

SOUTHERN INDIANA PLANT DISTRIBUTION RECORDS AND NOTES ON THE ENDANGERED, THREATENED, AND RARE VASCULAR PLANT SPECIES IN THE PROPOSED STATE PARK AREAS OF THE INDIANA ARMY AMMUNITION PLANT

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ABSTRACT: Students in botany classes at Indiana University Southeast as well as individual collectors have found 88 new vascular plant records for Clark, Floyd, Harrison, Scott, and Washington Counties in southern Indiana. Most of the Clark County collections are from the Indiana Army Ammunition Plant. The State/County record vouchers and other collections cited are in the Indiana University Herbarium at Bloomington. Noteworthy collections are discussed. A listing (as of 1994) of Indiana endangered, threatened, and rare vascular plant species at the Charlestown State Park site and a leased park site within the Indiana Army Ammunition Plant is also provided and discussed.

KEYWORDS: Charlestown State Park, Clark County, endangered, threatened, rare — vascular plants, reports — vascular plants, southern Indiana County/State records.

INTRODUCTION

Distribution records and noteworthy species are listed for Clark, Floyd, Harrison, Scott, and Washington Counties in southern Indiana. Genera are in the order of their appearance in the *Flora of Indiana* (Deam, 1940); species within each genus are alphabetical with county and collector. Nomenclature conforms with Gleason and Cronquist (1991), except as noted. The indications of Indiana endangered (e), threatened (t), or rare (r) follow *Indiana's Rare Plants and Animals* (Indiana Department of Natural Resources, 1993).

The senior author began an annual botanical survey in the secured area at the north end of the Indiana Army Ammunition Plant (IAAP) in March 1977 with the permission of the U.S. Army. The survey covers land now owned by the State (the proposed Charlestown Park site) containing Rose Island and the Devil's Backbone next to the Ohio River (Charlestown and Owen Quadrangles) and managed by the Department of Natural Resources (DNR), Division of State Parks. Also included in Maxwell's survey are approximately one thousand acres adjoining IAAP, most of which is leased to the State. The leased parcel includes two cedar limestone glades (Maxwell, 1987).

The survey's initial purpose was educational — to provide vascular plant vouchers for a Kentuckiana reference collection in the Indiana University Southeast Herbarium (JEF). With direction from the DNR, Division of Nature Preserves,

Indiana Natural Heritage Program, the focus shifted from simply collecting and identifying the local flora to a search for state and federally listed endangered, threatened, and rare vascular plant species. Those found within Maxwell's survey area as of December 1994 are listed and discussed below. An ongoing survey of the entire IAAP is being conducted by Michael A. Homoya, Botanist, Indiana DNR, Nature Preserves.

METHODS AND MATERIALS

Collections were made using conventional methods and materials. The specimens were processed, the pertinent literature checked, and primary determinations made at JEF. Voucher specimens for all new records and noteworthy collections were sent to the Indiana University Herbarium in Bloomington (IND) for confirmation and eventual incorporation into their permanent collection. Methods and criteria for listing Indiana's endangered, threatened, and rare vascular plant species have been discussed by Bacone and Hedge (1980), Bacone, Crovello, and Hedge (1981), and Aldrich, Bacone, and Homoya (1986).

Deam's anecdotal notes about collection sites in his published works, on his mounted collection labels, and his additional notes and collection route maps at IND are invaluable guides in the search for listed plants. The Indiana DNR, Nature Preserve vouchers are also at IND.

SOUTHERN INDIANA STATE/COUNTY RECORDS AND NOTEWORTHY COLLECTIONS

The following species with their counties, collectors, and status (if appropriate) were collected and identified:

Juniperus virginiana L. var. *crebra* Fern., Clark, Maxwell 2797

Asplenium x ebenoides R.R. Scott., Clark, Porter s.n.

Sparganium americanum Nutt., Harrison, Schoen s.n.

Sagittaria rigida Pursh., Clark, Lee 28

Chloris verticillata Nutt., Clark, Maxwell 3010

Digitaria ciliaris (Retz.) Koeler, Floyd, Maxwell 2893

Digitaria sanguinalis (L.) Scop., Floyd, Maxwell 2894

Eleusine indica (L.) Gaertn., Floyd, Maxwell 2892

Setaria faberi R. Herrm., Floyd, Maxwell 2891

Setaria geniculata (Lam.) P. Beauv. (e), Harrison, Lawton 13

Cyperus flavescens L., Floyd, Maxwell 2912

Commelina virginica L., Clark, Maxwell 3057

Allium burdickii (Hanes) A.G. Jones (Mohlenbrock 1986), Clark, Maxwell 2977
(*Allium tricoccum* Aiton var. *burdickii* Hanes (Gleason & Cronquist, 1991))

Allium sativum L., Harrison, Kepley 68

- Allium tricoccum* Aiton var. *tricoccum*, Clark, Maxwell 2975
Asparagus officinalis L., Harrison, Schoen s.n.
Hemerocallis fulva (L.) L., Clark, Hardman 61
Ornithogalum umbellatum L., Floyd, Weatherholt 886A
Trillium flexipes Raf., Washington, Emmert 173
Trillium flexipes Raf. f. *Walpolei* (Farw.) Fern. (Fernald, 1950), Clark,
Maxwell observed; Washington, Emmert 173
Liparis liliifolia (L.) Rich., Floyd, Maxwell & Emmert 2887
Platanthera peramoena (Gray) Gray (Mohlenbrock, 1986), Floyd,
Maxwell 1702
Spiranthes cernua (L.) Rich., Washington, Emmert 135
Spiranthes tuberosa Raf. var. *tuberosa*, Clark, Maxwell 2865
Alnus serrulata (Aiton) Willd., Floyd, Chambers 53
Ulmus americana L., Floyd, A. Johnson 11
Maclura pomifera (Raf.) C.K. Schneider, Floyd, Weatherholt 1550
Boehmeria cylindrica (L.) Swartz, Clark, Maxwell 3055
Iresine rhizomatosa Standley (t), Clark, Maxwell & Homoya 3056A
Portulaca oleracea L., Clark, Maxwell 3028
Clematis virginiana L., Clark, Maxwell 2925
Cimicifuga racemosa (L.) Nutt., Clark, Maxwell 3012
Hepatica acutiloba DC., Washington, Emmert 165
Berberis thunbergii DC., Clark, Maxwell 1823
Caulophyllum thalictroides (L.) Michx., Clark, Lyons 40
Corydalis flavula (Raf.) DC., Washington, Emmert 155
Arabidopsis thaliana (L.) Heynh., Floyd, Maxwell s.n.
Dentaria heterophylla Nutt. (Fernald, 1950), Scott, Zuckschwerdt s.n.
Descurainia pinnata (Walter) Britton, Clark, Maxwell 2237
Diplotaxis tenuifolia (L.) DC., Floyd, Maxwell s.n.
Nasturtium officinale R. Br. (Mohlenbrock, 1986), Floyd,
Weatherholt 1015
Mitella diphylla L., Washington, Emmert 312
Potentilla simplex Michx., Floyd, Speth 16
Rosa multiflora Thunb., Harrison, Lawton 76
Amorpha fruticosa L. var. *angustifolia* Pursh. (Mohlenbrock, 1986),
Clark, Maxwell 1589

- Lezpedeza cuneata* (Dum. Cours.) G. Don., Clark, Maxwell 1592;
Harrison, Schoen 111
- Melilotus officinalis* (L.) Pallas., Washington, Emmert 235
- Robinia hispida* L., Floyd, Kruer 139; Washington, Emmert 297
- Geranium carolinianum* L., Floyd, Hahn 33
- Geranium maculatum* L., Floyd, Weatherholt 985
- Oxalis violacea* L., Washington, Emmert 178
- Acalphya deamii* (Weatherby) Ahles. (t), Clark, Maxwell & Homoya 3052
- Aesculus glabra* Willd. var. *glabra*, Washington, Emmert 199
- Parthenocissus quinquefolia* (L.) Planchon, Floyd, Barker 74
- Vitis riparia* Michx., Clark, Maxwell & Emmert 2911
- Hibiscus syriacus* L., Harrison, Schoen s.n.
- Malva neglecta* Wallr., Harrison, Schoen s.n.
- Viola rafinesquii* Greene., Washington, Emmert 159
- Viola striata* Aiton., Floyd, Weatherholt 843
- Aegopodium podagraria* L., Floyd, Maxwell 2883
- Vinca minor* L., Floyd, Weatherholt 823
- Asclepias syriaca* L., Clark, Waterman 31
- Matelea obliqua* (Jacq.) Woodson (r), Clark, Maxwell 1683 (= *Gonolobus obliquus* (Jacq.) Schultes (Fernald, 1950))
- Mertensia virginica* (L.) Pers., Washington, Emmert 156
- Glechoma hederacea* L., Washington, Emmert 189
- Lamium amplexicaule* L., Washington, Emmert 150
- Leonurus cardiaca* L., Floyd, Weatherholt 1013
- Perilla frutescens* (L.) Britton, Harrison, Schoen s.n.
- Nepeta cataria* L., Clark, Maxwell & Emmert 2910
- Scutellaria elliptica* Muhl., Floyd, Weatherholt 722
- Datura wrightii* Regel. ?? c.f. discussion, Harrison, Schoen s.n.
- Datura stramonium* L., Washington, Emmert 261
- Physalis longifolia* Nutt., Floyd, Maxwell 2913
- Agalinis purpurea* (L.) Pennell, Clark, Maxwell 3007
- Mimulus alatus* Ait. f. *albiflora* House (Fernald, 1950), Floyd, Maxwell 2093
- Mimulus ringens* L., Floyd, Maxwell & Emmert 2888
- Veronica arvensis* L., Floyd, Speth 116
- Veronica peregrina* L. var. *peregrina*, Floyd, Weatherholt 876

- Catalpa speciosa* Warder (r), Clark, *J.A.M.* 60
Justicia americana (L.) M. Vahl, Washington, *Emmert* 222
Galium tinctorium L., Clark, *Maxwell & Emmert* 2908
Lonicera maackii (Rupr.) Maxim, Clark, *Maxwell* 2951
Dipsacus sylvestris Hudson, Clark, *Maxwell* 3031
Lobelia siphilitica L. var. *siphilitica* f. *albiflora* Britt. (Fernald, 1950),
Clark, *Maxwell* 3009
Sicyos angulatus L., Clark, *Maxwell* 3043; Floyd, *Maxwell* 3011;
Washington, *Emmert* 137
Aster pilosus Willd., Washington, *Emmert* 139
Hieracium caespitosum Dumort, Clark, *Maxwell* 2027; Washington,
Emmert 221
Matricaria matricarioides (Less.) Porter, Washington, *Emmert* 190
Rudbeckia laciniata L., Clark, *Maxwell* 3001
Tragopogon dubius Scop., Clark, *Calabro* 87; Harrison, *Schoen s.n.*;
Washington, *Emmert* 230

POSSIBLE STATE RECORDS/NOTEWORTHY COLLECTIONS

***Chloris verticillata* Nutt. (Poaceae).** Found in the IAAP, this specimen may represent the second State collection. The initial report was from Perry County.

***Digitaria ciliaris* (Retz.) Koeler (Poaceae).** Although close to *D. sanguinalis* (L.) Scop., this species is considered distinct and is found in southern Indiana (Gleason and Cronquist, 1991). *Maxwell* 2893 was submitted as a State voucher, since none was found nor were reports of any known at IND.

***Setaria geniculata* (Lam.) P. Beauv. (Poaceae).** This grass was reported as a species new to Indiana by Homoya and Hedge (1990) in Perry County. The Harrison County collection may be the second for the State.

***Allium tricoccum* Aiton and *A. burdickii* (Hanes) A.G. Jones (Liliaceae).** Both species are cited by Mohlenbrock (1986), but Gleason and Cronquist (1991) give only varietal status to *burdickii*. Homoya (pers. comm.) believes *burdickii* deserves species rank and pointed the differences between the two taxa out to the authors in the IAAP on 29 June 1994. The wooded slopes on both sides of Lick Creek in the IAAP lease area support large populations of both taxa. The locality is ideal for further study.

***Datura wrightii* Regel. (Solanaceae).** This collection does not represent the common jimsonweed. Whether or not the specimen might represent *D. meteloides* DC. or *D. metel* L. (Deam, 1940) could not be determined from the herbarium sheet.

***Lonicera maackii* (Rupr.) Maxim.** This large Asian honeysuckle shrub is well established along Loading Dock Road in the IAAP lease area and is moving into the open woods.

***Valerianella radiata* (L.) Dufr. (Valerianaceae).** This species was reported by Maxwell, *et al.* (1991) and was collected again within the IAAP in 1994 (Maxwell 2945 on 4 May 1994 and Maxwell 2953 on 18 May 1994). This species was excluded by Deam (1940). An examination of the Deam collections by their curator, Lewis Johnson, found that Deam did not annotate his *V. radiata* collections as *V. intermedia* "according to a recent revision" (Deam, 1940). Following Gleason and Cronquist (1991), *V. radiata* is maintained, and *V. intermedia* is placed in synonymy under *V. umbilicata* (Sulliv.) A. Wood. Based on Deam's original determinations of *Valerianella radiata* as found in his collections (IND), the species occurs in twenty-two counties in Indiana besides Clark County.

INDIANA ENDANGERED SPECIES WITHIN THE PARK SITES

***Asplenium resiliens* Kunze, Black-Stem Spleenwort (Aspleniaceae).** A few plants were discovered by Brian Abrell on the upper limestone cliffs of the Devil's Backbone south of the "fort." This species was vouchered by Homoya and Abrell (with Maxwell and Moberley) on 29 July 1994.

***Chaerophyllum procumbens* (L.) Cranz var. *shortii* T. & G., Wild Chervil (Apiaceae).** This species was found by Homoya (with Abrell and Maxwell) in the Jenny Lind Run area south of the proposed lease area in the IAAP proper. The species was vouchered by Homoya on 5 May 1994. Maxwell 2950 was collected on 12 May 1994 in the lease area. The pubescent fruit variety was common at both of these locations.

***Leavenworthia uniflora* Michx., Michaux's Leavenworthia (Brassicaceae).** This species was collected on 10 May 1978 as "indet." and identified later with the help of Cloyce Hedge of the Indiana Natural Heritage Program. Thousands of individuals were found early in the survey in very shallow soil on exposed, flat rock and in the gravel pavement of glade-like areas. A 7 April 1994 census yielded about 780 individuals concentrated in seven open meadow sites. These sites will eventually disappear without management. Introduced fescue is building sod over the few remaining exposed rock sites. *Lespedeza stipulacea* Maxim is well established and Japanese honeysuckle is prevalent and spreading throughout most of the survey area. Although suitable sites occur nearby, the IAAP proposed lease area is the only location in Indiana where this tiny winter annual has been found.

***Spiranthes magnicamporum* Sheviak, Great Plains Ladies' Tresses (Orchidaceae).** A colony of eleven plants was discovered by Homoya (1986) in 1985 growing in the east cedar limestone glade of the IAAP. Its identity was confirmed by Sheviak (1973), and the voucher (Homoya & Maxwell IND 132295, 10 October 1985) is deposited at IND. A later search increased the population to about seventeen plants in the southernmost part of the east glade. In 1986, twenty-three plants were found, but they were still confined to the east glade. Observations were sporadic until 1991, when nineteen individuals were counted in the east glade and about thirty-four in the west glade. A west glade voucher (Maxwell 2838 (IND)) was sent to Sheviak (New York State Museum Herbarium in Albany, New York), and he confirmed that *S. magnicamporum* had appeared in the west glade. A 28 October 1993 search found seventeen plants in the east glade and forty-seven in the west glade. Further study is needed to determine

whether the variation among new individuals represents natural development of *S. magnicamporum* or old field and prairie races of *S. cernua* (Sheviak, 1982). Homoya (1993) reports the IAAP glade location in Clark County as the most xeric of the two Indiana locations. The other site is a dune and swale area bordering Lake Michigan in Lake County. The nearest known population of *Spiranthes magnicamporum* is in the Kentucky TNC Pine Creek Barrens Preserve in Bullitt County, Kentucky, about 30 miles due south of the IAAP glades. Maxwell's 20 October 1994 IAAP glades' survey found 41 individuals. On 23 October 1994, he recorded 58 at the Pine Creek Barrens Kentucky site with morphological variations similar to those found in the Indiana populations.

INDIANA THREATENED SPECIES WITHIN THE PARK SITES

***Acalypha deamii* (Weatherby) Ahles., Mercury or Two-seeded Mercury (Euphorbiaceae).** A few plants were discovered by Homoya (with Maxwell) in the Jenny Lind Run ravine area west of the lake in the IAAP proper. A few more were also found in the narrow Fourteen Mile Creek bottom across from Rose Island in the lease area (Maxwell and Homoya 3052, 3 October 1994).

***Asplenium ruta-muraria* L., Wall-rue Spleenwort (Aspleniaceae).** A group of about fifteen individuals was found on limestone rock by Homoya. This upper, south-facing ledge line along Lick Creek in the lease area is an open, rocky woods habitat. The species was vouchered by Homoya (with Maxwell and Lewis Johnson) on 29 June 1994.

***Heliotropium tenellum* (Nutt.) Torr., Slender Heliotrope (Boraginaceae).** In August 1981, Medley identified the species as a new State record during a visit to a Harrison County limestone glade (Aldrich, *et al.*, 1981). The same species had been collected by Maxwell in the IAAP glades (Maxwell 1691, 20 July 1979) but misidentified. This heliotrope is common in the IAAP glades but very rare in other nearby IAAP glade-like areas.

***Iresine rhizomatosa* Standley, Eastern Bloodleaf (Amaranthaceae).** Homoya pointed out this species in the lease area associated with *Acalypha deamii* (see above). Bloodleaf was occasional at this locality. A voucher (Maxwell & Homoya 3056A, 3 October 1994) verifies the Clark County report in Deam (1940).

***Melica nitens* Nutt., Three-flowered Melic Grass (Poaceae).** A few individuals were discovered by Homoya just off the Devil's Backbone in the park area. This species was vouchered by Homoya (with Abrell, Maxwell, and Moberley) on 21 July 1994.

***Sedum telephioides* Michx., Allegheny Stonecrop or Wild Live Forever (Crassulaceae).** In 1984, Jim Aldrich of the Indiana Natural Heritage Program suggested looking for this plant on the upper southeast-facing bluffs of the Ohio River in the IAAP. A few individuals were found south of the lease area in the IAAP in July 1985. Larger populations were discovered later in 1985 within the lease area in the blooming period of September through October. On 3 October 1994, Homoya (with Maxwell) discovered many individuals on the upper southeast-facing bluffs from Battle Creek north to River Ridge in the IAAP proper and south of the lease area. The larger colonies within the lease area have disappeared within the last few years as sun exposure space on the upper rock ledges decreased. Japanese honeysuckle has climbed over the ledges and down

into the trapped organic debris on the cliff faces. Only one individual was found on the Devil's Backbone, but other sites nearby seem to exclude the possibility of imminent extirpation in the IAAP.

***Sullivantii sullivantii* (T. & G.) Britton, *Sullivantia* (Saxifragaceae).** This species is found on the west side of the Devil's Backbone on shaded limestone outcrops on steep slopes above Fourteen Mile Creek. The best of five local outcrop sites was reexamined by Abrell, Homoya, Maxwell, and Moberley on 21 July 1994. Hundreds of plants are flourishing in this remote but very fragile habitat.

INDIANA RARE SPECIES WITHIN THE PARK SITES

***Carex eburnea* F. Boott., *Ebony Sedge* (Cyperaceae).** This species was pointed out by Homoya on Ohio River cliff faces south of the lease area in the IAAP about 1985. *Carex eburnea* is common and profuse with *Sullivantia* in the park area and was collected (Maxwell 2048) on 31 May 1984. The species is occasional to rare in moist, cliff-face limestone pockets in the IAAP.

***Matelea obliqua* (Jacq.) Woodson, (*Gonolobus obliquus* (Jacq.) Schultes (Fernald, 1950)), *Angle-Pod* (Asclepiadaceae).** This species was collected by Maxwell (Maxwell 1683) on 11 June 1979 and determined by Lewis Johnson on 23 September 1994. The collection was from a rocky, open-wooded, south-facing slope of Lick Creek. Common angle-pod, *M. gonocarpa* (Walter) Shinnars (*Gonolobus gonocarpus* (Walter) Perry (Fernald, 1950)) is occasional in the IAAP.

***Hexalectris spicata* (Walter) Barnhart, *Crested Coral Root Orchid* (Orchidaceae).** Two colonies and a single stalk were found under red cedars next to the glades (Maxwell 1838) on 6 August 1980. Since then, the species has appeared annually with the number of individuals fluctuating greatly and seldom in the same locations. Only one individual has been found in a glade proper about 1 meter from the wood's margin. Most individuals appear under red cedars at the margins of the existing glades or what were probably former glade margin remnants in the surrounding open, rocky woods.

***Linum sulcatum* Riddell, *Grooved Yellow Flax* (Linaceae).** This species is found occasionally in the glades.

***Ophioglossum engelmannii* Prantl, *Limestone Adder's-Tongue* (Ophioglossaceae).** One population was found in the west glade. Hundreds of fronds may appear in May, but very few sporophylls develop.

***Passiflora incarnata* L., *Passion-Flower*, *Maypops* (Passifloraceae).** Maxwell's only "IAAP" collection is from a blackberry thicket in an open meadow north of the park area. Homoya and Maxwell observed numerous plants along the power line right-of-way south of River Ridge in the IAAP proper on 3 October 1994. The species was common in vacant lots in Jeffersonville near Warder Park during the 1970s. Recent student collections show it moving from urban environs north into country fence rows.

***Polypodium polypodioides* (L.) Watt., *Resurrection Fern* (Polypodiaceae).** One individual was seen on the Devil's Backbone on a dry cliff facing the Ohio River (Maxwell & McKay 2441) on 3 June 1986.

***Scutellaria parvula* Michx. var. *australis* Fassett, *Southern Scullcap* (Lamiaceae).** This species is common in the glades and frequently is found in

dry gravelly or rocky areas in the survey region. The species is fairly common in similar habitats outside the IAAP in Floyd and Harrison Counties.

CONCLUSIONS

Hopefully, scientific and educational work will continue in the IAAP survey areas with the cooperation of the Division of Natural Resources as it has in the past with the U.S. Army and ICI Americas, Inc. The authors will continue to lobby for the preservation and protection of unique areas within the proposed park, but they also hope that some carefully monitored botanical projects will be acceptable within the final management plan.

Although many IAAP collections are at JEF as "indet.", the critical vascular plant species with their unique habitats have been identified within the park and proposed park areas. Sporadic reports on the survey were sent to the U.S. Army prior to the issuance of Maxwell's annual pass. The preliminary results of the survey (mimeo) will be distributed to the DNR, Divisions of Parks and Nature Preserves, the IND and JEF herbaria, the federal liaison security officer at IAAP, and the Natural Resources Engineer of ICI Americas, Inc., also at IAAP. Hopefully, the faculty and students of Indiana University Southeast will continue their interest in the natural history of the park and will contribute to its success.

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