

THE MUSTARDS AND RELATED PLANT FAMILIES IN EASTERN TENNESSEE

(Continued from the July Number)

MILDRED HEBEL

DEPARTMENT OF BOTANY, UNIVERSITY OF TENNESSEE, KNOXVILLE

PART II. TAXONOMY

PAPAVERALES

Herbs, shrubs, or trees, mostly erect, sometimes climbing; pungent, or with colored milky or acrid juice. Leaves simple and entire to variously toothed, lobed or divided. Flowers perfect; regular or irregular; calyx and corolla segments rarely united. Stamens few and definite to numerous and indefinite; hypogynous. Gynoecium of two or more carpels united; ovary superior. Fruit capsular or baccate.

Key to the Families

1. Stamens numerous, more than twice as many as the sepals or lobes of the calyx PAPAVERACEAE
1. Stamens not more than twice as many as the sepals or calyx lobes.....2
2. Corolla irregular FUMARIACEAE
2. Corolla regular or nearly so.....3
3. Stamens tetradynamous CRUCIFERAE
3. Stamens 6 or more, approximately equal..... CAPPARIDACEAE

PAPAVERACEAE B. Juss. Hort. Trian. 1759.

(POPPY FAMILY)

Caulescent or acaulescent herbs with milky or colored juice, narcotic or acrid. Leaves mostly alternate, without stipules. Peduncles mostly 1-flowered. Flowers perfect, regular; sepals 2-3; petals 4 or more, early deciduous (rarely wanting); stamens numerous, indefinite (usually more than 16). Fruit a dry usually 1-celled pod or capsule, opening by pores or valves, with parietal placentae; sometimes imperfectly several-celled. Seeds numerous, with endosperm.

Key to the Genera

1. Acaulescent herbs; petals 8-12.....1. *Sanguinaria*
1. Caulescent herbs; petals 4-6.....2
2. Pod dehiscent to the base.....3
2. Pod dehiscent only at the top or not below the middle.....4
3. Capsule bristly pubescent.....2. *Stylophorum*
3. Capsule glabrous3. *Chelidonium*
4. Leaf blades spiny-toothed.....4. *Argemone*
4. Leaf blades not spiny-toothed.....5. *Papaver*

1. **SANGUINARIA** (Dill.) L. Sp. Pl. 505. 1753.

Perennial, acaulescent, the thick rootstocks with red juice. Leaves palmately lobed; cordate or reniform. Scape erect, 1-flowered or rarely 2-flowered. Flowers beautifully white, erect; sepals 2, early deciduous; petals 8-12, stamens numerous. Capsule elongated, completely dehiscent to the base. Seeds numerous, crested. Name from the color of the juice. A monotypic genus of eastern North America.

1. **Sanguinaria canadensis** L. Sp. Pl. 505. 1753. (Bloodroot.) Glaucous especially when young; glabrous. Petals delicately attached, fugacious. Capsule narrow, fusiform, 1-celled, 2-valved. Frequent in open woods. Early spring.

2. **STYLOPHORUM** Nutt. Gen. 2:7. 1818.

Caulescent perennials with yellow juice. Stems naked below, leafy above. Leaves pinnately parted or divided. Flowers perfect, regular; sepals 2, hairy; petals 4, deciduous; stamens numerous; style prominent, columnar; stigmas black. Capsule elongated, bristly, 2-4-valved to the base. Seeds many, crested. From *στυλος* and *φέρειν*, to bear a style because of this conspicuous character.



Fig. 4. Celandine Poppy (*Stylophorum diphyllum* (Michx.) Nutt.).

1. **Stylophorum diphyllum** (Michx.) Nutt. (Celandine Poppy.)
(*Chelidonium diphyllum* Michx. Fl. Bor. Am. 1:309. 1803.) (*Stylophorum*

diphyllum Nutt. Gen. 2:7. 1818.) (*Meconopsis diphylla* DC. Syst. Veg. 2:88.) Somewhat glaucous, slightly pubescent, often simple. Leaves 2-pinnatifid, the lower sometimes pinnate. Flowers clear deep yellow, to 5 cm. broad, 2-4 in inflorescence; stigmas 3 or 4. (Fig. 4.) Rich wet woods, in thick patches. Occasional throughout range. Spring.

3. CHELIDONIUM (Tourn.) L. Sp. Pl. 505. 1753.

Erect, brittle, branching herbs with yellow juice. Leaves pinnate or 2-pinnatifid. Flowers small, yellow, in a pedunculate umbel, buds nodding. Sepals 2, petals 4, stamens 16 or more, style short, distinct. Stigma 2-lobed. Pod linear, dehiscent upward from the base. Seeds smooth, shining, crested. From χελιδών, a swallow, because the flowers appear at the time the birds arrive in spring. A monotypic genus of Europe and Asia.

1. *Chelidonium Majus* L. Sp. Pl. 505. 1753. (Celandine.) Bright green, sparingly pubescent, weak; foliage glaucous beneath. Pedicels elongating in fruit. Capsules glabrous. Wet waste places. Occasional, spring to fall. Adventive from Europe.

4. ARGEMONE L. Sp. Pl. 508. 1753.

Glaucous, erect, branching herbs with yellow sap. Leaves sinuate-lobed, spiny-toothed, sessile. Flowers yellow, white or pink. Sepals 2-3; petals 4-6; stamens numerous; style short or none, stigmas 3-6. Pod prickly, opening at the top by 3-6 valves. All species natives of America. From ἄργεμα, an eye disease, treated with the juice of some plant, probably because of the noticeably colored sap of this genus.

Key to the Species

1. Petals yellow or rarely cream-colored; flowers sessile or nearly so 1. *A. mexicana*
 1. Petals white to pinkish; flowers distinctly peduncled 2. *A. alba*

1. *Argemone mexicana* L. Sp. Pl. 508. 1753. (Mexican Prickly Poppy.) Erect, simple or sparingly branched. Spiny or nearly unarmed. Leaves runcinate-pinnatifid, white-blotched. Flowers 3-6 cm. broad. Reported only in waste places in Nashville, Davidson County. Summer to fall. (Var. *ochroleuca* Lindl., cream-colored variety.)

2. *Argemone alba* Lestib. Bot. Belg. Ed. 2, 2: Part 2. 132. 1799. (White Prickly Poppy.) (*Argemone albiflora* Hornem. Hort. Harn. 469. 1815.) Stoutier than preceding. Leaves not blotched, though sometimes white-veined. Flowers 7-10 cm. broad. Reported with first species only from Nashville, Davidson County.

5. PAPAVER (Tourn.) L. Sp. Pl. 506. 1753.

Erect hispid or glaucous herbs with milky, sometimes narcotic, juice. Leaves alternate, lobed or dissected. Flowers showy, regular, nodding in bud. Sepals 2-3; petals 4-6; stamens indefinite, numerous. Capsule globose or subglobose, capped with the flat 4-20-rayed stigma. Seeds numerous on the 4-20 placentae projecting inward like imperfect

partitions; seeds marked with minute depressions. Capsule opening by pores or chinks under the edge of the stigma between the placentae. From *Papaver*, classic Latin name of the poppy.

Key to the Species

- 1. Smooth, glaucous; leaves clasping, lobed.....1. *P. somniferum*
- 1. Bristly-pubescent except the capsules; leaves pinnatifid.....2. *P. dubium*

1. **Papaver somniferum** L. Sp. Pl. 508. 1753. (Opium Poppy.) Corolla whitish, purple toward the center. Flowers 7-10 cm. broad; capsule globose. Sometimes escapes cultivation and persists for a time without spreading. Rare. Summer. Adventive from Europe. Source of opium.

2. **Papaver dubium** L. Sp. Pl. 1196. 1753. (Longpod Poppy.) Hirsute with spreading hairs. Leaves pinnatifid, petioled. Flowers about 5 cm. broad, scarlet. Stigmatic rays 6-10. Rare. Along cultivated grounds and in waste places. Summer. Adventive from Europe.

FUMARIACEAE DC. Syst. 2:104. 1821.

(FUMITORY FAMILY)

Erect, ascending, decumbent or climbing herbs, sometimes with corms; smooth, tender, with watery, bitter but non-poisonous sap. Leaves dissected, without stipules; alternate or mainly basal. Flowers perfect, irregular; in racemes, panicles or cymes. Sepals 2, scale-like. Petals 4, somewhat united, the outer pair with spreading tips and one or both of them spurred, the inner pair narrower, their thickened tips united over the stigma; corolla flattened. Stamens diadelphous, in 2 sets of 3 each, anthers of the middle ones 2-celled, anthers of the lateral ones 1-celled; androecium hypogynous. Carpels 2, united. Ovary 1-celled with 2 parietal placentae; stigma 2-lobed or 2 horned, flattened contrary to the placentae. Pod silique-like, 1-celled, 2-valved; 1-seeded and indehiscent, or more commonly several-seeded, the valves deciduous. Seeds with a minute embryo in fleshy endosperm.

Key to the Genera

- 1. Both outer petals spurred at the base.....2
- 1. One of the outer petals spurred at the base.....3
- 2. Petals permanently united and enclosing the capsule; vines.....1. *Adlumia*
- 2. Petals lightly united, deciduous; acaulescent herbs.....2. *Dicentra*
- 3. Fruit an elongated capsule, several-seeded.....3. *Capnoides*
- 3. Fruit globose, indehiscent, one-seeded.....4. *Fumaria*

1. **ADLUMIA** Raf. Med. Rep. (2)5:352. 1808.

Smooth delicate vines; biennial or perennial. Leaves pinnately decomposed. Corolla ovate-cordate, becoming spongy, persistent, enclosing the few-seeded fruit. Stamens monadelphous below, united in a tube which is adherent to the corolla; diadelphous above. Flowers white to purplish in drooping panicles. A monotypic genus of eastern North America. In honor of Major J. Adlum, an amateur botanist, Washington, D. C.

1. *Adlumia fungosa* (Ait.) Greene. (Climbing Fumitory.) (*Fumaria fungosa* Ait. Hort. Kew. 3:1. 1789.) (*Adlumia cirrhosa* Raf. Raf. Med. Rep. (2) 5:352. 1808.) (*Adlumia fungosa* Greene; B. S. P. Prel. Cat. N. Y. 3. 1888.) Beautifully delicate vine climbing over other plants by its slender petioles. Occasional in moist thickets in the mountains of East Tennessee. Sometimes cultivated.

2. **DICENTRA** Bernh. Linnaea 8:468. 1833.
(**BIKUKULLA** Adans. Fam. Pl. 2: App. 23. 1763.) (**DICLYTRA** Borck. Roem. Arch. I: Part 2, 46. 1797.)

Acaulescent herbs with tuberous rootstocks. Leaves all basal, delicate, blades ternately compound, on long petioles. Pedicles 2-bracted, flowers racemose. Corolla white to deep pinkish-purple, cordate at the base, 2-spurred, deciduous or withering-persistent. Filaments only slightly united. Pods oblong or linear, dehiscent to the base, 10-20-seeded. Seeds crested. From δῖς and ζέντρον, "double-spurred."



Fig. 5. Fringed Bleeding Heart (*Dicentra eximia* (Ker) Torr.).

Key to the Species

- 1. Racemes simple 2
- 1. Racemes compound 2
- 2. Inner petals conspicuously crested..... 1. *D. eximia*
- 2. Inner petals minutely crested..... 2. *D. canadensis*
- 3. *D. cucullaria*

1. **Dicentra eximia** (Ker) Torr. (Fringed Bleedingheart.) (*Fumaria eximia* Ker Bot. Reg. 1: pl. 50. 1815.) (*Diclytra eximia* DC. Syst. 2:109. 1821.) (*Dicentra eximia* Torr. Fl. N. Y. 1:46. 1843.) Millsp. Bull. West Va. Agric. Exp. Sta. 2:327. 1892.) Rootstock scaly. Divisions of the leaves oblong or ovate. Flowers pink to pinkish-purple, crest of the inner petals projecting. Somewhat glaucous. native species. (Fig. 5.) Rare. Rich moist woods of Alleghenies. Spring and summer.

2. **Dicentra canadensis** (Goldie) Millsp. (Squirrelcorn.) (*Corydalis canadensis* Goldie, Edinb. Phil. Journ. 6:329. 1822.) (*Diclytra canadensis* DC. Prodr. 1:118. 1824.) (*Dicentra canadensis* Walp. Rep. 1:118. 1842.) (*Bikukulla canadensis* Millsp. Bull. West Va. Agric. Exp. Sta. 2:327. 1892.) Rootstocks bearing scattered, small, grain-like tubers. Lobes of the leaves linear. Corolla heart-shaped, the crest of the inner petals conspicuous, projecting. Petals greenish white, purplish-tinged; slight fragrance of hyacinths. Rare. In rich woods in the Cumberland and Allegheny Mountains. Spring.

3. **Dicentra cucullaria** (L.) Millsp. (Dutchmans-breeches.) (*Fumaria Cucullaria* L. Sp. Pl. 699. 1753.) (*Diclytra Cucullaria* DC. Syst. Veg. 2:108. 1821.) (*Diclytra cucullaria* T. & G. Fl. N. Y. 1:66. 1838.) (*Dicentra Cucullaria* Torr. Fl. N. Y. 1:45. 1843.) (*Bikukulla cucullaria* Millsp. Bull. West Va. Agric. Exp. Sta. 2:327. 1892.) Delicate. Petioles and scapes from a bulbous base. Lobes of the leaves linear. Divergent spurs of the corolla longer than the pedicels; crests of the inner petals minute. Corolla white, tipped with cream color. Occasional in rich, damp woods. Spring and early summer.

3. CAPNOIDES (Tourn.) Adans. Fam. Pl. 2:431. 1763.
 (NECKERIA Scop. Introd. 313. 1777.) (CORYDALIS Medic. Phil. Bot. 96. 1789.)

Erect or climbing caulescent herbs. Leaves pinnately decompose, pale or glaucous, alternate, usually delicate. Inflorescence racemose, terminal or opposite the petioles. Corolla irregular, deciduous. The two outer petals unlike, one flat, the other spurred at the base; the inner smaller, often united at their tips, keeled on the back. Stamens in two sets of 3 each, opposite the outer petals; united to above the middle. Pod silique-like, linear or oblong, 2-valved, sometimes torulose. Seeds several, crested. Greek, καπνός and εἶδος, smoke-like, in allusion to the smoky odor emitted by freshly pulled roots of some species.

Key to the Species

- 1. Stems strict; flowers rosy, yellow-tipped..... 1. *C. sempervirens*
- 1. Stems low, diffuse or ascending; flowers yellow..... 2
- 2. Spur conspicuous; corolla longer than 1 cm..... 2. *C. aureum*
- 2. Spur short; corolla shorter than 1 cm..... 3
- 3. Crest entire; pods ascending..... 3. *C. micranthum*
- 3. Crest 3-4-toothed; pods pendulous or spreading..... 4. *C. flaculum*

1. **Capnoides sempervirens** (L.) Borck. (Pink or Pale Corydalis.) (*Fumaria sempervirens* L., Sp. Pl. 700. 1753.) (*Capnoides sempervirens* Borck, in Roem. Arch 1:Part 2:44. 1797.) (*Corydalis sempervirens* Pers. Syn. 2:269. 1807.) (*Corydalis glauca* Pursh Fl. Am. Sept. 463. 1814.) 1-12 dm. high, finally much-branched, the branches ascending. Spur much shorter than the body of the corolla. Pods linear, erect; nodose when mature; seeds finely reticulated. Occasional throughout range. In rocky places, especially in new clearings. Spring to fall.

2. **Capnoides aureum** (Willd.) Kuntze. (*Corydalis aurea* Willd. Enum. 740. 1809.) (*Capnoides aureum* Kuntze. Rev. Gen. Pl. 14. 1891.) Diffuse. Lower leaves petioled, upper sessile. Flowers bright yellow, the spur half as long as the body of the corolla. Pods spreading or pendulous, becoming torulose. Not frequent. In rocky clear places. Spring.

3. **Capnoides micranthum** (Engelm.) Britton. (Small-flowered Corydalis.) (*Corydalis aurea* var. *micrantha* Engelm.; A. Gray, Man. Ed. 5, 62. 1867.) (*Corydalis micrantha* A. Gray, Coult. Bot. Gaz. 2:189. 1886.) (*Capnoides micranthum* Britton, Mem. Torr. Club 5:166. 1894.) Pedicels short with small bracts. Corolla pale yellow; sometimes crestless and spurless; infrequently cleistogamous. Pods ascending and torulose; seeds smooth and shining. In woods. Not abundant.

4. **Capnoides flavulum** (Raf.) Kuntze. (Pale Corydalis.) (*Corydalis flavula* Raf. DC. Prodr. 1:129. 1824.) (*Capnoides flavulum* Kuntze, Rev. Gen. Pl. 14. 1891.) Pedicels slender with conspicuous bracts. Lower leaves petioled, upper sessile. Corolla bright yellow; tips of the outer petals pointed, longer than the inner. Pods torulose, drooping; seeds shining. Most frequent species of genus in range. Rocky woods and sandy banks. Spring.

4. FUMARIA (Tourn.) L. Sp. Pl. 699. 1753.

Mostly diffuse, branched, annuals. Leaves glaucous, delicate, pinnately decomposed. Flowers white or pink in terminal or lateral racemes; the outer petals larger, one of them spurred, the 2 inner narrower, often coherent at the apex, and keeled or crested on the back. Stamens diadelphous, opposite the outer sepals. Pods globular, 1-seeded, indehiscent. Seeds not crested. From *fumus*, Latin, smoke, because of the smoke-like odor of some species.

1. **Fumaria officinalis** L. Sp. Pl. 700. 1753. (Common Fumitory. Hedge Fumitory.) Glabrous, freely branching, diffuse or ascending. Racemes axillary and terminal. Sepals acute, toothed. Corolla flesh-color tipped with crimson; the spur somewhat shorter than the body of the corolla. Fruit depressed-globose. Rare. In gardens, or cultivated grounds. Summer. Adventive from Europe.

CRUCIFERAE B. Juss. Hort. Trian. 1759.

(Brassicaceae Lindl. Nat. Syst. 2:58. 1836.)

(MUSTARD FAMILY)

Annual to perennial herbs with watery acrid, but not poisonous, juice. Generally erect and often hairy. Flowers regular. Sepals 4, deciduous. Petals 4, sometimes minute or wanting, clawed, white, yellow, pink or purple; the spreading blades forming a cross. Stamens typically 6 (occasionally 4 or 2) tetradynamous, the two short ones lateral; anthers mostly 2-celled, splitting lengthwise; filaments often

dilated or toothed toward the base. Ovary of two carpels united (rarely 1-celled) separated by a thin partition from which the two valves separate when ripe. Style simple or wanting. Stigma terminal, lobed or discoid. Receptacle with honey glands. Fruit a pod or capsule, a silique if much elongated, a silicle if shorter; terete, angular or variously flattened; rarely indehiscent. Seeds without endosperm. Leaves alternate; entire, toothed or pinnatifid; petioled, sessile or clasping; without stipules. Flowers in terminal racemes or corymbs; pedicels rarely bracted.

Fruits and seeds furnish the most distinguishing characteristics of the genera. Other floral parts are deciduous, and of little value in separation of most genera. Realizing that sepals, petals, and fruits are rarely present on one specimen, the following diagnosis is based largely upon mature fruit and seed characters. Other floral characters are excluded almost entirely, since it is believed that former keys employing both flowers and fruits, which are often not contemporaneous, have been the source of much confusion. In using the key, then, plants with practically mature fruits are essential. In observing characters of pods in cross section, note especially the basal region of the pods.

Pubescence is also a constant character, and is used in some cases. Because the hairs of many genera and even species are so distinctive, the possibility of constructing a key based on the nature of the pubescence alone has suggested itself. It appears that segregation based only upon such evidence would be possible. This would be an interesting, though tedious, subject for future research. In studying pubescence, the epidermis had best be peeled, mounted, and observed with low power of the compound microscope. The divisions of the stellate hairs are sometimes not evident with a simple lens, especially if the hairs are appressed.

Key to the Genera

- 1. Mature pods flattened or compressed..... 2
- 1. Mature pods terete or prismatic, sometimes obscurely angled.....17
- 2. Pods flattened contrary to the narrow partition, less than three times as long as broad..... 3
- 2. Pods flattened or compressed parallel to the broad partition..... 5
- 3. Some or all of the hairs branched..... 1. *Capsella bursa-pastoris* 4
- 3. Pubescence of simple hairs or none..... 4
- 4. Seeds 2-8 in each cell..... 2. *Thlaspi arvense* 6
- 4. Seeds solitary in the cells..... 3. *Lepidium* 6
- 5. Pods orbicular, or if suborbicular broader than long..... 7
- 5. Pods oval to narrowly linear..... 7
- 6. Seeds solitary in each cell..... 4. *Koniga maritima* 8
- 6. Seeds few to several in each cell..... 5. *Lesquerella* 8
- 7. Valves of the mature pod entirely nerveless..... 14
- 7. Valves of the mature pod nerved (the nerves sometimes only at base of pod)..... 9
- 8. Seeds wingless 11
- 8. Seeds winged 11
- 9. Seeds in two rows in each cavity..... 10

9. Seeds in one row in each cavity.....12
10. Pods oval-oblong, to broadly linear.....12
10. Pods narrowly linear, greatly elongated.....6. *Draba*
11. Pubescence if present of simple hairs7. *Arabis*
11. Always stellate-pubescent.....8. *Leavenworthia*
12. Plants with elongated rootstocks; scapose with two to four stem-leaves subtending the peduncle9. *Berteroa incana*
12. Plants without rootstocks; caulescent with alternate leaves10. *Dentaria*
13. Pods not elastically dehiscent at maturity13
13. Pods elastically dehiscent at maturity7. *Arabis*
14. Leaf-blades entire, toothed or palmately compound11. *Cardamine*
14. Leaf-blades pinnatifid.....12. *Sisymbrium*
15. Pods oval, oblong, to broadly linear6. *Draba*
15. Pods narrowly linear to linear filiform.....16
16. Plants leafy, without a rootstock..7. *Arabis*
16. Plants scapose, with 2 to 4 stem-leaves; with a continuous or moniliform rootstock10. *Dentaria*
17. Length of pod less than twice the width18
17. Length of pod more than twice the width20
18. Seeds flat; plants pubescent with mostly branched hairs... ..19
18. Seeds turgid; plants pubescent with simple hairs or glabrous13. *Radicula*
19. Pods inflated or globular, not pyriform; the valves nerveless5. *Lesquerella*
19. Pods pyriform, the valves one-nerved14. *Camelina*
20. Pods merely tipped with short style, or style wanting21
20. Pods with elongated style forming a beak27
21. Pods terete or nearly so.....22
21. Pods four-sided or four-angled25
22. Seeds in two rows in each cavity of the pod13. *Radicula*
22. Seeds in one row in each cavity of the pod.....23
23. Leaf-blades pinnatifid or coarsely toothed.....24
23. Leaf-blades entire or slightly toothed.... ..15. *Hesperis matronalis*
24. Pods strikingly close-pressed to the stem;

- usually sparingly pubescent or more; petals yellow.....12 (3).
Sisymbrium officinale
24. Pods spreading or ascending glabrous; petals white to purplish16. *Iodanthus pinnatifidus*
25. Pods when ripe over 2 cm. long; leaves, at least in part, lyrate-lobed to pinnatifid ..17. *Barbarea*
25. Pods when ripe 1-2 cm. long; leaves entire or barely toothed26
26. Leaves obovate or oblong; petals white; April and May.....18. *Stenophragma thaliana*
26. Leaves lanceolate; petals yellow; July and August...19. *Erysimum cheranthoides*
27. Pods often constricted between the seeds; dehiscent
20. *Brassica*
27. Pods 1-celled or transversely several-celled, with spongy or pithy partitions; indehiscent
21. *Raphanus*

1. CAPSELLA Medic. Pfl. Gatt. 1:85. 1792.

(BURSA Siegsb. Weber, Wigg. Prim. Fl. Holst. 47. 1780.)

Annual caulescent herbs, with glabrous, sometimes pubescent leaves. Leaves often mainly basal, entire, toothed, lobed or pinnately divided. Corolla white, the petals much longer than the sepals. Pods obcordate-triangular, flattened contrary to the narrow partition. Seeds numerous. Name diminutive of *capsa*, Latin, a box, from the shape of the fruit.

1. *Capsella bursa-pastoris* Medic. (Shepherd's Purse.) (*Thlaspi Bursa-pastoris* L. Sp. Pl. 647. 1753.) (*Bursa pastoris* Weber Wigg. Prim. Fl. Holst. 47. 1780.) (*Capsella Bursa-pastoris* Medic. Pfl. Gatt. 1:85. 1792.) (*Bursa Bursa-pastoris* Britton, Mem. Torr. Club 5:172. 1894.) Pubescent below, glabrous above. Stems 3-9 dm. tall, simple or branching. Leaves mainly basal, petioles short, blades pinnately lobed or pinnatifid, rarely dentate or entire. Stem leaves few, linear to lanceolate, auricled at the base. Common weed.

March to October. Foliage and outline of pod extremely variable. Native of Europe.

2. THLASPI (Tourn.) L. Sp. Pl. 645. 1753.

Erect, low, glabrous herbs, with entire or dentate leaves, the basal ones forming a rosette, at least some of the stem-leaves auriculate-clasping. Flowers white to purplish. Pods orbicular, obovate, or obcordate, strongly flattened contrary to the narrow partition, the midrib of the boat-shaped valves extended into a wing. Valves dehiscent. Seeds 2-8 each cell. *Θαλείν*, to crush, from the flat pod.

1. *Thlaspi arvense* L. Sp. Pl. 646. 1753. (Pennycress.) Lower leaves wing-petioled, the upper sagittate-clasping. Silicle very flat, broadly winged all around, deeply notched at the apex, 1 cm. or over in diameter. Waste places, especially along roadsides, but not common here. Late spring and summer. Native of Europe.

3. LEPIDIUM (Tourn.) L. Sp. Pl. 643. 1753.

Cauliscent herbs; pubescence, when present, of simple hairs. Leaves entire, lobed or pinnatifid, sometimes clasping the stem. Petals always short, sometimes wanting, whitish or greenish. Stamens often fewer than six. Silicles strongly flattened contrary to the partition; valves dehiscent. Seeds flattened, pendulous, solitary in each cell. From *λεπίδιον*, a little scale, because of the scale-like fruits.

Key to the Species

1. Stamens 2; pods wing-margined at top, sometimes obscurely so; fruiting pedicels slender, widely spreading; plant green.....2
1. Stamens 6; pods winged all around; fruiting pedicels thickish, compressed, ascending; plant very glaucous.....1. *L. sativum*
2. Pod obscurely margined at top, or marginless; petals present except in some late flowers; fetid.....2. *L. virginicum*
2. Pod minutely wing-margined at top; petals usually wanting; nearly scentless3. *L. apetalum*

1. *Lepidium sativum* L. Sp. Pl. 644. 1753. (Garden Cress.) Usually much branched, bright green annual. Lower leaves once or twice pinnate or pinnatifid; upper leaves sessile or nearly so, entire or incised, much smaller than lower leaves. Racemes long and stiff; petals present, often pinkish. Common salad plant, cultivated for its pungent foliage. Frequently escapes from cultivation. Spring and summer. Native of Europe.

2. *Lepidium virginicum* L. Sp. Pl. 645. 1753. (Wild Peppergrass.) More or less puberulent. Basal leaves spatulate or oblanceolate in outline, the blades pinnatifid. Stem-leaves lanceolate or oblong-linear; sharply toothed, incised, or entire; the upper sessile, the lower stalked. A common weed along roadsides and waste places. Spring to fall.

3. *Lepidium apetalum* Willd. Sp. Pl. 3:439. 1801. Glabrous or puberulent; odorless. Basal leaves and sometimes the lower stem leaves with pinnatifid blades; upper stem leaves narrow, incised to entire. Occasional. Dry places along roadsides and railroads. Spring to fall. Native of Eurasia.

4. KONIGA Adans. Fam. Pl. 2:420. 1763.
(**LOBULARIA** Desv. Journ. Bot. 3:172. 1813.)

Perennials, pubescent or canescent with appressed hairs pointed at both ends, attached in the middle. Leaves entire. Petals white, entire. Silicle compressed, one seed in each cell. Named in honor of Charles Konig, a curator of the British Museum.

1. **Koniga maritima** (L.) R. Br. S. (Sweet Alyssum.) (*Clypeola maritima* L. Sp. Pl. 652. 1753.) (*Alyssum maritimum* Lam. Encycl. 1:98. 1783.) (*Koniga maritima* R. Br. in Denh. & Clapp, Narr. Exp. Afric. 214. 1826.) Procumbent or ascending, freely branching. Slightly and minutely hoary. Leaves linear. Flowers small, honey-scented. Waste places, not common. Summer. Often cultivated, and escaped. Adventive from Europe.

5. LESQUERELLA S. Wats. Proc. Am. Acad. 23:249. 1888.

Low, scapose or caulescent herbs with stellate pubescence. Leaves simple, entire or undulate. Flowers mostly yellow; petals entire; anthers sagittate. Pods mostly globular, or inflated and ovate; with a broad orbicular to ovate hyaline partition nerved from the apex to the middle; the valves nerveless. Seeds few or several in 2 rows. Named for Leo Lesquereux, Swiss and American bryologist and paleobotanist, 1805-1889.

Key to the Species

- 1. Pods flattened, densely pubescent when mature; the style about half as long as the body.....1. *L. Lescurii*
- 1. Pods globose, almost glabrous when mature; the style much longer than the pod2. *L. globosa*

1. **Lesquerella Lescurii** (A. Gray) S. Wats. Proc. Am. Acad. 23:252. 1888. Around 1-3 dm. tall. Freely branching from the base, ascending. Stellate pubescent, the pods densely so, with long spreading hairs. Stems leafy to within a short distance of the raceme, usually purplish near the base. Leaves all simple, sessile, repand-denticulate, obtusish, clasping by their auricled bases. Flowers light or bright yellow; petals broadly spatulate, about twice as long as the sepals. Racemes dense in flower, elongate and sparse in fruit. Pedicels ascending, sometimes slightly sigmoid, rather stout, 2-3 times as long as mature pod. Style slender, 1/3-1/2 as long as the pod. Seeds flat, several in each cell, narrowly margined. An endemic, in abundance on Cathay limestone, fields and hillsides, around Nashville, Davidson County. April, May.

2. **Lesquerella globosa** (Desv.) S. Wats. (Short's Bladderpod.) (*Vesicaria globosa* Desv. Journ. Bot. 3:184. 1814.) (*Vesicaria Shortii* T. & G. Fl. N. A. 1:102. 1838.) (*Lesquerella globosa* S. Wats. Proc. Am. Acad. 23:252. 1888.) Much taller than preceding. Branching, ascending. Finely stellate pubescent all over. Leaves oblong or lanceolate with tapering bases, not auricled; mostly entire, rarely undulate-margined to slightly repand-denticulate. Petals light yellow. Raceme in flower short, compact, greatly elongating in fruit. Pedicels almost horizontal, many times as long as the mature pods; style filiform, knobbed with the stigma. Pods globular, not at all flattened, usually slightly broader than long, practically glabrous when mature. Limited in distribution: Wisconsin to Kentucky and Tennessee. On Cumberland River bluffs, near Nashville, Davidson County. April, May.

6. DRABA (Dill.) L. Sp. Pl. 642. 1753.

Low herbs with simple, entire or toothed leaves, pubescence often stellate. Scapose or leafy-stemmed. Flowers white or yellow, sometimes pinkish. Silicles elliptic, oblong or linear, flattened parallel to the broad partition; the valves plane or slightly convex, dehiscent, nerveless. Seeds wingless, numerous, in two rows in each cell. From δραρα, acrid, biting, because of the taste of the plant.

Key to the Species

- 1. Leaves all radical.....1. *D. verna*
- 1. Leaves in part cauline.....2
- 2. Pods strongly twisted.....2. *D. ramosissima*
- 2. Pods straight.....3
- 3. Raceme in fruit corymbose or short, pods broadly linear, much longer than the ascending pedicels.....3. *D. caroliniana*
- 3. Raceme in fruit elongate, pods narrowly oblong, about the length of the ascending pedicels.....4. *D. brachycarpa*

1. **Draba verna** L. (Whitlowgrass.) (*Draba verna* L. Sp. Pl. 642. 1753.) (*Erophila vulgaris* DC. Syst. Veg. 2:356. 1821.) Leaves oblong or lanceolate, entire or toothed near the apex, pubescence stellate. Flowers white, cleistogamous; petals 2-cleft. Pods round-oval to oblong lanceolate, glabrous, shorter than their pedicels. An exceedingly polymorphic species. Common. Sandy waste places, roadsides, and pastures. Early spring. Naturalized from Europe.

2. **Draba ramosissima** Desv. Journ. Bot. 3:186. 1814.) (Branching Whitlowgrass.) Much branched below, the branches bearing tufts of leaves. Leaves mostly basal, dentate with spreading teeth. Petals white, sometimes wanting, twice or thrice as long as the sepals. Racemes corymbosely branched; pedicels elongate, spreading. Pods hairy; twisted. On cliffs and rocky banks. Infrequent. Spring.

3. **Draba caroliniana** Walt. (Carolina Whitlowgrass.) (*Draba caroliniana* Walt. Fl. Car. 174. 1788.) (*Draba hispidula* Michx. Fl. Bor. Am. 2:28. 1803.) (*Draba caroliniana micrantha* A. Gray, Man. Ed. 5, 72. 1867.) (*Draba micrantha* Nutt.; T. & G. Fl. N. A. 1:109. 1838.) Peduncles scape-like. Leaves tufted, obtuse, entire or rarely with several shallow teeth, pubescent with stiff stellate hairs. Petals white, entire, sometimes wanting in late flowers. Rather common. Sandy fields. Spring.

4. **Draba brachycarpa** Nutt.; T. & G. Fl. N. A. 1:108. 1838. (Short-fruited Whitlowgrass.) Minutely and loosely stellate pubescent. Leafy to the base of the dense at length elongate raceme. Leaves ovate to narrowly oblong, entire or few-toothed. Flowers small; petals yellow, sometimes none. Dry fields and open woods. Common. Spring.

7. ARABIS L. Sp. Pl. 664. 1753.
(TURRITIS L. Sp. Pl. 666. 1753.)

Mostly erect, glabrous to pubescent with entire to pinnatifid leaves. Flowers white to purple. Siliques linear, elongate, flat, valves mostly 1-nerved. Not dehiscent. Seeds marginless to winged. Named for Arabia, the native home of many mustards.

Key to the Species

- 1. Basal leaves pinnatifid.....2
- 1. Basal leaves entire or toothed.....3

- 2. Seeds winged, stem-leaves pinnatifid.....1. *A. virginica*
- 2. Seeds wingless, stem-leaves entire or dentate.....2. *A. lyrata*
- 3. Seeds wingless3. *A. dentata*
- 3. Seeds winged or margined.....4
- 4. Pods erect or appressed.....5
- 4. Pods recurved-spreading6
- 5. Pods ascending-spreading; style 1 mm. long.....4. *A. patens*
- 5. Pods erect-ascending or appressed; style scarcely any..5. *A. hirsuta*
- 6. Smooth and glaucous; at least some of the stem-leaves auriculate-clasping6. *A. laevigata*
- 6. Pubescent at least above, leaves pointed at both ends7. *A. canadensis*

1. **Arabis virginica** (L.) Trelease. (Virginia Rockcress.) (*Cardamine virginica* L. Sp. Pl. 656. 1753.) (*Cardamine ludoviciana* Hook. Jour. Bot. 1:191. 1834.) (*Arabis ludoviciana* Meyer, Ind. Sem. Petr. 9:60. 1842.) (*Arabis virginica* Trelease; Branner & Coville, Rep. Geol. Surv. Ark. 1884: Part 4, 165. 1891.) (*Planodes virginicum* Greene, Leaflets 2:221. 1912.) Diffuse, ascending. Nearly all leaves deeply pinnatifid, the uppermost sometimes bract-like. Essentially glabrous. Flowers very small, white. Pods ascending; seeds in 1 row in each cell, wing-margined. The distinctly wing-margined seeds distinguish this species from *Cardamine pennsylvanica* with which it is likely to be confused. Very common in open ground. Spring.

2. **Arabis lyrata** L. (Lyreleaved Rockcress.) (*Arabis lyrata* L. Sp. Pl. 665. 1753.) (*Cardamine spathulata* Michx. Fl. Bor. Am. 2:29. 1803.) (*Arabis lyrata occidentalis* S. Wats.; Robinson in Gray & Wats. Syn. Fl. 1: Part 1, 159. 1895.) Usually pubescent below, glabrous above, sometimes glabrous throughout. Basal leaves rosulate; lyrate-pinnatifid, spatulate or oblanceolate. Stem-leaves spatulate or linear, toothed or entire. Petals white. Pods ascending or spreading. Common. In rocky places. Ascends to 2,500 feet. Spring to fall.

3. **Arabis dentata** T. & G. (Spreading Rockcress.) (*Sisymbrium dentatum* Torr. Transyl. Journ. Ned. 10:338. Hyponym. 1837.) (*Arabis dentata* T. & G. Fl. N. A. 1:80 1838.) Slender, erect or ascending; roughish-pubescent. Leaves obovate-dentate, the basal on margined petioles, the stem-leaves sessile and auriculate-clasping, the upper acute. Petals, whitish, or greenish, scarcely exceeding the calyx; pods widely spreading, narrowly linear, style almost none; seeds in one row in each cell. Moist soil in open places. Frequent. Spring.

4. **Arabis patens** Sulliv. Am. Journ. Sci. 42:49. 1842. (Spreading Rockcress.) Erect, downy with spreading hairs. Leaves dentate to entire; the basal on margined petioles; the stem-leaves acutish, sessile, partly clasping by the cordate base. Petals bright white. Pods spreading-ascending on slender pedicels, tipped with the style. Seeds narrowly winged, in 1 row in each cell. Common throughout range. Spring and summer. In moist soil along rivers.

5. **Arabis hirsuta** (L.) Scop. (Hairy Rockcress.) (*Turritis hirsuta* L. Sp. Pl. 666. 1753.) (*Arabis hirsuta* Scop. Fl. Carn. Ed. 2, 2:30. 1772.) (*Arabis ovata* Poir. in Lam. Encycl. Suppl. 5:557. 1817.) Erect, usually simple. Rough-hairy to nearly glabrous. Basal leaves on margined petioles, obovate or spatulate, dentate or repand; stem-leaves oblong or lanceolate, entire or toothed, sessile, clasping by their somewhat auricled bases. Pods strictly erect ascending, or appressed. Seeds 1-rowed, or when young obscurely 2-rowed. Sandy or rocky and calcareous open places. Spring to fall. Frequent.

6. **Arabis laevigata** (Muhl.) Poir. (Smooth Rockcress.) (*Turritis laevigata* Muhl.; Willd. Sp. Pl. 3:543. 1801.) (*Arabis laevigata* Poir. in Lam. Encycl. Suppl. 1:411. 1810.) (*Arabis laevigata Burkii* Porter, Bull. Torr. Club 17:15. 1890.) (*Arabis laevigata laciniata* T. & G. Fl. N. A. 1:82. 1838.) Glaucous, entirely glabrous. Nearly simple. Stem-leaves partly clasping by their auricled bases, linear to lanceolate, mostly toothed, sometimes incised (var. *laciniata* T. & G.). Pods recurved-spreading on the ascending or spreading

pedicels. Seeds in 1 row, broadly winged. One of the most widely distributed mustards. In open wooded places, often in poor soil. Spring.

7. **Arabis canadensis** L. Sp. Pl. 665. 1753. (Sicklepod.) pubescent, pointed at both ends, sessile, the lower toothed. Stem-leaves pendulous on the spreading or recurved pedicels. Pods very flat, cell, wing-margined. Common. In rocky woods, ascends to 4,000 feet. Spring and summer.

8. LEAVENWORTHIA Torr. Ann. Lyc. N. Y. 4:87. 1837.

Low, mostly glabrous herbs, the pubescence if present of simple hairs. Stems scapose, leaves mainly basal, lyrate-pinnatifid. Flowers few or solitary. Petals wedge-shaped, white, yellow, or purplish. Pods elongated, somewhat inflated, often contracted between the seeds. Valves nerveless; seeds winged, flattened, in 1 row in each cavity. Named for Dr. M. C. Leavenworth, a southern botanist of the 19th century.

Key to the Species

1. Pods not torulose 2
1. Pods torulose even when young..... 1. *L. torulosa*
2. Pods linear-oblong, 2.5-3.5 cm. long, each tipped with a stout style 1 mm. long; petals white or purplish..... 2. *L. uniflora*
2. Pods oblong, 4-8 mm. long, each tipped with a slender style 4-6 mm. long; petals yellow 3. *L. stylosa*

1. **Leavenworthia torulosa** A. Gray, Bot. Gaz. 5:26. 1880. (Necklace Leavenworthia.) Foliage glabrous; blades pinnately-divided into entire, angled or lobed segments; sometimes represented by a large terminal segment and two small lateral ones; purplish petals with yellow bases, nearly twice as long as the sepals, emarginate; seeds 4-14. Infrequent in cedar glades in Middle Tennessee. Spring. All three species often in close proximity. Limited in distribution to Kentucky and Tennessee.

2. **Leavenworthia uniflora** (Michx.) Britton. (Michaux's Leavenworthia.) (*Cardamine uniflora* Michx. Fl. Bor. Am. 2:29. 1803.) (*Leavenworthia Michauxii* Torr. Ann. Lyc. N. Y. 4:89. 1837.) (*Leavenworthia uniflora* Britton, Mem. Torr. Club 5:171. 1894.) Foliage glabrous or nearly so; leaves mainly basal, segments 5-17, toothed or angular, the terminal one somewhat larger, all narrowed near the base but expanded at point of junction with rachis; stem-leaves none, or 1-3, similar but smaller. Purplish or white petals with a yellowish base. Seeds 4-18. Dry cedar barrens. Not widely distributed throughout range but abundant where found. Most common in Middle Tennessee.

3. **Leavenworthia stylosa** A. Gray Chapman Fl. So. U. S. Ed. 2. Supplement 605. 1883. Much-branched from the base, the stems ascending or prostrate; leaves mainly basal, blades of 3-7 entire or angular segments, the terminal one much larger than the rest. Petals yellow, emarginate. Pods tipped with a style 4-6 mm. long. Seeds 6-8. Endemic in cedar glades near Nashville, Davidson and Rutherford Counties on Lebanon limestone. May.

9. BERTEROA DC. Mem. Mus. Paris, 7:232. 1821.

Stellate-pubescent or canescent. Leaves usually narrow and entire. Flowers white in terminal racemes; petals 2-cleft; filaments 2-toothed at the base. Seeds several in each cell. For Carlo Guiseppe Bertero, a Piedmontese botanist (1739-1831).

1. *Berteroa incana* (L.) DC. (Hoary Alyssum.) (*Alyssum incanum* L. Sp. Pl. 650. 1753.) (*Berteroa incana* DC. Syst. 2:291. 1821.) Erect or ascending, branched, hoary pubescent. Leaves lanceolate or oblong, entire or undulate, the lower narrowed into a petiole. Pod canescent, plump, tipped with the style; on ascending pedicels. Introduced from Europe with seeds for cultivation, tending to escape to waste places. To date reported only as garden weeds. Not common. Early to late summer.

10. DENTARIA (Tourn.) L. Sp. Pl. 653. 1753.

Perennials with horizontal, fleshy, peppery rootstocks. Basal and stem leaves palmately divided into 3 leaflets which are variously toothed or cleft. Stem-leaves alternate, opposite, or whorled; above the middle of the scape. Flowers perfect, regular; white, pink or purplish; in terminal racemes or corymbs; petals much longer than the sepals. Pods more or less flattened, the valves nerveless or slightly nerved, elastically dehiscent from the base. Seeds marginless. From the Latin *dens*, a tooth, because of the toothlike projections on the rootstock.

Key to the Species

1. Blades of basal leaves and stem leaves similar.....2
1. Divisions of basal leaves ovate, divisions of stem-leaves linear or lanceolate1. *D. heterophylla*
2. Segments of the leaves linear.....2. *D. multifida*
2. Segments of the leaves not linear.....3
3. Leaf segments laciniate; rootstock moniliform.....3. *D. laciniata*
3. Leaf segments merely toothed.....4. *D. diphylla*

1. ***Dentaria heterophylla*** Nutt. (Slender Toothwort.) (*Dentaria heterophylla* Nutt. Gen. 2:66. 1888.) (*Cardamine heterophylla* Wood, Bot. & Fl. 38. 1870.) Glabrous or pubescent; rootstock near soil surface, jointed. Segments of the basal leaves ovate, mucronately toothed. Stem-leaves usually 2 and opposite; linear or lanceolate; dentate or entire. Common on open wooded slopes. Early spring.

2. ***Dentaria multifida*** Muhl. Willd. Sp. Pl. 3:479. 1800.³ "Rootstocks continuous. Foliage glabrous or nearly so; leaves nearly 3-foliate, with long petioles and once or twice pinnately parted segments, the ultimate segments linear, entire or sparingly toothed. Scapes erect, 2-3 dm. tall, simple; bracts 2, with short petioles, and blades similar to those of the leaves. Pedicels ascending, 1.5-2 cm. long. Sepals oblong, 5-6 mm. long, obtuse. Petals white, almost twice as long as the sepals. Pods slender, ascending, 3 cm. long, long-beaked." Gattinger collected this species near Nashville, Davidson County. No other records were found.

3. ***Dentaria laciniata*** Muhl. (Cutleaved Toothwort.) (*Dentaria laciniata* Muhl.; Willd. Sp. Pl. 3:479. 1800.) (*Cardamine laciniata* Wood, Bot. & Fl. 38. 1870.) (*Dentaria furcata* Small, Fl. SE. U. S. 480. 1903.) Rootstock deep, the fusiform segments readily separable. Basal leaves few, often wanting. Stem-leaves 2-4, usually 3. Leaves subentire, slightly gash-toothed or more; the lobes sometimes so deeply cut as to appear quinate (Woods, 1865, p. 230). This form with leaf segments cut nearly to the base is a frequent one around Chattanooga, Hamilton County. Miss Eleanor McGilliard (University of Chattanooga) has kindly supplied specimens from there several times. Although at a glance such a form appears very different from the usual type with less deeply-

³No specimens were available, and only one description was found, that of Small (Fl. SE. U. S., p. 480). It is quoted in full.

cut lacinate leaves, prolonged association with the *Dentarias* teaches one not to be surprised at leaf variations. *D. laciniata* seems most variable of all in this point. Possibly the most common of all *Dentarias* in the range. In open woods. Usually occurs with a mixture of *D. diphylla* and *D. heterophylla* (Fig. 6).

4. *Dentaria diphylla* Michx. (Two-leaved Toothwort.) (*Dentaria diphylla* Michx. Fl. Bor. Am. 2:30. 1803.) (*Cardamine diphylla* Wood, Bot. Fl. 37, 1870.) Rootstock continuous, toothed. Basal leaves nearly always present, and several in number. Stem-leaves mostly 2, rarely 3. (A specimen was collected recently with 6 stem-leaves, the segments of which were pinnatifid with 1 terminal and 2 pairs of lateral lobes.) Leaflets short-petiolate, usually rhombic-ovate or oblong-ovate, coarsely erenate, the teeth bluntly mucronate. Flowers white, the pods rarely maturing. Frequent throughout range in open woods usually with a mixture of other species of the same genus.*

11. CARDAMINE (Tourn.) L. Sp. Pl. 654. 1753.

Erect, or ascending; leafy-stemmed mostly glabrous annuals or perennials. Leaves entire, lobed, or pinnately dissected. Usually found growing along streams or in wet places. Flowers white, pink, or purple; stamens 6, rarely 4. Pods linear, flattened, usually elastically dehiscent from the base; valves nerveless; seeds wingless, in a single row in each cell. Greek, *καρδια* and *καρδια*; heart-strengthening, name applied by Dioscorides to a cress supposed to have that quality, perhaps because of the cordate leaves.

Key to the Species

1. Leaves simple or pinnately divided with not more than 3 segments.....2
1. Leaves pinnately 5-11-foliolate.....3
2. Stems from a tuberous base.....4
2. Fibrous-rooted1. *C. bulbosa*
3. Petals white, 7-12 mm. long; sepals greenish.....
3. Petals rose-purple, 10-18 mm. long; sepals tinged with purple2. *C. Douglassii*
4. Pods small, equaled or exceeded in length by the pedicels3. *C. rotundifolia*
4. Pods much exceeding the pedicels in length.....4. *C. Clematitis*
5. Plants of swamps, streams or wet grounds.....6
5. Plants of dry rock situations.....5. *C. parviflora*
6. Leaf segments all linear or linear-oblong, obtuse or acutish, entire or with 1-2 small teeth; pedicels 4-6 mm. long6. *C. arenicola*
6. Leaf segments undulate, toothed, or lobed, the terminal one much the largest, more or less cuneate at the base; pedicels 4-10 mm. long.....7. *C. pennsylvanica*

1. *Cardamine bulbosa* (Schreb.) B. S. P. (Spring Cress.) (*Arabis bulbosa* Schreb.; Muhl. Trans. Am. Phil. Soc. 3:174. 1793.) (*Cardamine rhomboidea* DC. Syst. Veg. 2:246. 1821.) (*Cardamine bulbosa* B. S. P. Prel. Cat.

*Small has inaugurated a new species, *D. incisa*, which from his description differs from *D. diphylla* only in that *D. incisa* has three stem-leaves whereas *D. diphylla* has two. *D. diphylla* does usually have 2 stem-leaves but a search over a patch of *Dentarias* is almost sure to bring forth at least one specimen with 3 stem-leaves. In fact, the number of these leaves in all species is not constant enough to be used as a positive identification character. Small (p. 481) notes that he did not see the fruits of *D. incisa*. Because of the frequent vegetative variations in all species, the writer doubts that there exists a true species *D. incisa*.

N. Y. 4. 1888.) Simple or sparingly branched from a slender rootstock bearing small tubers. Glabrous. Basal leaves oval, orbicular, or cordate, on long petioles; stem-leaves 5-8, scattered, the lower usually petioled, the upper sessile, dentate or entire. Petals white. Greenish sepals with a white margin. Pods narrowed at each end, tipped with a short style and conspicuous stigma. Wet meadows, and around springs. Fairly common. Ascends to 2,000 feet. Spring.

2. *Cardamine Douglassii* (Torr.) Britton. (Purple Cress.) (*Arabis rhomboidea* var. *purpurea* Torr. Am. Journ. Sci. 4:66. 1822.) (*Arabis Douglassii* Torr.; T. & G. Fl. N. A. 1:83. As synonym. 1838.) (*Cardamine Doug-*



Fig. 6. Cutleaved Toothwort (*Dentaria laciniata* Muhl.).

lassii Britton, Trans. N. Y. Acad. Sci. 9:8. 1889.) (*Cardamine purpurea* Britton, in Britt. & Brown, Ill. Fl. 2:139. 1897.) Very similar to preceding, usually somewhat pubescent. Stem-leaves 2-6. Petals pinkish to rose-purple. Sepals tinged with purple. Not as common as preceding species. In wet valleys and meadows. Spring.

3. *Cardamine rotundifolia* Michx. Fl. Bor. Am. 2:30. 1803. (Mountain Water Cress.) Stems branching, somewhat decumbent or creeping, producing runners. Leaves few, ovate to suborbicular, sometimes with heart-shaped bases; roundish or somewhat angled, rarely accompanied by two small lateral segments; petioled. Petals white. Pods small, linear-awl-shaped. Rare. Around springs. Spring and summer.

4. **Cardamine Clematitis** Shuttlw.; S. Wats. Bibl. Index 1:53. 1878. (Mountain Bitter Cress.) Erect, ascending, or weak from a slender rootstock; glabrous; dark green; somewhat succulent. Root-leaves kidney- or heart-shaped, sometimes with a pair of small lateral leaflets. Stem-leaves on sagittately appendaged petioles; entire or nearly 3-foliolate. Petals white. Rather infrequent. In wet spring places at high altitudes. Spring and summer.

5. **Cardamine parviflora** L. (Smallflowered Bitter Cress.) (*Cardamine parviflora* L. Sp. Pl. Ed. 2, 914. 1763.) (*Cardamine hirsuta* var. *sylvatica* A. Gray, Man. Ed. 5, 67. 1867.) Very slender; subsimple; glabrous or slightly pubescent. Leaflets of the radical leaves oval, or the terminal suborbicular; leaflets of the cauline leaves very narrow, linear, not confluent. Sepals scarious-margined, obtuse. Petals small, white. Pod narrowly linear, short-beaked. Fairly common on dry soil and rocky banks. Spring.

6. **Cardamine arenicola** Britton. (Sand Bittercress.) (*Cardamine virginica* Michx. Fl. Bor. Am. 2:29. 1803.) (*Cardamine arenicola* Britton, Bull. Torr. Club 19:220. 1892.) Similar to the last, but more branched from the base. Leaflets all narrowly linear and often toothed. Pods slender, erect. Often confused with the last, characters varying. In moist sandy soil. Not common. Spring.

7. **Cardamine pennsylvanica** Muhl. (Pennsylvania Bittercress.) (*Cardamine pennsylvanica* Muhl.: Willd. Sp. Pl. 3:486. 1800.) (*Cardamine pennsylvanica* Brittoniana Farwell, Asa Gray Bull. 6:46. 1894.) Erect, stout or slender; somewhat succulent; glabrous or with few scattered hairs. Leafy to the racemes; lateral leaflets all toothed, or some of them entire. Petals white. Common in wet places. Spring.

12. SISYMBRIUM (Tourn.) L. Sp. Pl. 657. 1753.

(**SOPHIA** Adans. Fam. Pl. 2:417. 1763.) (**DESCURAINIA** Webb & Barth. Phyt. Can. 1:71. 1836.)

Erect or ascending caulescent herbs, or sometimes shrubs with slender branching stems. Canescent or pubescent with simple or branched hairs. Leaf blades 1-3 pinnatifid to finely dissected. Small yellow or yellowish flowers in racemes which greatly elongate in fruit. Calyx and corolla early deciduous. Linear or linear-oblong siliques on slender pedicels, the valves one-nerved. Seeds very small, in 1 or 2 rows in each cell. Name from *σιούμβριον*, an ancient name of a fragrant herb.

Key to the Species

- 1. Seeds in 2 rows in each cell.....1. *S. canescens*
- 1. Seeds in 1 row in each cell.....2
- 2. Leaf blades 2-3 pinnatifid.....2. *S. Sophia*
- 2. Leaf blades 1-runcinate pinnatifid, the terminal segment largest3. *S. officinale*

1. **Sisymbrium canescens** (Walt.) Nutt. (Tansy-Mustard.) (*Erysimum pinnatum* Walt. Fl. Car. 174. 1788.) (*Sisymbrium canescens* Nutt. Gen. 2:68. 1818.) (*Descurainia pinnata* Britton, Mem. Torr. Club 5:173. 1894.) (*Sophia pinnata* Howell, Fl. N. W. Am. 1:56. 1897.) (*Sophia brachycarpa* (Richards.) Rydb.; Britton, Man. 462. 1901.) Densely canescent with pale hairs nearly all over, to glabrate, sometimes glandular. Simple or branched, the branches erect or ascending. Leaves 2-pinnatifid; the segments oblong; toothed or entire. Pods ascending on the horizontal pedicels. Pedicels usually longer than the pods. Seeds plainly in 2 rows in each cell. Rare. Dry soil in waste places. Britton notes that this species is apparently indigenous about Knoxville.

2. **Sisymbrium Sophia** L. (Herb-Sophia.) (*Sisymbrium Sophia* L. Sp. Pl. 659. 1753.) (*Descurainia Sophia* Webb; Prantl in Engler & Prantl. Nat. Pfl. 3:192. 1892.) (*Sophia Sophia* Britton, in Britt. & Brown, Ill. Fl. 2:144. 1897.) Minutely hoary-canescens, stem usually much branched, 3-8 dm. tall, somewhat bushy. Leaves 2-3 pinnatifid with linear or oblong-linear segments. Flowers very numerous; on slender pedicels, glabrous or nearly so. Pods narrowly linear, curved upward. Occasional in fields and gardens. Summer. Naturalized from Europe.

3. **Sisymbrium officinale** (L.) Scop. (Hedge Mustard.) (*Erysimum officinale* L. Sp. Pl. 660. 1753.) (*Sisymbrium officinale* Scop. Fl. Carn. Ed. 2, 2:26. 1772.) (*Sisymbrium leiocarpum* Jord. Diag. 1:139. 1864.) Branched; widely spreading annual; glabrous, or sparingly pubescent with simple hairs. Leaves variable, 2-20 cm. long, blades runcinate-pinnatifid, the segments 5-13, irregular, entire, toothed or lobed, the terminal one largest. Basal petioles long, decreasing above. Petals yellow, about twice as long as the sepals. Pods slender, 10-15 mm. long, each narrowed into a slender beak; thick-walled at maturity; scarcely stalked; close-pressed to the stem. Fairly common in waste places. Spring to fall. Naturalized from Europe.

13. RADICULA Hill, Brit. Herb. 265. 1765.

(RORIPA Scop. Fl. Carn. 520. 1760.) (NASTURTIUM R. Br. in Ait. Hort. Kew. Ed. 2, 4:109. 1812.)

Aquatic or hydrophytic herbs with erect or creeping stems; glabrous or sparingly pubescent with simple hairs. Leaves usually pinnate or pinnatifid. Flowers yellow or white; petals rarely wanting. Pods short or globular, terete or nearly so, the valves nerveless or 1-nerved. Seeds turgid, minute, in 2 rows (in ours) in each cell. Diminutive of *radix*, Latin, a root.

Key to the Species

- 1. Aerial leaves obviously pinnate.....1. *R. Nasturtium-aquaticum*
- 1. Aerial leaves not divided, merely toothed or lobed to deeply pinnatifid.....2
- 2. Aquatic, leaves finely divided.....2. *R. aquatica*
- 2. Terrestrial hydrophytes, none of the leaves finely dissected.....3
- 3. Flowers and pods sessile or nearly so.....3. *R. sessiliflora*
- 3. Flowers and pods manifestly pedicelled.....4
- 4. Leaves variously toothed but mostly not lobed, or the lower rarely pinnatifid, flowers white.....4. *R. Armoracia*
- 4. Nearly all leaves deeply pinnatifid; upper stem leaves sometimes only dentate; flowers yellow.....5. *R. palustris*

1. **Radicula Nasturtium-aquaticum** (L.) B. & R. (True Watercress.) (*Sisymbrium Nasturtium-aquaticum* L. Sp. Pl. 657. 1753.) (*Nasturtium officinale* R. Br. in Ait. Hort. Kew. Ed. 2, 4:110. 1812.) (*Roripa Nasturtium* Rusby, Mem. Torr. Club 3: Part 3, 5. 1893.) (*Radicula Nasturtium-aquaticum* Britton & Rendle, Brit. Seed Plants 3. 1907.) Glabrous; branching; floating or creeping; rooting at the nodes. Leaflets 3-11, nearly entire, the terminal larger than the lateral. Flowers white. Pods nearly terete, usually curved upward. Common in brooks and ditches. Used as salad. Spring to fall. Originally cultivated. Naturalized from Europe.

2. **Radicula aquatica** (Eat.) Robinson. (Lake Cress.) (*Cochlearia aquatica* Eaton, Man. Ed. 5, 181. 1829.) (*Nasturtium natans* var. *americanum* A. Gray, Ann. Lyc. N. Y. 3:223. 1836.) (*Nasturtium lacustre* A. Gray, Gen. Ill. 1:132. 1848.) (*Roripa americana* Britton, Mem. Torr. Club 5:169. 1894.) (*Neobeckia aquatica* Greene, Pittonia 3:95. 1896.) (*Radicula aquatica* Robinson, Rhodora 10:32. 1908.) Aquatic; immersed leaves 1-3 pinnately dissected

with filiform segments. Emerged leaves entire to pinnatifid, petals white. Pedicels widely spreading. Pods ovoid, a little longer than the style. Swamps along Tennessee and Cumberland Rivers. Not common. Summer.

3. **Radicula sessiliflora** (Nutt.) Greene. (Sessile-flowered Cress.) (*Nasturtium sessiliflorum* Nutt.; T. & G. Fl. N. A. 1:73. 1838.) (*Roripa sessiliflora* A. S. Hitchcock, Spring Fl. Manhattan 18. 1894.) (*Radicula sessiliflora* Greene, Leaflets 1:113. 1905.) Stems erect, tending to be simple. Leaves petioled, obtusely incised or toothed, obovate or oblong. Flowers minute, yellow, nearly sessile. Pods elongate-oblong, thick, style very short. Not common. Wet meadows and along ditches. Spring and early summer.

4. **Radicula Armoracia** (L.) Robinson. (Horseradish.) (*Cochlearia Armoracia* L. Sp. Pl. 648. 1753.) (*Nasturtium Armoracia* Fries; A. Gray, Man. 2, 31. 1856.) (*Roripa Armoracia* A. S. Hitchcock, Spring Fl. Manhattan 18. 1894.) (*Armoracia rusticana* Gaertn. Meyer & Schreb. Fl. Wett. 2:426. 1800.) (*Radicula Armoracia* Robinson, Rhodora 10: 32, 1908.) Erect from deep, thick, pungent roots. Root-leaves petioled, very large, oblong, crenate, rarely pinnatifid; stem-leaves lanceolate, sessile. Flowers white, showy. Pods globular, seldom formed. Cultivated to furnish well-known sauce. Rarely escaping into moist lowlands. Summer. Adventive from Europe.

5. **Radicula palustris** (L.) Moench. (Yellow Watercress.) (*Sisymbrium amphibium* var. *palustre* L. Sp. Pl. 657. 1753.) (*Radicula palustris* Moench, Meth. 263. 1794.) (*Nasturtium terrestre* R. Br. in Ait. Hort. Kew. Ed. 2, 4:110. 1812.) (*Nasturtium palustre* DC. Syst. 2:191. 1821.) (*Roripa palustris* Bess. Enum. 27. 1821.) Erect, branching, glabrous or slightly pubescent. Pedicels about as long as the flowers. Pods linear, or linear oblong, about equaling the pedicels. Style short.

6. **Radicula palustris** var. **hispida** (Desv.) Robinson. (*Brachylobus hispidus* Desv. Journ. Bot. 3:183. 1814.) (*Nasturtium hispidum* DC. Syst. 2:201. 1821.) (*Nasturtium palustre* var. *hispidum* A. Gray, Man. Ed. 2. 30. 1856.) (*Roripa hispida* Britton, Mem. Torr. Club 5:169. 1894.) (*Radicula hispida* Britton, Torreya 6:30. 1906.) (*Radicula palustris* *hispida* Robinson, Rhodora 10:32. 1908.) Hirsute; and often stouter than species. Pedicels longer than the globose pods. Both in wet meadows or shallow water. Both common. Late spring and summer. Natives of Eurasia.

14. CAMELINA Crantz, Stirp. Austr. 1:18. 1762.

Erect with entire, toothed, or pinnatifid leaves. Flowers small, yellowish. Pods pear-shaped, slightly flattened. Valves very convex, 1-nerved. Seeds numerous, marginless, in 2 rows.

1. **Camelina sativa** (L.) Crantz. (False Flax.) (*Myagrum sativum* L. Sp. Pl. 641. 1753.) (*Camelina sativa* Crantz, Stirp. Austr. 1:18. 1762.) Glabrous or nearly so. Leaves lanceolate and arrow-shaped. Pods 6-7 mm. broad. Not common. Weed in cultivated fields and waste places. Late spring and summer. Native of Europe.

15. HESPERIS (Tourn.) L. Sp. Pl. 663. 1753.

Erect, pubescent with simple or forked hairs. Leaves simple. Pods linear, nearly cylindrical, valves dehiscent. From ἑσπέρα, evening, because of the evening fragrance of the flowers.

1. **Hesperis matronalis** L. Sp. Pl. 663. 1753. (Dames Rocket.) Tall, roughish pubescent. Leaves lanceolate, simple; sessile or petiolate; entire or slightly dentate, very rarely inclined to be pinnatifid. Flowers white to purple, fragrant, petals clawed. Pods contracted between the seeds when ripe, spread-

ing. Seeds wingless. Cultivated, and escaped from gardens. Introduced from Europe. Occasional. Spring and early summer.

16 **IODANTHUS** T. & G.; A. Gray, Man. 32. 1848.

Erect perennial. Pods linear, somewhat flattened but not angular; valves 1-nerved. Wingless seeds, in one row in each cell. Flowers purplish; petals long-clawed. Name from ἰώδης; and ἄνθος, violet-colored flower. A monotypic genus of southeastern North America.

1. **Iodanthus pinnatifidus** (Michx.) Steud. (Purple Rocket.) (*Hesperis pinnatifida* Michx. Fl. Bor. Am. 2:31. 1803.) (*Iodanthus hesperidoides* T. & G.; A. Gray, Gen. Ill. 1:134. 1848.) (*Thelypodium pinnatifidum* S. Wats. Bot. King's Exp. 25. 1871.) (*Iodanthus pinnatifidus* Steud. Nomencl. Ed. 2, 812. 1841.) Glabrous. Root-leaves ovate, oblong to cordate; coarsely dentate, on slender petioles; the blades sharply and often doubly toothed, narrowing toward each end, the lower into a winged petiole, which is clasping and auriculate at the base; the lower part of the blade often pinnatifid into 2-6 pairs of segments; stem-leaves similar or merely dentate, the upper nearly sessile. Pods on short diverging pedicels, the short-pointed style remaining on fruit. Occasional throughout range. On river banks or bluffs. Spring and summer.

17. **BARBAREA** R. Br. in Ait. Hort. Kew. Ed. 2, 4:109. 1812.

Erect glabrous, branching, with angled stems, pinnatifid leaves and racemose yellow flowers. Silique linear and somewhat 4-angled, the valves keeled by a midnerve. Seeds in a single row in each cell, flat, marginless. Resembles *Radicula*. Named for St. Barbara to whom the herb was dedicated.

Key to the Species

- 1. Pods obscurely 4-angled, slender-pedicelled; lateral leaf segments 1-4 pairs1. *B. vulgaris*
- 1. Pods acutely 4-angled, pedicels almost as thick as the pods; lateral leaf segments 4-8 pairs.....2. *B. verna*

1. **Barbarea vulgaris** (L.) R. Br. (Common Wintercress.) (*Erysimum Barbarea* L. Sp. Pl. 660. 1753.) (*Barbarea vulgaris* R. Br. in Ait. Hort. Kew. Ed. 2, 4:109. 1812.) (*Barbarea vulgaris* var. *arcuata* A. Grey, Man. Ed. 2, 35. 1856.) (*Barbarea Barbarea* MacM. Met. Minn. 259. 1892.) Erect, smooth, the stems tufted. Lower leaves lyrate, petioled, the lateral lobes sometimes wanting. Upper leaves sessile or on short pedicels, sometimes clasping. Pods spreading or ascending, obscurely 4-angled, on slender pedicels. Throughout range, in waste places, but not as common as next species. Naturalized from Europe.

2. **Barbarea verna** (Mill.) Aschers. (Landcress.) (*Erysimum vernum* Mill. Gard. Dict. Ed. 8, No. 3. 1768.) (*Erysimum praecox* J. E. Smith, Fl. Brit. 2:707. 1800.) (*Barbarea praecox* R. Br. in Ait. Hort. Kew. Ed. 2, 4:109. 1812.) (*Barbarca verna* Aschers, Fl. Prov. Brandenb. 1:36. 1864.) Leaves all pinnatifid with 4-8 pairs of lateral lobes, the terminal one larger than the rest; toothed or entire, the upper sometimes auriculate-clasping. Flowers yellowish. Pods sharply 4-sided, slightly compressed on short stout pedicels. Cultivated as a salad (Scurvy Grass). In sandy waste places. Rather common. Spring. Introduced from Europe.

18. STENOPHRAGMA Celak. Flora 55:438. 1872.

Erect with the aspect of some species of *Arabis*. Pubescent with branching hairs. Leaves entire or toothed. Flowers small, white or pink. Pods narrowly linear, slightly angled; nerveless or finely nerved; dehiscent.

1. **Stenophragma Thaliana** (L.) Celak. (Mouse-ear Cress.) (*Arabis Thaliana* L. Sp. Pl. 665. 1753.) (*Sisymbrium Thalianum* Gray, Ann. Sci. Nat. 7:399. 1826.) (*Stenophragma Thaliana* Celak. Oester. Bot. Zeitsch. 27:117. 1877.) (*Arabidopsis Thaliana* (L.) Britton. Br. & Br. Ill. Fl. 2:176. 1913.) Slender, erect, usually branching. Pubescent, especially at base, with short stiff hairs. Basal leaves obtuse, oblanceolate or oblong, narrowed into a petiole; entire or barely toothed; stem leaves smaller, sessile, acutish. Sometimes almost leafless. Flowers white. Pods linear, somewhat longer than the spreading pedicels, glabrous. Fields and sandy places. A very common weed. Spring.

19. ERYSIMUM (Tourn.) L. Sp. Pl. 660. 1753.

Erect, branching, more or less pubescent, or hoary with appressed 2-3-branched hairs. Leaves simple; entire, toothed or lobed; some sessile but not clasping. Flowers yellow. Siliques linear, obtusely 4-angled. Seeds in 1 row in each cell. From ἐρύω; to cure, because of its supposed medicinal properties.

1. **Erysimum cheiranthoides** L. (Worm-seed Mustard.) (*Erysimum cheiranthoides* L. Sp. Pl. 661. 1753.) (*Cheirinia cheiranthoides* Link, Enum. Hort. Berol. 2:170. 1820.) (*Cheiranthus cheiranthoides* Heller, Cat. N. A. Pl. 4. 1898.) Minutely rough-pubescent. Erect, branching. Leaves lanceolate, entire or slightly toothed. Flowers small. Pods very obtusely 4-angled on slender diverging pedicels. Rare. In rich woods along Tennessee River bluffs. Undoubtedly indigenous here. April to June.

20. BRASSICA (Tourn.) L. Sp. Pl. 666. 1753.

Dr. L. H. Bailey (1930) has worked with the brassicas for nearly forty years. He calls them the most baffling plant group taxonomically, excluding *Rubus*, that he has attempted to study. To this genus belong many cultivated plants of importance, the cabbage, turnips, rapes, coles, and mustards. Frequent variation in many directions has made the taxonomy of the group most perplexing. *Brassica alba* and *Brassica arvensis* have often been separated from *Brassica* and placed in *Sinapis*. Bailey, who knows the group more thoroughly than any other taxonomist, can see no reason for this division, and believes that the genus, *Brassica*, should remain intact until more intelligent distinctions can be made. Adopting his judgment, the genus is kept undivided in the present paper. Bailey's key, somewhat shortened, is used for those recent escapes from cultivation found frequently or occasionally in eastern Tennessee. *B. arvensis* and *B. campestris*, pernicious weeds, are keyed also. All species of *Brassica* are natives of Europe or Asia.

Key to the Species

1. The COLES. Plants biennial or perennial or potentially so, the foliage thick and usually succulent, glaucous-blue or blue-green (red in some horticultural varieties of cabbage); flowers large, nearly 1/2 to 1 inch long, light in color (white to very pale yellow); siliques large and long2
1. The MUSTARDS. Plants annual in many cases, not making heavy durable stocks or caudices and usually without tuberous-thickened parts, the foliage usually thin and green or only superficially glaucous; flowers small3
 2. Inflorescence elongated and open at anthesis, 5-10 inches long, not closely corymbose at apex; flowers large, to 1 inch long, white or very light colored; young radical and heart leaves glabrous...1. *B. oleracea*
 2. Inflorescence short at anthesis, clustered or corymbose at top and usually 4 inches or less long at blooming time; flowers smaller, mostly 1/2 inch or less long and commonly yellow; young radical and heart leaves bearing a few translucent setae on ribs.....2. *B. Napus*
 3. Beak of glabrous silique or pod circular in section, not seed-bearing, slender or conical4
 3. Beak of hairy silique flat and knife-like, equaling or surpassing body, often bearing a seed; seeds very large, finely granulate or pitted under a pocket lens7
 4. Mature silique terete and elongated, spreading or standing away from the axis of raceme.....5
 4. Mature silique short and angled, closely appressed to rachis of raceme or parallel with it; seeds small, mostly angular, rough3. *B. nigra*
 5. Ripe seeds with featureless coats (not prominently pitted or marked) under a good hand-lens; silique not torose.....6
 5. Ripe seeds prominently pitted or foveolate under a hand-lens; siliques torose (corrugated) or with strongly keeled valves and very short beak.....4. *B. juncea*
 6. Root characteristically a large softish tuber without neck and roots only from under side (turnip), or heavy thick stock, plant potentially or actually biennial; stem-leaves mostly denticulate, variously clasping but not auriculate5. *B. Rapa*
 6. Root not a definite tuber; plants grown as potherbs or salads, or known chiefly as a weed.....6. *B. campestris*
 7. Leaves lyrate pinnatifid or pinnate with several pairs of lateral lobes or leaflets.....7. *B. alba*
 7. Leaves dentate or lobed, with few lobes.....8. *B. arvensis*

Six of these eight species of *Brassica* are cultivated forms and so well known that detailed analysis, aside from the long key descriptions, will not be given. The synonymy is confusing because of the many varietal names. Therefore only the correct scientific names of these six cultivated forms will be given together with the common name and economic uses.

1. **Brassica oleracea** L. Sp. Pl. 667. 1753. (Cabbage.) Cultivated in a number of variations as a leafy vegetable.
2. **Brassica Napus** L. Sp. Pl. 666. 1753. (Rape.) Cultivated for its seeds which are rich in oil.
3. **Brassica nigra** Koch, in Roehling, Deutsch. Fl. Ed. 3. 4:713. 1833. (Black Mustard.) Cultivated for the seeds which furnish the table mustard.
4. **Brassica juncea** Coss. Bull. Soc. France, 6:609. 1859. (Leafy Mustard.) Cultivated for greens, salad, pickles, and oil.

5. **Brassica Rapa** L. Sp. Pl. 666. 1753. (Turnip.) A biennial cultivated for its roots which are used as a vegetable.

6. **Brassica campestris** L. Sp. Pl. 666. 1753. (Field Mustard.) This species was formerly cultivated as a potherb and for its oil-yielding seeds, but lost its favor with the advent of the more desirable variations of *B. juncea*. It has persisted as a weed but is seldom troublesome. Erect annual; glaucous; glabrous or slightly pubescent. Fibrous-rooted or with a slender tap root. Lower leaves lyrate pinnatifid; on long petioles. Upper leaves sessile, their bases strongly cordate and clasping. Occasional about fields and along roadsides throughout range. Spring.

7. **Brassica alba** Rabenh. Fl. Lusit. 1:184. 1839. (White Mustard.) Cultivated as a potherb and for seeds.

8. **Brassica arvensis** Rabenh. Fl. Lusit. 1:184. 1839. (Charlock.) Erect or diffuse-spreading, much branched, sometimes 1 m. tall. Somewhat glaucous, often hispid pubescent and purplish below. Leaves not prominently lobed; petioled. Flowers deep yellow to whitish yellow. The most common mustard around grain fields. Spring.

21. RAPHANUS (Tourn.) L. Sp. Pl. 669. 1753.

Erect, branching, with lyrate leaves. White, yellow, pink or purplish showy flowers. Pods spongy and contracted between the seeds. No proper partition; style long; seeds spherical. From ῥᾶ and φαίνεσθαι, to appear quickly, because of the rapid germination.

Key to the Species

1. Pods longitudinally grooved, seeds 4-10.....1. *R. Raphanistrum*
 1. Pods not longitudinally grooved, seeds 2-3.....2. *R. sativus*

1. **Raphanus Raphanistrum** L. Sp. Pl. 669. 1753. (Wild Radish.) Leaves lyre-shaped; rough with stiff hairs, or rarely glabrous. Flowers yellow, fading to white or purplish, veiny. Pods necklace-form because of the constrictions, slender beaked. Common weed in cultivated fields. Naturalized from Europe. Late spring to summer.

2. **Raphanus sativus** L. Sp. Pl. 669. 1753. (Garden Radish.) Fleshy rooted. Similar to preceding, but flowers pale pinkish-purple to white. Pods fleshy, not grooved, short, hardly moniliform with a long conic beak. Rarely persisting after cultivation in gardens. Native of Asia.

CAPPARIDACEAE Lindl. Nat. Syst. Ed. 2, 61. 1836.

(CAPER FAMILY)

Herbaceous or woody (herbs in northern regions), often pungent like the Cruciferae; sometimes nauseous or poisonous. Leaves simple or palmately compound; stipules wanting or spine-like. Inflorescences in terminal racemes, rarely solitary. Flowers perfect; cruciform; regular or nearly so; white, yellow, or purple. Petals alike, sometimes unequal, usually clawed. Stamens 6 or more, not tetradynamous. Fruit a 1-celled pod, usually stalked; with 2 parietal placentae and no partition. Seeds kidney-shaped, embryo coiled, endosperm none.

Key to the Genera

1. Pods sessile or short-stiped; stamens more than 6.....1. *Polanisia*
 1. Pods long-stiped; stamens 6.....2. *Cleome*

1. **POLANISIA** Raf. Journ. Phys. 89:98. 1819.

Erect, often clammy-glandular, fetid herbs. Leaves alternate, mostly 3-foliolate. Flowers slightly irregular, in terminal bracted racemes. Petals clawed, notched at the apex. Stamens 8-32, unequal. Receptacle bearing a gland behind the base of the ovary. Pods silique-like, flattened, veiny, turgid, many-seeded, 2-valved at the apex. Seeds numerous. From *πολύ* and *άνισος*, many unequal, referring to the stamens.

1. **Palanisia graveolens** Raf. (Clammyweed.) (*Cleome dodecandra* Michx. Fl. Bor. Am. 2:32. 1803. Not L. 1753.) (*Polanisia graveolens* Raf. Am. Journ. Sci. 1:378. 1819.) Heavy-scented, usually erect, branching. Leaflets oblong. Petals short, white to pink. Stamens hardly longer than the petals. Calyx and filaments purplish. Sandy shores and banks. Rare, only reported by J. K. Small. June to August.

2. **CLEOME** L. Sp. Pl. 671. 1753.

Erect glabrous or glandular herbs. Leaflets 3-7. Flowers solitary or in terminal bracted racemes. Petals nearly equal, clawed. Stamens 6 (rarely 4). Fruit silique-like, flat, 2-valved. Seeds numerous, pendulous.

1. **Cleome spinosa** L. (Spider Flower.) (*Cleome spinosa* L. Sp. Pl. Ed. 2, 939. 1763.) (*Cleome pungens* Willd. Enum. Pl. 689. 1809.) Viscid-pubescent, leaflets 5-7, lanceolate, serrulate. Petals white or pink. Cultivated and occasionally persisting after escape. Summer. Native of the tropics. Reported only from Davidson County.

GLOSSARY⁵

- Acaulescent.* Stemless or apparently so with stem subterranean.
Accumbent. Cotyledons with margins folded against the hypocotyl.
Acuminate. Gradually tapering to the apex.
Acute. Sharp pointed.
Acutish. Almost, or somewhat acute.
Adventive. Not indigenous, but apparently becoming naturalized.
Alternate. Not opposite; with a single leaf at each node.
Anthesis. Period of flowering, or time of expansion of the flower.
Appressed. Lying close and flat against another organ.
Ascending. Growing obliquely upward, or upcurved.
Auricled. With basal ear-like lobes.
Awl-shaped. Tapering upward from the base to a slender or rigid point.
Axil. The point on a stem immediately above the base of a leaf.
Baccate. Berry-like, pulpy throughout.
Beaked. Ending in a prolonged tip.
Bifid. Two-cleft.
Bipinnate. Twice pinnate.
Bipinnatifid. Twice pinnatifid.
Blade. The flat expanded part of a leaf.
Bract. A more or less modified leaf subtending a flower or belonging to an inflorescence, or sometimes cauline.
Bulb. A bud with fleshy scales, usually subterranean.
Bulbous. Similar to a bulb; bearing bulbs.

⁵Definitions according to Gray (1908) and Britton and Brown (1913).

- Canescent.* With gray or hoary fine pubescence.
- Capsule.* A dry fruit of two carpels or more, usually dehiscent by valves or teeth.
- Cauline.* Pertaining to the stem.
- Cleistogamous.* Fertilized in the bud, without the opening of the flower.
- Cleft.* Cut about halfway to the midvein.
- Confluent.* Blended together.
- Cordate.* Heart-shaped.
- Corn.* A swollen fleshy base of a stem.
- Corolla.* The inner of two series of floral leaves.
- Corymbose.* Borne in corymbs; corymb-like.
- Cotyledon.* A rudimentary leaf of the embryo.
- Creeping.* Running along at or near the surface of the ground and rooting.
- Cuneate.* Wedge-shaped.
- Cyme.* A convex or flat flower-cluster of the determinate type, *i. e.*, the central flowers blooming earliest.
- Cymose.* Arranged in cymes; cyme-like.
- Deciduous.* Falling away at the close of the growing period.
- Decumbent.* Stems or branches in an inclined position, but the end ascending.
- Dehiscent.* Opening to emit the contents.
- Dentate.* Toothed, usually with the teeth directed outward.
- Diadelphous.* Stamens united into two sets.
- Didymous.* Twin-like; of two nearly equal segments.
- Diffuse.* Loosely spreading.
- Dissected.* Divided into many segments or lobes.
- Divided.* Cleft to the base or to the mid-nerve.
- Emarginate.* Notched at the apex.
- Emersed.* Above the surface of the water.
- Endemic.* Confined to a limited area.
- Endosperm.* The substance surrounding the embryo of a seed.
- Entire.* Without divisions, lobes, or teeth.
- Fetid.* Ill-smelling.
- Filiform.* Thread-like.
- Foveolate.* Having small pits or depressions.
- Fugacious.* Falling soon after development.
- Fusiform.* Spindle-shaped.
- Glabrous.* Devoid of hairs.
- Gland.* A secreting surface or structure.
- Glandular.* With glands.
- Glaucous.* Covered with a fine bluish or white bloom.
- Globose.* Spherical or nearly so.
- Hirsute.* With rather coarse stiff hairs.
- Hispid.* With bristly stiff hairs.
- Hoary.* Grayish-white with a fine close pubescence.
- Hypogynous.* Borne at the base of the ovary, or below.
- Imbricated.* Overlapping.
- Immersed.* Growing wholly under water.
- Incised.* Cut sharply and irregularly, more or less deeply.
- Incumbent.* With the back against the hypocotyl.
- Indehiscent.* Not opening.
- Indigenous.* Native and original to the region.
- Inflated.* Bladdery.
- Inflorescence.* The flowering part of a plant.
- Irregular.* A flower in which one or more of the organs of the same series are unlike.
- Keel.* A central dorsal ridge, like the keel of a boat.
- Laciniate.* Cut into narrow lobes or segments.
- Lanceolate.* Considerably longer than broad, tapering upward from the middle or below; lance-shaped.
- Leaflet.* One of the divisions of a compound leaf.

- Linear.* Elongated and narrow with sides nearly parallel.
Lobed. Divided to about the middle.
Lyrate. Pinnatifid, with the terminal lobe or segment considerably larger than the others.
Moniliform. Like a string of beads; cylindrical with contractions at intervals.
Mucronate. With a short sharp abrupt tip.
Nodose. Similar to nodes or joints; knotty.
Obcordate. Inversely heart-shaped.
Oblanceolate. Inverse of lanceolate.
Oblong. Longer than broad with the sides nearly parallel, or somewhat curving.
Obovate. Inversely ovate.
Obtuse. Blunt, or rounded.
Orbicular. Approximately circular in outline.
Ovate. In outline like a longitudinal section of a hen's egg.
Palmate. Diverging radiately like the fingers.
Panicle. A compound flower cluster of the racemose type.
Paniculate. Borne in panicles.
Parietal. Borne along the wall of the ovary, or pertaining to it.
Parted. Deeply cleft.
Pedicel. The stalk of a flower in a flower-cluster.
Peduncle. Stalk of a flower, or a flower-cluster.
Perfect. Flowers with both stamens and pistils.
Persistent. Organs remaining attached to those bearing them after the growing period.
Petiole. The stalk of the leaf.
Pilose. With long soft hairs.
Pinnate. Leaves divided into leaflets or segments along a common axis.
Pinnatifid. Pinnately cleft to the middle or beyond.
Placenta. The interior part of the ovary which bears the ovules.
Pod. Any dry and dehiscent fruit.
Prismatic. Of the shape of a prism; angular, with flat sides, and of nearly uniform size throughout.
Puberulent. With very short hairs.
Pubescent. With hairs.
Pungent. Acrid.
Pyriform. Pear-shaped.
Raceme. A simple inflorescence of pediceled flowers upon a common more or less elongated axis.
Racemose. In racemes, or resembling a raceme.
Rachis. The axis of a compound leaf, or of a spike or raceme.
Radical. Belonging to or proceeding from the root or base of the stem near the ground.
Recurved. Curved backward.
Reniform. Kidney-shaped.
Repand. With a somewhat wavy margin.
Rootstock. A subterranean stem.
Rosulate. Like a rosette.
Rugose. Wrinkled.
Runcinate. Sharply pinnatifid, or incised, the lobes or segments turned backward.
Sagittate. Like an arrow-head.
Scape. A leafless or nearly leafless stem or peduncle, arising from a subterranean part of a plant, bearing a flower or flower-cluster.
Scapose. Having scapes.
Septate. Provided with partitions.
Serrate. With teeth projecting forward.
Serrulate. Diminutive of serrate.
Sessile. Without a stalk.
Setose. Bristly.
Silicle. A silique much longer than wide.

- Winged.** An elongated two-valved capsular fruit, with two valved forms usually dehiscent. The peculiar part of the *Veronica*.
- Sinuate.** With strongly wavy margins.
- Smooth.** Without roughness or pubescence.
- Spike.** An elongated flower-cluster, with sessile or nearly sessile flowers.
- Spiny.** With sharp, rigid outgrowths.
- Spreading.** Diverging nearly at right angles; nearly general.
- Spur.** A hollow sac-like or tubular extension of some part of a flower.
- Stellate.** Star-like.
- Strict.** Straight and erect.
- Subcordate.** Somewhat heart-shaped.
- Subterete.** Nearly terete.
- Superior.** Applied to the ovary when free from the calyx.
- Terete.** Circular in cross section.
- Tetradynamous.** With four long stamens and two shorter ones.
- Undulate.** With wavy margins.
- Value.** One of the pieces into which a capsule splits.
- Villous.** With long soft hairs, not matted together.
- Whorl.** A group of three or more similar organs radiating from a node.
- Wing.** Any membranous or thin expansion bordering or surrounding an organ.

ABBREVIATIONS OF NAMES OF AUTHORS

- ADANS.** Adanson, Michel.
- AIT.** Aiton, William.
- BERNH.** Bernhardt, Johann Jacob.
- POECK.** Pockhausen, Moritz Bahihazar.
- B. S. P.** Britton, N. L.; Sterns, Emerson Alexander; Poggenberg, Juma.
- CASS.** Cassini, Henri.
- CELAK.** Celakowsky, Ladislav.
- DC.** De Candolle, Augustin Pyramus.
- DESV.** Desvaux, Nicaise Augustin.
- DILL.** Dillen, John Jacob.
- EAT.** Eaton, Amos.
- ENGELM.** Engelmann, George.
- GAERTN.** Gaertner, Carl Friedrich.
- HORNEM.** Hornemann, Jens Wilken.
- JORD.** Jordan, Alexis.
- B. JUSS.** Jussieu, Bernard de.
- KARST.** Karsten, H.
- L.** Linnaeus, Carolus.
- LAM.** Lamarck, Jean Baptiste.
- LESTIB.** Lestiboudois, Francois Joseph.
- LINDL.** Lindley, John.
- MACM.** MacMillan, Conway.
- MEDIC.** Medicus, Friedrich Cassimir.
- MICHX.** Michaux, Andre.
- MILL.** Miller, Philip.
- MILLSP.** Millspaugh, Charles Frederic.
- MUHL.** Muhlenberg, Henrich Ludwig.
- NUTT.** Nuttall, Thomas.
- PERS.** Persoon, Christian Hendrik.
- POIR.** Poiret, Jean Louis Marie.
- R. BR.** Brown, Robert.
- RAF.** Rafinesque-Schmaltz, Constantino Samuel.
- RYDB.** Rydberg, Per Axel.
- SCHREB.** Schreber, Johann Christian Daniel von.
- SCOP.** Scopoli, Johann Anton.
- SHUTTLW.** Shuttleworth, Robert.

The Mustards of Eastern Tennessee

SULLIV. Sullivant, William Starling.
S. WATS. Watson, Sereno.
T. & G. Torrey, John and Gray, Asa.
TORR. Torrey, John.
TOURN. Tournefort, Joseph Pitton de.
WALP. Walpers, Wilhelm Gerhard.
WALT. Walter, Thomas.
WEB. Weber, Friedrich.
WILLD. Willdenow, Carl Ludwig.

ABBREVIATIONS OF PUBLICATIONS⁶

A. GRAY BULL. Asa Gray's Bulletin.
A. GRAY MAN. Asa Gray's Manual.
AMER. JOURN. SCI. American Journal of Science.
ANN. LYC. N. Y. Annals of the Lyceum of Natural History of New York.
ANN. MO. BOT. GARD. Annals of the Missouri Botanical Garden.
ANN. SCI. NAT. Annales des Sciences Naturelles.
BOT. GAZ. Botanical Gazette.
BOT. REG. Botanical Register.
BULL. SOC. FRANCE. Bulletin Societe Francaise de Botanique.
BULL. TORR. CLUB. Bulletin of the Torrey Botanical Club.
BULL. WEST VA. AGRIC. EXP. STA. Bulletin of the West Virginia
Agricultural Experiment Station.
CAT. N. A. PL. Catalogue of North American Plants.
DC. SYST. VEG. De Candolle Regni Vegetabilis Systema Naturale.
EDINB. PHIL. JOURN. Edinburgh Philosophical Journal.
ENGLER. & PRANTL. NAT. PFLF. Engler and Prantl Naturlichen
Pflanzenfamilien.
FL. BOR. AM. Flora of Boreal America.
FL. N. A. Flora of North America.
FL. N. W. AM. Flora of Northwestern America.
FL. SE. U. S. Flora of the Southeastern United States.
GATT. PFL. Gattungen der Pflanzen.
ILL. FL. Illustrated Flora (Britton & Brown).
JOUR. BOT. Journal of Botany.
JOURN. PHYS. Journal of Physiology.
MEM. MUS. PARIS. Memoires Museum d'Histoire Naturelle de Paris.
MEM. TORR. CLUB. Memoirs of the Torrey Botanical Club.
OESTER. BOT. ZEITSCH. Oesterreichische Botanische Zeitschrift.
PHIL. BOT. SYN. Philadelphia Botanical Sentinal.
PRODR. Prodrromus Systematis Naturalis Regni Vegetabilis.
REP. GEOL. SURV. Report of the Geological Survey.
SP. PL. Species Plantarum.
STEUD. Steudel, Ernest Gottlieb.
SYN. FL. Synoptical Flora.
TRANS. AM. PHIL. SOC. Transactions of the American Philosophical
Society.
TRANS. N. Y. ACAD. SCI. Transactions of the New York Academy of
Sciences.
TRANSYL. JOURN. MED. Transylvania Journal of Medicine and Associate
Sciences.

⁶From "World List of Scientific Periodicals." Vols. I and II. London. 1927.

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