

## STUDIES ON SOME NORTH AMERICAN CRUCIFERAE

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The continued accumulation of materials of the Cruciferae for revisionary work has brought to light an unusual group of new entities. These provoke questions as to generic relationships within the family as well as species relationships within certain genera. Species in *Lesquerella*, *Physaria*, *Smelowskia*, and *Eutrema*, are dealt with in the paragraphs that follow.

## LESQUERELLA

In his monograph of *Lesquerella*, Payson (1922) created section *Enantiocarpa* to accommodate plants with siliques strongly compressed at right angles to the replum. Three species, *L. lasiocarpa* of Texas and Mexico, *L. argentea* (as *L. Schaueriana*) of Mexico, and *L. frigida* of Venezuela, were included. In the other forty-nine species accepted, the siliques were either uncompressed or compressed parallel to the replum. Two undescribed species of *Lesquerella* from the mountains of Idaho and Wyoming, have siliques flattened at right angles to the replum and the question as to their natural relationships immediately arises. Following Payson, the new species would fall into section *Enantiocarpa*. However, it is quite apparent, from a comparative study of the new plants and other species of the genus, that they are more closely related to *L. occidentalis*, *L. diversifolia*, and *L. Cusickii*, than to any of the species of that section. The characteristics of growth-habit, pubescence, leaves, and flowers, in these new plants are quite similar to members of the *L. occidentalis* group of species. The one striking difference is in the flattening of the siliques. In the *L. occidentalis* group, the valves are somewhat flattened parallel to the replum on the margins and toward the apex. In the new plants, the valves are uniformly flattened at right angles to the replum, except for a keel produced on each side by the replum itself in one of the species, *L. carinata*. This difference is fundamental and reflects major modifications in orientation of the flower parts. A re-examination of the evidence supporting section *Enantiocarpa* will be required in any subsequent revision of *Lesquerella*. Following are descriptions of these new entities.

***Lesquerella carinata* Rollins, sp. nov.**

Short-lived perennial; stellate-pubescent throughout with many-rayed stellae, rays forked near base or sometimes simple, usually somewhat



coherent towards their bases; caudex simple, thickened but not greatly so; stems several to many, decumbent, greatly exceeding basal leaves, unbranched, purplish, 5–15 cm. long; basal leaves tufted, entire, petiolate, silvery pubescent; blade elliptical to broadly obovate, 4–15 mm. long, 2–10 mm. broad, narrowing abruptly to a slender petiole; petiole 5–20 mm. long; terminal bud undeveloped; cauline leaves 2–5, petiolate, entire, 4–15 mm. long, blade oblanceolate to obovate; sepals oblong, pubescent, 4–6 mm. long, outer pair saccate, inner non-saccate; petals yellow, spatulate, 8–10 mm. long; fruiting raceme elongated; pedicels divaricate to ascending, straight to slightly sigmoid, 5–8 mm. long; siliques elliptical, rounded to more narrowly tapered at each end, strongly flattened at right angles to the replum, margins strongly flattened and the replum forming strong keels on each of the flattened sides, pubescent, 5–8 mm. long, 3–5 mm. wide; styles glabrous, 2–3 mm. long, stigmas capitate; locules with 5–7 ovules; replum obtuse to acute at apex, 5–8 mm. long, 2–3 mm. wide; funiculi slender, attached to septum near base; seeds brown, wingless, slightly longer than broad, somewhat flattened but remaining plump, ca. 2 mm. long; cotyledons accumbent. Fig. I. E–H.

Herba perennis undique indumento argenteo-stellato tecta; caulibus decumbentibus simplicibus 5–15 cm. longis; foliis radicalibus petiolatis ellipticis vel ovatis; foliis caulinis integris oblanceolatis vel ovatis 4–15 mm. longis; sepalis oblongis pubescentibus 4–6 mm. longis; petalis luteis spathulatis 8–10 mm. longis; pedicellis divaricatis vel adscendentibus 5–8 mm. longis; siliquis ellipticis carinatis pubescentibus 5–8 mm. longis 3–5 mm. latis; stylis glabris 2–3 mm. longis.

Type in the Gray Herbarium, collected on a dry hill, Birch Creek, Range 29 East, Township 11 North, Lemhi County, Idaho, July 3, 1941, *Ray. J. Davis 3801*. Other specimens examined, all from Idaho: Double springs summit, 8 miles northeast of Dickey, Custer Co., July 16, 1941, *A. Cronquist 3178* (GH); same locality, July 26, 1932, *J. H. Christ 1953* (US); in shallow soil on top of limestone at summit of grade between Challis and Dickey, Custer Co., June 13, 1944, *Hitchcock and Muhlick 8922* (Wash.); Head of Rock Creek, north slope of Lost River Mts., Custer Co., June 23, 1947, *C. L. Hitchcock 15727* (GH).

A second undescribed species has the siliques flattened at right angles to the replum, but the flattening does not extend to the margins, nor is there a keel produced as in *L. carinata*. This new plant, *L. Paysonii*, is related to *L. Wardii*, a species considered to be somewhat anomalous in *Lesquerella* by Watson (1888), because of its obcompressed siliques. Another species showing an even more marked flattening than *L. Wardii* was recently described as *L. hemiphysaria* by Maguire (1942). The latter entity was thought by Payson (1922) to represent *L. utahensis* Rydberg. I have not studied the type of *L. utahensis*



and cannot offer an opinion as to the correct application of the name. *L. Paysonii* belongs to this same general group of species but has a much more elongated silique than any of them. Payson supposed the plants included here were *L. prostrata*, but my collection no. 2326, from near the type locality of that species, shows it to have nearly globose fruits and but two ovules per loculus. Thus *L. prostrata* is scarcely of the same species-alliance.

***Lesquerella Paysonii* Rollins, sp. nov.**

Perennial, densely pubescent throughout with appressed silvery stellate trichomes, rays of the trichomes 7-12, equal, free nearly to their bases; stems slender, arising laterally on the caudex, decumbent, unbranched, 3-7 cm. long; basal leaves entire, petiolate, forming a terminal rosette above the fruiting stems, blades elliptical or broader, obtuse, cuneate at base, 4-15 mm. long, 4-10 mm. wide, petioles slender, 5-15 mm. long; cauline leaves few, petiolate, obtuse to acute, 5-10 mm. long; sepals narrowly oblong, 5-7 mm. long; petals yellow fading purplish, narrowly lingulate, not differentiated into blade and claw, 10-12 mm. long, 1.5-2 mm. wide; infructescence racemose, elongated, often over half the length of the stems; pedicels ascending, slightly to markedly sigmoid, 3-7 mm. long; siliques elliptical, compressed contrary to the replum, densely pubescent, 5-7 mm. long, 3-5 mm. wide, not quite sessile, stipe less than 1 mm. long; style glabrous, 2-4 mm. long; stigma capitate, only slightly expanded; replum lanceolate, acute at apex; ovules 5-7 in each locule, funiculus attached to septum at base; seeds wingless, flattened, orbicular, ca. 1.5 mm. in diameter; cotyledons accumbent.

Herba perennis undique indumento argenteo-stellato tecta; foliis radicalibus integris petiolatis ellipticis vel ovatis; foliis caulinis petiolatis integris; caulibus simplicibus decumbentibus 3-7 cm. longis; pedicellis divaricatis, 3-7 mm. longis; siliquis pubescentibus, 5-7 mm. longis, 3-5 mm. latis; stylis glabris, 2-4 mm. longis; loculis 5-7-ovulatis; seminibus emarginatis orbiculatis ca. 1.5 mm. latis.

Type in the Gray Herbarium, collected on rocky ridges, mountains near Cottonwood Lake, east of Smoot, Lincoln Co., Wyoming, Aug. 13, 1923, *Edwin B. Payson* and *George M. Armstrong* 3816. Other specimens examined: Kendall, Sublette Co., Wyoming, Aug. 6, 1922, *E. B. & L. B. Payson* 2944 (GH); calcareous summit, Teton Pass Mts., Wyoming, east of Victor, Idaho, July 25, 1920, *E. B. & L. B. Payson* 2131 (GH); among rocks on summit, Caribou Mountaun, Bonneville Co., Idaho, *E. B. Payson & G. M. Armstrong* 3553 (GH); Meadow Creek Ranger Station, Bear Lake Co., Idaho, June 26, 1938, *R. J. Davis* 388 (GH).

***Lesquerella Mcvaughiana* Rollins, sp. nov.**

Perennial, silvery stellate pubescent; stellae scale-like, rounded and with numerous rays united to their tips; caudex simple or with but few



branches; stems several to numerous, erect or decumbent at base, simple, densely pubescent, 5–20 cm. long; basal leaves petiolate, entire, densely pubescent with overlapping peltate trichomes, obtuse to rounded at apex, 2–5 cm. long; blade elliptical or obovate to broadly oblanceolate, 1–2 cm. long, 5–10 mm. broad; cauline leaves petiolate, broadly oblanceolate to linear-oblanceolate, 1–3 cm. long, 2–5 mm. broad; inflorescence short, dense, elongating only slightly in fruit, 1–3 cm. long; flowers white with a yellowish center; sepals densely pubescent, somewhat boat-shaped, narrowly oblong, tapering above, 3–4 mm. long; petals white fading pinkish near base, cuneate, not markedly differentiated into blade and claw, 6–9 mm. long, 4–6 mm. wide; fruiting pedicels widely spreading to slightly ascending, weakly sigmoid, 6–10 mm. long; siliques erect or ascending, glabrous, globose, not flattened, 3–4 mm. in diameter, substipitate, the stipe when present less than 1 mm. long; replum orbicular; ovules 4–6 in each loculus; funiculi attached to septum about half their length; styles 1–2 mm. long; seeds wingless, plump, very slightly longer than broad.

Herba perennis undique indumento argenteo-stellato tecta; caulibus erectis vel suberectis simplicibus 5–20 cm. longis; foliis radicalibus petiolatis integris obtusis 2–5 cm. longis, laminis ellipticis vel obovatis 1–2 cm. longis, 5–10 mm. latis; foliis caulinis petiolatis 1–3 cm. longis, 2–5 mm. latis; sepalis lineari-oblongis 3–4 mm. longis; petalis albis cuneatis 6–9 mm. longis, 4–6 mm. latis; pedicellis divaricatis plus minusve curvatis 6–10 mm. longis; siliquis erectis globosis glabris subsessilibus 3–4 mm. diametro; loculis 4–6 ovulatis; funiculis septo adnatis; seminibus immarginatis.

Type in the Gray Herbarium, collected in main canyon, east of Mt. Ord, Sierra del Norte, about 10 miles southeast of Alpine, Brewster County, Texas, April 7, 1947, *Rogers McVaugh 7862*. Other Texas specimens studied and included in the above description: steep limestone slopes, main canyon on west side of Santiago Mts., about eight miles southeast of Santiago Peak, Brewster Co., April 5, 1947, *McVaugh 7850* (GH); infrequent in upper Cottail Canyon, Chisos Mts., Brewster Co., Aug. 3, 1937, *B. H. Warnock 91* (GH); Pine Mountain, Sierra del Norte, Brewster Co., March 19, 1938, *O. E. Sperry T602* (GH); dry rocky limestone slopes, above Hess Ranch House, Glass Mts., north of Marathon, Brewster Co., March 16, 1941, *R. R. Innes & B. H. Warnock 469* (GH); abundant in shaded canyon bottoms, northeast side of Sierra Madera, about 25 miles south of Ft. Stockton, Pecos Co., April 12, 1947, *McVaugh 7912* (GH).

The ovule-number, glabrous siliques, relatively short styles and white flowers are characteristics shared by *L. Mcvaughiana*, *L. purpurea*, and *L. Johnstonii*. The latter and *L. Mcvaughiana* show further similarities in having congested infructescences and ascending siliques. There seems little doubt that all three species are, in fact, related. *L. Mcvaughiana* differs from the



others in having trichomes with the branches fused into a peltate disc, while in *L. purpurea* and *L. Johnstonii* the trichome branches are nearly or quite free to their bases. This difference is very striking and immediately sets *L. Mcvaughiana* apart as a distinct species. The latter also has entire basal leaves which contrasts with the other two species. *L. purpurea* has the pedicels recurved, while in *L. Johnstonii* they are divaricately ascending and nearly straight, and in *L. Mcvaughiana* they are widely spreading and weakly sigmoid.

### PHYSARIA

The evidence now assembled shows a continuous morphological gradation from the genus *Physaria* into *Lesquerella*. This evidence has been accumulating almost since the time Watson (1888) founded *Lesquerella* as a genus distinct from *Vesicaria*. Payson (1922) clearly recognized the proximity to *Physaria* of the entities he knew as *L. Kingii* and *L. utahensis*, and this was further emphasized by me (Rollins, 1939) as opposed to the ideas of Schulz (1936), who placed *Lesquerella* and *Physaria* in widely separated tribes of the family. More recently Maguire (1942) pointed up the close relationship of these two genera by using the specific name *hemiphsaria* for a species of *Lesquerella*. Formerly *Physaria Geyeri* was thought to be about as closely related to *Lesquerella* as any species of that genus, but a species of *Physaria* from Nevada, heretofore unknown, is even closer. Thus the assumed gap between these genera has been completely closed insofar as the morphology of the various entities involved is concerned. There remains the slender evidence from cytology which is, to say the least, very incomplete.

The basic chromosome number of *Physaria* is presumably  $n = 4$ . In *Lesquerella*, the known numbers are  $n = 5, 6, 8$ , and  $9$ , or their multiples. If such a chromosomal separation remains, when the problem has been sufficiently investigated, it would not be unreasonable nor inconsistent with the generic pattern in the Cruciferae to maintain *Physaria* and *Lesquerella* as separate genera. There is another practical reason for maintaining the two genera. *Physaria* is the smaller and older of the two, so that all the transfers would have to be made in that direction. It is hoped that the two genera can be kept going to avoid disruptions in the nomenclature of *Lesquerella*. The following new species provides added evidence that *Lesquerella* and *Physaria* had a common origin, as Payson (l. c.) has suggested. Indeed, *P. cordiformis* forms the nearly common link between



these genera. A further word of caution should be provided for those who might be tempted to hastily merge *Lesquerella* and *Physaria* without an adequate study of the problem. These genera are closely related to *Alyssum* at least, and possibly to *Vesicaria*. *Alyssum americanum* Greene could easily be accommodated in *Lesquerella* without upsetting the present generic concept seriously, but this species is closely related, at least morphologically, to *Alyssum alpestre* L. of the Old World. Quite obviously the question of *Alyssum* vs. *Lesquerella* would need to be considered in any move to unite the latter with another genus. Kuntze (1891) has already transferred a number of the species of *Lesquerella* to *Alyssum*.

***Physaria cordiformis* Rollins, sp. nov.**

Perennial from a tap-root, densely silvery stellate-pubescent throughout; stems several to numerous from the base, arising laterally on the caudex, simple, purplish, procumbent, 1-2 dm. long; radical leaves petiolate, terminating caudex, entire or with a few shallow teeth, 2-3 cm. long, blade rounded above, nearly orbicular to oblong, 3-12 mm. broad; cauline leaves petiolate, entire, linear-oblongate, 1-2.5 cm. long, 2-4 mm. wide; flowers numerous in elongated racemes; sepals narrowly oblong, outer pair slightly saccate, 4-5 mm. long; petals broadly spatulate, yellow, 7-10 mm. long, blade 2.5-3.5 mm. wide; infructescence greatly elongated, usually occupying over half the stem-length; pedicels divaricate to more ascending, sigmoid, 5-15 mm. long; siliques heart-shaped with a relatively shallow broad open sinus above and none below, sessile, densely pubescent, 3-5 mm. high, 3-5 mm. broad, compressed at right angles to the replum, not inflated; styles glabrous, 3-6 mm. long; stigma capitate; replum elliptical, rounded both above and below, not constricted, 3-4 mm. long; septum incomplete, forming a margin around the interior of the replum; ovules 3-4 in each loculus; seed wingless, brown, very slightly longer than broad.

Herba perennis caespitosa argentea stellato-pubescent; caulibus simplicibus decumbentibus 1-2 dm. longis; foliis radicalibus integris vel sparse dentatis 2-3 cm. longis, laminis orbiculatis vel oblongis 3-12 mm. latis; foliis caulinis petiolatis integris lineari-oblongatis 1-2.5 cm. longis, 2-4 mm. latis; sepalis lineari-oblongis 4-5 mm. longis; petalis flavis spathulatis 7-10 mm. longis, 2.5-3.5 mm. latis; racemis fructiferis elongatis; pedicellis divaricatis vel adscendentibus 5-15 mm. longis; siliquis cordiformis compressis non-inflatis pubescentibus 3-5 mm. altis, 3-5 mm. latis; stylis glabris 3-6 mm. longis; loculis 3-4-ovulatis; seminibus exalatis.

Type in the Gray Herbarium, collected near a branch of Cat Creek, in the Wassuk Range of Mountains, Mineral Co., Nevada, alt. 9,300 ft., July 8, 1945, *Annie M. Alexander* and *Louise Kellogg* 4393. Other specimens studied and included in the above description: dry chalky



lacustrine outcrop, associated with *Lepidium nanum*, 5 miles south of Sadler's Ranch, 55 miles south of Elko, on the Elko-White Pine County line, Nevada, alt. 5,000 ft., May 22, 1941, A. H. Holmgren 829 (GH); sandy washes between calcareous gravel knolls, Lone Mountain, 18 miles west of Eureka, Eureka Co., Nevada, alt. 6,150 ft., June 12, 1944, H. D. Ripley and R. C. Barneby 6220 (GH).

The latter two collections are from a lower altitude and a more northeasterly area than the type. The plants also differ somewhat from the type and may actually represent a separate, sub-specific entity, with broader basal leaves, longer styles, and a more appressed pubescence on the leaves and siliques. However, the plants of all three collections have many fundamental characters in common and appear to represent variants of a single species. Further field data and a more representative sample of the species are required for a valid appraisal of these variants.

#### SMELOWSKIA

For several years I have been puzzled by a plant sent in for determination by Prof. A. H. Holmgren.<sup>1</sup> It does not fit neatly into any of the established genera of the Cruciferae but is not sufficiently different from *Smelowskia* nor from *Braya* to form the basis of a new genus. In some respects it resembles certain species of *Arabis*, in other respects, members of *Thelypodium*. Thus the well known problem of generic definition in the Cruciferae is again emphasized. On technical characters of the flower, fruit, and seeds, the species is excluded from both *Arabis* and *Thelypodium*. It then becomes a question as to whether the characteristics of the plant are most in accord with those of *Smelowskia* or of *Braya*. Unfortunately, the new plant is not closely related to any known species in either genus, otherwise the problem would be relatively simple. Upon the evidence derived from a morphological study of the two genera and of the Nevada species, I have concluded that the latter should be placed in *Smelowskia*, where it is described below as *S. Holmgrenii*.

The basal leaves of *S. Holmgrenii* are entire, stiffly erect and glabrous except for marginal hairs. In these respects the basal portion of the plants resemble those of *Braya purpurascens* and are

<sup>1</sup> Professor Holmgren of Utah State Agricultural College, Logan, first sent flowering specimens in 1946. The following year, he returned to the same location in Nevada, several hundred miles distant, to re-collect the plant in fruit. I hereby express my obligation and appreciation for his keen interest and sustained effort in providing adequate material, including viable seeds, for the study of this species.



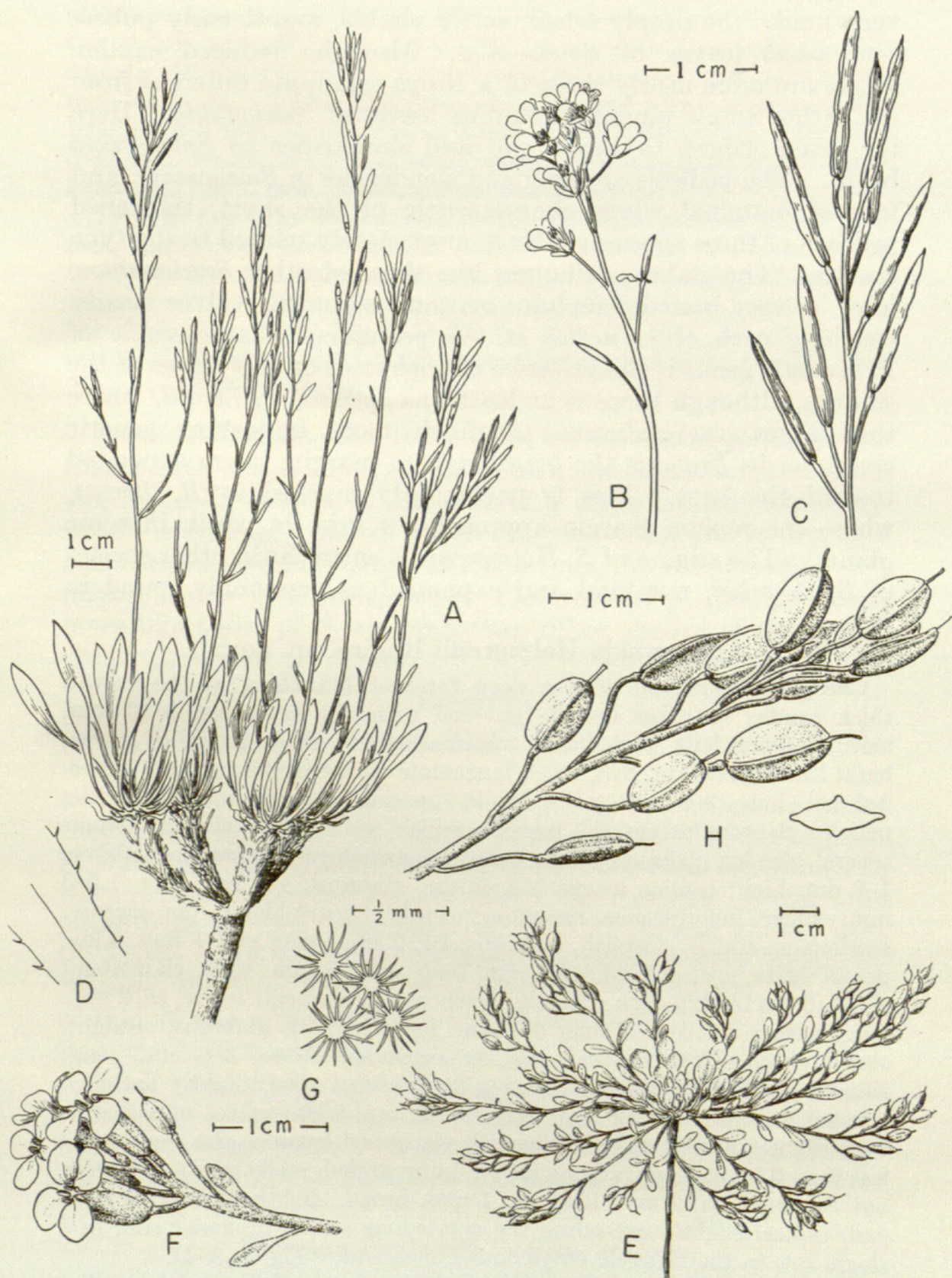


Fig. 1. A-D, *Smelowskia Holmgrenii*. A, habit sketch; B, inflorescence; C, infructescence; D, leaf-margins. E-H, *Lesquerella carinata*. E, habit sketch; F, inflorescence; G, group of 4 trichomes; H, infructescence including outline of transverse section of a single silique. Drawings by Jeanne Russel Janish.



very unlike the deeply lobed, softly pliable, and densely pubescent basal leaves of *Smelowskia*. Also the reduced cauline leaves are more nearly those of a *Braya* and quite different from the rather ample pinnatifid cauline leaves of *Smelowskia*. Here the resemblances to *Braya* end and similarities to *Smelowskia* begin. The pedicels are long and slender, as in *Smelowskia*, and free of marginal wings characteristic of the short, thickened pedicels of those species of *Braya* most closely related to the type species. The glabrous siliques, like those of other *Smelowskias*, have a very narrow replum margin, with the valves nearly touching each other across it. A prominent characteristic of *Braya* as a genus is the presence of trichomes on the valves of the siliques, although there is at least one species, *B. Longii*, where the valves are glabrous. A much more important generic character in *Braya* is the broad replum margin, much expanded toward the base. This is particularly marked in *B. Longii*, where the replum margin approaches 1 mm. in width in some plants. The stigma of *S. Holmgrenii* is entire, as in other species of *Smelowskia*, not bifid and expanded as commonly found in *Braya*.

***Smelowskia Holmgrenii* Rollins, sp. nov.**

Caespitose perennial with a deep tap-root branching at the crown; thick caudex branches densely covered with old leaf-bases, 5-10 mm. thick, 1-3 cm. long, each sobole terminating in a dense crown of leaves; basal leaves petiolate, stiff, erect, lanceolate to linear-oblong, acute, 2-5 cm. long, 3-5 mm. wide, blade tapering very gradually into the petiole, glabrous except the margins which are sparsely ciliate; stems several, slender, glabrous, terete, erect, somewhat gyrate, branched above, 1-2 dm. high; cauline leaves 3-5, linear, glabrous, 1-2 cm. long, 1.5-3 mm. wide; inflorescence racemose; sepals linear-oblong, non-saccate, scarious-margined, purplish, glabrous, ca. 2 mm. long and 1 mm. wide; petals white, spatulate, 3.5-4.5 mm. long, ca. 1.5 mm. wide, claw about one-half the blade length; stamens nearly equal, filaments terete, ca. 2 mm. long, anthers oval, less than 0.5 mm. long; pedicels glabrous, straight, strongly ascending, filiform, slightly expanded above, 3-8 mm. long; siliques erect linear-oblong, tapering at base and apex, slightly flattened parallel to septum, 5-12 mm. long, 1-1.5 mm. wide; valves nerveless or very slightly nerved at base, purplish, depressed between the seeds; style less than 0.5 mm. long; stigma entire, unexpanded; seeds brown, wingless, not flattened, ca. 2 mm. long, ca. 1 mm. broad, slightly pointed at each end, radical slightly exceeding the cotyledons at the funicular end, in a single row in the siliques; cotyledons incumbent. Fig. I, A-D.

Herba perennis caespitosa; caudicibus ramosis foliis persistentibus tectis; foliis radicalibus erectis rigidis numerosis lanceolatis vel lineari-oblongatis acutis 2-5 cm. longis, 3-5 mm. latis; caulibus tenuibus



glabris superne ramosis 1-2 dm. altis; foliis caulinis paucis remotis lineari-bus glabris 1-2 cm. longis, 1.5-3 mm. latis; sepalis lineari-oblongis non saccatis glabris purpureis ca. 2 mm. longis; petalis albis spathulatis 3.5-4.5 mm. longis, ca. 1.5 mm. latis; pedicellis fructiferis adscendentibus glabris tenuibus 3-8 mm. longis; siliquis erectis lineari-oblongis acutis teretibus 5-12 mm. longis, 1-1.5 mm. latis; seminibus oblongis alatis ca. 2 mm. longis, ca. 1 mm. latis; cotyledonibus incumbentibus.

Type in the Gray Herbarium, locally frequent, crevices of rocks on rocky prominence above middle fork of Pine Creek, Toquima Range, 10,000 ft., Nye Co., Nevada, Aug. 4, 1947, *Arthur H. Holmgren* and *Cecil Ballenger* 7076. Other specimens from the same general location: summit above Pine Creek Basin, 11,300 ft., July 16, 1945, *Bassett Maguire* and *A. H. Holmgren* 25814 (GH); same location, 11,400 ft., July 17, 1945, *Maguire* and *Holmgren* 25829 (GH).

*Smelowskia Holmgrenii* is the third species of this genus known from North America. It is easily distinguished from *S. calycina* and *S. ovalis* because of the lack of a dense whitish tomentum which is characteristic of those species. Also, the entire, stiff basal leaves are markedly different from the subpinnatifid soft pliable leaves of these species. The fruits of *S. Holmgrenii* are more like those of *S. calycina* than other species of the genus, either American or Asiatic.

#### EUTREMA

Up to the present only a single species of *Eutrema*, *E. Edwardsii*, has been well known from North America. This excludes species dubiously referred to *Eutrema* based on unauthenticated records. The range of *E. Edwardsii* is circumpolar in the arctic and sub-arctic, extending somewhat southward in the mountains of east central Asia. In America, it has been found from eastern Greenland (lat. 70° 50' N. and above) west to Alaska. All of the collections are from a very northerly latitude, the type having come from Melville Island. In view of this, it was quite startling to receive specimens of a *Eutrema* from the high mountains of Colorado. The comparatively long-petioled basal leaves and short narrowly elliptical siliques are sufficiently characteristic to make the plants unmistakably referable to this genus. A comparative study of the Colorado material with that of *E. Edwardsii* shows that the two entities are actually quite closely related species.

#### ***Eutrema Penlandii* Rollins, sp. nov.**

Perennial, stems one to few from a slightly fleshy tap-root, decumbent to erect, glabrous, 3-8 cm. high; basal leaves petiolate, petiole very slender, 1-2.5 cm. long, blade ovate to elliptical, cordate, truncate or



cuneate below, rounded at apex, 5–10 mm. long, 3–5 mm. wide, glabrous, slightly coriaceous with a prominent mid-rib; cauline leaves 3–7, sessile, crowded, narrowly oblong, not auriculate, 1–1.5 cm. long, 2–3 mm. wide, glabrous, slightly coriaceous with a well-defined mid-rib; sepals purplish, glabrous, broadly oblong, scarious-margined, 1.5–2 mm. long, somewhat persistent after anthesis; petals white, narrowly lingulate with a very narrow claw, 2–3.5 mm. long, less than 1 mm. wide; stamens subequal, ca. 2 mm. long, equaling or slightly exceeding the sepals, anthers minute, slightly longer than broad, ca. 0.2 mm. long; infructescence crowded, 1.5–3 cm. long; pedicels divaricately ascending, glabrous, straight, 3–5 mm. long, noticeably expanded distally; siliques narrowly elliptical, glabrous, not strongly flattened, ca. 1.5 mm. wide, 4–8 mm. long; style barely evident; stigma about the same diameter as the style, not noticeably lobed; seeds not seen.

Herba perennis; caulibus paucis decumbentibus vel erectis glabris 3–8 cm. altis; foliis radicalibus petiolatis integris laminis ovatis 5–10 mm. longis, 3–5 mm. latis; foliis caulinis sessilibus non auriculatis anguste oblongis 1–1.5 cm. longis, 2–3 mm. latis; petalis albis anguste lingulatis 2–3.5 mm. longis; pedicellis fructiferis glabris divaricatis, 3–5 mm. longis; siliquis glabris 4–8 mm. longis; seminibus ignotis.

Type in the Gray Herbarium, Hoosier Pass, Park Co., Colorado, elev. 12,300 ft., July 27, 1935, *C. William T. Penland 1305*. Isotype at Colorado College. A second collection from the same area was found rooted in moss in seepage below a snowbank on south scree slope of Hoosier Ridge, at about 12,800 ft., July 26, 1949, by *C. William T. Penland 3909*, and is now deposited in the Gray Herbarium.

*Eutrema Penlandii* differs from typical *E. Edwardsii* in having more slender pedicels, petals which are narrowly lingulate instead of broadly spatulate to obovate, and with the smaller (5–10 mm. long) blades of the petiolate leaves usually truncate to cordate below. In *E. Edwardsii* the blades (1–3 cm. long) are most often gradually narrowed to the petiole and only rarely approach being truncate. The blades of the petiolate leaves of *E. Penlandii* are usually broadly ovate with a rounded apex, but in some plants, variation to a narrower more cuneate blade is found. The basal leaves of *E. Edwardsii* are most often narrowly elliptical with a cuneate base and somewhat pointed apex. The Colorado plant is less robust in all respects than its northern relative, having fewer, more slender, and often somewhat decumbent stems; fewer and narrower cauline leaves, smaller flowers and smaller siliques. The infructescence of *E. Penlandii* is shortened and crowded, while that of *E. Edwardsii* is often much elongated, reaching a decimeter and a half in length.



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