

Noteworthy Native Plant Collections from the Delmarva Peninsula

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In Robert Tatnall's publication, the *Flora of Delaware and the Eastern Shore* (1946) he states that "the Peninsula of Delaware, Maryland and Virginia is a natural geographic unit of exceptional interest botanically with a flora exceeding in variety most areas of like extent in the eastern United States."

Traditionally, the Delmarva Peninsula has been defined as an area composed of two separate physiographic provinces, the Piedmont of northern Cecil County, Maryland and northern New Castle County, Delaware, and the coastal plain of Delaware, the Eastern Shore of Maryland, and the Eastern Shore of Virginia (Tatnall 1946, Phillips 1978, Dill et al. 1987). For the purposes of this paper, and future research (McAvoy, in prep.), the Delmarva Peninsula is defined as an area lying entirely within one distinct physiographic province, the Atlantic coastal plain. Geologically, a peninsula is defined as a body of land surrounded by water and narrowly connected to a mainland (Hamblin 1985), the mainland in this case being the Piedmont of Cecil County, Maryland and New Castle County, Delaware. Major differences in soils, hydrology, and floristics are unquestionable between the Piedmont and coastal plain provinces; thus, the Delmarva Peninsula is defined here as one distinct geographic and ecological unit.

The Delmarva Peninsula lies south of the fall line (the boundary between the Appalachian Piedmont province and the Atlantic coastal plain) and is bordered on the east by the Delaware River, Delaware Bay and the Atlantic Ocean, and on the west by the Chesapeake Bay. Its length north to south is ca. 200 miles (320 km), its greatest width is ca. 70 miles (110 km), its narrowest width is ca. 10 miles (16 km), and total land area is ca. 5,800 square miles (15,000 km²; Dill et al. 1987). It includes the coastal plain province of the state of Delaware (three counties), the Eastern Shore of Maryland (nine counties), and the Eastern Shore of Virginia (two counties).

Nearly 2,400 species and varieties of native and naturalized vascular plants are known to occur on the Delmarva Peninsula (McAvoy, in prep.). Delmarva's flora has strong affinities to the Southeast; over 20% of species are at or near their northern limits of geographic distribution here (McAvoy, in prep.). The peninsula's rich species diversity is a result of the variety of habitat types, including sea-level fens, Atlantic white-cedar swamps, baldcypress swamps, coastal plain ponds, tidal and non-tidal rivers and streams, fresh, brackish and salt

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marshes, xeric sand-ridges, Delaware Bay and Chesapeake Bay estuaries, and the beaches, dunes and barrier islands of the Atlantic coast.

The following noteworthy native plant collections are contributions to an atlas of the flora of the Delmarva Peninsula which is now in progress (McAvoy, in prep.). Development of this atlas is intended to combine all information, both historical and modern, into one current and reliable document that will add to the overall knowledge of the distribution of coastal plain plant species in eastern North America and help to outline the phytogeography of the region.

Nomenclature for taxa listed in this paper generally follows Gleason and Cronquist (1991). Herbaria acronyms follow Holmgren et al. (1990). Delmarva and state record determinations were based primarily on literature reviews of Tatnall (1946), Reed (1964), Phillips (1978), Brown and Brown (1984), Harvill et al. (1992), Kolb (1991, 1994), and Redman (1995); data from the Natural Heritage Programs of Delaware, Maryland, and Virginia; and specimen searches at BALT, DOV, CHRB, FARM, MARY, ODV, PH, US, VPI, and WILLI.

Many of the collections discussed in this paper are currently housed in the reference herbarium of the Delaware Natural Heritage Program (DNHP) and will later be deposited at the Claude E. Phillips Herbarium (DOV) in Dover, Delaware (a new building to house this collection is currently under construction).

Several of the taxa listed in this paper were discovered by botanists other than myself, but have not been previously reported in the literature. I have gratefully received permission from these individuals to report on their findings. Two botanists of note, Frank Hirst and Ron Wilson, have made many significant discoveries on the Delmarva Peninsula and several of their more important collections are presented below.

Agalinis skinneriana (Wood) Britt. (SCROPHULARIACEAE)

Dorchester County, Maryland: abundant on moist to dry edge of sand road through clear-cut, in sun, south of Brookview, 28 August 1998, *McAvoy with F. Hirst and R. Wilson 4007* (NLU); same locality, 28 August 1998, *Hirst with W. McAvoy and R. Wilson 1203* (NLU).

These collections document a new addition to the flora of the Delmarva Peninsula and establish the eastern limit of its geographic distribution in North America. *A. skinneriana* is primarily a species of the central and south-central states and is considerably disjunct on Delmarva. This species is considered to be rare throughout its range with extant populations known from the Canadian province of Ontario and the states of Arkansas, Louisiana, Kansas, Michigan, Missouri, Ohio, Tennessee, Wisconsin, Kentucky, Illinois, Indiana, and Maryland (The Nature Conservancy 1999a). In Maryland, it is known from a single occurrence west of the Chesapeake Bay. These collections were initially identified as *A. setacea* (J. F. Gmelin) Raf., but were later determined as *A. skinneriana* by Dr. John Hays of Northeast Louisiana University (NLU).

Arctostaphylos uva-ursi (L.) Sprengel (ERICACEAE)

Sussex County, Delaware: medium-sized colony (ca. 10 × 10 m) on sand in a pitch pine-scrub community, adjacent to open dunes at Cape Henlopen State Park, 11 September 1997, *Clancy 4801* (DNHP); same locality, 29 September 1997, *McAvoy 3108 with K. Clancy* (DNHP).

This collection marks a southern range extension for the species on the Atlantic coastal plain and a new addition to the flora of the Delmarva Peninsula and the state of Delaware. Keith Clancy discovered this population growing in a semi-open pitch pine scrub community on Delaware's Atlantic coast, Cape Henlopen. On the coastal plain, it was

formerly known as far south as southern New Jersey (Gleason and Cronquist 1991). The southern extreme in eastern North America for *A. uva-ursi* is in the mountains of Page County, Virginia (Harvill et al. 1992). Its overall geographic distribution is circumboreal, from Labrador to Alaska, south to Virginia, northern Indiana, northern Illinois, New Mexico and California (Gleason and Cronquist 1991). The discovery of *A. uva-ursi* at Cape Henlopen State Park adds to a list of taxa from the park that are characteristic of the Pine Barrens of southern New Jersey. *A. uva-ursi* in the central Pine Barrens is "frequent" (Stone 1911) and "characteristic of the plains of the Pine Barrens" (Stone 1911). The dominant canopy tree of the sandy pine lands of Cape Henlopen is *Pinus rigida*. According to Stone (1911), *P. rigida* is "the Pine of the New Jersey Barrens." Two rare Delmarva species found growing in the pine lands of Cape Henlopen, *Minuartia caroliniana* (McAvoy 2455 DNHP) and *Hudsonia ericoides* (McAvoy 277 DNHP), occur nowhere else on the Delmarva Peninsula. *M. caroliniana* is "frequent" in the Pine Barrens of New Jersey (Stone 1911), "but not found elsewhere in the state" (Stone 1911). *H. ericoides* is "common" in the Pine Barrens (Stone 1911), and "reported" from Middlesex County, New Jersey (Stone 1911).

Arundinaria gigantea (Walt.) Muhl. (POACEAE)

Northampton County, Virginia: dense, pure stand (ca. 30 × 60 m.) on edge of small stream in swampy, bottomland woods, with *Pinus taeda* and *Nyssa biflora*, east of Townsend, 15 August 1996, McAvoy 1792 (DNHP, WILLI); Dorchester County, Maryland: non-tidal portion of floodplain swamp, with *Pinus taeda*, *P. serotina*, *Acer rubrum*, *Nyssa biflora*, *Clethra alnifolia* and *Magnolia virginiana*, west side of Marshyhope Creek south of Federalsburg, covering ca. 10 acres (4 ha) in size and dominating the understory, 23 July 1997, McAvoy 2695 (DNHP); same locality, 4 October 1997, McAvoy 3138 with Frank Hirst and Ron Wilson (DNHP).

The Northampton County, Virginia collection was the first documented, native occurrence of *Arundinaria gigantea* from the Delmarva Peninsula. An unconfirmed report was made of *A. gigantea* from a farm in Sussex County, Delaware in 1976, but its significance was not recognized at the time and as a result, a specimen was not made and locational data has been lost (Redman 1995; A. Tucker, pers. comm.). The second population discovered of *A. gigantea* on Delmarva from Dorchester County, Maryland, resembles the "canebrakes" of the southeastern coastal plain described by Platt and Brantley (1997). They note that the largest canebrakes once occurred in alluvial floodplains and covered "vast" and "extensive" areas (Platt and Brantley 1997). The overall geographic distribution for *A. gigantea* is primarily within the southeastern coastal plain and ranges from Maryland, south to Florida and to east Texas (Gleason and Cronquist 1991, Redman 1995). Redman (1995) reports the northernmost occurrence of *A. gigantea* to be in Baltimore County, Maryland on the Western Shore of the state.

Carex decomposita Muhl. (CYPERACEAE)

New Castle County, Delaware: restricted to *Carex stricta* tussocks, ca. 30 tussocks with 50 to 75 fruiting culms per tussock, seepage swamp at extreme western end of Noxontown Pond/Appoquinimink River, south of Middletown, with *Carex straminea* and *Sphenopholis pennsylvanica*, 3 June 1999, McAvoy 4363 (DNHP).

This discovery documents a new addition to the flora of Delmarva and the state of Delaware, and establishes the extant northeastern limit of its distribution in the United States. *C. decomposita* is primarily a southern sedge once ranging from New York to Michigan and south to northern Florida and west to eastern Texas (The Nature Conservancy 1999b). It is possibly extirpated from New York, Michigan and Maryland (The Nature

Conservancy 1999b). *C. decomposita* is considered to be globally rare by The Nature Conservancy. The common name for *C. decomposita* is "cypress-knee sedge," which is appropriate due to its occurrence on baldcypress knees and bases in the south (Weakley 1996). At this Delmarva station, baldcypress (*Taxodium distichum*) does not occur. As a result, *C. stricta* tussocks provide the necessary substrate for its establishment.

Carex grayi Carey (CYPERACEAE)

Kent County, Maryland: small patch (ca. 1.5 × 1.8 m) with many flowering culms in shady swamp near shoreline of bay, north of Copeland, 16 July 1996, *McAvoy 1671* (DNHP).

This species is uncommonly known from the coastal plain of Maryland's Western Shore, as well as from the Piedmont of Cecil County, Maryland (Maryland Natural Heritage Program), but this is the first collection of the species from Delmarva. With this collection, the entire section *Lupulinae* is now represented on the Delmarva Peninsula (*C. gigantea* Rudge *McAvoy 2007* DNHP, *C. grayi* Carey, *C. intumescens* Rudge *McAvoy 1060* DNHP, *C. louisianica* Bailey *McAvoy 1130* DNHP, *C. lupuliformis* Sartwell *McAvoy 1134* DNHP, and *C. lupulina* Muhl. *McAvoy 1297* DNHP). In the eastern United States, this sedge is known from Vermont, south to Georgia and west to Mississippi (Jones and Hatch 1990, Gleason and Cronquist 1991, Thomas and Allen 1993).

Desmodium fernaldii Schubert (FABACEAE)

Dorchester County, Maryland: sandy roadside east of Hurlock, 19 August 1995, *Wilson and Hirst 0819957* (personal herbarium); Worcester County, Maryland: dry roadside north of Pocomoke City, 14 October 1995, *Wilson and Hirst 1014951* (personal herbarium). Identifications confirmed by Duane Isely, Iowa State University (ISC).

These collections establish *Desmodium fernaldii* as a new addition to the flora of the Delmarva Peninsula and the state of Maryland, and mark a northern range extension for the species. Harvill et al. (1992) list *D. fernaldii* as being present on the peninsula from Accomack County, Virginia, but the specimen (at GMUF) on which this report is based was misidentified (Gary Fleming, pers. comm.). Frank Hirst and Ron Wilson first discovered this species in Dorchester County while doing survey work for the Maryland Natural Heritage Program, and then collected it again in Worcester County the same season. *D. fernaldii* is distributed on the coastal plain from southeastern Virginia, south to Florida (Isley 1990).

Echinodorus cordifolius (L.) Griseb. (ALISMATACEAE)

Caroline County, Maryland: abundant on bare, muddy shore of the Choptank River, north of Greensboro, 19 August 1995, *McAvoy 1247* with *J. Ebert and J. Holt* (DNHP); Northampton County, Virginia: abundant in seepy head of stream with an open canopy, south of Cape Charles City, 22 August 1997, *McAvoy 2883* (WILLI).

Janet Ebert and Jack Holt first discovered *Echinodorus cordifolius* in Caroline County, Maryland in 1995 which established a new addition to the flora of the Delmarva Peninsula. The Northampton County, Virginia collection is only the second known station for this species on the peninsula. *E. cordifolius* on Delmarva is near its northern limit of distribution in the eastern United States. Its overall geographic distribution is along the coastal plain from Maryland and Virginia south to Florida and west to Texas, and north in the interior to southern Indiana, Illinois, Missouri and Kansas and south to tropical America (Gleason and Cronquist 1991).

Euphorbia purpurea (Raf.) Fern. (EUPHORBIACEAE)

Kent County, Delaware: seepage area in swamp at the base of a rich wooded slope, north of Cheswold, 7 May 1997, *McAvoy 2131* (DNHP).

This collection represents a very rare coastal plain occurrence for the species, which is extant on the Atlantic coastal plain only on Delmarva and in southern New Jersey (Snyder 1986, Ostlie 1990). Associated species here include: *Caltha palustris*, *Solidago patula*, *Cornus racemosa*, *Sagittaria australis*, *Carex mitchelliana* and *Saxifraga pensylvanica*. *E. purpurea* is considered to be rare throughout its range (Ostlie 1990) and is extant in Pennsylvania, New Jersey, Maryland, Ohio, Virginia, West Virginia and North Carolina (Ostlie 1990), and historical in Alabama (Ostlie 1990). In Cecil County, Maryland, *E. purpurea* is extant on the fall line within a kilometer of the coastal plain (Maryland Natural Heritage Program). This species was thought to be extirpated in Delaware (McAvoy 1996) and was known from only a single collection in the Piedmont of New Castle County ("swamps west of Hockessin," 8 June 1881, *A. Commons s.n.*, PH).

Hierochloa odorata (L.) Beauv. (POACEAE)

Sussex County, Delaware: ecotone of scrub and high salt marsh on east end of Thompson Island in Rehoboth Bay, 11 May 1994, *McAvoy 544* (DNHP).

This is the first collection of this species from a native population on the Delmarva Peninsula. *Hierochloa odorata* is cultivated in herb gardens in the U.S., including Delaware (A. Tucker, pers. comm.), but its overall natural distribution in North America is Maine south to southern New Jersey, west through Pennsylvania, West Virginia and Indiana, and in the southwest to Arizona (Gleason and Cronquist 1991). It is also disjunct and rare in North Carolina where it occurs in high-elevation pastures and openings (Weakley 1996). The presence of *H. odorata* on the Delmarva Peninsula may be a result of it being dispersed here by native Americans. Native Americans consider *H. odorata* to be a sacred plant and it is used in ceremonies and carried in medicine bundles (Tantaquidgeon 1942, Moerman 1986, Duke 1986). Archeological studies on the island site where this collection was made have determined that native Americans utilized this area as early as eight to nine thousand years ago and continued up until the time of European contact (Blume 1992). Many ancient, native artifacts have been discovered here, as well as a small burial plot (Blume 1992). *H. odorata* has also been collected from west of the Chesapeake Bay in Maryland at Soldiers Delight Serpentine Barren in Baltimore County (*Farley & Monteferrante 485* BALT; Maryland Natural Heritage Program).

Hydrastis canadensis L. (HYDRASTIDACEAE)

New Castle County, Delaware: a population of over 100 plants in a rich woods pocket west of Blackbird, 26 July 1995, *McAvoy 1172* (DNHP).

This Delmarva collection represents a very rare coastal plain occurrence for the species. *Hydrastis canadensis* is primarily restricted to deep, rich woods of the mountains and Piedmont (Gleason and Cronquist 1991). In the Piedmont province of Delaware, *H. canadensis* is fairly frequent with at least 50 known occurrences (Delaware Natural Heritage Program). *H. canadensis* is historical from the coastal plain of New Jersey and represented by a single collection (David Snyder, pers. comm.; "near Camden," 1852, *J.J. Seal s.n.* PH). In Mississippi, there are two extant occurrences of *H. canadensis*, both on the "upper coastal plain" (Ken Gordon, pers. comm.). Based on herbaria searches and a review of the literature, this collection and the two occurrences from the coastal plain of Mississippi may be the only extant populations for this species from the southeastern coastal plain. Habitat for the New

Castle County population is a "rich woods pocket", which is an uncommon habitat type for the coastal plain of Delmarva. This habitat type contains moist, dark loamy soils that often support a flora that is more typically found in the Piedmont. Also found growing with *H. canadensis* at this site is *Panax quinquefolius* (first collected on Delmarva from Cecil County, Maryland, 6 August 1938, *L.R. Holmes s.n.*, PH), which is another rare coastal plain occurrence for a species that is more typically found within the Piedmont and mountain physiographic provinces. *H. canadensis* is rare to uncommon throughout its range, which is from Vermont to Michigan and Minnesota, south to Georgia, Alabama, Mississippi, and Arkansas (Fernald 1950, Duncan and Kartesz 1981, Gleason and Cronquist 1991).

Lilium canadense L. (LILIACEAE)

Talbot County, Maryland: one small patch with several stems that have been browsed by deer, on a rich wooded slope, northeast of Trappe, 30 May 1996, *McAvoy 2068* (DNHP); Kent County, Delaware: abundant in a rich-woods east of Smyrna, 7 May 1996, *McAvoy 1429* (DNHP).

These two collections are rediscoveries of rare coastal plain populations on the Delmarva Peninsula. Elizabeth Earle first collected *Lilium canadense* from Talbot County, Maryland in 1949 from "woods 3 miles NE of Trappe" (2765 PH). Albert Commons first discovered *L. canadense* in Kent County, Delaware from "woods, Woodland Beach" in 1898 (*s.n.* PH) and it was later collected in 1932 from the same locality by Robert Tatnall (1461 PH). Both of these sites remained unexplored until rediscovered in 1996. Many of the associated species common to both sites are more typical of the Piedmont (e.g. *Cardamine concatenata*, *Agrimonia gryposepala*, *Geranium maculatum*, *Uvularia perfoliata*, *Sanguinaria canadensis*, *Osmorbiza longistylis*, *Collinsonia canadensis*, *Cimicifuga racemosa*, and *Phegopteris hexagonoptera*). In addition to the previously mentioned species, other typical Piedmont taxa that occur at the Kent County, Delaware site include *Sanicula gregaria*, *Aquilegia canadensis* and *Thalictrum revolutum*, and at the Talbot County, Maryland site, *Panax quinquefolius*, *Adiantum pedatum*, *Galearis spectabilis*, *Cynoglossum virginianum*, and *Hepatica nobilis* var. *obtusata*. The overall geographic distribution of *L. canadense* is primarily in the mountains and Piedmont, and ranges from Maine to Maryland and Virginia, west to Ohio, Kentucky, Indiana and Alabama (Gleason and Cronquist 1991). *L. canadense* is also known from the coastal plain of New Jersey (David Snyder, pers. comm.; Dr. David Fairbrothers, pers. comm.). Based on herbaria searches and a review of the literature, it appears that on the Atlantic coastal plain, *L. canadense* may only be known from the Delmarva Peninsula and southern New Jersey.

Liparis loeselii (L.) L.C. Rich. (ORCHIDACEAE)

Worcester County, Maryland: scattered and infrequent in swampy woods adjacent to a salt marsh, southeast of Stockton, 12 September 1993, *Hirst 824* (personal herbarium).

This discovery by Frank Hirst and Ron Wilson marks a first for the Delmarva Peninsula. Habitat here is a swampy woods that receives ground water seepage from the adjacent uplands and is ca. 15 m from the edge of a *Spartina alterniflora* marsh (personal observation made by the author while visiting the site with Hirst and Wilson in 1996 when five flowering plants of *L. loeselii* were observed and photographed [DNHP]). The canopy is composed of *Pinus taeda* and *Acer rubrum* with *Myrica cerifera* in the understory. In the description that Luer (1975) gives for *L. loeselii*, he states that "it shuns acid situations, preferring alkaline ones instead." High tides from the adjacent salt marsh at this site may be influencing soil chemistry to the point where conditions are suitable to support *L. loeselii* (R. Wilson, pers. comm.). *L. loeselii* is only known on the coastal plain from Cape Cod,

Massachusetts, southern New Jersey, Delmarva and southeast Virginia (Stone 1911, Svenson and Pyle 1979, Gleason and Cronquist 1991, Harvill et. al 1992). Its overall distribution is Nova Scotia, Quebec, Manitoba, Maine, south to North Carolina and Tennessee in the mountains, and Ohio, Indiana and Michigan (Gleason and Cronquist 1991).

Ludwigia leptocarpa (Nutt.) H. Hara (ONAGRACEAE)

Wicomico County, Maryland: seven robust plants were observed in a fresh tidal marsh of Pemberton Historical Park, southwest of Salisbury, 26 October 1996, *Wilson 1026961* (personal herbarium); same locality, 31 October 1996, *McAvoy with F. Hirst 2041* (DNHP).

This collection establishes a new northern coastal plain extension (*L. leptocarpa* occurs further north than Wicomico County, Maryland in the Piedmont in Virginia [Harvill et. al. 1992]) and a new addition to the flora of the Delmarva Peninsula, as well as the state of Maryland. It was first discovered and collected at this site by John Dennis of Princess Anne, Maryland in October of 1996 and was identified by Ron Wilson (pers. comm.). Habitat here is somewhat artificial; a tidal emergent marsh has developed after creation of a power-line cut across the Wicomico River and a nature trail and boardwalk run along the edge of the marsh. Despite the origin of this site and habitat, I feel that this population is native and future survey work of the surrounding natural wetlands may uncover additional populations. The overall geographic distribution of *L. leptocarpa* is from Virginia, south to Florida and west to Texas, and in the interior to southeast Missouri and southern Illinois (Gleason and Cronquist 1991). In 1865, a single collection was made of *L. leptocarpa* on "ballast ground" from Philadelphia County, Pennsylvania, but is not considered to be part of the state's native flora (Rhoads and Klein 1993).

Mitella diphylla L. (SAXIFRAGACEAE)

Kent County, Delaware: ten flowering plants observed in filtered sun in a rich-woods pocket northwest of Cheswold, 8 May 1996, *McAvoy 1419* (DNHP).

This collection from Delmarva represents a very rare Atlantic coastal plain occurrence. *M. diphylla* is known on the coastal plain only from Delmarva (Kent County, Delaware), Charles City County, Virginia (Ware and Ware 1992), Calvert County, Maryland (*McAvoy 435*, DNHP), and Ocean County, New Jersey (D. Snyder, pers. comm.; "Low ground, not common, New Egypt," 29 April 1905, *J. Grove s.n.*, PH; "rich wooded slope along Crosswicks Creek, ca. 1 mile NNW of New Egypt," 20 November 1947, *B. Long 66832*, PH). Habitat at this collection site is an isolated rich-woods pocket at the base of a moderate slope adjacent to a small stream. Co-occurring at this site are *Solidago flexicaulis* and *Trillium cernuum*, as well as other species that are more typical of the Piedmont, such as *Cardamine concatenata*, *Sanicula gregaria* and *Osmorhiza longistylis*. The overall geographic distribution of *M. diphylla* is from the Piedmont and mountains of the New England states, south to Virginia, the Carolinas, Georgia and Missouri (Gleason and Cronquist 1991, Weakley 1996).

Rhynchospora filifolia A. Gray (CYPERACEAE)

Sussex County, Delaware: abundant on edge of seasonal, wetland depression (coastal plain pond), southwest of Bethany Beach, 10 August 1984, *Hirst 435* (personal herbarium), confirmed by Richard LeBlond; same locality, 22 October 1992, *McAvoy 242* (DNHP).

This collection, made by Frank Hirst while doing a botanical survey of coastal plain seasonal ponds on Delmarva, was the first documentation for the species on the peninsula and fills in the distributional gap between Virginia and southern New Jersey. Frank also made collections that he labeled as *Rhynchospora filifolia* from two other Sussex County,

Delaware sites, as well as one site from Worcester County, Maryland. North Carolina botanist Richard LeBlond visited one of Frank's stations for *R. filifolia* and determined it to actually be *R. harperi* (Richard LeBlond, pers. comm.). He also examined specimens from Hirst's other three stations for *R. filifolia* and all but one (from the above mentioned site) were *R. harperi* (Richard LeBlond, pers. comm.). Richard discusses the distribution of *R. harperi* in *Castanea* 62(4): 278-280, December 1997. Albert Commons, in 1899, made a collection from Sussex County, Delaware that he labeled *R. axillaris* (Lam.) Britt. (= *R. cephalantha* A. Gray var. *cephalantha*). This specimen ("along rail road tracks, east of Ellendale," 17 August 1899, *A. Commons s.n.*, PH) was later annotated as *R. filifolia* by Dr. Shirley Gale in 1941 and included in her 1944 publication on *Rhynchospora* (Gale 1944). Shortly after the identification and confirmation of *R. harperi* on the Delmarva Peninsula by Richard LeBlond, I examined the A. Commons specimen at PH and annotated it as *R. harperi* based on spikelet length and achene features. Therefore, the Frank Hirst collection of *R. filifolia* is the first documentation of this species from the Delmarva Peninsula. *R. filifolia* occurs on the coastal plain from southern New Jersey, south to Florida and west to east Texas (Kral 1996).

Rhynchospora inexpansa (Michx.) Vahl (CYPERACEAE)

Sussex County, Delaware: 100 to 500 fruiting culms scattered on the north edge of power-line cut on moist ground, north of Dagsboro, 16 August 1996, *McAvoy 1858* (DNHP).

This collection establishes a new northern range extension for this southeastern coastal plain sedge and documents its northernmost extreme in North America. *Rhynchospora inexpansa* was first collected on the Delmarva Peninsula in 1935 by Fernald in Northampton County, Virginia ("wet depression in pine woods, south of Townsend," 14 October 1935, *M.L. Fernald, B. Long and Fogg 5246*, PH) and again from the same locality by R. Tatnall in 1936 (18 October 1936, *R. Tatnall 3216*, DOV). The site where Fernald and Tatnall made their collections appears to have been destroyed, but I collected *R. inexpansa* from moist swales in a loblolly pine woods due east of Townsend in 1996 (*McAvoy 1794*, DNHP). After the Northampton County collection, I then discovered *R. inexpansa* that same season in Sussex County, Delaware ca. 120 miles (190 km) north from the Northampton County population. The overall geographic distribution of *R. inexpansa* is chiefly on the coastal plain, from southeast Virginia south to Florida, and west to east Texas and Arkansas (Gleason and Cronquist 1991).

Saxifraga pensylvanica L. (SAXIFRAGACEAE)

Kent County, Delaware: seepage area in swamp at base of a rich wooded slope, north of Cheswold, 7 May 1997, *McAvoy 2132* (DNHP).

This Delmarva collection documents a rare occurrence for the species on the Atlantic coastal plain. The overall geographic distribution of *Saxifraga pensylvanica* is primarily within the Piedmont and mountains, from Maine to Minnesota, south to North Carolina and Missouri (Gleason and Cronquist 1991). *S. pensylvanica* infrequently occurs on the coastal plain of Cape Cod, Massachusetts (Svenson and Pyle 1979), southern New Jersey (Stone 1911), and southeastern Virginia (Harvill et al. 1992). Associated species include: *Caltha palustris*, *Solidago patula*, *Cornus racemosa*, *Carex mitchelliana*, *Sagittaria australis* and *Euphorbia purpurea*. In the Piedmont of New Castle County, Delaware, *S. pensylvanica* was last collected in 1937 ("2.1 miles north of Rockland, margin of streamlet in rocky woods," 26 May 1937, *R. Tatnall 2936*, PH).

Sideroxylon lycioides L. [*Bumelia lycioides* (L.) Pers.] (SAPOTACEAE)

Accomack County, Virginia: small population in semi-opening of mesic woods, south of Middlesex, with *Viburnum prunifolium*, *Cornus florida*, and *Polystichum acrostichoides*, September 26 1997, McAvoy 3073 (WILLI), determined by Gary Fleming, Virginia Natural Heritage Program; Sussex County, Delaware: large, widely scattered population in a thin, sandy mesic woods at Cape Henlopen State Park, 8 October 1997, McAvoy 3175 (DNHP).

The Accomack County collection was the first documented and verified occurrence of *Sideroxylon lycioides* on the Delmarva Peninsula. *S. lycioides* was seen in 1975 at Cape Henlopen State Park, Sussex County, Delaware and reported by Fleming (1978), but a voucher specimen was not made and the report was never confirmed. The Cape Henlopen State Park collection verifies Fleming's report and documents the northern extreme for the species in North America. Its overall geographic distribution is from southern Virginia south to Florida and east to Texas, southern Indiana and southern Missouri (Gleason and Cronquist 1991).

Silphium trifoliatum L. var. *trifoliatum* (ASTERACEAE)

Accomack County, Virginia: border of mixed oak flatwoods along road east of AEGIS facility, 1.25 miles (2.0 km) east-southeast of Wattsville, one large colony, 8 September 1994, G.P. Fleming 9851 (GMUF, WILLI); Accomack County, Virginia: abundant on power-line east of Wattsville, 19 August 1997, McAvoy 2841 (WILLI).

Gary Fleming's collection in 1994 marked a new addition to the flora of the Delmarva Peninsula. The collection was made from a site with a unique assemblage of species for the coastal plain, such as *Aster patens* (McAvoy 3016 WILLI), *Prenanthes serpentaria* (McAvoy 3020 DNHP), *Vernonia glauca* (McAvoy 3039 WILLI), *Solidago juncea* (McAvoy 2941 DNHP), *Eupatorium aromaticum* (McAvoy 3019 WILLI), *Eupatorium godfreyanum* (McAvoy 2849 DNHP), *Verbesina virginica* (McAvoy 3038 WILLI), *Cacalia atriplicifolia* (McAvoy 2842 DNHP), *Matelea carolinensis* (McAvoy 2847 WILLI), *Ruellia caroliniensis* (McAvoy 2846 DNHP), *Anemone virginiana* (McAvoy 2843 DNHP), *Pycnanthemum incanum* (McAvoy 2848 DNHP), *Aristolochia serpentaria* (McAvoy 2854 WILLI), and *Sanguinaria canadensis* (McAvoy 2926 DNHP). The overall geographic distribution of this typical northern variety of *S. trifoliatum* is southeastern Pennsylvania to Ohio and Indiana, south to Virginia and in the mountains to Georgia (Cronquist 1980). *S. trifoliatum* var. *trifoliatum* on Delmarva is a rare coastal plain occurrence. The literature suggests that on the Atlantic coastal plain, *S. trifoliatum* occurs only in southeastern Virginia and on the Delmarva Peninsula (Cronquist 1980, Duncan and Kartesz 1981, Brown and Brown 1984, Gleason and Cronquist 1991, Harvill et al. 1992). The southern variety, var. *latifolium* A. Gray, is found on the Atlantic coastal plain of North Carolina and the Gulf coastal plain of Alabama and Mississippi (Cronquist 1980).

Solidago flexicaulis L. (ASTERACEAE)

Kent County, Delaware: abundant in a rich woods pocket northwest of Cheswold, 11 September 1996, McAvoy 1919 (DNHP).

Prior to this discovery, *Solidago flexicaulis* was only known on the Atlantic coastal plain from southern New Jersey (Stone 1911; D. Snyder, pers. comm.) and southeastern Virginia (Harvill et al. 1992; Gary Fleming, pers. comm.). In Virginia, *S. flexicaulis* is "extremely rare and local on the coastal plain" and is "isolated in sheltered, north facing calcareous ravines" (G. Fleming, pers. comm.). Co-occurring at this collection site are *Mitella diphylla* and *Trillium cernuum*. The overall geographic distribution of *S. flexicaulis* is primarily in the

Piedmont and mountains, ranging from Nova Scotia and New Brunswick to North Dakota, south to Virginia, Kentucky, Tennessee and Missouri and in the mountains to North Carolina, Georgia and Arkansas (Cronquist 1980).

Solidago tarda Mackenzie (ASTERACEAE)

Sussex County, Delaware: dry sandy roadside, southwest of Kings Crossroads, 1 October 1990, *Hirst 1023* (personal herbarium); same locality, 13 October 1995, *McAvoy 1329* (DNHP); Worcester County, Maryland: dry sandy power-line cut northwest of Snow Hill, 21 October 1994, *Wilson 1001941* (personal herbarium); Wicomico County, Maryland: southwest of Mardela, 9 October 1996, *Hirst and Wilson 1185* (personal herbarium).

The Delaware collection marks the first report of this taxon from the state and the Maryland collections are new county and Eastern Shore records. *Solidago tarda* was first collected on the Delmarva Peninsula by Fernald ("dry pine-woods NW of Oyster," 14 October 1935, *M.L. Fernald, B. Long and Fogg 5512* PH) from Northampton County, Virginia and was first collected in Maryland from the Piedmont in Cecil County by Bayard Long "barrens, Bald Friar," 17 October 1913, *B. Long s.n.*, PH). Both of these collections were labeled *S. ludoviciana* (A. Gray) Small, but this name was misapplied and both specimens have been annotated as *S. tarda* by the author. *S. ludoviciana* and *S. tarda*, both within the *Solidago arguta* complex, are distinct entities (Cronquist 1980; Gleason and Cronquist 1991; Dr. J. Semple, pers. comm.), with *S. ludoviciana* having a distribution in Louisiana, Arkansas and Texas (Cronquist 1980; Gleason and Cronquist 1991). The overall geographic distribution of *S. tarda* is primarily coastal plain from southern New Jersey and southeastern Pennsylvania, south to northern Florida and Alabama (Cronquist 1980, Gleason and Cronquist 1991).

Staphylea trifolia L. (STAPHYLEACEAE)

Talbot County, Maryland: small grove of ca. 25 plants on moist ground near stream, Three Bridges Branch, northeast of Longwoods, 16 June 1998, *McAvoy 3628* (DNHP); Queen Anne's County, Maryland: rich seepage swamp on Reed Creek, southwest of Centerville, 3 June 1999, *McAvoy 4370* (DNHP).

These collections represent rare coastal plain occurrences of a species that is primarily found in the Piedmont, with infrequent inner coastal plain occurrences in southern New Jersey south to Georgia (Stone 1911, Radford et al. 1968, Duncan and Kartesz 1981, Brown and Brown 1984, Duncan and Duncan 1988, Harvill et al. 1992, Weakley 1996). Small (1933), notes that *S. trifolia* occurs in "various provinces, but rarely on the coastal plain." *S. trifolia* is disjunct in Liberty County, Florida and is considered endangered in the state (Clewell 1985). The overall geographic distribution of *S. trifolia* is from southern Quebec to Minnesota, south to Georgia, western Florida and Oklahoma (Gleason and Cronquist 1991).

Thalictrum revolutum DC. (RANUNCULACEAE)

Kent County, Delaware: rich woods east of Smyrna, 20 June 1996, *McAvoy 1556* (DNHP).

This rare coastal plain collection was made from a large, widely scattered population in a rich woods pocket immediately adjacent to a *Spartina alterniflora* marsh of the Delaware Bay. Albert Commons collected *Lilium canadense* from this very site in 1898 as did Robert Tatnall in 1932 (see *Lilium canadense* discussion above). It is surprising that both of these outstanding field botanists could miss this plant. Based on the size of the population, it must have established itself prior to A. Commons's day (1898). The overall geographic distribution of *Thalictrum revolutum* is from Massachusetts south to Florida and Arkansas (Gleason and

Cronquist 1991). *T. revolutum* also occurs in the Piedmont in New Castle County, Delaware where it is considered to be rare (Holt and Ebert 1994; Delaware Natural Heritage Program).

Trillium cernuum L. (LILIACEAE)

Kent County, Delaware: rich woods (of the coastal plain), 15 to 20 non-flowering plants, northwest of Cheswold, 8 May 1996, *McAvoy* 2082 (DNHP), determination by Tom Patrick, Georgia Natural Heritage Program; same locality, 7 May 1997, *McAvoy* 2128 (DNHP); Kent County, Delaware: rich wooded slope west of Cheswold, 13 May 1997, *McAvoy* 2167 (DNHP).

These collections document very rare coastal plain occurrences at the southeastern limit of the species range. *Trillium cernuum* is primarily a plant of the Piedmont and mountain provinces with rare coastal plain occurrences on Cape Cod, Massachusetts (Svenson and Pyle 1979), several counties on Long Island, New York (Steve Young, pers. comm.), and in southern New Jersey (Stone 1911). The first discovery and collection in 1996 was made from a small, sterile population and was identified (based on vegetative characters and habitat) by Tom Patrick, a noted *Trillium* expert. This population was revisited in the spring of 1997 and was found to be flowering, thus confirming Tom Patrick's determination. A field search in other areas within the same drainage where the first population was discovered proved to be fruitful. A second station was discovered in 1997 approximately 3.5 miles west of the first. The overall geographic distribution of *T. cernuum* is Newfoundland and Quebec, south to Maryland (in the Piedmont and mountains, Brown and Brown 1984), the Piedmont of Delaware (Gleason and Cronquist 1991, Delaware Natural Heritage Program), and in the mountains of Virginia (Harvill et al. 1992).

Trillium grandiflorum (Michx.) Salisb. (LILIACEAE)

Cecil County, Maryland: abundant in rich, moist woods on south bank of Great Bohemia Creek, Middle Neck, 3 May 1995, *McAvoy* 979 (DNHP); Cecil County, Maryland: frequent, scattered throughout rich, moist woods, Little Bohemia Creek, northeast of Cecilton, 12 May 1995, *McAvoy* 1010 (DNHP); Kent County, Maryland: abundant on rich, steep wooded slopes of ravine, Woodland Creek, west of Galena, 6 May 1998, *McAvoy* 3371 (DNHP).

The Cecil County collections represent rediscoveries of very rare coastal plain populations. The Kent County collection is new to the county and expands its Delmarva distribution further south. In 1928, Hugh Stone first documented *T. grandiflorum* on the peninsula from Cecil County, in the Great Bohemia Creek, Middle Neck area ("rocky wood, Middle Neck," 1928, *H. Stone s.n.*, PH). Robert Tatnall collected it from the same locality in 1929 ("woods bordering Great Bohemia Creek," 5 May 1929, *R. Tatnall* 251, PH) and again in 1932, 1933, and 1936 (A. Tucker, pers. comm.). Bayard Long also made a collection from the same locality in 1932 ("moist, sandy loam, wooded slope along Great Bohemia Creek, Middle Neck," 7 May 1932, *B. Long* 37271, PH). A final collection was made by Edgar Wherry in 1941 ("wooded slopes of first large ravine back from point on north side of Middle Neck," 23 July 1941, *E. Wherry s.n.*, PH). The second Cecil County site, on the Little Bohemia Creek, may have been visited first by Robert Tatnall in 1937. A Tatnall specimen of *T. grandiflorum* from this site has not been seen, but in his *Flora of Delaware and the Eastern Shore* (1946) he cites two colonies in Cecil County, Maryland; one was Middle Neck (listed above) and the other was "n.e. of Cecilton." My collection from Little Bohemia Creek is exactly 2.5 miles (4.0 km) northeast of Cecilton where Tatnall collected *Cypripedium pubescens* ("rich woods, estate of R.R.M. Carpenter, 2.5 miles ne by n of Cecilton, 9 plants were seen in bloom," 13 May 1937, *R. Tatnall* 3286, PH). Due to its

abundance, Tatnall could not have missed the *Trillium grandiflorum* at this site while he was collecting *C. pubescens*. These collections of *T. grandiflorum* may be the only known Atlantic coastal plain occurrences for the species (Tom Patrick, pers. comm.). The overall natural geographic distribution of *T. grandiflorum* is in the Piedmont and mountains from Quebec, Maine and Minnesota, south to Pennsylvania, Ohio, northern Georgia and northeastern Alabama (Gleason and Cronquist 1991).

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