

Division **5. MAGNOLIOPHYTA** Cronquist, Takht. & W. Zimm.

Class **1. MAGNOLIOPSIDA** Cronquist, Takht. & W. Zimm.

Order **7. CAPPARALES** Hutch.

Deciduous *trees, shrubs* or annual *herbs*. *Leaves* alternate. *Flowers* solitary or in terminal racemes. *Sepals* 4. *Petals* 4. *Stamens* numerous. *Ovary* superior. *Fruit* of 2 united carpels.  
Contains 5 families and nearly 4000 species.

**68. CAPPARACEAE** Juss. nom. conserv.

Deciduous *trees, shrubs* or annual *herbs*. *Leaves* alternate, simple, with 3 leaflets or palmate; stipules present or absent. *Flowers* solitary or in terminal racemes, bisexual, somewhat bilaterally symmetric. *Sepals* 4, free or united in lower part. *Petals* 4, usually stalked. *Stamens* about 6 or numerous. *Ovary* superior, stalked, the stalk lengthening in fruit. *Fruit* 1-celled, of 2 united carpels; seeds few to many.  
Contains 45 genera and about 700 species, mainly in the tropics.

**1. Cleome** L.

Erect *annuals* or shrubby *perennials*, often with glandular hairs. *Leaves* alternate, compound; stipules absent, but leaf-stalks sometimes with a solitary spine at base. *Flowers* in terminal bracteate racemes, bisexual. *Sepals* 4. *Petals* 4. *Stamens* usually 6. *Ovary* stalked, the stalk lengthening considerably in fruit. *Fruit* a 2-celled, many-seeded capsule; seeds brown, reniform, smooth.  
Contains about 150 species, mainly in the tropics.

**1. C. sesquiorialis** Naudin ex C. Huber Spiderflower  
*C. hassleriana* Chodat; *C. spinosa* auct.; *C. arborea* auct.; *C. pungens* auct.

*Annual herb*. *Stem* 1–2 m, erect, glandular hairy. *Leaves* palmate; leaflets 5–7, 3–7 × 0.8–1.5 cm, medium green, narrowly elliptical, acuminate at apex, entire, narrowed at base, with a short petiolule; petiole about as long as leaflets, often with a spine at base. *Inflorescence* a long raceme, each scented flower subtended by an ovate, cordate bract. *Sepals* 4, lanceolate, free. *Petals* 4, 25–40 mm, pink or violet, rarely white, elliptical, distinctly stalked, soon fading and falling. *Stamens* usually 6, up to 6 cm. *Capsule* 5–15 × about 0.3 cm, narrowly cylindrical and often curved, glabrous. *Flowers* 6–9.

Introduced. Grown as a bedding plant and sometimes occurs as a relic on tips in southern Great Britain. Native of South America from south-east Brazil to Argentina.

**69. BRASSICACEAE** Burnett nom. conserv.

*CRUCIFERAE* Juss. nom. altern.

*Annual to perennial herbs*, rarely woody at the base. *Leaves* alternate, simple to pinnate, petiolate to sessile,

without stipules. *Inflorescence* usually a raceme, usually much elongating after flowering, sometimes a panicle, usually ebracteate. *Flowers* normally bisexual, usually actinomorphic, hypogynous. *Sepals* 4, free, in 2 decussate pairs, the inner pair often with saccate bases in which nectar collects. *Petals* 4, free, rarely absent, commonly white or yellow, placed diagonally and alternating with the sepals. *Stamens* usually 6, an outer transverse pair with short filaments and 2 inner pairs with long filaments, one pair on the anterior and one on the posterior side; sometimes 4, by suppression of the outer pair, or fewer; filaments sometimes with tooth-like or wing-like appendages. *Glands* varying in size, shape and position lying around the bases of the stamens and ovary and secreting nectar. *Ovary* usually 2-celled, each with 1–many ovules. *Style* 1, rudimentary to long; stigma capitate, discoid or more or less 2-lobed. *Fruit* a specialised capsule called a *siliqua* if more than 3 times as long as wide, and a *silicula* if less than 3 times as long as wide, opening from below by 2 valves, sometimes breaking into segments transversely, *dehiscent* or *indehiscent*, the relative size of the dehiscent and indehiscent parts varying greatly. *Seeds* are attached to the *placentae* and adjacent wall tissue, the *replum* and the false *septum*; sometimes one or more seeds also develop in an indehiscent *beak* at the base of the style and some species have their seeds confined to this beak, which may then break transversely at maturity into 1-seeded parts and is thus a *lomentum*. *Seeds* are usually in 1 (*uniseriate*) or 2 (*biseriate*) rows. The position of the *septum* relative to a cross-section of the siliqua or silicula is an important character. When the septum is across the widest part of the cross-section it is said to be *latiseptate*, when across the narrowest part *angustiseptate*.

Contains about 375 genera and 3200 species, cosmopolitan, but chiefly in north temperate regions.

Rich, T. C. G. (1991). *Crucifers of Great Britain and Ireland*. BSBI. London. [An excellent account with illustrations of most species.]

Schulz, O. E. (1936). Cruciferae. In Engler, A. & Prantl, K., *Die natürlichen Pflanzenfamilien*. Ed. 2, **17b**: 227–658.

- 1. Fruit with 2 segments, the upper flat, foliaceous or lingulate, the lower with 1 or 2 seeds **48. Carrichtera**
- 1. Fruit without a terminal, flat, foliaceous or lingulate segment, often not segmented or with more than 2 segments 2.
- 2. Fruit pendulous, flat, not more than 13 times as long as wide 3.
- 2. Fruit erect or patent, rarely pendulous and more or less flattened, but then more than 12 times as long as wide 4.
- 3. Petals yellow; fruit with a wide often inflated wing **6. Isatis**
- 3. Petals white; fruit not winged **33. Peltaria**

4. Fruits lomentaceous – that is transversely articulate with 2 or more segments often separating at maturity; the lower segment 2-valved and dehiscent or sterile and stipitiform; the upper segment usually indehiscent	5.	21. Siliqua 3-veined, not beaked	1. <b>Sisymbrium</b>
4. Fruit a siliqua or silicula, sometimes dividing into several portions, or hard and indehiscent	9.	21. Siliqua 3- to 7-veined; beak 10 mm or more	43. <b>Sinapis</b>
5. Upper segment of fruit globose or ovoid, sometimes shortly beaked	6.	22. Siliqua not more than 7 times as long as wide	23.
5. Upper segments of fruit cylindrical or oblong-ovoid, sometimes constricted between the seeds	7.	22. Siliqua more than 7 times as long as wide	24.
6. Upper segment of fruit beaked or with a distinct persistent style		23. Seeds in 1 row in each loculus	17. <b>Arabis</b>
6. Upper segment of fruit not beaked; style absent		23. Seeds in 2 rows in each loculus	23. <b>Draba</b>
		24. Valves with median vein weak or absent	25.
7. Lower segment of fruit 2-valved, dehiscent, with 2–4 seeds (rarely some fruits with a sterile, stipitiform lower segment)		24. Valves with distinct median vein	29.
7. Lower segment of fruit indehiscent, often sterile and stipitiform or very small, with 0–2 seeds	8.	25. Valves flat, the siliqua strongly compressed	26.
8. Upper segment of fruit not more than 3 times as long as wide, mitre-shaped, usually 1-seeded		25. Valves convex, the siliqua not strongly compressed	27.
8. Upper segment of fruit at least 5 times as long as wide, cylindrical and often contracted between the seeds		26. Valves coiling spirally from the base and dehiscing suddenly at maturity	16. <b>Cardamine</b>
9. Fruit a siliqua, at least 3 times as long as wide	10.	26. Valves not coiled spirally	17. <b>Arabis</b>
9. Fruit a silicula, less than 3 times as long as wide	54.	27. Petals white	13. <b>Nasturtium</b>
10. Glabrous or with unbranched hairs only	11.	27. Petals yellow	28.
10. Hairs stellate, branched, or a mixture of branched and unbranched	38.	28. Inflorescence corymbose, seeds in 1 row in each loculus	12. <b>Barbarea</b>
11. Sepals erect (calyx closed)	12.	28. Inflorescence not corymbose; seeds in 2 rows in each loculus	14. <b>Rorippa</b>
11. Sepals erecto-patent or patent	19.	29. Siliqua strongly compressed	17. <b>Arabis</b>
12. Leaves simple, entire, somewhat fleshy	13.	29. Siliqua not strongly compressed	30.
12. At least some leaves toothed, lobed or divided (lyrate to pinnatisect)	15.	30. Petals yellow, sometimes with violet veins	31.
13. Cauline leaves cordate-amplexicaul; glabrous annuals		30. Petals white, veined with violet or purple	35.
13. Cauline leaves not amplexicaul; perennial or biennial	14.	31. Seeds in 2 rows in each loculus	32.
14. Valves of siliqua with only 1 prominent vein	42. <b>Brassica</b>	31. Seeds in 1 row in each loculus	33.
14. Valves of siliqua with 3 prominent veins	46. <b>Coincya</b>	32. Not caespitose; stems leafy	41. <b>Diplotaxis</b>
15. Stigma deeply 2-lobed	16.	32. Caespitose perennial; cauline leaves few or absent	42. <b>Brassica</b>
15. Stigma capitate, entire or slightly 2-lobed		33. Valves of the siliqua rounded on the back; median nectaries absent; lateral nectaries prismatic	42. <b>Brassica</b>
16. Siliqua not beaked; middle and upper cauline leaves simple, dentate or serrate	9. <b>Hesperis</b>	33. Valves of the siliqua keeled, median nectaries present or, if absent, the lateral nectaries semilunar or 2-lobed	34.
16. Siliqua with an ensiform beak; cauline leaves pinnatifid	44. <b>Eruca</b>	34. Median nectaries present; valves of siliqua not or only slightly torulose	12. <b>Barbarea</b>
17. Valves of siliqua with 1 prominent vein	42. <b>Brassica</b>	34. Median nectaries absent; valves of siliqua torulose	45. <b>Erucastrum</b>
17. Valves of siliqua with 3 veins, at least when young	18.	35. Seeds in 2 rows in each loculus	41. <b>Diplotaxis</b>
18. Petals with a long filiform claw; ovary with 16–50 ovules	46. <b>Coincya</b>	35. Seeds in 1 row in each loculus	36.
18. Petals with a short claw; ovary with 8–14 ovules	47. <b>Hirschfeldia</b>	36. Stout perennial up to 2 m; basal leaves 10–40 cm	42. <b>Brassica</b>
19. Valves with 3–7 veins	20.	36. Slender annual or perennial up to 50 cm; basal leaves much less than 10 cm	37.
19. Valves with a single median vein or veinless	22.	37. Most flowers subtended by a bract	1. <b>Sisymbrium</b>
20. Petals white	4. <b>Alliaria</b>	37. Flowers ebracteate	5. <b>Arabidopsis</b>
20. Petals yellow	21.	38. Stigma deeply 2-lobed, the lobes sometimes erect and connate to form a beak on the siliqua	39.
		38. Stigma capitate, retuse or slightly 2-lobed	44.
		39. Lobes of the stigma with a dorsal swelling or horn	11. <b>Matthiola</b>
		39. Lobes of the stigma without a swelling or horn	40.
		40. Petals yellow	41.
		40. Petals white, pink or violet, rarely reddish	42.
		41. Hairs all medifixed; style 2–3 mm in fruit	8. <b>Erysimum</b>
		41. Hairs various, but not all medifixed; style about 1 mm or less in fruit	9. <b>Hesperis</b>

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42. Inner sepals not saccate at base	10. <b>Malcolmia</b>	61. Petals yellow	62.
42. Inner sepals saccate at base	43.	61. Petals white	63.
43. Style short, the stigma lobes free	9. <b>Hesperis</b>	62. Plant with at least some leaves pinnate or pinnatifid or coarsely toothed; cauline leaves numerous	14. <b>Rorippa</b>
43. Style absent, the stigma lobes erect and connate	10. <b>Malcolmia</b>	62. Leaves usually entire; cauline leaves usually absent	23. <b>Draba</b>
44. Leaves 2- to 3-pinnatisect	2. <b>Descurainia</b>	63. Robust plants up to 1 m with fusiform roots	15. <b>Armoracia</b>
44. Leaves entire to pinnatisect	45.	63. Slender plants 2–40 cm; roots not fusiform	64.
45. Petals yellow	46.	64. Filaments curved	23. <b>Draba</b>
45. Petals white, pink or purple	49.	64. Filaments straight	25. <b>Cochlearia</b>
46. Siliqua not more than 10(–12) mm, not more than 6 times as long as wide	23. <b>Draba</b>	65. Sepals erect (calyx closed)	66.
46. Siliqua 10 mm or more, at least 10 times as long as wide	47.	65. Sepals patent or erecto-patent (calyx more or less open)	67.
47. Cauline leaves not amplexicaul	8. <b>Erysimum</b>	66. Silicula dehiscent, variously shaped, not reticulate-rugose	26. <b>Camelina</b>
47. Cauline leaves amplexicaul, sagittate or cordate at base	48.	66. Silicula indehiscent, subglobose, sometimes compressed, reticulate-rugose	27. <b>Neslia</b>
48. Siliqua hairy	5. <b>Arabidopsis</b>	67. Petals deeply 2-lobed	68.
48. Siliqua glabrous	17. <b>Arabis</b>	67. Petals entire or emarginate	71.
49. Plant more or less densely covered with medifixed hairs; style (1.5–)2.6 mm	8. <b>Erysimum</b>	68. Scapigerous; leaves mainly in basal rosette	24. <b>Erophila</b>
49. Plant with unbranched, branched or stellate hairs, sometimes mixed with a few medifixed hairs	50.	68. Not scapigerous; cauline leaves present	69.
50. Style at least 2.5 mm	18. <b>Aubrieta</b>	69. Petals white	21. <b>Berteroa</b>
50. Style not more than 2 mm	51.	69. Petals yellow	70.
51. Siliqua less than 10 times as long as wide	52.	70. Petals divided for less than one-third of their length	20. <b>Alyssum</b>
51. Siliqua at least 10 times as long as wide	53.	70. Petals divided for more than one-third of their length	21. <b>Berteroa</b>
52. Seeds in 1 row in each loculus	17. <b>Arabis</b>	71. Petals yellow	72.
52. Seeds in 2 rows in each loculus	23. <b>Draba</b>	71. Petals white, pink or purplish	73.
53. Valves of silicula rounded or angled	5. <b>Arabidopsis</b>	72. Annual or perennial; not scapose; leaves often toothed, wider	20. <b>Alyssum</b>
53. Valves of silicula flat, rarely keeled	17. <b>Arabis</b>	72. Dwarf, scapose perennials; leaves usually entire, often linear	23. <b>Draba</b>
54. Silicula with 3 loculi, the upper 2 side by side, sterile, the lower 1-seeded	3. <b>Myagrum</b>	73. Hairs nearly all medifixed	22. <b>Lobularia</b>
54. Silicula without 2 sterile loculi side by side	55.	73. Hairs stellate or branched	23. <b>Draba</b>
55. Silicula with 4 longitudinal wings or ridges or curved with irregular protuberances	7. <b>Bunias</b>	74. Fruits didymous; reniform or cordate	75.
55. Silicula without 4 wings or ridges and not curved with irregular protuberances	56.	74. Fruits not didymous; reniform or cordate, but sometimes obcordate	76.
56. Silicula latiseptate (compressed parallel to the septum which is therefore as wide as the widest diameter of the fruit), rarely nut-like	57.	75. Cauline leaves sessile, amplexicaul; petals about 4 mm	37. <b>Cardaria</b>
56. Silicula angustiseptate (compressed at right angles to the septum)	74.	75. Cauline leaves shortly petiolate; petals 0.5–1.5 mm	38. <b>Coronopus</b>
57. Ovary surrounded at the base by a glandular intrastaminal ring; small aquatic; leaves all basal	39. <b>Subularia</b>	76. Outer petals conspicuously larger than the inner	77.
57. Ovary without glandular ring; terrestrial, or if aquatic then leaves not all basal	58.	76. Petals (when present) equal in size	78.
58. Glabrous or with unbranched hairs	59.	77. Style distinct; stigma capitate	35. <b>Iberis</b>
58. At least some of the hairs branched or stellate	65.	77. Style inconspicuous	31. <b>Teesdalia</b>
59. Sepals erect or nearly so (calyx closed)	60.	78. Filaments with a wing or tooth-like appendage	31. <b>Teesdalia</b>
59. Sepals patent or erecto-patent (calyx more or less open)	61.	78. Filaments not appendaged	79.
60. Petals (10–)12 mm or more; silicula 20–90 × (10–)15–35 mm	19. <b>Lunaria</b>	79. Valves of fruit winged or strongly keeled	80.
60. Petals not more than 10 mm; silicula not more than 12 × 8 mm	26. <b>Camelina</b>	79. Valves of fruit not winged or keeled	83.
		80. Inflorescence leafy or bracteate at base; seeds curved, with transparent papilliform glands	30. <b>Ionopsidium</b>

80. Inflorescence ebracteate; seeds not curved, without transparent papilliform glands 81.
81. Seed solitary, pendulous from apex of each loculus 36. **Lepidium**
81. Seeds 1–8 in each loculus 82.
82. Plant without rhizome; cauline leaves sessile, clasping stem 32. **Thlaspi**
82. Plant with a strong rhizome; cauline leaves all petiolate 34. **Pachyphragma**
83. Fruit triangular-obcordate 28. **Capsella**
83. Fruit not triangular-obcordate 84.
84. Leaves simple 25. **Cochlearia**
84. Leaves pinnate or pinnatisect 29. **Hornungia**

Tribe 1. **Sisymbrieae** DC.

*Hairs* simple eglandular or branched, rarely glandular. *Sepals* spreading. *Petals* yellow or white. *Filaments* without appendages. *Stigma* capitate, often shortly 2-lobed. *Median nectaries* present, confluent with the lateral. *Fruit* a siliqua, rarely a silicula, usually beakless.

1. **Sisymbrium** L.

*Annual to perennial herbs*, glabrous or with simple, eglandular hairs. *Leaves* mostly pinnatisect or pinnatifid, rarely simple. *Inflorescence* usually a rather lax raceme, usually ebracteate, rarely bracteate. *Sepals* 4, not or slightly saccate. *Petals* 4, pale to bright yellow, rarely whitish, usually clawed. *Stamens* 6, without appendages; nectar glands round the bases of transverse stamens and outside bases of median, joined in a complete ring. *Style* usually distinct; stigma capitate or emarginate. *Fruit* a siliqua, without a beak; valves convex with a distinct midrib and usually 2 weaker laterals; seeds usually numerous, small, not winged, uniseriate.

Many species, chiefly in temperate Europe, North Africa and Asia, but it is very uncertain where the weed species are native.

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1. Inflorescence bracteate, at least in the lower part 2.
1. Inflorescence ebracteate 3.

2. Petals 1.5–2.5 mm; style distinctly thinner than siliqua 8. **polyceratum**
2. Petals 2.5–3.5 mm; style almost as thick as siliqua 9. **runcinatum**
3. Siliqua not more than 20 mm, closely adpressed to the stem 4.
3. Siliqua usually more than 20 mm, not closely adpressed to the stem. 5.
4. Siliqua hairy 11(i). **officinale** var. **officinale**
4. Siliqua glabrous 11(ii). **officinale** var. **leiocarpum**
5. Lower leaves ovate, entire or dentate 6.
5. At least the lower leaves deeply lobed or divided 8.
6. Annual; petals less than 3 mm, not exceeding the sepals 10. **erysimoides**
6. Biennial or perennial; petals more than 3 mm, exceeding the sepals 7.
7. Petals 4.5–10.0 mm; lower pedicels 8–10 mm in fruit; seeds 2–3 mm 1. **strictissimum**
7. Petals 3.5–5.0 mm; lower pedicels 3–6 mm in fruit; seeds 1.0–1.5 mm 5. **austriacum**
8. Petals less than 3 mm, shorter than or only slightly exceeding the sepals; anthers about 0.5 mm 9.
8. Petals 3 mm or more, distinctly exceeding the sepals; anthers (0.7)1.0–3.0 mm 11.
9. Pedicels 3–6 mm in flower, up to 20 mm in fruit and much thinner than the siliqua 2. **irio**
9. Pedicels 1–2 mm in flower, up to 5 mm in fruit and almost as thick as the siliqua 10.
10. Lower leaves sinuate-pinnatifid, the lateral lobes more or less triangular; stamens about 1.5 mm, shorter than the petals 8. **polyceratum**
10. Lower leaves lyrate-pinnatifid, the lateral lobes obovate to lanceolate; stamens about 3 mm, longer than the petals 10. **erysimoides**
11. Pedicel about as thick as siliqua, usually at least 0.7 mm in diameter at the base 12.
11. Pedicel thinner than siliqua, rarely more than 0.5 mm in diameter at the base 14.
12. Ovules not more than 30 in each loculus; siliqua rarely more than 60 mm 5. **austriacum**
12. Ovules 40–60 in each loculus; siliqua 50–100(–180) mm 13.
13. Uppermost leaves more or less sessile, pinnatisect, with the terminal lobe linear; outer sepals horned 6. **altissimum**
13. Uppermost leaves shortly petiolate, entire or hastate, with the terminal lobe oblong or lanceolate; outer sepals not horned 7. **orientale**
14. Inflorescence very contracted, the young siliquas distinctly overtopping the flowers and buds; anthers 0.7 mm 2. **irio**
14. Inflorescence elongate, the young siliquas not or scarcely overtopping the flowers; anthers 1–2 mm 15.
15. Siliqua less than 15 mm, usually strongly contorted 5. **austriacum**
15. Siliqua more than 15 mm, straight or only slightly contorted 16.



16. Septum of the siliqua white, opaque; stem glabrous or with short upwardly curving hairs; seeds 1.0–1.5 mm **5. austriacum**
16. Septum of the siliqua more or less hyaline; stem glabrous or hispid 17.
17. Sepals 2.0–4.5 mm; petals 4.5–7.5 mm; seeds 0.7–1.0 mm **3. loeselii**
17. Sepals 3.5–6.0 mm; petals 6–10 mm; seeds 1.0–1.5 mm **4. volgense**

Section 1. **Norta** (Adans.) DC.

*Norta* Adans.

*Leaves* simple and dentate. *Inflorescence* ebracteate. *Flowers* yellow. *Siliqua* not addressed; seeds numerous; valves (1–)3(–5)-veined.

1. **S. strictissimum** L. Perennial Rocket

*Perennial herb*, with a stout rootstock tasting like horseradish. *Stems* 60–120 cm, pale green, erect, with short downwardly directed hairs below, branched above, very leafy. *Leaves* alternate, medium green on upper surface, paler beneath; basal absent; lower cauline with lamina 3–8 × 1–3 cm, lanceolate or ovate, acute or acuminate at apex, more or less entire to shallowly toothed, rounded to cuneate at base and petiolate; upper cauline similar but smaller, shortly petiolate or sessile; all hairy beneath. *Inflorescence* of numerous racemose panicles terminating stem and branches, ebracteate; pedicels (4–)8–10 mm, erect to recurved. *Sepals* 4, 4.5–6.5 mm, green, oblong, awned, inclined. *Petals* 4, 4.5–10.0 × 2.4–3.0 mm, yellow, the limb oblanceolate, rounded at apex, with a whitish, indistinct claw. *Stamens* 6; filaments pale; anthers yellow. *Style* 1, 0.3–2.0 mm; stigma more or less entire. *Siliqua* 50–86 × 0.7–1.2 mm, linear, 4-angled, erect to recurved, sometimes stipitate, dehiscent; valves with (1–)3(–5) veins; seeds numerous, 2.0(–3.0) mm, cylindrical, yellow to pale brown, uniseriate. *Flowers* 6–8. Homogamous.  $2n = 28$ .

Introduced. Waste ground, pathsides and around docks. Scattered records in England. Native of southern Europe to Russia.

Section 2. **Irio** DC.

*Leaves* pinnatisect. *Inflorescence* ebracteate. *Petals* yellow. *Siliqua* not addressed; valves 3-veined; seeds numerous.

2. **S. irio** L. London Rocket  
*S. latifolium* Gray nom. illegit.

*Annual herb* with fibrous roots. *Stems* 10–60(–130) cm, bright green, erect, subterete, glabrous or very sparsely clothed with short, adpressed simple eglandular hairs, much branched above, leafy. *Leaves* alternate, bright green on upper surface, paler beneath; basal and lower cauline with lamina 10–16 × 2–6 cm, oblong to oblanceolate in outline, pinnatisect, with an ovate to lanceolate obtuse terminal lobe and 2–6 pairs of smaller lateral lobes; their margins irregularly toothed, the petiole 2–3 cm and flattened; upper cauline with lamina linear-lanceolate, irregularly pinnatisect, with an acute terminal lobe and 0–3 pairs

of small lateral lobes with entire or toothed margins; all glabrous or nearly so. *Inflorescence* at first densely corymbose and ebracteate, later forming a rather lax raceme, the inconspicuous flowers soon overtopped by the developing fruits; pedicels 3–12(–20) mm, filiform, erecto-patent, lengthening considerably in fruit. *Sepals* 4, 1.6–2.5(–3.5) × about 1 mm, oblong, green, obtuse at apex, glabrous or thinly hairy. *Petals* 4, 2.5–4.0(–6.0) × 0.5–1.0 mm, yellow, linear-oblanceolate, rounded at apex, indistinctly clawed. *Stamens* 6; filaments 2.5–3.5 mm; anthers 0.7 mm, yellow. *Style* 1, 0.3–0.9 mm; stigma capitate, emarginate. *Siliqua* (20–)25–53(–65) × (0.7–)0.8–1.2(–1.3) mm, linear, terete to compressed; valves torulose with 1 strong central vein and 2 weaker lateral veins; seeds numerous, 0.7–1.1 mm, yellowish-brown, oblong, minutely granulate. *Flowers* 5–12.  $2n = 14, 21, 28, 42, 56$ .

Introduced. Waste ground, roadsides, pavements, docks, walls and banks, often associated with grain imports and often as a wool alien. Persistent in London and Dublin, but usually a rare casual in England and Ireland and not recorded recently in Wales and Scotland. Probably native from south Europe and North Africa to India but introduced widely elsewhere in Europe, North and South America and Australasia. Called the London Rocket because of its abundance following the Great Fire of London in 1666.

3. **S. loeselii** L. False London Rocket

*Annual or overwintering herb* with a slender tap-root. *Stems* 30–150 cm, pale green, erect, with long, deflexed simple eglandular hairs below and few above, branched mainly above, leafy. *Leaves* alternate, medium green on upper surface, paler beneath; basal and lower cauline with lamina 3–8(–10) × 1–3 cm, ovate in outline, pinnatisect, with a large ovate-hastate or triangular, acute to obtuse, coarsely toothed terminal lobe and 1–6 pairs of small, oblong, coarsely toothed lateral lobes, petiolate; upper cauline with a hastate acute terminal lobe and 1–3 pairs of long, oblong to triangular lateral lobes, sessile; all with short adpressed hairs. *Inflorescence* a crowded terminal raceme, ebracteate; pedicels 4–14 mm, slender, inclined to patent. *Sepals* 4, 2.5–4.5 mm, yellow to green, oblong, shortly awned at apex, erect to inclined. *Petals* 4, 4.5–7.5 × 2.0–3.7 mm, yellow, the limb obovate, rounded at apex, with a pale to greenish distinct claw. *Stamens* 6; filaments pale; anthers 1–2 mm, yellow. *Style* 1, 0.3–1.5 mm, thick; stigma capitate, emarginate. *Siliqua* 7–31 × 0.6–1.1 mm, linear, more or less terete, ascending to patent, dehiscent; valves with 3 veins; seeds numerous, 0.7–1.0 mm, yellowish-brown, oblong, uniseriate. *Flowers* 5–11.  $2n = 14$ .

Introduced. Railway lines, waste ground, walls and docks and on tips. Scattered records in England, rare in Wales and Ireland. Native from Germany and Italy east to central Asia and India; introduced elsewhere in Europe and in North and South America.

4. **S. volgense** M. Bieb. ex E. Fourn. Russian Rocket

*Perennial rhizomatous herb* forming patches. *Stems* 30–75 cm, dark green or glaucous, decumbent to erect, glabrous or minutely hairy below, branched above, leafy, some not

flowering. *Leaves* alternate, dark green on upper surface, paler beneath; basal in a rosette, evergreen; lower cauline with lamina 3–15 × 1–4 cm, triangular to ovate in outline, irregularly toothed or lobed and usually lobed or cut near the base and distinctly hastate, the terminal lobe ovate and obtuse at apex, with 0–4 pairs of small lateral lobes, the lobes coarsely toothed; upper cauline lanceolate to rhombic, acute at apex, entire or toothed or lobed at base; lower minutely hairy, the upper glabrous. *Inflorescence* a lax terminal panicle, ebracteate, the flowers more or less overtopping the fruits and ebracteate; pedicels 4–6 mm, slender, ascending to patent. *Sepals* 3.5–6.0 mm, green, oblong, curved at apex, slightly saccate, erect to ascending. *Petals* 4, 6–10 × 4–5 mm, yellow, the limb broadly elliptical, rounded at apex, with an oblong, greenish claw. *Stamens* 6, filaments pale; anthers 1.0–2.0 mm, yellow. *Style* 1, 0.4–1.0 mm; stigma capitate, entire to emarginate. *Siliqua* 15–45 × 0.9–1.2 mm, linear, terete, ascending to patent, dehiscent; valves with 1 strong central vein and sometimes 2 weak laterals; seeds rarely developing, 1.0–1.5 mm, brown, elliptical, uniseriate. *Flowers* 6–8.  $2n = 14$ .

Introduced. Railways, waysides, canals, docks and waste places, often persistent, but rarely spreading. Rare in England and Wales, possibly introduced with Russian grain. Native of south-east Europe; introduced elsewhere in Europe and Russia.

**5. *S. austriacum* Jacq.** Austrian Rocket  
*S. pyrenaicum* (L.) Vill., non L.

*Biennial* or *perennial herb* with a slender tap-root. *Stems* 10–100 cm, pale green, erect, with upward-curving eglandular hairs to glabrous. *Leaves* alternate, medium green, variable, the lower ovate, entire to the upper sinuate-pinnatisect, the pinnae dentate, with few eglandular hairs. *Inflorescence* ebracteate, elongate; lower pedicels 3–6 mm in fruit. *Sepals* 4, green, lanceolate, acute at apex. *Petals* 4, 3.5–7.0(–8.0) mm, yellow, obovate, rounded at apex. *Stamens* 6; filaments pale; anthers 1–2 mm, yellow. *Style* 1. *Siliqua* up to 60 × 0.5–1.5 mm, ascending; septum yellowish, opaque; seeds 1.0–1.5 mm. *Flowers* 6–8.

Introduced. Recorded as a casual from Berkshire and Kent. Native of west-central and south-west Europe. Very variable, with several subspecies described, and can be confused with *S. volgense*.

### Section 3. *Sisymbrium*

*Leaves* pinnatifid. *Inflorescence* ebracteate. *Petals* pale yellow or yellow. *Siliqua* not adpressed; valves with 1–3 obscure veins; seeds numerous.

**6. *S. altissimum* L.** Tall Rocket  
*S. pannonicum* Jacq.; *S. sinapistrum* Crantz

*Annual* or overwintering *herb* with slender tap-root. *Stems* 30–100(–120) cm, pale green, erect, more or less hairy below but usually glabrous and pruinose above, branched mainly above, leafy. *Leaves* alternate, medium green on upper surface, paler beneath; basal in a rosette but not persisting; lower cauline with lamina 10–30 cm,

oblong in outline, deeply pinnatisect, the terminal lobe ovate to oblong, obtuse to acute at apex and coarsely lobed and toothed, with 5–11 pairs of narrowly triangular to oblong, toothed lateral lobes; upper cauline smaller, very finely divided, with a linear terminal lobe and 2–6 pairs of linear lateral lobes, all sessile or shortly petiolate and glabrous. *Inflorescence* a terminal raceme, ebracteate, much elongated in fruit; pedicels 4.5–12 mm, ascending to patent. *Sepals* 4, 3.6–6.5 mm, green, oblong and often inrolled, awned at apex, erect to patent. *Petals* 4, 5.7–11.0 × 2.0–3.5 mm, pale yellow, the limb obovate, rounded at apex, with a broad whitish claw. *Stamens* 6; filaments pale; anthers yellow. *Style* 1, 1.0–2.5 mm, swollen; stigma capitate, emarginate. *Siliqua* (30–)40–90 × 1.0–1.5 mm, linear, terete, ascending to patent, dehiscent; valves with 1–3 obscure veins; seeds numerous, 0.7–1.2 mm, brown, ovoid, uniseriate. *Flowers* 5–10. Homogamous.  $2n = 14$ .

Introduced. Waste ground, walls, waysides, railways, docks, towns, sandy places and tips. Frequent in England; scattered records in Wales, Scotland and Ireland. Probably native from Austria to India, but widely introduced in Europe, Asia, the Far East, North and South America and Australasia.

**7. *S. orientale* L.** Eastern Rocket  
*S. columnae* Jacq.

*Annual herb* with tap-root and fibrous side-roots. *Stems* 10–80(–100) cm, pale green, often tinged purple, erect, subterete, with soft, spreading simple eglandular hairs below and sparse above, branched mainly below, leafy. *Leaves* alternate, medium green on upper surface, paler beneath; basal not persisting; lower 6–15 × 1.5–6.0 cm, lyrate-pinnatisect, with a large, ovate to lanceolate or hastate, obtuse terminal lobe and (0–)1–4 pairs of broadly triangular to linear lateral lobes, the lobes entire, sinuate or shallowly toothed; upper smaller, the terminal lobe linear-lanceolate to linear-oblongeolate and with 0–1(–2) pairs of smaller, oblong, entire or toothed lateral lobes; all clothed with soft, spreading hairs. *Inflorescence* at first corymbose, later forming a lax raceme, ebracteate, the flowers soon overtopped by the developing fruits; pedicels 2–6 mm, lengthening and thickening in fruit. *Sepals* 4, (3.0–)4.5–6.0 mm, green with a wide membranous margin, oblong, obtuse at apex, glabrous or slightly hairy. *Petals* 4, (4.0–)7.0–10.5 × 2.2–4.1 mm, yellow, obovate, rounded at apex, with a broad claw about half as long as the limb. *Stamens* 6; filaments 3.5–6.5 mm; anthers yellow. *Style* 1, 0.3–3.5 mm; stigma large, entire to emarginate. *Siliqua* (25–)50–120 × (0.5–)1.1–1.7 mm, linear, more or less terete, inclined to patent; valves with 3 veins, usually hairy becoming glabrous; seeds 0.7–1.4 mm, brown, oblong, minutely granulate. *Flowers* 4–12.  $2n = 14$ .

Introduced. Persistent casual of walls, waste ground, roadsides, railways, docks, towns and cities from bird-seed or grain from which it was probably originally introduced and has spread particularly in the last 50 years. Abundant in many parts of England especially in the larger towns and cities and in the south-east; scattered records in Wales and Ireland and mainly in the east of Scotland. Native round

the Mediterranean region and in the Near East; widely introduced in the rest of Europe and in North America, the Far East and Australasia.

#### Section 4. *Chamaeplium* (Wallr.) Thell.

*Chamaeplium* Wallr.

*Leaves* pinnatifid. *Inflorescence* bracteate. *Petals* pale yellow. *Siliqua* not adpressed; valves obscurely 3-veined; seeds numerous.

#### 8. *S. polyceratum* L.

Southern Rocket

*Chamaeplium polyceratum* (L.) Wallr.

*Annual foetid herb* with fibrous roots. *Stems* 10–50 cm, pale green, erect, spreading or almost prostrate, obscurely angled, usually glabrous and shining, sometimes thinly hairy, often much-branched at the base, leafy. *Leaves* alternate, medium green on upper surface, paler beneath; basal forming a distinct rosette, 5–12 × 1.5–3.5 cm, narrowly oblong in outline, coarsely runcinate-pinnatifid, with an acute deltoid apical lobe and entire or remotely toothed lateral lobes, the petiole 2–5 cm, flattened; cauline smaller, hastate or with 1–2 pairs of lateral lobes; uppermost small, usually simple and often subentire and bract-like. *Inflorescence* axillary, consisting of a small cluster of minute, subsessile flowers, bracteate. *Sepals* 4, 1.5–1.8 × 0.4–1.0 mm, the 2 inner broader than the 2 outer, oblong, erecto-patent, more or less hairy at apex. *Petals* 4, 1.5–2.5 mm, pale yellow, obovate, tapering to a short claw. *Stamens* 6; filaments 1.5–1.8 mm; anthers yellow. *Style* 1, very short; stigma capitate. *Siliqua* 9–20(–25) × 0.7–1.2 mm, in clusters of 1–3(–5), with short, stout pedicels, erect or spreading; valves obscurely 3-veined; seeds 0.8 × 0.5 mm, bright brown, oblong, minutely granulate. *Flowers* 6–8.

Introduced. A rare casual of waste ground. A few scattered records in Great Britain. Native throughout the Mediterranean region and eastwards to Afghanistan; widely naturalised elsewhere.

#### 9. *S. runcinatum* Lag. ex DC.

Mediterranean Rocket

*Chamaeplium runcinatum* (Lag. ex DC.) Hayek

*Annual herb* with a slender tap-root and fibrous side-roots. *Stems* up to 75 cm, pale green, glabrous or nearly so, erect. *Leaves* alternate, medium green, the lower cauline subentire to sinuate-pinnatifid, the lobes oblong. *Inflorescence* with solitary flowers, bracteate. *Sepals* 4, lanceolate, acute at apex. *Petals* 4, 2.5–3.5 mm, pale yellow, obovate, rounded at apex. *Stamens* 6, filaments pale; anthers yellow. *Style* 1, almost as thick as siliqua; stigma more or less 2-lobed. *Siliqua* 10–35 × 1–2 mm, straight or slightly recurved. *Flowers* 6–8.  $2n = 56$ .

Introduced. An Esparto casual. Native of south-west Europe and North Africa.

#### Section 5. *Oxycarpus* Paol.

*Leaves* pinnatifid. *Inflorescence* ebracteate. *Flowers* pale yellow. *Siliqua* not adpressed; valves 1- to 3-veined; seeds numerous.

#### 10. *S. erysimoides* Desf.

French Rocket

*Annual herb* with a slender tap-root and fibrous side-roots. *Stems* 10–80 cm, pale green, erect, glabrous or shortly hairy. *Leaves* variously divided, often deeply so, rarely unlobed, ovate-lanceolate in outline, lyrate-pinnatifid and serrate, glabrous or slightly hairy. *Inflorescence* ebracteate, with pedicels 1–2 mm in flower, up to 5 mm in fruit. *Sepals* 4. *Petals* 4, 1.0–2.5 mm, yellow, obovate, rounded at apex. *Stamens* 6; filaments pale; anthers yellow, about 0.5 mm. *Style* 1, not more than 1.0 mm. *Siliqua* 25–50 × about 1.0 mm, attenuate into style; seeds about 1.0 mm. *Flowers* 6–8.  $2n = 14$ .

Introduced. A fairly regular wool-alien in England. Native of the west Mediterranean region.

#### Section 6. *Velarum* DC.

*Leaves* pinnatisect. *Inflorescence* ebracteate. *Flowers* yellow. *Siliqua* adpressed to stem; valves 3-veined; seeds about 10.

#### 11. *S. officinale* (L.) Scop.

Hedge Mustard

*Erysimum officinale* L.; *Chamaeplium officinale* (L.) Wallr.

*Annual or biennial herb* with a stout tap-root. *Stems* 15–100(–200) cm, dark green, often purple, erect, subterete, glabrous or with sparse simple eglandular hairs, with numerous spreading branches particularly in the upper half, leafy. *Leaves* dull medium green on upper surface, paler beneath, alternate; basal forming an overwintering rosette, 8–20(–30) × 3–10 cm, oblong or obovate in outline, pinnatisect, with a broadly ovate, obtuse to truncate terminal lobe and 2–6 pairs of smaller ovate to oblong or triangular lateral lobes with sinuate or irregularly toothed or lobed margin; lower cauline with an ovate to lanceolate terminal lobe and 2–4 lateral lobes; upper cauline leaves smaller, the terminal lobe lanceolate or hastate with 0–2 pairs of smaller, oblong lateral lobes with entire to irregularly toothed margins; all glabrous or with a few hairs; petioles 2–10 cm, flattened. *Inflorescence* terminal, at first densely corymbose, later forming a narrow, elongate raceme, ebracteate; pedicels 1–3 mm, more or less as wide as fruits. *Sepals* 4, 1.7–2.5 × 0.7–0.8 mm, green, oblong, subacute at apex, not awned, erect, hairy. *Petals* 4, 3.1–4.2 × 0.9–1.4 mm, yellow, unequal, obovate, obtuse or rounded at apex, tapered to a short claw. *Stamens* 6; filaments 1.5–2.0 mm, rather dilated towards the base; anthers yellow, minute. *Style* obscure; stigma capitate, more or less entire or emarginate. *Siliqua* (7–)10–16(–18) × 0.9–1.6 mm, linear, more or less terete, hairy or glabrous, erect and adpressed on short, stout pedicels; valves with 3 veins, not torulose; seeds about 10 per loculus, 1.0–1.7 mm, oblong, pale to dark brown, minutely granulate. *Flowers* 1–12.  $2n = 14$ .

##### (i) Var. *officinale*

*Siliques* hairy.

##### (ii) Var. *leiocarpum* DC.

*S. elatum* Koch

*Siliques* glabrous.

Native. Weed of gardens, roadsides, arable and waste land, usually associated with Man and rare in upland regions. Throughout most of Great Britain and Ireland, Europe, North Africa and the Near East but widely introduced. Only detailed maps will tell us if the common plant is var. *officinale* and var. *leiocarpum* is rare. Plants have two different sorts of habit: some have very short branches, others branches as long as the plant is high, which is up to 2 m. They nearly always seem to be associated with Oil-seed Rape and may have been introduced from eastern Europe.

**2. *Descurainia* Webb & Berthol. nom. conserv.**

*Annual* or *overwintering herb* with a slender tap-root, with stellate and often glandular and simple eglandular hairs. *Leaves* finely bipinnatisect to quadripinnatisect. *Inflorescence* a crowded terminal raceme, ebracteate. *Sepals* 4, not saccate. *Petals* 4, pale yellow, usually not exceeding the sepals. *Stamens* 6, without appendages. *Style* 1, very short; stigma capitate. *Fruit* a short siliqua, the somewhat convex valves with a strong midrib and a lateral network of smaller veins.

About 50 species chiefly in North and South America with few in Europe, Asia and Macaronesia. Named after François Descourain (1658–1740).

Best, K. F. (1977). The biology of Canadian weeds. 22. *Descurainia sophia* (L.) Webb. *Canad. Jour. Pl. Science* **57**: 499–507.  
Hultén, E. & Fries, M. (1986). *Atlas of north European vascular plants north of the Tropic of Cancer*. 3 vols. Königstein.  
Salisbury, E. J. (1964). *Weeds and aliens*. London.

**1. *D. sophia* (L.) Webb ex Prantl** Flixweed  
*Sisymbrium sophia* L.; *Sisymbrium absinthioides* Gray  
nom. illegit.

*Annual*, rarely *biennial herb* with a slender tap-root. *Stems* 10–100 cm, pale green, erect, terete, with stellate hairs below, but more or less glabrous above, branched above, leafy. *Leaves* alternate, greyish-green to green; lower with lamina 4–8(–10) × 4–6 cm, oblong to ovate in outline, variable but finely divided, bipinnatisect to quadripinnatisect, the segments more or less linear or linear-oblong, the lowest pair often clasping the stem; upper cauline pinnate to bipinnate; all more or less stellate-hairy. *Inflorescence* a crowded, terminal raceme, ebracteate; pedicels 5–14 mm, slender, inclined to patent. *Sepals* 4, 2–3 mm, green to yellow, linear, subacute at apex, erect to ascending. *Petals* 4, 1.4–1.8 × about 0.3 mm, pale yellow, the limb spatulate. *Stamens* 6; filaments pale; anthers yellow. *Style* 1, 0.2–0.3 mm; stigma more or less capitate. *Siliqua* 10–26 × 0.5–1.1 mm, linear, more or less compressed to terete, erect to ascending, dehiscent; valves more or less keeled with 1 strong central vein and weak lateral veins; seeds numerous, 0.8–1.1 mm, pale brown, ellipsoid to oblong, uniseriate. *Flowers* 5–10.  $2n = 28$

Introduced. A locally abundant weed of arable land on light soils in eastern England; elsewhere it occurs in long-established populations, but is usually a casual in

waste places. Its native range is uncertain but it has a Eurosiberian Temperate range and is naturalised in North America and the southern hemisphere.

**3. *Myagrum* L.**

*Annual herb* with a slender tap-root. *Basal leaves* sinuate-dentate to pinnatifid; cauline sessile and amplexicaul. *Sepals* 4, erect, the inner slightly saccate at the base. *Petals* 4, yellow, not clawed. *Ovules* 2, 1 aborting. *Fruit* an indehiscent, 1-seeded silicula with 3 loculi, the upper 2 loculi side by side and sterile, the lower containing the seed.

Contains one species in Mediterranean and central Europe to India; introduced in Australia.

Griffell, A. L. (1987). *Myagrum perfoliatum* L. in Cambridge-shire. *B.S.B.I. News* **47**: 34–35 (illustr.).

**1. *M. perfoliatum* L.** Mitre Cress

*Annual herb* with a slender tap-root and fibrous side-roots. *Stems* 20–60(–100) cm, erect, glaucous, glabrous. *Leaves* glaucous, glabrous; basal oblanceolate, sinuate-dentate to pinnatifid; cauline oblong-lanceolate, entire or denticulate, sagittate to cordate-amplexicaul. *Inflorescence* lax. *Sepals* 4, 1.5–2.5 mm, erect, the inner slightly saccate at base. *Petals* 4, 3–5 mm, yellow. *Stamens* 6. *Style* 1, about 1 mm, conical, persistent. *Silicula* 5–8 × 3–5 mm, broadly clavate to obovate, compressed, erect, indehiscent with 3 loculi, the upper 2 side by side and sterile, the lower with 1 seed; seed about 3 mm. *Flowers* 6–8.

Introduced. Rare casual, imported with grain. Probably native in south Europe, but widely naturalised elsewhere; also in south-west Asia.

**4. *Alliaria* Heist. ex Fabr.**

*Biennial* or short-lived *perennial herbs* with simple eglandular hairs or glabrous. *Leaves* reniform or ovate-cordate, simple, dentate. *Inflorescence* at first densely corymbose, later becoming a lax raceme, the lower flowers often bracteate. *Sepals* 4, not saccate, often early caducous. *Petals* 4, white. *Stamens* 6, without appendages, nectar-glands present round the bases of the short transverse stamens and also outside the bases of the median pairs of long stamens. *Style* 1, short; stigma capitate, entire to emarginate. *Fruit* a siliqua, unbeaked, made more or less 4-angled by the prominent midrib of the 3-veined valves; seeds large, uniseriate.

About five species in Europe, North Africa and Asia eastwards to Japan.

Anderson, R. C. et al. (1996). Aspects of the ecology of an invasive plant, garlic mustard (*Alliaria petiolata*), in Central Illinois. *Restoration Ecology* **4**(2): 181–191.  
Cavers, P. B., Heagy, M. I. & Kokron, R. F. (1979). The biology of Canadian weeds. 35. *Alliaria petiolata* (M. Bieb.) Cavara & Grande. *Canad. Jour. Pl. Science* **59**: 217–229.  
Grime, J. P. et al. (1988). *Comparative plant ecology*. London.  
Hultén, E. & Fries, M. (1986). *Atlas of north European vascular plants north of the Tropic of Cancer*. 3 vols. Königstein.



Lhotska, M. (1975). Notes on the ecology of germination of *Alliaria petiolata*. *Folia Geobot. Phytotaxon. (Praha)* **10**: 179–183.

**1. A. petiolata** (M. Bieb.) Cavara & Grande  
Garlic Mustard  
*Erysimum alliaria* L.; *Arabis petiolata* M. Bieb.;  
*Sisymbrium alliaria* (L.) Scop.; *A. officinalis* Andr. ex  
M. Bieb. nom. illegit.; *Erysimum alliaceum* Salisb. nom.  
illegit.; *Erysimum cordifolium* Stokes nom. illegit.;  
*A. alliacea* Britton & Rendle nom. illegit.

*Biennial* or short-lived *perennial herb* with a tap-root and fibrous side-roots. *Stems* 30–120 cm, bright green, erect, terete or obscurely ridged with sparse simple eglandular hairs below, branched above, leafy. *Leaves* alternate, medium green on upper surface, paler beneath, smelling of garlic when crushed; basal in a rosette, the lamina 10–25(–30) × 5–12 cm, reniform or subrotund, rounded at apex, sinuate or toothed, cordate at base, thinly hairy, with a channelled petiole up to 16 cm; lower cauline often larger than the basal, reniform or subrotund, obtuse to acute at apex, dentate or crenate, cordate at base with a wide sinus, glabrous or nearly so, the petioles shorter than basal; upper cauline smaller, ovate or reniform, mostly acute at apex, toothed, acutely cordate at base, shortly petiolate. *Inflorescence* at first densely corymbose, later forming a lax raceme, the lower flowers often subtended by small bract-like leaves; pedicels 1.0–2.5 mm, extending to 4–9 mm in fruit. *Sepals* 2.5–4.7 × 1.0–1.5 mm, white to pale green, oblong or narrowly ovate, more or less awned, erect, often early caducous. *Petals* (3.8–)4.5–7.8(–8.3) × (1.7–)1.9–3.8(–4.0) mm, white, obovate or oblanceolate, obtuse at apex, indistinctly clawed. *Stamens* 6; filaments 2.5–4.5 mm, flattened; anthers yellow. *Style* 1, 0.2–2.0 mm; stigma entire to emarginate. *Siliqua* (20–)30–65(–75) × 1.2–2.2 mm, linear, 4-angled, ascending to inclined; valves with 1 strong central vein and 0–2 weak lateral veins; seeds numerous, 2.4–4.5 mm, pale to dark brown, cylindrical, minutely papillose, with numerous conspicuous, longitudinal ridges, uniseriate. *Flowers* 4–6(–8). *2n* = 36, 42.

Native. Hedgerows, wood margins, road verges, embankments, river banks, shingle, waste ground and gardens and often abundant particularly in damp, partially shaded localities. Common throughout lowland Great Britain though less frequent in the north and west and absent from much of north-west Scotland, in Ireland less common and mainly in the east. Throughout Europe and east to the Himalayas and in North Africa; introduced in North America and Australasia. Formerly used as a salad, a pot herb, for flavouring and as a medicinal plant. European Temperate element also in central Asia and widely naturalised outside its native range.

**5. Arabidopsis** (DC.) Heynh.  
*Sisymbrium* section *Arabidopsis* DC.  
*Annual* to *biennial herb* with simple or branched hairs or glabrous. *Leaves* entire to coarsely toothed, shortly petiolate. *Inflorescence* at first densely corymbose, lengthening

to form a lax raceme, bracteate or ebracteate. *Sepals* 4, not or hardly saccate. *Petals* 4, white. *Stamens* 6, without appendages. *Style* 1, short; stigma entire, slightly emarginate. *Fruit* a slender siliqua, the convex, 1-veined valves having a more or less prominent midrib; seeds ovoid, uniseriate.  
A few species chiefly in Europe, North Africa and Asia; introduced elsewhere.

Estelle, M. A. & Somerville, C. R. (1986). The mutants of *Arabidopsis*. *Trends in Genetics* **2**: 89–93.  
Grime, J. P. et al. (1988). *Comparative plant ecology*. London.  
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**1. A. thaliana** (L.) Heynh. Thale Cress  
*Arabis thaliana* L.; *Sisymbrium thalianum* (L.) J. Gay;  
*Stenophragma thaliana* (L.) Čelak.

*Annual herb* with fibrous roots. *Stems* 2–30(–50) cm, greyish-green or more or less glabrous, often tinged violet, erect, slender, slightly sulcate, with spreading simple eglandular hairs or glabrous, simple or branched above, leaves few. *Leaves* greyish-green or slightly glaucous, alternate; basal forming a distinct rosette, the lamina 4–40 × 2–7 mm, ovate to elliptical, obtuse at apex, entire to coarsely toothed, very rarely lobed, cuneate to attenuate at base, shortly petiolate; cauline few, up to 15 × 5 mm, narrowly lanceolate, elliptical or linear, obtuse or acute at apex, narrowed to a sessile base; more or less densely clothed with stipitate, bifurcate hairs to nearly glabrous. *Inflorescence* bracteate or ebracteate, branched or unbranched, at first densely corymbose, later lengthening to form an elongate, lax raceme, branches erect or ascending. *Sepals* 4, 1.3–2.5 × 0.8–1.0 mm, green with purple tips, yellowing rapidly with age, oblong, obtuse to subacute at apex and hairy. *Petals* 4, 2.5–4.5 × 0.6–1.5 mm, white, the limb spatulate to oblanceolate, rounded at apex, the claw indistinct. *Stamens* 4–6; filaments 1.3–1.5 mm, flattened; anthers yellow. *Style* 1, short and stout; stigma capitate, more or less entire. *Siliqua* 6–16(–18) × 0.3–0.7 mm, linear, slender, flattened, ascending to inclined, glabrous; valves with 1 strong central vein; seeds numerous, 0.3–0.5 mm, pale brown, ellipsoid, minutely and densely granulate. *Flowers* nearly all the year but mainly 4–7. Largely self-pollinated, though it will outbreed if cross-pollinated. *2n* = 10.

Native. Rocks and ledges, dunes, river shingle and open sandy ground and a frequent weed of paths, gardens, waste ground, roadsides and characteristically railways,

usually in dry places and most frequent on light sandy soils. Throughout Great Britain though uncommon in hilly areas; infrequent in Ireland. Native from Europe to the Far East and east Africa; introduced in North America, South Africa and Australasia. Eurosiberian Temperate element.

6. *Isatis* L.

*Biennial to perennial herbs* which are glabrous. *Leaves* glaucous, the cauline sessile, with clasping auricles. *Inflorescence* a large, much-branched corymbose panicle. *Sepals* 4, not saccate. *Petals* 4, yellow, short-clawed. *Stamens* 6, without appendages. *Style* 1; stigma entire. *Fruit* an indehiscent silicula or siliqua, flattened, broadly winged, pendulous, 1(2)-seeded; seeds large, unwinged.

About 25 species in central Europe, Mediterranean region, west and central Asia.

Hultén, E. & Fries, M. (1986). *Atlas of north European vascular plants north of the Tropic of Cancer*. 3 vols. Königstein.  
Hurry, J. B. (1930). *The woad plant and its dye*. Oxford.  
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1. *I. tinctoria* L.

Woad

*Biennial or perennial herb* with a stout tap-root and a branched stock bearing several rosettes. *Stems* 40–150 cm, erect, pale green or glaucous, softly hairy below, glabrous above, branched above, leafy. *Leaves* alternate, dark glaucous green on upper surface, paler beneath; basal in a rosette, with lamina 10–30 × 1–5 cm, narrowly elliptical or lanceolate, obtuse at apex, entire to sinuate and sparsely toothed, attenuate at base to a petiole up to 6 cm; lower cauline oblanceolate, obtuse at apex, entire, narrowed to base of acute, clasping auricles; upper cauline small, lanceolate to linear-oblong, acute at apex, entire, sessile with large acute to rounded, clasping auricles; all glabrous. *Inflorescence* a large much-branched, corymbose panicle; pedicels 5–10 mm, very slender, pendulous in fruit. *Sepals* 4, 2.0–2.8 mm, yellow to greenish, oblong, obtuse at apex, patent. *Petals* 4, 2.5–4.0 × 0.9–1.5 mm, pale to deep yellow, the limb obovate, rounded or retuse at apex, narrowed to an indistinct claw. *Stamens* 6; filaments pale yellow; anthers yellow. *Style* 1, pale green; stigma entire. *Silicula* (9–)11–20(–21) × (3.0–)3.5–6.0 mm, purple-brown, oblong-lanceolate or oblong-elliptical, usually broadest beyond the middle, truncate or rounded at the end, pendulous, the 1-seeded cell surrounded by a broad thick wing; seed 3.2–4.8 mm, pale brown to yellow, cylindrical. *Flowers* 5–8. *2n* = 14, 28.

Introduced. Chalk or marl cliffs, arable fields, docks, waysides and waste ground. Rarely found in England, very rarely in Wales, Scotland and Ireland and now only known on cliffs in Gloucestershire and Surrey with occasional casual plants elsewhere. Possibly native in south Europe and North Africa to south-east Asia; introduced in Scandinavia and North and South America. The Ancient Britons were reputed to paint their bodies with woad, possibly as war-paint or for religious rites. The plant was long cultivated in Great Britain for the blue dye obtained by fermenting its leaves.

7. *Bunias* L.

*Annual to perennial herbs* with branched, simple eglandular and glandular hairs. *Leaves* more or less pinnatifid. *Inflorescence* a much branched panicle, much elongating in fruit. *Sepals* 4, half-spreading, the inner pair not or slightly saccate. *Petals* 4, white or yellow. *Stamens* 6, without appendages. *Style* 1, very short; stigma capitate, more or less entire. *Fruit* an indehiscent silicula, irregularly ovoid, covered with large irregular warts; seeds 1–4, ovoid.

Six species in the Mediterranean region and western Asia; widely introduced.

Hultén, E. & Fries, M. (1986). *Atlas of north European vascular plants north of the Tropic of Cancer*. 3 vols. Königstein.  
Jones, B. M. G. (1959). Distribution of *Bunias orientalis* in Britain. *Proc. Bot. Soc. Brit. Isles* 3: 330.

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|---|-----------------------------|
| 1. Petals 5.0–8.5 mm; silicula 5–8 mm, with irregular protuberances | <b>1. <i>orientalis</i></b> |
| 1. Petals 8–13 mm; silicula 10–12 mm, with 4 longitudinal wings     | <b>2. <i>erucago</i></b>    |

1. *B. orientalis* L.

Warty Cabbage

*Biennial to perennial herb* with a tap-root. *Stems* 25–120 cm, pale green, erect, with soft simple eglandular and branched hairs below and numerous yellow to black glandular hairs above, much branched, leafy. *Leaves* alternate, medium green on upper surface, paler beneath; basal in a rosette, the lamina 20–45 × 5–20 cm, elliptical, acute at apex, simple or pinnatifid at base, dentate, cuneate at base, petiolate; lower cauline similar, elliptical to lanceolate, pinnate to pinnatifid, with 1–4 small lateral lobes at base; upper cauline similar, lanceolate, acute at apex, dentate or with small lobes at base; all glabrous or nearly so. *Inflorescence* a crowded, much branched panicle; pedicels 10–18 mm, slender, ascending. *Sepals* 4, 2.5–4.5 mm, yellowish-green, elliptical to ovate, scarcely saccate, erect to patent. *Petals* 4, 4.5–8.5 × 2.3–4.2 mm, yellow, the limb broadly ovate, rounded to truncate at apex, with a short claw. *Stamens* 6; filaments pale; anthers yellow. *Style* 1, about 1.0 mm; stigma capitate, more or less entire. *Silicula* 5–8 × 3–5 mm, irregularly ovoid, covered with large irregular warts, tapered at apex, very shortly stipitate, erect, indehiscent; seeds 1–2 per silicula, 3.0–3.5 mm, pale brown, ovoid. *Flowers* 5–9. Visited by various flies and bees. *2n* = 14, 42.

Introduced. Waste ground, waysides, railway banks and docks. Occasional in England, especially the London area, rare in Wales and Scotland and absent from Ireland. Native in central and east Europe and western Asia.

2. *B. erucago* L.

Southern Warty Cabbage

*Annual or biennial herb* with a slender tap-root and fibrous side-roots. *Stems* 30–60(–100) cm, pale green, glandular-hairy. *Leaves* alternate; lower sinuate-pinnatifid, rarely almost entire; upper entire or dentate, oblong and obtuse at apex; petioles short or absent. *Inflorescence* narrow; pedicels long. *Sepals* 4, erecto-patent, the inner not or scarcely saccate at base, lanceolate, subacute at apex. *Petals* 4, (6–)8–13 mm, yellow, oblanceolate, emarginate at apex, gradually narrowed at base. *Stamens* 6, without