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BARTONIA

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Since its founding in 1891, the Philadelphia Botanical Club has offered outstanding programs, field trips, and other opportunities for those with an interest in plants to meet and exchange information. Monthly meetings (www.acnatsci.org/hosted/botany_club/meeting.html) feature speakers from various botanical backgrounds. They are held at 7:30 p.m. on the fourth Thursday of the month in September, October, and January through May and the third Thursday in November and December, usually at the Marvin Comisky Conference Center, One Logan Square (one block east of the Academy of Natural Sciences of Philadelphia). From April to October, expert field botanists lead field trips in the mid-Atlantic region and occasionally elsewhere in North America or overseas (www.acnatsci.org/hosted/botany_club/field_trips.html).

Bartonia, in publication since 1909, was named for William P. C. Barton (1786-1856), Professor of Botany at the University of Pennsylvania and author of the first local flora (1818), *Compendium Florae Philadelphicae* (and nephew of physician and botanist Benjamin Smith Barton, who was a mentor of the explorer Meriwether Lewis). The journal began as an annual abstract of the Club's proceedings with short articles on the plants of the Philadelphia area. Its scope has broadened to encompass original research in plant systematics, plant ecology, and plant conservation biology with articles on floristics, distribution, methods, biography, bibliography, history of botanical exploration, and other topics of botanical interest ranging throughout—and well beyond—the mid-Atlantic region.

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The Pollination Biology of *Sarracenia alata* Wood (Sarraceniaceae) in Louisiana

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ABSTRACT. Flowers of *Sarracenia alata* are not protandrous, confirmed by benzidine staining of stigmas for receptivity. *Bombus bimaculatus* is the primary pollinator in Louisiana, and the flowers are adapted to scrape adherent pollen from the dorsal wing surfaces as well as the thoracic and abdominal pile. The unique structure of the flower suggests adaptation for pollination when the bee exits the flower rather than enters, arguing for self-pollination rather than xenogamy.

INTRODUCTION

Sarracenia is a North American genus of moisture-loving perennial herbs with rhizomatous roots and leaves modified for trapping and digesting insects; hence the plants are referred to as carnivorous. Two types of leaves may be produced: hollow tubular leaves (trap leaves or pitchers), which may be erect or decumbent depending on species, and flat, sword-shaped leaves (phyllodia), which appear in some species early or late in the growing season or in response to soil nutrient enrichment (Schnell 2002). The ability to trap and digest prey allows these plants to grow in nutrient-poor soils.

The genus *Sarracenia* includes eight recognized species (*S. alata* Wood, *S. flava* L., *S. leucophylla* Raf., *S. minor* Walt., *S. oreophila* (Kearney) Wherry, *S. psittacina* Michx., *S. purpurea* L., *S. rubra* Walt.) and two to three subspecies (*S. purpurea* ssp. *venosa* [Raf.] Wherry var. *burkii* Schnell, *S. rubra* ssp. *alabamensis* [F.W. & R.B. Case] Schnell, *S. rubra* ssp. *jonesii* [Wherry] Wherry) considered by some to deserve species ranking. Of these, only two, *S. purpurea* and *S. flava*, have had studies conducted of their pollination biology, at various levels of detail (Burr 1979; Mandossian 1965; Schnell 1983).

Numerous authors have described the flowers of *Sarracenia* (Correll and Johnston 1979; Gleason and Cronquist 1991; Radford et al. 1968; Rhoads and Block 2000; Schnell 1978b; Small 1933). Briefly, *Sarracenia* have solitary nodding flowers at the end of long, naked, erect scapes. Robust plants may have one to three flowers; one flower per plant is typical. Plants typically bloom prior to the opening of the trap leaves, although it is not unusual to find some receptive flowers along with functioning traps. *Sarracenia alata* scapes are about as long as the leaves, with the flowers situated near the level of the mouths of the traps. The nodding flowers are perfect, with three appressed and persistent bracts. The bracts vary from green to reddish in color. The calyx is composed of five persistent sepals, broadly ovate to rhombic-ovate, 4 to 5 cm long to 4 cm wide, widest near their base and tapering toward the

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bluntly obtuse apex. The cleistopetalous corolla is composed of five pendant and deciduous petals. The petals are incurved, panduriform, and 5 to 6 cm long. The 2-cm long basal portion is rhombic-obovate and narrower than the rhombic-ovate 4-cm wide, broadly rounded apex. Petal bases overlap and the margins of the petals roll slightly outward at the constriction where the petals pass between the style rays. Petal color is typically greenish-yellow, but can range from white to a red blush, and the petal apex may be deeply cleft rather than rounded (Schnell 1978b; Bodri and Gaspard 2004). After 10 to 14 days the petals dry and fall off. The odor for the majority of species, including *S. alata*, has been described as "feline" (Schnell 1978b).

Numerous stamens, with short filaments and versatile, introrse anthers, surround the large subglobose superior ovary. The anthers are two-locular and dehisce longitudinally, spilling the pollen onto the modified style. Pollen grains of *S. purpurea* are barrel-shaped with three or four grooves visible from pole to pole, while five to eight grooves are visible in the polar view. The grains lack germinal pores (Mandossian 1965). Pollen development is similar among the different species (Nichols 1908). As pollen falls from the anther to the floor of the floral cavity, or as nectar drips onto already fallen pollen, it gets coated with nectar and becomes sticky (Schnell 1978a).

The gynoecium consists of five united carpels with numerous ovules on the axile. Nectar glands, appearing as tiny tubercles, are found within the skin of the ovary but are more numerous near the base of the petals. The style is simple and slender at the base but expanded up to 8 cm above into a style disc of five membranaceous rays connected by tissue forming a persistent, convex, umbrella-shaped body (which we will refer to later as the "umbraculum"). Each ray is singly notched at the apex, with a 1.5 to 2-mm simple, hooked stigma at the base of each notch. The stigma is dry but villous. Schnell (1983) described three zones in the *S. flava* style ray: a pyramidal basilar portion; a short cylindrical column; and the stigma tip or knob. The flowers of *S. flava* are protogynous (Schnell 1978a, 1983).

Burr (1979) and Mandossian (1965), studying different northern populations of *S. purpurea*, and Schnell (1983) studying *S. flava* in North Carolina, have all reported the primary pollinator as bumblebees (*Bombus* spp.). Variations in flower size of the different species, particularly the smaller flowers of *S. minor*, *S. psittacina* and *S. rubra*, could certainly influence the species of pollinators able to enter the flower chamber. The lack of data regarding the pollination ecology of *Sarracenia* in general prompted this study. Being the only Gulf Coast species west of the Mississippi, inland populations of *S. alata* in eastern Texas and western Louisiana are geographically isolated from every other species of pitcher plant in North America and therefore are arguably the best model for pollination biology studies of this genus. Our purpose in this study is to provide the first detailed description of pollination in *S. alata*, infer how our findings may relate to the mating system of the species, and develop hypotheses that will serve as a foundation for future studies.

Methods

We monitored the study site over two years, beginning in early March, 2004 and 2005. Field observations began on 4 April 2004 during the height of anthesis, continuing daily for two weeks with subsequent visits at weekly intervals until late May. In 2005, field observations began 9 April, with weekly visits terminating in mid-June. Temperature, relative humidity and light levels were determined throughout the day. Weather conditions varied from clear and sunny to cool, with drizzle or rain showers. Data collection included two twilight-

to-dark and two dark-to-twilight periods to maximize detection of crepuscular or nocturnal species of pollinators.

We observed floral visitations in the field during both blooming seasons. Possible pollinators were identified by observation of flowers and subsequent identification of flower visitors. Because all possible pollinators observed were insects, select individuals, primarily bumblebees (*Bombus* spp.) and honeybees (*Apis mellifera*), were followed and the number of flowers visited, as well as duration of visit per flower, were monitored and recorded until the insect departed the study site or was lost to tracking. Of the bees monitored, voucher specimens were collected for species determination, collection of pollen from the wings, pile and corbiculae, and morphometrics.

Bee morphometrics were based on measurements determined with an electronic digital Vernier caliper to establish mean thorax length (mm), width (mm) and dorsal-ventral thickness (mm) ($N = 20$) and mean abdominal length (mm), width (mm), and dorsal-ventral thickness (mm) ($N = 20$). All *Bombus* spp. and *A. mellifera* were collected over five visits, four individuals per visit, during the first field season. Other potential pollinators were collected as encountered.

The pollen-carrying ability of the two species of bees was examined by direct observation under a dissecting microscope and selectively brushing the wings and the thoracic and abdominal pile onto a thin film of silicon grease smeared on a glass slide. Pollen slides were flooded with Calberla's stain prior to microscopic examination. Corbiculae were emptied onto slides and prepared for examination in a similar fashion. Pollen collected directly from anthers was used for comparison purposes.

During the initial two-week flowering period of 2004, flower measurements were made either in the field or on freshly collected material returned to the laboratory. Flower morphometrics were based on measurements determined with an electronic digital vernier caliper to establish mean distance (mm) between style rays at the level of petal constriction ($N = 50$ flowers from 50 different plants, 250 distances total); mean width (mm) of petals at the level of the petal constriction ($N = 50$ flowers from 50 different plants, 250 widths total); mean height (mm) from the petal constriction (which creates a flat platform) to the sepal ($N = 50$ flowers from 50 different plants, 250 heights total); mean width (mm) of style ray at the level of petal constriction ($N = 43$ flowers from 43 different plants, 215 widths total); mean distance (mm) from anthers to umbraculum (height of style column) ($N = 43$ flowers from 43 different plants), and distance (mm) from the level of the indentation of the umbraculum to the stigma ($N = 40$ flowers from 40 different plants, 200 distances total).

Stigma receptivity of 40 flowers (200 stigmas) of two age classes (newly opened or senescent flowers, as determined by monitoring as well as sepal, petal and stigma appearance, and pollen drop) was determined by the presence of stigma peroxidase enzymes using benzidine (Kearns and Inouye 1993). The presence of peroxidases is considered a positive indicator of stigma receptivity. Briefly, excised stigmas were soaked in watch glasses with fresh benzidine solution (1% benzidine in 60% ethanol:hydrogen peroxide:water, 4:11:22 by volume) and observed under a dissecting microscope for the development of blue coloration, a positive reaction for peroxidases.

RESULTS

Bumblebees were located by their characteristic buzzing while in flight or within flowers. They were the first bees to become active in the mornings, likely due to their tolerance for

Table 1. Presence or absence of *Sarracenia alata* pollen on bees collected following visitation to flowers. Pollen was identified microscopically after preparation with Calberla's stain based on comparison to pollen collected directly from *Sarracenia* anthers.

	wings		thoracic pile		abdominal pile		corbeculae	
	POS	NEG	POS	NEG	POS	NEG	POS	NEG
Apis mellifera	6	14	7	13	3	17	12	8
Bombus bimaculatus	19	1	19	1	20	0	16	4

cooler temperatures (Kearns and Thomson 2001). Seventy-two bumblebees were observed to visit an average of 12.45 (± 20.36) flowers before returning to the nest or flying away from the study area. Mean duration of the 912 monitored visits was 17.37 (± 19.87) seconds.

Honeybees became active in the late morning, and did not become numerous at the study site until a week following anthesis. A fewer number were followed ($N = 8$) because they are not native pollinators and have evolved in geographic isolation from the plants. The mean number of flowers visited was 4.63 (± 4.78) and mean duration was 54.60 (± 79.42) seconds. Bumblebees have more pollen deposited on their body surfaces upon exiting flowers than do honeybee surfaces that were observed to come into contact with the stigma (Table 1).

Benzidine staining of stigmas indicates that *S. alata* flowers are receptive from the time the flowers open, with some stigmas remaining receptive until prior to or at the time of petal drop, 10 to 14 days after the flower opens (Table 2). Pollen is no longer released from the anthers at this time and the flowers assume a more erect presentation.

Flower and bee morphometrics are presented in Table 3 (and see Fig. 1) and summarized in the Discussion.

Table 2. Receptivity of *Sarracenia alata* stigmas from flowers of different ages (early anthesis versus late anthesis) based on benzidine staining for the presence of peroxidases. Positive (POS) stigmas turn blue, indicating a receptive stigma; negative (NEG) stigmas have no color change, indicating a non-receptive stigma. Early and late anthesis flowers were determined by the (1) appearance of the sepals, (2) appearance of the petals, and (3) pigmentation (green or red) of the basal portion of the stigma at the point of attachment to the style ray (see text). Newly opened flowers have pendent sepals while flowers open 10 days or longer have reflexed sepals with wavy margins. As flowers age, the petals wrinkle until they ultimately drop from the flower. Receptive stigmas are green in color at the basal portion whereas non-receptive stigmas tend to be red in color at the basal portion. An individual flower may have receptive (green) and non-receptive (red) stigmas present at the same time.

	benzidine staining					
	POS stigmas			NEG stigmas		
	green stigma	red stigma	total	green stigma	red stigma	total
Early anthesis ($N = 20$ flowers, 100 stigmas)	89	0	89	11	0	11
Late anthesis ($N = 20$ flowers, 100 stigmas)	13	22	35	5	60	65

Table 3. Morphometrics of *Sarracenia alata*, *Bombus bimaculatus* and *Apis mellifera*. Style ray gap is the width of the distance between two style rays. Width of petals is the measurement of a petal at the level of the fold, where the petal bends over the indentation of the umbraculum. Petal-sepal distance is the distance from the petal fold to the overhanging sepal. Width of style ray is the width measured at the level of the petal fold; it is the portion of the ray that extends above the enclosure created by the umbraculum and petals. Petal fold-stigma distance is the placement of the stigma on the style ray above the level of the petal fold. Style column height is the length of the column measured from the anthers to the umbraculum. See also Fig. 1.

flower parameter	*Bombus*	*Apis*	corresponding bee parameters
Style ray gap (mm) (Fig. 1, A)	7.64 ± 0.64	3.58 ± 0.17	Thorax width (mm)
12.73 ± 1.72	8.68 ± 0.37	3.86 ± 0.29	Abdomen width (mm)
Width of petals (mm) (Fig. 1, B)	7.64 ± 0.64	3.58 ± 0.17	Thorax width (mm)
9.15 ± 1.37	8.68 ± 0.37	3.86 ± 0.29	Abdomen width (mm)
Petal-sepal distance (mm) (Fig. 1, C)	7.87 ± 0.59	3.94 ± 0.36	Thorax thickness (mm)
13.69 ± 1.68	6.31 ± 0.44	3.12 ± 0.13	Abdomen thickness (mm)
Width of style ray (mm) (Fig. 1, D)	7.64 ± 0.64	3.58 ± 0.17	Thorax width (mm)
12.07 ± 1.43	8.68 ± 0.37	3.86 ± 0.29	Abdomen width (mm)
Petal fold-stigma distance (mm) (Fig. 1, E)	8.06 ± 0.78	3.17 ± 0.18	Thorax length (mm)
4.01 ± 1.10	11.38 ± 0.78	5.90 ± 0.58	Abdomen length (mm)
Style column height (mm)	7.87 ± 0.59	3.94 ± 0.36	Thorax thickness (mm)
9.41 ± 1.28	6.31 ± 0.44	3.12 ± 0.13	Abdomen thickness (mm)

Discussion

The most common visitors to *S. alata* flowers were female bumblebees of a single species, *Bombus bimaculatus,* and the European honeybee, *Apis mellifera* (Fig. 2). Additional insect visitors included the pitcher plant fly, *Sarcophaga sarraceniae*, carpenter bees (*Xylocopa* spp.), paper wasps (*Polistes* spp.), megachilid bees, as well as other incidental and casual arthropod visitors. The pitcher plant moth, *Exyra semicrocea*, was commonly observed within the pitchers but never observed to visit flowers. Bumblebees and *S. alata* flowers would seem to have evolved in tandem based upon the relative size of the insects and the floral parts.

Receptivity of *S. alata* flowers can be determined by their appearance, as verified by benzidine staining (Table 2). Stigmas become receptive around the time the petals open, with a decrease in receptivity until the time of petal drop. As flowers age, the sepals, normally pendant, begin to become slightly contorted, develop wavy margins, and reflex away from the umbraculum. In addition, the style rays change color at the point where the basilar portion of the stigma attaches, becoming a deep burgundy red to crimson. Non-receptive flowers lack petals.

Sarracenia alata flowers are well adapted to pollination by large-bodied insects, specifically bumblebees. In accordance with Mandossian (1965) and Schnell (1978a, 1983) working with *S. purpurea* and *S. flava* respectively, bumblebees were also found to be the likely primary pollinator of this species of pitcher plant. Unlike Schnell's observations (1978a, 2002), bumblebees we observed visiting *S. alata* flowers invariably landed on a flower petal at the level of the constriction, rather than a sepal or the pendulous portion of a petal. The petal constriction demarcates a bend that forms a flat platform delineated by the petal and the overhanging sepal, an opening approximately twice the thickness of the bee's thorax (Table

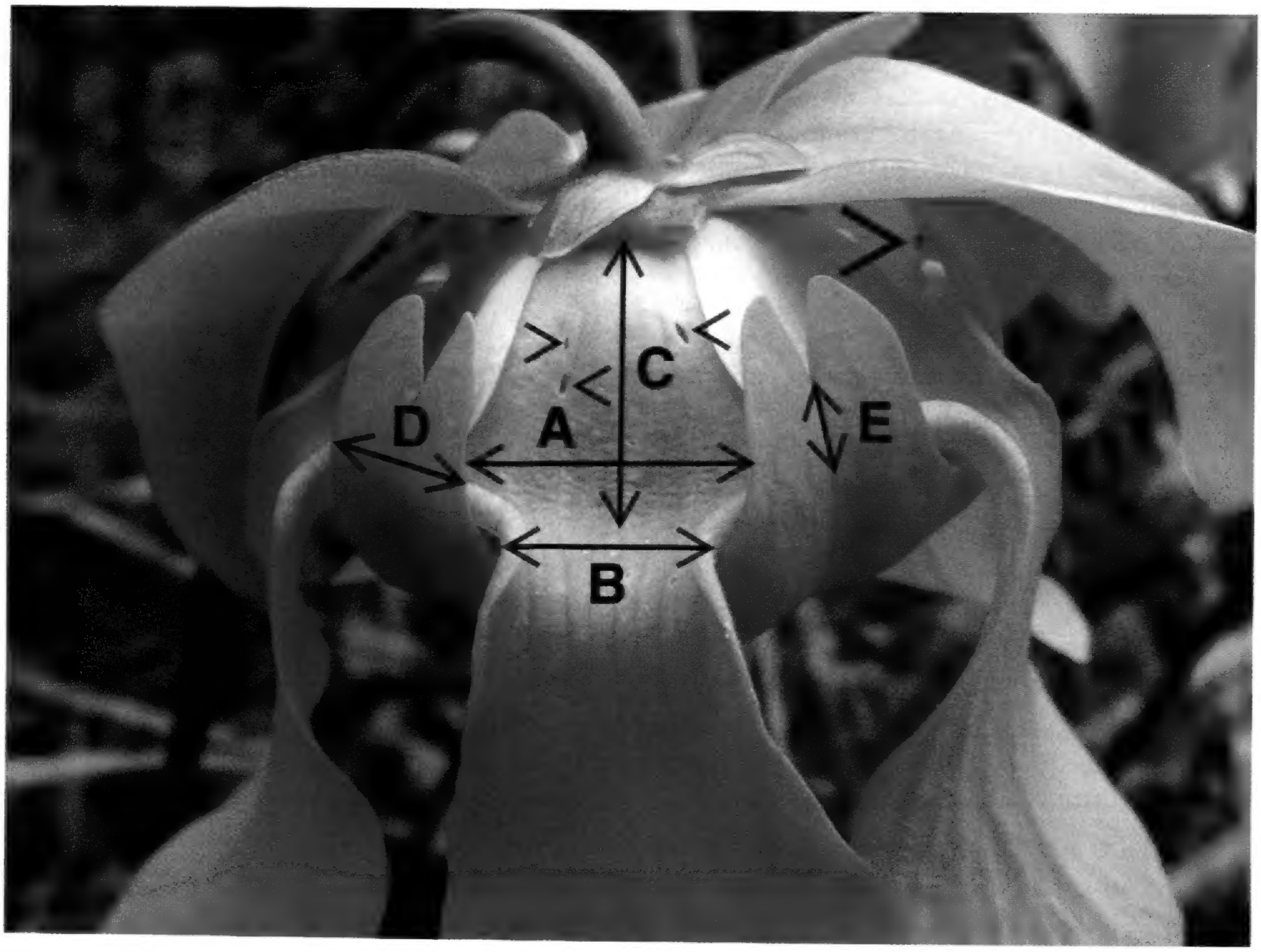

Figure 1. Flower of *Sarracenia alata* with morphometric parameters indicated. One sepal has been removed for clarity. A, style ray gap. B, width of petals. C, petal-sepal distance. D, width of style ray. E, petal fold-stigma distance. Small arrowheads indicate slits made by foraging *Xylocopa* spp. for "nectar robbing." Large arrowhead indicates stigma. See also Table 3.

3, petal-sepal distance). The width of this opening ranges from an average of 9.15 mm at the petal fold (Schnell [1978b] reports 14 mm but his material had been pressed flat) to 12.73 mm between the style rays (Table 3, width of petals and style ray gap). This floral measurement is 1.5 to 5.1 mm wider than the thorax of a bee and 0.47 to 4.1 mm wider than the abdomen. In contrast, the smaller honeybee has almost 10 mm more height clearance for the thorax and 5.6 to 9.2 mm more width clearance for the abdomen.

After landing on the petal, the bee typically entered a flower's interior by pushing beneath a style ray into a triangular gap formed by the overlapping petal margins. The lateral surface of the bumblebee readily contacted the stigma entering by this means, as the vertical distance of the stigma from the level of the petal roll is approximately twice the width of the thorax or abdomen (Table 3, petal fold-stigma distance). The mean width of honeybees is less than the petal fold-stigma distance, making it unlikely that there is contact with any pollen on the surface of the bee. Bumblebees were observed to visit unopened flowers, pushing their way inside by crawling under the style and pulling the petals aside.

The stigma is recurved toward the style, and the villous portion is somewhat shielded by the apex, possibly interfering with pollen collection. This morphology does, however, make the stigma an effective rake for pollen removal from a bee upon exit from the flower.

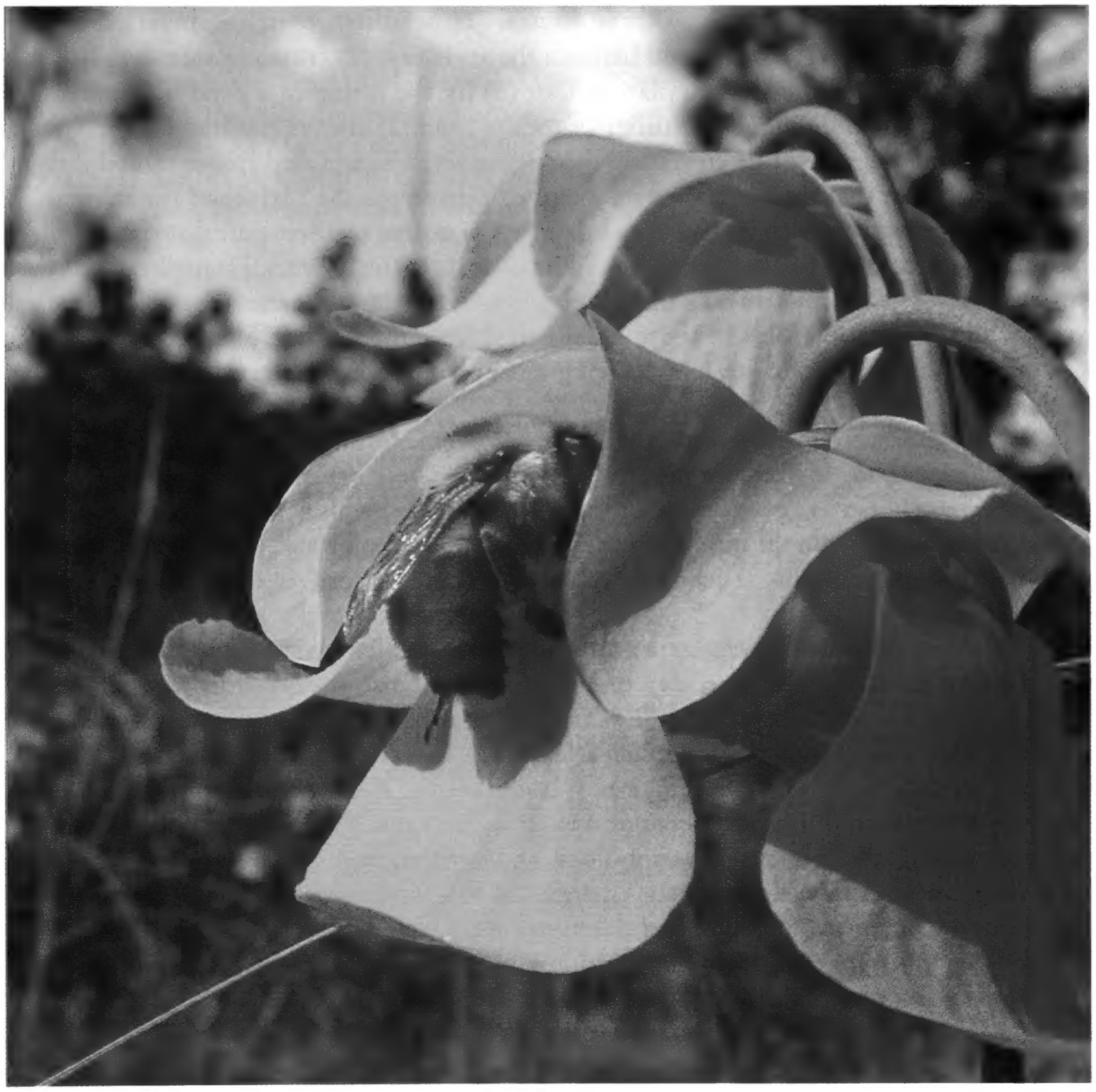

Figure 2. *Bombus bimaculatus* on the landing platform of *Sarracenia alata* formed by the recurved petal.

Once inside the flower, the bees forage for nectar and pollen. If the bee is on the tops of the anthers, the dorsum of a bumblebee is within 1.5 mm of the umbraculate cup and that of a honeybee is within 5.5 mm, exclusive of the additional height not accounted for by the legs. The dorsal pile of the bumblebee "scrapes" this surface repeatedly and, if circling along the sides, its wings drag in the pollen that has accumulated on this surface. Eighty percent of collected bumblebees had *Sarracenia* pollen in their corbeculae, 95% had pollen on the dorsal surface of their wings and thoracic pile, and 100% had pollen in the abdominal pile. Honeybees do not readily contact the inner surface of the umbrella and had less pollen deposited on their body surfaces: 30% were positive on their wings (microscopically, deposits were very scant), 35% on the thorax, and 15% on the abdomen (Table 1).

Bumblebee exit is in agreement with Schnell's (1978a) observations regarding pollination

of *S. flava*. Bees exited by one of three routes: (1) headfirst, crawling inverted straight upward from between the petals and beneath the style ray, (2) crawling sideways from the same opening toward the landing platform, or (3) by the lifting of a petal overhanging an indentation in the umbrella. Departure methods (1) and (2) always resulted in contact with the stigma and, because of its structure, the stigma acted as a curled finger pulled through one's hair, except that the bee pulled its wings or pile across the surface of the stigma. The wings of collected bumblebees had heavy deposits of pollen on their dorsal surfaces and, we speculate, are the most likely source of pollen pollinating the flowers. Honeybees had more difficulty exiting *S. alata* flowers, typically leaving by method (2), and were often observed to chew slits at the petal folds to allow easier egress from the interior. Size and mode of exit, as well as low surface deposition of pollen grains, precludes ready transfer of pollen to the stigma.

Xylocopa spp. were observed to visit *S. alata* flowers. Although specimens approximate *Bombus bimaculatus* in size, we never observed these bees entering flowers. Quite to the contrary, these bees were observed to cut slits in the flower petals at the bases, allowing them to forage for nectar from the outside of the corolla ("nectar robbing" [Kearns and Thomson 2001]). Other species of bees (including *A. mellifera*) and wasps were also observed feeding via these slits.

In summary, flowers of *S. alata* are not protandrous. Pollen was observed to be shed into the umbraculate cup on the first day of anthesis, a trait also observed in *S. flava* (Schnell 1983). Stigmas become receptive at the same time as pollen release and at least some remain receptive until the petals drop and pollen release has ceased. Bumblebees are attracted to the flowers by odor, sight, or a combination of both factors (Kearns and Thomson 2001), and have the ability to pollinate flowers upon entering or exiting the umbraculum. Following pollination, the flowers undergo morphologic changes that include the sepals reflexing away from the corolla and developing wavy margins, development of a red pigmentation at the stigmatic attachment, a lengthening of the stigma itself, and finally the loss of the petals. The flowers frequently become more erect following anthesis when the scape elongates unequally at the crook (downward bend).

We suggest these plants are primarily self-pollinating, due to the structure of the stigma, the rather dense accumulation of pollen on the upper wing surfaces and within the pile of the pollinator, the mode of exit, and the timing of pollen drop and stigma receptivity. Bees have a tendency to climb to the top of the flower upon exiting to clean their wings and pile of adherent pollen, decreasing the odds of xenogamy and geitonogamy. Self-pollination could help explain the development and persistence of morphotypes such as the "stock, hairy" variant of Alabama (Schnell 2002) even though Sheridan and Karowe (2000) showed, at least in *S. flava*, that the largest seed sets and the most viable seeds are obtained by cross-pollination. Furthermore, due to the geographic isolation of *S. alata*, it is likely that the pollinator of this species, a bumblebee, is representative of the pollinators of all remaining species of *Sarracenia* for which pollination biology studies have not been performed. "Flower constancy" (Kearns and Thomson 2001) of *Bombus* tends to keep them in the vicinity of the ramets, as observed by us, so that if self-pollination does not occur, geitonogamy within the genet is the next most likely alternative. This could explain the occurrence of distinct populations identified in this species, for example, in bogs where plants exhibit areoles in the trap leaves, and could possibly have contributed to speciation within the genus.

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Vascular Flora of the Kinzua Quality Deer Cooperative, Northwestern Pennsylvania, U.S.A.

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ABSTRACT. A summary is presented of the vascular flora of the Kinzua Quality Deer Cooperative, located in McKean County, Pennsylvania, in the Allegheny National Forest (66%) and on adjacent private and public lands (34%). The flora is based on observations and collections made between May and August, 2001 and 2003. In total, 305 species in 181 genera and 66 families were recorded in the 30,628-ha study area. The largest families are Cyperaceae (38 species), Poaceae (34 species), and Asteraceae (22 species) and the largest genera are *Carex* (35 species), *Viola* (7 species), and *Aster* sensu lato (7 species). Of all taxa recorded, 15% are non-native. An annotated species list, including the frequency of occurrence, growth form, whether native to Pennsylvania, and regional wetland status for each taxon, is included as an appendix. This list documents the baseline floristic conditions of an area that will be monitored over ten years as land managers attempt to mitigate the impacts of white-tailed deer on forest health.

INTRODUCTION

The Kinzua Quality Deer Cooperative (KQDC) consists of 30,628 ha located in McKean County in northwestern Pennsylvania (between 41°45′ to 42°00′ N and 78°37′ to 78°55′ W) in the unglaciated Allegheny Plateau (Keys et al. 1995) (Fig. 1). Sixty-six percent of the study area is located on the Allegheny National Forest (ANF), with the remaining 34% divided among private and public lands adjacent to the ANF: 16% Bradford City Water Authority, 13% Commonwealth Forest Investments, 4% Kane Hardwood, a Collins Pine Company, and ~1% RAM Forest Products. The vegetation on the ANF is comprised predominantly of forest communities, mainly variants of the northern hardwoods group (70%), including Allegheny hardwoods at mature stages of development with less frequent occurrences of stands dominated by *Tsuga canadensis* and *Quercus* spp. (Alerich et al. 1993). The land of the KQDC is managed for multiple uses including timber harvesting, recreation (primarily hunting), and oil, gas, and mineral recovery.

The study area has a humid temperate climate typified by temperatures averaging 2°C in January and 22°C in July, a growing season averaging 120 days, and annual net precipitation of 107 cm (Cronce and Ciolkosz 1983; Kingsley 1985; McNab and Avers 1994). The geology consists of plateau-like mountains (elevation ranging from 319 to 690 m above sea level) with soils derived from sandstone and shale that are strongly acidic and relatively poor in fertility

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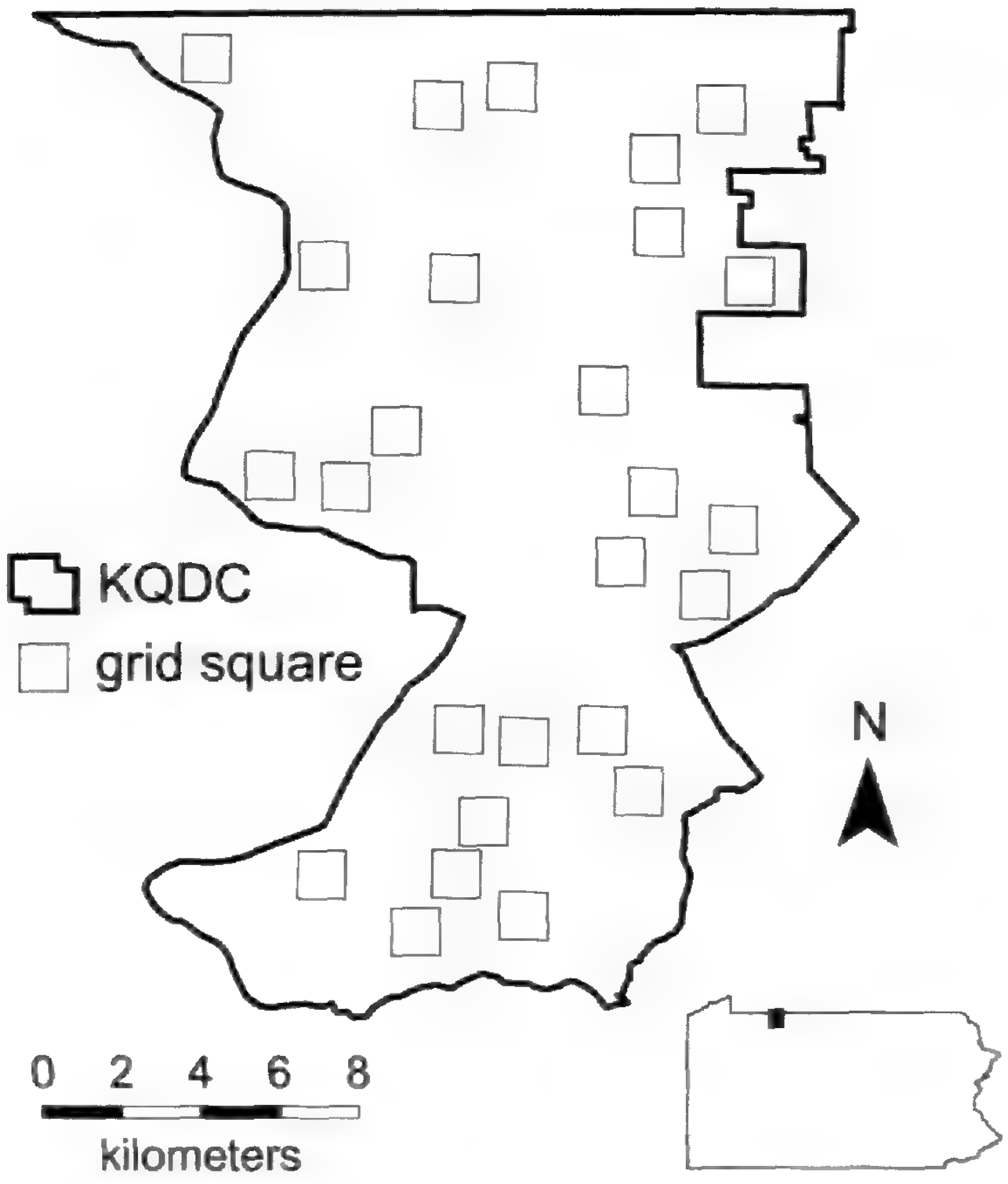

Figure 1. Locations of the sampling grid squares in relation to the boundaries of the 30,628-ha Kinzua Quality Deer Cooperative (KQDC), McKean County, Pennsylvania.

(Ciolkosz et al. 1970). Floristically rich microsites occasionally are found on lower slopes and valley bottoms (Horsley et al. 2000).

The KQDC is an adaptive management demonstration project organized by a consortium of land managers attempting to mitigate the effects of white-tailed deer (*Odocoileus virginianus* Zimm.) on forest health. Damage to forest ecosystems from browsing by white-tailed deer has been documented to include reductions in the abundance of preferred woody species, alterations in the number, size, and reproductive status of herbaceous species, and the spread of invasive species (Leopold et al. 1947; Hough 1965; Alverson et al. 1988; DeGraaf et al. 1991; Anderson 1994; Balgooyen and Waller 1995; McShea et al. 1997; Ruhren and Handel 2000; Vellend 2002; Horsley et al. 2003; Kirschbaum and Anacker 2005). Adaptive management objectives include reducing deer density through increased hunting pressure and hunting success and restoration of plant species evenness and reproductive success. A key component of this project is ecological monitoring of plant community responses to changes in deer density over time (Dzemyan et al. 2000; Kirschbaum and Anacker 2005). The purpose of this paper is to report the occurrence and frequency of vascular plant species found in the KQDC study area at the beginning of the adaptive management project. These data will serve as a baseline for future assessments of the effects of reducing deer impacts on plant communities.

Materials and Methods

Sampling occurred between 15 May and 20 August in 2001 and 2003 (175 field days total) and was performed by the authors and four field assistants. The sample design consisted of 26 randomly selected 1.6-km^2 grid squares (Fig. 2), each containing 6 plots spaced 400 m from the center of the square and a seventh at the center. The azimuth to the first outer plot

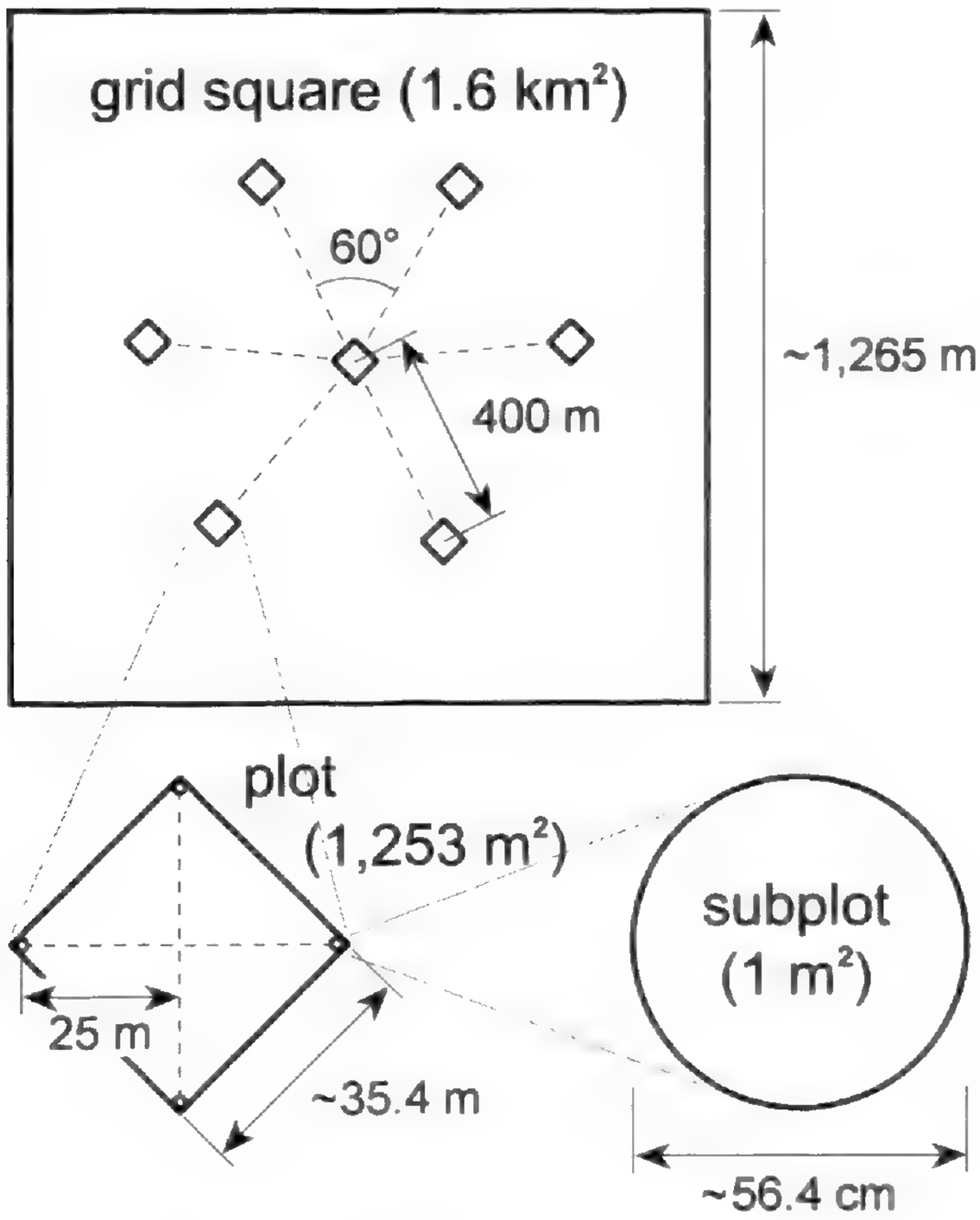

Figure 2. Ecological monitoring plot layout (see text).

in a selected square was chosen at random; the others were located by incrementing the azimuth by 60 degrees. Each 1,253-m^2 plot had four 1-m^2 circular subplots, placed 25 m from the center point of the plot in the cardinal directions (Figs. 2 and 3). A total of 168 plots and 672 subplots were sampled. The grid squares were located predominately within Allegheny hardwood and northern hardwood stands with some stands in areas dominated by *Quercus* spp. or *Tsuga canadensis*. Areas of non-forested habitat, high road density, resource extraction activity, or human settlement were avoided.

Figure 3. Center point of a monitoring subplot (black circle). The white poles delineate a larger subplot not used in this study.

In 2001, all vascular plants within 1-m^2 subplots (total area: 4 m^2 per plot) were identified. In 2003, a whole-plot survey (entire 1,253-m^2 area of plots) was added to increase detection of plant species present in the study area (see Figs. 2 and 4). The plots were traversed systematically until all plant species present were identified or collected (in the case of taxonomically difficult specimens). Collected specimens were later identified in the laboratory or sent for annotation to local flora and taxonomic group experts, including Todd Ristau (U.S. Forest Service, Northern Research Station, Forestry Sciences Lab, Irvine, Pennsylvania) and Tony Reznicek (MICH). In addition to these collections, voucher specimens were collected for less common species as well as for many common species, as time permitted. Voucher specimens were collected for 53% of all species encountered. Subsequent field seasons will allow for collection of the remaining species. We occasionally identified specimens only to the genus level due to a lack of diagnostic characters (e.g., *Amelanchier*, *Crataegus*). The bulk of the voucher specimens are deposited in the herbarium of the Forestry Sciences Lab in Irvine and the remainder at the herbarium of University of Wisconsin, Madison (WIS). The field protocols are detailed in Anacker et al. (2003).

A complete species list was compiled and family designations were added. Frequency of species occurrence was calculated as the percentage of plots where the species occurred of the total number of plots sampled for the 2003 data set (N = 147). Overstory tree data were

Figure 4. A whole-plot survey consisted of identifying all species present in the 1,253-m^2 plot area (see Fig. 2). The predominance of ferns and lack of a shrub layer is attributed to the long-term presence of a high deer population.

Table 1. Forest cover types of the Kinzua Quality Deer Cooperative (types are from Marquis and Ernst 1992).

	# of plots	% of plots
Northern hardwoods	93	55.4
Allegheny hardwoods	55	32.7
Transitional hardwoods	5	3.0
Hemlock-hardwoods	4	2.4
Oak-hickory	3	1.8
Unclassifiable	8	4.8
Total	168	100.0

classified by forest cover type using SILVAH (Marquis and Ernst 1992) for the 2001 plots and by field observation for plots new in 2003 (SILVAH analysis pending). The source of additional species information, including origin, growth form, duration, and wetland status (Reed 1988), was Rhoads and Block (2000). Species rarity and county records were obtained from the herbaria of the Carnegie Museum of Natural History (CM) and the Morris Arboretum, University of Pennsylvania (MOAR), and from Rhoads and Block (2000).

Results and Discussion

The forest cover type of the plots is mainly northern hardwoods (55.4%) and Allegheny hardwoods (32.7%), with some transitional hardwoods, hemlock hardwoods, and oak-hickory (Table 1). We recorded 305 species of vascular plants in 181 genera and 66 families (Table 2 and Appendix). Of these, 15.1% (46 species) are introduced species, 83.0% (253) are native, and 2.0% (6) are unclassified (identified only to genus). Of the introduced species, only one occurs on more than 5% of the plots: *Milium effusum* at 15%. None of the species are classified as federal noxious weeds (U.S.D.A. Natural Resources Conservation Service 2004). These numbers suggest that the study plots are fairly free of non-native plants. The majority of the families, genera, and species are dicots. Families with the most representatives are Cyperaceae (38 species, 3 genera), Poaceae (34 species, 22 genera), and Asteraceae (22 species, 11 genera). Other families with numerous representatives include Rosaceae (21 species), Liliaceae *sensu lato* (i.e., including Alliaceae, Colchicaceae, Liliaceae, Melanthia-

Table 2. Summary of the Kinzua Quality Deer Cooperative vascular flora.

	Clubmosses, ferns and horsetails	Conifers	Dicots	Monocots	Total	% of total
Families	9	1	50	6	66	—
Genera	16	2	119	44	181	—
Species	22	2	180	101	305	—
Native species	22	2	140	89	253	83.0
Introduced species	0	0	35	11	46	15.1
Origin unresolved*	0	0	5	1	6	2.0

*Taxa identified to genus only.

Table 3. Summary of Kinzua Quality Deer Cooperative vascular plant species by growth form.

	# of species	% of species
Herbaceous perennial	225	73.8
Deciduous tree	27	8.8
Herbaceous annual	20	6.6
Deciduous shrub	18	5.9
Herbaceous biennial	5	1.6
Perennial herbaceous vine	4	1.3
Woody vine	3	1.0
Evergreen tree	2	0.7
Evergreen shrub	1	0.3
Total	305	100.0

ceae, and Ruscaceae; 16 species), and Ranunculaceae (13 species) (see Appendix). The most common growth forms are herbaceous perennial (73.8%), deciduous tree (8.9%), herbaceous annual (6.6%), and deciduous shrub (5.9%) (Table 3). Of the species that have been classified by regional wetland status (72% of the total; see Table 4), upland and facultative upland species (FACU+, FACU, FACU–, UPL) make up the highest percentage (41.6%), followed by those that are equally likely to be found in uplands or wetlands (FAC+, FAC,

Table 4. Summary of the regional wetland status of Kinzua Quality Deer Cooperative vascular plant species. Classifications are from Reed (1988).

Wetland status*	# of species	% of species	% of species†
Obligate wetland	23	7.5	10.5
Facultative wetland +	10	3.3	4.6
Facultative wetland	28	9.2	12.8
Facultative wetland –	7	2.3	3.2
Facultative +	9	3.0	4.1
Facultative	39	12.8	17.8
Facultative –	11	3.6	5.0
Facultative upland +	4	1.3	1.8
Facultative upland	60	19.7	27.4
Facultative upland –	27	8.9	12.3
Obligate upland	1	0.3	0.5
Unclassified			
Not applicable	7	2.3	—
Not available	79	25.9	—
Total	305	100.0	100.0

*Wetland status refers to the estimated probability of a species occurring in wetlands under natural conditions: obligate wetland species, 99%, facultative wetland species, 67-99%, facultative species, 34-66%, facultative upland species, 1-33%, and obligate upland species, 1%. "+" and "–" characters represent a tendency towards the wetter and drier part, respectively, of the probability range. *Not applicable*: Taxa that were identified to genus only. *Not available*: Have not yet been assigned wetland indicator status.
†Recalculated excluding unclassified taxa.

FAC–; 26.9%), facultative wetland species (FACW+, FACW, FACW–; 20.6%), and obligate wetland species (OBL; 10.5%).

The 15 most frequently occurring species on the KQDC are native woody or herbaceous perennials (Table 5). Four of the 15 are deciduous trees. Three of the 10 most frequent taxa are ferns. The high frequency of ferns reflects the presence of areas of extensive fern dominance, termed "fern yards" (see Fig. 4). Such areas are often inferred to be an effect of high deer impact (Tilghman 1989; Horsley et al 2003).

Based on herbarium records at MOAR and CM, several species that we observed in the KQDC monitoring plots are first-time records for McKean County. These species include *Agrostis hyemalis*, *Cardamine parviflora*, *Carex gracilescens*, *Phryma leptostachya*, *Poa languida*, *Ranunculus allegheniensis*, and *Streptopus amplexifolius* (see Appendix). A voucher specimen for *A. hyemalis* has been collected but the remaining species will be vouchered in future years of this study.

Several rare species have been noted in the KQDC monitoring area. *Actaea rubra* is not rare or endangered, but it is on a watch list of uncommon species, and has not previously been reported for McKean County (S. Grund, personal communication). We have identified it in three monitoring plots, but *Actaea* spp. are rarely observed in flower or fruit in this area (likely due to herbivory by deer) and therefore these identifications were based on leaf pubescence. *Platanthera hookeri* is listed as endangered in Pennsylvania, but like *Actaea* spp., *Platanthera* spp. rarely bloom in McKean County. Identification of *Platanthera hookeri* (found in 11 plots) was based on leaf length and shape. *Poa languida*, proposed for threatened status in Pennsylvania, is difficult to distinguish from *Poa saltuensis*, and has recently

Table 5. The 15 most frequent plants in Kinzua Quality Deer Cooperative sampling plots. Growth form categories: HP = herbaceous perennial; SD = deciduous shrub (including seedlings); TD = deciduous tree (including seedlings).

freq (%)	species	common name	family	group	growth form
97.3	*Dryopteris intermedia* (Muhl.) Gray	intermediate woodfern	Polypodiaceae	fern	HP
94.6	*Acer rubrum* L.	red maple	Sapindaceae	dicot	TD
91.2	*Fagus grandifolia* Ehrh.	American beech	Fagaceae	dicot	TD
91.2	*Prunus serotina* L.f.	black cherry	Rosaceae	dicot	TD
86.3	*Maianthemum canadense* Desf.	Canada mayflower	Ruscaceae	monocot	HP
85.0	*Acer pensylvanicum* L.	striped maple	Sapindaceae	dicot	TD
85.0	*Brachyelytrum erectum* (Schreb.) Beauv.	bearded shorthusk	Poaceae	monocot	HP
81.6	*Dennstaedtia punctilobula* (Michx.) T. Moore	hay-scented fern	Polypodiaceae	fern	HP
81.0	*Thelypteris noveboracensis* (L.) Nieuwl.	New York fern	Polypodiaceae	fern	HP
78.9	*Amelanchier* sp.	serviceberry	Rosaceae	dicot	SD
78.9	*Medeola virginiana* L.	Indian cucumber-root	Liliaceae	monocot	HP
75.5	*Carex debilis* Michx.	white-edge sedge	Cyperaceae	monocot	HP
73.5	*Carex communis* Bailey	fibrous-root sedge	Cyperaceae	monocot	HP
72.1	*Viola blanda* Willd.	sweet white violet	Violaceae	dicot	HP
71.4	*Mitchella repens* L.	partridge-berry	Rubiaceae	dicot	HP

been proposed to be a subspecies of the latter (Haines 2004). A voucher specimen for this species or subspecies has not been prepared for the KQDC but has been noted in one plot. *Streptopus amplexifolius*, an endangered species in Pennsylvania, distinguished from the more common species *S. rosea* by its clasping leaf bases and glabrous nodes, has been found in three plots. Because of the rarity of these species, we have not collected them on our monitoring plots. In future monitoring years however, efforts will be made to photograph these plants for verification.

In this paper we have documented the baseline floristic conditions of an area that has received substantial impact from white-tailed deer over the last 60 years (Hough 1965; Redding 1995). The plant community will be resurveyed several times over ten years using the plots described here. If changes in deer density are realized during this time span, these monitoring data may reflect changes in the responses that are correlated with changes in deer impact. Such responses may include alterations in species richness and species evenness of both shrub and herb layers, as well as reduction of fern yard occurrence and reestablishment of species facing local extirpation such as *Viburnum lantanoides* (Hough 1965).

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Appendix. Annotated checklist of the vascular plants on Kinzua Quality Deer Cooperative sampling plots, including major taxonomic divisions, frequency of occurrence, growth form, whether native (N) or introduced (I) to Pennsylvania, and regional wetland indicator status. Growth form codes: HA = herbaceous annual; HB = herbaceous biennial; HP = herbaceous perennial; SD = deciduous shrub; SE = evergreen shrub; TD = deciduous tree; TE = evergreen tree; VP = perennial herbaceous vine; VW = woody vine. Wetland indicator status codes: OBL = obligate wetland; FACW = facultative wetland; FAC = facultative; FACU = facultative upland; UPL = obligate upland; N = not available (indicator status has yet to be applied); NA = not applicable (species is not identified below the genus level); see Table 4 footnotes for interpretation of wetland indicator status. Nomenclature follows the Pennsylvania Flora Project (2005); where they differ, the names used by Gleason and Cronquist (1991) are in parentheses.

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
Equisetophyta, Filicophyta, Lycopodiophyta						
	Equisetaceae	*Equisetum arvense* L.	< 1	HP	N	FAC
	Lycopodiaceae	*Diphasiastrum digitatum* (Dill.) Holub (= *Lycopodium d.* Dill.)	21.1	HP	N	N
		Huperzia lucidula (Michx.) Trevisan (= *Lycopodium lucidulum* Michx.)	38.8	HP	N	FACW–
		Lycopodium annotinum L.	12.2	HP	N	FAC
		Lycopodium clavatum L.	9.5	HP	N	FAC
		Lycopodium obscurum L.	59.2	HP	N	FACU
	Ophioglossaceae	*Botrychium virginianum* (L.) Sw.	4.1	HP	N	FACU
	Osmundaceae	*Osmunda cinnamomea* L.	24.5	HP	N	FACW
		Osmunda claytoniana L.	2.7	HP	N	FAC
	Polypodiaceae	*Adiantum pedatum* L.	1.4	HP	N	FAC–
		Athyrium filix-femina (L.) Roth	< 1	HP	N	FAC
		Dennstaedtia punctilobula (Michx.) T. Moore	81.6	HP	N	N
		Dryopteris carthusiana (Vill.) H.P. Fuchs	< 1	HP	N	FAC+
		Dryopteris goldiana (Hook.) Gray	< 1	HP	N	FAC+
		Dryopteris intermedia (Muhl.) Gray	97.3	HP	N	FAC
		Dryopteris marginalis (L.) Gray	3.4	HP	N	FACU–
		Onoclea sensibilis L.	8.8	HP	N	FACW

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
		Phegopteris hexagonoptera (Michx.) Fee (= *Thelypteris h.* [Michx.] Weatherby)	< 1	HP	N	FAC
		Polypodium virginianum L.	10.2	HP	N	N
		Polystichum acrostichoides (Michx.) Schott	35.4	HP	N	N
		Pteridium aquilinum (L.) Kuhn	2.0	HP	N	FACU
		Thelypteris noveboracensis (L.) Nieuwl.	81.0	HP	N	FAC
Coniferophyta	Pinaceae	*Pinus strobus* L.	6.1	TE	N	FACU
		Tsuga canadensis (L.) Carr.	46.9	TE	N	FACU
Magnoliophyta: Magnoliopsida						
	Adoxaceae	*Sambucus racemosa* L.	22.4	SD	N	FACU
		Sambucus canadensis L.	1.4	SD	N	FACW–
		Viburnum lantanoides Michx. (= *V. alnifolium* Marsh.)	< 1	SD	N	FAC
	Apiaceae	*Cicuta* sp.	< 1	HP	N	OBL
		Osmorhiza claytonii (Michx.) C.B. Clarke	2.7	HP	N	FACU–
	Aquifoliaceae	*Ilex montana* (Torr. & Gray) Gray	24.5	SD	N	N
	Araceae	*Arisaema triphyllum* (L.) Schott	52.4	HP	N	FACW–
	Araliaceae	*Aralia nudicaulis* L.	< 1	HP	N	FACU
		Aralia spinosa L.	< 1	TD	N	FAC
		Panax trifolius L.	7.5	HP	N	N
	Asteraceae	*Ageratina altissima* (L.) R.M.King & H.Robinson (= *Eupatorium rugosum* Houtt.)	1.4	HP	N	N
		Bidens sp.	1.4	HA		NA
		Cirsium arvense (L.) Scop.	< 1	HP	I	FACU
		Cirsium vulgare (Savi) Ten.	< 1	HB	I	FACU
		Erechtites hieraciifolius (L.) Raf. (= *E. hieraciifolia* [L.] Raf.)	2.7	HA	N	FACU
		Eupatorium perfoliatum L.	< 1	HP	N	FACW+
		Eurybia divaricata (L.) Nesom (= *Aster divaricatus* L.)	40.1	HP	N	N
		Eurybia macrophylla (L.) Cass. (= *Aster macrophyllus* L.)	< 1	HP	N	N
		Hieracium caespitosum Dumort.	< 1	HP	I	N
		Oclemena acuminata (Michx.) E.Greene (= *Aster acuminatus* Michx.)	19.7	HP	N	N
		Prenanthes alba L.	1.4	HP	N	FACU
		Prenanthes altissima L.	< 1	HP	N	FACU–
		Prenanthes trifoliolata (Cass.) Fern.	25.9	HP	N	N
		Pseudognaphalium obtusifolium (L.) Hilliard & B.L.Burtt. (= *Gnaphalium o.* L.)	< 1	HA	N	N

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
		Solidago caesia L.	1.4	HP	N	FACU
		Solidago rugosa Ait.	27.2	HP	N	FAC
		Symphyotrichum cordifolium (L.) Nesom (= *Aster cordifolius* L.)	6.1	HP	N	N
		Symphyotrichum lanceolatum (Wiegand) Nesom (= *Aster lanceolatus* Willd.)	< 1	HP	N	FACW
		Symphyotrichum lateriflorum (L.) A.Love & D.Love (= *Aster lateriflorus* [L.] Britt.)	< 1	HP	N	FACW–
		Symphyotrichum prenanthoides (Muhl.) Nesom (= *Aster p.* Muhl.)	3.4	HP	N	FAC
		Taraxacum officinale G.H. Weber	4.1	HP	I	FACU–
		Tussilago farfara L.	1.4	HP	I	FACU
	Balsaminaceae	*Impatiens capensis* Meerb.	10.9	HA	N	FACW
		Impatiens pallida Nutt.	2.0	HA	N	FACW
	Berberidaceae	*Berberis thunbergii* DC.		SD	I	N
		Caulophyllum thalictroides (L.) Michx.	2.7	HP	N	N
		Podophyllum peltatum L.	9.5	HP	N	N
	Betulaceae	*Betula alleghaniensis* Britt.	31.3	TD	N	FAC
		Betula lenta L.	21.8	TD	N	FACU
		Carpinus caroliniana Walt.	8.8	TD	N	FAC
		Ostrya virginiana (P. Mill.) K. Koch	15.6	TD	N	FACU–
	Boraginaceae	*Buglossoides arvense* (L.) I.M.Johnst. (= *Lithospermum a.* L.)	< 1	HA	I	N
		Hackelia virginiana (L.) I.M. Johnston	1.4	HB	N	FACU
		Hydrophyllum virginianum L.	2.7	HP	N	FAC
		Myosotis sp.	< 1	HA		NA
	Brassicaceae	*Barbarea vulgaris* R. Br.		HB	I	FACU
		Cardamine diphylla (Michx.) Wood	8.2	HP	N	FACU
		Cardamine parviflora L.	2.7	HA	I	FACU
		Cardamine pensylvanica Muhl.	3.4	HP	N	OBL
	Campanulaceae	*Lobelia inflata* L.	< 1	HA	N	FACU
	Caprifoliaceae	*Diervilla lonicera* P. Mill.	2.7	SD	N	N
		Lonicera canadensis Marsh.	< 1	SD	N	FACU
	Caryophyllaceae	*Cerastium fontanum* Baumg. (= *C. vulgatum* L.)	1.4	HP	I	FACU–
		Myosoton aquaticum (L.) Moench (= *Stellaria aquatica* [L.] Scop.)	< 1	HP	I	FACW
		Stellaria media (L.) Vill.	4.8	HA	I	N
		Stellaria pubera Michx.	1.4	HP	N	N
	Cornaceae	*Cornus florida* L.	< 1	TD	N	FACU–
	Ericaceae	*Gaultheria procumbens* L.	4.1	SE	N	FACU
		Kalmia latifolia L.	2.7	SD	N	FACU

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
		Monotropa uniflora L.	29.9	HP	N	FACU–
		Pyrola americana Sweet (= *P. rotundifolia* L.)	< 1	HP	N	FAC
		Rhododendron maximum L.	< 1	SD	N	FAC
		Rhododendron periclymenoides (Michx.) Shinners	1.4	SD	N	N
		Vaccinium angustifolium Ait.	2.0	SD	N	FACU–
		Vaccinium corymbosum L.	1.4	SD	N	FACW–
	Fabaceae	*Amphicarpaea bracteata* (L.) Fern.	< 1	VP	N	FAC
		Lotus corniculatus L.	< 1	HP	I	FACU–
		Trifolium pratense L.	< 1	HP	I	FACU–
		Trifolium repens L.	< 1	HP	I	FACU–
	Fagaceae	*Fagus grandifolia* Ehrh.	91.2	TD	N	N
		Quercus rubra L.	43.5	TD	N	FACU–
	Geraniaceae	*Geranium maculatum* L.	2.0	HP	N	FACU
		Geranium robertianum L.	< 1	HA	N	N
	Grossulariaceae	*Ribes cynosbati* L.	1.4	SD	N	N
	Hamamelidaceae	*Hamamelis virginiana* L.	17.7	SD	N	FAC–
	Hypericaceae	*Hypericum punctatum* Lam.	< 1	HP	N	FAC–
	Juglandaceae	*Carya cordiformis* (Wangenh.) K. Koch	3.4	TD	N	FACU+
		Carya ovata (P. Mill.) K. Koch	2.0	TD	N	FACU–
	Lamiaceae	*Blephilia hirsuta* (Pursh) Benth.	< 1	HP	N	FACU–
		Clinopodium vulgare L. (= *Satureja vulgaris* [L.] Fritsch)	< 1	HP	I	N
		Galeopsis bifida Boenn. (= *G. tetrahit* L.)	< 1	HA	I	N
		Lycopus uniflorus Michx.	1.4	HP	N	OBL
		Lycopus virginicus L.	2.0	HP	N	OBL
		Mentha sp.	< 1	HP		NA
		Monarda didyma L.	< 1	HP	N	FAC+
		Prunella vulgaris L.	2.0	HP	N	FACU+
		Scutellaria lateriflora L.	6.1	HP	N	FACW+
	Magnoliaceae	*Liriodendron tulipifera* L.	13.6	TD	N	FACU
		Magnolia acuminata (L.) L.	68.0	TD	N	N
	Malvaceae	*Tilia americana* L.	10.2	TD	N	FACU
	Myrsinaceae	*Lysimachia quadrifolia* L.	2.0	HP	N	N
		Trientalis borealis Raf.	54.4	HP	N	FAC
	Oleaceae	*Fraxinus americana* L.	49.0	TD	N	FACU
	Onagraceae	*Circaea alpina* L.	8.8	HP	N	FACW
		Circaea canadensis (L.) Hill ssp. *canadensis* (= *C. lutetiana* L.)	17	HP	N	FACU
		Epilobium ciliatum Raf.	< 1	HP	N	FAC–
	Orobanchaceae	*Epifagus virginiana* (L.) W. Bart.	4.1	HA	N	N
		Melampyrum lineare Desr.	< 1	HA	I	FACU
	Oxalidaceae	*Oxalis acetosella* L.	47.6	HP	N	FAC–
		Oxalis stricta L.	4.8	HP	N	N
	Papaveraceae	*Corydalis sempervirens* (L.) Pers.	< 1	HB	N	N
		Dicentra canadensis (Goldie) Walp.	< 1	HP	N	N
	Phrymaceae	*Phryma leptostachya* L.	< 1	HP	N	N

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
	Phytolaccaceae	*Phytolacca americana* L.	< 1	HP	N	FACU+
	Plantaginaceae	*Chelone glabra* L.	4.8	HP	N	OBL
		Digitalis purpurea L.	< 1	HB	I	N
		Veronica chamaedrys L.	1.4	HP	I	N
		Veronica officinalis L.	8.8	HP	N	N
		Veronica serpyllifolia L.	< 1	HP	I	FAC+
	Polygalaceae	*Polygala paucifolia* Willd.	4.7	HP	N	FACU
	Polygonaceae	*Fallopia cilinodis* (Michx.) Holub (= *Polygonum cilinode* Michx.)	3.4	VP	N	N
		Persicaria hydropiperoides (Michx.) Small (= *Polygonum h.* Michx.)	1.4	HP	N	OBL
		Persicaria longiseta (Bruijn) Kitagawa (= *Polygonum caespitosum* Blume)	1.4	HA	I	FACU–
		Persicaria maculosa S.F.Gray (= *Polygonum persicaria* L.)	< 1	HA	I	FACW
		Persicaria pensylvanica (L.) M.Gomez (= *Polygonum pensylvanicum* L.)	< 1	HA	N	FACW
		Persicaria sagittata (L.) H.Gross (= *Polygonum sagittatum* L.)	4.8	HA	N	OBL
		Persicaria virginiana (L.) Gaertner (= *Polygonum virginianum* L.)	1.4	HP	N	FAC
		Rumex acetosella L.	2.7	HP	I	FACU
		Rumex crispus L.	2.0	HP	I	FACU
		Rumex obtusifolius L.	4.8	HP	I	FACU–
	Portulacaceae	*Claytonia caroliniana* Michx.	< 1	HP	N	N
	Ranunculaceae	*Actaea pachypoda* Ell.	< 1	HP	N	N
		Actaea rubra (Ait.) Willd.	2.0	HP	N	N
		Anemone acutiloba (DC.) G.Lawson (= *Hepatica a.* DC.)	7.5	HP	N	N
		Anemone quinquefolia L.	1.4	HP	N	N
		Clematis virginiana L.	< 1	VP	N	FAC
		Coptis trifolia (L.) Salisb.	19.7	HP	N	FACW
		Ranunculus abortivus L.	3.4	HA	N	FACW–
		Ranunculus acris L.	1.4	HP	I	FAC+
		Ranunculus allegheniensis Britt.	< 1	HP	N	FAC
		Ranunculus hispidus Michx.	1.4	HP	N	FAC
		Ranunculus recurvatus Poir.	7.5	HP	N	FAC+
		Ranunculus repens L.	< 1	HP	I	FAC
		Thalictrum dioicum L.	1.4	HP	N	FAC
	Rosaceae	*Agrimonia gryposepala* Wallr.	< 1	HP	N	FACU
		Amelanchier sp.	78.9	SD	N	NA
		Crataegus sp.	7.5	TD	?	NA
		Dalibarda repens L.	10.9	HP	N	FAC
		Fragaria virginiana P. Mill.	< 1	HP	N	FACU
		Geum aleppicum Jacq.	< 1	HP	I	FAC
		Geum canadense Jacq.	< 1	HP	N	FACU
		Geum laciniatum Murr.	< 1	HP	N	FAC+

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
		Malus pumila Mill. (= *Pyrus malus* L.)	< 1	TD	I	N
		Potentilla recta L.	< 1	HP	I	N
		Potentilla simplex Michx.	5.4	HP	N	N
		Prunus pensylvanica L.f.	10.9	TD	N	FACU–
		Prunus serotina Ehrh.	91.2	TD	N	FACU
		Prunus virginiana L.	< 1	TD	N	FACU
		Rosa multiflora Thunb.	4.1	SD	I	FACU
		Rubus allegheniensis Porter	64.6	SD	N	FACU
		Rubus hispidus L.	2.0	VW	N	FACW
		Rubus idaeus L.	10.2	SD	N	FAC–
		Rubus pubescens Raf.	2.7	SD	N	FACW
		Sorbus americana Marsh.	< 1	TD	N	FACU
		Waldsteinia fragarioides (Michx.) Tratt.	3.4	HP	N	N
	Rubiaceae	*Galium asprellum* Michx.	< 1	HP	N	OBL
		Galium triflorum Michx.	26.5	HP	N	FACU
		Mitchella repens L.	71.4	HP	N	FACU
	Salicaceae	*Populus grandidentata* Michx.	1.4	TD	N	FACU–
		Populus tremuloides Michx.	2.0	TD	N	N
	Sapindaceae	*Acer pensylvanicum* L.	85.0	TD	N	FACU
		Acer rubrum L.	94.6	TD	N	FAC
		Acer saccharum Marsh.	58.5	TD	N	FACW
	Saxifragaceae	*Chrysosplenium americanum* Schwein.	4.1	HP	N	OBL
		Saxifraga pensylvanica L.	< 1	HP	N	OBL
		Tiarella cordifolia L.	17	HP	N	FACU–
	Solanaceae	*Solanum dulcamara* L.	1.4	VW	I	FAC–
	Ulmaceae	*Ulmus* sp.	< 1	TD	N	NA
	Urticaceae	*Boehmeria cylindrica* (L.) Sw.	< 1	HP	N	FACW+
		Laportea canadensis (L.) Weddell	11.6	HP	N	FACW
		Pilea pumila (L.) Gray	9.5	HA	N	FACW
		Urtica dioica L.	< 1	HP	I	FACU
	Violaceae	*Viola blanda* Willd.	72.1	HP	N	FACW
		Viola canadensis L.	6.1	HP	N	N
		Viola cucullata Ait.	6.8	HP	N	FACW+
		Viola macloskeyi Lloyd	66.7	HP	N	OBL
		Viola pubescens Ait.	8.8	HP	N	FACU–
		Viola sagittata Ait.	< 1	HP	N	FACW
		Viola sororia Willd.	< 1	HP	N	FAC–
Magnoliophyta: Liliopsida						
	Alliaceae	*Allium tricoccum* Ait.	8.2	HP	N	FACU+
	Colchicaceae	*Uvularia grandiflora* Sm.		HP	N	N
		Uvularia perfoliata L.	1.4	HP	N	FACU
		Uvularia sessilifolia L.	58.5	HP	N	FACU–
	Cyperaceae	*Carex aestivalis* M.A. Curtis	26.5	HP	N	N
		Carex aggregata Mack. (= *Carex sparganioides* Muhl. var. *a.* [Mackenzie] Gleason)	1.4	HP	N	FACU

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
		Carex appalachica J. Webber & P.W. Ball	5.4	HP	N	N
		Carex arctata Boott	15.6	HP	N	OBL
		Carex argyrantha Tuckerman	2.7	HP	N	N
		Carex baileyi Britt.	2.0	HP	N	OBL
		Carex blanda Dewey	< 1	HP	N	FAC
		Carex bromoides Willd.	2.7	HP	N	FACW
		Carex brunnescens (Pers.) Poir.	11.6	HP	N	FACW
		Carex canescens L.	< 1	HP	N	OBL
		Carex communis Bailey	73.5	HP	N	N
		Carex debilis Michx.	75.5	HP	N	FAC
		Carex deweyana Schwein.	17.7	HP	N	FACU
		Carex digitalis Willd.	10.9	HP	N	UPL
		Carex gracilescens Steud.	1.4	HP	N	N
		Carex gracillima Schwein.	14.3	HP	N	FACU
		Carex gynandra Schwein.	< 1	HP	N	OBL
		Carex intumescens Rudge	23.1	HP	N	FACW+
		Carex laxiculmis Schwein.	31.3	HP	N	N
		Carex laxiflora Lam.	17.7	HP	N	FACU
		Carex leptonervia (Fern.) Fern.	42.9	HP	N	FACW
		Carex pedunculata Muhl.	14.3	HP	N	N
		Carex pensylvanica Lam.	2.7	HP	N	N
		Carex plantaginea Lam.	8.8	HP	N	N
		Carex prasina Wahlenb.	10.2	HP	N	OBL
		Carex projecta Mackenzie	< 1	HP	N	FACW
		Carex radiata (Wahlenb.) Small	1.4	HP	N	N
		Carex rosea Schkuhr	4.1	HP	N	N
		Carex scabrata Schwein.	11.6	HP	N	OBL
		Carex scoparia Schkuhr	2.0	HP	N	FACW
		Carex stipata Muhl.	4.1	HP	N	N
		Carex swanii (Fern.) Mackenzie	6.1	HP	N	FACU
		Carex trisperma Dewey	1.4	HP	N	OBL
		Carex umbellata Schkuhr	< 1	HP	N	N
		Carex vulpinoidea Michx.	< 1	HP	N	OBL
		Dulichium arundinaceum (L.) Britt.	< 1	HP	N	OBL
		Scirpus atrovirens Willd.	2.0	HP	N	OBL
		Scirpus cyperinus (L.) Kunth	< 1	HP	N	FACW
Juncaceae		*Juncus effusus* L.	5.4	HP	N	FACW+
		Juncus tenuis Willd.	< 1	HP	N	FAC–
		Luzula acuminata Raf.	5.4	HP	N	FAC
Liliaceae		*Clintonia borealis* (Ait.) Raf.	12.2	HP	N	FAC
		Erythronium americanum Ker-Gawl.	5.4	HP	N	FAC
		Medeola virginiana L.	78.9	HP	N	N
		Streptopus amplexifolius (L.) DC.	2.0	HP	N	FAC+
		Streptopus roseus Michx.	28.6	HP	N	FAC–
Melanthiaceae		*Trillium erectum* L.	25.9	HP	N	FACU–
		Trillium grandiflorum (Michx.) Salisb.	1.4	HP	N	N
		Trillium undulatum Willd.	57.8	HP	N	FACU

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
		Veratrum viride Ait.	3.4	HP	N	FACW+
	Orchidaceae	*Cypripedium acaule* Ait.	2.0	HP	N	FACU
		Epipactis helleborine (L.) Crantz	4.8	HP	I	N
		Galearis spectabilis (L.) Rafinesque (= *Orchis s.* L.)	< 1	HP	N	N
		Goodyera pubescens (Willd.) R. Br.	1.4	HP	N	FACU–
		Platanthera clavellata (Michx.) Luer (= *Habenaria c.* [Michx.] Spreng.)	< 1	HP	N	FACW+
		Platanthera hookeri (Torr.) Lindley (= *Habenaria h.* Torr.)	7.5	HP	N	FAC
		Platanthera orbiculata (Pursh) Lindley (= *Habenaria o.* [Pursh] Torr.)	7.5	HP	N	FAC
	Poaceae	*Agrostis capillaris* L.	< 1	HP	I	N
		Agrostis gigantea Roth	< 1	HP	I	FACW
		Agrostis hyemalis (Walt.) B.S.P.	< 1	HP	N	FAC
		Agrostis perennans (Walt.) Tuckerman	5.4	HP	N	FACU
		Anthoxanthum odoratum L.	1.4	HP	I	FACU
		Brachyelytrum erectum (Schreb.) Beauv.	85.0	HP	N	N
		Bromus pubescens Muhl.	< 1	HP	N	N
		Calamagrostis canadensis (Michx.) Beauv.	< 1	HP	N	FACW+
		Cinna latifolia (Trev.) Griseb.	54.4	HP	N	FACW
		Dactylis glomerata L.	< 1	HP	I	FACU
		Danthonia compressa Austin	49.0	HP	N	FACU–
		Danthonia spicata (L.) Beauv.	1.4	HP	N	N
		Dichanthelium acuminatum (Sw.) Gould & C.A.Clark (= *Panicum lanuginosum* Ell.)	1.4	HP	N	FAC
		Dichanthelium clandestinum (L.) Gould (= *Panicum c.* L.)	6.1	HP	N	FAC+
		Elymus hystrix L.	7.5	HP	N	N
		Elymus riparius Wieg.	< 1	HP	N	FACW
		Festuca obtusa Biehler (= *F. subverticillata* [Pers.] Alexeev)	19.0	HP	N	FACU
		Glyceria melicaria (Michx.) F.T. Hubbard	24.5	HP	N	OBL
		Holcus lanatus L.	< 1	HP	I	FACU
		Leersia oryzoides (L.) Sw.	1.4	HP	N	OBL
		Leersia virginica Willd.	< 1	HP	N	FACW
		Lolium perenne L.	< 1	HP	I	FACU–
		Milium effusum L.	15.0	HP	I	N
		Muhlenbergia sp.	< 1	HP	N	NA
		Oryzopsis racemosa (Sm.) Ricker	8.8	HP	N	N
		Phalaris arundinacea L.	< 1	HP	N	FACW+
		Phleum pratense L.	< 1	HP	I	FACU
		Poa alsodes Gray	33.3	HP	N	FACW–

Appendix (*cont'd*)

group	family	species	freq. (%)	growth form	native/ introd.	wetland ind. status
		Poa compressa L.	< 1	HP	I	FACU
		Poa languida A.S. Hitchc.	< 1	HP	N	N
		Poa pratensis L.	< 1	HP	I	FACU
		Poa saltuensis Fern. & Wieg.	2.0	HP	N	N
		Poa trivialis L.	< 1	HP	N	FACW
		Schizachne purpurascens (Torr.) Swallen	5.4	HP	N	N
	Ruscaceae	*Maianthemum canadense* Desf.	86.4	HP	N	FAC–
		Maianthemum racemosum (L.) Link. (= *Smilacina racemosa* [L.] Desf.)	20.4	HP	N	FACU–
		Polygonatum biflorum (Walt.) Ell.	< 1	HP	N	FACU
		Polygonatum pubescens (Willd.) Pursh	36.1	HP	N	N
	Smilacaceae	*Smilax herbacea* L.	15.6	VP	N	FAC
		Smilax hispida Muhl.	6.8	VW	N	FAC

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The Historical Flora of Wykers Island in the Delaware River, Bucks County, Pennsylvania, from the 1884 to 1887 Botanical Notes of John and Harvey Ruth

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ABSTRACT. Over three years beginning in 1884, amateur botanists John and Harvey Ruth conducted a vascular plant species inventory of Wykers Island, now known as Lynn Island, in the Delaware River, Bucks County, Pennsylvania. This is one of the earliest known detailed descriptions of native plant communities in the state. It is a unique "snapshot" of the species composition of a riverine floodplain from a time before most of the native plant communities on riverine floodplains in the region were greatly altered by invasive plants and plant pathogens introduced from Eurasia. The Ruths' accounts are presented verbatim. An appendix lists the 197 species identified by them, with updated nomenclature, together with the 155 taxa found in a survey at the same site in 1992, which included only 51 of the species encountered by the Ruths.

INTRODUCTION

Detailed descriptions of plant communities from the nineteenth century are rare treasures for the botanist, historical ecologist, or wildland restoration specialist. So rare, in fact, that in several years of searching we have turned up only a handful for the entire state of Pennsylvania. People who had the botanical knowledge to identify all of the species growing in a particular location were uncommon then, as they are now. Even more exceptional were those who took the trouble to do so, and then to catalog them in writing. Except for the work of Alexander von Humboldt and Charles Darwin, ecology and plant geography scarcely existed as scientific disciplines until the 1890s, a decade that saw Eugenius Warming in Denmark, Oscar Drude and Andreas Schimper in Germany, and C. Hart Merriam and Henry C. Cowles in the United States independently turn ecology into a functioning science (Worster 1994). Until then it evidently didn't occur to most botanists and natural historians that species differences among plant communities—and their causes—were subjects worthy of study.

Historical "florulas" such as the subject of this article are our best sources of information about the species composition of plant communities before they were greatly altered by invasive exotic plants, introduced pathogens, and lethal insects from other parts of the world. Many native plants lack co-evolved defenses against these onslaughts; furthermore, native

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July 29th. 1885
Made a botanical trip to Wykers Island. This island, the most northern of the islands belonging to the County of Bucks, lies in the Delaware River, near the mouth of Gallows Run, and on the northern boundary of Nockamixon township, to which it was confirmed by the court in 1786. It doubtless received its name from the Wykers, a family who years ago lived at the Narrows, and probably were once the owners thereof. When the Dlaware is at low water mark the island is of considerable size, but during high water, the greater part of it, if not its entire surface ~~is~~ was swept by the river. Its higher portions are covered with sand, on which grow some forest trees, while the lower portions are an almost bare mass of cobble stones. Its present owner is Mr. Josiah Rufe. To the botanist this island is of considerable interest. It has frequently been visited by Dr. J. S. Mayer and other botanists, who were attracted by its rich flora, which presents all the characteristics of a river flora. Seeds from distant localities are brought by the freshets, and deposited among the drift heaps where they spring up, and in time the plants become firmly established. Cultivation does not retard plant growth, and the island has become partly covered with an almost impassable jungle. It has long been my desire to possess a complete catalogue of the flora of this island, but circumstances have heretofore not permitted us to begin the work. In our to-day's visit to the place we saw an opportunity to begin such a catalogue, and therefore collected such plants as fell within our reach. They represent the flora of the northern part of the island, ~~We~~ failed to penetrate to the higher, or thickly wooded parts. To this list I have added some plants which were observed in 1884, and to it we hope to make still further contributions in the future, till the list is as complete as it is possible for us to make it.

Flora of Wykers Island Bucks Co Penna.

1. Mollugo verticellata, L. Carpet-weed
2. Bratiola aurea, Nutt Golden Bratiola. Northern extremity.
3. Tanacetum vulgare, L. Tansy.
4. Eleocharis ~~intermedia~~ palustris, Schultes. Along the Delaware
5. Oxalis stricta, L. Yellow Wood Sorrel.
6. Physalis Virginiana, Mill. ??
7. Cassia chamaecrista, L. Partridge Pea
8. Helianthus giganteus, L. Giant Sunflower.
9. Hypericum pyramidatum, Ait. Great St. Johns-wort.
10. Cenchrus tribuloides, L. Sand Bur. Bur Grass.
11. Panicum capillare, L. Old-witch Grass.
12. Cornus sericea, L. Silky Cornel. Kinnikinnick.
13. Menispermum Canadense, L. Moonseed.

Collected for this island was granted by the State of Penna. to Wm. Penn, Jan. 21-1682. It was previously known as Gallows Island, and the name

Figure 1. The beginning of the Wykers Island floral list, from John Ruth's botanical notes.

predators, parasites, and herbivores have been incapable of regulating many of the newcomers' populations. Other relatively recent human influences, including land-use fragmentation, overbrowsing by unprecedented high deer populations, acid rain, and wildfire suppression, have resulted in a host of indirect effects on plant community composition. Today, as interest grows in probing these processes with the tools of modern scientific experimentation and in restoring certain "natural" ecosystems, the rare, early snapshots of native plant communities become more and more valuable.

The brothers John A. Ruth (1859-1918) and Harvey F. Ruth (1866-1904), amateur botanists who lived in northern Bucks County, Pennsylvania, were ahead of their time in their keen observations of habitat differences in plant species composition. As detailed in an earlier issue of *Bartonia* (White and Rhoads 1996), their botanical pursuits included John's meticulous accounts of their finds in a series of notebooks begun in 1881, when he was 22 and his brother was 16 (Ruth 1881-1917; see Figure 1). Despite their youth and amateur status, the Ruth brothers quickly cultivated a network of professional botanists who were their frequent correspondents and field companions. Their identifications were regarded as trustworthy because they were in the habit of sending difficult specimens to eminent botanists for

confirmation, including Thomas C. Porter (professor at Lafayette College and author of the first statewide flora of Pennsylvania, published posthumously in 1903), who was another pioneer in the plant geography of our region. The Ruths' finds were incorporated by others into county-wide and state-wide floras (Benner 1932; Porter 1903) but we have found no evidence that any of their notes, which are in the archives of the Academy of Natural Sciences of Philadelphia, have ever been published.

We were particularly struck by six notebook entries from January 1884 to October 1887 in which John Ruth recounted the brothers' visits to Wykers Island, now called Lynn Island, in the Delaware River at the Narrows below Nockamixon Cliffs (see Figures 2 and 3). This eyewitness account has special interest today because it is extraordinarily thorough for its time and because by now much of the region's riparian vegetation has been severely altered by invasive exotics, deer browsing, and other factors that have changed a great deal since the 1880s.

In 1884-1887, the Ruths identified 197 vascular plant species on the island, 166 native to the region and 31 introduced from Eurasia. They made no comment indicating that any of the non-native species were abundant. A survey in 1992 by Pam White and Ann Rhoads included 155 taxa, 111 native to the region and 44 introduced, including just 51 of the species identified more than 100 years earlier by the Ruths (see Appendix). Of the 51 species common to both lists, only 5 are introduced—*Barbarea vulgaris* (common wintercress), *Daucus carota* (Queen Anne's-lace), *Hypericum perforatum* (common St. John's-wort), *Linaria vulgaris* (butter-and-eggs) and *Plantago major* (broad-leaved plantain); none is considered an invasive pest species. According to White and Rhoads (1996), "Today the herbaceous flora of much of the island's interior is dominated by exotics such as *Alliaria petiolata, Anthriscus sylvestris, Hesperis matronalis, Microstegium vimineum, Lonicera japonica, Lamium purpureum, Glechoma hederacea, Allium vineale* and *Polygonum cuspidatum* [*Fallopia japonica*], none of which were reported 100 years ago."

Here we present the Ruths' notebook entries documenting their historic surveys of Wykers Island in their entirety, as a window into the experience of a pair of dedicated, late nineteenth-century, amateur botanists. We have attempted a faithful transcription of the notes including variant spelling and punctuation, capitalization and cross-outs. The current names of plants are inserted in square brackets where appropriate. We conclude with an appendix that lists, in current nomenclature and by family, the Ruths' finds and the additional taxa found by White and Rhoads in 1992.

Excerpts from the Ruth Brothers' Botanical Notes

Jan. 20 – 1884.

If opportunity offers we will work out the botany of Wyker's Island. The island is not a large one, but is covered with a dense mass of vegetation, and doubtless some very interesting plants. Aquatic plants may be looked for. At high water the entire island is submerged. An orchard was on it at one time, several apple~~s~~ trees remaining to mark the spot. Among the rare plants ~~is~~ are the beautiful Lupinus perennis, and Smilacina stellata. The northern end is covered with cobble stones, and overgrown with low bushes and grasses. The southern end is covered with trees, overgrown with parasitic vines. During the great freshets of late years large quantities of driftwood and logs have been lodged on the middle and southern sections. Great piles of it are every where seen. This forms an excellent harbor for rabbits and other small animals, and perhaps some reptiles. By a little work and perseverance much may be learned about this island.

Aug. 23 – 1884.

Yesterday morning Harvey loaned Mr. Riegel's boat and we went to Wyker's Island. We found the island an excellent collecting ground for many of the grasses, but had collected most of them before. We however found good specimens of Spartina cynosuroides [*S. pectinata*] or Fresh Water Cord Grass and Panicum proliferum [*P. dichotomiflorum*]. The former is probably new to our county. We also found Lythrum Salicaria, Cirsium discolor, and three species of Potamogeton, which as near as we can determine without the fruit are P. lucens [*P. illinoensis*], P. lonchites [*P. gramineus* L.], and P. perfoliatus. They grow in the Delaware at Monroe. The island is a mass of vegetation, a paradise for the botanist. It would be an excellent training to catalogue the flora of the island. I would try it if I lived nearer. We found the grasses fine and abundant. The Leguminosae were well represented by the Lupine and by a number of species of Desmodium and Lespedeza. The Star Cucumber is common, and frequently ascends to the tops of the trees. Laportea soon reminded us of its presence. We found three species of Oak. Willows form an important part of the vegetation. Received Bailey's 'Botanical Collectors Handbook.' It contains instructions for collecting all kinds of plants. If circumstances are favorable I shall next spring begin a new, first class herbarium. Mounted on good paper, and poison proof against insects.

July 29th. 1885.

. . . Made a botanical trip to Wyker's Island. This island, the most northern of the islands belonging to the county of Bucks, lies in the Delaware River, near the mouth of Gallows Run, and on the

Figure 2. A 1991 view of Lynn Island (formerly Wykers Island) from the top of Nockamixon Cliffs (photo by Ann Rhoads).

northern boundary of Nockamixon township, to which it was confirmed by the court in 1786. It doubtless received its name from the Wyker's, a family who years ago lived at the Narrows, and probably were once the owners thereof. When the Delaware is at low water mark the island is of considerable size, but during high water, the greater part of it, if not its entire surface ~~are~~ is swept by the river. Its higher portions are covered with sand, on which grow some forest trees, while the lower portions are an almost bare mass of cobble stones. Its present owner is Mr. Josiah Rufe. To the botanist this island is of considerable interest. It has frequently been visited by Dr. I. S. Moyer and other botanists, who were attracted by its rich flora, which presents all the characteristics of a river flora. Seeds from distant localities are brought by the freshets, and deposited among the drift heaps where they spring up, and in time the plants become firmly established. Cultivation does not retard plant growth, and the island has become partly covered with an almost impassable jungle. It has long been my desire to possess a complete catalogue of the flora of this island, but circumstances have heretofore not permitted us to begin the work. In our to-day's visit to the place we saw an opportunity to begin such a catalogue, and therefore collected such plants as fell within our reach. They represent the flora of the northern part of the island. We failed to penetrate to the higher, or thickly wooded parts. To this list I have added some plants which were observed in 1884, and to it we hope to make still further contributions in the future, till the list is as complete as it is possible for us to make it.

[marginal note] A patent for this island was granted by the State of Penna. to Wm. Erwin Jan. 21 – 1812. It had previously been surveyed Dec. 10 – 1811, and the area is given 14 a. 16 p.

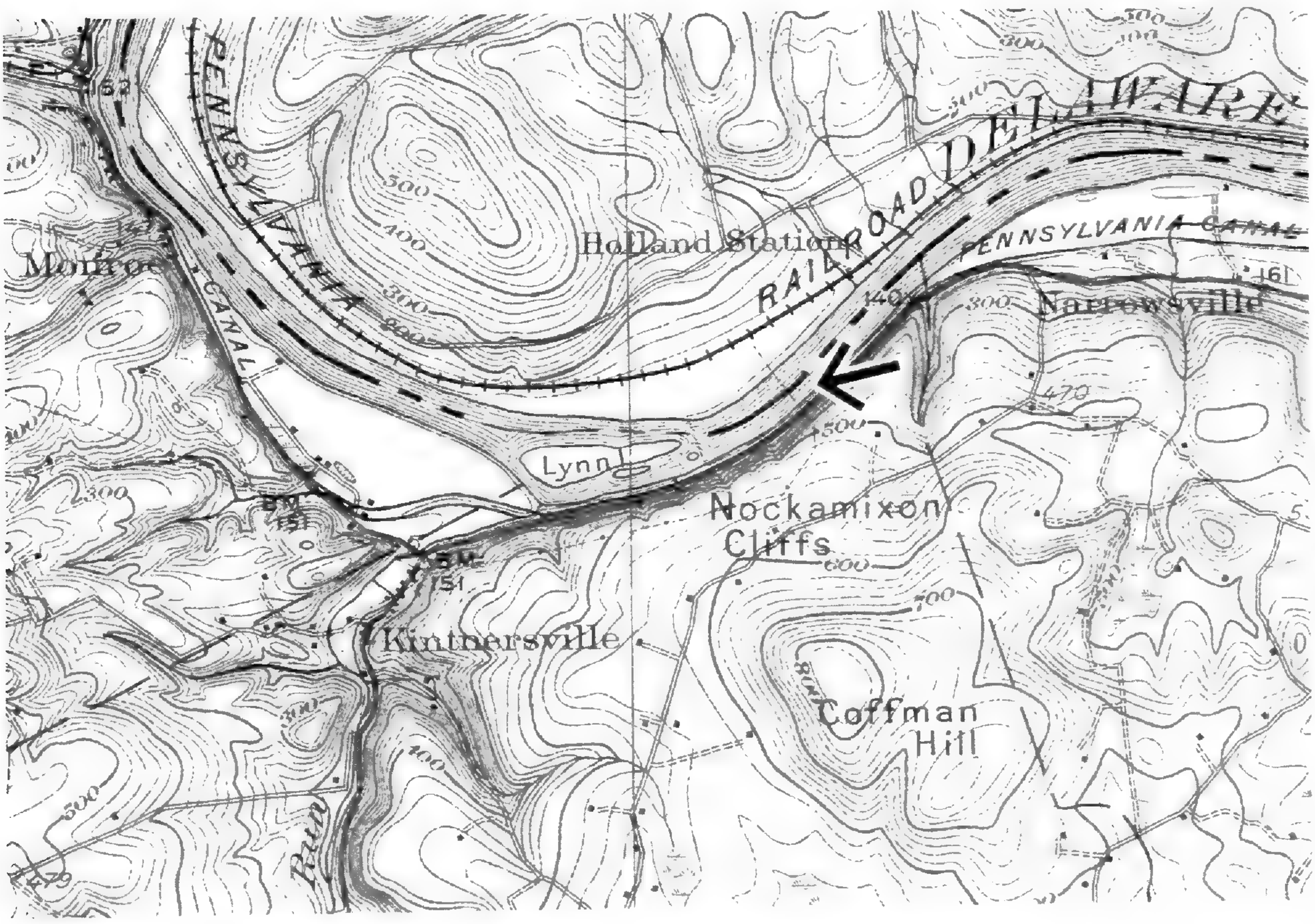

Figure 3. An early twentieth-century map of Lynn Island and vicinity (adapted from U.S. Geological Survey 1932). The arrow indicates the vantage point and direction of the photo in Figure 2. Scale: 1 inch = approximately 4,000 feet. North at top.

Flora of Wyker's Island, Bucks Co. Penna.

1. Molugo verticellata, L. Carpet-weed. [*Mollugo verticillata*]
2. Gratiola aurea, Muhl. Golden Gratiola. Northern extremity.
3. Tanacetum vulgare, L. Tansy.
4. Eleocharis ~~intermedia~~ palustris, Schultes. Along the Delaware. [(L.) Roemer & Schultes]
5. Oxalis stricta, L. Yellow Wood-Sorrel..
6. Physalis Virginiana, Mill. ??
7. Cassia chamaecrista, L. Partridge Pea. [*Chamaecrista fasciculata* (Michx.) Greene]
8. Helianthus giganteus, L. Giant Sunflower.
9. Hypericum pyramidatum, Ait. Great St. John's-wort.
10. Cenchrus tribuloides, L. Sand Bur. Bur Grass.
11. Panicum capillare, L. Old-witch Grass.
12. Cornus sericea, L. Silky Cornel. Kinnikinnick. [*C. amomum* P.Mill.]
13. Menispermum Canadense, L. Moonseed.
14. Carpinus Americana, Mx. Hornbeam. [*C. caroliniana* Walt.]
15. Chrysopogon nutans, Benth. Indian Grass. [*Sorghastrum n.* (L.) Nash]
16. Spiraea salicifolia, L. Common Meadow Sweet. [*S. latifolia* (Ait.) Borkh.]
17. Liriodendron Tulipifera, L. Tulip Poplar.
18. Lysimachia quadrifolia, L. Four-leaved Loosestrife.
19. Verbena urticifolia, L. White Vervain.
20. Verbena hastata, L. Blue Vervain.
21. Tradescantia Virginica, L. Common Spiderwort. [*virginiana*]
22. Scutellaria laterifolia, L. Mad-dog Skullcap. [*lateriflora*]
23. Setaria glauca, Beauv. Foxtail Grass. [*S. pumila* (Poir.) Schultes]
24. Panicum Crus-galli, L. Barnyard Grass. [*Echinochloa crusgalli* (L.) Beauv.]
25. Lepidium Virginicum, L. Wild Pepper Grass.
26. Onoclea sensibilis, L. Sensitive Fern.
27. Galium asprellum, Mx. Rough Bedstraw.
28. Rumex crispus, L. Common, or Curled Dock.
29. Hypericum perforatum, L. Common St. John's-wort.
30. Ampelopsis quinquefolia, Mx. Virginian Creeper. [*Parthenocissus q.* (L.) Planch.]
31. Rhus toxicodendron, L. Poison Ivy. [*Toxicodendron radicans* (L.) Kuntze]
32. Crataegus coccinea, L. Scarlet-fruited Thorn.
33. Baptisia tinctoria, R.Br. Wild Indigo. [(L.) Vent.]
34. Phleum pratense, L. Timothy.
35. Aster patens, Ait. Spreading Aster. [*Symphyotrichum p.* (Ait.) Nesom]
36. Asclepias tuberosa, L. Pleurisy Root.
37. Verbascum Thapsus, L. Common Mullein.
38. Panicum clandestinum, L. Hidden-flowered Panic Grass. [*Dichanthelium c.* (L.) Gould]
39. Rudbeckia hirta, L. Cone Flower.
40. Ludwigia alternifolia, L. Seed-box.
41. Elymus Canadensis, L. Var. glaucifolia, Gr. Wild Rye. Lyme Grass.
42. Cyperus filiculmis, Vahl. Wiry Sedge. [*C. lupulinus* (Sprengel) Marcks]
43. Chrysanthemum Leucanthemum, L. Ox-eye Daisy. [*Leucanthemum vulgare* Lam.]
44. Chenopodium Botrys, L. Jerusalem Oak. [*Dysphania b.* (L.) Mosyakin & Clemants]
45. Elymus Canadensis, L. Wild Rye.
46. Panicum dichotomum, L. Polymorphus Panic Grass. [*Dichanthelium d.* (L.) Gould]
47. Cassia Marilandica, L. Wild Senna. [*Senna m.* (L.) Link]
48. Euphorbia corollata, L. Flowering Spurge.
49. Betula nigra, L. River Birch.
50. Teucrium Canadense, L. Germander.
51. Rhyncospora glomerata, Vahl. Common Beak Rush. [*Rhynchospora capitellata* (Michx.) Vahl]
52. Eupatorium purpureum, L. Joe Pye Weed. [*Eutrochium p.*]
53. Juglans cineria, L. Butternut. [*cinerea*]
54. Mimulus ringens, L. Monkey Flower.
55. Platanus occidentalis, L. Buttonwood.
56. Linaria vulgaris, Mill. Toad Flax. [Hill]
57. Potentilla Canadensis, L. Common Cinquefoil.
58. Lespedeza capitata, Mx. Capitate Bush Clover.
59. Tephrosia Virginiana, Pers. Goat's Rue. [(L.) Pers.]
60. Daucus Carota, L. Common Carrot.
61. Echium vulgare, L. Viper's Bugloss.
62. Saponaria officinalis, L. Bouncing Bet.
63. Achillea Millefolium, L. Yarrow.
64. Apocynum cannabinum, L. Indian Hemp.
65. Penthorum sedoides, L. Ditch Stone Crop.
66. Andropogon scoparius, Mx. Purple Wood

Grass. [*Schizachyrium scoparium* (Michx.) Nash]
67. Cyperus inflexus, Muhl. Dwarf Galingale. [*C. squarrosus* L.]
68. Eleocharis obtusa, Schultes. Obtuse Spike-rush. [(Willd.) Schultes]
69. Mentha Canadensis, L. Wild Mint. [*M. arvensis* L.]
70. Eupatorium perfoliatum, L. Thoroughwort.
71. Hypericum ellipticum, Hook. Elliptic St. John's-wort.
72. Hypericum mutilum, L. Dwarf St. John's-wort.
73. Lysimachia ciliata, L. Fringed Loosestrife.
74. Lysimachia stricta, Ait. Spiked Loosestrife. [*L. terrestris* (L.) BSP]
75. Andropogon furcatus, Muhl. Finger-spiked Wood Grass. [*A. gerardii* Vitman]
76. Equisetum arvense, L. Common Horsetail.
77. Equisetum hyemale, L. Scouring Rush. 1884.
78. Ambrosia artemisiaefolia, L. Ragweed. [*artemisiifolia*]
79. Plantago lanceolata, L. Ribgrass.
80. Cyperus phymatodes, Muhl. Straw Sedge. [*C. esculentus* L.]
81. Juncus acuminatus, Mx. Var. legitimus, Gr. Sharp-fruited Rush.
82. Juncus tenuis, Willd. Slender Rush.
83. Cyperus dentatus, Torr. Toothed Galingale.
84. Prunus pumila, L. Dwarf Cherry.
85. Desmodium Canadense, DC. Canada Tick Trefoil. [(L.) DC.]
86. Eragrostis pilosa, Beauv. Slender Meadow Grass. [(L.) Beauv.]
87. Solidago lanceolata, L. Lanceolate Golden-rod. [*Euthamia graminifolia* (L.) Nutt.]
88. Nasturtium palustris, DC. Marsh Cress. [*N. officinale* R.Br.]
89. Barbarea vulgaris, R.Br. Yellow Rocket.
90. Agrostis scabra, Willd. Hair Grass.
91. Cuscuta gronovii, Willd. Common Dodder.
92. Spartina cynosuroides, Willd. Fresh water Cord Grass. [*S. pectinata* Link]
93. Panicum virgatum, L. Tall, Smooth Panic Grass.
94. Panicum agrostoides, Spreng. Agrostis-like Panic Grass. [*P. rigidulum* Nees]
95. Panicum proliferum, Lam. Prolific Panic Grass. 1884. [*P. dichotomiflorum* Michx.]
96. Lythrum salicaria, L. Spiked Loosestrife. 1884.
97. Cirsium discolor, Spreng. Two colored Thistle. 1884. [(Muhl.) Spreng.]
98. Lupinus perennis, L. Wild Lupine. 1884.
99. Sicyos angulatus, L. One-seeded Star Cucumber. 1884.
100. Diospyrus Virginiana, L. Persimmon. [*Diospyros*]
101. Laportea Canadensis, Gaudichaud. Wood-nettle. 1884. [(L.) Weddell]
102. Rubus Canadensis, L. Low Blackberry. Dewberry.

Of the above named Flora, Nos. 83, 92 & 96 are new to the flora of Bucks Co., and are rare. No. 92 is found at the extreme northern end of the island and is well established. Of No. 96 we found a single plant along the eastern shore near the water's edge. Have not seen it this year. It has probably been destroyed. Of No. 100 we found a small tree, well in fruit. It is rare in these parts but common in the Trap Rock Region. 98 is not common. We have noticed a few plants of it along the Delaware, north of the island. 84 is a very interesting shrub, having somewhat the appearance of a willow. It is at present laden with the ripe cherries. 99 was very abundant when we were on the island in 1884. Its vines covered bush and tree. 36 was very abundant at the same time. No. 2 is found in the mud at the northern extremity, and is also found along the Delaware near Monroe. Grasses are plentiful. The above list contains 18 species. The St. John's-worts are well represented.

When returning from the island we made an examination of the Potamogetons growing in the Delaware, and found the following:—

1. Potamogeton lonchitis, Tuckerm. Long-leaved P. [*P. gramineus* L.]
2. [Potamogeton] lucens, L. Shining Pondweed. [*P. illinoensis* Morong]
3. [Potamogeton] perfoliatus, L. Perfoliate [Pondweed].

No. 1 is new to the county as is also No. 2. No. 3 is found at a single place near Monroe, and I am not too sure in regard to the analysis. It may be P. crispus, L. Found some Fresh Water Sponges, on the under side of stones along the shore. Found Dulichium spathaceum, Pers. [*D. arundinaceum* (L.) Britt.] along the Delaware, near John Nicholas' woods. The second bud of our Night-blooming Cereus opened last night.

August 21st. 1885.

Made another trip to Wyker's Island yesterday for the purpose of collecting its flora. Found Cyperus dentatus and Sparatina [sic] cynosuroides well established. Came through the higher and wooded parts of the island and made the following additions to our list of the Flora:

Flora of Wyker's Island. (Continued)

103. Lobelia cardinalis, L. Cardinal flower. Rare.
104. Helianthus annuus, L. Common Sun Flower.
105. Impatiens fulva, Nutt. Spotted Touch-me-not. [*I. capensis* Meerb.]
106. Smilacina stellata, Desf. Stellate Solomon's Seal. [*Maianthemum stellatum* (L.) Link.]
107. Cirsium altissimus Willd. Tallest Thistle. [*C. altissimum* (L.) Spreng.]
108. Poa serrotina, Ehrhart. Foul Meadow Grass. [*P. palustris* L.]
109. Tricuspis seslerioides, Torr. Tall Red Top. [*Tridens flavus* (L.) A.S.Hitchc.]
110. Bromus ciliatus, L. Var. purgans, Gr. Fringed Brome Grass.
111. Smilacina racemosa, Desf. False Spikenard. [*Maianthemum racemosum* (L.) Link.]
112. Lindera Benzoin, Meisner. Spice Bush. [(L.) Blume]
113. Celastrus scandens, L. Climbing Bitter-sweet.
114. Rhus typhina, L. Staghorn Sumach.
115. Silene stellata, Ait. Starry Campion. [(L.) Ait.f.]
116. Anemone Virginiana, L. Virginian Anemone.
117. Elymus striatus, Willd. Slender Lyme Grass. [*E. villosus* Muhl. ex Willd.]
118. Hydrangea arborescens, L. Wild Hydrangea.
119. Alisma plantago, L. Water Plantain. [*A. subcordatum* Raf.]
120. Epilobium coloratum, Muhl. Willow Herb. [Biehler]
121. Rubus occidentalis, L. Black Raspberry.
122. Phytolacca decandra, L. Pokeweed. [*P. americana* L.]
123. Thalictrum cornuti, L. Tall Meadow Rue. [*T. pubescens* Pursh]
124. Nepeta cataria, L. Catnip.
125. Smilax rotundifolia, L. Common Greenbrier.
126. Cynoglossum Morisoni, DC. Beggar's Lice. [*Hackelia virginiana* (L.) I.M.Johnston]
127. Rubus odoratus, L. Purple Flowering Raspberry.
128. Erechthites hieracifolia, Raf. Fireweed. [*Erechtites hieraciifolia* (L.) Raf. ex DC.]
129. Clematis Virginiana, L. Common Virgin's Bower.
130. Euphorbia maculata, L. Spotted Spurge.
131. Leersia oryzoides, Swartz. Rice Cut Grass. [(L.) Swartz]
132. Bidens frondosa, L. Common Beggar-ticks.
133. Oenothera biennis, L. Evening Primrose.
134. Ipomoea pandurata, Meyer. Wild Potato-vine. [(L.) G.F.W.Mey.]
135. Helenium autumnale, L. Sneeze-weed.
136. Lycopus Europaeus, L. Water Horehound.
137. Plantago major, L. Common Plantain.
138. Gerardia tenuifolia, Vahl. Slender-leaved Gerardia. [*Agalinis t.* (Vahl) Raf.]
139. Cyperus strigosus, L. Bristly-spiked Galingale.
140. Aster ericoides, L. Heath-like Aster. [*Symphyotrichum e.* (L.) Nesom]
141. Leersia Virginica, Willd. White Grass.
142. Cyperus diandrus, Torr. Diandrus Sedge.
143. Polygonum Pennsylvanicum, L. Penna. Knotweed. [*Persicaria pensylvanica* (L.) M. Gomez]
144. Ambrosia trifida, L. Great Ragweed.
145. Vernonia Noveboracensis, Willd. Ironweed. [(L.) Michx.]
146. Xanthium Canadense, Mill. Common Cocklebur. [*X. strumarium* L.]
147. Gaura biennis, L. Gaura.
148. Lactuca Canadensis, L. Wild Lettuce.
149. Castanea vesca, L. Chestnut. [*C. dentata* (Marshall) Borkh.]
150. Juniperus Virginiana, L. Red Cedar.
151. Cinna arundinacea, L. Wood Reed Grass.
152. Carex comosa, Boot.
153. Muhlenbergia Mexicana, Trin. Mexican Muhlenbergia. [(L.) Trin.]
154. Muhlenbergia sylvatica, Torr. & Gr. Sylvan Muhlenbergia. [(Torr.) Torr. ex A.Gray]
155. Carex stipata, Muhl. Awn-fruited Sedge.

Lobelia cardinalis is not common in this locality. Found three plants of it along the northern end of the island. No. 148. will bear further study. The specimens were from 6 to 8 feet high and had the general appearance of Lactuca, but had white flowers, instead of yellow. No. 117 is one of the rare grasses of this region. No. 106 is rare. Dr. Moyer collected it on the island years ago. Few specimens have been found along the Delaware. It was also discovered in another part of the county by several botanists in 1884.

On our way home we collected a lot of Potamogetons which we have sent to Dr. Moyer for analysis. Also sent him some specimens of Podostemon.

May 20th. 1887.

Made a trip to Wyker's Island, the first since 1885. During that year we made several trips for the purpose of cataloguing the flora of the island. During 1886 circumstances prevented us from continuing the work. Our former trips were made in July & August, and the plants then collected represent the mid-summer flora. To day's trip was made to collect as much as possible of the spring flora. I loaned one of Mr. Carty's boats and rowed from Monroe to the northern end of the island. One of the first plants found was Prunus pumila in flower. It is spread over the stony northern end of the island. We formerly collected it in fruit. Near by we found large beds of Lupine in flower. This is a splendid plant. I never saw such fine plants of it before. A scrubby kind of oak was found in flower but the fruit and mature leaves are necessary to determine the species. The willows form a prominent part of the flora. About an hours collecting resulted in the following additions to the flora.

Flora of Wyker's Island. Continued.

156. Galium triflorum, Mx. 1885. Sweet scented Bedstraw.
157. Thalictrum dioicum, L. Early Meadow Rue.
158. Saxifraga Virginiensis, Mx. Virginian Saxifrage.
159. Geranium maculatum, L. Wild Geranium.
160. Aspidium marginale, Swz. Shield Fern. [*Dryopteris marginalis* (L.) A.Gray]
161. Sambucus Canadensis, L. Common Elder.
162. Tilia Americana, L. Basswood.
163. Prunus Americana, Marshall. Wild Plum.
164. Anthoxanthum odoratum, L. Sweet Vernal Grass.
165. Thaspium aureum, Nutt. Golden Meadow Parsnip. [*T. trifoliatum* (L.) A.Gray]
166. Erigeron bellidifolium, Muhl. Robin's Plaintain. [*E. pulchellus* Michx.]
167. Taraxacum officinale, Weber. Dandelion.
168. Poa pratensis, L. Common Spear Grass.
169. Urtica gracilis, Ait. Nettles. [*U. dioica* L. ssp. *gracilis* (Ait.) Seland.]
170. Viola cucullata, Ait. Blue Violet.
171. Sassafras officinale, Nees. Sassafras. [*S. albidum* (Nutt.) Nees]
172. Phlox subulata, L. Moss Pink.
173. Cerastium arvense, L. Field Chickweed.
174. Vitis cordifolia, Mx. Frost Grape. [*V. vulpina* L.]
175. Salix longifolia, Muhl. Long-leaved W. [*S. exigua* Nutt.]
176. Salix alba, L. White Willow.
177. Salix petiolaris, Smith. Petioled Willow.
178. Salix cordata, Muhl. Heart-leaved W. [*S. eriocephala* Michx.]
179. Quercus ilicifolia, Wang. Scrub Oak.
180. Carex [sic]

October 1st. 1887.

. . . Made a trip to Wyker's Island this morning for the purpose of collecting its fall flora. The Delaware was in fine condition for rowing and I made the down trip in a very short time. The island is well worth visiting at this time of the year. The flora of the extreme northern end of the island is not very interesting as that part was under water a great part of the summer. But further in-

land flowering plants are abundant. Aster patens, Ait. [*Symphyotrichum p.* (Ait.) Nesom] is very abundant, and its fine, large, blue flowers are a splendid sight. Among them I found the fruit of Asclepias tuberosa. Found the following which are new to the Flora of the island:—

Flora of Wyker's Island. Continued.

181. Acalypha Virginica, L. Three-seeded Mercury.
182. Bidens connata, Muhl. Swamp Beggar-ticks.
183. Solidago nemoralis, Ait. Old field Golden Rod.
184. Gnaphalium polycephalum, Mx. Common Everlasting. [*Pseudognaphalium obtusifolium* (L.) Hilliard & B.L.Burtt.]
185. Aster cordifolius, L. Cordate-leaved Aster. [*Symphyotrichum cordifolium* (L.) Nesom]
186. Eupatorium ageratoides, L. White Snakeroot. [*Ageratina altíssima* (L.) R.M.King & H.Robinson]
187. Aster linariifolius, L. [*Ionactis l.* (L.) Greene]
188. [Aster] Novae-Angliae, L. New England Aster. [*Symphyotrichum n.* (L.) Nesom]
189. [Aster] multiflorus, Ait. Many-flowered [Aster]. [*Symphyotrichum ericoides* (L.) Nesom]
190. [Aster] umbellatus, Mill. [*Doellingeria umbellata* (P.Mill.) Nees]
191. [Aster] diffusus, Ait. Diffuse [Aster]. [*Symphyotrichum lateriflorum* (L.) A.&D.Love]
192. [Aster] paniculatus, Lam. Panicled [Aster]. [*Symphyotrichum lanceolatum* (Wieg.) Nesom]
193. Melilotus alba, Lam. White Melilot. [Medic.]
194. Solidago caesia, L. Bluish Golden Rod.
195. [Solidago] Canadensis, L. Canada [Golden Rod].
196. [Solidago] serotina, Ait. [*S. gigantea* Ait.]
197. Panicum sanguinale, L. Crab Grass. [*Digitaria sanguinalis* (L.) Scop.]
198. Quercus coccinea, Weng. Var. tinctoria, Gr. Black Oak. [*Q. velutina* Lam.]
199. Juglans nigra, L. Black Walnut.
200. Carya tomentosa, Nutt. Mocker Nut. [(Lam. ex Poir.) Nutt.]

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Appendix: Flora of Wykers Island (now Lynn Island), Bucks County, Pennsylvania

The list includes the 197 species recorded in January and August 1884, July and August 1985, and May and October 1887 by John and Harvey Ruth (Ruth 1881-1917) and the 155 taxa identified in May and August 1992 by Pam White and Ann Rhoads (White and Rhoads 1996). There are 301 taxa in all, with 51 species in common between the two sets of surveys. Nomenclature follows the Pennsylvania Flora Project database (Rhoads and Block 2006). The last column is an index of the numbers John Ruth used in his notes on the island's flora; where it is blank, the taxon was found in 1992 but not in 1884-1887. Species found by White and Rhoads, including those also seen by the Ruth brothers, are in block letters (sans-serif typeface).

Aceraceae (see **Sapindaceae**)			
Adoxaceae	*Sambucus canadensis* L.	American elder	161
Alismataceae	*Alisma subcordatum* Raf.	broad-leaved water-plantain	119
Alliaceae	*Allium canadense* L.	wild onion	
	*Allium vineale** L.	field garlic*	
Amaranthaceae	*Dysphania botrys** (L.) Mosyakin & Clemants	feather-geranium*	44
Anacardiaceae	*Rhus typhina* L.	staghorn sumac	114
	Toxicodendron radicans (L.) Kuntze	poison-ivy	31
Apiaceae	*Anthriscus sylvestris** (L.) Hoffm.	chervil*	
	*Daucus carota** L.	Queen Anne's-lace*	60
	Thaspium trifoliatum (L.) A.Gray	meadow-parsnip	165
	Zizia aptera (A.Gray) Fern.	heart-leaved alexanders	
Apocynaceae	*Apocynum cannabinum* L.	Indian-hemp	64
	Asclepias tuberosa L.	butterfly-weed	36
Araceae	*Arisaema dracontium* (L.) Schott	green-dragon	
Asclepiadaceae (see **Apocynaceae**)			
Asteraceae	*Achillea millefolium** L.	common yarrow*	63
	Ageratina altissima (L.) R.M.King & H.Robinson var. *altissima*	common white snakeroot	186
	Ambrosia artemisiifolia L.	common ragweed	78
	Ambrosia trifida L.	giant ragweed	144
	*Arctium minus** (Hill) Bernh.	common burdock*	
	*Artemisia vulgaris** L.	common mugwort*	
	Bidens connata Muhl.	purple-stemmed beggar-ticks	182
	Bidens frondosa L.	devil's beggar-ticks	132
	Cirsium altissimum (L.) Spreng.	tall thistle	107
	*Cirsium arvense** (L.) Scop.	Canada thistle*	
	Cirsium discolor (Muhl.) Spreng.	field thistle	97
	*Conyza canadensis** (L.) Cronq.	horseweed*	

*Not indigenous to the region.

Appendix (*cont'd*)

Asteraceae (*cont'd*)	*Doellingeria umbellata* (P.Mill.) Nees	flat-topped white aster	190
	Erechtites hieraciifolius (L.) Raf. ex DC.	fireweed	128
	Erigeron philadelphicus L.	daisy fleabane	
	Erigeron pulchellus Michx.	robin's-plantain	166
	Eupatorium perfoliatum L.	boneset	70
	*Eupatorium serotinum** Michx.	late eupatorium*	
	Eutrochium maculatum L.	spotted joe-pye-weed	
	Eutrochium purpureum L.	sweet-scented joe-pye-weed	52
	Euthamia graminifolia (L.) Nutt.	grass-leaved goldenrod	87
	Gnaphalium uliginosum L.	low cudweed	
	Helenium autumnale L.	common sneezeweed	135
	*Helianthus annuus** L.	common sunflower*	104
	Helianthus giganteus L.	swamp sunflower	8
	Ionactis linariifolius (L.) Greene	stiff-leaved aster	187
	Lactuca canadensis L.	wild lettuce	148
	*Leucanthemum vulgare** Lam.	ox-eye daisy*	43
	Pseudognaphalium obtusifolium (L.) Hilliard & B.L.Burtt.	fragrant cudweed	184
	Rudbeckia hirta L.	black-eyed-susan	39
	Solidago caesia L.	bluestem goldenrod	194
	Solidago canadensis L.	Canada goldenrod	195
	Solidago gigantea Ait.	smooth goldenrod	196
	Solidago nemoralis Ait.	gray goldenrod	183
	Solidago rugosa Ait.	wrinkle-leaf goldenrod	
	Symphyotrichum cordifolium (L.) Nesom	blue wood aster	185
	Symphyotrichum ericoides (L.) Nesom ssp. *ericoides*	white heath aster	140, 189
	Symphyotrichum lanceolatum (Wieg.) Nesom ssp. *lanceolatum*	simple aster	192
	Symphyotrichum lateriflorum (L.) A.&D.Love	calico aster	191
	Symphyotrichum novae-angliae (L.) Nesom	New England aster	188
	Symphyotrichum patens (Ait.) Nesom	late purple aster	35
	*Tanacetum vulgare** L.	common tansy*	3
	*Taraxacum officinale** Weber	common dandelion*	167
	Verbesina alternifolia (L.) Britt.	wingstem	
	Vernonia noveboracensis (L.) Michx.	New York ironweed	145
	Xanthium strumarium L.	common cocklebur	146
Balsaminaceae	*Impatiens capensis* Meerb.	jewelweed	105
Betulaceae	*Betula nigra* L.	river birch	49
	Carpinus caroliniana Walt.	hornbeam	14
Bignoniaceae	*Catalpa speciosa** (Warder ex Barney) Warder ex Engelm.	catalpa*	
Boraginaceae	*Echium vulgare** L.	viper's bugloss*	61
	Hackelia virginiana (L.) I.M.Johnston	beggar's-lice	126
	Myosotis sp.*	forget-me-not*	

*Not indigenous to the region.

Appendix (*cont'd*)

Brassicaceae	*Alliaria petiolata** (Bieb.) Cavara & Grande	garlic-mustard*	
	*Barbarea vulgaris** R.Br.	common wintercress*	89
	*Capsella bursa-pastoris** (L.) Medic.	shepherd's-purse*	
	*Hesperis matronalis** L.	dame's-rocket*	
	Lepidium virginicum L.	poor-man's-pepper	25
	*Nasturtium officinale** R.Br.	watercress*	88
Caesalpiniaceae (see **Fabaceae**)			
Campanulaceae	*Lobelia cardinalis* L.	cardinal-flower	103
	Lobelia inflata L.	Indian-tobacco	
Cannabaceae	*Celtis occidentalis* L.	hackberry	
Caprifoliaceae	*Lonicera japonica** Thunb.	Japanese honeysuckle*	
	*Lonicera morrowii** A.Gray	Morrow's honeysuckle*	
(see also **Adoxaceae**)			
Caryophyllaceae	*Cerastium arvense* L. ssp. *arvense*	field chickweed	173
	*Saponaria officinalis** L.	bouncing-bet*	62
	*Silene latifolia** Poir.	white campion*	
	Silene stellata (L.) Ait.f.	starry campion	115
	*Stellaria media** (L.) Vill.	common chickweed*	
Celastraceae	*Celastrus orbiculatus** Thunb.	Oriental bittersweet*	
	Celastrus scandens L.	American bittersweet	113
Chenopodiaceae (see **Amaranthaceae**)			
Clusiaceae (see **Hypericaceae**)			
Commelinaceae	*Tradescantia ohiensis* Raf.	Ohio spiderwort	
	Tradescantia virginiana L.	Virginia spiderwort	21
Convolvulaceae	*Cuscuta gronovii* Willd. ex Schultz	common dodder	91
	Ipomoea pandurata (L.) G.F.W.Mey.	man-of-the-earth	134
Cornaceae	*Cornus amomum* P.Mill.	silky dogwood	12
Cucurbitaceae	*Echinocystis lobata* (Michx.) Torr. & A.Gray	prickly cucumber	
	Sicyos angulatus L.	bur cucumber	99
Cupressaceae	*Juniperus virginiana* L.	eastern red-cedar	150
Cuscutaceae (see **Convolvulaceae**)			
Cyperaceae	*Carex comosa* Boott	longhair sedge	152
	Carex grayi Carey	Gray's sedge	
	Carex stipata Muhl. ex Willd.	stalk-grain sedge	155

*Not indigenous to the region.

Appendix (*cont'd*)

Cyperaceae (*cont'd*)	*Cyperus dentatus* Torr.	toothed flatsedge	83
	Cyperus diandrus Torr.	umbrella flatsedge	142
	Cyperus esculentus L.	yellow nutsedge	80
	Cyperus lupulinus (Sprengel) Marcks	Great Plains flatsedge	42
	Cyperus squarrosus L.	bearded flatsedge	67
	Cyperus strigosus L.	false nutsedge	139
	Eleocharis acicularis (L.) Roemer & Schultes	needle spike-rush	
	Eleocharis obtusa (Willd.) Schultes var. *obtusa*	blunt spike-rush	68
	Eleocharis palustris (L.) Roemer & Schultes	creeping spike-rush	4
	Eleocharis tenuis (Willd.) Schultes	slender spike-rush	
	Rhynchospora capitellata (Michx.) Vahl	brown beak-rush	51
Dioscoreaceae	*Dioscorea villosa* L.	wild yam	
Dryopteridaceae (see **Polypodiaceae**)			
Ebenaceae	*Diospyros virginiana* L.	persimmon	100
Equisetaceae	*Equisetum arvense* L.	field horsetail	76
	Equisetum hyemale L.	scouring-rush	77
	Equisetum sp.	horsetail	
Euphorbiaceae	*Acalypha virginica* L.	three-seeded mercury	181
	Euphorbia corollata L.	flowering spurge	48
	*Euphorbia cyparissias** L.	cypress spurge*	
	Euphorbia maculata L.	spotted spurge	130
Fabaceae	*Amorpha fruticosa* L.	false-indigo	
	Apios americana Medic.	ground-nut	
	Baptisia tinctoria (L.) Vent.	wild indigo	33
	Chamaecrista fasciculata (Michx.) Greene	partridge-pea	7
	Desmodium canadense (L.) DC.	showy tick-trefoil	85
	Desmodium sp.	tick-trefoil	
	Lespedeza capitata Michx.	round-headed bush-clover	58
	Lupinus perennis L.	blue lupine	98
	*Melilotus alba** Medic.	white sweet-clover*	193
	Robinia pseudoacacia L.	black locust	
	Senna marilandica (L.) Link	southern wild senna	47
	Tephrosia virginiana (L.) Pers.	goat's-rue	59
Fagaceae	*Castanea dentata* (Marshall) Borkh.	American chestnut	149
	Fagus grandifolia Ehrh.	American beech	
	Quercus ilicifolia Wang.	scrub oak	179
	Quercus rubra L.	northern red oak	
	Quercus velutina Lam.	black oak	198
Geraniaceae	*Geranium maculatum* L.	wood geranium	159
Grossulariaceae	*Ribes americanum* P.Mill.	wild black currant	

*Not indigenous to the region.

Appendix (*cont'd*)

Hemerocallidaceae	*Hemerocallis fulva** (L.) L.	orange day-lily*	
Hyacinthaceae	*Ornithogalum umbellatum** L.	star-of-Bethlehem*	
Hydrangeaceae	*Hydrangea arborescens* L.	sevenbark	118
Hypericaceae	*Hypericum boreale* (Britt.) Bickn.	northern St. John's-wort	
	Hypericum ellipticum Hook.	pale St. John's-wort	71
	Hypericum mutilum L.	dwarf St. John's-wort	72
	*Hypericum perforatum** L.	common St. John's-wort*	29
	Hypericum punctatum Lam.	spotted St. John's-wort	
	Hypericum pyramidatum Ait.	great St. John's-wort	9
Juglandaceae	*Carya tomentosa* (Lam. ex Poir.) Nutt.	mockernut hickory	200
	Juglans cinerea L.	butternut	53
	Juglans nigra L.	black walnut	199
Juncaceae	*Juncus acuminatus* Michx.	sharp-fruited rush	81
	Juncus tenuis Willd. var. *tenuis*	path rush	82
Lamiaceae	*Agastache nepetoides* (L.) Kuntze	yellow giant-hyssop	
	Collinsonia canadensis L.	horse balm	
	*Glechoma hederacea** L.	gill-over-the-ground*	
	*Lamium purpureum** L.	purple dead-nettle*	
	Leonurus sp.*	motherwort*	
	*Lycopus europaeus** L.	European water-horehound*	136
	Lycopus sp.	water-horehound	
	Mentha arvensis L.	field mint	69
	Mentha sp.	mint	
	Monarda fistulosa L.	horsemint	
	*Nepeta cataria** L.	catnip*	124
	Prunella vulgaris L.	heal-all	
	Scutellaria lateriflora L.	mad-dog skullcap	22
	Teucrium canadense L. var. *virginicum* (L.) Eat.	wild germander	50
Lauraceae	*Lindera benzoin* (L.) Blume	spicebush	112
	Sassafras albidum (Nutt.) Nees	sassafras	171

Liliaceae (see **Alliaceae, Hemerocallidaceae, Hyacinthaceae, Ruscaceae**)

Limnanthaceae	*Floerkea proserpinacoides* Willd.	false-mermaid	
Lythraceae	*Lythrum salicaria** L.	purple loosestrife*	96
Magnoliaceae	*Liriodendron tulipifera* L.	tuliptree	17
Malvaceae	*Tilia americana* L.	white basswood	162
Menispermaceae	*Menispermum canadense* L.	moonseed	13
Molluginaceae	*Mollugo verticillata** L.	carpetweed*	1

*Not indigenous to the region.

Appendix (*cont'd*)

Moraceae	*Morus* sp.*	mulberry*	
Myrsinaceae	*Lysimachia ciliata* L.	fringed loosestrife	73
	*Lysimachia nummularia** L.	creeping-charlie*	
	Lysimachia quadrifolia L.	whorled loosestrife	18
	Lysimachia terrestris (L.) BSP	swamp-candles	74
Oleaceae	*Fraxinus americana* L. var. *americana*	white ash	
	Fraxinus pennsylvanica Marshall	green ash	
	*Ligustrum obtusifolium** Sieb. & Zucc.	obtuse-leaved privet*	
Onagraceae	*Circaea canadensis* (L.) Hill ssp. *canadensis*	enchanter's-nightshade	
	Epilobium coloratum Biehler	purple-leaved willow-herb	120
	Gaura biennis L.	gaura	147
	Ludwigia alternifolia L.	seedbox	40
	Oenothera biennis L.	evening-primrose	133
Orobanchaceae	*Agalinis tenuifolia* (Vahl) Raf.	slender false-foxglove	138
Oxalidaceae	*Oxalis stricta* L.	common yellow wood-sorrel	5
Papaveraceae	*Chelidonium majus** L.	greater celandine*	
Penthoraceae	*Penthorum sedoides* L.	ditch stonecrop	65
Phrymaceae	*Mimulus ringens* L.	Allegheny monkey-flower	54
Phytolaccaceae	*Phytolacca americana* L.	pokeweed	122
Plantaginaceae	*Chelone glabra* L.	turtlehead	
	Gratiola aurea Muhl. ex Pursh	goldenpert	2
	Gratiola neglecta Torr.	hedge hyssop	
	*Linaria vulgaris** Hill	butter-and-eggs*	56
	Penstemon digitalis Nutt. ex Sims	tall white beard-tongue	
	*Plantago lanceolata** L.	English plantain*	79
	*Plantago major** L.	broad-leaved plantain*	137
	*Veronica arvensis** L.	corn speedwell*	
Platanaceae	*Platanus occidentalis* L.	sycamore	55
Poaceae	*Agrostis perennans* (Walt.) Tuckerman	autumn bent	
	Agrostis scabra Willd.	fly-away grass	90
	Andropogon gerardii Vitman	big bluestem	75
	*Anthoxanthum odoratum** L.	sweet vernalgrass*	164
	Bromus ciliatus L.	fringed brome	110
	*Cenchrus tribuloides** L.	dune sandbur*	10
	Cinna arundinacea L.	wood reedgrass	151
	Dichanthelium clandestinum (L.) Gould	deer-tongue grass	38
	Dichanthelium dichotomum (L.) Gould	cypress panic grass	46
	*Digitaria sanguinalis** (L.) Scop.	northern crabgrass*	197

*Not indigenous to the region.

Appendix (*cont'd*)

Poaceae (*cont'd*)	*Echinochloa crusgalli** (L.) Beauv. var. *crusgalli*	billion-dollar grass*	24
	Elymus canadensis L. var. *canadensis*	Canada wild-rye	41, 45
	Elymus riparius Wieg.	riverbank wild-rye	
	Elymus villosus Muhl. ex Willd.	hairy wild-rye	117
	Eragrostis frankii C.A.Mey. ex Steud.	sandbar lovegrass	
	*Eragrostis pilosa** (L.) Beauv.	India lovegrass*	86
	Leersia oryzoides (L.) Swartz	rice cutgrass	131
	Leersia virginica Willd.	whitegrass	141
	*Microstegium vimineum** (Trin.) A.Camus.	stiltgrass*	
	Muhlenbergia mexicana (L.) Trin.	leafy satingrass	153
	Muhlenbergia sylvatica (Torr.) Torr. ex A.Gray	woodland muhly	154
	Panicum capillare L.	witchgrass	11
	Panicum dichotomiflorum Michx.	smooth panic grass	95
	Panicum rigidulum Nees	red-top panic grass	94
	Panicum virgatum L.	switchgrass	93
	*Phleum pratense** L.	timothy*	34
	Poa palustris L.	fowl bluegrass	108
	*Poa pratensis** L.	Kentucky bluegrass*	168
	Schizachyrium scoparium (Michx.) Nash var. *scoparium*	little bluestem	66
	*Setaria pumila** (Poir.) Schultes	yellow foxtail*	23
	Sorghastrum nutans (L.) Nash	Indian-grass	15
	Spartina pectinata Link	freshwater cordgrass	92
	Tridens flavus (L.) A.S.Hitchc.	purpletop	109
Polemoniaceae	*Phlox subulata* L. ssp. *subulata*	moss-pink	172
Polygonaceae	*Fallopia convolvulus** (L.) A.Love	black bindweed*	
	*Fallopia japonica** (Hout.) Ronse Decraene	Japanese knotweed*	
	Fallopia scandens (L.) Holub	climbing false-buckwheat	
	*Persicaria longiseta** (Bruijn) Kitagawa	low smartweed*	
	Persicaria pensylvanica (L.) M.Gomez	Pennsylvania smartweed	143
	Persicaria punctata (Elliott) Small	dotted smartweed	
	Persicaria virginiana (L.) Gaertner	jumpseed	
	Rumex altissimus A.Wood	tall dock	
	*Rumex crispus** L.	curly dock*	28
Polypodiaceae	*Dryopteris marginalis* (L.) A.Gray	marginal wood fern	160
	Onoclea sensibilis L.	sensitive fern	26
	Thelypteris palustris Schott	marsh fern	
Primulaceae (see **Myrsinaceae**)			
Ranunculaceae	*Anemone virginiana* L.	tall anemone	116
	Clematis virginiana L.	virgin's-bower	129
	*Ranunculus bulbosus** L.	bulbous buttercup*	
	Thalictrum dioicum L.	early meadow-rue	157
	Thalictrum pubescens Pursh	tall meadow-rue	123
Rosaceae	*Crataegus coccinea* L. sensu lato	red-fruited hawthorn	32
	Geum canadense Jacq.	white avens	

*Not indigenous to the region.

Appendix (*cont'd*)

Rosaceae (*cont'd*)	*Physocarpus opulifolius* (L.) Maxim.	ninebark	
	Potentilla canadensis L.	dwarf cinquefoil	57
	Potentilla simplex Michx.	old-field cinquefoil	
	Prunus americana Marshall	wild plum	163
	Prunus pumila L. var. *depressa* (Pursh) Gleason	sand cherry	84
	Prunus virginiana L.	choke cherry	
	*Rosa multiflora** Thunb. ex Murr.	multiflora rose*	
	Rubus canadensis L.	smooth blackberry	102
	Rubus hispidus L. sensu lato	swamp dewberry	
	Rubus occidentalis L.	black-cap	121
	Rubus odoratus L.	purple-flowering raspberry	127
	Rubus pensilvanicus Poir. sensu lato	blackberry	
	*Rubus phoenicolasius** Maxim.	wineberry*	
	Spiraea latifolia (Ait.) Borkh.	meadow-sweet	16
Rubiaceae	*Cephalanthus occidentalis* L.	buttonbush	
	Galium asprellum Michx.	rough bedstraw	27
	*Galium mollugo** L.	white bedstraw*	
	Galium triflorum Michx.	sweet-scented bedstraw	156
Ruscaceae	*Maianthemum racemosum* (L.) Link.	Solomon's-plume	111
	Maianthemum stellatum (L.) Link.	starflower	106
Salicaceae	*Populus tremuloides* Michx.	quaking aspen	
	*Salix alba** L.	white willow*	176
	Salix discolor Muhl.	pussy willow	
	Salix eriocephala Michx.	diamond willow	178
	Salix exigua Nutt.	sandbar willow	175
	Salix nigra Marshall	black willow	
	Salix petiolaris Smith	slender willow	177
Sapindaceae	*Acer negundo* L.	box-elder	
	*Acer platanoides** L.	Norway maple*	
	Acer saccharinum L.	silver maple	
	Acer saccharum Marshall	sugar maple	
Saxifragaceae (see also **Penthoraceae**)	*Saxifraga virginiensis* Michx.	early saxifrage	158
Scrophulariaceae (see also **Orobanchaceae, Phrymaceae, Plantaginaceae**)	*Scrophularia marilandica* L.	eastern figwort	
	*Verbascum thapsus** L.	common mullein*	37
Simaroubaceae	*Ailanthus altissima** (P.Mill.) Swingle	tree-of-heaven*	
Smilacaceae	*Smilax rotundifolia* L.	common greenbrier	125
Solanaceae	*Physalis virginiana* P.Mill.	Virginia ground-cherry	6
	*Solanum dulcamara** L.	trailing nightshade*	

*Not indigenous to the region.

Appendix (*cont'd*)

Thelypteridaceae (see **Polypodiaceae**)			
Tiliaceae (see **Malvaceae**)			
Ulmaceae (see also **Cannabaceae**)	*Ulmus americana* L.	American elm	
Urticaceae	*Boehmeria cylindrica* (L.) Swartz	slimspike false nettle	
	Laportea canadensis (L.) Weddell	Canada wood-nettle	101
	Pilea pumila (L.) A.Gray	clearweed	
	Urtica dioica L. ssp. *gracilis* (Ait.) Seland	stinging nettle	169
Verbenaceae	*Verbena hastata* L.	blue vervain	20
	Verbena urticifolia L.	white vervain	19
Violaceae	*Viola cucullata* Ait.	blue marsh violet	170
	Viola sororia Willd.	common blue violet	
Vitaceae	*Parthenocissus quinquefolia* (L.) Planch.	Virginia-creeper	30
	Vitis vulpina L.	frost grape	174

*Not indigenous to the region.

Bartonia No. 63: 49-51, 2006

Fungus Names in the Schweinitz Herbarium Validated or Proposed by J. B. Ellis

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ABSTRACT. The cryptogamic herbarium of Lewis David von Schweinitz is among the oldest in North America and contains type material, not only of the majority of names published by him, but also of names published by his contemporaries with whom he corresponded. Job B. Ellis (although not one of Schweinitz's contemporaries) published seven new species based on material in the Schweinitz herbarium. The types of some of these taxa have only recently been rediscovered during curation by the author and are discussed here for the first time since their publication in 1895. The types of several other species named in the same 1895 publication by Ellis have not yet been located in the herbarium the Academy of Natural Sciences of Philadelphia.

INTRODUCTION

The personal herbarium of Lewis David von Schweinitz was deposited with the Academy of Natural Sciences of Philadelphia in 1834. It has long been recognized as a major resource rich in historically significant type and non-type material. Indeed, the vascular plant portion of the herbarium, which consists of over 21,000 taxa, is composed of the collections not only of Schweinitz himself but also of many of his contemporaries including Thomas Nuttall, Constantine-Samuel Rafinesque and John Torrey. The cryptogamic portion of the Schweinitz herbarium also comprises a significant number of specimens, including types of many of the taxa named by Schweinitz (the "father of American mycology") as well as those of other early authors such as A. Halsey and E. M. Fries. The Schweinitz herbarium as a whole contains a large number of manuscript names never published by Schweinitz. Some of these were validated by later authors; several Pyrenomycetes in particular were validated by J. B. Ellis in the *Proceedings of the Academy of Natural Sciences of Philadelphia*. The types of these taxa were discovered only recently by the author while performing routine curatorial work on the type and special collections at the herbarium of the Academy of Natural Sciences of Philadelphia (PH).

The specimens discussed here were first discovered in a package at PH in 1894 when they were studied by J. B. Ellis. Ellis noted that many of the specimens were collected at Bethlehem, Pennsylvania and Salem, North Carolina and that a large number of the specimens were "all very small—many of them old and without fruit" (Ellis 1895). The results of Ellis's study of the specimens were published in the *Proceedings of the Academy of Natural Sciences of Philadelphia* in 1895. There Ellis provided notes on the synonymy of the specimens that he considered identifiable and in several cases, validated the manuscript names that Schwein-

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itz had left with the specimens. Two new species were also described based on Schweinitz specimens. Ellis honored Schweinitz in the specific epithets of both of these taxa. After the publication of Ellis (1895) however, these specimens appear to have been all but forgotten, although the names were included in an index to the fungi named by J. B. Ellis (Cash 1952, 1953, 1954).

Catalogue

The taxa included here are listed alphabetically by the epithet typified by specimens at PH.

Diatrypella **obscurata** Schweinitz *ex* Ellis
Ellis (1895: 27). Holotype, PH 1000553 (Collins Collection #330 *in* Herb. Schweinitz). On limbs of trees or shrubs, Bethlehem, Pennsylvania, United States.
The original packet reads "Sphaeria ob*f*curata LvS, Bethl." The specimen was not annotated by J. B. Ellis. Cash (1952) attributed this name to both Ellis & Everhart; however, Ellis alone should be cited as the authority.

Pseudovalsa **occulta** Schweinitz *ex* Ellis
Ellis (1895: 27). Holotype, PH 1000552 (Collins Collection #319 *in* Herb. Schweinitz). On twigs, Bethlehem, Pennsylvania, United States.
The original packet reads "319, Sphaeria occulta LvS, in [illegible] an S. corticis?, Bethel." Ellis later annotated "Pseudovalsa prunicola E. & E." There is duplicate of the holotype in the Ellis herbarium (NY) that includes a drawing of an ascus with eight spores and a drawing of a single spore with measurements ("45-62 × 13-16μ") that match those given in the protologue. If one does not consider the specimen in PH to be the holotype, the specimen in NY would be a suitable lectotype.

Discosia **placentula** Schweinitz *ex* Ellis
Ellis (1895: 29). Holotype, PH 1000548 (Collins Collection s.n. *in* Herb. Schweinitz). On leaves (*Tilia?* sp.), Bethlehem, Pennsylvania, United States.
The original packet reads "Sphaeria placentula LvS. Bethl." Ellis annotated the back of the packet with the published identification ("Discosia placentula [Schw.]"). Cash (1952) attributed this name to Ellis & Everhart; however, the authority should be cited as Ellis alone.

Phoma **pyrina** Schweinitz *ex* Ellis
Ellis (1895: 28). Holotype, PH 1000550 (Collins Collection #325 *in* Herb. Schweinitz). On dead limbs of *Malus* sp., Bethlehem, Pennsylvania, United States.
The original packet reads "Sph. pyrina Bethl." The specimen is mounted in two preparations; besides the original packet there are several fragments mounted on a card by Ezra Michener during his curation of the herbarium, mostly during 1856-1857 according to Arthur & Bisby (1918).

Sphaeropsis **schweinitzii** Ellis & Everhart *ex* Ellis
Ellis (1895: 28). Holotype PH 1000549 (Syn. #1717? *in* Herb. Schweinitz). On dead herbaceous stems, Bethlehem, Pennsylvania, United States.
One packet from the Collins Collection (*in* herb. Schweinitz) is annotated "Sphaeria caulium LvS, Salem" in the hand of Schweinitz. Interestingly, it is this packet which Ellis annotated as *Sphaeropsis schweinitzii* and not that which is actually from the type locality as indicated in the original description. Only the specimen from Bethlehem is considered to

represent type material, although both were annotated by Schweinitz. The original packet reads "Sphaeria caulium . . . [illegible] . . . Beth." The specimen is mounted in two preparations; besides the original packet there are several fragments mounted on a card by Ezra Michener during his curation of the herbarium (see Arthur & Bisby 1918)

Trematosphaeria **schweinitzii** Ellis & Everhart *ex* Ellis
Ellis (1895: 25). Holotype, PH 1000547 (Collins Collection #296 *in* Herb. Schweinitz & Syn. #1619 *in* Herb. Schweinitz?). On dead canes of *Rubus* sp., Bethlehem, Pennsylvania, United States.
Ellis only annotated the specimen from the Collins Collection (*in* herb. Schweinitz) with his new name. The specimen from Schweinitz's personal herbarium records two localities. The original packet from the Collins collection reads "296 Sphaeria rostellata, Bethl." There is a probable duplicate of the holotype in the Ellis herbarium (NY) that, unlike a similar duplicate specimen (of *Pseudovalsa occulta*), does not include any drawings or notes from Ellis.

Rosellinia thelena (Fries) Rabenhorst var. **terrestris** Schweinitz *ex* Ellis
Ellis (1895: 22). Holotype, PH 1000551 (Collins Collection #236 *in* Herb. Schweinitz). On the ground, New York, New York, United States.
The original packet reads "236, Sphaeria terrestris, LvS. New York."

Acknowledgments

I wish to thank R. C. Harris and an anonymous reviewer for providing helpful commentary and criticism of this paper. I also wish to thank R. C. Harris for bringing the duplicates of *Pseudovalsa occulta* and *Trematosphaeria schweinitzii* in the Ellis herbarium at NY to my attention.

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Bartonia No. 63: 53-67, 2006

2003–2004 FIELD TRIPS

Reports by TED GORDON, except where otherwise indicated.

2003 Field Trips

26, 27 April: Bear Swamp, Downe Township, Cumberland County, New Jersey. Joint trips with the Torrey Botanical Society. The group walked into Bear Swamp West south of Paynters Crossing. This required much bushwhacking along an old survey line. Within the swamp a small colony of *Tipularia discolor* was noted growing under *Ilex opaca.* As the group continued eastward in the swamp the trees continued to increase in size. In the old-growth area the group got to see excellent old-growth examples of *Ilex opaca, Liquidambar styraciflua, Liriodendron tulipifera, Magnolia virginiana,* and *Nyssa sylvatica.* The largest *Magnolia* specimen noted was 63 inches in circumference at breast height; the largest one recorded from this swamp was a wind-thrown specimen that measures 73.5 inches (Stevens Heckscher in *Bartonia* **53**: 69, 1987). Even such shrubs as *Lindera benzoin* and *Vaccinium corymbosum* were impressively large. Also noted in some of the *Nyssa* was *Phoradendron serotinum.*

At the end of the day, the group traveled north of Shaws Mill to see an excellent stand of blooming *Helonias bullata* in a cedar swamp. Also noted here in bloom in the uplands were *Epigaea repens* and *Viola sagittata* var. *ovata.*

On the second day the group visited Bear Swamp East which is southeast of Dividing Creek Station and southwest of Whitehead Station. In the north-south trail leading to the old-growth area, a small population of *Listera australis* in bloom was noted. This old-growth area is not as extensive as the one in Bear Swamp West. Most of the large trees are specimens of *Liriodendron tulipifera* that appeared to be in declining health. The largest tree of either swamp was noted here, a *Liriodendron* that measured 177 inches in circumference at breast height. Later in the day the group botanized (and birded) at Hansey Creek and Turkey Point. At Turkey Point in the sandy berms out in the salt marsh, large stands of the non-native *Teesdalia nudicaulis* were noted in bloom. Participants: 18. Leaders: Gerry Moore and James Lendemer; report by the former (see also the report on the trip to the same locations on 15 November).

2-4 May: Delaware Water Gap National Recreation Area, Pike and Monroe Counties, Pennsylvania. This spring wildflower weekend was based at the Pocono Environmental Education Center. The group visited various stream corridors to observe and learn the spring flora of the area. Some of the species observed included *Mertensia virginica, Trillium erectum, Viola sororia, V. striata, Uvularia sessilifolia, Antennaria plantaginifolia, Podophyllum peltatum, Arabis laevigata, Cardamine concatenata, Geranium maculatum, Hydrophyllum canadense, H. virginianum, Erythronium americanum, Maianthemum canadense, M. race-*

mosum, Polygonatum pubescens, Veratrum viride, Sanguinaria canadensis, Phlox stolonifera, Claytonia virginica, Actea pachypoda, Aquilegia canadensis, Hepatica nobilis var. *obtusa (= H. americana), Thalictrum thalictroides, Houstonia caerulea, Mitella diphylla* and *Tiarella cordifolia.* Report by leader: Bill Olson.

17 May: F. M. Mooberry's Garden, East Marlborough Township, Chester County, Pennsylvania. Leader: Ernie Schuyler.

7 June: Whites Mill tract, Salford Township, Montgomery County, Pennsylvania. On a very rainy day in early June a handful of Club members explored the Whites Mill tract, recently acquired by Salford Township. The 150-year old millpond at the site yielded specimens of *Potamogeton nodosus*, with underwater leaves still intact, and *P. crispus* in flower. Another interesting plant observed was *Lemna trisulca,* which floats just below the water surface. Other Lemnaceae seen included *Wolffia borealis, W. columbiana, W. brasiliensis* and *Lemna minor*. A stinkpot turtle that had emerged from the pond also caught our attention; these aquatic turtles are rarely seen.

In the wet meadow along Ridge Valley Creek downstream from the millpond we observed a healthy population of *Carex meadii*. Other sedges at this location included *C. bushii, C. caroliniana, C. conoidea, C. glaucodea, C. laxiculmis, C. lurida, C. squarrosa* and *C. stricta*. Report by leader: Ann Rhoads.

14 June: Big Elk Creek, Chester County, Pennsylvania. Eleven guests, Club members, and Muhlenberg Society members joined the leaders on a beautiful late spring day for a leisurely walk down an old dirt road paralleling Elk Creek through woodlands ranging from floodplain forest to dry rocky oak - mountain-laurel woods. Early on we spent considerable time discussing the differences between the native perennial whitegrass (*Leersia virginica*) and the similar but noxious alien stilt-grass (*Microstegium vimineum*) which were growing in the road. Numerous sedges were also examined. Fringe-tree (*Chionanthus virginicus*) proved surprisingly elusive, but the leaders eventually found a few sterile saplings growing along the main road. Several banks along the way bore carpets of ground-pine (*Lycopodium obscurum*) which is becoming increasingly rare in southeastern Pennsylvania. Maleberry (*Lyonia ligustrina*) was also seen.

A floodplain meadow halfway through the walk yielded a small colony of blooming blue iris (*Iris versicolor*) and cow-parsnip (*Heracleum lanatum*) in bud, among other species. Another small side trip was taken to observe some healthy green-dragons (*Arisaema dracontium*). The best came last, where along a stretch of rich rocky mesic woods and brushy roadbank we saw woodland chickweed (*Stellaria pubera*), early rue (*Thalictrum dioicum*), spikenard (*Aralia racemosa*), nodding trillium (*Trillium cernuum),* Culver's-root (*Veronicastrum virginicum*), and numerous stringers of the feature species, leatherflower (*Clematis viorna*). We had hoped to catch it in bloom, which it had been at that date last year, but a late winter and cold wet spring delayed its flowering, and only buds were seen. The leaders also learned, thanks to the horticulturists in the company, that a colony of an invasive mint we had called spotted dead-nettle (*Lamium maculatum*) was actually yellow archangel (*Lamiastrum galeobdolon*). Report by leaders: Janet Ebert and Jack Holt.

21 June: Island Beach State Park, Ocean County, New Jersey. Leaders: Diane Bennett-Chase, David Fairbrothers and Pete McLain.

22-26 June: Suffolk County, Long Island, New York. The joint field meeting with the Northeastern Section of the Botanical Society of America, the Torrey Botanical Society and the Long Island Botanical Society took place at the New York Institute of Technology, Central Islip Campus. The areas visited included a unique 300-year-old maritime holly forest on barrier Fire Island, the globally rare dwarf Pine Plains, a northeastern mixed hardwood forest on a terminal moraine, an unusual pitch pine-scrub oak barrens, and a remnant of the Hempstead Plains, once the largest prairie east of the Mississippi. Plant communities included salt marshes, freshwater bogs, kettle holes, swamps, ponds, rivers, forests and marine communities. Evening lectures included "Plants and Plant Communities Found on Long Island's Greenbelt Trails" by Tom Casey, President of the Long Island Greenbelt Trail Conference; "100 Years of Change in the Orchid Flora of Long Island" by Dr. Eric Lamont, President of the Long Island Botanical Society; "The Blight and Immune System of the American Chestnut Tree" by Dr. John Potente, Director of the Long Island Chapter of the American Chestnut Foundation; and "Long Island Forests from the Ice Age to the Present" by Dr. Andy Greller, Professor Emeritus of Botany and Ecology at Queens College. The field meeting was chaired by Joanne Tow. Participants: 50. Report by Karl Anderson.

8 July (Tuesday): Oswego Lake Savanna, Burlington County, New Jersey. From cranberry grower William Haines, Jr., we obtained permission to botanize this extensive, privately-owned savanna, situated southeast of Oswego Lake, west of Sim Place, and north of the Warren Grove Air National Guard Range. This vast wetland complex is comprised of a series of parallel fingers of savanna land, ringed by *Chamaecyparis thyoides, Acer rubrum* var. *trilobum, Nyssa sylvatica, Magnolia virginiana, Clethra alnifolia* and a host of ericaceous shrubs. Widely distributed were the following species: *Carex exilis, C. atlantica, C. striata, Eleocharis tuberculosa, Rhynchospora fusca, R. alba, Muhlenbergia torreyana, Calamovilfa brevipilis, Danthonia epilis, Panicum virgatum, Sarracenia purpurea, Iris prismatica, Lobelia nuttallii, Morella pensylvanica (= Myrica p.), Lycopodiella alopecuroides* and *L. appressa.* Among the peat mosses recorded were *Sphagnum pulchrum, S. cuspidatum, S. flavicomans, S. pylaesii, S. perichaetiale, S. magellanicum, S. bartlettianum* and *S. cyclophyllum.* Dominating the floral display were the bright yellow petals of *Utricularia striata* and the white, wooly heads studded with deep yellow stars of *Lophiola aurea.* Additional color was provided by scattered plants of *Calopogon tuberosus* and *Pogonia ophioglossoides* as well as by *Cladium mariscoides, Hypericum denticulatum, H. densiflorum, Sabatia difformis, Drosera filiformis, Eriocaulon decangulare* and *E. compressum*, the latter then scattering its chaff. A few sterile plants of *Nathecium americanum* were also seen.

Although we were unsuccessful in discovering new occurrences of *Cleistes divaricata, Zygadenus leimanthoides* or *Asclepias rubra,* we succeeded, despite the heat, in relocating a small cluster of the disjunct northern grass *Calamagrostis pickeringii* and a fine display of 67 flowering culms of viscid asphodel, *Triantha racemosa* (or as currently reported for New Jersey by John Packer in the *Flora of North America, Triantha glutinosa* x *T. racemosa*). Both occurrences of these two state-endangered taxa were first discovered here by the leader in 1985. Participants: 14. Leader: Ted Gordon.

13 July: Nescopeck State Park, Luzerne County, Pennsylvania. This was the Club's second visit to Nescopeck State Park, where Ann and Tim have previously identified more than 650 species of plants. Sure enough, club members added at least one additional plant to the list: *Isotria verticillata*. Other species noted included *Lygodium palmatum*, *Rubus pubescens*, *Rubus recurvicaulis*, *Desmodium glutinosum*, *Phlox subulata*, *Lupinus perennis*, *Lechea racemulosa*, *Hedeoma pulegioides*, *Carex polymorpha*, *C. vestita*, *C. gracillima*, *C. swanii*, *Panicum linearifolium*, *P. depauperatum*, *P. microcarpon*, *P. sphaerocarpon* and, in Nescopeck Creek, *Isoetes engelmannii* and *Schoenoplectus subterminalis*. Several non-native species were also noted: *Sisymbrium officinale*, *Hypericum perforatum*, *Potentilla argentea*, *Lathyris latifolius* and *Spiraea japonica*. Leaders: Ann Rhoads and Tim Block; report by the former.

19 July: Egg Harbor City ponds, Atlantic County, New Jersey. Leader: Ernie Schuyler.

2 August: Mill Creek, Willingboro, Burlington County, New Jersey. This trip focused on the plants of the shore and intertidal zone along Rancocas Creek, but while waiting for the tide to ebb, we explored other areas of this suburban park. The margin of a shallow detention pond, where not overgrazed by a large flock of Canada geese, produced *Lobelia chinensis*, *Scutellaria lateriflora*, several species of *Polygonum* and a nice colony of *Veronica anagallis-aquatica*. In this pond we noticed one small floating rosette of *Trapa natans*, a very invasive aquatic that has appeared in several New Jersey locations in the last few years. Transferring our attention to the shore of Rancocas Creek, we found the *Sagittaria latifolia*, *Peltandra virginica*, *Nuphar advena* and *Zizania aquatica* so typical of these areas, but we also found large populations of *Sagittaria subulata*, along with *Eriocaulon parkeri*, *Isoetes riparia*, *Sium suave*, *Lysimachia ciliata*, *Heteranthera* sp., *Rumex verticillatus*, *Elodea canadensis* and again *Lobelia chinensis*. After lunch, we visited Taylor's Preserve in Cinnaminson to look at the Delaware River shore. Here we added *Typha* x *glauca*, *Iris pseudacorus* and *Acorus calamus* to the day's list. Participants: 11. Report by leader: Karl Anderson.

23 August: Supawna Meadows National Wildlife Refuge, Salem County, New Jersey. Joint trip with the Torrey Botanical Society. Neither club had previously visited this 3,000-acre refuge, of which only a small part is open to the public. We began our trip with a walk through a forested tract near the refuge parking lot. As in many forests in this part of New Jersey, the ground was carpeted with *Lonicera japonica* and occasional patches of *Microstegium vimineum*. *Elaeagnus umbellata* was scattered throughout. With a little searching we found over one hundred plants of *Tipularia discolor* in bloom. Also seen were *Goodyera repens* (one blooming), *Mitchella repens*, *Bartonia virginica*, *Osmunda regalis* and *Botrychium dissectum*. Several specimens of squid stinkhorn fungus, *Pseudocolus schellenbergiae*, attracted interest. They had a remarkably foul odor.

Next we walked a loop through a mesic woodland in the Xmas Tree Lane section of the refuge. Typical trees were *Nyssa sylvatica*, *Liquidambar styraciflua*, *Quercus palustris*, *Q. phellos* and *Acer rubrum*. A good find here was a stand of mature *Quercus michauxii*. Several were quite large. Further on we saw some large colonies of *Saururus cernuus* and *Woodwardia areolata*, as well as occasional *Lycopus americanus*, *L. virginicus*, *Sanicula canadensis*, *Scutellaria integrifolia*, *Chelone glabra*, and an impressive patch of *Lobelia cardinalis* in flower. A second small population of *Tipularia* was also discovered. Our destination was the

marsh edge, where we admired a stand of bald-cypress, *Taxodium distichum*. Some of these trees had been planted, but were thriving and reproducing. A total of 27 trees of all sizes were counted, and the forest floor was studded with the "knees" typical of the species. We noted that some of the more open areas were being taken over by rapidly-spreading *Polygonum perfoliatum*, which we saw in several places. Lush carpets of *Microstegium vimineum*, sometimes mixed with *Leersia virginica*, were present here and there in the forest.

Following lunch, we visited the upland edge of a slightly brackish tidal marsh. Here we added a number of flowering or fruiting species to the day's list, among them *Baccharis halimifolia, Eclipta prostrata, Asclepias incarnata, Mikania scandens, Hibiscus moscheutos, Echinochloa walteri, Tripsacum dactyloides, Cicuta maculata, Fimbristylis autumnalis, Pluchea odorata* and *Leptochloa fascicularis* var. *maritima* (= *L. fusca* ssp. *fascicularis).*

The day ended with a drive south to Elsinboro Point, where the diminutive *Lilaeopsis chinensis* was found in fruit on eroding peat banks on the shore of Delaware Bay. This was a new plant for most of the participants. Participants: 20. Report by leader: Linda Kelly.

24 August: Palmyra Cove Nature Park, Palmyra, Burlington County, New Jersey. This trip was a visit to a 300-acre area of landfill, dredge impoundments and freshwater tidal marsh that is bordered by the Delaware River, Pennsauken Creek and Route 73. The flora at this site consists of about 350 species, of which about one-third is non-native. Uplands here are dominated by such trees as *Ailanthus altissima* and *Populus deltoides,* with an understory of *Polygonum cuspidatum* and *Urtica dioica,* but on this trip they also produced *Cycloloma atriplicifolium, Lycopus europaeus, Mirabilis nyctaginea, Croton glandulosus, Leptoloma cognatum, Polygonum orientale* and many other plants typical of disturbed habitats. A fine stand of *Salix exigua,* a very distinctive willow species, was found on the sandy shore of the Delaware River. A foray into a wet dredge-spoil impoundment produced *Schoenoplectus pungens, S. smithii, Eleocharis ovata, Potamogeton diversifolius, Alisma subcordatum, Ludwigia peploides* and *Lindernia dubia.* Species noted but not seen previously at this site included *Strophostyles leiosperma, Scirpus polyphyllus, Lupinus* sp. and, not surprisingly, *Polygonum perfoliatum,* which has been expanding its range in the Delaware Valley. Participants: 14. Report by leader: Karl Anderson.

8 September (Monday): Lower (East) Pine Plains and adjacent Oswego River Savannas within the Air National Guard Range south of Warren Grove, Burlington County, New Jersey. Pre-registration to enter the federal range was required by participants. Both leaders have been engaged in conducting long-term, rare species surveys on this 9,416-acre diverse "firescape."

The group visited upland dwarf-pine communities comprised of serotinous *Pinus rigida, Quercus marilandica* and *Q. ilicifolia* with an understory of fine cushions of *Corema conradii,* at the species' southern limit of range. Of special interest were the formerly bulldozed, regenerating, seepage strips bordering an airfield runway along with similarly created, abandoned flight sight-lines. Both of these habitats are being managed by periodic prescribed burns. Among the diverse plants recorded here were *Rhynchospora knieskernii* (extensive occurrences), *R. torreyana, R. alba, R. capitellata, Scleria minor, S. triglomerata, S. pauciflora, Cyperus dentatus, Eleocharis tuberculosa, E. microcarpa, E. olivacea, Juncus scirpoides,*

J. canadensis, J. pelocarpus, Drosera filiformis, Gentiana autumnalis, Liatris graminifolia, Lobelia nuttallii, Solidago stricta, Xyris difformis, Lycopodiella appressa, Vaccinium macrocarpon, Polygala nuttallii, Sorghastrum nutans, Amphicarpum purshii, Andropogon glomeratus, Aristida longespica var. *longespica, A. purpurascens* var. *virgata (= A. virgata), Muhlenbergia torreyana* and *Calamovilfa brevipilis.* The latter two taxa were especially dominant in intermittently flooded, pitch pine lowland swales periodically swept by fire during droughts. Companion species here included *Eriophorum virginicum, Agalinis virgata (= A. fasciculata), Gaylusaccia dumosa* and *Oclemena nemoralis.*

An Atlantic white-cedar swamp and sphagnous savannas bordering the Oswego River in the vicinity of a hunting cabin produced fine occurrences of *Narthecium americanum, Juncus caesariensis* and *Calamovilfa brevipilis* in association with *Carex exilis, C. atlantica* ssp. *capillacea, C. livida, Rhynchospora gracilenta, R. cephalantha, R. alba, Scleria muhlenbergia, Eriophorum virginicum, Danthonia epilis, Xyris torta, X. difformis, Schizaea pusilla, Eriocaulon decangulare, Lophiola aurea* and *Triantha racemosa* or *T. glutinosa* x *T. racemosa.* Rare peat mosses seen were *Sphagnum cyclophyllum, S. perichaetiale* and *S. portoricense.* A timber rattlesnake was also observed. We searched unsuccessfully for populations of *Xyris fimbriata, Spiranthes laciniata, Eupatorium resinosum* and *Platanthera integra.* Participants: 14. Leaders: Walt Bien and Ted Gordon.

13 September: Hamilton-Trenton Marsh, Duck Island created wetland, Mercer County, New Jersey. Four sites, Roebling Park / Spring Lake and three tidal freshwater areas along the Delaware River, yielded many interesting species of which only a few are noted here. At the Duck Island created wetland (comprising 94 acres, construction completed in 1994), where we walked across the north marsh to the Delaware River, we saw *Amaranthus cannabinus, Bidens laevis, Heteranthera reniformis, H. multiflora*, Mimulus alatus** and *Zizania aquatica* var. *aquatica* (plants marked with an asterisk are New Jersey-listed rarities). The most conspicuous flowering species were *Clematis terniflora* (upland edge), *Impatiens capensis* and *Mikania scandens.* Several *Polygonum* species were well distributed; *P. punctatum* and *P. hydropiper* were prominent along the channel edge and *P. sagittatum* at higher elevations. *Symphyotrichum puniceum* var. *puniceum (= Aster puniceus), Helenium autumnale* and *Vernonia noveboracensis* were scattered on the tidal marsh, and *Eupatorium rugosum, E. serotinum, Helianthus tuberosus* and *Verbesina alternfolia* were found along the upland edges. Wetland invasives were also conspicuous. These were *Lythrum salicaria*, which does not appear to reduce species diversity in this wetland, and *Phragmites australis*, which, in contrast, is expanding.

Due to time constraints, a small mitigation site of two acres completed in 2002 was incompletely surveyed. *Artemisia annua, Polygonum caryii, P. lapathifolium* and *P. pensylvanicum* grow in the upland disturbed areas. Despite the incoming tide, *Sagittaria subulata** was found at the river's edge just south of this constructed wetland. A population of more than a dozen plants of *Bidens bidentoides** and three patches of *Justicia americana* were observed on the north side of the ramp at the Mercer County boat launch. Another species of interest there was *Mazus pumilus.*

At Spring Lake was a patch of *Eichhornia crassipes*, which does not appear to overwinter at this location. *Polygonum amphibium* was in flower. Lemnaceae were *Lemna minor, Spi-*

rodela polyrhiza, Wolffia columbiana and *Wolffiella floridana**. The last was restricted to the northwest corner of the forested island locally known as Beaver Point. Participants: 11 drenched botanists caught in a downpour at the very end of the trip. Leaders: Charles and Mary Leck; report by the latter.

26-28 September: Delaware Water Gap National Recreation Area, Pike and Monroe Counties, Pennsylvania, and Sussex County, New Jersey. This fall wildflower weekend was based at the Pocono Environmental Education Center. The group visited open meadows and forest edges to identify asters, goldenrods and sunflowers. Pressed specimens were also studied in the evening in the laboratory. The new taxonomy of asters and goldenrods was discussed. The following species were observed and studied: *Symphyotrichum cordifolium, S. laeve, S. lanceolatum, S. lateriflorum, S. novae-angliae, S. patens, S. pilosum, S. prenanthoides, S. concolor, S. puniceum, S. racemosum, S. urophyllum (= Aster sagittifolius), Eurybia divaricata, E. spectabilis, Ionactis linariifolius, Doellingeria umbellata, Oclemena acuminata, Solidago altissima, S. bicolor, S. caesia, S. canadensis, S. gigantea, S. juncea, S. nemoralis, S. odora, S. patula, S. puberula, S. rugosa, S. sempervirens, S. speciosa, Euthamia caroliniana, E. graminifolia, Smallanthus uvedalius (= Polymnia uvedalia), Helianthus decapetalus, H. divaricatus* and *Heliopsis helianthoides.* Report by leader: Bill Olson.

15 November: Bear Swamp, Downe Township, Cumberland County, New Jersey. Joint trip with the Torrey Botanical Society. The lichens of Bear Swamp East were the focus of many trip participants, specifically under the leadership of James Lendemer. Within the swamp a number of interesting crustose lichens were observed, such as *Trypethelium virens,* which forms large bronze patches on holly trees; *Intralichen* sp., a lichenicolous fungus on *Lecanora subpallens*; *Lepraria incana*, a rare sorediate crust; and *Buellia vernicoma*, a species with four-celled ascospores. Also found was a large red maple covered with *Lobaria quercizans*, a species thought possibly extirpated in New Jersey, and several small populations of *Parmotrema gardner,* an uncommon foliose lichen that occurs sporadically throughout southern New Jersey.

The low sand barrens adjacent to the swamp also host an interesting assemblage of lichens (notably different from that of the barrens farther north in Atsion and Batsto), including *Placynthiella uliginosa*, which forms conspicuous, black, tar-like patches in sandy areas, and several species of *Trapelia* and *Trapeliopsis* typical of acid habitats. We also found *Lecanora minutella* abundantly growing on the edges of pine cones. While returning from the old-growth portions of the swamp, we explored a pin oak forest apparently experiencing regeneration failure; the lichen flora here included a number of species not yet known from or considered rare in the region. These included several sterile sorediate crusts that could not be identified to genus and the inconspicuous *Schismatomma glaucescens,* which grows on the inner grooves of fissured oak bark. Participants: 52 (divided into two groups). Report by leaders: James Lendemer and Gerry Moore (see also the report on the trip to the same locations on 26 and 27 April).

2004 Field Trips

24 April: Burden Hill Forest, Quinton and Alloway Townships, Salem County, New Jersey. Natural Lands Trust associates and friends came to explore the last large woodland in Salem

County, an area known as the Burden Hill Forest. Here the Cohansey Formation, which is exposed between the Kirkwood and Bridgeton Formations, forms the setting for a unique flora, which combines characteristics of the Pine Barrens and the Inner Coastal Plain. Our trip included visits to three separate parcels protected by the Natural Lands Trust and New Jersey Conservation Foundation. The first site was southwest of Telegraph Road near the headwaters of a tributary to Cool Run. Oak – pine forest dominates the upland and a red maple wetland forest is associated with small streams and seeps. Numerous common coastal plain forest trees were identified including *Quercus alba, Q. coccinea, Q. falcata, Q. prinus, Q. marilandica, Q. phellos* and *Q. velutina. Pinus rigida* and *P. virginiana* are also common associates in the upland where disturbance was noted. *Pinus echinata* is present as a scattered canopy tree. *Fagus grandifolia* and sprouts of *Castanea dentata* occur on the finer-textured soils. *Sassafras albidum* and *Prunus serotina* occupy clearings and forest edges. The upland forest has an understory dominated by scattered thickets of *Castanea pumila* and *Kalmia latifolia.* A near-continuous ground cover of *Gaylussacia baccata, G. frondosa* and *Vaccinium pallidum* was noted throughout. Upland sedges such as *Carex tonsa, C. nigromarginata, C. swanii* and *C. pensylvanica* were identified on most dirt paths and open areas. Upland grasses including *Panicum dichotomum (= Dichanthelium d.), P. commutatum (= Dichanthelium c.), Danthonia spicata* and *Schizachyrium scoparium* occur in the same locations.

We noted that even though cankers were present on both chestnut species, the smaller chinquapin seems able to reproduce sexually before succumbing to the effects of the blight. American chestnut rarely achieves this level of maturity and is represented in this forest only by stump sprouts or the occasional small tree. A fence lizard and a brown elfin butterfly also attracted our attention.

Red maple wetland forests surrounding the headwater seeps provided opportunities to see *Helonias bullata* and *Listera australis* in the *Sphagnum*-dominated forest floor. Both species were in full bloom. *Listera* occupies the upper edge of the *Sphagnum* mat where standing water is rare. *Helonias* is confined to sphagnous hummocks along the seeps and stream channel. *Lilium superbum, Platanthera blephariglottis* and *P. clavellata* also were found in this habitat. We discovered multiple colonies of *Amianthium muscaetoxicum* and a single stand of Virginia bunchflower, *Melanthium virginicum,* growing in a similar headwater seep near Telegraph Road. *Symphyotrichum novi-belgii (= Aster n.), Symplocarpus foetidus, Carex atlantica* ssp. *capillacea, C. collinsii* and *C. folliculata* were noted in the same habitat.

The second site inspected was a large parcel that includes a recently abandoned farm field adjacent to a stream corridor and upland forest. We saw several tall, straight specimens of *Pinus rigida* and scattered individuals of *P. strobus.* In a recently cut *Chamaecyparis thyoides* stand we found that dense slash was providing some protection from browsing by deer during seedling establishment.

Our last stop was along Old Stage Road northeast of the intersection of Route 49 and Cohansey-Pecks Corner Road. This area of open field and woodland provided a view of an intact Atlantic white-cedar stand with a dense cover of *Symplocarpus foetidus* and scattered *Trientalis borealis* and *Helonias bullata.* Participants: 11. Leaders: Ann Rhoads, Steve Eisenhauer and Joe Arsenault; report by the latter.

15 May (Saturday): Laurels Reserve, Newlin Township, Chester County, Pennsylvania (Joint trip with the Brandywine Conservancy). On a sunny spring day nine Club and Conservancy members met the leaders in the parking lot at the south end of the Laurels Reserve, a Brandywine Conservancy property carved out of the heart of the old King Ranch in the 1980s. Before passing the gate we examined the differences between the two largest local members of the carrot family, cow-parsnip (*Heracleum lanatum*) and the uncommon great angelica (*Angelica atropurpurea*) growing on the adjacent streambank. Once in the reserve proper we walked slowly along an old dirt road lined by forested slopes with occasional rock outcrops, noting as we moved north how the vegetation changed from young tuliptree – spicebush woodland to older oak – beech forest dotted with mountain-laurel (*Kalmia latifolia*) and pinxter-flower (*Rhododendron periclymenioides*), the latter in bloom. On one rock outcrop just below the road we looked for and finally found a small wild columbine (*Aquilegia canadensis*), the last remnant of a long-persistent but dwindling population.

Beneath the oaks the steep uphill mossy slopes bore a carpet of blueberries, huckleberries and sedges, including the distinctive woodland bulrush (*Trichophorum planifolium*). A few trailing-arbutus (*Epigaea repens*) and patches of rockcap fern (*Polypodium virginianum*) were also seen. Crossing a lush grassy low streamside meadow and the first of two covered bridges, we examined the rich spring ephemeral flora of a steep wooded hillside, including Dutchman's-breeches (*Dicentra cucullaria*), spider-flower (*Tradescantia virginica*) and bladdernut (*Staphylea trifolia*). The shrubby level north side of the trail yielded maidenhair fern (*Adiantum pedatum*) and bristly greenbrier (*Smilax tamnoides*). After lunch on the second covered bridge, we retraced our steps back to the parking lot. Report by leaders: Janet Ebert and Jack Holt.

22 May: Allaire State Park, Howell and Wall Townships, Monmouth County, New Jersey. Joint trip with the Torrey Botanical Society. From the Interpretive Center we followed the Red Trail across a boardwalk through a floodplain forest along the Manasquan River dominated by *Acer saccharum, Fraxinus pensylvanica* and *Carya cordiformis.* Serious flooding during the previous winter had left large silt deposits and debris along the lower terraces. Despite large areas of the floodplain being overgrown with *Microstegium vimineum*, we still found a nice variety of flowering species, including *Anemone quinquefolia, Arabis laevigata, Arisaema triphyllum, A. dracontium, Asarum canadense, Cardamine concatenata, Claytonia virginica, Maianthemum canadense, Ornithogalum umbellatum, Oxalis violacea, Ranunculus abortivus, Trientalis borealis* and *Veratrum viride. Alliaria petiolata* was abundant near the river's edge, as were the remains of *Dicentra cucullaria.* On the upper edge of the floodplain, we were pleased to find adder's-tongue fern, *Ophioglossum pusillum* (= *O. vulgatum* var. *pseudopodum*) fully emerged, flowering golden ragwort, *Senecio aureus*, and lily-leaved twayblade, *Liparis liliifolia*, which was just beginning to flower.

After lunch we stopped at an old cemetery north of the main park complex. Here we found the rare *Valerianella radiata* growing nearby in an open, damp area protected under easement. Other species encountered at this stop were *Comandra umbellata, Vicia tetrasperma, Veronica chamaedrys, Potentilla argentea, Helianthemum canadense* and *Piptochaetium avenaceum.*

Our last stop for the day was at a successional old field within another section of the park, site of a former home and adjacent mesic forest. Species added to the day's list were *Krigia*

biflora, Penstemon digitalis, Viola palmata, V. primulifolia, V. macloskeyi, V. pubescens, Aralia nudicaulis, Lycopodium clavatum and *Listera australis.* Participants: ca. 20. Report by leader: Linda Kelly.

12 June: Thompson Park, Middletown, Monmouth County, New Jersey. Leader: Steve Glenn.

13-17 June: Bruce Peninsula, Ontario. The joint field meeting of the Philadelphia Botanical Club, the Torrey Botanical Society and the Northeastern Section of the Botanical Society of America took place on the Bruce Peninsula, the dolomite ridge that separates Georgian Bay from the main body of Lake Huron. Housing and meals were at the Wildwood Lodge in Red Bay. Sites visited included the traditional botanical destinations: the dunes at Au Sable Beach, Oliphant Fen, the fen and forest at Petrel Point Preserve, and Flowerpot Island. We also went to some lesser-known sites at the base of the Peninsula including Bayview Escarpment Nature Preserve, Inglis Falls, MacGregor Point Provincial Park and Inverhuron Provincial Park.

A few local plant species of particular interest included the ferns *Asplenium scolopendrium, Asplenium trichomanes-ramosum, Polystichum lonchitis* and *Cryptogramma stelleri;* the orchids *Corallorhiza striata, Calypso bulbosa, Cypripedium arietinum* and *Listera ovata;* and other taxa such as *Hypericum kalmianum, Lithospermum caroliniense, Cirsium pitcheri* and *Anemone multifida.* The trip leaders were Alan Anderson, Nels Maher and John Pedlar. Evening lectures included "Nature on the Bruce Peninsula" by Joan and Walter Crowe; "Geological Highlights of the Bruce Peninsula" by Victor Last; "Orchids of the Bruce Peninsula" by Alan Anderson; and "Bruce Peninsula National Park" by Ethan Meleg. Local guides and speakers were recruited by Joan Crowe. The field meeting was chaired by Nancy Williams. Participants: 73, from 11 states. Report by Karl Anderson.

17 July: Intermittent Hampton-Central Ponds, Wharton State Forest, Burlington County, New Jersey. Joint trip with the Torrey Botanical Society. Enroute to the target site, we stopped along Carranza Road just southeast of Hampton Gate to see a small, flowering population of the globally rare (G3G4) *Pityopsis falcata (= Chrysopsis f.),* growing on the exposed sand of an embankment. The sickle-leaved golden aster reaches the southern limit of its range in New Jersey, where it is known from just three counties, Burlington, Ocean and Atlantic. Near the Carranza Memorial, we saw *Stylisma pickeringii* var. *pickeringii* in flower, also growing in exposed mineral soil. At the northern limit of its range, this state-endangered morning-glory has survived a long history of vehicular abuse at this site.

We drove about one mile west on High Crossing Road, a sand trail, and then headed south on another trail to reach the vicinity of a cluster of three intermittent ponds ("Hampton-Central"), situated about one mile southeast of Hampton Furnace and 400 yards north of the abandoned Jersey Central Railroad. From here we hiked some 800 yards west to the ponds, through a pitch-pine lowland swale, whose canopy had been consumed in a recent wildfire. This ecotone community provided a diverse assemblage of plants including *Calamovilfa brevipilis, Andropogon glomeratus, A. virginicus, Rhynchospora torreyana, R. capitellata, Scleria minor, S. triglomerata, Xerophyllum asphodeloides, Bartonia virginica, Lobelia nuttallii, Polygala lutea, Pyxidanthera barbulata, Lechea racemulosa, Hudsonia ericoides, Mo-*

rella pensylvanica (= Myrica p.), Leucothoe racemosa, Gaylussacia dumosa, G. baccata and *G. frondosa.*

We next explored adjacent "Big Pond," an estimated 3 to 4 acres in size and covered by 6 to 8 inches of water. Shrubs encircling the open pond included *Ilex glabra, Decodon verticillatus, Vaccinium corymbosum, V. macrocarpon, Kalmia angustifolia, Lyonia mariana* and *Chamaedaphne calyculata.* Also growing in this outer band, both among the shrubs and a bit beyond, were *Juncus biflorus, J. canadensis, J. pelocarpus, Eleocharis tuberculosa, Rhynchospora alba, R. fusca, R. gracilenta, Carex barrattii, C. striata, C. livida, C. bullata, Cyperus dentatus, Muhlenbergia torreyana, Panicum virgatum, Sphagnum cyclophyllum, Lobelia canbyi, Polygala cruciata* and *Platanthera blephariglottis*. Dominating the interior of the pond were *Eleocharis robbinsii, Cladium mariscoides, Xyris smalliana* and *Panicum spretum.* Present in lesser quantities were *Saccharum giganteum (= Erianthus giganteus), Nymphaea odorata, Nymphoides cordata, Brasenia schreberi, Dulichium arundinaceum, Utricularia striata, Triadenum virginicum, Proserpinaca pectinata, Eriocaulon decangulare, E. aquaticum* and *E. compressum,* the latter with flower heads decomposing. Although we saw three plants of *Rhexia virginica* in bloom, we did not encounter—as the leaders did in 2003—several specimens of a *Rhexia* that likely was a hybrid with features of *R. aristosa* (S1). Identification of this "mystery" plant will require further study.

Our most significant find was a fine population of at least 28 fruiting culms of *Panicum hirstii (= Dichanthelium h.),* confined to the southwestern section of the pond. This panic grass, recorded in Burlington County for the first time, is critically imperiled globally. The new record is the larger of only two occurrences currently reported to be extant in the state.

We briefly explored nearby "South Pond," less than 1.5 acres in size and covered with about 2 inches of water. Readily observed species were *Cladium mariscoides, Scleria minor, Juncus canadensis, Rhynchospora pallida, Calamovilfa brevipilis* and *Muhlenbergia torreyana.* The floral displays of *Hypericum denticulatum, Lophiola aurea, Utricularia juncea* and *Sabatia difformis* were especially attractive. A herpetological highlight was seeing the state-endangered corn snake, *Elapha guttata,* partially submerged in water. "Southwest Pond," the smallest of the three ponds visited, had *Eriocaulon compressum, Lachnanthes caroliniana* and considerable stands of *Woodwardia virginica* and *Rhynchospora cephalantha* (S3).

Our final stop was a pitch-pine lowland savanna severely impacted by off-road vehicles along the south side of the Jersey Central Railroad tracks. Here we searched unsuccessfully for a known occurrence of *Rhynchospora nitens* (S2). Many of the same species we had seen earlier also occurred here. Participants: 14. Leaders: Russell Juelg and Ted Gordon.

24 July: Franklin Parker Preserve, Chatsworth, Burlington County, New Jersey. Leader: Emile De Vito.

7 August: Fairfield, Greenwich, and Stow Creek Townships, Cumberland County, New Jersey. Joint trip with the Torrey Botanical Society. This trip began in Springtown, Greenwich Township, in the vicinity of Pine Mount (Mount Gibbon) where there is a small pinelands outlier that includes an abandoned cranberry bog. The leader noted that Bessie Ayars Andrews in her *Historical Sketches of Greenwich in Old Cohansey* (1905) commented on the

local flora, which included spotted wintergreen *(Chimaphila maculata)*, moccasin-flower *(Cypripedium acaule)*, trailing-arbutus *(Epigaea repens)*, American holly *(Ilex opaca)*, mountain-laurel *(Kalmia latifolia)* and sweet-bay *(Magnolia virginiana)*. Andrews wrote that the wealth of the flora "afforded us girls more happiness than the glittering gold of Ophir or the sparkling diamonds of India could possibly have given us in later years." The group focused its efforts on the upland areas in the vicinity of the Springtown Cemetery along Springtown Road, east of Pine Mount Creek. Here the group noted Gray's flatsedge *(Cyperus grayi)*, trailing milk pea *(Galactia regularis)* and pine barren heather *(Hudsonia ericoides)*. The rare narrowleaf bluecurls *(Trichostema setaceum)* was noted growing with common bluecurls *(T. dichotomum)*. Other rare species noted were velvety-leaved trefoil *(Desmodium viridiflorum)* and poison-oak *(Toxicodendron pubescens)*.

The group then explored a low woods at Davis Mill adjacent to Macanippuck Run in Stow Creek Township. Here, as in most low woods of this area, *Diphasiastrum digitatum (Lycopodium d.)* and *Lycopodium obscurum* were common. A single specimen of *Populus deltoides* was also noted. Open, rich wetlands adjacent to an active farm field were then studied in Gum Tree Corner Wildlife Management Area. Here the group observed a large population of robust specimens of the rare *Rotala ramosior*, and puzzled over whether a large *Carex* observed was *C. lupulina* or *C. lupuliformis* (the leader later concluded, with some reservation, that it was *C. lupulina*). The rare *Hypericum gymnanthum* was also observed. Other species noted here included *Apios americana, Galium tinctorium, Juncus acuminatus, Lindernia dubia* and four *Polygonum* species, *P. cespitosum* var. *longisetum, P. pensylvanicum, P. lapathifolium* and *P. punctatum* var. *confertiflorum*.

The group then returned to Greenwich Township and visited a young, moist forest in Stathems Neck to see a population of *Goodyera pubescens* in bloom. Along Wheaton Island Road, the group saw an excellent specimen of *Quercus stellata* that measured 11 feet, 1 inch in circumference at breast height, 1 inch smaller than New Jersey's largest recorded specimen in Haddonfield, Camden County. In a roadside ditch, a large population of *Tripsacum dactyloides* was noted.

The last stop of the day was in an upland woodland edge in Gouldtown, Fairfield Township. Here a fine stand of the state-endangered *Vernonia glauca* was seen in bloom. Bayard Long last reported this species from Cumberland County in 1935. Other species noted here included the rare *Desmodium laevigatum, Crataegus uniflora, Helianthus tuberosus, Monotropa hypopithys* and *Quercus prinoides*. Participants: 12. Thanks are due Warren Adams, Cumberland County Historical Society, for providing a copy of Bessie Ayars Andrews' account of Pine Mount. Report by leader: Gerry Moore.

8 August: Big Goose and Little Goose Ponds, Atlantic County, New Jersey. Situated at the head of Landing Creek, these two intermittent ponds have been the destination of scores of field trips ever since Frank and the late Bob Hirst in the 1950s apprised the botanical community of their unusual flora. Rare species that have been reported from both ponds include *Panicum hemitomon, Rhexia aristosa*, Rhynchospora inundata, Sagittaria teres*, Nymphoides cordata, Lobelia canbyi, Sphagnum macrophyllum, Utricularia purpurea* and *Ludwigia linearis* (species marked with an asterisk are state-endangered). Confined only to Big Goose Pond is *Eleocharis equisetoides**, while *Lobelia boykinii*, Utricularia olivacea** and *U. re-*

*supinata** are here only known from Little Goose Pond. Because of their enormous size both ponds present a special challenge.

We accessed Big Goose Pond from the northwest via a small drainage ditch in which we observed the following sphagnum species: *Sphagnum tenerum, S. compactum, S. magellanicum* and *S. cuspidatum.* Dominant throughout the flooded pond (containing about 5 to 6 inches of water) is *Sphagnum cuspidatum*; the rare *S. macrophyllum* occurs around the rim. In the southern lobe, it was encouraging to see some 30 flowering stalks of *Rhexia aristosa* and an even greater number still in bud. During the past few years, this population of the globally rare awned meadow-beauty has been increasing. Also here in flower were *Eriocaulon aquaticum, Xyris smalliana, Spiraea tomentosa, Utricularia striata* and *U. cornuta.* Further to the east, several fruiting spikes of *Rhynchospora inundata* were found growing among such dominant species as *Cladium mariscoides, Eleocharis robbinsii* and *Panicum hemitomon.* Our search in this vicinity for *Eleocharis equisetoides,* one of our target species, was unsuccessful. Other species seen included *Rhynchospora fusca, Panicum spretum, P. rigidulum, Triadenum virginicum, Juncus pelocarpus, J. effusus, Sagittaria englemaniana, Dulichium arundinaceum, Schoenoplectus subterminalis, Lobelia canbyi, Nymphaea odorata* and *Utricularia purpurea.*

In Little Goose Pond, inundation was less uniform, and substantial areas of pond bottom were exposed. In shallow water along the northern border, we succeeded in rediscovering New Jersey's only known occurrence of *Utricularia olivacea.* This diminutive, white-flowered bladderwort, discovered here by the Hirst brothers, was last seen by the leader on 6 August 1989. Initially it was thought that the tiny submersed plants we examined were seedlings of *Utricularia geminiscapa*, since they appeared to have submersed cleistogamous flowers. However, subsequent examination under the microscope revealed those structures to be tiny winter buds on diminutive pedicels. No cleistogamous flowers were present. Indeed, all other dimensions proved to be those of mature *Utricularia olivacea.* We did not succeed in relocating the elusive *Lobelia boykinii.* However, we did see in flower more *Lobelia canbyi,* more *Rhexia aristosa*, and six *Sagittaria teres.* Also noted were our three species of *Drosera, Eleocharis tuberculosa, E. olivacea, E. microcarpa, Panicum verrucosum, P. hemitomon,* seedlings of *Lachnanthes caroliniana, Nymphoides cordata,* and yellow patches of *Gratiola aurea.* Leader: Ted Gordon.

14 August: Bennett Bogs Preserve, Property of The Nature Conservancy and New Jersey Conservation Foundation, Cape May County, New Jersey. Joint trip with the Torrey Botanical Society. In his article "*Bennett Bog Now a Nature Sanctuary,*" (*Bartonia* **28**, 1957), Edgar T. Wherry stated that in the 1850s Bennett Bog "was a favorite site for duck shooting, ice skating, and cutting ice . . . " Over the years, the two "bogs," which actually are meadow-like depressions, have become drier. Wherry also pointed out that mosquito-related ditching of the site had changed the hydrology. On 24 July 1907, two Philadelphia botanists, Bayard Long and S. S. Van Pelt, recorded the first rare plants, *Platanthera nivea* and *Boltonia asteroides* var. *glastifolia,* at this site. Since that time numerous botanists have traveled to Bennett Bogs "to see for themselves the remarkable assemblage of plants growing there."

The North Pond was somewhat wet with perhaps 2 inches of water. Plants of interest noted here were *Eleocharis quadrangulata, E. microcarpa, E. tuberculosa, Rhynchospora mac-*

rostachya, Hypericum denticulatum, Panicum wrightianum (= Dichanthelium w.), Ludwigia alterniflora, L. sphaerocarpa, Sium suave and an abundance of *Scleria reticularis.* We found only a few plants of the unusual *Eryngium aquaticum.* Regrettably, our search for *Platanthera nivea* and the unusual wrinkled joint grass, *Coelorachis rugosa,* both state-endangered species, was unsuccessful. The former, once abundant here, has been seen only on rare occasions in recent years. A population of *Phragmites australis* continues to persist near the western edge of the pond.

The South Pond, choked by *Panicum hemitomon,* contained some water as well. *Polygonum amphibium* and *Eleocharis quadrangulata* were abundant, but only one clump of *Eleocharis melanocarpa* was observed. We cut through the woods in the direction of the rear pond. Along a ditch near the pond we searched unsuccessfully for a population of cypress swamp sedge, *Carex joorii,* recently reported here. Sections of the pond were covered by a foot of water. We saw *Juncus canadensis, Leersia oryzoides, Triadenum virginicum, Scirpus cyperinus, Eleocharis quadrangulata, Utricularia geminiscapa* and *Chasmanthium laxum.* Thanks are due Karl Anderson and Ted Gordon for their input and to Gerry Moore for maintaining a list of species observed. A species list may be requested from the leader at 856-696-8554. Participants: 18. Report by leader: Renee Scagnelli.

27-29 August: Delaware Water Gap National Recreation Area, Pike and Monroe Counties, Pennsylvania and Sussex County, New Jersey. This fern and fern allies weekend was based at the Pocono Environmental Education Center. The group visited some of the woodlands, wetlands, and rocky ledges in the park to learn to identify quillworts (*Isoetes*), spikemosses (*Selaginella*), clubmosses (*Lycopodium, Huperzia* and *Diphasiastrum*), and true ferns. Pressed specimens were also studied in the evening in the laboratory. The changing taxonomy for ferns and fern allies was discussed. The following species were observed and studied: *Adiantum pedatum, Asplenium platyneuron, A. rhizophyllum, A. trichomanes, Athyrium filix-femina, Botrychium dissectum, Cheilanthes lanosa, Cystopteris bulbifera, C. protrusa, C. tenuis, Dennstaedtia punctilobula, Deparia acrostichoides, Dryopteris carthusiana, D. clintoniana, D. cristata, D. intermedia, Equisetum arvense, Gymnocarpium dryopteris, Huperzia lucidula, Isoetes engelmannii, Diphasiastrum digitatum, D. tristachyum, Lycopodium clavatum, L. hickeyi, L. obscurum, Matteuccia struthiopteris, Onoclea sensibilis, Osmunda cinnamomea, O. claytoniana, O. regalis* var. *spectabilis, Phegopteris connectilis, P. hexagonoptera, Polypodium virginianum, Polystichum acrostichoides, Pteridium aquilinum* var. *latiusculum, Selaginella apoda, S. rupestris, Thelypteris noveboracensis, T. palustris* var. *pubescens, Woodsia ilvensis* and *W. obtusa.* Report by leader: Bill Olson.

11 September: Unexpected Wildlife Refuge, Gloucester and Atlantic Counties, New Jersey. This refuge is a 600-acre complex of hardwood swamps, upland forests, ponds and small clearings, straddling the Atlantic-Gloucester County line northwest of Buena. It has been managed as a wildlife sanctuary since 1954 (when it included only 85 acres). The purposes of this field trip, besides the usual ones of educating and entertaining the participants, were to introduce a new, publicly accessible site and to begin a plant list for the refuge. Some of the species seen around the pond edges included *Lobelia cardinalis, L. siphilitica, Bidens coronata, Pontederia cordata, Drosera intermedia, Decodon verticillatus, Rhynchospora macrostachya, R. alba, Cladium mariscoides* and a single, flowering plant of *Spiranthes odorata.* A small, isolated, pine barrens-type fen had *Carex striata, Chamaedaphne calyculata, Brase-*

nia schreberi and *Utricularia striata.* Upland forests had such species as *Quercus falcata, Q. stellata, Carya pallida, Monotropa uniflora, M. hypopithys* and the lichens *Cladonia clavulifera, C. strepsilis, C. coniocraea* and *C. chlorophaea.* Hardwood swamps had the expected *Liquidambar styraciflua, Acer rubrum, Magnolia virginiana, Aronia arbutifolia, Ilex laevigata, I. verticillata, Carex collinsii, C. folliculata* and the ferns *Osmunda cinnamomea, O. regalis, Woodwardia areolata, W. virginica, Thelypteris palustris* and *T. simulata.* 174 species of vascular plants were listed during the trip. Participants: 12. Report by leader: Karl Anderson.

11 September: Hamilton-Trenton-Bordentown Marsh, Mercer County, New Jersey. Joint trip with the Torrey Botanical Club. The areas visited were the edge of the Delaware River at the Trenton boat launch on Lamberton Road, areas at the east fringe of the marsh near Watson Creek, including the edge of the creek, a bluff hillside, and sedge-alder swamp. Along the Delaware River species included several robust plants of *Bidens bidentoides**, as well as *Chelone glabra**, *Datura stramonium**, *Helenium autumnale**, *Heteranthera reniformis, Justicia americana, Lobelia siphilitica**, *Lycopus europaeus**, *Lycopus virginicus**, *Maclura pomifera, Mazus pumila**, *Mirabilis nyctaginea**, *Scutellaria galericulata**, *Verbesina alternifolia** and *Vernonia noveboracensis* (plants marked with an asterisk were seen in flower). Near Watson Creek were *Apios americana, Bidens laevis, Heteranthera multiflora**, *Hypericum mutilum**, *Lycopus americanus**, *Osmorhiza longistylis, Panicum anceps**, *Physocarpus opulifolius, Sagittaria subulata* (large mats underwater), *Scrophularia marilandica** and *Tridens flavus* var. *flavus**. On the bluff hillside were *Hieracium paniculatum, Paronychia canadensis**, *Silene stellata** and *Solidago caesia.* In the sedge-alder swamp were *Alnus incana* ssp. *rugosa, A. serrulata, Asclepias incarnata, Carex stricta, Ilex verticillata, Rosa palustris, Sagittaria latifolia* and *Saururus cernuus.* Vines that occurred in several locations were *Clematis terniflora**, *Dioscorea villosa, Humulus japonicus**, *Mikania scandens**, *Polygonum sagittatum**, *P. scandens** and *Sicyos angulatus**. Other broadly distributed species included *Impatiens capensis, Polygonum punctatum, P. virginicum** and *Pontederia cordata.* Across Watson Creek in the tidal marsh many blackbirds were feeding at the abundant *Zizania aquatica**. Participants: 12. Leaders: Charlie and Mary Leck; report by the latter.

Bartonia No. 63: 69, 2006

Program of Meetings
September 2005–May 2006

Date	*Subject*	*Speaker*
2005		
22 Sep	Members' Reports on Summer Botanizing	
27 Oct	Getting Wet with Plants in Eastern Pennsylvania Lakes	Ann F. Rhoads and Timothy A. Block, The Morris Arboretum
17 Nov	Morphology and Distribution of *Juncus longii*—Clarifying its Status as a Species	Wesley M. Knapp, Maryland Department of Natural Resources
15 Dec	Fire, Rain, and Flowering along Florida's Lake Wales Ridge and Adventures in the Everglades	Amy E. Faivre, Cedar Crest College
2006		
26 Jan	Floristic Resources of Evansburg State Park, Montgomery County, Pennsylvania	Nancy Khan, Wissahickon Restoration Volunteers
23 Feb	Plant Diversity in New Jersey Pinelands Fens (a.k.a. Savannas)	Matt Palmer, Columbia University
23 Mar	The Native Grasslands and Meadows of Pennsylvania—Past, Present, and Future	Roger Latham, Continental Conservation
27 Apr	A Southern California Spring Odyssey—Desert Wildflowers in a Record Rainfall Year	Douglas Ripley, Headquarters, U.S. Air Force Environmental Division (retired)
25 May	Adventures with Seep-Weeds and Sea-Blites: Systematics of the Genus *Suaeda*	Wayne R. Ferren, Jr., Maser Consulting

Bartonia No. 63: 71-78, 2006

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