

Raphanus raphanistrum L., JOINTED CHARLOCK. Annual, taprooted, flat-rosetted, 1-stemmed at base, unequally branching at most nodes, in range 30–140 cm tall; shoots with basal leaves and cauline leaves, hispid-hirsute to \pm scabrous with hairs scattered over most of plant or sometimes dense at basal nodes, the hairs unbranched, \pm enlarged to nearly bulbous at base, with the largest hairs or their bases persistent; taproot thick but not swollen, whitish to radish red, with strong odor of radish. **Stems:** \pm cylindric, < 25 mm diameter at base, \pm zigzagged with projecting leaf bases, green or striped with rose, \pm glaucous or not; solid or becoming hollow, pith white. **Leaves:** helically alternate, deeply pinnately lobed and petiolate (basal and lower cauline leaves) and 3-lobed to unlobed and sessile but not clasping (upper cauline leaves), without stipules; petiole channeled and crescent-shaped in \times -section to hemicylindric or subcylindric, to 120 mm long (scaling with blade length), to 20 mm broad at base, fleshy, greenish to pink-rose, conspicuously scabrous in channel approaching stem; blade of basal leaves ovate or obovate to oblanceolate or oblong, 65–530(–780) \times 30–250 mm, 7–16-lobed, terminal lobe wide-ovate to round, 1/4 to 1/2 of blade length, shallowly crenate to weakly lobed on margins, lateral lobes spreading or directed backward along fleshy, hemicylindric axis, lobes opposite or alternate and sinuses \pm to midrib near base of blade and mostly opposite above, sometimes a mixture of long and short lobes with short ones between or opposite large lobes, oblong or ovate and rounded at tip (larger lateral lobes) to triangular and obtuse to acute at tip (short lateral lobes), 5–140 \times 4–85 mm, asymmetric at base with leading portion broadly attached to rachis and trailing portion semicordate, shallowly crenate on margins, pinnately veined with principal veins raised on lower surface, greenish to pink-rose, upper surface somewhat scabrous or also \pm short-strigose along veins; blade of upper cauline leaves narrowly ovate to lanceolate in outline, unlobed to 12-lobed, 30–280 \times 15–120 mm, lobes similar to basal leaves but smaller, crenate to dentate on margins, pinnately veined with principal veins raised on lower surface and greenish to pink-rose, upper surface somewhat scabrous or also \pm short-strigose along veins. **Inflorescence:** panicle of racemes, terminal, many-flowered, \pm flat-topped with several open flowers overtopping buds; bract subtending each raceme leaflike, several-lobed or unlobed, 25–60 \times 7–60 mm, decreasing upward; raceme in flower 25–35 mm long increasing to 50–390 mm in fruit; main axis glabrescent; bractlets absent; pedicel at anthesis ascending and 6–17 mm long increasing 2 \times in fruit and sometimes spreading, glabrous, slightly glaucous. **Flower:** bisexual, radial, 15–25 mm across; **sepals** 4, erect, somewhat dimorphic, outer sepals oblong, 6.2–10.8 \times 1.5–2.2 mm, pouchlike at base, 5-veined, inner sepals narrowly lanceolate, 6.4–11 \times 1.2–1.8 mm, hooded at tip, 3-veined, light green to yellowish green and narrowly membranous on margins, with 0–several bristlelike hairs above midpoint; **petals** 4, 12–20.5 mm long, conspicuously long-clawed with limb spreading at a right angle; claw erect, narrowly wedge-shaped, 6.5–10.5 mm long, $>$ sepals, whitish, 1-veined, flat on outer side and with raised midrib on inner side; limb obovate, 5–11 \times 4–8.5 mm, whitish to light yellow (reddish purple to reddish purple above midpoint and fading to white below midpoint), pinnately veined, the veins conspicuous, dark purple (green), fading in age to pale yellow or whitish, terminating in open ends or closed loops; **stamens** 6, free, dimorphic, outer 2 short and inner 4 longer, short stamens exerted to 2 mm; filaments 3.5–8.9 mm long (short stamens) and 6.9–11 mm long (long stamens), whitish with purplish to greenish vein \pm visible on inner side; anthers dorsifixed, dithecal, 2.8–3.5

mm long (short stamens) and 2.4–2.9 mm long (long stamens), light yellow, narrowly arrow-shaped at base, rounded at tip, longitudinally dehiscent with large, clear cells on outer face of connective; pollen light yellow; **nectaries** 2 broad ones outside short stamens, sometimes 2 narrow alternate with and outside pairs of long stamens, broad nectary \pm quadrate to corn kernel-like, $0.4 \times 0.4 \times 0.2$ mm, narrow nectary peglike or tonguelike, ca. 0.4 mm long, green; **pistil** 1, glabrous, at anthesis 6–13 mm long, with a weakly differentiated base below ovary, the base < 1 mm long (seemingly 2-valved); ovary superior, cylindrical, greenish white at anthesis, sometimes striped, without valves, inconspicuously 2-chambered generally with 7–12 green ovules; style length \pm = ovary length; stigma slightly exerted to midpoint of exerted anthers, capitate, yellowish green, short-papillate. **Fruit:** siliqua (silique), indehiscent but schizocarpic by breaking between seeds, hard, 1–7(–12)-seeded, lanceoloid with bulging seeds (torulose), $16\text{--}60 \times 3.5\text{--}5$ mm, tannish brown, longitudinally ridged, sessile but with very short, seedless basal segment and a seedless beak; beak to 17 mm long. **Seed:** lenticular, $3\text{--}3.5 \times 2.5$ mm, tannish, without a margin, each seed tightly enclosed within a spheroidal cavity surrounded by hard wall and germinating from within seed chamber. Early December–mid-May.

Naturalized. Annual found occasionally within range mostly along the coastline in vacant lots or roadsides. *Raphanus raphanistrum*, like wild radish, evolved in Europe through events of natural hybridization of mustard species (*Brassica*). Jointed charlock is typically recognized as radish forms with yellow to white petals having conspicuously pigmented veins, but locally one can also find individuals with reddish purple flowers, and both species can have conspicuous veins. Because this species hybridizes with *Raphanus sativus*, purple-flowered population may have resulted from crosses where they grow together at the same location.

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