

DRABA (CRUCIFERAE) IN MEXICO AND GUATEMALA

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In North America, *Draba* occurs primarily in temperate, mountainous, and arctic areas. There are no native species in Central America south of Guatemala, but in South America, beginning in the mountains of Colombia and Venezuela, the genus is well represented southward, especially in the Andes. *Draba* is the largest genus of the Cruciferae in the western hemisphere and in many ways it is taxonomically the most difficult. Part of this is attributable to the complexity associated with the large number of species involved, but to some degree it is due to the lack of adequate specimens of some of the taxa. This will be evident in the treatment that follows.

In contrast to the situation north of Mexico, the Mexican representation of *Draba* is often an attenuation of the distribution of species with a wider geographic range. For example, *D. standleyi* Macbride & Payson and *D. platycarpa* T. & G. are presently known only in northeastern Coahuila from the Sierra Maderas del Carmen. *Draba stanleyi* occurs otherwise from Texas to Arizona and *D. platycarpa* ranges from Arkansas to Washington; *D. cuneifolia* Nutt., in the wide sense, is limited to northern Mexico but is widely distributed from Florida to Kentucky and westward to California. Some taxa follow the cordillera southward as does *D. helleriana* Greene, but again the southward extension is an attenuation of its total geographic range. There is, however, a group of interrelated species in south central Mexico and in Guatemala that is unrelated to those species found further north. Some tend to be associated largely with volcanic peaks: the disparate populations on these isolated peaks have posed taxonomic problems beginning with the earliest botanical exploration of the region.

There are at least 12 species names available for *Draba* of the high volcanic mountains of south central Mexico and Guatemala, yet our evaluation of the available specimens allows only two taxa at the specific level. Part of the difficulty arises from the inherent variation that characterizes the two species, *D. jorullensis* Kunth ex H.B.K. and *D. nivicola* Rose; but part is the evaluation and interpretation of the variation found. Bentham (1841) and Hemslley (1879) had too little material for study to chart the variations of the isolated populations accurately. Apparently Rose (1903) minimized variation and emphasized diversity, for he described five new species from the area at one time. Unfortunately, he did not satisfactorily distinguish any one from another; or for that matter, from the other four putative species previously described from the same peaks. The fate of Rose's proposed species has been about as might have been expected. One species and two taxa at the varietal level were recognized by Schulz (1927), and Hitchcock (1941) accepted one species and one variety from the lot. My own evaluation allows only one specific name to survive, *D. nivicola* Rose.

Some confusion appears to have been introduced by the name *Draba jorullensis*, the type of which, according to the field books of Humboldt and Bonpland, did not come from "volcano de Jorullo" as implied, but rather from Nevado de Toluca. Contrary to what was formerly supposed, the types of both *D. jorullensis* and *D. toluensis* Kunth ex H.B.K. came from the same volcanic mountain, Nevado de Toluca. Although in growth form specimens of the type collection of *D. toluensis* are more compact, and appear to be perennial instead of clearly biennial, as compared to those of *D. jorullensis*, both collections fall within the range of variation of a single species.

With a much greater array of material than was available to Hitchcock (1941), we still came out with about the same evaluation of the taxonomic situation as he presented. Building on his treatment, the present contribution extends the coverage to include newly discovered taxa and provides a presentation of all presently known taxa of *Draba* in Mexico and Guatemala.

KEY TO THE SPECIES

- A. Plants obviously annual; styles scarcely evident or only forming a weak apiculation on mature siliques; ovules more than 10 in each loculus; basal leaves in a flat rosulate cluster.
 - B. Siliques elliptical to obovate, rounded at apex, pubescent with simple trichomes, 2.5-3.7 mm. wide 1. *D. platycarpa*.
 - B. Siliques oblong, acute to somewhat obtuse at apex, pubescent with simple or branched trichomes or glabrous, 1.2-2.8 mm. wide 2. *D. cuneifolia*.
- A. Plants biennial or perennial; styles strongly evident on mature siliques (except in *D. beamanii* where the stigmas may be nearly sessile); fewer than 10 ovules in each loculus; basal leaves not rosulate or if so not flat.
 - C. Flowers conspicuous; petals at least twice the length of the sepals; styles slender, more than 1 mm. long; fruiting pedicels mostly divaricately ascending to erect (except in *D. rubricaulis* where they are widely spreading).
 - D. Basal leaves petiolate, linear or oblanceolate, 3-8 cm. long, hirsute or at least margined with large mostly simple trichomes.
 - E. Basal leaves linear to narrowly oblanceolate, mostly less than 5 mm. wide; pedicels erect to divaricately ascending; caudex clothed in dead leaf bases ... 3. *D. standleyi*.
 - E. Basal leaves oblanceolate, up to 1 cm. wide; pedicels widely spreading, from slightly ascending to slightly descending; caudex free of leaf bases 6. *D. rubricaulis*.
 - D. Basal leaves spatulate to broadly oblanceolate without a defined petiole, mostly less than 3 cm. long; pubescent with either branched or simple trichomes or both.
 - F. Plants matted and with numerous flowering stems barely emergent from mat of leaves, stems less than 3 cm. long; caudex branches covered with marcescent leaves and leaf bases; styles 2.5-3.5 mm. long 5. *D. implexa*.
 - F. Plants not matted; flowering stems clearly exerted above leaves, few to several, mostly 1 dm. or more tall; caudex not covered by dead leaves or leaf bases (except in *D. helleriana*); styles less than 2mm. long.
 - G. Stamens exerted; petals linear; fruiting pedicels 5 mm. or less long 4. *D. corrugata* var. *demareei*.
 - G. Stamens included; petals obovate to broadly spatulate; fruiting pedicels 7 mm. or more long 7. *D. helleriana*.
 - C. Flowers inconspicuous; petals barely exceeding to much less than twice the length of sepals; styles stout, less than 1 mm. long; fruiting pedicels at right angle to rachis.
 - H. Petals whitish when dry; cauline leaves ovate to broadly elliptical, less than 1 cm. long; stems simple 8. *D. beamanii*.

- H. Petals yellow; cauline leaves oblanceolate or none, when present more than 1 cm. long; stems branched or simple.
- I. Leaves oblanceolate, narrowed toward base; at least some stems branched; plants mostly biennial 9. *D. jorullensis*.
- I. Leaves linear to oblong, not narrowed toward base; stems mostly simple, branching rare; plants perennial.
- J. Leaves densely pubescent at least on lower surface with minute dendritic trichomes, usually silvery-gray, oblong, taproot usually very thick 10. *D. nivicola*.
- J. Leaves glabrous to sparsely hirsute on the margins with coarse simple or forked trichomes, greenish, linear; taproot slender to moderately thickened 11. *D. hidalgensis*.

1. *D. platycarpa* Torrey & Gray, Fl. N. Amer. 1: 108. 1838.

D. cuneifolia Nutt. var. *platycarpa* (T. & G.) S. Watson, Proc. Amer. Acad. 23: 256. 1888.

GEOGRAPHIC RANGE IN U.S.A.: Arkansas and Texas west to Arizona, north to Washington.

Mexico. Coahuila: Laguna Peak-El Uno road, on steep N-facing rhyolitic slopes, 29°01'30" N, 102°31'30" W, Sierra Maderas del Carmen, April 4, 1974, *Wendt, Lott & Riskind 132H* (TEX-LL). This is the only specimen of *D. platycarpa* we have seen from Mexico.

2. *D. cuneifolia* Nuttall in Torrey & Gray, Fl. N. Amer. 1: 108. 1838.

For synonyms (none based on Mexican material) and a map showing the geographic distribution of var. *integrifolia* and var. *sonorae*, see Hartman et al. (1975).

KEY TO THE VARIETIES

- Siliques with simple trichomes; lower stems hirsute with at least some coarse simple or merely forked trichomes; styles scarcely evident 2a. var. *cuneifolia*.
- Siliques with branched trichomes; stems pubescent throughout with 3- to 4-branched trichomes; styles apiculate.
- Siliques (5-)-7-12 mm. long, occurring on the distal one-half to two-thirds of infructescence axis 2b. var. *integrifolia*.
- Siliques 3-6 (-8) mm. long, occurring on nearly entire length of infructescence axis 2c. var. *sonorae*.

2a. *D. cuneifolia* Nuttall var. *cuneifolia*

GEOGRAPHIC RANGE IN U.S.A.: Ohio to northern Florida, west to California.

Mexico. Baja California: Sierra Juárez, 1.6 mi. SE of San Fuastino, *Moran 14926* (GH); 21 mi. S of Santo Tomás, *Wiggins 4274* (GH). Chihuahua: near Chihuahua, 6 April 1886, *Pringle s.n.* (GH); *Purpus 1026* (GH). Coahuila: Sierra de las Cruces, 5 km. above Tinaja Blanca, *Stewart 2261* (GH); near Tinaja Blanca, *Stewart 2240* (GH); ca. 2 km. N of Estacion Carneros, M. C. *Johnston et al. 10497C* (TEX); 15 mi. S of Saltillo, *Rollins & Tryon 58150* (GH, TEX); Sierra de Parras, *Purpus 1026a* (GH); Cañon del Agua, 0.7 mi. S from ranchito at mouth of canyon, Lat. 27°05'15" N, Long. 102°24'05" W, *Tom Wendt et al. 1945* (ENCB). Zacatecas: 5 km. W of Concepcion del Oro, M. C. *Johnston et al. 10480D* (TEX); Puerto de Rocamontes, M. C. *Johnston et al. 10487A* (TEX).

2b. *D. cuneifolia* Nuttall var. *integrifolia* S. Watson. Proc. Amer. Acad. 23: 256. 1888.

GEOGRAPHIC RANGE IN U.S.A.: Texas to southwestern Utah, southern Nevada and central California.

Mexico. Baja California: vicinity of Bahia de los Angeles, ca. 4 mi. S of Las Flores, *Wiggins & Thomas 253* (GH); near highway in mountains ca. 15 mi. S of Ensenada, *Gentry 7926* (ENCB,

MEXU); Sierra Juárez, 5 km. W of La Rumorosa, *Moran 24110* (GH). **Nuevo Leon:** 24 mi. E of Saltillo, *Rollins & Tryon 58104* (ENCB, GH, TEX); San Juan, *Pringle 13719* (GH, MSC); 9.6 km. W of Ojo de Agua de Sabinas Hidalgo, Villaldama, *C. P. Cowan 3775 et al.* (GH, TEX); just N of Cañon de Potrerillos, *M. C. Johnston et al. 1024A* (TEX).

- 2c. *D. cuneifolia* Nuttall var. *sonorae* (Greene) Parish, Bull. S. Calif. Acad. Sci. 2: 81. 1903, based on *D. sonorae* Greene, Bull. Calif. Acad. Sci. 2: 59. 1886.

GEOGRAPHIC RANGE IN U.S.A.: southern Arizona to southern California.

Mexico. Baja California: Cañada la Matanza, 4 km. S of Colonet, *Moran 26830* (GH); Las Trincheras, *Moran 12610* (GH); San Quentin, *Palmer 611* (GH); Santa Maria plains, 23.5 mi. S of Hamilton Ranch, *Wiggins 4321* (GH); Santa Agueda, *Palmer 207* (GH); margin of Laguna Chapala, *J. R. & C. G. Reeder 6804* (ENCB); first cove east of Puerto Refugio, Isla Angel de la Guarda, *Moran 8630* (GH); El Terminal, *Moran 7930* (GH); Santo Domingo, (Hamilton's Ranch and vicinity) *Wiggins 4498* (GH, TEX-LL). **Sonora:** northwestern mountains, 24 March 1884, *Pringle s.n.* (GH, isotype); 1 mi. S of Pinacate Peak, Sierra Pinacate, *Felger et al. 19346* (ENCB); Hourglass Canyon, ca. 2 mi. NE of Hurache (Pyramid) Tank, W side of Pinacate region, *Felger 19158* (ENCB); 4 mi. W of Caborca, *Keck 4037* (GH); San Bernardo, Rio Mayo, *Gentry 1361* (GH).

3. *D. standleyi* Macbride & Payson, Ann. Mo. Bot. Gard. 5: 150. 1918, based on *D. gilgiana* Wootton & Standley, Contr. U.S. Nat. Herb. 16: 124. 1913, not *D. gilgiana* Muschler, Fedde Rep. Nov. Sp. 3: 212. 1906.

GEOGRAPHIC DISTRIBUTION IN U.S.A.: Texas to Arizona.

Mexico. Coahuila: Sierra Maderas del Carmen, ¼ mi. N of Campo Dos along trail to Campo Tres, 28°59'30" N, 102°36'30" W, 7 Aug. 1974, *Wendt & Adamcewicz 524* (GH, MEXU, TEX).

4. *D. corrugata* S. Watson var. *demareei* (Wiggins) C. L. Hitchcock, Univ. Wash. Publ. Bot. 11: 33. 1941, based on *D. demareei* Wiggins, Contr. Dudley Herb. 1: 168. 1933.

Variety *corrugata*, *D. corrugata* var. *saxosa* (Davidson) Munz & Johnston and *D. corrugata* f. *vestita* (Davidson) C. L. Hitchcock apparently occur only in southern California, U.S.A. Variety *demareei* appears to be restricted to the Sierra San Pedro Martir of northern Baja California.

Mexico. Baja California, Sierra San Pedro Martir: Vallecitos, *Wiggins & Demaree 4970* (GH); ridge NW of Corona, 35°59' N, 115°35' W, *Moran 11279* (GH); east slope of Cerro, 31°02' N, 115°27' W, *Moran 15267* (GH); Yerba Buena, 31°00' N, 115°27' W, *Moran & Thorne 14142* (GH, TEX-LL); La Encantada, *Wiggins & Demaree 4875* (GH).

5. *D. implexa* Rollins, *sp. nov.*

Herba perennis; caudicibus ramosis; caulibus simplicibus, 3-5 cm. longis; foliis basalibus, pubescentibus, oblanceolatis, 1.5-3 cm. longis, 2-3 mm. latis, integris vel sparse denticulatis; foliis caulinis spathulatis, vel oblongis, cuneatis, integris, pubescentibus; pedicellis divaricatus, 3-5 mm. longis; sepalis erectis, oblongis, sparse pubescentibus, 3.5-4mm. longis, 1.5-2 mm. latis; petalis spathulatis, luteis, 5-6 mm. longis, ca. 1.5 mm. latis; siliquis immaturis oblongis, acutis, glabris vel sparse pubescentibus; stylis 2.5-3.5 mm. longis; seminibus ignotis.

Holotype in the Gray Herbarium. **Mexico, Durango:** N slopes of Cerro Huehueto (Huehuento), south of Huachicheles, about 75 mi. W of C. Durango; abundant on exposed rocks, rich, deep, woodland soil in dense pine forest; elevation 2900-3150 m., 2 July 1950, *James H. Maysilles 7290*. Isotype: MICH.

Matted perennial; caudex branches several to many, thickened with remnants of dead leaves and leaf bases; stems leafy, simple, densely pubescent

with a mixture of small dendritically branched trichomes and fewer large simple or forked ones, 3-5 cm. tall; basal leaves oblanceolate, petiolate, entire or with one or two remote small teeth, obtuse, pubescent with coarse dendritic trichomes on blade surfaces, often margined with larger simple or forked trichomes particularly on the petioles, 1.5-3 cm. long, 2-3 mm. wide; cauline leaves overlapping, extending to inflorescence, spatulate to oblong, obtuse, entire, cuneate at base, 1-1.5 cm. long; inflorescence condensed, flowers congested; pedicels divaricately ascending, pubescent, 3-5 mm. long; sepals erect, hirsute with simple or rarely forked trichomes, 3.5-4 mm. long, 1.5-2 mm. wide, inner pair plain, outer pair slightly saccate and somewhat boat-shaped; petals spatulate with a narrow claw, truncate to slightly retuse above, yellowish, drying nearly white, 5-6 mm. long, ca. 1.5 mm. wide; stamens strongly tetradynamous, filaments slender, paired filaments ca. 3.5 mm. long, anthers oval to broadly oblong, ca. 1 mm. long; glandular tissue well-developed, surrounding base of single filaments, subtending base of paired filaments; immature siliques oblong, acute to acuminate at apex; glabrous on valve surfaces, usually pubescent with simple trichomes on the margins; styles slender, 2.5-3.5 mm. long; siliques of previous season twisted, ovate-lanceolate, 7-10 mm. long, 3-4 mm. wide; seeds wingless, oblong, ca. 1.5 mm. long, ca. 1 mm. wide, 6-8 in each loculus; cotyledon position not determinable.

Draba implexa is not closely related to any other known North American species of the genus. The matting habit of growth is somewhat like that of *D. smithii* Gilg, a species of southern Colorado, but any close similarity stops there except that both have twisted fruits, a feature of many species of *Draba*. In having a cushion of dead leaf bases covering the caudices, *D. implexa* is similar to *D. standleyi* Macbride & Payson and *D. petrophila* Greene, but in most other characteristics these species have very little in common.

The flower color of *Draba implexa* was indicated to be yellow by the collector. However, the dried specimens show the petals to be nearly white and I have assumed that the yellow pigmentation was lost during drying. An interesting feature of the holotype specimen is that there are successive tufts of dead leaf bases along the caudex branches. This probably indicates that, in successive years, the leaf bases have persisted but that after each deposition, some growth of the caudex branch has taken place before the following year's remnants were left behind. Unfortunately, *D. implexa* is known only from the one collection cited and very little of the variation presumably present in this species can be assessed.

6. *D. rubricaulis* Heller, Bull. Torr. Bot. Club 26: 262. 1899.

D. helleriana Greene var. *patens* (Heller) Schulz f. *rubricaulis* (Heller) O. E. Schulz. Pflanzenreich IV, 105: 185. 1927.

Perennial; stems several from a loosely branching caudex, simple or branched above, hirsute below with a mixture of simple and forked spreading

trichomes, usually glabrous above, 2.5-4.5 dm. tall; basal leaves petiolate, mid-vein prominent, oblanceolate, obtuse at apex, remotely dentate, sparsely pubescent with simple or forked trichomes (2-)3-7 cm. long, (5-)7-12 mm. wide; cauline leaves 3-6, sessile, oblong, entire to dentate, non-auriculate, sparsely pubescent with simple or forked (sometimes few-branched) trichomes, 2-5 cm. long, (5-)8-15 mm. wide; sepals yellowish, outer saccate pair wider than inner non-saccate pair, glabrous except for two or three large simple or forked trichomes toward apex, 3.5-4 mm. long; petals yellow, narrowly lingulate, erect, not unguiculate, not differentiated into blade and claw, 7-9 mm. long, 1.5-2 mm. wide; glandular tissue well-developed flanking base of single stamen filament, otherwise obscure; anthers oval, ca. 1.5 mm. long; fruiting raceme elongated, up to 2 dm. long; pedicels spreading at right angle to rachis to slightly ascending, nearly straight, glabrous, 8-15 mm. long; siliques ascending, oblong, twisted, acute at apex, glabrous or with short simple trichomes on the valve surfaces, 8-11 mm. long, 2-3 mm. wide; styles 2-3 mm. long; seeds light brown, plump, wingless, slightly longer than wide, ca. 1.3 mm. long; cotyledons accumbent.

Mexico. Chihuahua: summit of Sierra Mohinora, *Correll & Gentry 23160* (GH, TEX-LL); Mt. Mohinora, *E. W. Nelson 4880* (GH); cool ledges, Sierra Madre, *Pringle 1529* (GH, holotype).

Draba rubricaulis is apparently restricted to the Sierra Madre of Chihuahua. Hitchcock (1941) followed Schulz in his treatment of this taxon. However, the petiolate basal leaves of *D. rubricaulis* and consistent simple or rarely forked trichomes on the leaves, stems, and pedicels are distinctive as compared with *D. helleriana*. Variety *patens* of that species is closest to *D. rubricaulis* but there is a large difference in flower size: those of *D. rubricaulis* are much larger than those of var. *patens*.

7. *D. helleriana* Greene, *Pittonia* 4: 17. 1899.

As interpreted by Hitchcock (1941), *Draba helleriana* consists of four varieties and one form, and has a combined distribution that includes southern Colorado, New Mexico, Arizona, and the Sierra Madre of Chihuahua. I recognize forma *rubricaulis* as a species distinct from *D. helleriana* as indicated above, but it is clear there is a close relationship between these two species. That *D. helleriana* is a complex of infraspecific taxa is also recognized. Material from Nuevo Leon not seen by Hitchcock extends the distribution and complexity of this species. The two varieties described below are strong perennials with branching caudices and simple stems quite unlike most varieties of *D. helleriana* where the caudices are simple and the stems branched. This is particularly true in *D. helleriana* var. *patens* (Heller) O. E. Schulz, to which the two following varieties appear to be most closely related. These varieties represent the species as it is presently known in Mexico.

KEY TO THE VARIETIES

- Plants with closely branching caudices and a thick taproot; stems mostly 1.5 dm. or less tall 7a. var. *potosiensis*.
 Plants sprangely in caudex area; stems 2 dm. or more tall 7b. var. *viejoensis*.

7a. *D. helleriana* Greene var. *potosiensis* Rollins, var. nov.

Herba perennis, caespitosa; caudicibus ramosis; caulibus erectis, 6-18 cm. altis; siliquis glabris vel sparse pubescentibus.

Holotype in the Gray Herbarium. Mexico, Nuevo Leon: Cerro Potosí, top of mtn., ca. 3650 m. alt., in alpine meadow, abundant, 1 July 1959, John H. Beaman 2665. Isotype: MSC.

Mexico, Nuevo Leon: Cerro Potosí, Galeana, G. B. Hinton et al. 17037 (ENCB, TEX), 17038 (ENCB, MSC), 17050 (ENCB, MSC, TEX); near summit of Cerro Potosí, Galeana, Sharp 45753 (GH); Dorr 2279 (TEX); C. H. Mueller 2241, 2273 (GH); Beaman 4457 (MSC); ascent of Sierra Potosí by N hogback, ca. 20 mi. NE of Galeana, C. H. & M. T. Mueller 1252 (GH, MEXU, TEX); Sierra La Marta, G. B. Hinton et al. 17973 (TEX).

Field notes accompanying some of the specimens indicate that var. *potosiensis* grows abundantly on boulders and in open areas and that the flowers are bright yellow.

7b. *D. helleriana* Greene var. *viejoensis* Rollins, var. nov.

Herba perennis; caulibus 2-6 dm. altis; foliis basalibus late oblanceolatis vel obovatis; pedicellis 1-2 cm. longis; siliquis glabris vel sparse pubescentibus.

Holotype in the Gray Herbarium. Mexico, Nuevo Leon: Sierra Madre Oriental, Cerro del Viejo, 15 mi. W of Dulces Nombres, municipality of Zaragoza, on open, nearly barren, limestone outcrops, 18 August 1948, F. G. Meyer & D. J. Rogers 2984. Isotype: GH.

Mexico, Nuevo Leon: San Antonio Peña Nevada, Dr. Arroyo, G. B. Hinton et al. 17331 (ENCB); area of Cerro Peña Nevada, ca. 12 km. NE of San Antonio Peña Nevada, 30 km. E of Dr. Arroyo, N slopes of mt. known locally as Picacho Onofre, Wells & Nesom 452 (GH), Beaman 2700 (MSC); Picacho San Onofre, Zaragoza, G. B. Hinton et al. 17384 (ENCB); Cerro Potosí, open forested area near microwave tower, shaded moist ravine, McGregor et al. 340 (GH).

8. *D. beamanii* Rollins, sp. nov.

Herba biennis; caudicibus simplicibus; caulibus 1-6, erectis, simplicibus, pubescentibus, 5-16 cm. altis; foliis basalibus oblanceolatis, integris vel parce denticulatis, nonpetiolatis, pubescentibus, 1-1.5 cm. longis, 4-6 mm. latis; foliis caulinis 3-5, ovatis vel late oblongis, integris, vel parce denticulatis, dense pubescentibus, 4-10 mm. longis; sepalis late oblongis, nonsaccatis, sparse hirsutis, ca. 2 mm. longis, ca. 1.5 mm. latis; petalis spathulatis, ca. 2.5 mm. longis, ca. 1.2 mm. latis; pedicellis divaricatis, rectis, dense pubescentibus, 2-5 mm. longis, siliquis oblongis vel anguste ovatis, glabris vel sparse pubescentibus, 4-6 mm. longis, 2-3 mm. latis, loculis 4-7 ovulatis; seminibus immaturis oblongis, exalatis.

Holotype in the Gray Herbarium. Guatemala, Huehuetenango: Sierra de los Cuchumatanes, near lake at east end of Llano de Tierra, ca. 2.5 mi. W of Llano de San Miguel; ca. 3500 m. alt.; in wet meadow near lake shore, 2 August 1960, John H. Beaman 3965. Isotypes: DUKE, ENCB, MSC, TEX.

Biennial or possibly perennial with 1-6 unbranched stems arising from a cluster of basal leaves, pubescent nearly throughout with dendritically branched and scattered simple or forked trichomes; caudex simple; stems erect or slightly curved upward at base, 5-16 cm. tall; basal leaves oblanceolate, obtuse, nonpetiolate, entire or with a few remote denticulations, usually pubescent above with a mixture of larger simple or forked and smaller

dendritic trichomes, uniformly pubescent below with dendritic mostly 4-branched trichomes, 1-1.5 cm. long, 4-6 mm. wide; cauline leaves 3-5, ovate to broadly oblong, entire or with a few remote denticulations, densely pubescent with dendritic 3-5 branched trichomes, 4-10 mm. long; sepals broadly oblong to nearly elliptical, nonsaccate, hyaline-margined, hirsute with a few forked or simple trichomes, ca. 2 mm. long, ca. 1.5 mm. wide; petals whitish when dry, spatulate, truncate to slightly retuse, ca. 2.5 mm. long, ca. 1.2 mm. wide; stamens subequal, anthers nearly oval, ca. 0.2 mm. in diameter; glandular tissue well-developed above petal base and subtending single stamen filaments; pedicels widely spreading to slightly ascending, straight, densely pubescent, 3-5 mm. long; siliques oblong to narrowly ovate, strongly compressed parallel to plane of septum, glabrous to sparsely pubescent along margins, 4-6 mm. long, 2-3 mm. wide; styles barely visible; stigmas nearly sessile; ovules 4-7 in each loculus; funiculi slender, ca. 1 mm. long; seeds immature, plump, wingless; ca. 1.2 mm. long, ca. 1 mm. wide; cotyledons accumbent.

Guatemala. Huehuetenango. Sierra de los Cuchumatanes: at Chemal, Km. 318 on Ruta Nacional 9N, *Beaman* 3077 (GH, MSC); between Tojiah and Chemal at Km. 317 on Ruta Nacional 9N, *Beaman* 3824 (GH, MSC); between Paquix and Chemal, *Beaman* 3006 (MSC); about 10.5 mi. SW of San Juan Ixcay, *W. D. Stevens* 1254 (MSC).

Because of its biennial to short-lived perennial habit and unbranched caudex, *Draba beamanii* must be compared with *D. jorullensis*, which is probably its nearest known relative. But the stems are few and unbranched in *D. beamanii* while *D. jorullensis* has numerous branched stems in all well-developed plants. The siliques of *D. jorullensis* bear short but definite styles while in *D. beamanii*, the stigmas are practically sessile with styles scarcely visible. And the trichome pattern is very different in these two species. The basal leaves especially are covered or at least margined with large simple trichomes in *D. jorullensis* whereas in *D. beamanii* the predominating trichomes are dendritically branched and although simple trichomes are often present, they do not fringe the leaves as in *D. jorullensis*. Also, the petals fade to white in *D. beamanii* but are yellow in *D. jorullensis*. The latter species does occur in Guatemala as shown below, but I have not seen any specimens from the Dept. of Huehuetenango.

9. *D. jorullensis* Kunth ex H.B.K., Nov. Gen. et Sp. Pl. 5: 78. 1821.

For synonymy see Hitchcock (1941). $n = 12$, *Beaman*, et al. (1962).

Guatemala. Chimaltenango: Volcán de Fuego, *Beaman* 4034 (MSC); Volcán Acatenango, *Beaman* 3285, 4034 (GH, MSC). **Sacatepequez:** Volcán de Agua, *Hartweg* 571 (GH, isotype of *D. volcanica* Benth.); *Beaman* 2923 (MSC); *Harmon* 3663 (ENCB). **San Marcos:** Volcán Tacna, *Beaman* 3137, 3222 (GH, MSC). **Quezaltenango:** Volcán Santa Maria, *Skutch* 850 (GH); *Beaman* 4106 (MSC); *Matuda* 2348 (MEXU, TEX-LL).

Mexico. Chiapas: Mt. Tacaná, *E. Matuda* s.n. (GH), *Matuda* 2348 (MEXU); near summit of Volcán Tacaná, Union Juárez, *D. E. Breedlove* 26720 (ENCB); *Breedlove* 29376 (MEXU). **Jalisco:** Nevado de Colima, *McVaugh* 11650 (GH); *Beaman* 2346 (MSC, TEX); *Goldsmith* 61 (GH); *Gregory & Eiten* 271 (GH), 297 (GH, MSC). **Mexico:** Sierra de las Cruces, 11 Sept. 1892, *Pringle* 5260

(GH, MEXU, type no. but wrong date for isotype of *D. confusa* Rose); Serrania de Ajusco (Cerro de Ajusco), *Pringle* 7385 (GH), 10266 (GH, MEXU, MSC), 15623 (GH, MSC); *Beaman* 2783 (GH, MSC); Crucero Agua Blanca, *Hinton* 4921 (GH); Iztaccihautl, *Beaman* 1984 (GH, MSC), 2847 (GH, MSC, TEX), 3502 (GH, MSC); Nevado de Toluca, *Hernández X.* X10164 (CHAPA); *Beaman* 1679, 1695 (GH), 1891 (GH, MSC), 2448 (GH, MEXU, MSC), 1890 (MEXU, MSC, TEX); *Pringle* 4248 (GH, MEXU, MSC, TEX-LL, isotypes of *D. pringlei* Rose); Cerro Tláloc, Sierra Nevada, *Wendt & Atkinson* 3440 (CHAPA, ENCB). **Mexico-Puebla:** Popocatepetl, *H. Cristie s.n.* (GH, photo); *Koch* 7466 (CHAPA); *Correll* 14308 (GH); *Beaman* 1728, 2106 (GH, MSC); *Rose & Hay* 5980 (GH). **Michoacan:** Cerro Tancitaro, *W. C. Leavenworth* 276 (GH); Cerro San Andres, *Beaman* 4289 (GH, MSC). **Puebla-Vera Cruz:** Pico de Orizaba, *Beaman* 1762 (GH, MSC), 2271 (GH, MSC, TEX-LL); *Pringle* 8581 (ENCB, GH, MEXU, MSC, TEX, TEX-LL). **Puebla:** Sierra Negra (SW of Pico de Orizaba), *Beaman* 2521 (MSC). **Tlaxcala:** Malinche, *Beaman* 2229, 2257 (MSC). **Veracruz:** Cofre de Perote, *Beaman* 2162 (GH, MSC); *Dorantes Lopez* 329 (GH); *Dorantes et al.* 01563 (ENCB); *Balls & Gourlay* B4614 (CHAPA).

Evidently *Draba jorullensis* is very abundant on the volcanic peaks where it occurs for there are 52 specimens of it in the Gray Herbarium alone and I have examined well over 100 different collections. The popular peaks, such as Iztaccihautl, Orizaba, Popocatepetl, and Toluca have been collected most heavily with more than 15 different collections represented in some instances. I mention this because with as many samples as this to work with, it is clear, as it was to Hitchcock (1941), that this species is exceedingly variable. Without doubt, this is the basic reason for the unusual number of redundant names proposed for it. The habit ranges from compact individuals of low growth to those with greatly elongated stems and a sprangly growth form. Other features are similarly variable. I endorse the conclusions reached by Hitchcock (1941) and refer the reader to his paper for a further discussion of the variation present.

10. *D. nivicola* Rose, Contr. U. S. Nat. Herb. 8: 29. 1903.

D. orbiculata Rose, *ibid.* *D. nivicola* var. *orbiculata* (Rose) O. E. Schulz, Das Pflanzenreich IV, 105: 166. 1927.

Mexico. Mexico: parte alta Cerro Tláloc, *Rzedowski* 31559 (ENCB); *Beaman* 2328 (MSC); Iztaccihautl, *Purpus* 78, 1650 (GH); *E. Matuda* 26126 (GH, MEXU); Nevado de Toluca, *Pringle* 4234 (GH, MEXU, MSC, isotypes of *D. orbiculata* Rose); *Balls & Gourlay* B4082 (CHAPA); *Paray* 3323 (ENCB); *Lyonnet* 1393 (MEXU); *Beaman* 1693 (GH, MSC), 1902 (GH), 2447 (MEXU, MSC). **Tlaxcala:** Malinche, *Beaman* 2230 (GH, MEXU, MSC, TEX). **Puebla-Veracruz:** Pico de Orizaba, *Rose & Hay* 5766 (GH, MEXU, isotypes); *Beaman* 1767 (ENCB, GH, MSC, TEX); 2270, 3629 (GH, MSC, TEX); *Purpus* 2800a (GH). **Veracruz:** Cofre de Perote, *Beaman* 2142 (GH, MEXU, MSC); *Ortega-Oetiz* 206 (GH); *Dorantes-Lopez* 328 (GH, MEXU); *M. G. Zola et al.* 72 (ENCB, MEXU).

The specimens from Nevado de Toluca show silique variation from orbicular, as in the type collection of *Draba orbiculata*, to ovate, as in the type collection of *D. nivicola*. Most of the specimens are of the ovate type. I agree with Hitchcock (1941) that *D. orbiculata* makes a weak variety at best, but now with more and better material available for study than was available to him, it is difficult to make a case for recognizing two taxa. For this reason, I have listed *D. orbiculata* as a straight synonym of *D. nivicola*.

11. *D. hidalgensis* Calderón, Bol. Soc. Bot. Mexico 31: 109, fig. 1. 1970.

Mexico. Hidalgo. Pachuca: 6 km. al N de Pachuca, Cerro de las Ventanas, *Rzedowski* 26804

(holotype and an isotype ENCB); above Pueblo Nuevo on road from Real del Monte to El Chico, Moore & Wood 4086 (GH); Cerro de las Ventanas, El Chico, Al Gentry et al. 32176 (GH); Rzedowski 16999 (ENCB).

The flowers and siliques of *Draba hidalgensis* are, in general, similar enough to *D. jorullensis* and *D. nivicola* to be allied with these species. However, it is distinctive and certainly merits recognition as a species. Its linear, nearly glabrous greenish leaves, are longer and not at all rosulate as in the densely pubescent rosulate and grayish leaves of *D. nivicola*. Even when the unusually wide variability of *D. jorullensis* and the lesser but substantial range of variation of *D. nivicola* are taken into account, the characteristic features of *D. hidalgensis* place it well outside either of those taxa.

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