

Rafinesque's *Florula Delawarica*¹

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The life and times, travels and journals, publications and correspondence of Constantine Samuel Rafinesque-Schmaltz (1783-1840) are representative of an important period in the development of North American botany (Stuckey 1986). Robert R. Tatnall (1946), in his *Flora of Delaware and the Eastern Shore*, commented on the collections and *Florula Delawarica* by Rafinesque: "this work was never published, and the manuscript is lost. After Rafinesque's death his herbarium became widely scattered, so that there is small chance of locating the specimens from our state."

For those interested in mid-Atlantic floristics in general and Del-Mar-Va floristics in particular, the possibility of finding Rafinesque's lost *Florula Delawarica* is an exciting challenge! Although we, as well as many others (apparently including Rafinesque himself) have failed to relocate this lost treasure, it has not been for want of searching. We endeavored to locate Rafinesque's *Florula Delawarica* in the collections of Benjamin Smith Barton at the American Philosophical Society, Boston Public Library, The Historical Society of Pennsylvania, and the Library of Congress and the correspondence of Henry Ernest Muhlenberg at The Historical Society of Pennsylvania.

While we cannot locate an extant copy of the manuscript itself, perhaps we may yet reconstruct a portion of Rafinesque's "little flora of Delaware" from published and unpublished sources, including surviving letters and herbarium specimens. In this regard, we were encouraged by the efforts of E. L. Little (1943) to reconstruct Rafinesque's *Florula Columbica*.

This paper reports on the results of our searches and builds upon the work of many others. In our efforts to reconstruct Rafinesque's list, we have good evidence—and reasonable scientific supposition—to support a minimum Delaware list which included 55 vascular plants, eight fungi, and one lichen.

Our reconstructed list may be the best that can be done with the known literature and auxillary sources. We hope, however, that it will serve as a challenge for those interested in historical floras to continue the botanical treasure hunt for Rafinesque's lost manuscripts. Those with a serendipitous outlook may find the hunt, itself, as rewarding as the treasure!

RAFINESQUE'S *FLORULA DELAWARICA*

At the age of 18, Rafinesque landed at Philadelphia on 18 April 1802 with his younger brother, Anthony A. Rafinesque. From 1802 to 1803 they travelled throughout Pennsylvania and New Jersey and made acquaintances with the naturalists of the area. In May 1804 the elder Rafinesque made his first sojourn in the state of Delaware. Rafinesque wrote in his *Life of Travels* (Rafinesque 1835):

¹ Contribution No. 11 from the Claude E. Phillips Herbarium.

I crossed [Delaware] lengthways from North to South, returning by the Western shore of Maryland [apparently Western shore of Del-Mar-Va in Maryland, not Western shore of Maryland]. I travelled 300 miles on foot in May and June. My friend Col. [Thomas] Forrest had given me Letters for Mr. MacLane, Senator [Col. Allen McLane], and Dr. [James] Tilton, both of Wilmington, who gave me a friendly reception, and furnished me with circulars for their friends through the State, whereby I was treated with great hospitality wherever I went, and began to experience the kind feelings of the Southern planters. I was even offered horses to ride, but I preferred my pedestrian mode, although I had often to wade through streams and swamps. I went through Dover, small borough, metropolis of this small State, and visited the Governor [Col. David Hall] of the State at his plantation [in 1790 Col. Hall had constructed his residence at 107 King's Highway, Lewes].

At Lewistown [Lewes] I was well received by the Rev. Mr. [James Patriot] Wilson, and went thence to Cape Henlopen, to visit the downs [dunes], the light house, and the Sea shore, to collect Crabs, Shells and Sea plants. At Dagsborough Mr. [William Hill] Wells [son-in-law of General John Dagworthy and owner of the Dagworthy estate since Dagworthy's death in 1784] sent me with an Oxen wagon into the great Dismal [Cypress] Swamp [Del-Mar-Va, not Virginia], one of those singular Cypress Swamps of the Sea shore region. The *Cupressus thyoides* [*Chamaecyparis thyoides* (L.) Britton, Sterns & Poggenb.] and *disticha* [*Taxodium distichum* (L.) L. C. Rich], two species of Cypress, are the chief trees found in it; but this is also the northern limit of many southern trees and plants, such as *Hopea tinctoria* [*Symplocos tinctoria* (L.) L'Hér.], &c. These swamps are very different from others, the waters are shallow, colored like beer yet clear. Roads are made into them with trees laid across.

Many geographical observations were made in this journey, where I began to study the soil, swamps, sands, downs [dunes], marls, islands, strata and fossils of those vast littoral atlantic plains which extend 2000 miles from New Jersey to Florida and Louisiana. The low sandy islands which skirt all the atlantic shores from Long Island to Yucatan, are a very peculiar feature of the physical geography of this continent, which has hardly been noticed; altho' it has scarcely any parallel elsewhere. These islands become often peninsulas as it were under our own eyes.

On my return, I went in to East Maryland, visiting Easton and Chester. I dwelt awhile on the shores of the Chesapeak, and came back by Christiana and Wilmington in Delaware. This journey in the great peninsula of Chesapeak afforded me many rare and new plants with other natural objects.

In mid-July of 1802 E. I. du Pont moved his family from Bergen Point, New Jersey to establish his powder mills (now Eleutherian Mills-Hagley Foundation, Inc.) on Brandywine Creek near Wilmington, Delaware. Through John Vaughan, merchant, powder agent, and secretary of the American Philosophical Society, du Pont made the acquaintance of Rafinesque. In the fall of 1804 du Pont entertained Rafinesque at his home, and Rafinesque botanized in the nearby Brandywine woods (Wilkinson 1972).

On 12 December 1804, Rafinesque wrote to E. I. du Pont from Philadelphia:

I am very sorry that you did not return to town at the time you mentioned, for if your visit is much delayed I shall not have the pleasure of seeing you. I have just had letters from my family in Italy that recall me immediately, and as a ship is ready to sail for Livourne I am going in a few days. If you are not in town before then, I will leave with Mr. Vaughan the Book [Michaux's *Flora Boreali-Americana*] you were good enough to lend me. My departure for Europe is most unexpected. Who would have thought of it when I planned with you to see the Brandywine again next year, and afterward to visit the Western country! I have made my preparations so hurriedly that I have scarcely had time to pack my plants. I much regret the hickory nuts that I left at your house. We agreed with Dr. Barton to call *lennixylum* the kind of hickory that is so different from the Juglans, and I have five species—*L. angulosa* [*Carya ovata* (Mill.) K. Koch], *amara* [*C. cordiformis* (Wang.) K. Koch], *pyriforme* [*C. glabra* (Mill.) Sweet], *squamosa* [*C. ovalis* (Wang.) Sarg.] and *globosa* [*C. tomentosa* (Poir.) Nutt.]. You will recognize them by the names and you will see them in my *Florula Delawareica*, which I have given to Dr. Barton for his paper (B. G. du Pont 1925).

When Rafinesque returned to Italy on 1 January 1805, sailing from New Castle, Delaware, he took with him nearly 10,000 herbarium specimens from Delaware, the District of Columbia, Maryland, Pennsylvania, and Virginia (Rafinesque 1836; Little 1943).

In a letter dated 8 August 1805 to the Rev. ("Dr.") Henry Ernest Muhlenberg of Lancaster, Pennsylvania, Rafinesque wrote:

You will have been sent by Dr. [Benjamin Smith] Barton my 2 little florulas—Delawarica & Columbica—where you will have perceived many synonymies of Michaux & others. That little Essay was however done in such a hurry for a sort of remembrance of my stay in America that I have since detected Myself some improper applications, but they will have stroke you & you no doubt have been able to correct them.

In 1806, Benjamin S. Barton's journal, *The Philadelphia Medical and Physical Journal*, announced: "Mr. Rafinesque, an Italian gentlemen, has put into the hands of the Editor, a MS. catalogue of the plants of the State of Delaware, and of the District of Columbia. This catalogue, with large additions by the Editor, will be published in future parts of this *Journal*" (Barton 1806). Barton never published Rafinesque's catalog.

In 1815, Rafinesque published *Analyse de la Nature*, a work which contained on the cover pages lists of his works and essays, including:

2. Florula Delawarica et Florula Columbica—Catalogue des Plantes de l'État de Delaware et du district de Columbia dans l'États Unis d'Amérique, communiqué au Doct. Barton pour insérer dans le Journal de Physique de Philadelphie en 1805.

In 1816, Rafinesque, in his first publication after returning to the United States, listed his works and tracts up to that date and included:

Florula Delawarica, or a Catalogue of the Plants found in the State of Delaware. This tract and the following [Florula Columbica] were given to Dr. Barton in 1804, for insertion in his Medical and Physical Journal, and he promised to do so, volume II, page 177; but never performed his promise.

Rafinesque further explained that all his books, manuscripts, drawings, and herbarium specimens were lost when his ship, "Union of Malta," sailing from Sicily to New York, was wrecked off Fishers Island near New London, Connecticut on 2 November 1815. Thus, if Rafinesque had kept a copy of his *Florula Delawarica*, it was lost in the shipwreck.

Later, Rafinesque (1833) again reiterated his disappointment with Barton, when he published another list of his works, including: "1804, Floras of Delaware and District of Columbia, my first essay, suppressed by Dr. Benjamin Barton."

Rafinesque, in spite of his difficulty in publishing in America, continued to work, correspond, and publish in both Europe and North America (Stuckey, 1986). From the sources listed below and from those previously quoted, we have attempted to reconstruct a portion of Rafinesque's *Florula Delawarica*.

PRIMARY SOURCES FOR RAFINESQUE'S *FLORULA DELAWARICA*

On 1 September 1807, Rafinesque wrote a letter from Palermo, Italy to Dr. Samuel L. Mitchell and listed new genera and species that he discovered in the United States during his travels of 1803–1804 (Rafinesque 1808b). In this published letter he listed two fungi, one lichen, and ten species of higher plants that he had collected in Delaware.

In 1808, a prospectus of Rafinesque's two intended works was published with a new cryptogam from Delaware (Rafinesque 1808a).

On 1 April 1810, Rafinesque again wrote a letter from Palermo to Dr. Samuel L. Mitchell. In this letter he listed his mid-Atlantic plants which he believed were naturalized in the United States from Europe and other parts of the U.S. (Rafinesque 1811a). In this published letter he cited 18 species he had collected in Delaware.

On 1 April 1810, Rafinesque wrote another published letter from Palermo and listed one species of *Callitriche* and four species of *Potamogeton* that he had collected in Delaware (Rafinesque 1811b).

On 7 January 1811, the Rev. Muhlenberg wrote to Dr. William Baldwin, then living in Wilmington, Delaware (Darlington 1843):

The State of Delaware, alone, amongst all others, has contributed nothing to my Herbarium; and I am certain it contains many new and curious plants. This, a former acquaintance of mine, Mr. Rafinesque, has informed me of; and Mr. William Hamilton, of the Woodlands, confirms his information.

I have seen part of Mr. Rafinesque's catalogue,—amongst the plants he mentions, several were new to me.—as *Uniola paniculata* [*U. latifolia* Michx.], *Zizania miliacea* [*Z. aquatica* L.], *Hydrocotyle ficarioides* [*Hydrocotyle ranunculoides* L.], *Hopea tinctoria* [*Symplocos tinctoria*], *Sida rhombifolia* [*S. spinosa* L.], *Astragalus Carolinianus* [*A. canadensis* L. var. *canadensis*], *Jacobaea tomentosa* [*Senecio tomentosus* Michx.] and *lyrata* [*S. aureus* L.], *Helianthus lanceolatus* [*H. decapetalus* L.], *Viola rotundifolia* [*V. rotundifolia* Michx.], *Veratrum nigrum* [*V. viride* Ait.], *Melanthium racemosum* [*M. hybridum* Walt.], *Blechnum Virginicum* [*Woodwardia virginica* (L.) Sm.], &c.

In 1812, Benjamin S. Barton published a *Flora Virginica* and listed two species which were apparently in the *Florula Delawarica*: "*Bartonia tenella*. [*B. virginica* (L.) Britton, Sterns & Poggenb.]—Rafinesque, *Florula Delavarica et Columbica*, M.S." and "*Bartonia verna*. [*B. verna* (Michx.) Raf. ex Barton]—Rafinesque, *Florula Delawarica et Columbica*, M.S."

In 1813, Rafinesque wrote an article which included five fungi from Delaware.

In 1814, Rafinesque published *Précis des découvertes et travaux somologiques*, a work which listed four fungi collected in Delaware. The descriptions are similar, but not identical, to those published in 1813.

Rafinesque's self-admitted uncontrolled and uncontrollable tendency to rush into print with many new taxa has, from the beginning, produced many critics (Stuckey 1986). However, Rafinesque's works have provided twentieth century botanists with countless opportunities to apply the rules of the *International Code of Botanical Nomenclature*. We, too, have taken up this challenge of synonymy in our list, perhaps with a little appreciation. A hasty critical dismissal of Rafinesque and his works does not give credit to the species which he named and which still stand today (e.g., *Drosera filiformis*). While he was ignored by his contemporaries, Rafinesque has generated progressively greater interest in twentieth century botanists (Stuckey 1986).

RECONSTRUCTION OF RAFINESQUE'S FLORULA DELAWARENICA

Although it is very hazardous to venture identifications without herbarium vouchers, the following species were apparently in Rafinesque's small flora. Identifications are primarily based upon plant distributions in Delaware (Tatnall 1946) and synonymies in Fernald (1950), Kartesz and Kartesz (1980), and Merrill (1943, 1949). In the following catalog we have quoted Rafinesque exactly and completely because of the obscurity of the letters and journals. Previously unpublished names are listed without authority. This list should not be interpreted as an attempt at valid publication of these names.

FUNGI

Agaricus aterrimus Raf. = ?

"*Agaricus aterrimus*. Entièrement noir, stipe fistuleux, lisse, contigu; peridie lisse, convexe-conique diamètre, de la moitié de la longueur du stipe. En *Delaware*." (Rafinesque 1813).

"*Amanita aterrima*. Entièrement noir, stipe fistuleux, lisse, contigu; péride lisse, convexe-conique, diamètre la moitié de la hauteur du stipe. *Dans l'état de Delaware*." Rafinesque 1814).

Agaricus azureus Raf. = ? *Lactarius indigo* (Schwein.) Fr.?

"*Agaricus azureus*. Couleur azuré; stipe court semifistuleux, continu; diamètre du peridie convexe, ombiliqué, quadruple, de la longueur du stipe, lames décurrentes bleues. En *Delaware*." (Rafinesque 1813).

"*Amanita azurea*. Entièrement azuré, stipe demi fistuleux et continu; péride à diamètre quadruple de la hauteur du stipe, convexe, ombiliqué, lames bleues décurrentes. En *Delaware*." (Rafinesque 1814).

Dycticia clathroides Raf. = ? misidentification of *Clathrus columnatus* Bosc?

"*Dycticia*, (clathroides) akin to clathrus, but without volva. Found in Delaware." (Rafinesque 1880a).

Hydnum aurantium Raf. = ? *Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst?

"*Hydnum aurantium*. Stipe blanc tuberculeux, de la longueur de diamètre du peridie qui est convexe en-dessus, lisse et de couleur orangé claire; papilles subulées, incarnat-orangé Dans les bois, en *Delaware*." (Rafinesque 1813).

"*Hydnum aurantium*. Stipe blanc tuberculé, de la longueur du diamètre du péride qui est convexe supérieurement, lisse, orangé pale, dessous concave à papilles subulées orangées incarnates. En *Delaware*." (Rafinesque 1814).

Hydnum barbatum Raf. = ? *Hericium erinaceus* (Fr.) Pers.?

"*Hydnum barbatum*, bearded hydnum; pedunculated, whitish, peridium obovated, irregularly truncated, barb slender. Found near Lewistown, in Delaware." (Rafinesque 1808b).

Hydnum puniceum Raf. = ? *Fistulina hepatica* Schaeff. ex Fr.?

"*Hydnum puniceum*. D'une couleur écarlate; sessile, plane, solitaire, lisse; papilles inférieures d'un rouge brun. Sur les arbres, en *Delaware*." (Rafinesque 1813).

"*Hydnum puniceum*. Ecarlatte, péride sessile plane solitaire lisse, papilles congeâtres. *Sur les arbres en Delaware*." (Rafinesque 1814).

Lycoperdon coccineum Raf. = ? *Rhizopogon rubescens* Tulasne? or ?*R. roseolus* (Corda) Hollos?

"*Lycoperdon coccineum*. Couleur rouge; sessile, globuleux, presque lisse; dehiscence arrondie, poussière brune rougeâtre. Croît dans les bois de *Delaware*." (Rafinesque 1813).

"*Lycoperdon coccineum*. Rouge sessile globuleux, presque lisse, déhiscence arrondie, poussière brune-rougeâtre. *Amér. Sept. dans les bois en Delaware*." (Rafinesque 1814).

Peziza cupularia Raf. = ? *Tarsetta cupularis* (L. ex Fr.) Lamb?

"*Peziza cupularia*; cupped peziza; semi-pedunculated yellowish, long campanulated. In Delaware." (Rafinesque 1808b).

LICHEN

Druparia rosea Raf. = ? *Baeomyces roseus* Pers.?

"10. *Druparia*. Crypt. fungus; natural order of the mushrooms; gelatinous, containing a carilaginous peridium, in which the seeds are dispersed in a mucilaginous substance. 1 *D. violacea*, pruniform, violaceous. I have found it near Philadelphia 2 *D. rosea*, semi-ovate, of a pale rose colour; found near Wilmington, in Delaware. 3 *D. globosa*, globular, cherry-like, reddish, found near Easton, Pennsylvania." (Rafinesque 1808b).

FERN

BLECHNACEAE

Blechnum virginicum L. = *Woodwardia virginica* (L.) Sm. (Darlington 1843).

GYMNOSPERMS

TAXODIACEAE

Cupressus disticha L. = *Taxodium distichum* (L.) L. C. Rich. (Rafinesque 1836).

CUPRESSACEAE

Cupressus thyoides L. = *Chamaecyparis thyoides* (L.) Britton, Sterns & Poggenb. (Rafinesque 1836).

ANGIOSPERMS: MONOCOTS

POTAMOGETONACEAE

Potamogeton diversifolium Raf. = *P. diversifolius* Raf.

"Potamogeton diversifolium (Raf.—*P. hybridum* b. Mich. fl. bor.) foliis submersis, linearibus, acutis sessilibus, emersis, oblongo-ovalibus, natanibus, spicis cilindricis.—in Carolina, Virginia et Delaware." (Rafinesque 1811b).

Potamogeton filiforme Raf. = *P. pectinatus* L.

"Potamogeton filiforme (Raf.) foliis filiformibus, longissimis, subsessilibus, acutis, spicis terminalibus paucifloris.—in Delaware." (Rafinesque 1811b).

Potamogeton foliorum Raf. = *P. foliosus* Raf.

"Potamogeton foliorum (Raf.—*P. gramineum* Mx. fl. bor. Amer. nec. Linn.) foliis sessilibus, anguste linearibus, obtusiusculus, spicis sub. 4. floris—in Carolina, Virginia et Delaware." (Rafinesque 1811b).

Potamogeton petiolaris Raf. = *P. nodosus* Poir.

"Potamogeton petiolaris. (Raf.) foliis linearibus, obtusis, longe petiolatis) spicis brevibus subcilindricis.—in Delaware." (Rafinesque 1811b).

POACEAE

Avena elatior L. = *Arrhenatherum elatius* (L.) Beauv. ex J. & C. Presl.

Festuca elatior L.

"Festuca elatior, Avena elatior, lately introduced into the meadows near Lancaster, and Wilmington in Delaware—rather rare." (Rafinesque 1811a).

Uniola paniculata = *U. latifolia* Michx. (Darlington 1843).

Zizania miliacea = *Z. aquatica* L. (Darlington 1843).

LILIACEAE

Melanthium racemosum = *M. hybridum* Walt. (Darlington 1843).

Ornithogalum umbellatum L.

"Ornithogalum umbellatum—common—in some parts of New-Jersey and Delaware, near Lancaster, &c. in fields, meadows and gardens." (Rafinesque 1811a).

Veratrum nigrum = *V. viride* Ait. (Darlington 1843).

AGAVACEAE

Yucca filamentosa L.

"Yucca filamentosa—from the Southern States: found in Delaware and near Havre de Grace." (Rafinesque 1811a).

SMLACACEAE

Smilax heterophylla Raf. = *S. glauca* Walt.

"Smilax heterophylla, heterophyllous sarsaparilla; stem angular, unarmed; leaves ovate-semi-cordated, or ovate-lanceolated, obtuse 7 nervous, umbells axillary, many flowers. It grows in several woods of Delaware, and the eastern shore of Maryland." (Rafinesque 1808b).

ANGIOSPERMS: DICOTS

JUGLANDACEAE

Lennixylum amara = *Carya cordiformis* Wang.) K. Koch (du Pont 1925).

Lennixylum angulosa = *Carya ovata* (Mill.) K. Koch (du Pont 1925).

Lennixylum globosa = *Carya tomentosa* (Poir.) Nutt. (du Pont 1925).

Lennixylum pyriforme = *Carya glabra* (Mill.) Sweet (du Pont 1925).

Lennixylum squamosa = *Carya ovalis* (Wang.) Sarg. (du Pont 1925).

FAGACEAE

Quercus suberoides Raf. = *Q. muhlenbergii* Engelm.

"Quercus suberoides, suberous-oak; leaves lanceolated, very acute, smooth, unequally semi-dentated, bark suberous in Newcastle county, Delaware, and Berks county, Penn." (Rafinesque 1808b).

POLYGONACEAE

Polygonum inundatum Raf. = *P. hydropiperoides* Michx.

"Polygonum inundatum, inundated; stem upright, semi-angular, leaves alternated, petiolated linear-lanceolated, very acute, spike terminal, flowers 8 androus, 2 gynous; grows in the swamps of Sussex county, in

Delaware, to the height of one or two feet under water; the flowers are always above it, and always of a white rose-colour." (Rafinesque 1808b).

NYCTAGINACEAE

Mirabilis dichotoma L. = apparent misidentification, probably *M. jalapa* L.

"*Mirabilis dichotoma*—in Pennsylvania, Maryland and Delaware." (Rafinesque 1811a).

CARYOPHYLLACEAE

Cerastium velutinum Raf. = *C. arvense* L. var. *arvense*.

"*Cerastium velutinum*, velvet mouse-ear; stem procumbent; leaves ovate, elliptic, obtuse, tomentous, flowers few, terminal. In Newcastle county, Delaware, and Chester county, Penn." (Rafinesque 1808b).

Spergula arvensis L.

"*Spergula arvensis*—common—particularly in Delaware and New-Jersey, in flax fields." (Rafinesque 1811a).

RANUNCULACEAE

Aquilegia vulgaris L.

"*Aquilegia vulgaris*—in Delaware, near Lanc. and Washington, near Germantown, rare—near gardens, or along roads." (Rafinesque 1811a).

BRASSICACEAE

Cochlearia armoracia L. = *Armoracia rusticana* P. Gaertn., B. Mey. & J. Scherb.

Lepidium sativum L.

Myagrum sativum L. = *Camelina sativa* (L.) Crantz

"*Lepidium sativum*, *Myagrum sativum*, *Cochlearia armoracia*, in Delaware and near Lancaster, do. [near houses] do in New-Jersey, & do., rare—near gardens." (Rafinesque 1811a).

Sinapis alba L.

Sinapis nigra L. = *Brassica nigra* (L.) W. D. J. Koch

"*Sinapis alba*, *nigra*, rather common—near Lancaster, Newark, &c. and in Delaware, near houses." (Rafinesque 1811a).

DROSERACEAE

Drosera filiformis Raf.

"*Drosera filiformis*, filiformous sundew; leaves radical filiformous, adspersed of pediculated glands, stems terminated with a spike of unilateral flowers. It grows in marshly grounds in the county of Gloucester, New Jersey, and Sussex county, Delaware." (Rafinesque 1808b).

ROSACEAE

Prunus spinosa L.

"*Prunus spinosa*—rare—in some hedges and fields, in Maryland, New-Jersey, and Delaware." (Rafinesque 1811a).

FABACEAE

Astragalus Carolinianus L. = *A. canadensis* L. var. *canadensis* (Darlington 1843).

Medicago sativa L.

"*Medicago sativa*—rare—in some fields of Maryland and Delaware." (Rafinesque 1811a).

CALLITRICHACEAE

Callitriche terrestris Raf. = *C. terrestris* Raf. emend. Torr. (*C. austinii* Engelm.).

"*Callitriche terrestris* (Muhlenberg Mss.) Caule humifuso, foliis omnibus petiolatis, ellipticis, obtusis, integris, crassis, enervibus, floribus, monoicis.—In Pennsylvania, Nova Cesarea, Delawara, in locis humidiusculis." (Rafinesque 1811b). Malvaceae.

Sida rhombifolia = *S. spinosa* L. (Darlington 1843).

VIOLACEAE

Viola rotundifolia Michx. (Darlington 1843).

ONAGRACEAE

Ludwigia aurantiaca Raf. = *L. alternifolia* L.

"*Ludwigia aurantiaca*, oranged ludwigia; stem upright branched, leaves sessile, ovate-lanceolated, alternated, acute, smooth, flowers axillary, petals equalling in length the calix. I found it in Newcastle county, Delaware, and Chester county, Pennsylvania; the petals are of an orange colour." (Rafinesque 1808b).

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HALORAGIDACEAE

Burshia humilis Raf. = *Myriophyllum humile* (Raf.) Morong

"3. Burshia. Tetrandria tetragynia:—akin to the prosperinaca, calyx superous 4 dentated, corolla 0, stam. 4, styles 4 subdulated, capsul, 4 locular, 4 spermous. *B. humilis humble burshia*, leaves pinnatifid, divisions incised, pinnatifid, acute; flowers axillary, solitarious sessile. This new plant was first discovered by Mr. Bursh [Frederick T. Pursh], in New Jersey. I have since found it in the county of Sussex, state of Delaware; it is an aquatic plant, which only rises to the height of a few inches." (Rafinesque 1808b). This genus was later published as *Purshia* (Rafinesque 1815).

APIACEAE

Anethum foeniculum L. = *Foeniculum vulgare* Mill.

"Anethum foeniculum—in Delaware, and in Pennsylvania, near Bethlehem, along some roads." (Rafinesque 1811a).

Hydrocotyle ficarioides = *H. ranunculoides* L. (Darlington 1843).

SYMPLOCACEAE

Hopea tinctoria L. = *Symplocos tinctoria* (L.) L'Hér. (Rafinesque 1836; Darlington 1843).

CONVOLVULACEAE

Convolvulus battatas L. = *Ipomoea batatas* (L.) Lam.

"Convolvulus battatas—in fields—in New-Jersey and Delaware." (Rafinesque 1811a).

BORAGINACEAE

Cynoglossum officinale L.

"Cynoglossum officinale—common—in Delaware, Maryland, and N. Jersey, in roads and near houses." (Rafinesque 1811a).

SCROPHULARIACEAE

Antirrhinum cymbalaria = *Cymbalaria muralis* P. Gaertn., B. Mey. & J. Scherb.

"Antirrhinum cymbalaria, rare—in fields . . . in Delaware." (Rafinesque 1811a).

GENTIANACEAE

Bartonia tenella Muhl. ex Willd. = *B. virginica* (L.) Britton, Sterns & Poggenb. (Barton 1812).

Bartonia verna (Michx.) Raf. ex Barton (Barton 1812).

Chironea amoena Raf. = *Sabatia stellaris* Pursh

"Chironea amoena, graceful chironia; stem cylindrical, dichotomous, leaves-narrow-lanceolated, acute, flowers terminal, calix equalling in length the corolla, which is wheeled; grows on the sea-shores of Maryland, Delaware, and Jersey; the flowers are rose-colour, with a double star in the centre, the interior one yellow, the exterior one red. A variety has white flowers, with the same stars." (Rafinesque 1808b).

RUBIACEAE

Galium parviflorum Raf. = *G. concinnum* Torr. & A. Gray

"Galium parviflorum, small flowered galium; stems diffuse, angular, smooth; leaves verticillated 5 by 5, or 6 by 6, linear lanceolated, very acute, smooth; flowers paniculated, very minute and numerous, seeds smooth. In Newcastle county, Delaware. Very rare, flowers white, exceedingly small." (Rafinesque 1808b).

ASTERACEAE

Helianthus lanceolatus = *H. decapetalus* L. (Darlington 1843).

Jacobaea tomentosa = *Senecio tomentosus* Michx. (Darlington 1843).

Jacobaea lyrata = *S. aureus* L. (Darlington 1843).

Solidago pauciflora Raf. = ? depauperate *S. odora* Ait.?

"Solidago pauciflora; stem simple, smooth; leaves oblong-lanceolated, acute, entire, flowers 1-5 terminal. I have found it in Gloucester county, New Jersey, and in Kent county, Delaware." (Rafinesque 1808b)

SUMMARY

1. Twelve species names listed above were never published by Rafinesque. These included: *Uniola paniculata*, *Zizania miliacea*, *Melanthium racemosum*, *Veratrum nigrum*, *Heliathus lanceolatus*, *Jacobaea tomentosa*, and *J. lyrata*.
2. The genus *Lennixylum*, with five species, was also never published by Rafinesque,

- and so we must deduce its correct nomenclature from the meager evidence. *Lennixylum* (a.) is a member of the Juglandaceae, (b.) is sufficiently different from *Juglans* to warrant a separate genus, (c.) was described from the Piedmont of Delaware, and (d.) was apparently described primarily from the fruit. Rafinesque did publish *Hicoria amara* (Fl. Ludovic. 109. 1817), a synonym of *C. cordiformis*.
3. The report of *Astragalus canadensis* var. *canadensis* is noteworthy because there is no herbarium specimen of this taxon from DelMarVa (Duane Isley, pers. comm. 1988).
 4. *Drosera filiformis* is also unvouchered from Delaware, although Fernald (1931), with no cited references or vouchers, included Cape Henlopen in his map of the range of *D. filiformis*. *Drosera filiformis* was figured by Rafinesque in a set of unpublished plates, as were *Burshia humilis* and *Hydnum barbatum* (Gerard 1885).
 5. The publication of *Bartonia verna* by Barton antedates by a year the publication by Muhlenberg. This prior publication was first noted by Pennell (1926) and later by Little (1943), but was not cited in the most recent revision of *Bartonia* (Gillett 1959). Today *B. verna* ranges as far north as North Carolina (Gillett, 1959).
 6. The *Florula Delawarica* may have included, at least, eight fungi, one lichen, one fern, two gymnosperms, 13 monocots, and 39 dicots from Delaware. The 55 vascular plants in this small reconstructed flora are distributed among 45 genera and 31 families.

THE RELEVANCE OF RAFINESQUE'S *FLORULA DELAWARICA* TODAY

For many botanists studying the composition of modern floras by examining historical records and collections, there is overwhelming evidence that our local floras have changed—sometimes drastically—over the past two centuries. This observation is sometimes difficult to appreciate fully; for, while we are quick to agree with Darwin on the dynamic nature of individual species, we often fall back to a pre-Darwinian position that local floras are rather static (floras comprised, albeit, of the admittedly dynamic individual species!).

The joy of finding a rare species existing today in exactly the same place it was reported 50 or 100 years ago on herbarium labels makes us realize that rarity is a common survival strategy successfully exploited by many species for long periods of time. At the same time, finding rare species "exactly where they are supposed to be" fosters our static view of nature. This view is self-reinforced by our limited lifetime views—and even more limited professional views—of any single flora.

Recent work in constructing lists of rare, threatened, and endangered species to support the conservation of biotic diversity brings us back to the dynamic nature of floras and makes us wish for a greater quantity of historic herbarium specimens with labels of higher informational quality.

Constantine S. Rafinesque seems to have had an unusual ability to spot important taxa as well as minor color variants. His preference for walking and his keen eye have given us an invaluable picture of a vanished Del-Mar-Va. In particular, the discovery of species which are now extirpated, such as *Astragalus canadensis* var. *canadensis*, *Drosera filiformis*, and *Bartonia verna*, indicate a flora in 1804 that was different from today.

Probably one of the most detrimental effects on the flora of Del-Mar-Va results from attempts to offset the gradual geological subsidence of the Del-Mar-Va Peninsula. The first extensive effort to drain Delaware dates back to the Culbreth Marsh Ditch Com-

pany in 1832 (Ratlidge 1972–1973). Over 150 years of gradual drainage from ditching have affected a high number of rare, threatened, and endangered wetland species (Tucker et al. 1979; Naczi et al. 1986; Dill et al. 1987). Sadly, we have only recently realized the importance of freshwater wetlands.

The observations and collections of botanists such as Rafinesque provide us with baseline data from which to measure nearly two centuries of change. These works are priceless contributions to our understanding of floristic dynamics, the management of threatened habitats, and the conservation of biological diversity.

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