

## **ANDRÉ MICHAUX'S AMERICAN PLANT COLLECTIONS, 1785-1796**

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### **ABSTRACT**

This article points readers to an online collection of digital images of the Michaux herbarium in Paris and corresponding information, posted to the Botanica Caroliniana website. Included is a table of contents of Michaux's herbarium by volume and family.

André Michaux's collection in the herbarium of the Jardin des Plantes, part of the Muséum National d'Histoire Naturelle in Paris, is a wide-reaching, annotated body of evidence for the botany of eastern North America, and especially the Southeast, for the years between 1785 and 1800. In 2014, we took digital photographs of Michaux's specimens, and through the cooperation of the Jardin des Plantes, we are able to publish these images and accompanying data under an open content license. The data include two kinds: digital images of specimens and data recording specimens.

An online view of the data is at Blackwell et al. (2017; Images of André Michaux's Specimens, Jardin des Plantes), with a canonical version of the data in TSV format available under version control.

Here we provide a table of the contents of Michaux's herbarium by volume and family. Michaux's herbarium is organized by the Linnaean taxonomy used in Michaux's *Flora Boreali-Americana*. This is a cursory overview of the nearly 4000-specimen collection, but it should help guide the reader through the online collection. We point readers to the online images and full catalog. All of the identifications and other metadata are accessible there, with the caveat that this online catalog is mostly unedited and is a work in progress.

This table includes references to Linnaean taxonomy and page references to the *Flora Boreali-Americana*. The *Flora* is in two volumes; volume 2 begins with *Didynamia Gymnospermia* (*Lamiaceae sensu lato*).

<b>Volume</b>	<b>Family</b>	<b>Linnaean Class</b>	<b>Linnaean Order</b>	<b>Flora Boreali- Americana</b>
1	Plantaginaceae	Monandria	Monogynia	1
	Amaranthaceae	Monandria	Monogynia	1
	Cannaceae	Monandria	Digynia	2
	Callitrichaceae	Monandria	Digynia	2
	Oleaceae	Diandria	Monogynia	3
	Plantaginaceae	Diandria	Monogynia	4
	Acanthaceae	Diandria	Monogynia	7
	Plantaginaceae	Diandria	Monogynia	10
	Lentibulariaceae	Diandria	Monogynia	11
	Lamiaceae	Diandria	Monogynia	13
	Onagraceae	Diandria	Monogynia	17
1B	Valerianaceae	Triandria	Monogynia	18
	Burmanniaceae	Triandria	Monogynia	19
	Hydrocharitaceae	Triandria	Monogynia	20
	Haemodoraceae	Triandria	Monogynia	20
	Iridaceae	Triandria	Monogynia	22
	Xyridaceae	Triandria	Monogynia	23
	Iridaceae	Triandria	Monogynia	23
	Commelinaceae	Triandria	Monogynia	23
	Mayacaceae	Triandria	Monogynia	26
	Caryophyllaceae	Triandria	Monogynia	26
	Cyperaceae	Triandria	Monogynia	27
2	Poaceae	Triandria	Digynia	43
2B	Cyperaceae	Triandria	Monogynia	34
	Poaceae	Triandria	Digynia	38
3	Poaceae	Triandria	Digynia	67
3B	Haloragaceae	Triandria	Trigynia	76
	Cistaceae	Triandria	Trigynia	76
	Molluginaceae	Triandria	Trigynia	77
	Rubiaceae	Tetrandria	Monogynia	78
	Tetrachondraceae	Tetrandria	Monogynia	82
	Rubiaceae	Tetrandria	Monogynia	83
	Linnaeaceae	Tetrandria	Monogynia	87

	Onagraceae	Tetrandria	Monogynia	87
4	Cornaceae	Tetrandria	Monogynia	91
	Callicarpaceae	Tetrandria	Monogynia	
	Plantaginaceae	Tetrandria	Monogynia	94
	Solanaceae	Tetrandria	Monogynia	95
	Gentianaceae	Tetrandria	Monogynia	96
	Lythraceae	Tetrandria	Monogynia	99
	Rutaceae	Tetrandria	Monogynia	99
	Nyctaginaceae	Tetrandria	Monogynia	100
	Rosaceae	Tetrandria	Digynia	100
	Hamamelidaceae	Tetrandria	Digynia	100
	Potamogetonaceae	Tetrandria	Tetragynia	101
	Ruppiaceae	Tetrandria	Tetragynia	102
4B	Rubiaceae	Pentandria	Monogynia	103
	Caprifoliaceae	Pentandria	Monogynia	105
	Diervillaceae	Pentandria	Monogynia	106
	Caprifoliaceae	Pentandria	Monogynia	106
	Campanulaceae	Pentandria	Monogynia	108
	Primulaceae	Pentandria	Monogynia	109
	Grossulariaceae	Pentandria	Monogynia	109
	Caryophyllaceae	Pentandria	Monogynia	112
	Apocynaceae	Pentandria	Monogynia	114
5	Sapotaceae	Pentandria	Monogynia	122
	Primulaceae	Pentandria	Monogynia	123
	Menyanthaceae	Pentandria	Monogynia	124
	Primulaceae	Pentandria	Monogynia	126
	Boraginaceae	Pentandria	Monogynia	128
	Hydrophyllaceae	Pentandria	Monogynia	133
	Convolvulaceae	Pentandria	Monogynia	135
5B	Polemoniaceae	Pentandria	Monogynia	142
	Gentianaceae	Pentandria	Monogynia	146
	Loganiaceae	Pentandria	Monogynia	146
	Plumbaginaceae	Pentandria	Monogynia	
	Scrophulariaceae	Pentandria	Monogynia	148
	Solanaceae	Pentandria	Monogynia	149

	Ericaceae	Pentandria	Monogynia	150
	Diapensiaceae	Pentandria	Monogynia	152
	Rhamnaceae	Pentandria	Monogynia	153
6	Rhamnaceae	Pentandria	Monogynia	154
	Celastraceae	Pentandria	Monogynia	155
	Cyrillaceae	Pentandria	Monogynia	157
	Iteaceae	Pentandria	Monogynia	156
	Vitaceae	Pentandria	Monogynia	159
	Montiaceae	Pentandria	Monogynia	160
	Araliaceae	Pentandria	Digynia	161
	Apiaceae	Pentandria	Digynia	162
	Saxifragaceae	Pentandria	Digynia	171
	Ulmaceae	Pentandria	Digynia	172
	Amaranthaceae	Pentandria	Digynia	173
	Convolvulaceae	Pentandria	Digynia	175
	Gentianaceae	Pentandria	Digynia	175
	Hydroleaceae	Pentandria	Digynia	177
6B	Adoxaceae	Pentandria	Trigynia	178
	Anacardiaceae	Pentandria	Trigynia	182
	Staphyleaceae	Pentandria	Trigynia	184
	Parnassiaceae	Pentandria	Tetragynia	184
	Araliaceae	Pentandria	Pentagynia	185
	Droseraceae	Pentandria	Pentagynia	186
7	Agavaceae	Hexandria	Monogynia	187
	Amaryllidaceae	Hexandria	Monogynia	188
	Hypoxidaceae	Hexandria	Monogynia	
	Nartheciaceae	Hexandria	Monogynia	189
	Juncaceae	Hexandria	Monogynia	190
	Commelinaceae	Hexandria	Monogynia	193
	Pontederiaceae	Hexandria	Monogynia	
	Acoraceae	Hexandria	Monogynia	194
	Araceae	Hexandria	Monogynia	
	Alliaceae	Hexandria	Monogynia	
	Bromeliaceae	Hexandria	Monogynia	195
	Agavaceae	Hexandria	Monogynia	196

	Liliaceae	Hexandria	Monogynia	197
	Colchicaceae	Hexandria	Monogynia	198
	Liliaceae	Hexandria	Monogynia	200
	Ruscaceae	Hexandria	Monogynia	201
	Liliaceae	Hexandria	Monogynia	
	Ruscaceae	Hexandria	Monogynia	
	Berberidaceae	Hexandria	Monogynia	203
	Cabombaceae	Hexandria	Digynia	206
7B	Arecaceae	Hexandria	Trigynia	206
	Juncaginaceae	Hexandria	Trigynia	208
	Tofieldiaceae	Hexandria	Trigynia	
	Melanthiaceae	Hexandria	Trigynia	211
	Liliaceae	Hexandria	Trigynia	214
	Trilliaceae	Hexandria	Trigynia	215
	Polygonaceae	Hexandria	Trigynia	216
	Saururaceae	Hexandria	Tetragynia	218
	Alismataceae	Hexandria	Polygynia	218
	Sapindaceae	Heptandria	Monogynia	219
	Primulaceae	Heptandria	Monogynia	220
	Melastomataceae	Octandria	Monogynia	221
	Onagraceae	Octandria	Monogynia	223
8	Onagraceae	Octandria	Monogynia	224
	Thymeleaceae	Octandria	Monogynia	236
	Berberidaceae	Octandria	Monogynia	236
	Polygonaceae	Octandria	Trigynia	237
	Lauraceae	Enneandria	Monogynia	243
8B	Polygonaceae	Enneandria	Monogynia	246
	Tofieldiaceae	Enneandria	Trigynia	247
	Ericaceae	Decandria	Monogynia	249
9	Diapensiaceae	Decandria	Monogynia	250
	Ericaceae	Decandria	Monogynia	252
9B	Ericaceae	Decandria	Monogynia	258
	Clethraceae	Decandria	Monogynia	260
	Fabaceae	Decandria	Monogynia	261
	Ericaceae	Decandria	Monogynia	266

	Onagraceae	Decandria	Monogynia	267
	Hydrangeaceae	Decandria	Digynia	268
	Saxifragaceae	Decandria	Digynia	268
10		Decandria	Digynia	
	Polygonaceae	Decandria	Trigynia	271
	Caryophyllaceae	Decandria	Trigynia	271
	Caryophyllaceae	Decandria	Tetragynia	275
	Caryophyllaceae	Decandria	Pentagynia	276
	Crassulaceae	Decandria	Pentagynia	
	Penthoraceae	Decandria	Pentagynia	278
	Phytolaccaceae	Decandria	Decagynia	278
	Aristolochiaceae	Dodecandria	Monogynia	279
		Dodecandria	Monogynia	
	Lythraceae	Dodecandria	Monogynia	280
	Cactaceae	Icosandria	Monogynia	282
	Hydrangeaceae	Icosandria	Monogynia	282
	Rosaceae	Icosandria	Monogynia	284
	Rosaceae	Icosandria	Digynia	287
10B	Rosaceae	Icosandria	Trigynia	290
	Rosaceae	Icosandria	Pentagynia	291
	Rosaceae	Icosandria	Polygynia	295
11	Rosaceae	Icosandria	Polygynia	302
	Calycanthaceae	Icosandria	Polygynia	305
	Malvaceae	Polyandria	Monogynia	306
	Cistaceae	Polyandria	Monogynia	307
	Ranunculaceae	Polyandria	Monogynia	308
	Papaveraceae	Polyandria	Monogynia	309
	Berberidaceae	Polyandria	Monogynia	309
	Sarraceniaceae	Polyandria	Monogynia	310
	Nymphaeaceae	Polyandria	Monogynia	311
	Nelumbonaceae	Polyandria	Monogynia	
	Hamamelidaceae	Polyandria	Digynia	312
	Ranunculaceae	Polyandria	Trigynia	314
11B	Nelumbonaceae	Polyandria	Polygynia	317
	Ranunculaceae	Polyandria	Polygynia	317

	Schisandraceae	Polyandria	Polygynia	326
	Magnoliaceae	Polyandria	Polygynia	326
	Annonaceae	Polyandria	Polygynia	329
	Lamiaceae	Didynamia	Gymnospermia	1
12	Lamiaceae	Didynamia	Gymnospermia	7
	Phrymaceae	Didynamia	Angiospermia	13
	Plantaginaceae	Didynamia	Angiospermia	13
	Euphorbiaceae	Didynamia	Angiospermia	
	Orobanchaceae	Didynamia	Angiospermia	16
	Plantaginaceae?	Didynamia	Angiospermia	17
	Orobanchaceae	Didynamia	Angiospermia	17
12B	Plantaginaceae	Didynamia	Angiospermia	
	Scrophulariaceae	Didynamia	Angiospermia	21
	Plantaginaceae	Didynamia	Angiospermia	22
	Acanthaceae	Didynamia	Angiospermia	23
	Plantaginaceae	Didynamia	Angiospermia	24
	Bignoniaceae	Didynamia	Angiospermia	25
	Orobanchaceae	Didynamia	Angiospermia	26
	Brassicaceae	Tetradynamia	Siliculosa	27
	Iridaceae	Monadelphina	Triandria	
	Diapensiaceae	Monadelphina	Pentandria	34
	Linaceae	Monadelphina	Pentandria	36
	Passifloraceae	Monadelphina	Pentandria	37
13	Malvaceae	Monadelphina	Polyandria	44
	Fabaceae	Diadelphia	Pentandria	48
	Fumariaceae	Diadelphia	Hexandria	51
	Polygalaceae	Diadelphia	Octandria	52
	Theaceae	Diadelphia	Octandria	
	Geraniaceae	Monadelphina	Decandria	38
	Oxalidaceae	Monadelphina	Decandria	38
	Styracaceae	Monadelphina	Polyandria	40
	Symplocarpaceae	Monadelphina	Polyandria	43
	Theaceae	Monadelphina	Polyandria	43
13B	Fabaceae	Diadelphia	Decandria	55
	Asteraceae			

14	Asteraceae	Syngenesia	Polygamia Aequalis	83
14B	Fabaceae	Diadelphia	Decandria	70
	Hypericaceae	Polyadelphia	Polyandria	77
15	Asteraceae	Syngenesia	Polygamia Aequalis	101
	Asteraceae	Syngenesia	Polygamia Superflua	108
15B	Asteraceae	Syngenesia	Polygamia Superflua	125
16	Asteraceae	Syngenesia	Polygamia Frustranea	138
16B	Balsaminaceae	Syngenesia	Monogamia	149
	Violaceae	Syngenesia	Monogamia	149
	Campanulaceae	Syngenesia	Monogamia	151
	Orchidaceae	Gynandria	Monandria	155
	Aristolochiaceae	Gynandria	Hexandria	161
	Araceae	Gynandria	Monadelphia	162
	Platanaceae	Monoecia	Monandria	163
	Araceae	Monoecia	Diandria	163
	Podostemaceae	Monoecia	Diandria	164
	Eriocaulaceae	Monoecia	Triandria	165
	Cyperaceae	Monoecia	Triandria	167
17	Fagaceae	Monoecia	Polyandria	192
17B	Cyperaceae	Monoecia	Triandria	169
	Euphorbiaceae	Monoecia	Triandria	175
	Buxaceae	Monoecia	Tetrandria	177
	Urticaceae	Monoecia	Tetrandria	178
	Moraceae	Monoecia	Tetrandria	179
	Betulaceae	Monoecia	Tetrandria	180
	Asteraceae	Monoecia	Pentandria	182
	Euphorbiaceae	Monoecia	Pentandria	185
	Araceae	Monoecia	Polyandria	186
	Typhaceae	Monoecia	Polyandria	189
	Alismataceae	Monoecia	Polyandria	189
	Haloragaceae	Monoecia	Polyandria	190
	Juglandaceae	Monoecia	Polyandria	191



18	Betulaceae	Monoecia	Polyandria	201
	Altingiaceae	Monoecia	Polyandria	202
	Pinaceae	Monoecia	Monadelphia	203
	Cupressaceae	Monoecia	Monadelphia	208
	Euphorbiaceae	Monoecia	Monadelphia	209
18B	Cucurbitaceae	Monoecia	Syngenesia	217
	Schisandraceae	Monoecia	Syngenesia	218
	Amaranthaceae	Monoecia	Syngenesia	
	Hydrocharitaceae	Dioecia	Monandria	220
	Ericaceae	Dioecia	Diandria	221
	Oleaceae	Dioecia	Diandria	222
	Salicaceae	Dioecia	Diandria	225
	Elaeagnaceae	Dioecia	Tetrandria	227
	Myricaceae	Dioecia	Tetrandria	227
	Aquifoliaceae	Dioecia	Tetrandria	228
	Cannabaceae	Dioecia	Pentandria	230
	Vitaceae	Dioecia	Pentandria	230
19	Santalaceae	Dioecia	Pentandria	231
	Rutaceae	Dioecia	Pentandria	235
	Aquifoliaceae	Dioecia	Pentandria	236
	Smilacaceae	Dioecia	Hexandria	237
	Dioscoreaceae	Dioecia	Hexandria	239
	Polygonaceae	Dioecia	Octandria	240
	Fabaceae	Dioecia	Decandria	241
	Menispermaceae	Dioecia	Polyandria	241
	Zamiaceae	Dioecia	Polyandria	242
	Salicaceae	Dioecia	Polyandria	243
	Amaranthaceae	Dioecia	Monadelphia	244
	Taxaceae	Dioecia	Monadelphia	245
	Cupressaceae	Dioecia	Monadelphia	245
	Ulmaceae	Polygamia	Monoecia	247
	Melanthiaceae	Polygamia	Monoecia	249
	Urticaceae	Polygamia	Monoecia	
	Sapindaceae	Polygamia	Monoecia	252
	Fabaceae	Polygamia	Monoecia	254

19B	Ericaceae	Polygamia	Dioecia	255
	Oleaceae	Polygamia	Dioecia	255
	Araliaceae	Polygamia	Dioecia	256
	Fabaceae	Polygamia	Dioecia	257
	Ebenaceae	Polygamia	Dioecia	258
	Nyssaceae	Polygamia	Dioecia	258
	Pteridaceae	Cryptogamia	Filices	261
	Blechnaceae	Cryptogamia	Filices	264
	Osmundaceae?	Cryptogamia	Filices	
	Aspleniaceae	Cryptogamia	Filices	264
	Polypodiaceae	Cryptogamia	Filices	
20	Osmundaceae	Cryptogamia	Filices	272
	Lygodiaceae	Cryptogamia	Filices	275
	Equisetaceae	Cryptogamia	Equisetaceae	281
	Psilotaceae	Cryptogamia	Lycopodiaceae	282
	Lycopodiaceae	Cryptogamia	Lycopodiaceae	
	Selaginellaceae?	Cryptogamia	Lycopodiaceae	
		Cryptogamia	Hepaticae	276
20B		Cryptogamia	Musci	285
	Lichen			
21	Poaceae	Triandria	Digynia	52

## Methodology

The 20 volumes of Michaux's herbarium are organized according to the classification scheme Michaux used for his *Flora Boreali-Americana*. The top level of the organization is Linnaean class. Within each class are subdivisions by orders, which are marked by bits of paper stuck in between folders. The genera are contained in individual manila folders, which can contain numerous specimens. Each volume of the collection is divided into two parts. In our cataloging, we designated volumes as 1 followed by 1B, 2 followed 2B, etc.

The Michaux collection was not included in the herbarium's online catalog. Because the collection is organized by Linnaean taxonomy, it was difficult or impossible to search for specific specimens, especially since we did not have internet access and so could not easily cross check the historical names of modern taxa. The best catalog was the *Flora Boreali Americana*, because the entire collection is organized according to that scheme. In any case, we were not looking for specific specimens.

We established a workflow using our available equipment: a Fujifilm XE-2 camera with a Fuji XF 14mm f/2.8 lens (shooting handheld), two Apple Macbook Pro laptops, and a countertop next to a window that served as our light source. We photographed the entire collection in three full days: 2845 specimens, plus assorted detail shots and shots of folder covers.

The specimens are organized according to the Linnaean taxonomy described in Michaux's *Flora Boreali Americana*. We recorded Michaux's names for all of them, as well as transcribing various notes and noting which specimens had been identified as type material by other scholars examining the collection. Many specimens contained locality notes, which are transcribed in their own field; mostly this information refers to where the plants grow, not where individual specimens were collected.

McMillan and Hackney Blackwell examined all the specimens in Volume 1, and McMillan has identified all of them. Any other identifications listed with the specimens come from McMillan's examination of the actual specimens in Paris, done during the photography.

### Raw Image Data

We photographed the specimens with a Fujifilm XE-2 camera with a Fuji XF 14mm f/2.8 lens, handheld, under natural light from the windows at the Herbarium. The resulting camera-RAW images were processed in Apple Aperture for color balance, sharpening. The reference versions are online as Pyramidal TIFF images in a world-readable directory on a server at the University of Houston. We are grateful to the Center for High Performance Computing at the University of Houston, Keith Crabb, Director, for providing this space on their servers. All images in the *Botanica Caroliniana* library are licensed under a Creative Commons, 3.0 BY-NC license. The TIFF images can be found at, and downloaded from

[http://amphoreus.hpcc.uh.edu/botcar/reference\\_images\\_2017a/](http://amphoreus.hpcc.uh.edu/botcar/reference_images_2017a/)

### Integrated Images and Data

The master dataset is under version-control on GitHub at

[https://github.com/botcar/botcar-data/blob/master/Michaux2017/michaux\\_specimens\\_master.tsv](https://github.com/botcar/botcar-data/blob/master/Michaux2017/michaux_specimens_master.tsv)

These data are in plain text in tab-separated-values format. The first record in each row is a unique identifier for a specimen; this is expressed as a Universal Resource Name (URN), an internet standard, following the Cite2 URN format specified by the Cite Architecture (<http://cite-architecture.github.io>).

The second record is another Cite2 URN identifying an image of the specimen.

For more convenient viewing and browsing, there is an online presentation of that data at

<http://folio.furman.edu/projects/botanicacaroliniana/michaux/index.html>

On this page, users can sort the table by columns, or filter it by typing in the text-fields at the top of each column. The image URNs are linked to an online viewer that provides a zooming interface to the full-resolution image, and offers a “download image” link.

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