in mature woods, 5e, M, L; 139. S. rotundifolia L., A, roadside thicket, 5a, U, M, L; 89, 780A. Uvularia perfoliata L., C, calcareous ravine, 5a, U, M, L; 923. \*U. sessilifolia L., LC, swamp woods, 5a, M; 913. \*Yucca filamentosa L., O, edge of sand dune, 6a2, U, M, L; 264.

ORCHIDACEAE: \*Aplectrum hyemale (Willd.) Torrey, R, slope of calcareous ravine, 5a, U, M, L; 891. Cypridium acaule Aiton, C, dry woods, 5a, U, M, L; 140. \*C. calceolus L., R, slope of calcareous ravine, 1, U, M, L; 933. Goodyera pubescens (Willd.) R. Brown, O, rich woods, 5a, U, M, L; 436. H. clavellata (Michx.) Sprengel, O, streambank, 5a, U, M, L; 372, 579. \*H. cristata (Michx.) R. Brown, R, swamp woods, 5a, U, M, L; 797. H. lacera (Michx.) Lodd., R, swamp woods, 5a, U, M, L; 1031. Isotria verticillata (Willd.) Raf., LC, rich woods, 5a, M, L; 1042. Liparis liliifolia (L.) Lindley, R, rich woods, 5a, M, L; 539. \*Malaxis spicata, R, mucky soil in calcareous ravine, 4, M, L; 765. M. unifolia Michx., O, dry woods, 5a, U, M, L; 500, 1012. \*Orchis spectabilis L., LA, calcareous ravine, 5a, M, L; 171, 918. \*Ponthieva racemosa (Walter) Mohr, LA, calcareous ravine, 4, M, L; 774. \*\*\*,\*\*Spiranthes grayi Ames, R, roadside swale, 5a, M, L; 643A. Tipularia discolor (Pursh) Nuttall, C, mixed woods, 5a, U, M, L; 536.

POACEAE: \*\*Agropyron repens (L.) Beauv., LC, edge of marsh and dirt road, 7, M; 1053. \*Agrostis hyemalis (Walt.) BSP. var.

hyemalis, C, roadside, 4, U, M, L; 978. \*A. perennans (Walt.)  
 Tuckerman, A, swamp woods, 4, U, M, L; 510, 568, 644, 688. \*A.  
stolonifera L., LA, roadside shoulder, 7, U, M, L; 145, 267, 352.  
Aira caryophyllea L., C, roadside, 7, U, M, L; 162. A. elegans  
 Gaudin, LC, roadside, 7, U, M, L; 1009. \*Ammophila breviligulata  
 Fernald, LC, sand dunes, 5d, U, M, L; 850. \*Andropogon scoparius  
 Michx., O, sandy pine woods, 5a, U, M, L; 832. A. ternarius  
 Michx., O, roadside swale, 5e, U, M, L; 818. A. virginicus L., C,  
 roadside shoulder, 4, M, L; 696, 814. Anthoxanthum odoratum L., A,  
 roadside shoulder, 7, U, M, L; 27. Aristida oligantha Michx., LC,  
 compacted soil in dirt road, 3b, M, L; 1067. Arrhenatherum elatius  
 (L.) Presl var. bulbosum (Willd.) Spenner, O, cultivated field, 7,  
 U, M, L; 1048. \*Arthraxon hispidus (Thunberg) Makino var.  
cryptathenus (Hackel) Honda, C, roadside ditch, 7, M, L; 806.  
 \*Arundinaria tecta (Walter) Muhl., O, edge of young woods, 5c, U, M,  
 L; 302. Avena sativa L., O, escaped at edge of cultivated field, 7,  
 U, M, L; 235. \*\*Brachyeltrum erectum (Schreber) Beauvois, R,  
 calcareous ravine, 5a, M, L; 476. Bromus japonicus Murray, C, edge  
 of cultivated field, 7, U, M, L; 234. Cenchrus tribuloides L., LC,  
 sand dunes, 4, U, M, L. Cinna arundinacea L., C, low woods, 5a, U,  
 M, L; 645, 670. \*Cynodon dactylon (L.) Persoon, A, disturbed area,  
 7, U, M, L; 300. \*Dactylis glomerata L., C, roadside, 7, U, M, L;  
 108, 149. \*Danthonia sericea Nuttall, O, roadside by mixed woods,  
 6a2, U, M, L; 200, 1017. D. spicata (L.) Beauv., LC, dirt road,  
 3a, U, M, L; 991. Dichanthelium clandestinum (L.) Gould, C, edge  
 of swamp woods, 5a, U, M, L; 215, 706. D. commutatum (Schultes)  
 Gould, C, roadside, 5a, U, M, L; 153, 317, 975. \*\*D. depauperatum

(Muhl.) Gould, 0, edge of mixed woods, 5a, U, M, L; 206, 968. D. dichotomum (L.) Gould, C, edge of mixed woods, 5a, U, M, L; 202, 214, 1003. \*D. ensifolium (Ell.) Gould, C, streambank, 5a, U, M, L; 532. D. lanuginosum (Ell.) Gould var. lanuginosum, 0, disturbed area, 5e, U, M, L; 667. \*D. lanuginosum var. lindheimeri (Nash) Harvill, LC, low roadside shoulder, 4, U, M, L; 353. D. laxiflorum (Lam.) Gould, C, cut-over field, 4, M, L; 364, 608. \*D. ravenelii (Scribn.) Gould, C, roadside, 5a, U, M, L; 324, 437. D. scoparium (Lam.) Gould, LC, cut-over field, 4, U, M, L; 452. \*D. sphaerocarpon (Ell.) Gould var. polyanthes (Schultes) Gould, 0, grassy woods road, 5a, M, L; 1034. D. sphaerocarpon (Ell.) Gould var. sphaerocarpon, 0, roadside, 4, U, M, L; 322. Digitaria ischaemum (Schreber) Muhl., A, cut-over field, 7, U, M, L; 746B. \*D. sanguinalis (L.) Scopoli, C, cut-over field, 7, U, M, L; 459. Distichlis spicata (L.) Greene, LA, salt marsh, 4, U, M, L; 652, 679. Echinochloa crusgalli (L.) Beauv., A, cut-over field, 7, U, M, L; 362, 380, 484. E. walteri (Pursh) Heller, 0, freshwater marsh, 5a, U, M, L; 699. Eleusine indica (L.) Gaertner, 0, edge of grassy field, 7, U, M, L; 590. Elymus virginicus L., C, sand dune, 5a, U, M, L; 298, 381. Eragrostis cilianensis (All.) Mosher, R, cultivated field, 7, U, M, L; 1087. \*E. curvula (Schrader) Nees (not in Atlas of the Virginia Flora), LC, roadside ditch, 7; 179, 864. \*\*E. pilosa (L.) Beauv., C, roadside bank, 7, U, M, L; 711. E. spectabilis (Pursh) Steudel, A, cultivated field, 5a, U, M, L; 549. Erianthus contortus Ell., LC, powerline cut, 5c, U, M, L; 828. \*E. giganteus (Walter) Muhl., R, low moist woods, 4, U, M, L; 1074. \*Festuca arundinacea Schreber,



LC, border of cultivated field and salt marsh, 7, U, M, L; 969. \*F. myuros L., LC, sandy roadside shoulder, 7, U, M, L; 1038. \*F. obtusa Biehler, O, swamp woods, 5a, U, M, L; 1002. \*\*F. octoflora Walter, LC, grassy dirt road, 3a, U, M, L; 1022. F. pratensis Hudson, C, sandy grassy field, 7, U, M, L; 177, 741. Glyceria striata (Lam.) Hitchcock, A, swamp woods, 4, U, M, L; 184, 218, 952. \*\*Gymnopogon ambiguus (Michx.) BSP., R, sandy pine woods, 5a, M, L; 783. \*Holcus lanatus L., C, streambank, 7, U, M, L; 63, 191, 357. Hordeum pusillum Nuttall, O, edge of cultivated field, 4, U, M, L; 1019. Leersia oryzoides (L.) Swartz, swamp woods, 1, U, M, L; 633. L. virginica Willd., C, streambank, 5a, U, M, L; 664. \*Lolium perenne L., LA, disturbed area, 7, U, M, L; 240. \*Melica mutica Walter, R, slope of rich woods, 5c, M, L; 962. \*\*Miscanthus sinensis Andersson, O, roadside shoulder, 7, U, M; 809. Muhlenbergia schreberi J. F. Gmel., LC, dirt path near cultivated field, 4, M, L; 1083. \*Panicum agrostoides Spreng. (not in Atlas of the Virginia Flora), C, grassy field, 4; 655. \*P. amarulum Hitch. & Chase (not in Atlas of the Virginia Flora), O, beach of Rappahannock R., 5e; 851. P. amarum Ell., C, sandy beach, 5e, U, M, L; 740. P. anceps Michx., C, roadside ditch, 5a, U, M, L; 446, 567. \*P. dichotomiflorum Michx., C, moist disturbed area, 4, U, M, L; 627A. \*P. verrucosum Muhl., C, cut-over field, 5a, U, M, L; 606, 796B. P. virgatum L., A, steep roadside shoulder, 4, U, M, L; 528, 591. Paspalum dilatatum Poir., A, roadside, 7, U, M, L; 349. P. floridanum Michx., C, gravel of roadside, 5c, U, M, L; 525. P. laeve Michx., O, woods clearing, 5a, U, M, L; 1047. \*P. setaceum Michx., O, roadside shoulder, 4, U, M, L; 346, 582. Phleum pratense

L., O, disturbed area, 7, U, M, L; 266. \*Phragmites communis Trinius, O, LA, marshy disturbed area, 8, U, M, L; 556. Poa annua L., A, cultivated field, 7, U, M, L; 125, 163. P. compressa L., O, sandy roadside shoulder, 7, U, M, L; 1025. P. cuspidata Nuttall, C, swamp woods, 6a1, M, L; 955. P. pratensis L., A, edge of cultivated field, 7, U, M, L; 121, 124. \*\*P. trivialis L., LA, ash swamp, 7, M, L; 977. \*Polypogon monspeliensis (L.) Desf., LC, edge of salt marsh, 7, U, M, L; 304. Secale cereale L. (not in Atlas of the Virginia Flora), C, gravel of roadside, 7; 55, 883. Setaria faberi W. Herrmann, O, roadside by cut-over field, 7, U, M, L; 323, 728. \*S. geniculata (Lam.) Beauv., C, edge of salt marsh, 4, U, M, L; 566, 682. \*S. glauca (L.) Beauv., C, grassy roadside shoulder, 7, M, L; 347. \*Sorghum halepense (L.) Persoon, A, cultivated field, 7, U, M, L; 390. Spartina alterniflora Loiseleur, LA, salt marsh, 5e, U, M, L; 678. S. cynosuroides (L.) Roth, C, salt marsh, 5e, U, M, L; 559. S. patens (Aiton) Muhl., C, salt marsh, 8, U, M, L; 416. Sphenopholis nitida (Biehler) Scribn., C, rich woods, 5a, U, M, L; 936. \*\*S. obtusata (Michx.) Scribn., O, powerline cut, 4, U, M, L; 1028. \*\*S. pennsylvanicum (L.) Hitchcock, O, streambank, 5a, U, M, L; 959. \*Sporobolus indicus (L.) R. Brown, O, grassy roadside shoulder, 7, U, M, L; 351. \*Stipa avenacea L., O, dry pine woods, 5d, U, M, L; 967. Tridens flavus (L.) Hitchcock, A, roadside, 7, U, M, L; 527. \*Triplasis purpurea (Walter) Chapman, LC, sand dunes, 4, U, M, L; 735. \*Tripsacum dactyloides L., R, thicket at edge of river, 4, U, M, L; 514. Triticum aestivum L. (not in Atlas of the Virginia Flora), LC, roadside, 7; 1039. Uniola laxa (L.) BSP., C, wooded roadside bank,

5e, U, M, L; 569. Zizania aquatica L., LC, freshwater marsh, 5a, U, M, L; 1073.

POTAMOGETONACEAE: \*\*Potamogeton diversifolius Raf., LC, shallow water of stream, 4, U, M, L; 799, 1005. \*\*\*,\*\*P. foliosus Raf., LC, submerged in shallows of beaver pond, 4, M; 697. \*\*P. pulcher Tuckerm., LC, slow water in swamp, 5e, M, L; 1082.

SPARGANIACEAE: Sparganium americanum Nuttall, 0, standing water in marsh, 5a, U, M, L; 385.

TYPHACEAE: Typha angustifolia L., C, brackish marsh near river, 8, U, M, L; 232. T. latifolia L., A, freshwater marsh, 8, U, M, L; 626.

XYRIDACEAE: Xyris torta Smith, R, ditch by low mixed woods, 5a, U, M, L; 1059.

#### DICOTYLEDONEAE

ACANTHACEAE: Ruellia caroliniensis (Walter) Steudel, 0, cut-over field, 5a, U, M, L; 368.

ACERACEAE: Acer rubrum L., C, edge of mixed woods, 5a, U, M, L; 8. Acer saccharinum L., R, edge of thicket beyond salt marsh, 5a, U, M, L; 885.

AIZOACEAE: Mollugo verticillata L., C, disturbed area, 7, U, M, L; 344.

AMARANTHACEAE: Amaranthus cannabinus (L.) J. D. Sauer, 0, edge of salt marsh, 6a2, U, M, L; 657. \*Amaranthus hybridus L., C, cultivated field, 7, U, M, L; 673.

ANACARDIACEAE: Rhus copallina L., A, roadside thicket, 5a, U, M, L; 585. R. glabra L., C, steep roadside bank, 4, U, M, L; 51,

301. R. radicans L., A, streambank, 4, U, M, L; 857. \*R. vernix L., R, streambank in low woods, 5a, U, M, L; 715B.

ANNONACEAE: Asimina triloba (L.) Dunal, O, streambank in calcareous ravine, 5a, U, M, L; 768.

APIACEAE: \*Angelica venenosa (Greenway) Fernald, O, edge of mixed woods, 5a, U, M, L; 409, 418. Chaerophyllum tainturieri Hooker, O, open grassy field, 5c, U, M, L; 66. Cicuta maculata L., O, swamp woods, 4, U, M, L; 421. \*Cryptotaenia canadensis (L.) DC., R, streambank, 5a, U, M, L; 374. Daucus carota L., A, edge of cultivated field, 7, U, M, L; 270. Foeniculum vulgare Miller, O, edge of grassy field, 7, U, M, L; 625. \*Hydrocotyle ranunculoides L. F., C, standing water in swamp, 4, U, M, L; 282. H. verticillata Thunberg var. triradiata (A. Rich.) Fernald, LC, shallow water of beaver pond, 4, U, M, L; 1071. Oxypolis rigidior (L.) Raf., O, swamp woods, 5a, U, M, L; 573. Sanicula canadensis L., C, rich woods, 5a, U, M, L; 84.

APOCYNACEAE: Apocynum cannabinum L., C, grassy field, 3a, U, M, L; 228. \*Vinca major L., O, grassy field, 7, M, L; 61. \*V. minor L., LA, edge of wooded ravine, 7, U, M, L; 250.

AQUIFOLIACEAE: Ilex opaca Aiton, C, edge of mixed woods, 5a, U, M, L; 131. I. verticillata (L.) Gray, C, low moist woods, 5a, U, M, L; 213, 273, 281.

ARALIACEAE: Aralia spinosa L., C, edge of woods, 5a, U, M, L; 383. \*Hedera helix L., O, wooded ravine, 7, M, L; 472.

ARISTOLOCHIACEAE: Aristolochia serpentaria L., R, streambank, 5a, M, L; 855. Hexastylis virginica (L.) Small, C, wooded ravine, 6c, U, M, L; 247.

ASCLEPIADACEAE: \*Asclepias amplexicaulis Smith, 0, edge of cultivated field, 5a, U, M, L; 233. A. incarnata L., C, swamp, 5a, U, M, L; 494B. \*A. syriaca L., 0, grassy roadside shoulder, 5a, U, M, L; 303. A. tuberosa L., C, roadside, 4, U, M, L; 251. A. variegata L., R, cut-over field, 5a, U, M, L; 373. Matelea carolinensis (Jacquin) Woodson, R, roadside thicket, 5c, M, L; 1045.

ASTERACEAE: Achillea millefolium L., A, grassy roadside, 7, U, M, L; 103. Ageratina altissima (L.) K. & R. var. altissima, 0, edge of wooded ravine, 5a, U, M, L; 761. \*A. aromatica (L.) K. & R., R, cemetery grounds, 6a1, U, M, L; 1079. Ambrosia artemisiifolia L., A, roadside, 4, U, M, L; 552. Antennaria plantaginifolia (L.) Richardson, C, roadside shoulder, 5a, U, M, L; 48. Anthemis arvensis L., C, gravel of roadside, 7, U, M, L; 76, 144. \*Artemisia vulgaris L., LC, edge of beach of Rappahannock R., 7, U, M, L; 846. \*Aster dumosus L., LC, grassy roadside swale, 5a, U, M, L; 881. A. gracilis Nuttall, C, edge of cultivated field, 6a1, U, M, L; 565, 654. \*A. grandiflorus L., 0, seepage area of roadside bank, 6c, M, L; 824. A. lateriflorus (L.) Britton, C, low woods, 5a, U, M, L; 805A. \*\*A. patens Aiton, 0, cut-over field, 5a, M, L; 827. A. pilosus Willd., A, roadside bank, 5a, U, M, L; 802, 808. \*A. puniceus L., C, freshwater marsh, 5a, U, M, L; 829. A. simplex Willd., LC, base of cliff by beach of Rappahannock R., 5a, M, L; 842. A. subulatus Michx., C, salt marsh, 6a1, U, M, L; 734. \*\*\*,\*\*A. tataricus L.f., R, roadside ditch, 7, M, L; 875. A. tenuifolius L., 0, salt marsh, 6a2, U, M, L; 737. Raccharis halimifolia L., C, edge of salt marsh, 4, U, M, L; 725. Bidens bipinnata L., C, cut-over field, 4, U, M, L; 554. B. discoidea (T.

& G.) Britton, A, swamp, 5a, M, L; 700A. B. frondosa L., C, cut-over field, 3a, U, M, L; 758. B. laevis (L.) BSP., O, freshwater marsh, 4, U, M, L; 868. B. polylepis Blake, A, ditch by meadow, 5a, U, M, L; 604. B. tripartita L., O, swamp, 7, U, M, L; 700B, 804. Cacalia atriplicifolia L., O, rich woods, 5a, U, M, L; 537. \*Carduus nutans L., R, between two cultivated fields, 7, M; 236. Centaurea cyanus L., C, grassy field by salt marsh, 7, U, M, L; 59. Chrysanthemum leucanthemum L., C, roadside shoulder, 7, U, M, L; 98. Cichorium intybus L., C, edge of cultivated field, 7, U, M, L; 271. \*Cirsium discolor (Willd.) Nuttall, O, edge of cultivated field, 5b, U, M, L; 641. Conoclinium coelestinum (L.) DC., C, ditch by cultivated field, 4, U, M, L; 543. Coreopsis lanceolata L., O, grassy field, 5a, U, M, L; 151. Eclipta alba (L.) Hasskarl, O, ditch by cultivated field; 8, U, M, L; 672. Elephantopus carolinianus Raeusch, O, cut-over field, 4, U, M, L; 610. E. nudatus Gray, O, low woods, 5e, U, M, L; 861A. E. tomentosus L., C, edge of mixed woods, 5c, U, M, L; 540. Erechtites hieracifolia (L.) Raf., O, cut-over field, 5a, U, M, L; 553. Erigeron annuus (L.) Persoon, A, roadside, 3a, U, M, L; 180. E. canadensis L., A, edge of cultivated field, 4, U, M, L; 488. \*E. pulchellus Michx., R, cemetery grounds, 5a, M, L; 85. E. strigosus Willd., C, roadside, 3a, U, M, L; 1007. Eupatoriadelphus dubius (Poiret) K. & R., C, edge of low woods, 6a1, U, M, L; 588, 723. E. fistulosus (Barratt) K. & R., O, edge of low woods, 5a, U, M, L; 507. Eupatorium album L., O, edge of mixed woods, 5a, U, M, L; 822. E. capillifolium (Lam.) Small, A, cut-over field, 5a, U, M, L; 831. E. hyssopifolium L., LA, disturbed area, 5a, U, M, L; 629. \*E.

hyssopifolium var. laciniatum Gray, R, cut-over field, 5a, U, M, L; 753, 794B. E. perfoliatum L., C, swamp woods, 5a, U, M, L; 217. \*E. pilosum Walter, O, bank near mixed woods, 6a1, U, M, L; 571, 744. E. rotundifolium L., C, edge of previously cultivated field, 5a, U, M, L; 671. \*E. rotundifolium ssp. ovatum (Bigelow) M. & F., O, roadside by mixed woods, 6a1, U, M, L; 547. \*\*\*,\*\*E. saltuense Fernald, R, edge of young mixed woods, 6c, M; 867. \*E. serotinum Michx., O, sandy soil near salt marsh, 4, U, M, L; 651. Galinsoga quadriradiata Ruiz & Pavon, C, cut-over field, 7, M, L; 315. Gnaphalium obtusifolium L., C, cut-over field, 5a, U, M, L; 790. G. purpureum L., C, edge of cultivated field, 4, U, M, L; 126, 321, 751. Helianthus atrorubens L., O, roadside bank near woods, 6c, U, M, L; 541. \*\*H. strumosus L., R, roadside by telephone pole, 5a, M, L; 649. \*H. tuberosus L., O, edge of cultivated field, 5a, U, M, L; 677. Heterotheca graminifolia (Michx.) Shinnery, O, sandy roadside slope, 4, U, M, L; 447, 542. H. mariana (L.) Shinnery, C, wooded roadside bank, 5a, U, M, L; 686. Hieracium gronovii L., C, edge of mixed woods, 5a, U, M, L; 503, 526. H. venosum L., O, wooded roadside shoulder, 5a, U, M, L; 117. Hypochoeris radicata L., C, side of dirt road, 7, U, M, L; 119. Iva frutescens L., C, edge of salt marsh, 5e, U, M, L; 593. Krigia virginica (L.) Willd., C, grassy field, 5a, U, M, L; 37. Lactuca canadensis L., C, previously cultivated field, 3a, U, M, L; 405, 555. L. floridana (L.) Gaertner, C, previously cultivated field, 5a, U, M, L; 614. Liatris graminifolia (Walter) Willd., O, sandy pine woods, 6a2, U, M, L; 834. Mikania scandens (L.) Willd., C, edge of swamp woods, 4, U, M, L; 577. Pluchea purpurascens

(Swartz) DC., C edge of salt marsh, 4, U, M, L; 695. \*Polymnia uvedalia L., O, cut-over field, 5a, U, M, L; 464. \*\*\*Prenanthes altissima L., R, calcareous ravine, 5a, M, L; 775. P. serpentaria Pursh, O, grassy roadside swale, 6al, U, M, L; 726, 755B. Pyrrhopappus carolinianus (Walter) DC., O, edge of cultivated field, 5c, U, M, L; 333. Rudbeckia hirta L., C, grassy roadside bank, 4, U, M, L; 269. \*R. laciniata L., O, streambank in calcareous ravine, 5a, U, M, L; 1078. \*R. triloba L., R, cemetery grounds, 5a, U, M, L; 1080. Senecio anonymus Wood, C, edge of cultivated field, 6al, U, M, L; 146. S. aureus L., C, swamp woods, 5a, U, M, L; 183. S. tomentosus Michx., C, roadside shoulder, 5e, U, M, L; 104, 161. Sericocarpus asteroides (L.) BSP., C, dry bank by woods, 6al, U, M, L; 204, 544. S. linifolius (L.) BSP., C, edge of pine woods, 5a, U, M, L; 276. \*Silphium trifoliatum L., LC, thicket by ditch, 6al, U, M, L; 1062. Solidago altissima L., C, open field, 5a, U, M, L; 759. S. bicolor L., O, roadside by cut-over field, 5a, U, M, L; 825. S. caesia L., O, edge of mixed woods, 5a, U, M, L; 760. S. erecta Pursh, O, roadside swale, 6al, U, M, L; 810, 821. S. gigantea Aiton, O, cut-over field, 3a, M, L; 609. \*S. graminifolia (L.) Salisbury, C, cut-over field, 5a, U, M, L; 693. \*S. juncea Aiton, O, clearing in pine woods, 5a, U, M, L; 635. S. microcephala (Greene) Bush, O, edge of mixed woods, 6al, U, M, L; 852. S. nemoralis Aiton, C, roadside bank, 5a, U, M, L; 838. S. odora Aiton, O, roadside shoulder, 5a, U, M, L; 602, 603. S. pinetorum Small, C, grassy roadside bank, 6c, M, L; 445, 570, 617. S. rugosa Miller, C, cut-over field, 5a, U, M, L; 690, 718, 720, 795B, 819. \*S. sempervirens L., C, edge of salt marsh, 4, U, M, L;



732. S. tenuifolia Pursh, C, cut-over field, 6a2, U, M, L; 789. Sonchus asper (L.) Hill, 0, edge of beach rubble, 7, U, M, L; 239, 314. Taraxacum officinale Wiggers, A, border of cultivated field, 7, U, M, L; 14. Verbesina occidentalis (L.) Walter, LC, cut-over field, 5c, U, M, L; 462. \*Vernonia noveboracensis (L.) Michx., 0, freshwater marsh, 6a1, U, M, L; 574. \*Xanthium strumarium L. var. glabratum (DC.) Cronquist, 0, cultivated field, 7, U, M, L; 815. X. strumarium var. strumarium, 0, sandy beach, 7, U, M, L; 845.

BALSAMINACEAE: Impatiens capensis Meerb., C, freshwater marsh, 5a, U, M, L; 557.

BERBERIDACEAE: Podophyllum peltatum L., LA, rich woods, 5a, U, M, L; 78.

BETULACEAE: Alnus serrulata (Ait.) Willd., C, streambank, 5a, U, M, L; 890. Carpinus caroliniana Walter, C, border of low woods, 5a, U, M, L; 165. Corylus americana Walter, C, low woods, 5a, U, M, L; 490.

BIGNONIACEAE: Bignonia capreolata L., R, streambank, 5c, U, M, L; 246. Campsis radicans (L.) Seemann, C, roadside thicket, 5a, U, M, L; 255.

BORAGINACEAE: Cynoglossum virginianum L., 0, wooded slope, 5a, U, M, L; 505. Lithospermum arvense L., 0, grassy roadside shoulder, 7, U, M, L; 5. \*Myosotis arvensis (L.) Hill, R, grassy field, 7, M, L; 118. \*M. laxa Lehmann, LC, swamp woods, 8, U, M, L; 1051.

BRASSICACEAE: Arabidopsis thaliana (L.) Heynh., C, cultivated field, 7, U, M, L; 3, 41. Barbarea verna (Miller) Ascherson, A, open roadside shoulder, 7, U, M, L; 10, 143. B. vulgaris R. Brown, C, grassy field, 7, U, M, L; 932. \*Brassica campestris L.,

O, cultivated field, 7, U, M, L; 916. B. napus L.(not in Atlas of the Virginia Flora), O, cultivated field, 7; 32. Cakile edentula (Bigelow) Hooker, LC, sand dunes, 3b, U, M, L; 423. Capsella bursa-pastoris (L.) Medicus, A, cultivated field, 7, U, M, L; 888. \*\*Cardamine bulbosa (Schreber) BSP., O, swamp woods, 5a, U, M, L; 902. \*C. douglassii (Torrey) Britton, R, swamp woods, 5b, M; 926. C. hirsuta L., C, cultivated field, 7, U, M, L; 4, 155. C. pennsylvanica Muhl., C, streambank, 3a, M, L; 911. \*C. pratensis L. var. palustris Winn. & Grab., R, sphagnous hummock in swamp woods, 1, U, M; 945. \*Dentaria laciniata Willd., LC, calcareous ravine, 5a, U, M, L; 894. Lepidium campestre (L.) R. Brown, C, edge of cultivated field, 7, U, M, L; 16, 110, 229. L. virginicum L., C, gravel of roadside, 3a, U, M, L; 929. Raphanus raphanistrum L., C, steep roadside bank, 7, U, M, L; 9. Sisymbrium officinale (L.) Scopoli, LC, edge of cultivated field, 7, U, M, L; 1026. Teesdalia nudicaulis (L.) R. Brown, C, open roadside shoulder, 7, U, M, L; 28.

CACTACEAE: Opuntia compressa (Salisbury) Macbride, O, sandy soil near Rappahannock R., 5a, U, M, L; 417.

CALLITRICHACEAE: Callitriche heterophylla Pursh, O, margin of beaver pond, 4, U, M, L; 1072.

CAMPANULACEAE: Lobelia cardinalis L., C, swamp woods, 5a, U, M, L; 535. L. inflata L., C, newly cut-over field, 5a, U, M, L; 458, 463. \*L. nuttallii R. & S., LA, woods clearing, 6a1, U, M, L; 334. L. puberula Michx., O, low moist woods, 5a, U, M, L; 563. \*L. siphilitica L., O, low woods by stream, 5a, M, L; 754, 887. Triodanis perfoliata (L.) Nieuwland var. perfoliata, C, ditch by

cultivated field, 4, U, M, L; 129.

CAPRIFOLIACEAE: Lonicera japonica Thunberg, A, woods clearing, 7, U, M, L; 168. L. sempervirens L., O, thicket at edge of cultivated field, 5a, U, M, L; 921. Sambucus canadensis L., C, edge of mature woods, 4, U, M, L; 212, 856A. \*Viburnum acerifolium L., O, slope of calcareous ravine, 5a, U, M, L; 920. V. nudum L., C, low moist woods, 5e', U, M, L; 258, 434, 771. V. prunifolium L., C, wooded ravine by stream, 5a, U, M, L; 387, 917.

CARYOPHYLLACEAE: \*Agrostemma githago L., R, ditch by cultivated field, 7, U, M, L; 1030. Arenaria serpyllifolia L., LC, gravel of roadside shoulder, 7, U, M, L; 941. Cerastium glomeratum Thuillier, C, roadside ditch, 7, U, M, L; 985. C. vulgatum L., C, grassy roadside, 7, U, M, L; 147. Dianthus armeria L., C, roadside ditch, 7, U, M, L; 197. Lychnis alba Miller, C, edge of wooded ravine, 7, U, M, L; 174. \*Saponaria officinalis L., LC, side of dirt road, 7, U, M, L; 621. Scleranthus annuus L., LA, cultivated field, 7, U, M, L; 42. Silene antirrhina L., O, edge of cultivated field, 4, U, M, L; 164, 982. S. stellata (L.) Aiton f., O, woods clearing, 5a, U, M, L; 1058. Stellaria media (L.) Cyrillo, A, cultivated field, 7, U, M, L; 2. \*\*\*,\*\*S. pubera Michx., LC, slope of calcareous ravine, 6al, M, L; 910A.

CELASTRACEAE: Euonymus americanus L., C, wooded ravine, 5a, U, M, L; 169, 172.

CERATOPHYLLACEAE: Ceratophyllum demersum L., LC, submerged in pond, 1, U, M, L; 616.

CHENOPODIACEAE: \*Atriplex patula L., O, salt marsh, 1, U, M, L; 680. Chenopodium album L., O, edge of cultivated field, 7, U, M, L;

489, 843. C. ambrosioides L., O, disturbed area by beach, 7, U, M, L; 742B, 742C. Salicornia europaea L., O, salt marsh, 1, U, M, L; 739. \*Salsola kali L., R, sandy beach of Rappahannock R., 8, U, M, L; 844.

CISTACEAE: \*Lechea maritima Leggett var. virginica Hodgdon, R, sand dune, 6c, U, M, L; 685. L. racemulosa Michx., C, powerline clearing, 5a, U, M, L; 469, 816B.

CLETHRACEAE: Clethra alnifolia L., C, edge of swamp woods, 5e, U, M, L; 412.

CONVOLVULACEAE: Calystegia sepium (L.) R. Brown, C, thicket by sand dunes, 1, U, M, L; 188. \*Convolvulus arvensis L., LA, cultivated field, 7, U, M, L; 435. Cuscuta campestris Yuncker, C, roadside, 4, U, M, L; 433. C. compacta Jussieu, C, swamp, 5a, U, M, L; 531. C. gronovii R. & S., C, swamp, 5a, U, M, L; 498, 702. Ipomoea coccinea L., C, edge of cultivated field, 7, U, M, L; 618. I. hederacea (L.) Jacquin, C, cultivated field, 7, U, M, L; 524. I. lacunosa L., C, cultivated field, 5a, U, M, L; 661. I. pandurata (L.) Meyer, C, roadside by woods, 5a, U, M, L; 359. I. purpurea (L.) Roth, C, cultivated field, 7, U, M, L; 523.

CORNACEAE: Cornus florida L., C, edge of mixed woods, 4, U, M, L; 19, 75. C. foemina Miller, C, swamp woods, 5c, U, M, L; 495.

CRASSULACEAE: Penthorum sedoides L., C, mucky soil near stream, 5a, U, M, L; 466.

DIAPENSIACEAE: Galax urceolata (Poiret) Brummitt, LC, rich wooded slope, 6c, U, M, L; 360.

EBENACEAE: Diospyros virginiana L., O, between road and beach of Piankatank R., 5a, U, M, L; 481.

ELAEAGNACEAE: \*Elaeagnus pungens Thunberg, R, calcareous ravine, 7, M, L; 953. E. umbellata Thunberg, LC, roadside, 7, U, M; 946.

ERICACEAE: Chimaphila maculata (L.) Pursh, C, dry woods, 6a1, U, M, L; 307. C. umbellata (L.) Barton, R, edge of mixed woods, 1, U, M, L; 502. Epigaea repens L., O, dry woods, 5a, U, M, L; 186. Gaylussacia baccata (Wang) K. Koch, C, powerline clearing, 5a, U, M, L; 278. G. frondosa (L.) T. & G., C, young mixed woods, 6a1, U, M, L; 135, 274. Kalmia latifolia L., C, mixed woods, 5a, U, M, L; 132. Leucothoe racemosa (L.) Gray, O, woods near stream, 5e, U, M, L; 141, 290. Lyonia ligustrina (L.) DC., O, edge of mixed woods, 5a, U, M, L; 398B. L. mariana (L.) D. Don, O, pine woods, 5e, U, M, L; 127. Monotropa uniflora L., O, low woods under oaks, 2, U, M, L; 800. \*Oxydendrum arboreum (L.) DC., O, edge of pine woods, 5a, U, M, L; 345. Rhododendron nudiflorum (L.) Torrey, O, wooded roadside shoulder, 6a1, U, M, L; 115, 295. R. viscosum (L.) Torrey, O, slope above road, 6a1, U, M, L; 361. Vaccinium atrococcum (Gray) Heller, O, edge of mixed woods, 5a, U, M, L; 25. V. corymbosum L., O, young mixed woods, 6a1, U, M, L; 134, 205. V. stamineum L., C, edge of mixed woods, 5a, U, M, L; 43, 116, 292. V. vacillans Torrey, C, edge of mixed woods, 5a, U, M, L; 24, 286, 291.

EUPHORBIACEAE: \*Acalypha gracilens Gray, C, newly cut-over field, 5a, U, M, L; 627B. \*A. rhomboidea Raf., O, roadside ditch, 5a, U, M, L; 745. \*\*A. virginica L., LC, newly cut-over field, 5a, U, M, L; 401, 465. \*Euphorbia cyparissias L., O, edge of mixed woods, 7, U, M, L; 35, 99. \*E. epithymoides L. (not in Atlas of the Virginia Flora), LC, between cultivated field and road, 7; 970.

E. maculata L., C, gravel of roadside, 4, U, M, L; 424. E. polygonifolia L., LC, sand dune, 5d, U, M, L; 592. E. supina Raf. (not in Atlas of the Virginia Flora), LA, sandy field, 4; 662.

FABACEAE: Albizia julibrissin Durazzini, O, roadside thicket, 7, U, M, L; 487. Amphicarpa bracteata (L.) Fernald, O, wooded ravine, 5a, U, M, L; 384, 716. \*Apios americana Medicus, C, edge of swamp woods, 5a, U, M, L; 432. Baptisia tinctoria (L.) R. Brown, O, roadside bank, 5a, U, M, L; 201. Cassia chamaecrista L., A, gravel of roadside, 5a, U, M, L; 522. \*C. marilandica L., R, thicket off dirt road, 5a, M, L; 1061. C. nictitans L., C, roadside bank, 5a, U, M, L; 530. Centrosema virginianum (L.) Bentham, R, thicket at edge of dry woods, 5a, U, M, L; 1068. Cercis canadensis L., O, edge of rich woods, 4, U, M, L; 474. Clitoria mariana L., O, mixed woods, 5a, U, M, L; 486. \*\*\*,\*\*Coronilla varia L., LA, edge of mill pond, 7, M; 243, 835. \*Crotalaria sagittalis L., R, edge of dry woods, 4, U, M, L; 512. Cytisus scoparius (L.) Link, O, steep roadside bank, 7, U, M, L; 112. Desmodium canescens (L.) DC., O, edge of mixed woods, 5a, U, M, L; 442, 634. \*D. ciliare (Willd.) DC., O, edge of mixed woods, 4, U, M, L; 639B, 709. D. glabellum (Michx.) DC., C, edge of low woods, 5a, U, M, L; 715A, 756. \*D. glutinosum (Willd.) Wood, O, steep roadside bank, 4, M, L; 545. \*D. laevigatum (Nuttall) DC., LC, edge of mixed woods, 5a, U, M, L; 665A. \*\*D. marilandicum (L.) DC., R, edge of pine woods, 5a, U, M, L; 639A. D. nudiflorum (L.) DC., C, lightly wooded roadside, 5a, U, M, L; 402. D. paniculatum (L.) DC., C, edge of mixed woods, 5a, U, M, L; 501A, 665B. \*D. pauciflorum (Nuttall) DC., O, calcareous ravine, 5a, M, L; 475. D.

rotundifolium DC., R, rich beech woods, 5a, U, M, L; 963. \*D.  
viridiflorum (L.) DC., O, roadside ditch, 5a, M, L; 710, 746A.  
 \*Galactia volubilis (L.) Britton, O, edge of wooded ravine, 5a, U,  
 M; 551, 646. \*Glycine max (L.) Merrill (not in Atlas of the  
Virginia Flora), LC, shoulder of gravel road, 7; 787. Lathyrus  
hirsutus L., O, edge of cultivated field, 7, U, M, L; 133. \*L.  
latifolius L., O, open roadside shoulder, 7, U, M, L; 242.  
 \*Lespedeza angustifolia (Pursh) Ell., O, roadside swale, 5e, U, M, L;  
 717. \*L. capitata Michx., O, sandy soil near Rappahannock R., 5a,  
 U, M, L; 622. L. cuneata (Dumont) G. Don, A, roadside, 7, U, M,  
 L; 615B, 623. L. procumbens Michx., LA, roadside swale, 5a, U, M,  
 L; 642. L. repens (L.) Barton, C, gravel of roadside, 5a, U, M,  
 L; 478, 558. L. stipulacea Maxim., C, gravel of roadside, 7, M, L;  
 529. L. striata (Thunberg) H. & A., C, grassy field, 7, U, M, L;  
 656. \*L. stuevei Nuttall, O, newly cut-over field, 5a, U, M, L;  
 659. L. virginica (L.) Britton, C, roadside thicket, 5a, U, M, L;  
 583, 587, 660. Lupinus perennis L., LC, high roadbank under pines,  
 5a, U, M, L; 943. Medicago lupulina L., O, grassy powerline cut, 7,  
 M, L; 1027. Melilotus alba Desr., O, thicket off dirt road, 7, U,  
 M, L; 477. M. officinalis (L.) Lam., O, crack in grocery store  
 parking lot, 7, M, L; 237. \*Pueraria lobata (Willd.) Ohwi, LA,  
 grassy bank near Rappahannock R., 7, U, M, L; 848. \*Robinia  
pseudo-acacia L., O, roadside thicket, 5a, U, M, L; 92.  
 \*Strophostyles helvola (L.) Ell., LC, sandy beach near bay, 5a, U,  
 M, L; 624. S. umbellata (Willd.) Britton, C, edge of dry mixed  
 woods, 5e, U, M, L; 511. Stylosanthes biflora (L.) BSP., C, gravel  
 of roadside, 5a, U, M, L; 448. Tephrosia spicata (Walter) T. & G.,

R, sandy pine woods, 5c, U, M, L; 833. T. virginiana (L.)  
 Persoon, LC, edge of dry woods, 5a, U, M, L; 306. Trifolium arvense  
 L., A, roadside by cultivated field, 7, U, M, L; 189. T. campestre  
 Sturm, C, open roadside shoulder, 7, U, M, L; 158. \*T. dubium  
 Sibth., C, gravel of roadside, 7, U, M, L; 73. T. incarnatum L.,  
 O, edge of cultivated field, 7, U, M, L; 58. T. pratense L., A,  
 open roadside shoulder, 7, U, M, L; 97. T. repens L., C, grassy  
 roadside shoulder, 7, U, M, L; 105. Vicia angustifolia L., A,  
 grassy roadside shoulder, 7, U, M, L; 17. V. dasycarpa Tenore, C,  
 edge of cultivated field, 7, U, M, L; 181, 194. V. hirsuta (L.)  
 S. F. Gray, C, roadside bank, 7, U, M, L; 52. \*\*Wisteria sinensis  
 (Sims) Sweet, LC, old homesite, 7, U, M, L; 853.

FAGACEAE: Castanea dentata (Marshall) Borkh., R, sprouts from  
 stump in low woods, 5a, U, M, L; 708. C. pumila (L.) Miller, O,  
 mixed woods, 5a, U, M, L; 515, 546. Fagus grandifolia Ehrhart, C,  
 mesic woods, 5a, U, M, L; 764. Quercus alba L., A, mixed woods, 5a,  
 U, M, L; 762. Q. coccinea Muenchh., C, mixed upland woods, 5a, U,  
 M, L; 791, 792. Q. falcata Michx. var falcata, C, edge of mixed  
 woods, 5e, U, M, L; 770. Q. falcata Michx. var. pagodaefolia  
 Ell., O, beach of Rappahannock R., 5e, U, M, L; 729. Q.  
marilandica Muenchh., O, mixed pine woods beyond salt marsh, 5a, U,  
 M, L; 784. Q. michauxii Nuttall, O, above stream in newly cut-over  
 field, 5e, U, M, L; 826, 862A. Q. nigra L., O, strip of woods near  
 Piankatank R., 5e, U, M, L; 830. Q. phellos L., O, edge of woods  
 near Rappahannock R., 5e, U, M, L; 471. Q. prinus L., LC, dry mixed  
 woods, 6a1, U, M, L; 863, 1020. Q. rubra L., C, mixed upland  
 woods, 5a, U, M, L; 869, 872. Q. stellata Wang, O, mixed pine



woods beyond salt marsh, 5a, U, M, L; 782, 793. Q. velutina Lam., C, upland woods, 5a, U, M, L; 877.

FUMARIACEAE: Fumaria officinalis L., R, steep roadbank, 7, U, M, L; 31.

GENTIANACEAE: Bartonia paniculata (Michx.) Muhl., R, low moist woods, 5a, M; 803. \*B. virginica (L.) BSP., O, swamp woods, 5a, U, M, L; 578A, 578B. \*Gentiana villosa L., R, clearing in moist woods, 5a, M, L; 1090. \*Obolaria virginica L., R, calcareous ravine, 5a, U, M, L; 895. \*Sabatia angularis (L.) Pursh, C, newly cut-over field, 5a, U, M, L; 400.

GERANIACEAE: Geranium carolinianum L., C, grassy field, 3a, U, M, L; 60. G. dissectum L., O, grassy field, 7, M, L; 956.

HAMAMELIDACEAE: Hamamelis virginiana L., LC, slope of calcareous ravine, 5a, U, M, L; 1001. Liquidambar styraciflua L., C, newly cut-over field, 4, U, M, L; 399.

HYPERICACEAE: \*Hypericum canadense L., LC, desiccated pond bed, 5a, U, M, L; 1044. H. gentianoides (L.) BSP., C, open disturbed ground, 5a, U, M, L; 403. \*H. gymnanthum Engelm. & Gray, O, woods clearing, 5e, U, M, L; 407, 456, 520. H. hypericoides (L.) Crantz, C, powerline clearing, 4, U, M, L; 450, 663. H. mutilum L., O, mucky soil in swamp, 5a, U, M, L; 428, 439. H. perforatum L., A, roadside bank, 7, U, M, L; 277, 391. H. punctatum Lam., C, powerline clearing, 5a, U, M, L; 288. H. virginicum L., O, freshwater marsh, 6a1, U, M, L; 508. H. walteri Gmelin, R, swamp woods, 6c, U, M, L; 676B.

JUGLANDACEAE: Carya cordiformis (Wang.) K. Koch, C, upland woods, 5a, U, M, L; 870. C. glabra (Mill.) Sweet, O, low woods,

5a, M, L; 813. \*C. ovalis (Wang.) Sargent, R, edge of wooded ravine, 5a, U, M, L; 871. C. pallida (Ashe) Engler & Graebner, C, dry woods, 6a2, U, M, L; 714, 752, 852. C. tomentosa Nutt., C, cut-over field, 5a, U, M, L; 879, 880. Juglans nigra L., O, bottom of wooded ravine, 5a, U, M, L; 777, 972.

LAMIACEAE: \*\*\*,\*\*Agastache nepetoides (L.) Kuntze, R, thicket between rich woods and dirt road, 5a, M, L; 1066. Glechoma hederacea L., LA, mowed ground at edge of wooded ravine, 7, U, M, L; 175. Lamium amplexicaule L., C, cultivated field, 7, U, M, L; 1. L. purpureum L., C, open grassy field, 7, U, M, L; 67. Lycopus rubellus Moench., C, mucky soil in low woods, 5e, U, M, L; 1085. L. virginicus L., C, ditch by road, 5a, U, M, L; 548. \*Mentha piperita L., LC, swamp woods, 7, M, L; 1065. \*M. spicata L., R, edge of grassy field near salt marsh, 7, U, M, L; 733. Monarda punctata L., C, grassy field near beach of Rappahannock R., 5e, U, M, L; 849. Perilla frutescens (L.) Britton, A, newly cut-over field, 7, U, M, L; 668. Prunella vulgaris L., C, roadside, 7, U, M, L; 460. \*Pycnanthemum incanum (L.) Michx., R, roadside near low woods, 6a1, U, M, L; 637. \*P. tenuifolium Schrader, R, roadside thicket in ditch, 5a, U, M, L; 1063. Salvia lyrata L., C, old field, 5a, U, M, L; 95. Satureja nepeta (L.) Scheele, O, roadside by mixed woods, 7, U, M, L; 605. Scutellaria elliptica Muhl., R, low woods, 5a, M, L; 1023. S. integrifolia L., C, wooded roadside, 5e, U, M, L; 221. S. lateriflora L., O, swamp, 3a, U, M, L; 496. Teucrium canadense L., LC, grassy field near Rappahannock R., 3a, U, M, L; 415. Trichostema dichotomum L., C, disturbed area, 5a, U, M, L; 562.

LAURACEAE: Lindera benzoin (L.) Blume, C, swamp woods, 5a, U, M, L; 388. Sassafras albidum (Nuttall) Nees, C, thicket at edge of cultivated field, 5a, U, M, L; 11, 21.

LINACEAE: Linum medium (Planchon) Britton var. texanum (Planchon) Fernald, O, seepage area by cultivated field, 5a, U, M, L; 393. \*L. striatum Walter, O, mucky soil in swamp, 5a, U, M, L; 580.

LOGANIACEAE: Gelsemium sempervirens (L.) Jaume Saint-Hilaire, LA, pine woods, 4, U, M, L; 1052. Polypremum procumbens L., LA, newly cut-over field, 4, U, M, L; 377.

LYTHRACEAE: Decodon verticillatus (L.) Elliott, C, by stream in low woods, 5a, U, M, L; 598. \*Rotala ramosior (L.) Koehne, C, swale by dirt road, 4, M, L; 691.

MAGNOLIACEAE: Liriodendron tulipifera L., C, strip of woods by cultivated field, 5a, U, M, L; 111. Magnolia virginiana L., C, swamp woods, 5e, U, M, L; 195.

MALVACEAE: \*\*\*,\*\*Anoda cristata (L.) Schlecht., LC, cultivated field, 7, M, L; 674. Hibiscus moscheutos L. ssp. moscheutos, C, edge of salt marsh, 6cl, U, M, L; 595. Kosteletzkya virginica (L.) Gray, C, edge of salt marsh, 4, U, M, L; 559.

MELASTOMATACEAE: Rhexia mariana L., C, roadside by cultivated field, 5a, U, M, L; 296. \*R. nashii Small, R, ditch by roadside swale, 6c, M, L; 721. R. ventricosa Fernald & Griscom, O, cut-over field, 6c, M, L; 660B. R. virginica L., C, powerline clearing, 5a, U, M, L; 470.

MENISPERMACEAE: Menispermum canadense L., R, slope of calcareous ravine, 5a, U, M, L; 999.

MORACEAE: Broussonetia papyrifera (L.) Vent., O, roadside by low woods, 7, U, M, L; 414, 441. Morus alba L., O, thicket near cultivated field, 7, U, M, L; 840. Morus rubra L., O, steep bank at edge of mixed woods, 5a, U, M, L; 154.

MYRICACEAE: Myrica cerifera L., A, sandy thicket by Piankatank R., 4, U, M, L; 113. \*M. heterophylla Raf., R, pine woods near salt marsh, 5e, M, L; 722.

NYSSACEAE: Nyssa sylvatica Marshall, C, edge of young woods, 4, U, M, L; 123, 467.

OLEACEAE: Chionanthus virginicus L., O, low moist woods, 5a, U, M, L; 703. Fraxinus americana L., C, bottom of wooded ravine, 5a, U, M, L; 766A. F. pennsylvanica Marshall, O, streambank in low woods, 5a, M, L; 750. \*Ligustrum ovalifolium Hassk. (not in Atlas of the Virginia Flora), O, edge of grassy field at Rappahannock R., 7; 260. L. sinense Lour., O, low disturbed woods, 7, U, M, L; 238.

ONAGRACEAE: Circaea lutetiana ssp. canadensis (L.) A. & M., C, edge of stream in low woods, 1, U, M, L; 250B, 325. Epilobium coloratum Biehler, R, swamp woods, 5a, M, L; 1084. Ludwigia alternifolia L., C, by stream in low woods, 5a, U, M, L; 369. L. decurrens Walter, O, swamp, 4, U, M, L; 631. \*L. palustris (L.) Ell., LA, swamp, 8, U, M, L; 705. Oenothera biennis L., C, roadside shoulder, 3a, U, M, L; 584. O. humifusa Nuttall, O, disturbed sandy ground near Rappahannock R., 4, M, L; 297, 841. O. laciniata Hill, C, grassy roadside, 4, U, M, L; 96, 398.

OROBANCHACEAE: Epifagus virginiana (L.) Barton, C, under beeches on slope of ravine, 5a, U, M, L; 473.

OXALIDACEAE: \*\*Oxalis corniculata L., R, dirt road, 7, M, L; 1056. O. dillenii Jacquin, C, edge of cemetery, 4, U, M, L; 87. O. stricta L., C, gravel of roadside, 4, U, M, L; 1046.

PAPAVERACEAE: Sanguinaria canadensis L., O, wooded slope above stream, 5a, M, L; 320.

PASSIFLORACEAE: Passiflora incarnata L., LC, thicket between woods and cultivated field, 5c, U, M, L; 1064. P. lutea L., O, cut-over field, 5a, U, M, L; 370.

PHRYMACEAE: Phryma leptostachya L., O, newly cut-over field near stream, 2, U, M, L; 378.

PHYTOLACCACEAE: Phytolacca americana L., C, woods clearing, 5a, U, M, L; 272.

PLANTAGINACEAE: Plantago aristata Michx., C, gravel of roadside, 3a, U, M, L; 253. P. lanceolata L., A, open grassy field, 7, U, M, L; 64. P. rugelii Dcne., C, roadside, 5a, U, M, L; 316. P. virginica L., A, grassy roadside shoulder, 3a, U, M, L; 18.

PLATANACEAE: Platanus occidentalis L., C, newly cut-over field, 4, U, M, L; 749B.

PLUMBAGINACEAE: Limonium carolinianum (Walter) Britton, LC, sandy soil near salt marsh, 4, U, M, L; 681.

POLYGALACEAE: Polygala curtissii Gray, O, clearing of pine woods, 6c, U, M, L; 615A. \*P. incarnata L., R, newly cut-over field, 4, U, M, L; 327. \*P. mariana Miller, O, roadside swale, 5e, U, M, L; 337, 643B.

POLYGONACEAE: Polygonum arifolium L., C, swamp, 5a, U, M, L; 425. P. aviculare L., C, gravel of roadside, 7, U, M, L; 326, 589.

\*P. cespitosum Blume, LC, roadside by cut-over field, 7, M, L;  
 612B. P. cuspidatum Siebold & Zucc., LC, old homesite, 7, U, M, L;  
 854. P. pennsylvanicum L., C, sandy disturbed area, 5a, U, M, L;  
 455, 564. P. persicaria L., C, newly cut-over field, 7, U, M, L;  
 310, 343. P. punctatum Ell., LA, swamp, 4, U, M, L; 630, 731. P. sagittatum L., C, swamp, 5a, U, M, L; 497. P. scandens L., LA, over trees by cultivated field, 5a, M, L; 839. \*P. setaceum Elliott, C, low woods near stream, 5e, M, L; 411, 607B. P. virginianum L., C, low woods near stream, 2, U, M, L; 607A. Rumex acetosella L., A, open roadside shoulder, 7, U, M, L; 29. \*R. conglomeratus Murray, between road and salt marsh, 7, U, M, L; 262. R. crispus L., C, open grassy field, 7, U, M, L; 62. R. verticillatus L., O, edge of salt marsh, 5a, U, M, L; 262, 305.

PORTULACACEAE: Claytonia virginica L., LC, swamp woods, 5a, U, M, L; 897.

PRIMULACEAE: Anagallis arvensis L., C, cultivated field, 7, U, M, L; 210. Samolus parviflorus Raf., O, edge of salt marsh, 1, U, M, L; 694.

RANUNCULACEAE: Anemone virginiana L., O, edge of low cut-over woods, 5a, M, L; 313. Aquilegia canadensis L., LC, gravel of wooded roadside, 5a, U, M, L; 947. \*Caltha palustris L., LC, swamp woods, 1, U, M, L; 899. \*Clematis maximowicziana Fran. & Sav., O, roadside shoulder, 7, U, M, L; 650. \*C. virginiana L., R, low woods by stream, 5a, U, M, L; 859. Hepatica americana (DC.) Ker., LC, calcareous ravine, 5a, U, M, L; 170. Ranunculus abortivus L., C, streambank in low woods, 5a, U, M, L; 903. R. bulbosus L., A, edge of cultivated field, 7, U, M, L; 38, 366. \*R. hispidus

Michx., R, upland open woods, 5a, M, L; 912. R. pusillus Poiret, LC, moist soil at edge of salt marsh, 5a, M, L; 964. \*R. recurvatus Poiret, O, streambank in ravine, 5a, U, M, L; 924. R. sardous Crantz, LA, cultivated field, 7, U, M, L; 120. \*R. septentrionalis Poiret, O, swamp woods, 5a, M, L; 185, 930. \*Thalictrum pubescens Pursh, O, swamp woods, 6a1, U, M, L; 1041. \*T. revolutum DC., R, streambank in low woods, 5a, M, L; 858A, 988.

ROSACEAE: Agrimonia parviflora Aiton, O, streambank in calcareous ravine, 4, M, L; 767B. A. pubescens Wallroth, O, moist newly cut-over field, 5a, U, M, L; 611. Amelanchier arborea (Michx. f.) Fernald, C, edge of mixed woods, 5a, U, M, L; 26, 896. Aronia arbutifolia (L.) Elliott, O, edge of mixed woods, 5a, U, M, L; 46, 356, 647. \*\*\*,\*\*Crataegus flava Aiton, R, newly cut-over field, 6c, M, L; 747B. Duchesnia indica (Andrz.) Focke, C, edge of wooded ravine, 7, U, M, L; 244. Fragaria virginiana Dcne., O, open sandy woods, 3a, U, M, L; 944. Geum canadense Jacquin, C, newly cut-over field, 5a, U, M, L; 319. \*\*Malus angustifolia (Aiton) Michx., R, edge of mixed woods, 5e, M, L; 408, 747A. M. pumila Miller, O, edge of mixed woods, 7, M, L; 866. Potentilla canadensis L., C, open grassy field, 5a, U, M, L; 86, 152. P. recta L., C, disturbed area, 7, M, L; 157. P. simplex Michx., LC, open grassy field, 5a, U, M, L; 36. \*Prunus angustifolia Marshall, R, hedgerow, 5a, U, M, L; 901. P. serotina Ehrhart, A, roadside by cultivated field, 4, U, M, L; 88. \*Pyrus communis L., O, edge of mixed woods, 7, U, M, L; 34, 862B. Rosa carolina L., O, edge of mixed woods, 5a, U, M, L; 429. \*R. micrantha Smith, R, grassy field at edge of pine woods, 7, M, L; 150. \*R. multiflora Thunberg, C, steep roadbank, 7, U, M, L;

192. R. palustris Marshall, C, swamp, 5a, U, M, L; 256. \*R. wichuriana Crepin, C, old homesite, 7, U, M, L; 224. Rubus argutus Link, C, thicket by beach, 5c, U, M, L; 241, 960A. \*R. cuneifolius Pursh, C, sandy soil near Rappahannock R., 6a1, U, M, L; 284. R. flagellaris Willd., O, open grassy field, 5b, U, M, L; 39. R. hispidus L., O, streambank in woods, 5a, U, M, L 208. R. occidentalis L., C, roadside thicket, 5a, U, M, L; 275. R. pensilvanicus Poiret, C, clearing of low woods, 5b, U, M, L; 960B. R. phoenicolasius Maxim., O, edge of wooded ravine, 7, U, M, L; 166.

RUBIACEAE: Cephalanthus occidentalis L., C, wooded pond edge, 4, U, M, L; 422. Diodia teres Walter, A, sandy soil of roadside, 5a, U, M, L; 427. D. virginiana L., ditch by cultivated field, C, 5a, U, M, L; 365. Galium aparine L., C, open grassy field, 1, U, M, L; 65, 81. G. circaezans Michx., O, wooded ravine, 5a, U, M, L; 248B. G. obtusum Bigelow var. obtusum, C, swamp, 5e, U, M, L; 389, 494A, 581. G. obtusum var. filifolium (Wieg.) Fernald, C, freshwater marsh, 6c, U, M, L; 293. G. pilosum Aiton, C, powerline clearing, 5a, U, M, L; 287. G. triflorum Michx., C, streambank in low woods, 1, M, L; 386. Houstonia caerulea L., C, wooded roadside shoulder, 5a, U, M, L; 49. H. purpurea L., O, edge of wooded ravine, 5a, U, M, L; 178. Mitchella repens L., A, powerline clearing through mixed woods, 5a, U, M, L; 57, 207. \*Oldenlandia uniflora L., LC, grassy field at edge of salt marsh, 4, M, L; 727. \*Sherardia arvensis L., LC, roadside, 7, U, M, L; 156.

SALICACEAE: Populus alba L., O, roadside by churchyard, 7, U, M, L; 50. P. deltoides Marshall, O, near beach of Rappahannock R.,



5a, U, M, L; 485. \*\*Salix fragilis L., R, edge of swamp woods, 7, M, L; 259. S. nigra Marshall, C, low woods by stream, 5a, U, M, L; 984B.

SAURURACEAE: Saururus cernuus L., A, swamp woods, 5a, U, M, L; 257.

SAXIFRAGACEAE: Heuchera americana L., O, slope of calcareous ravine, 5a, U, M, L; 907. Hydrangea arborescens L., O, slope of mixed woods, 5a, U, M, L; 283, 440. Itea virginica L., C, by stream in low woods, 5e, U, M, L; 142, 216.

SCROPHULARIACEAE: Agalinis purpurea (L.) Pennell, O, moist cut-over field, 4, U, M, L; 689. Aureolaria virginica (L.) Pennell, O, edge of dry woods, 6a1, U, M, L; 265. Chelone glabra L., O, by stream in low woods, 5a, U, M, L; 795A, 874. \*C. obliqua L., LC, swamp woods, 5a, U, M; 676A. Gratiola neglecta Torrey, C, mucky soil in marsh, 3a, M, L; 993. \*G. pilosa Michx., O, seasonally inundated newly cut-over field, 5e, U, M, L; 453. G. virginiana L., O, mucky soil near Piankatank R., 5a, U, M, L; 966. Linaria canadensis (L.) Dumont, C, grassy roadside shoulder, 4, U, M, L; 70. Lindernia anagallidea (Michx.) Pennell, O, mucky soil in swamp, 4, U, M, L; 493, 1086. L. dubia (L.) Pennell, C, mucky soil in swamp, 4, U, M, L; 335. Mecardonia acuminata (Walter) Small, O, moist newly cut-over woods, 5c, M, L; 454. Mimulus alatus Aiton, O, by stream in low woods, 5a, U, M, L; 613. \*M. ringens L., R, freshwater marsh, 5a, U, M, L; 786. Paulownia tomentosa (Thunberg) Steudel, O, edge of overgrown lot, 7, U, M, L; 93. \*\*Pedicularis lanceolata Michx., O, swampy area of calcareous ravine, 5b, M, L; 778. Penstemon laevigatus Aiton, LC, edge of wooded

ravine, 6a, U, M, L; 245. Scrophularia marilandica L., R, wooded ravine near stream, 5a, M, L; 1091. Verbascum blattaria L., C, edge of cultivated field, 7, U, M, L; 198, 392. V. thapsus L., O, steep roadside bank, 7, U, M, L; 193. \*Veronica anagallis-aquatica L., R, swamp, 8, M, L; 492. V. arvensis L., C, grassy roadside shoulder, 7, U, M, L; 199. \*V. hederifolia L., LA, edge of road and overgrown lot, 7, U, M, L; 94. \*V. officinalis L., O, disturbed area, 7, U, M, L; 159. V. peregrina L., C, cultivated field, 4, U, M, L; 971, 986. \*V. persica Poiret, C, edge of cultivated field, 7, U, M, L; 23.

SIMAROUBACEAE: Ailanthus altissima (Miller) Swingle, C, roadside by low woods, 7, U, M, L; 413.

SOLANACEAE: \*Datura stramonium L., O, edge of cultivated field, 7, U, M, L; 309. \*Physalis heterophylla Nees, R, mesic woods, 5a, M, L; 1089. \*P. virginiana Mill. var. subglabrata (M. & B.) Water., O, thicket at edge of mixed woods, 5a, M, L; 1077. Solanum americanum Miller, O, disturbed open ground, 5a, U, M, L; 561. S. carolinense L., C, cultivated field, 5a, U, M, L; 209.

ULMACEAE: Celtis occidentalis L., O, thicket above Rappahannock R., 5a, U, M, L; 847. \*Ulmus americana L., O, swamp at bottom of calcareous ravine, 5a, M, L; 973. U. rubra Muhl., O, by stream in low woods, 5a, U, M, L; 858B.

URTICACEAE: Boehmeria cylindrica (L.) Swartz, C, swamp woods, 5a, U, M, L; 420, 443. \*Pilea fontana (Lunell) Rydberg, O, swamp, 5a, M, L; 701. P. pumila (L.) Gray, LC, by stream in wooded ravine, 5a, U, M, L; 675.

VALERIANACEAE: Valerianella locusta (L.) Latterade, C,



roadside at edge of cultivated field, 7, U, M, L; 12. V. radiata (L.) Dufur., C, roadside at edge of cultivated field, 5a, U, M, L; 91.

VERBENACEAE: Callicarpa americana L., R, edge of mixed woods, 4, U, M, L; 666. Verbena urticifolia L., O, moist newly cut-over field, 5a, U, M, L; 379.

VIOLACEAE: \*Viola arvensis Murray, LA, grassy roadside shoulder, 7, U, M, L; 15. \*V. conspersa Reichenbach, R, by stream at bottom of calcareous ravine, 5a, U, M, L; 935. V. cucullata Aiton, C, grassy roadside shoulder, 5a, U, M, L; 20, 893, 914. V. primulifolia L., O, near stream in low woods, 5a, U, M, L; 136. V. rafinesquii Greene, LA, grassy roadside shoulder, 5a, U, M, L; 892. \*V. sagittata Aiton, O, old road through mixed woods, 5a, U, M, L; 501B, 915. \*V. sororia Willd., R, cemetery near brick wall, 5b, M, L; 925.

VITACEAE: Parthenocissus quinquefolia (L.) Planchon, C, twining in tree near beach, 4, U, M, L; 396. Vitis aestivalis Michx., C, cut-over field, 5a, U, M, L; 748, 817. V. labrusca L., A, twining over trees in low woods, 6a1, U, M, L; 640. V. rotundifolia Michx., C, thicket at edge of salt marsh, 5c, U, M, L; 513. V. vulpina L., LA, old overgrown homesite, 5a, U, M, L; 223.

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