

## ***Flora of North America North of Mexico* Guide for Contributors—March 2008**

### **CONTENTS**

1. Introduction and coverage
  2. General instructions for treatments
    - 2.1. Entry for family and subdivisions of families
    - 2.2. Entry for genus and subdivisions of genera
    - 2.3. Entry for species
    - 2.4. Entry for species with infraspecies
    - 2.5. Entry for infraspecies
    - 2.6. Keys
    - 2.7. Vernacular names
    - 2.8. Status indicators
    - 2.9. Basionym and synonyms
    - 2.10. Description paragraphs
    - 2.11. Numbers, measurements, and conventions
    - 2.12. Chromosome numbers
    - 2.13. Number-of-taxa statements
    - 2.14. Phenology, habitat, and distribution statements
    - 2.15. Maps and dot placement
    - 2.16. Discussion paragraphs
    - 2.17. Citation of literature
  3. Suggested references for style, nomenclatural citations, and literature citations
  4. Abbreviations and symbols
    - 4.1. Bibliographic abbreviations
    - 4.2. Nomenclatural abbreviations
    - 4.3. Measurement abbreviations
    - 4.4. Other abbreviations
    - 4.5. Symbols
- Appendix A. Minimum Characters for All Family Descriptions  
Appendix B. Sample Treatment  
Appendix C. Checklist for Authors of Vascular Plant Taxa  
Appendix D. Guidelines for Working with Illustrators  
Appendix E. List of Selected Floras and Checklists

### **1. INTRODUCTION AND COVERAGE**

The *Flora of North America North of Mexico*, to be published in 30 volumes, is a synoptic floristic account of the plants of Greenland, St. Pierre and Miquelon, Canada, and the continental United States of America (including the Florida Keys and the Aleutian Islands). The *Flora* includes accepted names, literature citations, selected synonyms, identification keys, descriptions, chromosome numbers, summaries of habitats and geographic ranges, phenological information, conservation status, and significant biological observations, as well as occurrence maps and illustrations. Each volume contains a bibliography and an index to taxa treated.

This guide describes standardizations intended to make the *Flora* easy to use and relatively consistent across vascular plant volumes. Exceptions to the guide are made when it is necessary to convey

information about particular taxa; editors must approve the exceptions. Communication with editors throughout the manuscript preparation process is encouraged.

This guide contains information to help with preparing treatments of vascular plant taxa (sections 2--4, Appendix A), a sample treatment (Appendix B), a checklist for authors (Appendix C), guidelines for working with illustrators (Appendix D), and a list of standard floras used to compile the names to be accounted for in each treatment (Appendix E). Contributors are encouraged to use recent volumes (e.g., vols. 5, 19, 20, and 21) of the *Flora* as a model for treatment content. Details regarding final manuscript format, which are primarily the responsibility of technical editors, are covered in the FNA Editorial Handbook. Guidelines particular to bryophyte treatments are available through <http://www.mobot.org/plantscience/bfna> and also please refer to volume 27.

Submit manuscripts to the taxon editor in electronic form and in hardcopy form if requested. If the taxon editor is unavailable for any reason, please submit manuscripts to the lead editor (volume editor). Accepted manuscripts will be sent by the taxon editor and the technical editor to the lead editor, regional reviewers, editorial director, managing editor, nomenclatural editor, and bibliographic editor. Authors will have the opportunity to review their manuscripts twice; first, following taxonomic review, when the author(s) will interact with the taxon or lead editor, possibly multiple times, to ensure the information is complete and accurate, and second, after near-final editing, giving the author(s) opportunity to check the final version.

Contact information and published volumes are available at the FNA website, <http://www.fna.org>, or the Bryophyte website, <http://www.mobot.org/plantscience/bfna>

## 2. GENERAL INSTRUCTIONS FOR TREATMENTS

Taxa to treat in full include native species, native species thought to be extirpated, named hybrids that are well established, and introduced plants that are naturalized or found frequently outside cultivation.

New names, names for new taxa, and new combinations must be published prior to their use in the flora. Journals recommended for prompt publication include *Novon*, a journal of the Missouri Botanical Garden, and the *Journal of the Botanical Research Institute of Texas*, a publication of the Botanical Research Institute of Texas, among others.

Treatments should be synoptic, not monographic; treatments should be diagnostic, descriptive, and succinct. With few exceptions, taxa below the family are presented in taxonomic sequence. If no classification is possible, the taxa may be arranged alphabetically.

Spell out name of each taxon fully and number sequentially; label infraspecific taxa alphanumerically.

Intrafamilial, infrageneric, and infraspecific groupings may be included as needed. See, for example: tribes and subtribes in Asteraceae (vols. 19--21), subgenera in *Cyperus* (vol. 23: 141--191), and sections in *Carex* (vol. 23: 254--572).

Treatments at each taxonomic level are similar generally. The order of elements for each entry is specified below. Certain elements (vernacular name, derivation of name, status indicator letter(s), basionym, synonyms, discussion, and selected references) are not always necessary. In the entries below, periods mark separate paragraphs (punctuation within paragraphs is described in later sections).

### 2.1. Entry for family

Family name, family authority, vernacular name, status indicator letter(s). Treatment author. Morphologic description (see Appendix A, Minimum Characters for All Family Descriptions). Number of genera and number of species worldwide, number of genera and species in the flora, general

distribution both in the flora and worldwide. Discussion. Selected references. Key to genera. See Appendix A.1 for the Family Template.

## **2.2. Entry for genus**

Genus name, genus authority, bibliographic citation for taxon name, vernacular name, derivation of genus name, status indicator letter(s). Treatment author if different from family author. Basionym with author and bibliographic citation, synonyms. Morphologic description, chromosome base number ( $x =$ ). Number of species worldwide, number of species in the flora, distribution worldwide. Discussion. Selected references. Key to species (or subgenera, sections, etc.).

## **2.3. Entry for species**

Genus name and specific epithet, authority, bibliographic citation for taxon name, vernacular name, status indicator letter(s). Basionym with author and bibliographic citation, synonyms. Morphologic description, chromosome diploid number ( $2n =$ ). Phenological information, habitat, elevation, distribution within the flora area, distribution outside the flora area. Discussion. Selected references.

## **2.4. Entry for species with infraspecies**

Genus name and specific epithet, authority, bibliographic citation for taxon name, vernacular name, status indicator letter(s). Basionym with author and bibliographic citation, synonyms. Morphologic description, chromosome diploid number (see below if only one infraspecific taxon in the flora). Number of infraspecies worldwide, number of infraspecies in the flora, distribution both in the flora and worldwide. Discussion. Selected references. Key to infraspecies.

## **2.5. Entry for infraspecies**

Genus name and specific epithet, authority, infraspecific epithet, authority, bibliographic citation for taxon name other than autonym, vernacular name, status indicator letter(s). Basionym with author and bibliographic citation, synonyms. Morphologic description, chromosome diploid number. Phenological information, habitat, elevation, distribution within the flora area, distribution outside the flora area. Discussion. Selected references.

Use one infraspecific rank within a genus (confer with taxon and lead editors for exceptions). Do not use ranks below variety. If only one infraspecific taxon for a species occurs in the flora, describe the infraspecies, not the species, and make that description parallel to descriptions of species in that genus.

## **2.6. Keys**

Include a dichotomous, indented key for any taxon within which two or more taxa in the flora are treated. Subspecies and varieties should not be included in the key to species, but rather as a separate key under the appropriate species entry.

Make leads of each couplet parallel and treat characteristics in the same order. Number couplets; begin each lead of a pair with the same number followed by a period; and place the lead with fewer subordinate couplets first.

Information given in keys must be consistent with information given in descriptions and must be repeated in the descriptions.

Construction of keys, descriptions, and sequence of characters must be parallel for all taxa within a rank; e.g., within genus, subgenus, or section, if leaf shape is mentioned in one species, it must be mentioned in all species. Exceptions: in some families or genera, a character state that occurs in relatively few taxa should be noted at the highest rank possible, and then described only in those taxa in which it occurs.

A taxon may be keyed out more than once; if keyed more than once, add (in part) after the taxon name.

Avoid using characteristics in keys that require greater than 20\times magnification. Use distribution information sparingly and unambiguously in both key leads, and place it last in the character sequence. Note the keyboard strokes \times substituted for multiplication symbol, which should be used in similar instances in manuscripts submitted. See 4.5 Symbols for other keyboard substitutions.

## 2.7. Vernacular names

Give vernacular name(s) for genera, species, and infraspecies that reflect common usage and the language appropriate to their regional use.

## 2.8. Status indicators

After an accepted taxon heading, indicate the following conditions by the appropriate letter(s).

(e.g., **1. Asphodelus fistulosus** Linnaeus, Sp. Pl. 1: 309. 1753

\* Onion-weed      F      I)  
    C      of conservation concern  
    E      endemic  
    F      illustrated  
    I      introduced  
    W      weedy

“Of conservation concern” applies to species that are globally rare or threatened based on NatureServe’s G1 or G2 designations or infraspecific taxa designated as T1 or T2 (<http://natureserve.org>) or other compelling sources.

“Introduced” is defined broadly to mean the plant was released accidentally or deliberately into the flora area and now persists without cultivation (i.e., is naturalized).

“Weedy” applies to taxa listed by the State and Federal Composite List of All U.S. Noxious Weeds (<http://plants.usda.gov/java/noxiousDriver>) or the Invader Database System (<http://invader.dbs.umt.edu>).

The editorial staff will assist authors in checking the databases given above.

## 2.9. Basionym and synonyms

Give basionym with author(s) and bibliographic citation. After the basionym, list in alphabetical order the synonyms with author(s) but without bibliographic citations (for identical trinomials, subspecies precede varieties).

Synonyms to be accounted for include names accepted in recent floristic or monographic works that are significant for the taxon and region and names accepted in any of the works on the List of Selected Floras and Checklists (Appendix E). The organizational center and editors will help alert authors to such names. Long unused names (i.e., names not used as accepted names in a work in Appendix E) are included only if they are basionyms.

Mention misapplied, pro parte, and sensu names in discussion; *do not list them in synonymy*. The word “sensu” should not be used; use instead: “in the sense of”, “in the broad sense”, “in the narrow sense”, etc.

## 2.10. Description paragraphs

Descriptions must confirm characteristics used in keys. Repeat characteristics used in keys in descriptions at the same level; i.e., characters used in key to genera must be treated in descriptions of

genera. Descriptions of all taxa within a rank must be directly comparable (parallel); e.g., within genus, subgenus, or section, if anther size is given for one species, it must be given for all species.

Character states common to all taxa should be placed in description for next higher rank; e.g., if corollas are red in all species of genus *X*, so state in description of genus *X* and do not repeat corolla color in each description of each taxon recognized in genus *X*. Exception: a character state common to all species of a genus may be treated at species level to avoid lengthening the descriptions of other genera.

Particular characters to include in the descriptions should be worked out between taxon editor and author.

Describe plants in the conventional order: from habit to seeds, base to apex, proximal to distal, abaxial before adaxial, and staminate before pistillate. Place each major structure in a separate sentence and separate subparts by semicolons. Use plural for plant parts except a part that occurs singly within the next more inclusive part. The general order for describing characters is given below. *Note that it is not required that all of these be included.*

**Growth Form**, persistence, habit, nutrition. **Roots** and/or other belowground parts. **Stems** general; trunks; bark; wood; branches, shoots; twigs. **Buds** general. **Leaves** general arrangement; stipules; petiole; leaf blade; lobes; higher-order axes and petiolules; leaflets; modified leaflets. **Scape** if described. **Inflorescences** general position, type; peduncle; branches (i.e., description of higher-order axes); bracts; different flower (or head or spikelet) types. **Pedicels** if described. **Flowers** general (including sexuality); receptacle and hypanthia; perianth (tepals) or calyx (sepals) and/or corolla (petals); corona; glands and/or discs; androecia (at flowering); gynoecia (at flowering). **Fruits** general type; aggregation of or division within fruit; fruit or mericarp structure; accessory structures; multiple fruit structure. **Seeds** external structures, internal anatomy; germination, abortion; endosperm; embryos.

For a particular structure or organ system, describe parts in the following order:

presence, number, position/insertion, arrangement, orientation, connation, adnation, coherence, adherence

Describe features of a whole organ in the following order:

color, odor, symmetry, architecture, venation, shape, dimensions (length, width, thickness, mass), texture, base, margins, peripheral region, central area, apex, surface, vestiture, internal parts, exudates

Unless otherwise stated, descriptions for vascular plants assume that plants are green, photosynthetic, and reproductively mature; woody plants are perennial; roots are fibrous; stems are erect; leaves of perennial plants are deciduous; leaves lack stipules, have petioles, and are simple; flowers are bisexual, radially symmetric, and pedicellate; perianth parts are hypogynous, distinct, and free; and ovaries are superior.

Keep descriptions succinct (ideally fewer than 700 characters and spaces would suffice for most taxa).

Minimize technical language in descriptions; instead, use common English equivalents in place of Latin or Latinized terminology. Specialized terms should be defined in the family or generic discussions. To avoid ambiguity, use the terms distal rather than upper; proximal rather than lower; abaxial rather than below, lower, or dorsal; and adaxial rather than above, upper, or ventral. Kiger and Porter's *Categorical Glossary for the Flora of North America Project* details botanical terminology commonly used in the flora (see <http://www.fna.org>).

### **2.11. Numbers, measurements, and conventions used in descriptions**

Use metric measures at the appropriate scale, e.g., 1--3 mm rather than 0.1--0.3 cm. To aid comparability, use same unit of measure for same structure; i.e., if leaf length is given in cm in one species, give it in cm for all species in the genus. Measurements are assumed approximate; omit ca., about, +/-, or up to.

Place characteristics found only outside the flora area in square brackets: anthers 1.2--2[--3.5] mm; shrubs [trees].

Give unusual or additional characteristics or notes parenthetically: petals pink (white).

Give extreme limits of measurements or counts parenthetically: seeds (1--)2--4 mm; stems 1(--2).

Use numeric ranges when possible, not adjectives: flowers 180--240 OR flowers ca. 200 [NOT flowers numerous]; petals 1--2 mm [NOT petals small].

A single measure is understood to be length (or height): trees to 15 m [NOT trees to 15 m tall].

Give length by width as: sepals 3--5 x 0.3--0.5 cm; leaf blades 12--24 x 5--8 mm.

Give fractions from smaller to larger: maroon spots in proximal 1/2--2/3.

Round decimal fractions to one decimal place: 0.3 mm [NOT 0.34 mm].

Omit following decimal place for whole numbers: 1.5--2 cm [NOT 1.5--2.0 cm].

Use numerals in descriptions: apex 2-fid; 2 veins (or 2-veined) [NOT apex bifid; two veins or two-veined].

State "times" in relative measures: 2 times as long as wide OR lengths 2 times widths [NOT twice as long as wide; 2X as long].

Contrast "none" with "some" and "present" with "absent": glands present versus glands absent [NOT glands present versus glands inconspicuous].

Contrast counts with counts: petals 0 versus petals 3--8 [NOT petals absent versus petals 3--8]: petals 0 or 5 [NOT petals absent or 5].

Use nouns that agree in number within a phrase: sepals distinct to bases [NOT sepals distinct to base].

### **2.12. Chromosome numbers**

Cite base numbers for the genus at end of the description if available, e.g.,  $x = 6$ . The base number will be the lowest reported haploid number for the genus unless research supports a different interpretation. There should be a single base number for a taxon; avoid  $x = 4, 5,$  or  $6$ , etc.

Give diploid chromosome numbers for species or infraspecies if available, e.g.,  $2n = 18$ . If a count is available only from an area adjacent to the flora, state the area in parentheses, e.g.,  $2n = 14$ (West Indies).

No new counts are published in the flora; base chromosome numbers on published, vouchered count(s).

Citations for chromosome counts are not required, unless they are mentioned in the discussion section.

### **2.13. Number-of-taxa statements for family, genus, and species for which infraspecies are treated**

Following the description of each family, genus, and species for which infraspecies are treated, state the number of taxa and the general distribution. Separate regions by commas.

Family: Genera 5, species 92 (2 genera, 5 species in the flora): tropical regions worldwide.

Genus: Species 5 (2 in the flora): North America, Europe, Asia.

Species with infraspecies: Subspecies 8 (3 in the flora): sw United States, n Mexico.

Monospecific taxon: Genus 1, species 1: North America. OR Species 1: s Florida.

Introduced taxon: Species ca. 4 (1 in the flora): introduced; Asia.

## **2.14. Phenology, habitat, elevation, and distribution statements for species and infraspecies**

Following the species or infraspecies description, include flowering and/or fruiting time, habitat type, elevation range, and worldwide distribution.

A general example, properly punctuated, is given below (see 2.15 for details regarding the maps and dot placement)

Flowering spring; fruiting late summer. Wet, mossy, arctic and alpine tundra, lakeshores, alluvial streams, gneissic seashores; 40--600 m; Greenland; B.C., N.W.T., Nunavut, Que., Yukon; Alaska; Eurasia.

Two additions to distribution statements are possible: (1) “of conservation concern” inserted before the elevation range; (2) “introduced” inserted after the elevation range.

Flowering spring--fall. Riverine shoals and pools; of conservation concern; 300--400 m; Ala.

Fruiting summer. Margins of lakes; 0--100 m; introduced; Fla.; Central America; South America.

### Phenology

Flowering and/or fruiting times should be given (usually available from herbarium specimens or other sources of information). Authors should confer with taxon editors about preferences for describing phenology by seasons or months. The modifiers early, mid, or late may be included. If using months abbreviate them to the first three letters (e.g., Flowering Jan--Mar; fruiting May--Jul).

### Habitat

Describe habitat types in easily understood terms; use plural forms, e.g., savannas, woodlands.

### Elevation

Estimate the elevation range within the flora from specimen label data or other reliable sources. Express the elevation range in increments of 10 if below 100 meters or in increments of 100 if above 100 m by rounding downward at the lower extreme and upward at the upper extreme. For an elevation range near sea level, stating 0 m is appropriate.

### Distribution

For each species, provide the worldwide distribution. Begin with distribution within the flora. List provinces of Canada and states of the United States where the taxon is recorded and supported by herbarium vouchers; do not cite the specimen vouchers in the text.

The distribution statement should contain only a list of regions. The discussion paragraph is the appropriate location to mention doubtful records, historical occurrences, expected distributions, and restricted ranges (e.g., to one or several counties within a state, to a particular vegetation type, etc.).

Order the major regions of the world as follows:

Greenland; St. Pierre and Miquelon; Canada; United States; Mexico; West Indies; Bermuda; Central America; South America; Eurasia (or Europe; Asia); Africa; Atlantic Islands (including Macaronesia); Indian Ocean Islands; Pacific Islands (including Hawaii and New Zealand); Australia; Antarctica.

Use of New World and Old World preceded by “in the”; i.e. in the New World.

If the distribution outside the flora area is localized to specific political units that are considered noteworthy, alphabetize the countries and place them in parentheses:

Central America (Belize, Guatemala).

If the taxon occurs widely in Mexico, simply state Mexico or indicate its regional distribution (e.g., s Mexico). If the taxon is localized to any of the 11 northern states, list them alphabetically in parentheses:

(Baja California, Baja California Sur, Chihuahua, Coahuila, Durango, Nuevo León, San Luis Potosí, Sinaloa, Sonora, Tamaulipas, Zacatecas).

List the provinces of Canada and states of the United States using abbreviations if indicated. The order of the provinces/states follows alphabetical sequence of full names, as given below.

<b>Canadian provinces and abbreviations</b>		<b>United States (except Hawaii<sup>1</sup>) and abbreviations</b>			
Alberta	Alta.	Alabama	Ala.	Montana	Mont.
British Columbia	B.C.	Alaska	Alaska	Nebraska	Nebr.
Manitoba	Man.	Arizona	Ariz.	Nevada	Nev.
New Brunswick	N.B.	Arkansas	Ark.	New Hampshire	N.H.
Newfoundland and Labrador	Nfld. and Labr. <sup>2</sup>	California	Calif.	New Jersey	N.J.
Northwest Territories	N.W.T.	Colorado	Colo.	New Mexico	N.Mex.
Nova Scotia	N.S.	Connecticut	Conn.	New York	N.Y.
Nunavut	Nunavut	Delaware	Del.	North Carolina	N.C.
Ontario	Ont.	District of Columbia	D.C.	North Dakota	N.Dak.
Prince Edward Island	P.E.I.	Florida	Fla.	Ohio	Ohio
Quebec	Que.	Georgia	Ga.	Oklahoma	Okla.
Saskatchewan	Sask.	Idaho	Idaho	Oregon	Oreg.
Yukon	Yukon	Illinois	Ill.	Pennsylvania	Pa.
		Indiana	Ind.	Rhode Island	R.I.
		Iowa	Iowa	South Carolina	S.C.
		Kansas	Kans.	South Dakota	S.Dak.
		Kentucky	Ky.	Tennessee	Tenn.
		Louisiana	La.	Texas	Tex.
		Maine	Maine	Utah	Utah
		Maryland	Md.	Vermont	Vt.
		Massachusetts	Mass.	Virginia	Va.
		Michigan	Mich.	Washington	Wash.
		Minnesota	Minn.	West Virginia	W.Va.
		Mississippi	Miss.	Wisconsin	Wis.
		Missouri	Mo.	Wyoming	Wyo.

<sup>1</sup>Hawaii is treated as a region of the Pacific Islands, e.g., Pacific Islands (Hawaii).

<sup>2</sup>If found in both Newfoundland and Labrador; if found in Newfoundland only: Nfld. and Labr. (Nfld.); if found in Labrador only: Nfld. and Labr. (Labr.).

### 2.15. Maps and dot placement

Distribution in the printed volumes will be illustrated using political boundary dot maps. A single dot will be placed in the center of each political unit for which geographic occurrence is recorded: Greenland, St. Pierre and Miquelon, Canadian provinces and territories, and individual states of the continental United States (including the Florida Keys and the Aleutian Islands and excluding Hawaii). Maps will be derived from distribution statements the authors provide for each species or infraspecies.

### 2.16. Discussion paragraphs

Discussion, in complete sentences, may follow descriptions at any rank. Support statements by citation of the pertinent literature. Use taxon name rather than “This family,” “This genus,” etc., in discussions.

Discussion of a family may include the following discretionary items, presented in the order below:

unusual morphologic features (including pollen and pollination if relevant) and morphologic problems that pertain to the description; explanation and justification of differences with previous taxonomies; relationships to closely related families; ecology and biogeography; fossil record; economic, ethnobotanic, or pharmaceutical importance; taxa excluded from the flora

Discussion of a genus, species, or infraspecies may include (but is not limited to) the following points:

protected status, uses, weedy nature, toxicity, noteworthy distribution features (e.g., nature of introduction, endemism, restricted or expected range, historical or doubtful records), biologic interactions, relationships and taxonomic problems, excluded taxa and names

If known, describe briefly the means of introduction and persistence of populations. Terms such as “waif” or “adventive” should be avoided. Please refer to Pyšek, P. et al. “Alien plants in checklists and floras: towards better communication between taxonomist and ecologists.” *Taxon* 53 (1) 2004: 131-143.

Authors who expect a species to occur in a particular state, province, or territory, although documentation is lacking, may mention the discrepancy in discussion.

Specimen vouchers that are particularly noteworthy may be mentioned in discussion.

In discussions, account for illegitimate and/or invalid names used as accepted names in recent floras or monographs for plants in the flora; do not include such names in synonymies. Provide their bibliographic citation and reasons for their exclusion. See, for example, Volume 3: p. 48, *Aristolochia durior*; p. 65 *Nelumbo lutea* and *N. pentapetala*; p. 279, *Berberis trifoliata* var. *glauca*; p. 366, *Fothergilla major*. An example of an excluded invalid name: 21: 484, *Stevia hispidula* (Grashoff) B. L. Turner.

The first time a generic name appears in a discussion paragraph, spell it out in full. Subsequently, abbreviate it to the first letter, unless it is the first word of a sentence or the paragraph refers to two genera beginning with the same letter.

Spell out place names in discussions (and keys); spell out compass directions in discussions (not keys).

### 2.17 Citation of literature

Following the discussion paragraph of the family, include a paragraph of pertinent Selected References. Selected References for a genus, species, and infraspecies entry are optional. Include works, other than “standard” floras, that are directly and significantly relevant to the occurrence of the taxon in the flora.

Use in-text citations for scholarly attribution of information given in the treatment. Provide full citations for these works in a list of Other References following the manuscript; begin each bibliographic entry on a separate line. All Other References must be cited in the text. Robert Kiger will remove duplicated citations, edit, and collate the Selected References and Other References, which form the Literature Cited of each volume and the composite bibliography.

Use the author-date format for in-text citations and provide authors’ initials. For works with three or more authors, use the “First Author et al.” format. Examples:

(D. K. Smith 1988)  
(R. E. Woodson Jr. 1953)  
(L. Lesquereux and T. P. James 1884)  
(N. W. Uhl et al. 1995)  
(E. B. Bartram 1934; G. L. Smith 1971)  
According to S. B. Hoot (1994)

## 3. SUGGESTED REFERENCES FOR STYLE, NOMENCLATURAL CITATIONS, AND LITERATURE CITATIONS

Editors will assist with manuscript format and style, which are based on recent editions of *The Chicago Manual of Style* and the references given below.

Spell out surname(s) of author(s) of taxonomic names and include initials as given by R. K. Brummitt and C. E. Powell’s (eds.) *Authors of Plant Names*, which is also available online (<http://www.ipni.org>).

Titles of periodicals usually are abbreviated according to G. D. R. Bridson and E. R. Smith’s B-P-H (*Botanico-Periodicum-Huntianum*) and to B-P-H/S (*Botanico-Periodicum-Huntianum/Supplementum*).

Book titles usually are abbreviated according to F. A. Stafleu and R. S. Cowan’s TL-2 (*Taxonomic Literature*, ed. 2) and to F. A. Stafleu and E. A. Mennega’s supplement.

If titles of publications are not in those references, or if references are not available, spell out full title.

For a Linnaean genus name dating from *Species Plantarum* (1753) provide the corresponding citation for *Genera Plantarum* ed. 5 (1754); for an on-line copy see <http://www.botanicus.org/title/b11659750>

## 4. ABBREVIATIONS AND SYMBOLS

### 4.1 Bibliographic abbreviations

ed.	edition, editor
eds.	editors
et al.	and others
fig.	figure
figs.	figures
no.	number
nos.	numbers
n. s.	new series
p.	page
pp.	pages
ser.	series
vol.	volume
vols.	volumes

### 4.2 Nomenclatural abbreviations

sect.	section(s)
sp.	species singular
spp.	species plural
subsp.	subspecies singular
subsp.	subspecies plural
subfam.	subfamily(-ies)
subg.	subgenus(-era)
var.	variety(-ies)
forma	forma

### 4.3 Measurement abbreviations

cm	centimeter(s)
dm	decimeter(s)
diam.	diameter(s)
m	meter(s)
mm	millimeter(s)
µm	micrometer(s) ———will be changed to the µm symbol during pre-press production

### 4.4 Other abbreviations

Use sparingly the abbreviation for approximately (ca.) for counts, e.g., flowering for ca. 10 days, florets ca. 50 per head.

Abbreviate compass directions in keys (e.g., sc United States), but not in discussions (e.g., south-central United States).

## 4.5 Symbols

**Do not use symbols that are not on the keyboard.** The only exception is the degree sign (°).

Do use ° (degree symbol)

Do not use < or >; instead use “less than” or “greater than”; “fewer than” or “more than.”

Do use & (ampersand) to link multiple authors of plant names; do not use & to link multiple authors of publications or multiple collectors

**The following keyboard substitutions should be used instead of symbols (the keyboard substitutions will be replaced during pre-press production)**

--	– (en dash, used in ranges)
---	— (em dash, rarely used)
+/-	± (more or less)
*	· (bullet)
♀	pistillate
♂	staminate
x	× (multiplication symbol with a space on each side)
x\ <i>\</i>	× (multiplication symbol for named hybrid; e.g., <i>Ambrosia x<helena< i="">e</helena<></i>
<i>\</i> x	× (multiplication symbol for magnification factor; e.g., 20 <i>\</i> x hand lens)
<i>\</i> um	µm (micrometer)
...	3 periods used for an ellipsis that does not end a sentence
....	4 periods used for an ellipsis that ends a sentence
.....	5 periods (for tab preceding taxon number and name in key)

## APPENDIX A. MINIMUM CHARACTERS FOR ALL FAMILY DESCRIPTIONS

Family descriptions must contain, but are not limited to, the following characters:

### GENERAL

Habit and persistence (e.g., annuals, biennials, perennials, subshrubs, shrubs, trees, vines)

### LEAVES

Arrangement (e.g., opposite, alternate, basal)  
Leaf architecture (e.g., simple, compound)  
Stipules  
Petioles

### LEAF BLADES

Architecture (e.g., pinnate, palmate, x-foliolate)

### INFLORESCENCES

Position  
Type (e.g., racemes, umbels, cymes, or solitary flowers)

## FLOWERS

Sex distribution pattern (e.g., bisexual, unisexual on different plants)  
Architecture  
Symmetry\* (e.g., radially/bilaterally symmetric)

## PERIANTHS (if sepals and petals indistinguishable)

Number or absence  
Position/insertion  
Connation/adnation  
Symmetry

## SEPALS

Number or absence  
Position/insertion  
Connation/adnation  
Symmetry (and differences between whorls, if applicable)\*

## PETALS

Number or absence  
Position/insertion  
Connation/adnation  
Symmetry (and differences between whorls, if applicable)\*

## STAMENS

Number or absence (of stamens and staminodes)  
Position/insertion  
Connation/adnation  
Symmetry (and differences between whorls, if applicable)\*  
Pollen (only for families with very unusual pollen, e.g., Asclepiadaceae, Orchidaceae)

## PISTILS

Number  
Architecture (e.g., 3-carpellate)  
Ovaries  
    Number of locules  
    Placentation  
Style number  
Stigma number

## FRUITS

Type  
Dehiscence

\*Usually give symmetry for flower as a whole. Where symmetry differs from whorl to whorl, note it for each of the differing whorls.

## APPENDIX A.1. FAMILY TEMPLATE

### FAMILY TEMPLATE

<Family> <Authority> \* <Vernacular name> Family  
<author>

<Habit>, <persistence>, (<plant sexuality distribution>) [if not bisexual and need to indicate monoecious, dioecious, etc.], <succulence>, <nutrition>. **Stems** [applies mostly to herbaceous taxa] <primary stems>, <primary hairiness>, <primary exudates>. **Leaves** <persistence>, <position> [herbaceous groups only; assume cauline otherwise.] <arrangement>, <architecture>; stipules <presence/absence>; petiole <presence/absence>; blade <texture>, margins <lobed, dentate, entire, etc.>. **Inflorescences** <position>, <type>. **Flowers** <sex distribution pattern> [bisexual/hermaphrodite implied unless required across order for parallelism], <fl. heterostyly/heteromorphy if present>, <symmetry>[radial implied], <architecture>[note1]; perianth and androecium <position>[note2]; epicalyx <presence/absence>; hypanthium <presence/absence>; tepals [if sepals-petals indistinguishable] <#>, <symmetry>[radial implied], <connation/adnation>; sepals <absence>[note3], <#>, <symmetry>[if different between whorls], <connation/adnation>; petals <absence>, <#>, <symmetry>[if different between whorls], <connation/adnation>, corolla shape; nectary <presence/absence><position>; stamens [and/or staminodes] <#>, position [for stamens = or less than petals/sepals, state as « antipetalous (antisepalous) » ; ignore if stamens numerous], <insertion>, <symmetry>[if different between whorls], <connation/adnation>; anther dehiscence; pistils <#>, <architecture>[ #-carpellate], <free or adnate to hypanthium>, <degree of connation [if partial]>, ovary <position>, #-locular, <placentation> [; ovule orientation, integument number, nucellus type]; styles <#>, <position/insertion> [e.g., basal vs apical], <connation [if carpels numerous and connation partial]>; stigmas <#>, position; ovules <#, type, etc.>. **Fruits** <type>, <dehiscence>. **Seeds** #, color, shape; embryo description.

Genera <global #>, species <global #> (<#> genera, <#> species in the flora):  
<introduced if applicable>; <distribution>.

Key to fonts used in template:

<Courier New> mandated by Guidelines

<Verdana> required for parallelism

<Times New Roman> exceptional - to be used only where an exceptional diagnostic  
feature is present

[ ]: comment or notes

[underline] amendments for Vol. 8 agreed on by R.K. Rabeler and C.C. Freeman

- 3/12/07

Notes

1. Flower architecture: in the Guidelines, this is a required character. This character is interpreted in vastly different manners by authors and editors (for a strict application, see Categorical Glossary, categorical conspectus - flower>architecture p. 134-135). The problem is that most terms describing architecture are highly technical (vs accessibility of terminology as per Guidelines) and that most refer to missing whorls or whorl connation that may be handled as easily, and sometimes more clearly to the user, at the level of each whorl; ex: flower gamopetalous = petals connate (or corolla gamopetalous, which is not to be recommended given the terminology issue). Unless a feature can only be expressed here, we suggest that they would be best handled at each whorl.

2. Position/insertion is required here and for all whorls; usually, the position/insertion of perianth and androecium is identical; therefore, it appears unnecessary to require this trait for each whorl when it can be dealt with at the flower level; we suggest to use "perianth and androecium so and

so" as was done in Caryophyllaceae. Insertion is particularly useful with the stamen whorl, e.g. in Asteridae: stamens adnate to corolla. Ovary position may be needed because ovaries may be semi- or half-inferior, as in Saxifragaceae.

3. Only absence needs be noted; if absent, all that follows is non-applicable.

Example of family description

#### 84. THEOPHRASTACEAE Link

\* Theophrasta

Anita F. Cholewa

**Shrubs or trees, annual or perennial herbs**, usually glandular-punctate or with secretory resin canals appearing as dark dots or streaks on vegetative and/or floral parts (sometimes somewhat obscure in *Samolus*). **Leaves** often persistent, pseudoverticillate at ends of branches or alternate (some *Samolus* also with basal rosettes or reduced and scalelike leaves), simple; stipules absent; petiole present (but often poorly differentiated in *Samolus*); blade margins entire or serrate. **Inflorescences** terminal or axillary racemes or corymbs. **Flowers** bisexual or unisexual [in the tropical *Clavia*, plants dioecious], homostylous, usually radially symmetric; perianth and androecium hypogynous or perigynous (*Samolus*); sepals 5, distinct or connate proximally, greenish; corolla usually campanulate or salverform [or urceolate or subrotate in some tropical species] with long or short tube, petals 5, connate proximally; stamens 5, antipetalous, epipetalous (free in some *Samolus*), distinct or closely aggregated (rarely connate); anthers dehiscent by longitudinal slits; staminodes 5 (sometimes absent in *Samolus*), epipetalous and alternating with petals; pistils 1, 5+-carpellate; ovary superior to partly inferior (*Samolus*), 1-locular; placentation free-central with +/- globose central axis; ovules anatropous, integuments 2, usually not embedded in placentae, tenuinucellate; styles 1; stigmas 1, truncate to capitate or lobed. **Fruits** baccate, drupaceous, or valvate-capsular (*Samolus*). **Seeds** 1--250, light to dark brown, +/- angular, globose or flattened; embryo dicotyledonous, some embedded in copious, starchless endosperm.

Genera 7, species ca. 100 (3 genera, 6 species in the flora): mainly neotropical (except the cosmopolitan *Samolus*).

## APPENDIX B. SAMPLE TREATMENT

The sample treatment below is not intended to illustrate all of the general instructions for preparing treatments. The treatment is single-spaced here to save space; treatments should be submitted double-spaced. The nonproportional font Courier New should be used if possible. Please refer to recently published volumes or contact an editor (volume, taxon, technical, or managing editor) if particular questions arise.

PLUMBAGINACEAE    Jussieu    \*    Leadwort Family

Nancy R. Morin

**Herbs or shrubs [lianas]**, perennial or, rarely, annual; taprooted or rhizomatous. **Stems** woody stocks, acaulescent, or erect to prostrate, nodes swollen; indument of simple hairs, capitate glands that may secrete water or calcium salts, or multicelled glandlike structures. **Leaves** often basal, alternate, spiraled; stipules absent; petiole present or absent; blade linear to broadly obovate, ovate, or round, margins entire or lobed. **Inflorescences** terminal or axillary cymes, panicles, racemes, or corymbs, or solitary heads; bracts herbaceous, scarious, sometimes absent; involucre bracteoles (epicalyces) immediately subtending calyces usually present. **Pedicels** absent or present (short). **Flowers** bisexual, radially symmetric; perianth and androecium hypogynous; sepals persistent in mature fruits, 5, connate into 5- or 10-ribbed tube, mostly dry and membranous, sometimes petaloid, toothed or with distinct simple or lobed limbs; petals 5, nearly distinct, connate at bases or for most of their length (corolla salverform); blade clawed or claw absent, margins entire; corona absent; stamens 5; filaments adnate to bases of petals or free; ovary superior, 1-locular, placentation basal; ovules 1 per ovary, anatropous, bitegmic, crassinucellate; styles 1 with apically lobed stigma, or 5, each with linear stigma. **Fruits** utricles, achenes, or capsules. **Seeds** 1, embryo straight, endosperm present or absent.

Genera 24, species ca. 775 (3 genera, 11 species in the flora): worldwide, especially maritime areas.

A report of *Ceratostigma plumbaginioides* Bunge from Missouri is based on a single specimen collected in an alley in Columbia, Boone County (D. B. Dunn 1982), and probably is not naturalized, according to George Yatskievych (pers. comm.), who considers that it probably has not persisted. J. H. Schaffner (1932) reported the same species as a waif in Lake County, Ohio. T. C. Cooperrider (1995) cited that report and indicated that he had not seen a specimen. Cultivated *Ceratostigma* seems to have the potential for becoming naturalized. *Ceratostigma* resembles *Plumbago* but has stamens adnate to the corolla tube and a nonglandular calyx.

Plumbaginaceae may be a sister group to Polygonaceae (M. D. Lledó et al. 1998). It includes some plants of horticultural value, including *Ceratostigma*, *Armeria*, *Limonium*, and *Plumbago*. Some species of *Plumbago* and *Limonium* have medicinal uses. Plumbaginaceae often occur in saline habitats; basal leaves may have glands that excrete calcareous or chalklike salts. Some species of *Armeria* occur on soils rich in lead or on mine tailings. The family's Latin and common names derive from an early belief that the plants could cure lead poisoning.

SELECTED REFERENCES Carlquist, S. and C. J. Biggs. 1996. Wood anatomy of Plumbaginaceae. Bull. Torrey Bot. Club 123: 135--147. Lledó, M. D. et al. 1998. Systematics of Plumbaginaceae based upon cladistic analysis of *rbcL* sequence data. Syst. Bot. 23: 21--29. Luteyn, J. L. 1990. The Plumbaginaceae in the flora of the southeastern United States. Sida 14: 169--178.

1. Inflorescences dense hemispheric heads terminal on leafless scape; leaf blades mostly linear to lanceolate.....1. *Armeria*, p. xxx
1. Inflorescences terminal or axillary racemes, panicles, or corymbs; leaf blades elliptic to oblong to round, rarely linear.
  2. Plants acaulescent; petals nearly distinct; stamens adnate to bases of petals.....2. *Limonium*, p. xxx
  2. Plants with stems erect, prostrate, or climbing; petals connate for most of their length, corollas salverform; stamens free from petals.....3. *Plumbago*, p. xxx

1. ARMERIA Willdenow, Enum. Pl. 1: 333. 1809 \* Thrift  
[Celtic *ar mor*, at seaside, alluding to habitat]

Claude Lefèbvre  
Xavier Vekemans

**Plants** herbs, perennial, scapose, acaulescent; taprooted, rootstocks branched, woody. **Leaves** in basal rosettes, sessile; blade linear to linear-spatulate [lanceolate], narrowed or straight to base, margins entire. **Scapes** glabrous or densely pubescent, sometimes rugose, enclosed by tubular leafless sheath at apex. **Inflorescences** solitary, apical, dense hemispheric heads of scorpioid cymes, each surrounded by involucre of scarious bracts. **Pedicels** absent or present (short). **Flowers** monomorphic or dimorphic (in pollen and stigma characteristics); calyx 10-ribbed, funnel-shaped; tube usually pubescent on ribs

only or all around, rarely glabrous, limbs membranaceous, awned or not; petals slightly connate basally, white to deep purple; filaments adnate to base of corolla; anthers included; styles 5, free, hairy proximally; stigmas linear, papillate or smooth. **Fruits** dry, enclosed in persistent calyces, dehiscing transversely.  $x = 9$ .

Species ca. 50 (1 in the flora): North America, s South America, Europe, w Asia (n Siberia), n Africa.

*Armeria* is known to be taxonomically difficult. Species concepts vary among authors. About 50 species can be recognized according to A. R. Pinto da Silva (1972).

SELECTED REFERENCES Bernis, F. 1952. Revisión del género *Armeria* Willd. con especial referencia a los grupos Ibéricos. *Anales Inst. Bot. Cavanilles* 11(2): 5--287. Lawrence, G. H. M. 1940. *Armerias*, native and cultivated. *Gentes Herb.* 4: 391--418. Lawrence, G. H. M. 1947. The genus *Armeria* in North America. *Amer. Midl. Naturalist* 37: 751--779. Lefèbvre, C. 1974. Population variation and taxonomy in *Armeria maritima* with special reference to heavy-metal tolerant populations. *New Phytol.* 73: 209--219. Lefèbvre, C. and X. Vekemans. 1995. A numerical taxonomic study of *Armeria maritima* (Plumbaginaceae) in North America and Greenland. *Canad. J. Bot.* 73: 1583--1595.

1. ***Armeria maritima*** (Miller) Willdenow, *Enum. Pl.* 1: 333. 1809

*Statice maritima* Miller, *Gard. Dict.* ed. 8, *Statice* no. 3. 1768

**Rootstock** erect. **Leaf blades** 1--15 cm x 0.5--3 mm, base 1- or +/- 3-veined, faces glabrous or hairy. **Scapes** erect, 2--60 cm, glabrous or hairy. **Inflorescences:** involucrel sheath 5--32 mm; outermost involucrel bract ovate to triangular-lanceolate, 4--14 mm, shorter than, equaling, or exceeding head, mucronate or not; heads 13--28 mm diam. **Flowers** monomorphic, with all stigmas papillate and pollen reticulate, or dimorphic, with papillate stigmas and finely reticulate pollen or smooth stigmas and coarsely reticulate pollen; calyx tube hairy on and between ribs (holotrichous), on ribs only (pleurotrichous), or glabrous (atrichous); teeth triangular to shallowly triangular, awned or not; corolla pink to white; petals showy and exceeding calyx or reduced and included in calyx.  $2n = 18$ .

Subspecies 10 (4 in the flora): North America, Eurasia.

1. Flowers dimorphic, papillate stigmas associated with finely reticulate pollen and smooth stigmas associated with coarsely reticulate pollen.....1a. *Armeria maritima* subsp. *maritima*
1. Flowers monomorphic, stigmas all papillate with coarsely reticulate pollen.
  2. Inflorescence sheath lengths usually 0.75 times diam. of flower heads; outer involucre bracts almost equaling or exceeding flower head; scapes glabrous; calyces hairy on ribs.....1b. *Armeria maritima* subsp. *californica*
  2. Inflorescence sheath lengths usually 0.5--0.75 times diam. of flower heads; outer involucre bracts 0.5--0.75 times flower head; scapes glabrous or hairy; calyces hairy throughout, on ribs only, or glabrous.
    3. Calyces hairy throughout or on ribs only; scapes glabrous or hairy; leaf blades hairy or glabrous.....1c. *Armeria maritima* subsp. *sibirica*
    3. Calyces glabrous; scapes glabrous; leaf blades glabrous.....1d. *Armeria maritima* subsp. *interior*

**1a. *Armeria maritima*** (Miller) Willdenow subsp. ***maritima***

**Leaf blades** hairy or glabrous. **Scapes** hairy. **Inflorescences:** sheath length 0.33--0.75 times diam. of flower head; outer involucre bracts much shorter than flower head. **Flowers** dimorphic: papillate stigmas associated with finely reticulate pollen; smooth stigmas associated with coarsely reticulate pollen; calyx hairy throughout or on ribs only. **2n** = 18.

Flowering late spring--early summer. Maritime rocks, cliffs; 0 m; Greenland; Oreg.; Europe.

Populations of subsp. *maritima* occur mainly in coastal salt marshes, cliffs, rocks, and pastures in northwestern Europe and have their most western extension in southern Greenland, below 62°N latitude. It is introduced and naturalized at Yaquina Head.

**1b. *Armeria maritima*** (Miller) Willdenow subsp. ***californica***  
(Boissier) A. E. Porsild, Bull. Natl. Mus. Canada 135: 174.  
1955

*Armeria andina* Poeppig ex Boissier var. *californica* Boissier in A. P. de Candolle and A. L. P. de Candolle, Prodr. 12: 682. 1848; *A. arctica* (Chamisso) Wallroth subsp. *californica*

(Boissier) Abrams; *A. maritima* var. *californica* (Boissier) G. H. M. Lawrence

**Leaf blades** glabrous or hairy. **Scapes** glabrous.

**Inflorescences:** sheath length usually 0.75 times diam. of flower head; outer involucre bracts almost equaling or exceeding flower head. **Flowers** monomorphic: stigmas papillate, pollen coarsely reticulate; calyx hairy on ribs. **2n** = 18.

Flowering mid spring--mid summer. Maritime rocks, cliffs, sandy bluffs, sandy dunes; 0--200 m; B.C.; Calif., Oreg., Wash.

In northern Washington and on Vancouver Island, populations with hairy leaves have been called *Armeria maritima* var. *purpurea* (Koch) G. H. M. Lawrence, a dimorphic-flowered taxon from central Europe. The American monomorphic-flowered specimens thought to belong to var. *purpurea* are not distinct from subsp. *californica*, except for their hairy leaves. We include hairy-leaved specimens in subsp. *californica*.

**1c. *Armeria maritima*** (Miller) Willdenow subsp. ***sibirica***  
(Turczaninow) Nyman, Consp. Fl. Eur., 616. 1881

*Armeria sibirica* Turczaninow ex Boissier in A. P. de Candolle and A. L. P. de Candolle, Prodr. 12: 678. 1848; *A. arctica* (Chamisso) Wallroth; *A. labradorica* Wallroth; *A. labradorica* var. *submutica* (S. F. Blake) H. F. Lewis; *A. maritima* subsp. *arctica* (Chamisso) Hultén; *A. maritima* subsp. *labradorica* (Wallroth) Hultén; *A. maritima* var. *labradorica* (Wallroth) G. H. M. Lawrence; *A. maritima* var. *sibirica* (Turczaninow) G. H. M. Lawrence

**Leaf blades** hairy or glabrous. **Scapes** glabrous or hairy.

**Inflorescences:** sheath length usually 0.5--0.75 times diam. of flower head; outer involucre bracts 0.5--0.75 times length of flower head. **Flowers** monomorphic: stigmas papillate, pollen coarsely reticulate; calyx hairy throughout or on ribs only. **2n** = 18.

Flowering summer. Gravelly tundras, flood plains, lakes and seashores, alpine meadows; 0--1200 m; Greenland; Man., Nfld. and Labr., N.W.T., Nunavut, Ont., Yukon; Alaska, Colo.; Eurasia.

The population of subsp. *sibirica* in Colorado is found on Hoosier Ridge. Plants with calyces hairy throughout and hairy scapes appear in eastern North America east of approximately 100°W longitude mixed with plants with hairy calyx ribs and glabrous scapes. Plants from this area have been called var. *labradorica*; there is no taxonomic reason for this recognition (C. Lefèbvre and X. Vekemans 1995).

**1d. *Armeria maritima*** (Miller) Willdenow subsp. **interior**  
(Raup) A. E. Porsild, Bull. Natl. Mus. Canada 135: 172. 1955

*Statice interior* Raup, J. Arnold Arbor. 17: 289, plate 198.  
1936; *Armeria maritima* var. *interior* (Raup) G. H. M. Lawrence

**Leaf blades** glabrous. **Scapes** glabrous. **Inflorescences:** sheath  
length usually 0.5--0.75 times diam. of flower head; outer  
involucral bracts 0.5--0.75 times length of flower head.

**Flowers** monomorphic: stigmas papillate, pollen coarsely  
reticulate; calyx glabrous. **2n** = 18.

Flowering summer. Sand dunes, gravel pavements; 200--300  
m; Sask.

Subspecies *interior* is known only from the south shore of  
Lake Athabasca.

2. LIMONIUM Miller, Gard. Dict. Abr. ed. 4, vol. 2. 1754,  
name conserved \* Sea lavender, statice, marsh rosemary  
[Greek *leimon*, meadow, referring to frequent occurrence of some  
species on salt meadows]

Alan R. Smith

**Plants** herbs, usually perennial, scapose, acaulescent;  
taprooted or rhizomatous. **Leaves** basal (sometimes also on  
inflorescence axes), sessile or petiolate; blade often  
punctate, elliptic to obovate, oblanceolate, spatulate,  
oblong, or round, usually coriaceous, base usually long-  
attenuate, margins entire or toothed to pinnatifid, apex  
rounded to apiculate or retuse. **Inflorescences** usually of  
terminal panicles or corymbs, ultimate branch tips bearing  
secund, usually 1--3(--5)-flowered spikelets. **Pedicels**  
absent or present (very short, subtended by 3 or 4  
sheathing bracts). **Flowers** homostylous; calyx tubular to  
funnelform, 5-ribbed, glabrous or pubescent, plicate,  
lobes oblong to triangular, sometimes with smaller  
intervening lobes, or lobes +/- connate and calyx mouth  
erose; petals nearly distinct, white, lavender, or yellow,  
long-clawed; filaments adnate to base of corolla; anthers  
included; styles 5, distinct to base; stigmas linear-  
clavate, papillate. **Fruits** utricles, usually exserted  
from persistent calyx, brownish green, usually capped by  
marcescent corolla and style bases. **x** = 8, 9.

Species ca. 300 (8 in the flora): worldwide, especially  
from Mediterranean region east to c Asia.

The greatest diversity in *Limonium* is found in Europe (ca.  
100 species and many subspecies; see S. Pignatti 1972) and in

Mediterranean and central Asian regions, often on saline or calcareous soils and cliffs near the coasts; other species are found in saline marshlands. The showiest species (*L. arborescens* and *L. perezii*), with a persistent blue-purple to lavender calyx, have their origin in the Canary Islands; they are often cultivated for ornament or their inflorescences are air-dried for floral arrangements under their Linnaean name "Statice." Other species have been used in rock gardens. Six species are locally naturalized in California.

*Limonium vulgare* Miller (*Statice limonium* Linnaeus), similar morphologically to *L. carolinianum*, has been reported by H. J. Scoggan (1978--1979, part 4) from central Saskatchewan and southern Ontario ("in a weedy...cemetery...York Co., where 'growing without cultivation'"). It is doubtful that the species persists or is spreading. Recent revisitation of the site in Ontario by J. E. Eckenwalder (pers. comm.) suggests that *Limonium vulgare* is no longer extant there. *Limonium leptostachyum* (Boissier) Kuntze (*S. leptostachya* Boissier) has been reported from New York by R. S. Mitchell and G. C. Tucker (1997); it is doubtful that this central Asian species is naturalized in the flora area. It differs from all other species in the flora area by having small (10--30 x 5 mm), deeply pinnatifid leaves and narrow, spikelike inflorescences.

Some species of *Limonium*, e.g., *L. sinuatum*, have dimorphic pollen and stigmas that result in self-incompatibility, although the native species in the flora area have been shown to be self-compatible (H. G. Baker 1953b). Agamospermy is also common in some extraterritorial species, and this may account, in part, for the taxonomic difficulty in some groups of *Limonium*.

SELECTED REFERENCES Baker, H. G. 1953b. Dimorphism and monomorphism in the Plumbaginaceae II. Pollen and stigmata in the genus *Limonium*. Ann. Bot. (Oxford), n. s. 17: 433--445. Luteyn, J. L. 1976. Revision of *Limonium* (Plumbaginaceae) in eastern North America. Brittonia 28: 303--317.

1. Leaf blade margins pinnately lobed; inflorescence axes with 3--5 wings, these with linear leaflike appendages 2--8 x 0.2--0.5 cm and stiff, stout hairs to ca. 1.5 mm  
.....7. *Limonium sinuatum*
1. Leaf blade margins +/- entire or obscurely undulate; inflorescence axes not winged, or if winged, then wings 2(--3), linear leaflike appendages absent, glabrous.
  2. Inflorescences with some nonflowering branches  
.....6. *Limonium otolepis*

2. Inflorescences with all (or nearly all) branches bearing flowers.
  3. Inflorescences greater than 1 m, axes strongly winged, wings leaflike, veined  
.....5. *Limonium arborescens*
  3. Inflorescences less than 1 m, axes not winged.
    4. Calyces blue-purple distally; leaf blades round to broadly ovate or subcordate, bases abruptly narrowed, nearly as broad as long; floral bracts ciliate or fimbriate on margins; coastal s California  
.....4. *Limonium perezii*
    4. Calyces whitish distally; leaf blades obovate to oblong or oblanceolate, bases gradually tapered; floral bracts glabrous at margins; widespread.
      5. Leaf blades less than 4 x 1.5 cm, each with single midrib and sometimes 2 lesser, +/- parallel veins; petals pink to lavender, exserted 2--3 mm from calyx; calyx ribs glabrous; coastal salt marshes of s California.....8. *Limonium ramosissimum*
      5. Leaf blades more than 4 x 1.5 cm, pinnately veined; petals lavender or whitish, exserted 0--2 mm from calyx; calyx ribs often pilose, sometimes glabrous; widespread.
        6. Calyx lobes spreading at maturity; spikelets always densely aggregated at tips of inflorescence branches; inland alkaline areas.....2. *Limonium limbatum*
        6. Calyx lobes ascending or erect at maturity; spikelets not aggregated, or loosely to moderately or densely aggregated along inflorescence branches; coastal salt marshes or flats.

7. Spikelets loosely to moderately densely aggregated along inflorescence branches; leaf blade apices cuspidate, cusps 1--3 mm, soon falling; Atlantic and Gulf coastal plains.....1. *Limonium carolinianum*
7. Spikelets moderately to densely aggregated along inflorescence branches; leaf blade apices rounded or, occasionally, retuse at tips, rarely cuspidate (cusps less than 0.5 mm); California and Oregon coasts, Arizona, s Nevada.....3. *Limonium californicum*

**1. *Limonium carolinianum*** (Walter) Britton, Mem. Torrey Bot. Club 5: 255. 1894 \* Canker or ink or marsh root, lavender or American or seaside thrift

*Statice caroliniana* Walter, Fl. Carol., 118. 1788; *Limonium angustatum* (A. Gray) Small; *L. carolinianum* var. *angustatum* (A. Gray) S. F. Blake; *L. carolinianum* var. *compactum* Shinnars; *L. carolinianum* var. *nashii* (Small) B. Boivin; *L. carolinianum* var. *obtusilobum* (S. F. Blake) H. E. Ahles; *L. carolinianum* var. *trichogonum* (S. F. Blake) B. Boivin; *L. nashii* Small; *L. nashii* var. *angustatum* (A. Gray) H. E. Ahles; *L. obtusilobum* S. F. Blake; *L. trichogonum* S. F. Blake

**Leaves** all in basal rosettes, living at anthesis, 5--25(--40) cm; petiole often narrowly winged distally, 0.1--20 cm, usually shorter than blade; blade usually elliptic, spatulate, or obovate to oblanceolate (rarely linear), 5--15(--30) x 0.5--5(--7.5) cm, leathery, base gradually tapered, margins usually entire, sometimes undulate, apex rounded or acute to retuse, cuspidate, cusp 1--3 mm, soon falling; main lateral veins ascending, obscurely pinnate. **Inflorescences:** axes not winged, 10--60(--95) cm x 1--5 mm, glabrous; nonflowering branchlets absent; spikelets loosely to moderately densely aggregated along branches, internodes 0.5--10 mm; subtending bracts 2--6 mm, obtuse, surfaces and margins glabrous; flowers solitary or 2--3(--5) per spikelet. **Flowers:** calyx whitish, obconic, 4--6.5(--7.5) mm; tube 2.5--5 mm, glabrous or densely pilose along ribs;

lobes erect, to ca. 2 x 1 mm; petals lavender (rarely white), slightly exceeding calyx. **Utricles** 3--5.5 mm. **2n** = 36.

Flowering Jun--Dec. Salt marshes and salt flats along Atlantic and Gulf seacoasts; 0 m; N.B., Nfld. and Labr. (Nfld.), N.S., P.E.I., Que.; Ala., Conn., Del., Fla., Ga., La., Maine, Md., Mass, Miss., N.H., N.J., N.Y., N.C., R.I., S.C., Tex., Va.; Mexico (Tamaulipas); Bermuda.

J. L. Luteyn (1976, 1990) discussed the more or less continuous variation in this polymorphic species. He noted that seedling establishment is rare, and that populations spread primarily by vegetative means from horizontal rhizomes.

**2. *Limonium limbatum*** Small, Bull. Torrey Bot. Club 25: 317. 1898

*Limonium limbatum* var. *glabrescens* Correll; *Statice limbata* (Small) K. Schumann

**Leaves** all in basal rosettes, living at anthesis, 10--25 cm; petiole narrowly winged distally, 0.1--9 cm, shorter than blade; blade oblong-spatulate, obovate, or elliptic, 4--16 x 1.5--6.5 cm, leathery, base gradually tapered, margins entire, apex rounded or retuse, often short-cuspidate, cusp less than 1 mm; main lateral veins ascending, obscurely pinnate.

**Inflorescences:** axes not winged, 30--60(--100) cm x 2--3 mm, glabrous; nonflowering branchlets absent; spikelets densely aggregated at tips of branchlets, internodes 0.5--3 mm; subtending bracts 1--5 mm, apex obtuse, surfaces and margins glabrous; flowers 1--3 per spikelet. **Flowers:** calyx whitish distally, with reddish brown ribs, obconic to slightly funnellform, 3.5--5 mm, ribs usually densely pubescent; tube ca. 3 mm; lobes spreading at maturity, 0.5--1.5 x 1--1.5 mm; petals blue to nearly white, not exceeding calyx. **Utricles** 2.5--3 mm. Flowering Jun--Aug. Wet meadows, gypsum soils, salt flats, alkaline depressions in the interior; 400--1800 m; Ariz., N.Mex., Okla., Tex.

**3. *Limonium californicum*** (Boissier) A. Heller, Cat. N. Amer. Pl., 6. 1898 \* Marsh rosemary

*Statice californica* Boissier in A. P. de Candolle and A. L. P. P. de Candolle, Prodr. 12: 643. 1848; *Limonium californicum* var. *mexicanum* (S. F. Blake) Munz; *L. commune* Gray var. *californicum* (Boissier) Greene; *L. mexicanum* S. F. Blake

**Leaves** all in basal rosettes, living at anthesis, 10--30 x 1--6 cm; petiole often very narrowly winged, 0.1--12 cm, usually

shorter than blade; blade spatulate to oblanceolate or obovate, 7--20 x 1--6 cm, leathery, base gradually tapered and long-decurrent, margins entire to undulate, apex obtuse or rounded, sometimes retuse, rarely cuspidate, if so, cusp less than 0.5 mm; main lateral veins strongly ascending, obscurely pinnate. **Inflorescences:** axes not winged, 15--60 cm x 2--5 mm, glabrous; nonflowering branches absent; spikelets moderately to densely aggregated, internodes 1--2 mm; subtending bracts 3--6 mm, apex usually acute or apiculate, surfaces and margins glabrous; flowers 1--2 per spikelet. **Flowers:** calyx whitish distally, with brownish ribs, obconic, ribs glabrous or pilose; tube 4--6 mm; lobes erect at maturity, triangular, ca. 1 mm; petals lavender to whitish, only slightly exceeding calyx. **Utricles** not seen. **2n** = 18.

Flowering Jul--Dec. Coastal strand, salt marshes, sand hills, beaches, bays, alkaline flats; 0--50(--600) m; Calif., Nev., Oreg.; Mexico (Baja California).

*Limonium mexicanum* (or *L. californicum* var. *mexicanum*) has been distinguished on the basis of having glabrous calyces. Plants with glabrous (or nearly glabrous) calyces occur throughout the species range, from Humboldt to San Diego counties, and so the character state seems of dubious taxonomic significance. The two variants seem otherwise indistinguishable.

The sole collection seen from Nevada (*Fosberg 14278*, UC) was collected at the highest elevation known for the species, on dried alkaline mud flats. J. Morefield (pers. comm.) reported that it has been established in southern Nevada since at least 1898, and so may be native there. Morefield also reported a collection from the Salt River drainage, Gila County, Arizona, but I have not seen that specimen.

**4. *Limonium perezii*** (Stapf) F. T. Hubbard, *Rhodora* 18: 158. 1916

*Statice perezii* Stapf, *Ann. Bot.* (Oxford) 22: 116. 1908

**Leaves** all in basal rosettes, living at anthesis, to 30 cm; petiole winged distally, to 18 cm, usually exceeding blade; blade round to broadly ovate or subcordate, to 15 x 9 cm, leathery, base subtruncate (abruptly narrowed) and then decurrent, margins entire, apex cuspidate, cusp to 5 mm, soon falling; main lateral veins pinnate. **Inflorescences:** axes not winged, to 100 cm x 7 mm, glabrous to puberulent (hairs ca. 0.1 mm); nonflowering branches absent; spikelets moderately to densely aggregated at tips of branches, internodes mostly 2--4 mm; subtending bracts 3--6 mm, acute or aristate (outer) to

truncate (inner), ciliate or fimbriate at margins, surfaces glabrous or minutely appressed-pubescent; flowers 1--2 per spikelet. **Flowers:** calyx blue-purple in distal 1/2, with reddish brown, glabrous ribs, funnelform; tube ca. 5 mm, minutely pubescent along proximal end of ribs (hairs less than 0.1 mm); lobes spreading, ca. 5 mm (5 main lobes with shallower lobes between larger lobes), or lobes indistinct and calyx appearing erose or irregularly lobed at mouth; petals whitish, barely exceeding calyx. **Utricles** 4--5 mm. **2n** = 14. Flowering Mar--Sep. Disturbed coastal areas, cliffs, sand dunes, roadsides (where it is sometimes planted); 0--100 m; introduced; Calif.; Atlantic Islands (Canary Islands).

**5. *Limonium arborescens*** Kuntze, Revis. Gen. Pl. 2: 395. 1891

**Leaves** all in basal rosettes, living at anthesis, sessile or with very short petiole; blade entire, oblanceolate, 15--35 x 5--10 cm, leathery, base tapered gradually to narrow or broad wing, margins entire, apex rounded, cuspidate, cusp 1--2 mm, soon falling; main lateral veins pinnate. **Inflorescences:** axes broadly 2--3-winged, to 100+ cm x 8 mm, glabrous or pubescent (hairs ca. 0.2 mm), wings to ca. 7 mm wide, leaflike, net-veined, variable in width, interrupted at branch points, leaflike appendages absent; nonflowering branches absent; spikelets moderately to densely aggregated at tips of branches, internodes mostly 3--8 mm; subtending bracts 5--7 mm, acute to truncate at tips, margins and surfaces glabrous or often densely pubescent or fimbriate; flowers 1--2 per spikelet. **Flowers:** calyx blue-purple in distal 1/2, with reddish brown, short-pubescent ribs, funnelform; tube 5--6 mm, expanded portion 5--7 mm, lobes indistinct, glabrous; petals whitish, barely exceeding calyx.

Flowering Mar--Oct. Disturbed urban areas, coastal lagoons, roadsides, dunes, vacant lots; 0 m; introduced; Calif.; Atlantic Islands (Canary Islands).

**6. *Limonium otolepis*** (Schrenk) Kuntze, Revis. Gen. Pl. 2: 396. 1891

*Statice otolepis* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 1: 362. 1843

**Leaves** in basal rosettes and on inflorescence axes, leaves in rosettes dead before anthesis; petiole 3--8 cm, +/- equaling blade; blade obovate to oblong, 3--8 x 1.5--3 cm, base tapered, margins +/- entire, apex unknown, venation not seen; leaves on inflorescence axes sessile, clasping stems, blade +/- round,

less than 3 cm. **Inflorescences:** axes not winged, sometimes angled, 40--80+ cm x 2--3 mm, glabrous; nonflowering branches present, especially in proximal part, slender; spikelets densely aggregated at branch tips, internodes 1--2 mm; subtending bracts whitish, 1--2 mm, truncate, surfaces and margins glabrous; flowers 1--2(--3) per spikelet. **Flowers:** calyx whitish distally, with reddish brown ribs, obconic, proximal 1/2 pilose between and on ribs (hairs 0.2--0.4 mm); tube +/- 1.5--2 mm; lobes 0.5--0.7 x 0.5--0.7 mm; petals blue to whitish, ca. 0.5 mm, exceeding tube. **Utricles** 1--2 mm. **2n** = 18.

Flowering Sep--Feb. Disturbed coastal and urban areas, especially salt marshes, roadsides; 0--100 m; introduced; Calif.; w, c Asia.

The name *Limonium perfoliatum* (Karelin ex Boissier) Kuntze, usually now treated as a synonym of *L. reniforme* (Girard) Linczevski, was misapplied to this species by J. T. Howell et al. (1958) and P. A. Munz (1968).

**7. *Limonium sinuatum*** (Linnaeus) Miller, Gard. Dict. ed. 8, Limonium no. 6. 1768

*Statice sinuata* Linnaeus, Sp. Pl. 1: 276. 1753

**Leaves** all in basal rosettes, living at anthesis, 6--16 x 1.5--3 cm; petiole to ca. 5 cm, shorter than blade; blade oblanceolate, 6--12 cm x 1.5--36 mm, herbaceous to chartaceous, base tapered to a sinuate wing, margins pinnately lobed to 1--3 mm from midrib (lobes mostly 4--6 per side, broadest near apex), apex cuspidate, cusp 1--3 mm, soon falling; main lateral veins pinnate. **Inflorescences:** axes narrowly 3--5-winged, 20--40 (--50) cm x 3--5 mm, hispid (hairs to 1.5 mm), wings to 3 mm wide, each with +/- leaflike, linear, hispid appendage 2--8 x 0.2--0.5 cm usually at branch points; nonflowering branches absent, spikelets moderately to densely aggregated at branch tips; internodes mostly 5--10 mm; subtending bracts 5--10 mm, narrowly acuminate or often awned at tips, surfaces and margins hispid; flowers 1--3 per spikelet. **Flowers:** calyx blue to lavender distally, funnelform, glabrous or minutely hairy on tube, lobes not distinct, expanded portion spreading, 5--7 mm, erose; petals pale yellow, exceeding calyx 2--4 mm. **Utricles** ca. 5 mm. **2n** = 16, 18.

Flowering Mar--Oct. Disturbed coastal areas, vacant lots, old fields, roadsides; 0-300 m; introduced; Calif.; Mediterranean region; w Asia.

**8. *Limonium ramosissimum*** (Poiret) Maire, Bull. Soc. Hist. Nat. Afrique N. 27: 244. 1936

*Statice ramosissima* Poiret, Voy. Barbarie 2: 142. 1789;  
*Limonium psilocladon* (Boissier) Kuntze; *Statice psiloclada*  
Boissier

**Leaves** more than 10, all in basal rosettes, living at anthesis, essentially sessile; blade obovate, 2--4 x 0.7--1.4 cm, base tapered, margins +/- entire, apex rounded; main veins 1--3 per leaf, +/- parallel, not obviously pinnate. **Inflorescences:** axes not winged or angled, 15--25 cm x 1--1.5 mm, glabrous; nonflowering branches absent; spikelets moderately to densely aggregated at branch tips, internodes 2--3 mm; subtending bracts 1.5--5 mm, rounded to broadly acute, surfaces and margins glabrous; flowers 1--2 per spikelet. **Flowers:** calyx whitish distally with reddish brown ribs, funnelform, 4--5 mm, glabrous; tube 3--4 mm, lobes spreading, 1 x 1 mm; petals lavender to pink, exceeding calyx ca. 2--3 mm. **Utricles** unknown. **2n** = 24, 27.

Flowering Jun. Coastal salt marshes; 0 m; introduced; Calif.; Mediterranean region.

*Limonium ramosissimum* is abundantly naturalized in Carpenteria Salt Marsh, Santa Barbara County (C. F. Smith 1998). Its identification is somewhat problematic, for lack of comparative material in American herbaria and the immense size and complexity of the genus in Mediterranean areas; our plants appear to match specimens identified and keyed as *Limonium ramosissimum* from southern Europe and northern Africa, but further study is needed. S. Pignatti (1972) recognized five subspecies in that polymorphic species, and E. McClintock (as reported by Smith) identified our adventive as subsp. *provinciale* (Pignatti) Pignatti; however, it seems premature to assign our taxon to any of the subspecies without detailed comparison with European material. Plants have been seen in California nurseries and gardens under the name *L. psilocladon* (Boissier) Kuntze (as "psiloclada"), generally regarded as a synonym of *L. ramosissimum*. Another very similar species is *L. hyblaëum* Brullo, native to Sicily, which is thought to be naturalized around harbors and coastal marshes in southern Australia (D. B. Foreman et al. 1993--1999, vol. 3; J. Edmondson, pers. comm.). At its present naturalized location, *L. ramosissimum* may be a threat to the endangered *Cordylanthus maritimus* Nuttall, with which it grows (W. R. Ferren Jr., pers. comm.).

Another introduced and naturalized *Limonium*, as yet unidentified to species and probably from Mediterranean regions, has recently been collected in salt marshes in San Diego County, (Lawhead 32, SD, UC). It is similar in stature and

inflorescence characters to *L. ramosissimum* but differs in having longer, thinner-textured leaves to 8 x 1 cm, with more gradually attenuate bases and apiculate blades, each having a single medial vein. It appears that non-native species of *Limonium* are being grown by the cut-flower industry in the area, escaping, and establishing, perhaps to the detriment of native species.

3. PLUMBAGO Linnaeus, Sp. Pl. 1: 151. 1753; Gen. Pl. ed. 5, 75. 1754 \* Leadwort [Latin *plumbago*, a leadlike ore, alluding to historical use as a cure for lead poisoning]

Alan R. Smith

**Plants** perennial shrubs or suffrutescent herbs; roots not known. **Stems** erect, prostrate, or climbing, ribbed. **Leaves** cauline, sessile or short-petiolate (petiole usually less than 1.5 cm); blade elliptic to oblanceolate or spatulate, base narrowed, margins entire, apex acute, acuminate, or obtuse, membranaceous. **Inflorescences** terminal or axillary spikelike racemes or panicles. **Pedicels** 2-bracteolate, short. **Flowers** sometimes heterostylous, short-pedicellate; bracts absent; calyx persistent, 5-ribbed, tubular, with stalked, capitate-glandular protuberances along ribs; lobes triangular, 1--2 mm; corolla salverform, evenly to somewhat unevenly 5-lobed, lobes spreading, obovate, round, or truncate, mucronate; stamens included or exserted, free from corolla; style 1 included or exserted; stigmas 5, linear. **Fruits** capsules, included, brownish, long-beaked; valves coherent at apex.  $x = 7$ .

Species 12 (2 in the flora); tropical and subtropical regions, North America, Central America, South America, Europe, Asia, Africa.

Several species of *Plumbago* are cultivated, including *P. auriculata*. The entire plant of that species, especially the root, contains plumbagin, a toxic naphthoquinone derivative (oil of plumbago), which may cause severe skin irritation or blistering in humans and may also be toxic to other animals (T. C. Fuller and E. McClintock 1986).

The remarkable glands on the calyces of *Plumbago* are often called "glandular hairs," but they are not true hairs, being much more massive and multicellular structures with enlarged, capitate apices.

1. Corollas pale blue, tube 2 or more times length of calyx; calyces with stipitate, glandlike protuberances and hairs;

inflorescences compact, 2.5--3(--5) cm; plants cultivated and locally naturalized in Florida.....1. *Plumbago auriculata*

1. Corollas white, tube mostly less than 2 times length of calyx; calyces with stipitate, glandlike protuberances, true hairs absent; inflorescences elongate, 3--15(--30) cm; plants native.....2. *Plumbago zeylanica*

1. **Plumbago auriculata** Lamarck in J. Lamarck et al., Encycl. 2: 270. 1786 \* Cape leadwort

*Plumbago capensis* Thunberg

**Plants** evergreen shrubs. **Stems** erect, trailing, or climbing, diffusely branched, to 3+ m, glabrous or pubescent on youngest shoots. **Leaves** usually sessile, sometimes short-petiolate; blade elliptic, oblanceolate, or spatulate, (1--2.5--9 x 0.5--2.5) cm, base usually long-attenuate, sometimes auriculate, apex acute or obtuse, mucronate. **Inflorescences** 2.5--3(--5) cm, rachises short-pilose (hairs ca. 0.1 mm), eglandular; floral bracts lanceolate, 3--9 x 1--2 mm. **Flowers** 3-stylous; calyx 10--13 mm, tube usually short-pilose and with stalked, capitate, glandlike protuberances ca. 1 mm along distal 1/2--3/4 of ribs; corolla pale blue, 37--53 mm, tube 28--40 mm (more than 2 times length of calyx), lobes 10--16 x 6--15 mm; stamens included or exserted. **Capsules** 8 mm. **Seeds** brown, 7 mm. **2n** = 14 + 0--1B.

Flowering year-round. Hummocks, thickets, disturbed sites in dry soil; 0--50 m; introduced; Fla.; s Africa.

*Plumbago auriculata* is frequently cultivated in Mediterranean-type warmer climates, especially in California, Arizona, and Texas.

2. **Plumbago zeylanica** Linnaeus, Sp. Pl. 1: 151. 1753  
\* Doctorbush

*Plumbago scandens* Linnaeus

**Plants** herbaceous. **Stems** prostrate, climbing, or erect, glabrous. **Leaves** petiolate (to 1.5 cm) or sessile; blade ovate, lance-elliptic, or spatulate to oblanceolate, (3--5--9(--15) x (1--2.5--4(--7) cm, base attenuate, apex acute, acuminate, or obtuse. **Inflorescences** 3--15(--30) cm, rachises glandular, viscid; floral bracts lanceolate, 3--7 x 1--2 mm. **Flowers** heterostylous; calyx 7--11(--13) mm, tube glabrous but with stalked glands along length of ribs; corolla white, 17--33 mm, tube 12.5--28 mm (less than 2 times length of calyx), lobes 5--

12 x 3--3.5 mm; stamens included. **Capsules** 7.5--8 mm. **Seeds** reddish brown to dark brown, 5--6 mm.

Flowering year-round. Palm groves, thickets, shady hummocks, shell mounds, rocky places in open areas; 0--50 m; Ariz., Fla., Tex.; Mexico; Central America; South America; Asia; Africa; Pacific Islands.

*Plumbago zeylanica* and *P. scandens*, both Linnaean species, have heretofore been treated as distinct, the former name applied exclusively to Old World plants, the latter to New World specimens. John Edmondson (pers. comm.) indicates that he believes this "could be a classic case of New World and Old World taxonomists each doing their own thing." Plants in herbaria under these two names appear indistinguishable.

**APPENDIX C. CHECKLIST FOR AUTHORS OF VASCULAR TAXA  
FOR THE *FLORA OF NORTH AMERICA***

Please submit a copy of this form with your manuscript(s) and provide details as they should appear in the front matter.

Print your: (1) name \_\_\_\_\_  
(2) affiliation & address \_\_\_\_\_

Taxonomic headings (family, genus, species, infraspecies, as appropriate)

- Authority and place of publication is provided; all included taxa are published (no “comb. nov.”)
- Vernacular name is provided
- Name derivation is provided
- Basionym with author(s) and bibliographic citation is provided
- Synonyms with author(s) but no bibliographic citations are provided; formae, except for basionyms, are excluded

Special status indicated by letter(s) at the end of taxon heading

- Taxa of conservation concern are marked with a “C”
- Taxa that are endemic are marked with an “E”
- Taxa selected by author to be illustrated are marked with an “F”
- Taxa that are introduced are marked with an “I”
- Taxa that are weedy are marked with a “W”

Keys

- All treated taxa are included in the key
- Keys are indented with couplets numbered
- Leads of each couplet are parallel; lead with fewer subordinate couplets placed first
- Key couplets and descriptions agree (descriptions confirm key leads)
- Infraspecies are keyed after species description, not within the key to species

Descriptions

- All included taxa are described
- Generic descriptions are parallel within families; specific descriptions are parallel within genera
- Units of measure are used consistently and are appropriate to precision of measurement
- Extreme limits of measurements and/or uncommon character states are given in parentheses ( )
- Important extraterritorial character states are given in square brackets [ ]
- Only published chromosome numbers are given

Phenology, habitat, and elevation statements

- Phenology, habitat, and elevation statements are provided for all taxa

Distribution statements

- Statements cover the worldwide distribution; specific regions are listed except at family level
- Number of taxa worldwide and in the flora are given for family, genus, and species with infraspecies
- Statements for species and/or infraspecies list Canadian province and U.S. state abbreviations

Discussion paragraph(s)

- Complete sentences are used

References

- In-text citations are given either under Selected References or Other References
- Complete citation information is provided for Selected References and Other References

## **APPENDIX D. GUIDELINES FOR WORKING WITH ILLUSTRATORS**

Illustrations will be drawn from herbarium specimens approved by the author and selected by the author and/or taxon editor or managing editor. Additional materials such as living specimens, pickled material, or photographs are extremely useful, chiefly when details are not readily apparent in dried specimens. (Instructions for illustrations for the bryophyte volumes are provided at the bryophyte website, <http://www.mobot.org/plantscience/bfna>).

Before the illustrator can begin illustrating your taxa, the following items must be provided:

### **1. A list of species to be illustrated**

Illustrations follow the treatment. One species for each genus and about every sixth species is illustrated. If there are 4 more species than would be divisible by 6, an additional figure is added. So 1-9 species gets 1 figure, 10-15 gets 2, 16-21 gets 3, 22-27 gets 4, etc.

### **2. Clear instructions for the illustrator**

Provide descriptions from your treatment or a copy of the treatment itself and instructions to the managing editor. The instructions may be sent in an e-mail or a letter accompanying the list of species to be illustrated, on notes (i.e. Post-It) accompanying the specimens, or given in a telephone conversation with the managing editor. The managing editor or the taxon editor will tell you who the assigned illustrator for your plants is. At minimum, indicate which features of which taxa are to be illustrated. Typically an illustration of a species is 1/3 of one of the panels that extends across the top of a page in the printed volume and consists of a habit with a flower and fruit detail. However, you may want to choose one habit and several flowers, fruits, leaves, or other structures to provide comparative diagnostic features in the illustrations. Flexible layout is possible. Please confirm the number and type of illustrations you require with the taxon or lead editor.

### **3. Selected specimens and other materials to be used as the basis for illustrations**

To ensure accuracy, you should select your own reference specimens for the illustrator to use or visit the Missouri Botanical Garden to select appropriate specimens. If necessary, the managing editor can select specimens from the collection at MO for illustrator use. Photographic slides or prints are extremely helpful and appreciated (these are filed with your instructions for safekeeping and will be returned to you). If slides are not available, please provide references to publications of photos or web addresses that show the features to be illustrated. Please send all specimens and materials for illustration to the managing editor at the address below, unless otherwise directed by your lead editor. Please also copy the managing editor on all correspondence relating to the illustrations.

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Scans of the illustrations for review will be sent simultaneously to the manuscript author, taxon editor, lead editor (volume editor), and managing editor at each step of the process: (1) initial pencil, (2) corrected pencil, and (3) final ink. Prompt approval of the illustrations is the responsibility of the author; however, the editors become involved in the illustration review process as needed to facilitate timely completion of all illustrations.

Please review the artwork carefully and expeditiously. ALL changes should be made in the pencil stages. It is very important that you notify the illustrator as quickly as possible if you approve the illustrations or if there are corrections that need to be made.

**Example 1. Author's instructions to the illustrator—providing features to be illustrated, reference to specimens and photos, and description from treatment:**

I have kept a photo of all the specimens I selected at MO for the illustrator. If there is any problem, contact me to ask specific questions. See also:

<http://pisum.bionet.nsc.ru/kosterin/plants/plant3/alpinus.htm>.

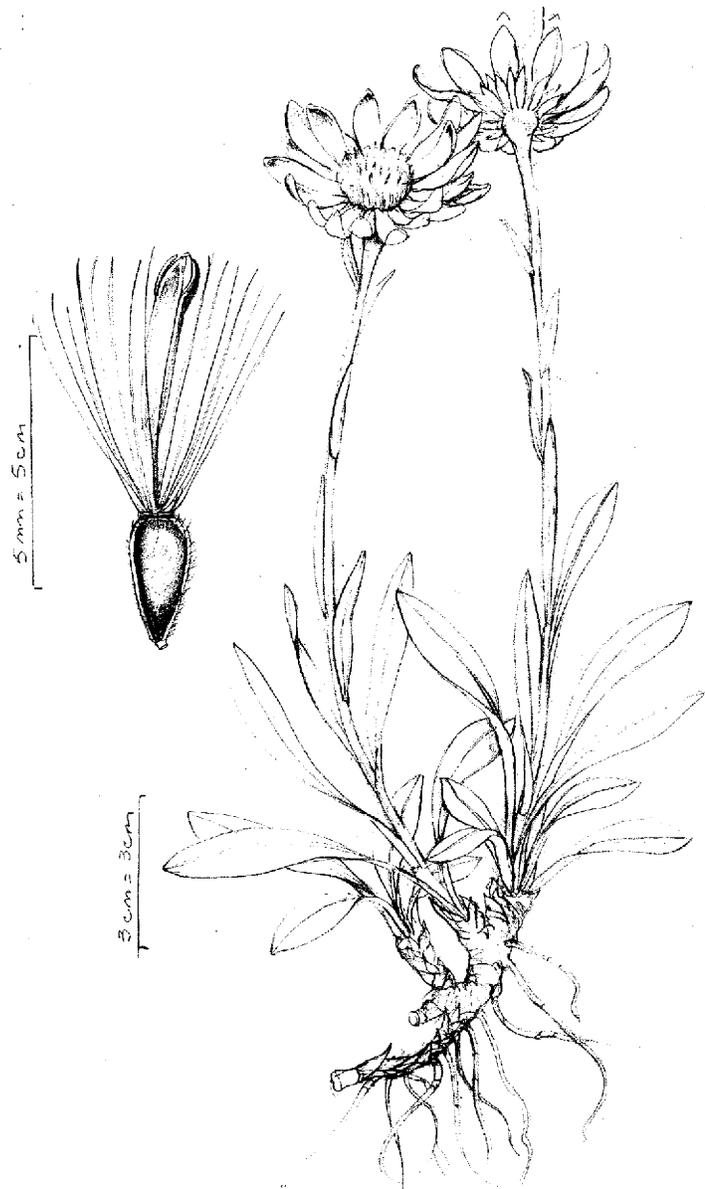
Illustrate *Aster alpinus* subsp. *vierhapperi* using the elements below from the combined generic and species description and include:

- 1) habit of plant, showing underground rootstock, leaves, and capitulescence
- 2) head oriented so as to show clearly the phyllaries (i.e., slightly from the back) and rays
- 3) a cypsela or a disc floret

**Herbs** perennial, caespitose, with 1--5(--8+) rosettes, scapiform.

**Rhizomes** elongate, 2--7+ mm diam., woody, and thick, woody, branched caudices, +/- covered with marcescent leaf bases. **Stems** erect to ascending, 1 per rosette, often reddish or brownish, relatively stout (0.7--2.5 mm diam. [to 3 mm diam. in fruit], flaring to 2.5--4(--5) mm [to 6 mm in fruit] under heads), 0.2--3.2 dm [to 4 dm in fruit], simple, +/- densely white villous, becoming nearly woolly distally under heads, short-glandular or not proximally to +/- densely short- or long-glandular distally under heads. **Leaves** basal and cauline, margins entire, densely villous-ciliate, faces +/- densely villous, +/- densely short-glandular or (distal mainly) not; basal persistent or marcescent, petiolate to subpetiolate or sometimes sessile; petiole 7--38 mm; blade oblanceolate or obovate to spatulate, 3-nerved, 10--112 x 2.5--14 mm, base tapering or attenuate, margins entire, apex +/- acute to rounded; cauline leaves sessile (occasionally petiolate), lanceolate or lance-oblong to linear-lanceolate or linear, 7--43(--50) x 1--6(--8) mm, progressively reduced distally.

**Heads** radiate, borne singly, 1.5--2.1 cm (flattened, excluding rays).



\*\*\*\*\*

Note that the illustration conforms nicely to the instructions.

**Example 2. Author's instructions to the illustrator—providing features to be illustrated within the list of species treated:**

8. MIRABILIS

....

Section OXYBAPHOIDES

8.8. *M. oxybaphoides*

8.9. *M. laevis*

**8.9. a. *M. laevis* var. *crassifolia* – illustrate habit, flower, fruit**

8.9. b. *M. laevis* var. *villosa*

8.9. c. *M. laevis* var. *retrorsa*

....

Section OXYBAPHUS

**8.12. *M. albida* – illustrate fruit from eastern and western populations**

**8.13. *M. melanotricha* – illustrate habit, flower, fruit**

8.14. *M. linearis*

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**Example 3. Author's review of pencil drawing:**

Note that author checked details and made a clear comment regarding number of stamens to illustrate.



MIRABILIS LAEVIS VAR. CRASSIFOLIA 9A.1

SEPTEMBER 12 200

T.R. & R. VAN HEVENBERG 94371

## APPENDIX E. LIST OF SELECTED FLORAS AND CHECKLISTS

- A** – Hultén, E. *Flora of Alaska and Neighboring Territories: A Manual of the Vascular Plants* [Fl. Alaska – QK195/H85]. xxii + 1008 pp. Stanford Univ. Press. 1968.
- B** – Welsh, S. L. *Anderson's Flora of Alaska and Adjacent Parts of Canada* [Fl. Alaska – QK195/A53]. xvi + 724 pp. Brigham Young Univ. Press. 1974.
- C** – Scoggan, H. J. *The Flora of Canada* [Fl. Canada – QK201/S3]. Pteridophyta, Gymnospermae, Monocotyledoneae. Fl. Canada 2: 93–545. 1978 [1979]; Dicotyledoneae (Saururaceae to Violaceae). Fl. Canada 3: 547–1115. 1978; Dicotyledoneae (Loasaceae to Compositae) Fl. Canada 4: 1117–1711. 1979.
- D** – Cody, W. J. *Flora of the Yukon Territory* [Fl. Yukon – QK202/C62]. xvii + 643 pp. NRC Research Press. 1996.
- E** – Porsild, A. E. and W. Cody. *Vascular Plants of the Continental Northwest Territories, Canada* [Vasc. Pl. Continental Northw. Terr. Canada – QK202.2/P64]. viii + 667 pp. National Museums of Canada. 1980.
- F** – E. H. Moss and J. G. Packer. 1983. *Flora of Alberta: A Manual of Flowering Plants, Conifers, Ferns, Fern Allies found growing without cultivation in the Province of Alberta, Canada, ed. 2.* [Fl. Alberta (ed. 2) – QK203.6/M6]. 687 pp. Univ. Toronto Press. 1983.
- G** – Böcher, T. W., B. Fredskild, K. Holmen, and K. Jakobsen. *Grønlands Flora* [Grønlands Fl. – QK474/B63]. 326 pp. P. Haase & Sønns Forlag. 1978.
- H** – Abrams, L. *Illustrated Flora of the Pacific States* [Ill. Fl. Pacific States – QK177/A3]. Ferns to Birthworts. Ill. Fl. Pacific States 1: i–ix, 1–557. 1923; Buckwheats to Kramerias. Ill. Fl. Pacific States 2: i–viii, 1–635. 1944; Geraniums to Figworts. Ill. Fl. Pacific States 3: i–viii, 1–866. 1951; Abrams, L. and R. S. Ferris. Bignonias to Sunflowers. Ill. Fl. Pacific States 4: i–vii, 1–732. 1960. Stanford Univ. Press.
- I** – Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson. *Vascular Plants of the Pacific Northwest* [Vasc. Pl. Pacific NW – QK177/H57]. Vascular Cryptogams, Gymnosperms, and Monocotyledons. Vasc. Pl. Pacific NW 1: 1–914. 1969; Salicaceae to Saxifragaceae. Vasc. Pl. Pacific NW 2: 1–597. 1984; Saxifragaceae to Ericaceae. Vasc. Pl. Pacific NW 3: 1–614. 1984; Ericaceae through Campanulaceae. Vasc. Pl. Pacific NW 4: 1–510. 1984; Compositae. Vasc. Pl. Pacific NW 5: 1–343. 1984. Univ. Washington Press.
- J** – Munz, P. A. *A California Flora* [Cal. Fl. – QK194/M79]. 1681 pp. Univ. California Press. 1959.
- K** – Munz, P. A. *A California Flora, Supplement* [Cal. Fl. Suppl. – QK194/M79]. 224 pp. Univ. California Press. 1968.
- L** – Munz, P. A. *A Flora of Southern California* [Fl. S. Calif. – QK194/M795]. 1086 pp. Univ. California Press. 1974.
- M** – Hickman, J. C. *The Jepson Manual: Higher Plants of California* [Jepson Man.: Higher Pl. Calif. – QK194/J46]. xvii + 1400 pp. Univ. California Press. 1993.
- N** – Shreve, F. and I. L. Wiggins. *Vegetation and Flora of the Sonoran Desert* [Veg. Fl. Sonoran Des. – QK1/C295]. 1: i–x, 1–840, & 2: i–v, 841–1740. Stanford Univ. Press. 1964.
- O** – Cronquist, A., N. H. Holmgren, and P. K. Holmgren. *Vascular Plants of the Intermountain West, U.S.A.* [Intermountain Fl. – QK176/I58]. Geological and Botanical History of the Region, Its Plant Geography and a Glossary. The Vascular Cryptogams and the Gymnosperms. Intermountain Fl. 1: i–iii, 1–270; Subclass Rosidae (except Fabales). Intermountain Fl. 3A: 1–446. 1997; Fabales. Intermountain Fl. 3B: 1–279. 1989;

Subclass Asteridae (except Asteraceae). *Intermountain Fl.* 4: 1–573. 1984; Asterales. *Intermountain Fl.* 5: 1–496. 1994. The New York Botanical Garden.

**P** – Voss, E. G. *Michigan Flora* [Michigan Fl. – QK164/V6]. Gymnosperms and Monocots. *Michigan Fl.* 1: i–xv, 1–488. 1972; Dicots (Saururaceae–Cornaceae). *Michigan Fl.* 2: i–xix, 1–724. 1985; Dicots (Pyrolaceae–Compositae). *Michigan Fl.* 3: i–xix, 1–622. 1996. Cranbrook Institute of Science.

**Q** – Great Plains Flora Association. *Flora of the Great Plains* [Fl. Great Plains – QK166/G7]. vii + 1392 pp. University Press of Kansas. 1986.

**R** – Correll, D. S. and M. C. Johnston. *Manual of the Vascular Plants of Texas* [Man. Vasc. Pl. Texas – QK156/C6]. xv + 1881 pp. The University of Texas at Dallas. 1970.

**S** – Fernald, M. L. *Gray's Manual of Botany* (ed. 8) [Manual (ed. 8) – QK117/G75]. lxiv + 1632 pp. American Book Company. 1950.

**T** – Gleason, H. A. and A. Cronquist. *Manual of the Vascular Plants of Northeastern United States and Adjacent Canada* (ed. 2) [Man. Vasc. Pl. N.E. U. S. (ed. 2) – QK117/G49]. Man. Vasc. Pl. N.E. U. S. (ed. 2). lxxv + 910 pp. The New York Botanical Garden. 1991.

**U** – *Vascular Flora of the Southeastern United States* [Vasc. Fl. S.E. U. S. – QK136/V37]: Cronquist, A. Asteraceae. *Vasc. Fl. S.E. U. S.* 1: i–xv, 1–261. 1980; Isely, D. Leguminosae (Fabaceae). *Vasc. Fl. S.E. U. S.* 3(2): i–xix, 1–258. The University of North Carolina Press. 1990.

**V** – Godfrey, R. K. and J. W. Wooten. *Aquatic and Wetland Plants of Southeastern United States* [Aquat. Wetland Pl. SE. U. S. – QK136/G64]. *Aquat. Wetland Pl. SE. U. S., Monocotyledons.* 712 pp. 1979; *Aquat. Wetland Pl. SE. U. S., Dicotyledons.* 933 pp. 1981. The University of Georgia Press.

**W** – Small, J. K. *Manual of the Southeastern Flora* [Man. S.E. Fl. – QK135/S63]. xxii + 1554 pp. [Published by the author]. 1933.

**X** – Radford, A. E., H. E. Ahles, and C. R. Bell. *Manual of the Vascular Flora of the Carolinas* [Man. Vasc. Fl. Carolinas – QK140/R23]. lxi + 1183 pp. Univ. North Carolina Press. 1968.

**Y** – Long, R. W. and O. Lakela. *A Flora of Tropical Florida: A Manual of the Seed Plants and Ferns of Southern Peninsular Florida* [Fl. Trop. Florida – QK143/L65]. xii + 962 pp. Banyan Books, Miami. 1971.

**Z** – Wunderlin, R. P. *Guide to the Vascular Plants of Florida* [Guide Vasc. Pl. Florida – QK143/W86]. x + 806 pp. University Press of Florida. 1998.