

Central Ohio Flora: Summary of the Vascular Plant Treatments of Franklin County, Ohio (U.S.A.), 1834-1997

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Abstract: Franklin County is one of only a few Ohio counties that permits a comprehensive inventory disclosing knowledge of Ohio floristics since the arrival of the first white settlers. The efforts of two frontier botanists, John Leonard Riddell and William Starling Sullivant, laid the foundation for this historical review of Franklin County's vascular plants. Riddell's (1834) *Catalogue* is brought to light in this comparative summary, just as 33 species represented in Sullivant's 1840 collection (labeled "Columbus") at The Ohio State University Herbarium (OS) are treated based on the study of references and herbarium records that led to the understanding of this historical collection for the validation of entries cited in Sullivant's (1840) *Catalogue*. At the turn of the 19th century, Augustine D. Selby and Moses Craig were responsible for the preparation of preliminary treatments for a vascular flora of Franklin County. The phases the present inventory underwent and how this led to the making of a manual for central Ohio flora are discussed: literature survey, herbarium survey, Franklin County plant information system, catalogue, and manual. Regional floras, Weishaupt's (1971) *Vascular Plants of Ohio* and Gleason and Cronquist's (1991) *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, were instrumental in the making of "A Central Ohio Flora: Manual of the Vascular Plants of Franklin County." This historical summary of Franklin County's vascular plants exemplifies the importance of county floras as they relate to a better understanding of Ohio floristics, and how the making of a manual for central Ohio flora reveals recommendations for future updates of Franklin County's contributions to the ongoing Ohio Flora Project.

Key Words: inventory, vascular flora, manual, Franklin County, Ohio, taxonomy

Introduction

Over the past two centuries, herbarium specimens representing county records have been indispensable for the validity of taxonomic research, and have played an important historical role in the making of herbaria and floras throughout the United States of America. Our understanding of biological diversity has been heightened by recognizing the county as a logical geographic unit for floristic work. This was exemplified in the State of Ohio in 1891 when William Ashbrook Kellerman initiated the collection of specimens by county for each species (Meyer, 1983), under the "laudable objective of building up the State Herbarium so that it would serve as a comprehensive...county by county record of the flora of the state. To this end he encouraged collectors...to send in specimens to the Herbarium." To guide them, he appended to his 1899 *Catalog of Ohio Plants* "a list for each county of the serial numbers of those species which were already represented in the Herbarium for that county...The momentum of this policy continued for many years after Kellerman passed from the scene."

Emma Lucy Braun (1889-1971), one of Ohio's leading field ecologists and plant taxonomists, was a staunch advocate of Kellerman's policy and made it the principal objective of the Ohio Flora Project founded in 1950. She believed that "For a taxonomic work herbarium specimens are the only acceptable records of the occurrence of species." She borrowed and examined all "specimens that would have added a county record (a dot on the map)" for the preparation of her *Woody Plants of Ohio* (1961) and *The Monocotyledoneae, Cat-tails to Orchids of Ohio* (1967). Subsequently published volumes, *The*

Dicotyledoneae of Ohio, Part 3: Asteraceae by T. Richard Fisher (1988) and *Part 2: Linaceae through Campanulaceae* by Tom S. Cooperrider (1995), have used dot distribution maps in which “a dot in a county means that a specimen from that county had been examined.” These finished volumes (Braun, 1967; Fisher, 1988; Cooperrider, 1995) disclose only 784 of the 1,756 taxa recognized in the present survey of Franklin County’s vascular flora that have been dot mapped for Franklin County by the Ohio Flora Project.

The herbarium at The Ohio State University (OS), under the commitment to preserve its natural history collections as part of Ohio’s heritage, has built up its holdings with specimens from all of Ohio’s 88 counties. The importance of these biological collections should not be underestimated (Williams, 1994), since “without such collections there can never be an honest and complete appraisal of biological reality.”

The earliest known collections from Franklin County were collected by Jonathan Roberts Paddock (Lowden, 1997) in the vicinity of Worthington from 1833-1840. His specimens are at the University of Illinois (ILL). William Starling Sullivant’s 1840 Columbus collections (Lowden, 1997) represent some of the oldest and most important historical collections in the herbarium of The Ohio State University (OS). The exact nature of this 1840 collection is discussed based on our current understanding of herbarium records and literature, since both have played an important role in the recommendation of how this historical collection should be interpreted.

During the period 1882-1900 (Lowden, 1998), numerous vascular plants were collected in Franklin County by Moses Craig, Augustine Dawson Selby, William C. Werner, E. Mead Wilcox, Ernest E. Bogue, and Kellerman. These collections contributed to the initial formation of the State Herbarium at The Ohio State University under the direction of Kellerman, who was the first professor of botany and chairman of the newly founded Botany Department (Lowden 1970, 1998).

The first half of the 20th century reveals significant plant collections made in Franklin County by John H. Schaffner, Robert F. Griggs, Wendell H. Camp, Robert B. Gordon, Edward S. Thomas, Lawrence E. Hicks, Floyd B. Chapman, Clyde H. Jones, and Ervin M. Herrick. Since the mid-1960s, a number of vascular specimens have been collected in Franklin County by Ronald L. Stuckey, Marvin L. Roberts, Thomas G. Lammers, and Lucy E. Tyrrell at The Ohio State University. Recently, botanists and naturalists at the Columbus and Franklin County Metropolitan Park District and the Ohio Department of Natural Resources (ODNR) have made significant collections. Of special interest are those specimens collected by John Watts, Diana Morawetz, Dennis Witsberger, and Gary R. Moore from Highbanks Metro Park (included in this study even though part of this park lies in Delaware County), as well as those collected by David B. Owens from Blendon Woods, and Eugene Wright from Pickerington Pond. Allison W. Cusick and James S. McCormac, botanists at the Division of Natural Areas and Preserves (ODNR), have given generously through their knowledge of collections and observations.

These collections from Franklin County have contributed to the rapid development of The Ohio State University Herbarium (OS), which houses today more than a half million vascular plant specimens from Ohio in the Museum of Biological Diversity. Many specimens at the museum are still filed in alphabetical sequence by county, the same order used to register plant specimens in floristic, monographic, and revisionary treatments, and in some cases, this sequence discloses the close proximity of distinct morphological forms inhabiting a county. Outstanding in Franklin County are specimens for variants of *Claytonia caroliniana* Michx. (a form of *C. virginica* L.), *Chaerophyllum procumbens* var. *shortii* Torr. & A. Gray, *Hydrophyllum appendiculatum* Michx. (two specimens with calyx not appendaged collected by Selby at Indianola Place, Columbus, June 1892; Selby, 1893), *Polemonium reptans* var. *villosum* E. L. Braun, *Smilax illinoensis* Mangaly, *Triphora trianthophora* var. *schaffneri* Camp, *Urtica dioica* L. var. *dioica*, *Viola sororia* forma *priceana* (Pollard) Cooperr., *V. x brauniae* Grover & Cooperr. (*V. striata* Aiton x *V. rostrata* Pursh), and *V. triloba* Schwein. var. *triloba* (*V. palmata* L.).

It is quite evident that the emphasis in Ohio floristics has been given to the actual existence of plant specimens in herbaria. However, in the case of Franklin County, it was impossible to ignore 165 vascular taxa recognized in the present survey based exclusively on Franklin County's rich literature documentation (Lowden, 1997, 1998). No specific mention of Riddell's (1834) *Catalogue* was made by Sullivant (1840) and Selby and Craig (1890), nor were supporting references for exact plant data at the county level considered part of the scope of the Ohio Flora Project. In an exhaustive way, Riddell's (1834) *Catalogue*, which represents the first county flora west of the Alleghany Mountains, Sullivant's (1840) *Catalogue*, and Selby and Craig's (1890) *Preliminary List* have received (along with the more recent Ohio Flora Project) a comprehensive treatment in this current summary of Franklin County's vascular flora, thus permitting an exact account of Franklin County's floristic composition during the past two centuries. In like manner, the extensive historical background of Franklin County's botanical literature and herbarium records enabled the treatment of its vascular plants in a manual for a flora of central Ohio.

Development of the Franklin County Plant Information System

In the summer of 1988, I returned to my native Columbus to attend Clara Gertrude Weishaupt's (1898-1991) 90th birthday party (Stuckey, 1988) at The Ohio State University, and to respond to the University's postdoctoral announcement (ASPT Newsletter 1(1): 11. 1987.) "to collect specimens, pursue herbarium research, and write a manual of the vascular plants of Franklin County, Ohio." Shortly after this commemorative event, the month of August was spent searching for all literature pertaining to Franklin County's vascular flora, which culminated in a literature survey (April 1989; Lowden unpublished, ii + 251 pp., deposited at OS) for the vascular plants of Franklin County. In the spring of 1989, this literature survey (along with approx. 10,000 index cards) was presented to the Department of Plant Biology at The Ohio State University. That same summer, another search began for herbarium specimens from Franklin County deposited in The Ohio State University Herbarium, other Ohio herbaria, and the Johnathan Roberts Paddock collection (Lowden, 1997) at the University of Illinois. All specimen labels were xeroxed and bound in five volumes for research purposes (1,802 pp., deposited at OS). At this moment, fieldwork was initiated by collecting vascular plants throughout Franklin County, representing nearly a third (4,072 plant specimens) of the total deposited in The Ohio State University Herbarium for Franklin County (Lowden collection numbers 4000-5086). These herbarium specimens formed the basis for a second survey of the county's vascular flora, entitled "Herbarium Survey" (April 1990; Lowden unpublished, v + 326 pp., along with approx. 7,000 index cards, deposited at OS).

Having completed both surveys of Franklin County's vascular flora, literature and herbarium, the foundation had been laid for the critical study of the taxonomy of the county's vascular flora under the Franklin County plant information system. This study took place in the new herbarium facility (OS) of the Museum of Biological Diversity at The Ohio State University, where two full years (1991-1992) were spent making determinations and checking identifications for more than 14,000 voucher specimens from Franklin County. The results of this research were presented in nine volumes as a "Catalogue of the Vascular Flora of Franklin County, Ohio" (1991-92; Lowden unpublished, 1,908 pp., deposited at OS) following the arrangement of plant families used in the 8th edition of Gray's *Manual of Botany* (Fernald, 1950), the same arrangement employed by the Ohio Flora Project (Cooperrider, 1984).

While preparing this catalogue of the vascular flora of Franklin County, the 2nd edition of the *Manual of the Vascular Plants of Northeastern United States and Adjacent Canada* by Gleason and Cronquist (1991) was published. Upon checking identifications and nomenclature of Franklin County's vascular plants with this new regional flora, results revealed the necessity to reorganize my catalogue following the Cronquist System for the classification of flowering plant families, and to consider the presentation of Franklin County's vascular flora in the form of a manual for central Ohio plants. Significant state and national floras had already adopted the widely accepted Cronquist System, just as The Ohio State University Herbarium (OS) had reorganized its more than 500,000 flowering plant specimens following the phylogenetic family sequence of the Cronquist System.

Consequently, with a manual in mind that treats specifically Franklin County's vascular plants, I decided to reformat for this purpose the keys and descriptions to families, genera, and species in the 3rd edition of Weishaupt's (1971) *Vascular Plants of Ohio*, updating them according to the Cronquist System using the nomenclature in the *Manual of Vascular Plants of Northeastern United States and Adjacent Canada* (Gleason and Cronquist, 1991). In the past, Weishaupt's *Vascular Plants of Ohio* has been used with great success by students and teachers in the Local Flora Program at The Ohio State University and its field station, Franz Theodore Stone Laboratory, Gibraltar Island (in Put-in-Bay, Lake Erie, Ohio). This manual still represents the only single volume of keys for the identification of Ohio's vascular flora.

In addition, the abbreviations, glossary, explanation of diagrams, and keys to woody plants presented in Appendices I-III of the proposed manual were adopted from Clara Weishaupt's *Vascular Plants of Ohio*. Keys not treated by Weishaupt were revised for the genus *Crataegus* (Braun, 1961; Gleason and Cronquist, 1991), *Cardamine flexuosa* (Voss, 1985), varieties of *Juncus tenuis* (Braun, 1967), and the genus *Lemna* (Landoll, 1986). Some family names and leads in Weishaupt's key to plant families were reformatted according to their accepted family names used under the Cronquist System. Keys to families, genera, and species are for the most part dichotomous (Fig. 1). All leads in keys were lettered for tracing purposes, thus permitting easy backtracking of the route taken for identifying a plant. Figure plates of Franklin County's vascular plants were assembled using the drawings from *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada* (Gleason, 1952). The permission for the drawings was obtained from the New York Botanical Garden, and the actual preparation of a manual of the vascular plants of Franklin County began in 1993.

Toward the end of 1995, the prototype of this manual had been formatted on the computer and the above materials (literature survey, herbarium survey, catalogue, and figures) had all been processed in eight volumes as an "Illustrated Manual of the Vascular Plants of Franklin County, Ohio" (1993; Lowden, 2,792 pp. + 305 figure plates, deposited at OS). Subsequently, in 1997, "A Central Ohio Flora: Manual of the Vascular Plants of Franklin County" was finished (Jan 1997; Lowden unpublished, computer formatted, xi + 541 pp., plus 260 plates) and deposited with the Ohio Biological Survey (Museum of Biological Diversity, The Ohio State University, Columbus). A computer printout of this manual has been tested at The Ohio State University by students in Plant Biology 210 during the spring quarters of 1995-98 under the direction of Professor Daniel J. Crawford (Department of Plant Biology).

A Central Ohio Flora: Manual of the Vascular Plants of Franklin County

The information given for all of the 1,590 formally treated species in "A Central Ohio Flora: Manual of the Vascular Plants of Franklin County" follows a similar format (Fig. 1). Throughout the text, accepted scientific names are in bold type. Brummitt and Powell (1992) was used to standardize abbreviations of authors after scientific names. All **species names** (binomial names) are printed in italics. In general, the order of plant figures is the same as their textual descriptions. Species without an asterisk before the binomial name are considered native; those with an asterisk are alien. **Status and geographical origin** are given for non-indigenous taxa. The dagger sign (†) before 373 taxa in the manual represents rare or endangered plants, for which Appendix IV of the manual should be consulted for exact reference and status. **Common or vernacular names** are given for most species. **Diagnostic features** distinguish one taxon from another, and are followed with pertinent synonymy. **References** may elucidate copied or paraphrased facts about nomenclature, habitats, localities, specific collections, blooming dates, and/or plant collectors. **Herbarium records** cite all plant collections reviewed that represent scientific vouchers for the actual proof of dates, localities, flowering times, and collectors of Franklin County's vascular plants. In all, a total of 14,080 vascular plant specimens from the following herbaria were inspected using the dissecting microscope: BGSU (40), CLM (444), College of Wooster (Wooster, Ohio) (171), DEN (2), KE (117), MU (62), MUS (3), BHO (22), OWU (289), CINC (43), ILL (124), OS (12,674), and Urbana University (Urbana, Ohio) (89). During the progress of this project, the herbaria of Oberlin College (Oberlin, Ohio) and Otterbein College (Westerville, Ohio), having 95 and 609 vascular specimens from Franklin County,

respectively, were acquired by The Ohio State University. Consequently, these totals have been included under The Ohio State University Herbarium (OS). At Marietta College (Marietta, Ohio), no vascular specimens were located from Franklin County. **Notes** reveal additional information for some species.

cultivation, Cols., *Waller & J. H. Schaffner*). Not treated by Braun (1967). *Iris germanica* L. (Common Iris, a European cultigen). Not mentioned for Franklin Co. by Braun 1967:401.

a Flowering stems usually not more than 15 cm tall, from superficial rhizomes; sepals not bearded, with 3-ridged, toothed, orange-white crest; perianth blue or violet, rarely white. 1. *I. cristata*

a' Flowering stems taller than 15 cm, from usually deep rhizomes.

b Sepals bearded. *I. germanica* L., Common I.

b' Sepals not bearded.

c Perianth yellow; petals much shorter than sepals. 2. *I. pseudacorus*

c' Perianth blue, lilac, or rarely white, sometimes with spots of other color.

d Stem zigzag, shorter than leaves, sometimes decumbent; flowers short-stalked, from all but lowest axils; capsule 6-angled. 3. *I. brevicaulis*

d' Stem erect, with flowers on upper part; axillary flowers long-stalked; capsule 3-angled, inner surface dull; petals obovate, little shorter than sepals; sepals with bright yellow pubescent blotch at base. 4. *I. virginica* var. *shrevei*

1. *Iris cristata* Aiton Crested Dwarf Iris
 REFERENCE: Selby 1892a:111 (Georgesville, *Werner*).
 NOTE: No specimens seen from Franklin Co. Not mapped for Franklin Co. by Braun 1967:403 (illus. p. 400).

2. **Iris pseudacorus* L. Yellow Iris, Yellow Water Flag
 Naturalized (native of Europe)
 Flowers bright yellow; petals much shorter than the unbearded sepals; sepals dark lined towards interior.
 HERBARIUM RECORDS: 25 May 1953—along the Olentangy R., Cols., *W. Goslin*; 21 May 1977—swampy ground on bank of Olentangy R., just N of Lane Ave. bridge, Cols., *W. Carr* 228; 22 May 1986—OSU campus, E bank of Olentangy R., N of Drake Union, in mud along edge or river, standing water, Cols., *Hollander* 042; 28 May 1988—along Olentangy R., ¼ mi. from Bethel Rd. & Rt. 315, Cols., *Kelly* 37; 29 May 1988—OSU campus, W bank of Olentangy R., between Lane Ave. bridge & Fawcett Center for Tomorrow, mudflat, *T. Lammers* 6228 (MU, OS); 20 May 1993—bike path along W bank of Olentangy R., ½ mi. S of Antrim Lake, E of Rt. 315, Sharon Twp., *Lowden* 5043.
 NOTE: Not mentioned for Franklin Co. by Braun 1967:404 (illus. p. 402).

3. †*Iris brevicaulis* Raf. Leafy Blue Flag, Lamance Iris, Zigzag Iris
 REFERENCES: Braun 1967:404 (illus. p. 405); Stuckey & Roberts 1977:33; Stuckey & Roberts 1982:39; McCaone 1984:A-142.
 NOTE: No specimens seen from Franklin Co.

4. *Iris virginica* L. var. *shrevei* (Small) E.S.Anderson Southern Blue Flag
 Sepal bases with a yellow-orange blotch; petals only a little shorter than sepals; usually one lateral branch equaling main stalk. Syn.: *I. shrevei* Small
 REFERENCES: Riddell 1834:158 (*Iris versicolor*, marshes); Sullivant 1840:41 (*Iris versicolor* L.); Selby & Craig 1890:16 (*Iris versicolor* L.); Braun 1967:404 (illus. p. 406).
 HERBARIUM RECORDS: 1840—Cols., *Sullivant*; Jun 1887—Cols., *Craig*; Summer 1988—along Big Darby Creek between I-70 & Little Darby Creek.

ORCHIDACEAE, Orchid Family

Perennial herbs, terrestrial, often with rhizomes or corms; roots sometimes thickened; some species nongreen; leaves solitary or alternate on the stem (or rarely opposite), sometimes all basal; flowers epigynous, bisporangiate, solitary or in clusters; perianth zygomorphic; sepals 3, sometimes 2 of them united; petals 3, one of them, the lip, different from the others in size and shape, sometimes spurred; carpels 3, united; ovary 1-loculed with 3 parietal placentae; fertile stamens 1 or 2 (1 or more staminodes sometimes present), adnate to style and stigma and with them forming the column; pollen in pollinia; fruit a many-seeded capsule.

a Anthers 2; lip petal an inflated sac 2-7 cm long; flowers 1-3. 1. **CYPRIPEDIUM**

a' Anther 1; lip petal not an inflated sac or, if somewhat inflated, smaller.

b Leaves white- or pale-reticulate, in basal rosette. 3. **GOODYERA**

b' Leaves not white- or pale-reticulate.

c Leaves in 1 whorl of usually 5 on the stem; sepals much longer than petals. 7. **ISOTRIA**

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Figure 1. Sample page 479 showing format used for the presentation of taxa in “A Central Ohio Flora: Manual of the Vascular Plants of Franklin County.”

In general, the manual's 674 genera (incl. 43 informally treated) and 1,756 species (incl. 166 informally treated) are ordered according to Gleason and Cronquist (1991), and numbered. Taxa informally treated are those that receive casual mention in keys or after descriptions of families, genera, or species. An additional 65 varieties, 15 hybrids, 3 forms, and 2 other variants below the species rank are recognized. In Appendix V of the Manual 295 plants were considered to be new records.

Sullivant's 1840 Collections and Adjacent County Records

In "A Central Ohio Flora: Manual of the Vascular Plants of Franklin County," 376 species have "1840–Columbus, *Sullivant*" cited after herbarium records (Fig. 1), of which 343 are further substantiated with other references and/or herbarium records for Franklin County. Knowing we do not have absolute proof that Sullivant obtained all of these specimens from Franklin County (Stuckey and Roberts, 1991), the existence of the remaining 33 species in Franklin County rests solely on these historical specimens labeled "Columbus Ohio 1840 W.S.S." at The Ohio State University. These 33 species are treated in the following list, of which 15 species marked with daggers (†) were cited by Sullivant (1840) and retained by Selby and Craig (1890) as plants collected in adjacent counties. Current knowledge for all listed plants in adjacent counties (Delaware, Fairfield, Licking, Madison, Pickaway, and Union Counties) is letter abbreviated (bold type) in parentheses after common names of taxa and based for the most part on voucher specimens used for mapping purposes by the Ohio Flora Project (Braun, 1961, 1967; Fisher, 1988; Cooperrider, 1995; Furlow's 1991 unpublished "Checklist and Distribution Maps" for the *Dicotyledoneae of Ohio, Part 1: Saururaceae through Fabaceae*, deposited at OS):

- †*Betula pumila* L., low birch.
- Bulbostylis capillaris* (L.) C. B. Clarke, sedge (**D, F, P**).
- Carex swanii* (Fernald) Mack., sedge (**D, F, M**).
- Chamaedaphne calyculata* (L.) Moench, leather-leaf (**L**).
- Chelone glabra* L. var. *linifolia* N. Coleman, turtlehead.
- †*Cladium mariscoides* (Muhl.) Torr., twig-rush.
- Cyperus schweinitzii* Torr., Schweinitz's sedge.
- †*Deschampsia caespitosa* (L.) P. Beauv., tufted hair grass.
- Deschampsia flexuosa* (L.) Trin., crinkled hair grass (**F**).
- †*Drosera rotundifolia* L., sundew (**L**).
- Glyceria acutiflora* Torr., sharp-glumed manna grass (**P**).
- †*Hedyotis purpurea* (L.) Torr. & A. Gray, large summer bluets.
- Helianthemum canadense* (L.) Michx., Canada frostweed (**F**).
- †*Hypericum gentianoides* (L.) Britton, Sterns & Poggenb., orange-grass (**D, F**).
- Myriophyllum verticillatum* L. var. *pectinatum* Wallr., whorled water-milfoil.
- Nothoscordum bivalve* (L.) Britton, false garlic.
- †*Polygonum tenue* Michx., knotweed (**F, P**).
- †*Rhamnus alnifolia* L'Her, alder-leaved buckthorn.
- †*Rhododendron maximum* L., rosebay rhododendron (**F**).
- Sarracenia purpurea* L., pitcher-plant (**L**).
- †*Scleria triglomerata* Michx., tall nut-rush.
- †*Selaginella apoda* (L.) Spring, meadow spike-moss.
- Sphenopholis pennsylvanica* (L.) Hitchc., swamp-oats.
- †*Stenanthium gramineum* (Ker Gawl.) Morong var. *gramineum*, featherbells (**L**).
- †*Tephrosia virginiana* (L.) Pers., goat's rue (**F, L, P**).
- Thaspium pinnatifidum* (Buckley) A. Gray, cut-leaf meadow-parsnip.

Tiarella cordifolia L., foam-flower (F).
 †*Tofieldia glutinosa* (Michx.) Pers., false asphodel.
 †*Utricularia cornuta* Michx., horned bladderwort.
Utricularia intermedia Hayne, flat-leaved bladderwort.
Valeriana edulis Nutt., prairie valerian.
Vicia caroliniana Walter, pale vetch (F).
Viola villosa Walter, southern wood violet.

Due to the rarity of these species and to the changes that took place in Franklin County's physical features during the latter part of the 18th and early 19th centuries (Lowden, 1997), it is not inconceivable that some of the above species might have been collected by Sullivant in Franklin County and have not been recollected since. On the other hand, it is unlikely that Sullivant had time to collect all these rare plants for the first time in Franklin County during the collecting season of 1840, considering the fact that none were cited by him as existing in the county just a few months earlier in his *Catalogue* (Sullivant, 1840). Surely, if this had been the case, Sullivant would have anticipated their presence in Franklin County and considered at least some of these plants, especially those without daggers (†), with special notes as he did for others in his *Catalogue*.

Perhaps we can safely conclude that Selby and Craig (1890) never had any knowledge of Sullivant's Columbus 1840 collections and as such retained 68 plant entries, these 15 species (†) along with 53 others, as plants collected in adjacent counties. Presently, Madison and Fairfield Counties are the only adjacent counties for which we have known records that Sullivant collected flowering plants (Stuckey and Roberts, 1991), and they were most likely collected by Sullivant in these two adjacent counties. The majority of these 15 species do not have current records that reveal their existence in adjacent counties, indicating that they were perhaps known exclusively by Sullivant for Franklin County's adjacent counties and have since escaped the attention of botanists for these central Ohio counties. It is recommended that these 15 species (†) be left as Sullivant (1840) cited them in his *Catalogue*, as "plants collected in adjacent counties" and not in Franklin County, until other data presents itself that further substantiates their existence in Franklin County, or otherwise.

It should be kept in mind that some plants collected by Sullivant in Franklin County's adjacent counties (Sullivant, 1840) were also collected by him at other localities elsewhere in Ohio (Stuckey and Roberts, 1991). This was the case for *Betula pumila* (Sullivant referred to this plant as *B. glandulosa* Michx.), *Rhamnus alnifolia*, and *Sullivantia sullivantii* (Torr. & A. Gray) Britton ["*Heuchera*? ____ ? † (3.)"; Sullivant's (1840) *Catalogue*, p. 20, 57]. Plants of the former two species were collected in "Champaign County at Cedar Bog, 6 mi. south of Urbana; 50 mi. from Columbus" and the latter namesake on the limestone cliffs of the rocky fork of Paint Creek in Highland County. Pale vetch (*Vicia caroliniana*), although not cited in Sullivant's *Catalogue*, was collected by Sullivant at Lancaster in Fairfield County in 1840, and "seen along the sandy shore of Lake Erie or in the tamarack bogs of northeastern Ohio" (Stuckey and Roberts, 1991). Only in recent times has *Vicia caroliniana* been collected in Franklin County (Alum Creek Drive and Bixby Road, along N side of Big Walnut Creek, 200 m from road, 17 Apr 1981, Lawrence Albanese 3 OS).

On the other hand, concerning those species without daggers in the aforesaid list, Sullivant (1840) gave specific footnote information on pages 59 and 60 of his *Catalogue* for two entries, "*Valeriana* ____ (sp. nov.) (17.)" [= *V. edulis* Nutt.] and "*Utricularia intermedia*, Heyne. (22.)" [*U. intermedia* Hayne], both species taken from "Cedar Swamp, six miles south of Urbana" in Champaign County, and not from Franklin County and its adjacent counties. Selby and Craig (1890) treated *U. intermedia* along with plants collected outside Franklin County by Sullivant. In like manner, Stuckey and Roberts (1991) have documented from Sullivant's letter to Charles W. Short of Louisville, Kentucky (27 August 1840; Short Papers, Filson Club, Louisville) and from other herbarium records that Sullivant collected plants of leather-leaf (*Chamaedaphne calyculata*), Schweinitz's sedge (*Cyperus schweinitzii*), crinkled hair-grass (*Deschampsia flexuosa*), and pitcher-plant (*Sarracenia purpurea*) "along the sandy shores of Lake Erie or in the tamarack bogs of northeastern Ohio" in Erie and Cuyahoga Counties; and false

garlic (*Nothoscordum bivalve*) near Springfield in Clark County. Consequently, at least those Sullivant specimens marked “Columbus Ohio 1840 W.S.S.” (OS) for these 7 species were collected in these Ohio counties, and not in Franklin County. Thus, 10 plants without daggers in the aforesaid list (*Bulbostylis capillaris*, *Carex swanii*, *Chelone glabra* var. *linifolia*, *Glyceria acutiflora*, *Helianthemum canadense*, *Myriophyllum verticillatum* var. *pectinatum*, *Sphenopholis pensylvanica*, *Thaspium pinnatifidum*, *Tiarella cordifolia*, and *Viola villosa*) remain with an uncertain existence in Franklin County.

In Sullivant’s (1840) *Catalogue*, a total of 90 entries were “inserted” as plants collected in adjacent counties, based on the assumption that many would be found eventually in Franklin County. At present, 62 of these 90 entries have been noted as such under recognized species in “A Central Ohio Flora: Manual of the Vascular Plants of Franklin County” and represent additions to the vascular flora of Franklin County since Sullivant’s time, 14 of which are credited to Selby and Craig’s (1890) *Preliminary List* (Lowden, 1998). All of these 62 entries except for the 15 marked with daggers in the aforesaid list have further references and/or herbarium records that substantiate their existence in the County. Concerning the remaining 28 entries, perhaps 6 could have possible occurrence in Franklin County. These are *Alnus serrulata* Willd. (F, L), *Betula lenta* L. (F, L), *Carex plantaginea* Lam. (F), *Gentiana puberula* Michx. (= *G. puberulenta* J. Pringle) (M), *Polygala incarnata* L. (F), and *Polypodium vulgare* L. (= *P. virginianum* L.) (F, L). Even though no proof exists for their presence in Franklin County, future studies might disclose their existence, thus adding to the total number of species in the County based on Sullivant’s prediction that “many of which, no doubt, will ultimately be found” in Franklin County. To date, 75% of the plants collected in adjacent counties by Sullivant (1840) have been accounted for under the present survey; and 274 Sullivant specimens in The Ohio State University Herbarium (OS) along with 11 in other Ohio herbaria (CLM, Urbana University), have been associated with the 853 or more plant entries in Sullivant’s (1840) *Catalogue*, thus documenting the importance of Sullivant’s 1840 collections for approximately 33.41% of the plant entries in his *Catalogue*.

Comparative Analysis of Franklin County’s Vascular Flora

Table 1 summarizes the vascular plant treatments of Franklin County (Riddell, 1834, 1835a, 1835b, 1836; Sullivant, 1840; Craig, 1890; Selby and Craig, 1890; Selby, 1891, 1892; Kellerman and Werner, 1893; Werner, 1893; Wilcox, 1895) tabulating the number of native and alien species determined in this historical review (Lowden, 1997, 1998) for 154 vascular plant families belonging to five plant divisions whose phylogenetic sequence follows Gleason and Cronquist (1991). Comparative totals for treatments are given in Table 2 for 12 fern/fern-relative families, 5 gymnosperm families, and 113 dicotyledonous and 24 monocotyledonous flowering plant families represented in this summary, along with totals for each treatment. Since certain family names (Table 1) might easily be overlooked due to acceptable alternative names or dispositions, for the sake of convenience, these names are highlighted as follows: Polypodiaceae (incl. Dennstaedtiaceae, Adiantaceae, Aspleniaceae, Onocleaceae, and Blechnaceae); Nelumbonaceae and Cabombaceae apart from Nymphaeaceae; Clusiaceae for Hypericaceae (Guttiferae); Brassicaceae for Cruciferae; Hydrangeaceae and Grossulariaceae apart from Saxifragaceae (incl. *Penthorum*); Mimosaceae, Caesalpiniaceae, and Fabaceae for Leguminosae; Cornaceae includes Nyssaceae (*Nyssa*); Apiaceae for Umbelliferae; Lamiaceae for Labiatae; Asteraceae for Compositae; Potamogetonaceae and Zannichelliaceae apart from Zosteraceae; Poaceae for Gramineae; and Agavaceae and Smilacaceae apart from Liliaceae (incl. Amaryllidaceae).

In Franklin County, the greatest number of species occur in the Composite Family (Asteraceae: 204), Grass Family (Poaceae: 141), Sedge Family (Cyperaceae: 113), Rose Family (Rosaceae: 70), Pea or Bean Family (Fabaceae: 63), Mustard Family (Brassicaceae: 57), and Mint Family (Lamiaceae: 51). These same families are represented in like order in the Ohio flora. Other outstanding families in Franklin County include the Figwort Family (Scrophulariaceae: 42), Lily Family (Liliaceae: 42), Buttercup Family (Ranunculaceae: 38), Carrot Family (Apiaceae: 28), Pink Family (Caryophyllaceae: 28), Smartweed Family (Polygonaceae: 27), Willow Family (Salicaceae: 27), Orchid Family (Orchidaceae: 26), Honeysuckle Family (Caprifoliaceae: 21), and Violet Family (Violaceae: 18).

Table 1. Current summary of the treatments of Franklin County's vascular flora, showing the number of native and alien species cited in each plant family arranged according to the Cronquist System (Gleason and Cronquist, 1991).

DIVISION: CLASS Family	Riddell 1834-36		Sullivant 1840		Selby & Craig 1890*		Present Survey	
	native	alien	native	alien	native	alien	native	alien
LYCOPODIOPHYTA								
Lycopodiaceae	2		1		1		4	
Selaginellaceae							1	
EQUISETOPHYTA								
Equisetaceae	3		3		3		5	
POLYPODIOPHYTA								
Ophioglossaceae	2		2		3		4	
Osmundaceae	2		3		3		3	
Dennstaedtiaceae	2		1		2		2	
Adiantaceae	2		2		2		3	1
Aspleniaceae	11		14		16		18	
Onocleaceae			1		1		1	1
Blechnaceae	1						1	
Marsileaceae								1
Salviniaceae								1
PINOPHYTA								
Ginkgoaceae								1
Taxaceae	1				1		1	
Pinaceae	1						3	3
Taxodiaceae								1
Cupressaceae	2		2		2		2	
MAGNOLIOPHYTA:								
MAGNOLIOPSIDA								
Magnoliaceae	2				2		2	
Annonaceae	1		1		1		1	
Calycanthaceae								1
Lauraceae	2		2		2		2	
Saururaceae	1		1		1		1	
Aristolochiaceae	2		2		2		2	
Nelumbonaceae	1				1		1	
Nymphaeaceae	2		1		1		2	
Cabombaceae							1	
Ceratophyllaceae	2		1		1 (2)		2	
Ranunculaceae	26	3	22	1	26 (27)	3 (4)	31	7
Berberidaceae	3		3		3		3	1
Menispermaceae	1		1		1		1	

DIVISION: CLASS Family	Riddell 1834-36		Sullivant 1840		Selby & Craig 1890*		Present Survey	
	native	alien	native	alien	native	alien	native	alien
MAGNOLIOPSIDA (cont.)								
Papaveraceae	1	1	1		2	1	2	3
Fumariaceae	3		3		3		3	1
Platanaceae	1		1		1		1	1
Hamamelidaceae	1		1		1	0 (1)	1	1
Ulmaceae	3		3		4		4	
Cannabaceae		2		2		2		3
Moraceae	1		1		1	0 (1)	1	2
Urticaceae	4		5		5		5	
Juglandaceae	6		7		7		8	1
Fagaceae	8		8		11		14	
Betulaceae	3		3		3		4	1
Phytolaccaceae	1		1		1		1	
Nyctaginaceae								2
Chenopodiaceae		3	1	3	2	4	2	9
Amaranthaceae	1	1	1	1	2	4	2	4
Portulacaceae	1	1	1	1	1 (2)	1	2	2
Molluginaceae		1		1		1		1
Caryophyllaceae	6	4	9	4	10	6 (7)	12	16
Polygonaceae	10	7	10	7	14	7	16	11
Clusiaceae	5	1	3	1	6	1	8	1
Tiliaceae	1		1		1		2	
Malvaceae		5	2	3	2	4	2	10
Sarraceniaceae							1	
Droseraceae							1	
Cistaceae							1	
Violaceae	6	1	6	1	9	2	15	3
Passifloraceae	1		1		1		1	
Cucurbitaceae	2		2		2		2	1
Salicaceae	6	1	3		10 (11)	3 (4)	19	8
Capparaceae	1				1		1	1
Brassicaceae	7	8	13	5	17	15	20	37
Ericaceae	6		1		2		10	
Pyrolaceae	4		1		2		4	
Monotropaceae	1		1		2		2	
Ebenaceae			1		1		1	
Styracaceae								1
Primulaceae	5	1	7		7	1	8	2

DIVISION: CLASS Family	Riddell 1834-36		Sullivant 1840		Selby & Craig 1890*		Present Survey	
	native	alien	native	alien	native	alien	native	alien
MAGNOLIOPSIDA (cont.)								
Hydrangeaceae	1		1		1		1	2
Grossulariaceae	1		2		2		3	2
Crassulaceae	1		1		1	1	2	3
Saxifragaceae	5		5		6		8	
Rosaceae	27	3	24	2	29	4 (7)	48	22
Mimosaceae								1
Caesalpiniaceae	5		6		6		7	
Fabaceae	19	5	23	3	27 (28)	10 (11)	36	27
Elaeagnaceae								2
Haloragaceae					0 (2)		3	
Lythraceae	2		4		5		6	1
Thymelaeaceae	1				1		1	
Onagraceae	9		7		7 (8)		11	2
Cornaceae	5		3		7		9	
Santalaceae	1		1		1		1	
Celastraceae	3		3		3		3	2
Aquifoliaceae	1		1		1		2	
Euphorbiaceae	5	2	5	1	6	4	7	8
Rhamnaceae	1		2		2		3	1
Vitaceae	4		3		4		5	1
Linaceae	1	1			2	1	2	1
Polygalaceae	3		2		3		3	
Staphyleaceae	1		1		1		1	
Sapindaceae								2
Hippocastanaceae	1		2		2		2	1
Aceraceae	4		3		5		6	1
Anacardiaceae	4		4		4		6	1
Simaroubaceae						1		1
Rutaceae	2		2		2		2	
Zygophyllaceae								1
Oxalidaceae	3	1	2		3		4	1
Geraniaceae	1		1		2	1	3	3
Limnanthaceae	1		1		1		1	
Balsaminaceae	2	1	2		2		2	1
Araliaceae	4		3		3		4	
Apiaceae	14	3	17		18	3	21	7
Gentianaceae	4		4		5		5	

DIVISION: CLASS Family	Riddell 1834-36		Sullivant 1840		Selby & Craig 1890*		Present Survey	
	native	alien	native	alien	native	alien	native	alien
MAGNOLIOPSIDA (cont.)								
Apocynaceae	3		2		2		3	1
Asclepiadaceae	7		6		10		13	1
Solanaceae	2	2	2	2	4 (5)	5 (6)	5	11
Convolvulaceae	2	2	3		4	1 (2)	4	4
Cuscutaceae	1		1		1		4	1
Menyanthaceae			1		1		1	
Polemoniaceae	6		5		6		7	
Hydrophyllaceae	5		5		6		6	
Boraginaceae	4	2	4	3	6	5	7	7
Verbenaceae	4		4		6		6	2
Lamiaceae	25	5	24	5	30	8	36	15
Callitrichaceae							3	
Plantaginaceae	1	1	1	2	2	3	3	4
Oleaceae	3	1	3		4		4	4
Scrophulariaceae	15	5	20	6	22	6	24	18
Orobanchaceae	1		2		3		3	
Acanthaceae	3		2		2		3	
Pedaliaceae		1		1		1		1
Bignoniaceae	1		1		1	0 (1)	1	2
Lentibulariaceae	1		1		1		3	
Campanulaceae	9		8		8		9	1
Rubiaceae	11		8		12		16	1
Caprifoliaceae	8	1	7		9	1	14	7
Valerianaceae	1	1	2	1	2	1	3	3
Dipsacaceae		1		1		1		2
Asteraceae	79	13	72	7	109	29 (32)	139	65
MAGNOLIOPHYTA:								
LILIOPSIDA								
Butomaceae								1
Alismataceae	2		2		3		5	
Hydrocharitaceae	2		1		1 (2)		2	
Juncaginaceae			2		2		2	
Potamogetonaceae	4		2		3		9	1
Najadaceae					1		2	1
Zannichelliaceae							1	
Acoraceae	1		1		1		1	
Araceae	4		3		3		5	

DIVISION: CLASS Family	Riddell 1834-36		Sullivant 1840		Selby & Craig 1890*		Present Survey	
	native	alien	native	alien	native	alien	native	alien
LILIOPSIDA (cont.)								
Lemnaceae	1		1		3		8	
Xyridaceae	1						1	
Commelinaceae	1		1		1		1	1
Juncaceae	3		5		8	1	10	2
Cyperaceae	1		64		77 (78)		112	1
Poaceae			45	16	62 (64)	23 (25)	88	53
Sparganiaceae	2				2		4	
Typhaceae	1		1		1		2	
Pontederiaceae	2		1		1		3	
Liliaceae	21		23		23	4 (5)	30	12
Agavaceae								1
Smilacaceae	3		2		3		5	
Dioscoreaceae	1		1		1		1	
Iridaceae	2		3		3		5	2
Orchidaceae	13		13		17		26	

*Included are additions to Selby & Craig's "Preliminary List of the Plants of Franklin County" made by Selby (1891, 1892), Werner (1893) and Wilcox (1895). Numbers in parentheses show increases in these numbers of species based on plants reported by Craig (1890) and/or Kellerman & Werner (1893).

The present survey (Table 1) reveals 28.86% of Franklin County's flora is alien, most largely represented in seven dicotyledonous families (Asteraceae, Brassicaceae, Fabaceae, Rosaceae, Scrophulariaceae, Caryophyllaceae, and Lamiaceae) and two monocotyledonous families (Poaceae and Liliaceae). At present, the origin of Franklin County's alien flora is predominantly European (35%), Eurasian (32%), and Asian (10%). However, 14% comes from the United States, 5% from Middle and South America, and 4% is unknown (mostly cultivated). Half (52%) of the county's alien flora has been considered naturalized.

Three time periods are recognized (Tables 1-2) in this comparative survey of Franklin County's vascular flora: up to and through 1840, after 1840 through 1900, and after 1900 through 1997. Tabulations for the number of species belonging to one or a combination of these three periods were made using dates of references and/or herbarium records cited for the 1,590 (1,131 native, 459 alien) species formally treated in "A Central Ohio Flora: Manual of the Vascular Plants of Franklin County." Thus, based on these data, the number of species known for Franklin County at the end of each time period was formulated as follows: 1,028 (907 native, 121 alien) by 1840; 1,227 (975 native, 252 alien) by 1900. Further analysis of references and herbarium records for species reveals: 82 (77 native, 5 alien) exclusive to period through 1840; 58 (34 native, 24 alien) exclusive to period after 1840 through 1900; and 301 (93 native, 208 alien) exclusive to period after 1900 through 1997. Data of species based on combinations of these three periods discloses: 116 (109 native, 7 alien) recognized in the first 2 periods but not seen since 1900; 264 (146 native, 118 alien) recognized after 1840; and 1,094 (867 native, 227 alien) established in Franklin County since the first period, of which 41 (35 native, 6 alien) were not reconfirmed for the second period.

Even Sullivant had communicated to John Torrey (letter of 7 Nov 1839; NY) that he collected "all the plants (near 1000)" in the vicinity of Columbus (Lowden, 1997). This total of 1,000 plants is verified above for the period through 1840. Likewise,

a similar estimate of 1,021 plants can be made using data from this survey by summing the 731 species Sullivant determined in this current summary (Table 2) with the 177 species reported by Riddell but not by Sullivant, and the 113 species for which herbarium records exist through 1840 without reference to Sullivant or Riddell. If this is the case, then 1,028 represents a fair estimate for the number of species growing in Franklin County when the first white settlers arrived.

Originally, Selby and Craig (1890) totaled 1,002 species in Franklin County, and Selby (1899) tabulated all additions since 1890, giving a new total of 1,142 vascular taxa in the County (Lowden, 1998). The above accumulative total of 1,227 indicates more species were existing in Franklin County at the turn of the 19th century. Likewise, Selby's (1899) calculation for a gain in Sullivant's list "amounting to 353 [371] species," equaling a 32.5% increase in the known flora since 1840, and his "16.7 percent [16.1%]" for alien plants, are not exact figures if we consider the actual numbers of species cited in the present survey located in Franklin County through 1840 and 1900. Based on present findings, by the turn of the 19th century, only a 16.2% increase in the known flora had occurred since 1840, and present data reveals a 25.7% increase since 1900. In like manner, the following figures are considered to be closer approximations for the county's non-indigenous flora: 11.8% by 1840 and 20.5% by 1900.

Table 2. Totals for the comparative summary of the treatments of Franklin County's vascular flora showing the number of native and alien species in each major plant group along with total species recognized.

Plant Groups	Riddell 1834-36		Sullivant 1840		Selby & Craig 1890*		Present Survey	
	native	alien	native	alien	native	alien	native	alien
Clubmoss & Spikemoss	2		1		1		5	
Horsetails	3		3		3		5	
Ferns	20		23		27		32	4
Gymnosperms	4		2		3		6	5
Flowering Plants:								
Dicotyledons	466	91	451	64	585 (594)	141 (156)	760	375
Monocotyledons	65		171	16	216 (220)	28 (31)	323	75
Totals	560	91	651	80	835 (848)	169 (187)	1131	459
	651		731		1004 (1035)		1590	

Conclusions

Although the overall focus of the ongoing Ohio Flora Project, under the direction of the Ohio Flora Committee of the Ohio Academy of Science (Cooperrider, 1984), has been at the state level, it has contributed substantial county data based on herbarium vouchers represented by dot maps. Braun (1961, 1967), Fisher (1988), and Cooperrider (1995) have treated for Franklin County, 159 woody species (incl. 4 gymnosperms), 225 monocotyledons (monocots), 403 dicotyledons (dicots) from the Linaceae through the Campanulaceae, and 156 dicots from Asteraceae, respectively. Furlow mapped (1991, unpublished checklist) 332 dicots for Franklin County. At present, less than half of the known vascular taxa for Franklin County has been published under the Ohio Flora Project. Considering only those volumes of "The Vascular Flora of Ohio" finished under the Ohio Flora Project, the present survey presents a 46% increase in the number of monocots treated for Franklin County in Volume 1, the *Monocotyledoneae*, *Cat-tails to Orchids* (Braun, 1967); and for the *Dicotyledoneae* in Volume 2, a 21% increase over those treated in *Part 2: Linaceae through Campanulaceae* (Cooperrider, 1995), and a 27% increase over those treated in *Part 3: Asteraceae* (Fisher, 1988).

The scope of the Ohio Flora Project over the past 50 years has been the treatment of the vascular flora of the state; however, the ferns and gymnosperms have not been the focus of interest. Despite this discrepancy, an estimate can be made of the number of vascular plants in Ohio considering the 75 ferns and 16 gymnosperms recognized by Weishaupt (1971). Adding these totals to the 650 (-700) monocots (Braun, 1967), 743 (-789) dicots (Furrow's 1991 unpublished checklist), 700 dicots (Cooperrider, 1995), and 276 dicots (Fisher, 1988) reveals, at present, an estimated total of 2,556 vascular plants in the state of Ohio.

The present survey of Franklin County's vascular flora reports a total of 1,756 vascular plants, of which 1,590 are formally treated in keys. Sixteen percent (16%) of these plants represent new records (Appendix V of the *Manual*), of which 62% were based on records after 1900. The knowledge of Franklin County's vascular plants as presented in this inventory of the County's flora discloses that two-thirds of the vascular flora of the state of Ohio has existed at one time or another in Franklin County during the past two centuries.

These increases in plant reports for Franklin County beyond those recorded by the Ohio Flora Project are supportive of the belief that fieldwork and taxonomic studies at the county level can be quite productive. Even Sullivant (1840) alluded to the importance of county floras when he stated, "Many interesting facts, illustrating the subject of Botanical Geography, would be made known by local catalogues of plants, such as is here attempted." Beyond any doubt, future research at the county level will enhance our knowledge of state floristics. Continuous urban development in Franklin County places it, as it does for many of Ohio counties, in a constant flux as to the actual number of species considered to be true inhabitants. Surprisingly, the large number of vascular plants recognized for Franklin County was responsible, in part, for the treatment of its vascular flora in a manual that serves not only this county but those with similar floristic compositions in the central Ohio area.

Most appropriate here are the words in memory of Arthur Cronquist (Barkley, 1992): "Our generation of biologists has the privilege of remembering Art as one of the most able and influential botanists of our time. Posterity will liken him to Asa Gray, for Arthur Cronquist was as important to the science of our century as was Asa Gray to the science of his." "A Central Ohio Flora: Manual of the Vascular Plants of Franklin County" not only represents a nomenclaturally updated portion of Weishaupt's manual, but is the first complete vascular plant manual in Ohio to follow the Cronquist System. It is inevitable that once the ongoing Ohio Flora Project is finished, the work will begin to update and reorganize its outstanding systematic treatments accordingly—a task undoubtedly for the 21st century.

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