GENERIC REVISIONS IN THE CRUCIFERAE: SIBARA

By Reed C. Rollins

Sibara is a relatively small genus of North American Cruciferae. Most of the species are restricted in distribution, often to inaccessible areas of the southwestern deserts of the continent. As a result of their inaccessibility, several members of the genus are very poorly represented in herbaria. Attempts to assess the extent of natural variation in such species are frustrating and often futile. The most widespread species, *S. virginica*, extends from Virginia westward to central and southern California. Probably the most restricted species is *S. filifolia* which has been collected only on Santa Cruz Island, California.

The species of *Sibara* are all annual or biennial herbs. Some of them, at least, go through their life cycle very quickly. Plants of several species have been grown from seed to maturity in less than three months. *Sibara* is undoubtedly related to *Arabis* from which it was initially separated by Greene.[1] In a previous paper[2] presenting a study of *Arabis*, I have stressed the important differences and similarities of these two genera. In the aggregate, the characters pointed to there set *Sibara* apart as a separate assemblage of species from *Arabis* proper. Whether this group of species, which appears to be intrarelated, should receive generic rank or be placed in *Arabis* as a subgenus was difficult to decide. However, after repeated study of the problem, I am still convinced that phylogeny in the Cruciferae as a whole is best served by keeping *Sibara* separate as a genus, even though it is not as discrete as one would like to have it. By so doing one rightly casts doubt upon any suggestions of there being close genetical relationship between the species of the two genera.

There are two seemingly intrarelated groups of species in *Sibara*. Those species with winged seeds and runcinately divided leaves appear to be more closely related to each other than to members of the other group. The species having the above characteristics are *S. virginica*, *S. mexicana*, *S. runcinata* and *S. Viereckii*. The center of the distributional area of this group of species is northeastern Mexico and adjacent Texas. The second group of species includes the rest of those in the genus. The species of this group have wingless seeds and pectinate foliage. Their distributional center is in Baja California, Mexico.

[1] Pittonia 3: 10–12. 1896.
[2] Rhodora 43: 292–293. 1941.

Only two species of *Sibara* have been examined for chromosome number, *S. deserti* and *S. Viereckii*. The chromosomes in root-tip smears are very minute in both species and appear to be fairly uniform in size. *S. deserti*[3] has 2n = 26; *S. Viereckii*, 2n = 28.

Material upon which the present paper is based has been provided by many herbaria. Specimens are cited in accordance with the usual custom of using capital letters as symbols representing the institutions to which they belong. Cooperation has been received from the following herbaria: California Academy of Sciences (CAS); Natural History Chicago Museum (CM); Dudley Herbarium of Stanford University (DS); Gray Herbarium of Harvard University (G); Missouri Botanical Garden (M); New York Botanical Garden (NY); Pomona College (P); Rocky Mountain Herbarium of the University of Wyoming (RM); University of California (UC); United States National Herbarium (US).

SIBARA Greene, Pittonia **3:** 10. (1896).

Annual or biennial, herbaceous; stems single to several from the base, divaricately branched, glabrous or sparsely pubescent below with simple or branched trichomes; leaves pectinate to runcinate-pinnatifid, the upper cauline rarely almost entire, glaucous; inflorescence racemose, lax; flowers small; sepals narrowly ovate to nearly oblong, nonsaccate or the outer pair slightly saccate; petals white to pink or purplish, spatulate to nearly oblong, entire to rarely denticulate at base (constricted in middle in *S. pectinata*); nectar glands small, subtending or surrounding single stamen, absent or obsolete near paired stamens and petals; pedicels not expanded at apex; siliques linear, flattened parallel to septum to nearly terete; valves nerveless to nerved below; seeds oblong to nearly orbicular, winged or wingless, uniseriate; cotyledons accumbent to incumbent. TYPE-SPECIES—*S. angelorum* (S. Wats.) Greene.

ARTIFICIAL KEY TO THE SPECIES

A. Seeds winged; foliage runcinate-pinnatifid, leaf-lobes oblong to obovate; siliques divaricate ..... B.
  B. Cauline leaves not auriculate; styles less than 1 mm. long on mature siliques ..... C.
    C. Mature siliques 1.5–2 mm. wide; seeds 1–1.5 mm. broad; stems hirsute at least below ..... 1. *S. virginica.*
    C. Mature siliques about 1 mm. wide; seeds small, about 0.5 mm. broad; whole plant glabrous ..... 2. *S. mexicana.*
  B. Cauline leaves auriculate; styles 2–4 mm. long ..... D.
    D. Cauline leaves sagittate, lobed to deeply lobed but scarcely pinnatifid; auricles large, 3–5 mm. long; siliques stipitate ..... E.

[3] I wish to thank Miss Mary E. Riner for making this determination on this species.

E. Petals 3–5 mm. long; siliques 1.5–2.5 cm. long. 3. *S. Viereckii.*
E. Petals 6–8 mm. long; siliques 3–5 cm. long. 3a. *S. Viereckii*, var. *Endlichii.*
D. Cauline leaves nonsagittate or only barely so, pinnatifid; auricles small, 1–2 mm. long; siliques nearly sessile 4. *S. runcinata.*
A. Seeds wingless; foliage pectinate; leaf-lobes narrowly linear (except to some extent in *S. deserti* and *S. rosulata*); siliques divaricate, spreading or reflexed ..... F.
F. Mature siliques divaricately ascending to widely spreading, 2–5 cm. long (rarely 1.5 cm.); styles slender (except in *S. rosulata* where they are thicker and club-shaped) ..... G.
G. Siliques widely spreading, nearly arcuate, 1.5–2 mm. wide ..... H.
H. Petals entire; siliques arcuate to pendent; leaf-segments 0.75–1.5 mm. wide ..... 7. *S. angelorum.*
H. Petals markedly constricted near the middle; siliques widely spreading, scarcely arcuate; leaf-segments narrower ..... 6. *S. pectinata.*
G. Siliques divaricately ascending, straight, less than 1.5 mm. wide ..... J.
J. Pedicels 6–12 mm. long; basal leaves caducous; styles unexpanded toward the apex ..... 5. *S. filifolia.*
J. Pedicels 2–3 mm. long; basal leaves persistent; styles expanded toward the apex ..... 10. *S. rosulata.*
F. Mature siliques pendulous to reflexed, less than 2 cm. long; styles thick (not markedly so in *S. deserti*) ..... K.
K. Pedicels less than 4 mm. long; styles club-shaped and expanded near the apex ..... L.
L. Siliques flattened parallel to septum, sparsely pubescent; pedicels slender; leaves and stems sparsely pubescent; plants of the Death Valley region of California and Nevada ..... 9. *S. deserti.*
L. Siliques terete, glabrous; pedicels thick, approaching siliques in diameter; leaves and stems glabrous; plants of Baja California, Mexico ..... 11. *S. Brandegeana.*
K. Pedicels 5–10 mm. long; styles narrowing from base to apex ..... 8. *S. laxa.*

1. S. VIRGINICA (L.) Rollins. Annual or biennial; stems one to several, decumbent to ascending, branched above, hirsute below with simple or rarely forked trichomes, glabrous to sparsely pubescent.—Rhodora **43:** 481 (1941); *Cardamine virginica* L. Sp. Pl. 656 (1753); *Arabis virginica* Poir. Encycl. Suppl. **1:** 413 (1810); *Cardamine ludoviciana* Hook. Journ. Bot. **1:** 191 (1834); *Arabis ludoviciana* C. A. Mey. in Fisch. & Mey. Ind. Sem. Hort. Petrop. **9:** 60 (1843); *Planodes virginicum* Greene, Leaflets Bot. Obs. **2:** 221. (1912).

A complete description with citation of specimens has been given by Hopkins[4] under *Arabis virginica* (L.) Poir., and need not be repeated here. Most of the specimens cited by him in this work have been verified as to identity by personal examination.

[4] Rhodora **39:** 80–84. (1937).

Several attempts have been made to count the chromosomes of *Sibara virginica*, but they were found to be so minute that the technical difficulties preventing accurate observations were never mastered. In growing *S. virginica* for this purpose, along with a number of *Arabis* species and other crucifers, one could not but be impressed by the great difference in appearance and behavior exhibited by the young seedlings and rosettes of *Arabis* and those of *S. virginica*. To say that they were utterly different is to put it mildly. The young rosette of *S. virginica* resembled that of some species of *Lepidium* far more than any species of *Arabis*, even *A. lyrata* its supposed near relative.

2. S. MEXICANA (S. Wats.) Rollins. Slender annual or biennial, glabrous; stems weak, decumbent, branched above, about 2 or 3 dm. high; basal leaves and lower parts of plant unknown; cauline leaves petiolate, lyrately pinnatifid with entire or toothed segments, 3–4 cm. long, glabrous; inflorescence racemose, elongated in fruit; flowers minute; sepals glabrous, oblong, nonsaccate; petals white, narrowly oblong, 1–2 mm. long; pedicels slender, divaricate, unexpanded at apex, 2–3 mm. long; siliques ascending, only slightly flattened parallel to septum, 12–18 mm. long, slightly more than 1 mm. wide, valves very faintly nerved below or nerveless; style slightly less than 1 mm. long, slender; seeds orbicular, fairly plump, narrowly winged, less than 1 mm. broad; cotyledons accumbent.—Rhodora **43:** 480 (1941); *Arabis mexicana* S. Wats. Proc. Amer. Acad. **17:** 319 (1882).—MEXICO: Guanajuato, 1880, *A. Dugès* (M, TYPE).

S. mexicana is known only from the type collection. That this species is perfectly distinct from all other known species can hardly be challenged, but further knowledge concerning it awaits exploration in the area where it is found. *S. mexicana* is nearest related to *S. virginica*, having similar siliques, seeds, flowers and foliage.

3. S. VIERECKII (Schulz) Rollins. One- or usually several-stemmed annual or biennial, branched above; stems hirsute below with simple trichomes, glabrous above, 1.5–6 dm. high; basal leaves runcinate-pinnatifid, with acutely lobed divisions, sparsely pubescent with simple trichomes, petiolate, 4–10 cm. long; cauline sessile, auriculate, clasping, deeply and irregularly lobed but hardly pinnatifid except the lowermost, sparsely pubescent to glabrous, upper rarely almost entire; inflorescence greatly elongated in fruit, loosely racemose; sepals sparsely pilose to glabrous, oblong to slightly broader, about 2.5 mm. long; petals spatulate, slender-clawed, white, 3.5–4.5 mm. long; pedicels divaricate, pilose to rarely glabrous, unexpanded at apex, 4–8 mm. long; siliques glabrous, divaricate, 1.5–4.5 cm. long, 1.5–2 mm. wide, nerveless to faintly nerved below, slightly stipitate; style 2–4 mm. long; seeds oblong, narrowly winged, about 2 mm. long, 1.5 mm. wide; cotyledons accumbent.—

Rhodora **43:** 481 (1941); *Arabis Viereckii* O. E. Schulz, Notizblatt **11:** 398 (1932).—TEXAS: Laredo, Feb. 1919, *Hanson 348* (G, US); Combe Station, Cameron County, March, 1926, *Runyon 33* (G, US); woodland N. E. of Resaca Park, Brownsville, Cameron County, March, 1944, *Runyon 3778* (DS); Raymondsville, March, 1925, *Runyon 702* (US); Barreda, Cameron County, Feb. 1933, *Runyon 1459* (US); April, 1941, *Runyon 2522* (DS); 2 miles south of Barreda, Cameron County, March, 1944, *Runyon 3977* (DS); Donna, Hidalgo County, Feb. 1924, *Runyon 611* (US); 1 mile east of Sullivan City, Hidalgo County, March 31, 1941, *C. L. & A. A. Lundell 9818* (DS); ca. 8 miles east of Rio Grande City, Starr County, April 5, 1941, *C. L. & A. A. Lundell 9989* (DS). MEXICO: NUEVO LEÓN: Hacienda el Carrizo, Feb. 1906, *Pringle 10207* (G, NY, US).

3a. S. VIERECKII var. ENDLICHII (Schulz) Rollins, Rhodora **43:** 479 (1941); *Arabis Endlichii* O. E. Schulz, Notizblatt **11:** 390 (1932).—MEXICO: Sierra de Parras, Coahuila, March, 1905, *Purpus 1028* (CM, G).

S. Viereckii is a close relative of *S. runcinata*, differing from it only in having sessile, sagittate, auriculate and sometimes nearly entire cauline leaves. In *S. runcinata* the cauline leaves are pinnately dissected and the auricles are much smaller. Both species are known only limitedly from Texas and Mexico, hence an adequate statement of their complete range variation is impossible at this time. Being rapid growing annuals, they show marked responses to environmental influences. Plants which grew under unfavorable conditions are much dwarfed in size when compared to those grown under favorable circumstances.

A number of plants of typical *S. Viereckii* have been grown from seeds supplied by Mr. Robert Runyon of Brownsville, Texas, his number 3778. Root-tip preparations of several of these plants were studied to determine the chromosome number present. The chromosomes were found to be very small, but could be readily counted after the root-tips were prefixed in paradichlorobenzene. The number $2n = 28$ was repeatedly observed.

4. S. RUNCINATA (S. Wats.) Rollins. Annual or biennial; stems one or few, branched or rarely simple, densely hirsute below with rather long white simple trichomes, glabrous above, 1.5–5 dm. high; basal leaves runcinate-pinnatifid, petiolate, pubescent with simple acerose trichomes, 4–12 cm. long, 1–2 cm. wide; cauline similar but with small auricles clasping the stem; inflorescence loosely racemose; flowers small; sepals pubescent, oblong, scarious-margined, nonsaccate, about 3 mm. long; petals white to pinkish, spatulate, 4–5 mm. long; pedicels divaricate to widely spreading, pubescent, remote, unexpanded at apex, 3–8 mm. long; siliques flattened parallel to septum, slightly stipitate, 1.5–4 cm. long, 2–3 mm. wide, nerveless or faintly nerved below; style 2–4 mm. long, slender;

seeds broadly oblong, winged, 2–3 mm. long, 1.5–2 mm. broad; cotyledons accumbent.—Rhodora **43:** 481 (1941).

KEY TO THE VARIETIES

Siliques 2.5–4 cm. long, styles 3–4 mm. long; seeds narrowly winged ..... 4a. var. *typica.*
Siliques 1.5–2.5 cm. long, styles about 2 mm. long; seeds more widely winged ..... 4b. var. *brachycarpa.*

4a. Var. **typica.** *Arabis runcinata* S. Wats. Proc. Amer. Acad. **17:** 319 (1882), not *A. runcinata* Lam. Encycl. **1:** 222 (1783).—MEXICO: near San Luis Potosí, 1876, *J. G. Schaffner 155* (G, TYPE); near Tehuacan, state of Puebla, Dec. 1895, *Pringle 6292* (G, NY, US).

4b. Var. **brachycarpa,** var. nov. Herba annua; siliquis 1.5–2.5 cm. longis; stylo ca. 2 mm. longo; seminibus alatis.—TEXAS: Cotulla, La Salle County, March, 1917, *E. J. Palmer 11314* (RM, TYPE); Laredo, March, 1907, *Reverchon 3715* (M); Laredo, 1932, *M. E. Jones s. n.* (G).

Var. *typica* is a larger plant throughout except it is usually not taller. Its leaves, stems and siliques particularly are larger than those of var. *brachycarpa.* The two entities are also widely separated geographically insofar as our present knowledge of the species is concerned. Further exploration of the region adjoining the known stations for these plants should bring the ranges of the varieties closer together.

The leaves and habit of *S. runcinata* resemble certain species of *Sisymbrium,* but the winged seeds, accumbent cotyledons, flattened siliques and unexpanded pedicels certainly ally it with *S. virginica.* Actually the closest relative of *S. runcinata* is *S. Viereckii,* but both species belong in the same group as *S. virginica* and *S. mexicana.*

5. S. FILIFOLIA Greene. Single-stemmed annual, slender, glabrous and glaucous, branched above, 1.5–3 dm. high; basal leaves absent or caducous; cauline pinnate with narrowly linear segments, 2–4 cm. long, petiolate, segments 5–10 mm. long; inflorescence loosely racemose, rachis somewhat gyrate; sepals oblong, glabrous, scarious-margined; petals spatulate, broadening from base to apex, pink to purplish, 3–5 mm. long, entire; pedicels slender, divaricate, 6–12 mm. long, unexpanded at apex; siliques slender, flattened parallel to septum, divaricate, 2.5–4 cm. long, less than 1 mm. wide, valves faintly nerved below; style about 1 mm. long, slender; seeds oblong, slightly less than 1 mm. long, wingless; cotyledons obliquely incumbent.—Pittonia **3:** 11 (1896); *Cardamine filifolia* Greene, op. cit. **1:** 30 (1887); *Arabis filifolia* Greene, Bull. Calif. Acad. **2:** 390 (1887).—CALIFORNIA: Santa Cruz Island, April, 1888, *T. S. Brandegee* (G); plant grown from seed obtained on Santa Cruz Island, *Greene* (UC, TYPE).

This insular species is not well known, but its specific distinctness must go unchallenged. It is related to *S. pectinata* and *S.*

angelorum, but is amply distinct in many ways. In having incumbent cotyledons, it is similar to *S. laxa* and *S. Brandegeana*.

6. S. PECTINATA Greene. Single-stemmed annual, glabrous and glaucous, branched above, 1–4 dm. high; basal leaves absent or caducous; cauline petiolate, pinnate with narrowly linear, entire segments, 3–6 cm. long; segments 5–15 mm. long, less than 0.5 mm. wide; inflorescence very lax; sepals narrowly ovate to broadly oblong, scarious-margined, nonsaccate, obtuse, glabrous, 2–3 mm. long; petals pink to purplish, spatulate, constricted near the middle and notched at apex, 5–6 mm. long; pedicels widely spreading, 8–15 mm. long; siliques straight, flattened, widely spreading, 2.5–4.5 cm. long, about 1.5 mm. wide, valves faintly nerved below; style about 2 mm. long; seeds oblong, wingless, about 1.5 mm. long, about 1 mm. wide; cotyledons accumbent.—Pittonia **3:** 11 (1896); *Arabis pectinata* Greene, op. cit. **1:** 287 (1889).—BAJA CALIFORNIA: Cedros Island, March, 1911, *Rose 16180* (G, NY, US); March, 1889, *Palmer 717* (G, NY, US); March–June 1897, *Anthony 287* (DS, G, NY, US); Cedros Island, Aug. 16, 1932, *J. T. Howell 10688a* (CAS); San Bartolomé Bay, March, 1889, *Lt. Pond* (UC, TYPE); March, 1911, *Rose 16193* (NY, US); Arroyo del Rosarito, 30 miles south of Punta Prieta, March, 1935, *Harbison 11782* (DS).

Though collected first on the mainland of Baja California, most of the material of this species has been obtained from nearby Cedros Island. *S. pectinata* is nearest in its relationship to *S. angelorum*. The chief distinctive character is the rather marked constriction of the petal found in *S. pectinata*, otherwise the two species are very similar. Further knowledge of variation and geographic range may show that *S. pectinata* should not have more than varietal rank under *S. angelorum*, but for the present, such a treatment is hardly warranted.

7. S. ANGELORUM (S. Wats.) Greene. Single-stemmed annual, branched above only, 3–7 dm. high, glabrous and glaucous; basal leaves absent or caducous; cauline petiolate, glaucous, glabrate, pinnate with linear segments, 4–7 cm. long, segments 0.75–1.5 mm. broad, 1–2 cm. long, entire to rarely one- or two-lobed; inflorescence very lax; sepals narrowly ovate, scarious-margined, glabrous, 2.5–3.5 mm. long; petals spatulate, gradually broadening from base to apex, entire, sometimes slightly narrowed near the middle, pink to purplish, 4.5–5.5 mm. long; pedicels widely spreading to somewhat arched downward, 1–1.5 cm. long; siliques slightly curved downward, flat, 2.5–4.5 cm. long, about 1.5 mm. wide, valves nerved below; style slender, 1–1.5 mm. long; seeds oblong, wingless, about 1.5 mm. long, about 1 mm. wide; cotyledons accumbent.—Pittonia **3:** 11 (1896); *Cardamine angelorum* S. Wats. Proc. Amer. Acad. **24:** 39 (1889).—MEXICO: BAJA CALIFORNIA: 39 miles north of San Ignacio, Jan. 1929, *Reed 6249* (G); Los Angeles Bay, Dec. 1887, *Palmer 594* (G, TYPE, NY,

US, isotypes); 8 miles north of San Juanico, March, 1939, *Gentry 4315* in part (G).

S. angelorum is apparently a shade-tolerant plant with limited distribution in the central portion of the Baja California peninsula. Greene made it the type species of *Sibara.*

8. S. LAXA (S. Wats.) Greene. Single-stemmed annual with many long weak and lax branches arising along the main axis, glabrous and glaucous, 4–7 dm. high; strictly basal leaves absent or caducous; cauline petiolate, pinnate with linear segments, 3–5 cm. long, segments 1–2 cm. long, nearly 1 mm. wide; inflorescence loosely racemose; sepals oblong to narrowly ovate, scarious-margined, glabrous; petals oblong to broadly spatulate, entire, often slightly narrowed near middle, purplish, 4–6 mm. long; flowering pedicels sparsely pubescent with simple trichomes; fruiting pedicels reflexed, sparsely pubescent or glabrous, unexpanded at apex, 5–10 mm. long; siliques pendent to reflexed, slightly flattened parallel to septum, 1–1.5 cm. long, about 1.5 mm. wide, valves nerveless; style thick, narrowing from replum to stigma; seeds wingless, oblong, about 1 mm. long, uniseriate; cotyledons incumbent.—Pittonia **3:** 11 (1896); *Nasturtium ? laxum* S. Wats. Proc. Amer. Acad. **24:** 39 (1889).—MEXICO: BAJA CALIFORNIA: 25 miles north of Punta Prieta, April, 1931, *Wiggins 5357* (CAS, DS); 22 miles south of Pozo Alemán, March, 1935, *Wiggins 7853* (DS); sandy plains, Los Angeles Bay, Dec. 1887, *Edward Palmer 598* (G, TYPE, NY, US); Lagoon Head, March, 1889, *Palmer 815* (CAS, G, NY, US); 5 miles southeast of Mesquital Springs, near Santa Rosalia, Jan. 1929, *Reed 6267* (G); 8 miles north of San Juanico, March, 1939, *Gentry 4315* in part (DS).

Watson[5] suggested that this plant might possibly be a *Thelypodium.* It would certainly require a stretch of the imagination to actually place it there. Now that more material is available for study, *S. laxa* is unmistakably related to *S. deserti* and *S. rosulata* on the one hand, and to *S. angelorum* on the other.

9. S. **deserti** (M. E. Jones), comb. nov. Single-stemmed annual, branched or unbranched above, 1–3 dm. high, sparsely pubescent with minute branched trichomes; strictly basal leaves caducous; cauline leaves petiolate, 2–4 cm. long, sparsely pubescent, segments 4–8 mm. long, lower pinnate, upper tending to be entire; inflorescence loosely racemose, rachis somewhat gyrate; sepals oblong, pubescent, scarious-margined, about 2 mm. long; petals white, spatulate, slightly notched at apex, sometimes minutely denticulate at base, 2–3 mm. long; pedicels widely spreading to descending, sparsely pubescent, unexpanded at apex, 3–4 mm. long; siliques flattened parallel to septum, linear, sparsely pubescent, often somewhat curved, slightly descending to loosely reflexed, 1–1.5 cm. long,

[5] loc. cit.

valves nerved below; style rather stout, 1–1.5 mm. long; seeds oblong, wingless, ca. 1 mm. long; cotyledons accumbent.—*Thelypodium deserti* M. E. Jones, Contr. West. Bot. No. **12:** 1 (1908); *Arabis deserti* Abrams, Ill. Fl. Pacific States **2:** 305 (1944).—Death Valley region of Nevada and California. NEVADA: Amargosa Desert, Nye County, April 27, 1907, *M. E. Jones s. n.* (P, TYPE; DS, isotype). CALIFORNIA: north end of Death Valley, near road to Ubehebe Crater, Inyo County, March 25, 1947, *Ferris & Wiggins 11258* (DS); Emigrant Canyon, Panamint Mts., Inyo County, *Barneby 2868a* (CAS).

The foliage and habit of *S. deserti* recall *S. virginica* and *S. mexicana*, but on technical grounds it is more closely related to *S. laxa*. Payson (in a letter to Mrs. Ferris) some years ago suggested that *Thelypodium deserti* of M. E. Jones was probably to be associated with species of *Sibara*. In my opinion this is the correct disposition, although, as Jones[6] points out, it resembles in a general way *Streptanthella longirostris* (*Streptanthus longirostris*). The latter species most certainly has a different relationship, however, and should either remain as a monotype, or if incorporated in a larger genus, then it should be shifted toward *Thelypodium*.

Root-tips of several seedlings of *S. deserti* have been smeared for chromosome counting. The chromosome number in all instances was found to be 2n = 26. Seeds from Ferris and Wiggins no. 11258 were used to produce the seedlings.

10. S. **rosulata,** sp. nov. Herba annua; caulibus ramosis glabris vel sparse pubescentibus 1–3 dm. altis; foliis basilaribus petiolatis rosulatis pinnatisectis persistentibus glabris vel sparse pubescentibus 3–5 cm. longis; foliis caulinis pinnatifidis vel integris; sepalis glabris vel sparse pubescentibus oblongis 1.5–2 mm. longis; petalis albis spathulatis 2.5–3 mm. longis; pedicellis glabris divaricato-adscendentibus 2–3 mm. longis; siliquis linearibus glabris 1.5–3 cm. longis 1–1.5 mm. latis; stigmatibus integris; seminibus oblongis ca. 1 mm. longis; cotyledonibus accumbentibus.

Annual; stems one or rarely few, terete, slightly gyrate, divaricately branched above, glabrous to very sparsely pubescent, 1–3 dm. high, branches filiform, subtended by entire or subentire leaves; leaves dimorphic, basal leaves rosulate, deeply pinnately lobed, persistent, glabrous to sparsely pubescent with simple or branched trichomes, petiolate, 3–5 cm. long, lobes 1–2 mm. wide, 4–8 mm. long, lower cauline leaves somewhat lobed, upper entire and linear; inflorescence loosely racemose; sepals nonsaccate, very sparsely pubescent to glabrous, scarious-margined, oblong, 1.5–2 mm. long, petals white, narrowly spatulate, obscurely emarginate

[6] op. cit. 2.

at apex, 2.5–3 mm. long; paired stamens very slightly longer than single stamens; siliques linear, divaricately ascending, widely spaced on the rachis, glabrous, flattened parallel to septum, 1-nerved to middle or above, 1.5–3 cm. long, 1–1.5 mm. wide; styles club-shaped, 2–3 mm. long; stigma entire; fruiting pedicels divaricately ascending, glabrous, 2–3 mm. long; seeds wingless, oblong, ca. 1 mm. long; cotyledons accumbent.—Death Valley region of southeastern CALIFORNIA: mouth of Emigrant Canyon, Panamint Mts., Inyo County, *Ferris, Scott & Bacigalupi 3990* (DS); same locality, *R. C. Barneby 2868* (CAS); south end of Panamint Valley, Inyo County, *Train 515* (DS, US); west side of Townes Pass, Panamint Mts., *Eastwood & Howell 7693* (CAS); Titus Canyon, east side of Death Valley, T 13 S, R 45 E, Inyo County, elev. 3300 ft., March 26, 1947, *David D. Keck & Roxana S. Ferris 5804* (DS, TYPE); Nevares Peak, Funeral Mts., Death Valley, *Gilman 1248* (US); Nevares Canyon, Death Valley, *Abrams 13779* (DS); Grotto Canyon, Death Valley, *Epling, Robison & Haines s. n.* (CAS).

Until the recent collections of *Sibara* from Death Valley made by Mrs. Roxana Ferris, Dr. David D. Keck and Dr. Ira L. Wiggins, it had been supposed that a single species, *S. deserti*, was present in this area of California. The material previously studied did not agree in several details with the type series of *S. deserti*, but it was presumed that the latter represented an unusual population of the species as a whole. However, with another extensive collection (*Ferris and Wiggins 11258*) of typical *S. deserti* available for study, a new interpretation of the total material of *Sibara* from the Death Valley region is indicated. It now seems reasonably certain that the type series of *S. deserti* represents a species distinct from the bulk of known material from the area in question rather than an unusual population of the same species.

S. rosulata and *S. deserti* are closely related, but differ in a number of important characters. The pubescence of *S. deserti* is minute, highly branched and is rather abundant on the leaves, stems, pedicels and siliques. The pubescence of *S. rosulata* is much coarser and is simple or merely forked rather than highly branched. It is very sparse on the leaves and lower stems and practically absent elsewhere on the plants. The siliques in particular are wholly glabrous. *S. rosulata*, as the name suggests, has a rosulate cluster of persistent leaves at the base of the stem, but such leaves are early shed by *S. deserti*. In the latter species the pedicels are loosely reflexed, making the short siliques pendulous, while in *S. rosulata* the straight, longer siliques and shorter pedicels are divaricately ascending. *S. deserti* tends to have

pinnatifid cauline leaves, whereas in *S. rosulata* they tend to be entire even toward the basal portion of the stem.

11. S. Brandegeana (Rose) Greene. Single-stemmed annual, divaricately branched above, glabrous and somewhat glaucous, 2–4 dm. high; stems purplish; basal leaves absent or caducous; cauline pinnate with narrowly linear segments, petiolate, 1–3 cm. long, segments 5–10 mm. long, obtuse; mature inflorescence extending from near base to apex; sepals oblong, scarious-margined; petals purplish, oblong, minutely denticulate near base, 3–4 mm. long; pedicels geniculately reflexed, stout, glabrous, 2–4 mm. long; siliques nearly terete, reflexed or laxly descending, straight to slightly curved upward, 1–1.5 cm. long, slightly more than 1 mm. broad; style thick, club-shaped, about 2 mm. long; seeds oblong, wingless, about 1 mm. long; cotyledons incumbent.—Pittonia **3:** 11 (1896); *Sisymbrium Brandegeanum* Rose, Contr. U. S. Nat. Herb. **1:** 10 (1890); *Microsisymbrium lasiophyllum* (Hook. & Arn.) O. E. Schulz, f. *Brandegeanum* O. E. Schulz, Pflanzenreich 4^{108}**:** 163 (1924).—Mexico: Baja California: Lagoon Head, March 6–15, 1889, *Edward Palmer 821* (US, type, G, UC, isotypes); San Bartolomé Bay, March, 1911, *Rose 16227* (G, NY, US); San Quintín, April, 1936, *Epling & Stewart s. n.* (DS, NY); near Calmallí, *C. R. Orcutt s. n.* (UC).

S. Brandegeana is not as well placed in *Sibara* as are the other species, even though its foliage is highly pectinate and most of its other characters simulate those of the other species. In this species, the siliques are terete and the pedicels are very thick like some species of *Sisymbrium*. However, I do not see how the species can be removed from its present disposition on good grounds.

Species excluded from Sibara

1. *S. Palmeri* (Wats.) Greene in Pittonia **3:** 12 (1896) = *Dryopetalon Palmeri* (Wats.) O. E. Schulz in Notizbl. **10:** 561 (1929).

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