

CALYPTRIDIDIUM PARRYI VAR. *MARTIRENSE* (MONTIACEAE), A NEW TAXON
ENDEMIC TO THE SIERRA DE SAN PEDRO MÁRTIR, BAJA
CALIFORNIA, MEXICO

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ABSTRACT

Calyptridium parryi var. *martirensis* is described as new. Here we present quantitative measurements and statistical analyses of a number of morphological features that demonstrate the distinctiveness of this new taxon. The new variety differs from the others in having shorter fruits (3.1–4.1 mm) and a correspondingly smaller fruit length to sepal length ratio (1.0–1.4). The capsule is also the widest (1.4–2.2 mm) and the sepals the longest (2.4–3.9 mm) of any other *C. parryi* variety. *Calyptridium parryi* var. *martirensis* is currently known only from high elevation locations (1900–2630 m) in the Sierra de San Pedro Mártir, Baja California, Mexico.

Key Words: Baja California, *Calyptridium*, endemism, Montiaceae, Sierra de San Pedro Mártir.

Calyptridium (Montiaceae, *sensu* APG III 2009) is a genus of annual and perennial herbs comprising nine species and 11 total taxa, including varieties. (See Simpson et al. 2010 for a review of the taxonomy of the genus and associated literature.) The genus has been the subject of a recent master's thesis (Guilliams 2009), and a morphological analysis of the currently recognized varieties of *C. parryi* A. Gray plus the morphologically similar *C. monandrum* Nutt. (Simpson et al. 2010). In that latter study we detected significant morphological differences between *C. parryi* specimens from the Sierra de San Pedro Mártir of Baja California, Mexico, and all other specimens of *C. parryi* included in the analysis, although only five samples of the former were measured. These specimens from the Sierra de San Pedro Mártir had previously been identified as either *C. monandrum* or *C. parryi* var. *nevadense* J. T. Howell. Here we provide quantitative data from all known specimens of this annual *Calyptridium* from the Sierra de San Pedro Mártir, confirming the morphological pattern previously reported by Simpson et al. (2010). We conclude that these collections from the Sierra de San Pedro Mártir represent a new taxon, which we recognize as a variety of *C. parryi*.

MATERIALS AND METHODS

This study includes quantitative analyses of a total of 85 specimens of *C. parryi* varieties (var.

hesseae J. H. Thomas, var. *nevadense*, var. *parryi*, and the variety described here) from 10 herbaria (ARIZ, ASU, CAS-DS, JEPS, RSA, SD, SDSU, UC, UCR, UTC). In addition, we included 12 specimens of *C. arizonicum* (J. T. Howell) M. G. Simpson, M. Silveira & Guilliams and 13 of *C. monandrum*, taxa that we formerly recognized as distinct from *C. parryi* (Simpson et al. 2010), so that our previous taxonomic hypothesis could be evaluated with this expanded dataset. The data matrix from the previous study was broadened to include complete measurements of all remaining *C. parryi* specimens from Baja California, Mexico, a total of 11 additional specimens. Only one specimen was excluded from the analysis (*Vasek s.n.*, UCR 15269), as the individuals on this sheet do not bear mature fruits. Vouchers of all specimens of *Calyptridium arizonicum*, *C. monandrum*, and *C. parryi* vars. *hesseae*, *nevadense*, and *parryi* used in the current analysis are the same as those cited in Appendix 1 of Simpson et al. (2010); vouchers of the Sierra de San Pedro Mártir populations of *C. parryi* used in the current analysis are equivalent to the list of types below, minus the *Vasek s.n.* specimen.

Characters measured and methods of data acquisition were identical to Simpson et al. (2010). In brief, several seed measurements were taken, including the seed sagittal diameter (including notch length), seed transverse diameter, seed notch length, and distance from the perimeter to the central-most extent of papillae along both the transverse and sagittal planes (these last two transformed as percentage distance from perimeter to center of the seed). In addition to seed characters, we measured fruit

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TABLE 1. DESCRIPTIVE STATISTICS FOR *CALYPTRIDUM* TAXA EXAMINED IN THIS STUDY. Taxon acronyms: *C. arizonicum* = ARI; *C. monandrum* = MON; *C. parryi* var. *hesseae* = HES; *C. parryi* var. *martirensis* = MAR; *C. parryi* var. *nevadense* = NEV; *C. parryi* var. *parryi* = PAR. Values provided are the mean, minimum/maximum values, and the standard deviation. Asterisks (* = $P < 0.05$; ** = $P < 0.01$) and plus signs (+ = $P < 0.05$; ++ = $P < 0.01$) indicate when a taxon is statistically different from all other taxa or from other members of *Calyptridium parryi*, respectively, in Anova/Tukey post-hoc tests of significance.

Taxon	n	Seed sagittal diameter (mm)	Seed transverse diameter (mm)	Seed notch length (mm)
ARI	12	0.759** 0.705/0.803 0.030	0.750* 0.705/0.782 0.028	0.022 0.016/0.031 0.005
MON	13	0.615 0.538/0.692 0.055	0.634 0.553/0.717 0.056	0.018 0.010/0.024 0.004
HES	16	0.542** 0.483/0.576 0.025	0.538** 0.495/0.587 0.025	0.023 0.016/0.031 0.004
MAR	16	0.635 0.568/0.723 0.051	0.669 0.598/0.756 0.051	0.037 0.019/0.056 0.009
NEV	33	0.675 0.578/7.58 0.041	0.703 0.640/810 0.036	0.045 0.010/0.354 0.056
PAR	20	0.663 0.547/0.740 0.052	0.691 0.570/0.765 0.050	0.032 0.022/0.046 0.007

length, maximum fruit width, sepal blade length, sepal width at widest point, scarious sepal margin width (measured on one side only, the one most intact), and distance from the sepal blade base to the point of greatest sepal width. One ratio character was created and examined: ratio of fruit length to sepal length. See Simpson et al. (2010) for a diagrammatic representation of these measurements.

Most statistical analyses used in Simpson et al. (2010) were repeated with the present data set, although here we omit the principal components analysis for brevity. The morphological characters that appeared important in distinguishing between the Sierra de San Pedro Mártir specimens of *C. parryi* and the three recognized varieties were evaluated for statistically significant differences by taxon using analysis of variance (ANOVA), with multiple comparisons made between the taxa for each character using the Tukey post hoc test. All statistical analyses were performed in SYSTAT, Version 11 (Systat Software, Inc., San Jose CA; <http://www.systat.com>).

RESULTS

Basic descriptive statistics for the variables measured are given in Table 1. Importantly, these data continue to support *Calyptridium arizonicum* and *C. monandrum* as separate taxonomic entities, with strong differences in fruit length, seed size, and seed sculpturing in the former, and sepal length, fruit width, and fruit length to sepal length ratio in the latter. With respect to *C. parryi*, seed size, seed papillation, fruit length, fruit width, width of the sepal scarious margin, and the fruit length to sepal length ratio appear to be among the more important of the morphological traits

distinguishing the varieties from one another. These differences between varieties *hesseae*, *nevadense*, and *parryi* are discussed at length in Simpson et al. (2010) and will not be repeated here. The remainder of this section will focus on those quantitative characters important for evaluating the distinctiveness of *C. parryi* “martirensis.” Fig. 1A–C shows boxplots for some of these variables, with asterisks denoting when a given taxon was found to be statistically different from all other taxa and plus signs denoting when a subgroup (variety or the “martirensis” specimens) of *C. parryi* was statistically different from all other subgroups of *C. parryi*, using the Tukey HSD post hoc test (described below). For *C. parryi* “martirensis”, the fruit length (3.1–4.1 mm, mean = 3.7 mm), fruit width (1.4–2.2 mm, mean = 1.9 mm), fruit length to sepal length ratio (1.0–1.4, mean = 1.2), sepal length (2.4–3.9 mm, mean = 3.2 mm), and sepal width (2.4–3.8 mm, mean = 3.2 mm) appear to be the most distinctive quantitative traits with respect to other *C. parryi* varieties (Table 1, Fig. 1). The ANOVAs and Tukey HSD post hoc tests of these variables confirm that the varieties of *C. parryi*, including *C. parryi* “martirensis”, are significantly different from one another (Table 1). Among all studied taxa, *Calyptridium parryi* “martirensis” has a significantly smaller fruit length (Fig. 1A), and a significantly smaller fruit length to sepal length ratio (Fig. 1B). Among the *C. parryi* varieties, “martirensis” has a significantly larger fruit width (Fig. 1C), a significantly larger sepal length (Fig. 1D), and an intermediate but significantly different sepal width (Table 1).

DISCUSSION

This study expands upon the morphometric analysis of Simpson et al. (2010) by including all

TABLE 1. EXTENDED.

Taxon	Seed papillation % (sagittal)	Seed papillation % (transverse)	Fruit length (mm)	Fruit width (mm)
ARI	0** 0/0 0	00** 0/0 0	6.689** 5.817/ 7.775 0.650	1.742 1.346/ 1.943 0.169
MON	34.910 28.144/ 40.746 4.307	35.922 29.184/ 52.527 5.812	4.384 3.780/ 5.044 0.442	0.894** 0.790/ 1.100 0.076
HES	31.543 26.821/ 35.032 2.235	33.988 27.662/ 38.912 2.954	4.468 4.110/ 4.691 0.200	1.449 1.110/ 2.018 0.273
MAR	39.529 30.082/ 51.657 6.077	38.024 31.117/ 46.712 4.469	3.676** 3.067/ 4.117 0.372	1.898++ 1.435/ 2.243 0.231
NEV	35.290 25.316/ 54.351 6.845	34.208 25.574/ 52.043 6.244	4.689 3.830/ 5.745 0.533	1.504 1.080/ 1.927 0.172
PAR	99.720** 94.396/ 100 1.253	99.668** 93.362/ 100 1.484	4.567 2.913/ 5.260 0.595	1.577 1.340/ 1.863 0.150

known accessions of *C. parryi* "martirensis" from the Sierra de San Pedro Mártir. The Simpson et al. (2010) study focused on examining differences between *C. arizonicum* and *C. parryi*, and thus only five accessions of *C. parryi* "martirensis" were measured and included. Nevertheless, we found patterns in the morphological data that suggested that *C. parryi* "martirensis" was morphologically distinct from the other varieties of *C. parryi*. The present study with expanded sampling confirms our previous results, showing that *C. parryi* "martirensis" differs from other *C. parryi* varieties in a number of morphological features, the most notable of which are fruit length and fruit length to sepal length ratio. While the differences between the *C. parryi* varieties are minute, in some cases requiring a dissecting microscope to adequately quantify (e.g., seed size, seed papillation), they are remarkably consistent and statistically significant.

The demonstrated morphological distinctiveness of these taxa, coupled with largely non-overlapping distributions, provide compelling justification for retaining the current varieties of *C. parryi*, as well as for recognizing *C. parryi* "martirensis" as a new taxon, using a taxonomic species concept (Cronquist 1978, 1988). Under this species concept, also known as the morphological species concept, species are circumscribed based on the discontinuity of morphological features with respect to other morphologically similar species. Varieties and subspecies are typically considered to be taxonomic entities that show morphological differences from one another, but the feature or features that make them different have some intergradation.

This present study also supports previous taxonomic hypotheses regarding the distinctiveness of *C. arizonicum* and *C. monandrum*, taxa that are morphologically similar to the *C. parryi* varieties.

Calyptridium parryi* var. *martirensis Williams, M. G. Simpson, & Rebman, var. nov. (Figs. 2, 3).—Type: MEXICO, BAJA CALIFORNIA, Sierra de San Pedro Mártir, S of Vallecitos in wet, open meadow near Cerro la Botella Azul, *Pinus jeffreyi*, *Abies concolor*, *Linanthus melingii*, granitic sand, 2590 meters elev., 30.9722°N, 115.43722°W, 28 June 1998, *J. P. Rebman 5407* (holotype: SD; isotypes: BCMEX, MEXU, RSA, UC, UCR).

Calyptridium parryi var. *martirensis* differs from *C. parryi* vars. *hesseae*, *nevadense*, et *parryi* fructibus brevioribus (3.1–4.1 mm) et latioris (1.4–2.2 mm), sepalis longioris (2.4–3.9 mm), et proportione parve longitudinis fructus ad sepali (1.0–1.4).

Calyptridium parryi var. *martirensis* differs from *C. parryi* vars. *hesseae*, *nevadense*, and *parryi* by a shorter (3.1–4.1 mm) and wider (1.4–2.2 mm) fruit, by a longer sepal (2.4–3.9 mm), and by a small fruit to sepal length ratio (1.0–1.4).

Plant an annual or possibly biennial herb. **Root** a single taproot. **Stems** prostrate, with several (5–13) primary branches radiating from center, primary branches up to 13 cm long, each terminating in an inflorescence unit and either unbranched or (more typically) bearing several lateral secondary and tertiary branches, each of these with a terminal inflorescence unit; stems becoming pink at maturity in some plants. **Leaves** simple, spiral, exstipulate, basal and cauline in position, sessile from narrow, attenuate base (appearing petiolate), often proximally conduplicate-canalicate and forming membranous, sheath-like margins at point of attachment, margin entire, apex acute-rounded, mucronulate, glabrous, somewhat succulent, only midrib vein apparent; basal leaves forming compact, outer rosette when immature, often caducous when mature, mature leaves spatulate, up to 5 cm long, 5 mm wide at widest region near apex; cauline

TABLE 1. EXTENDED.

Taxon	Sepal blade length (mm)	Sepal width (mm)	Sepal scarious margin (mm)	Sepal base to widest (mm)	Fruit length: sepal length
ARI	3.090 2.756/ 3.783 0.311	3.942 3.416/ 4.725 0.395	0.415 0.345/ 0.470 0.042	0.885 0.709/ 1.066 0.118	2.173 1.885/ 2.455 0.169
MON	1.591** 1.349/ 2.027 0.203	1.419 1.238/ 1.731 0.152	0.161 0.051/ 0.248 0.059	0.633* 0.459/ 1.023 0.159	2.781** 2.398/ 3.418 0.342
HES	2.297* 1.674/ 2.553 0.269	1.838++ 1.353/ 2.524 0.299	0.160++ 0.053/ 0.237 0.051	0.894 0.418/ 1.229 0.196	1.967+ 1.667/ 2.563 0.217
MAR	3.186++ 2.437/ 3.918 0.412	3.165++ 2.412/ 3.796 0.414	0.447 0.348/ 0.687 0.089	0.981 0.719/ 1.239 0.164	1.173** 1.025/ 1.446 0.102
NEV	2.772 1.707/ 3.827 0.500	3.715+ 2.248/ 5.253 0.800	0.634** 0.339/ 1.048 0.169	1.074 0.590/ 1.522 0.257	1.734 1.157/ 2.595 0.312
PAR	2.702 2.150/ 3.272 0.346	2.765 2.076/ 3.570 0.375	0.414 0.265/ 0.629 0.094	1.103 0.766/ 1.448 0.199	1.705 1.117/ 2.172 0.239

leaves spatulate to oblanceolate, decreasing in size toward apex, becoming pink at maturity in some plants. **Inflorescence** units terminal on primary or lateral branches, bracteate, bracts subtending axes usually photosynthetic, short oblanceolate, mucronulate to mucronate; bractlets present at base of and along axis of inflorescence unit scarious, triangular to ovate, acuminate; inflorescence unit a secund, monochasial cyme, the flower-containing part of units up to 3 cm long at maturity. **Flowers** perfect, bracteate, subsessile. **Flower bracts** positionally displaced from flowers, ca. 2 mm long, white-scarious, sessile, lance-ovate to ovate-deltate, rounded to cordate, entire, caudate, glabrous. **Perianth** biseriate. **Calyx** aposepalous, green with whitish, scarious margin, glabrous. **Sepals** two, unequal, at flowering stage adaxial sepal widely ovate, ca. 3 mm long, 2.5 mm wide, strongly involute distally, overlapped by abaxial sepal; abaxial sepal widely orbicular, in flower ca. 3 mm long, 3.5 mm wide, with scarious margins ca. 0.5 mm wide, mostly widely ovate to orbicular; sepals accrescent at fruiting stage, abaxial sepal at fruiting stage widely orbicular, 2.4–3.9 mm long, 2.4–3.8 mm wide, cuneate at base, reniform just above base, entire or irregularly lobed, undulate when dried, apically rounded, mostly ternately veined from base, veins anastomosing, prominent when dried, margins scarious, scarious region 0.3–0.7 wide on each side; abaxial sepal appressed to fruit. **Corolla** apopetalous, actinomorphic. **Petals** whitish, four (rarely five), quincuncial, oblong, apically rounded, slightly cup-shaped (concave toward central axis), ca. 2 mm long, 1 mm wide. **Stamens** three, uniseriate, apostemonous, filamentous, whorled, inserted. **Filaments** terete, ca. 0.5 mm long. **Anthers** basifixed, dithecal, longitudinal, introrse, ca. 0.5 mm long, elliptic, thecae parallel. **Pollen** yellow. **Gynoecium** syncarpous, hypogynous. **Ovary** superior, ca. 1 mm long, globose, 3-lobed, glabrous. **Style** one, terminal, terete, ca. 0.3 mm long. **Stigmas** 3, narrowly

oblong, slightly twisted, ca. 0.2 mm long, papillate. **Nectaries** not observed. **Carpels** 3. **Locule** 1. **Placentation** free-central. **Ovules** approximately 14 per ovary. **Fruit** a 2-valved, tan, oblong capsule, flattened perpendicular to inflorescence axis, 3.0–4.1 mm long and 1.4–2.2 mm wide at maturity apically calyprate from persistent, detached corolla. **Seeds** ca. 6–10 per fruit, black, discoid, with marginal notch, 0.6–0.7 mm in diameter, glabrous, smooth in center, papillate along margin (width of papillate region ca. 0.1–0.2 mm), arranged in 2 rows in fruit.

Calyptridium parryi var. *martirensis* is currently known only from high elevation (1900–2630 m) locations in the Sierra de San Pedro Mártir of Baja California, Mexico. It is found in usually sandy soil and/or soil and rocks of granitic origin, sometimes fine clay soil, and typically in open habitats near creeks/streams or in wet or dry, open meadows or forest understory of mixed forests of *Pinus jeffreyi*, *Abies concolor*, *Populus tremuloides*, and occasionally *Hesperocyparis montana* (= *Cupressus m.*; *Callitropsis m.*) with mixed shrub and herb associates.

The Sierra de San Pedro Mártir is a floristically diverse region of great botanical importance, having a natural fire regime and being the southern-most limit of several montane plant species of the California Floristic Province (Riemann and Ezcurra 2007; Thorne et al. 2010). The higher elevations comprise the Parque Nacional Sierra de San Pedro Mártir, established in 1947. Thorne et al. (2010) reviewed the vascular plant flora of the “high” Sierra de San Pedro Mártir, defined as being greater than 1800 meters in elevation. These authors cited 453 species native to this region. Of these taxa, 23 species and one variety are endemic to the Sierra de San Pedro Mártir, slightly over 5%. To this we add another variety, increasing the endemic flora of this interesting region. Note that in addition to *Calyptridium parryi* var. *martirensis*, Thorne et al.

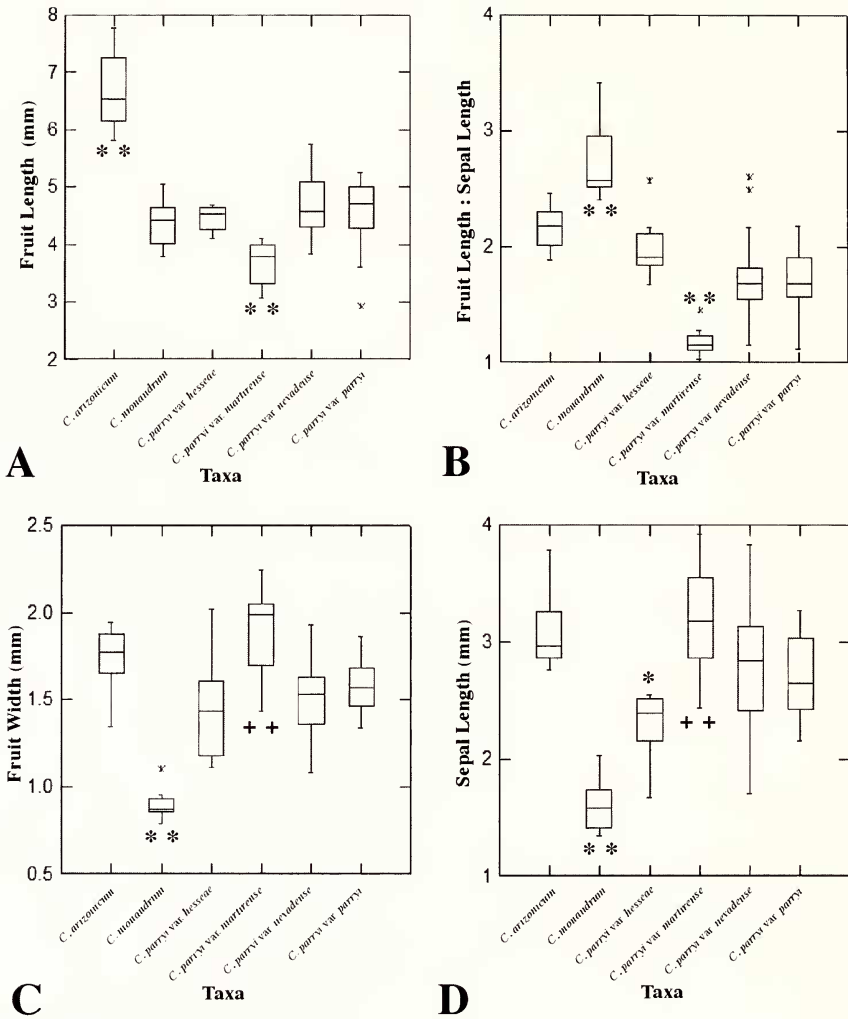


FIG. 1. Box plots of single characters. **A.** Fruit length (mm). **B.** Fruit length to sepal length ratio. **C.** Fruit width (mm). **D.** Sepal length (mm). Note: box plots show median (middle horizontal line), first and third quartiles (lower and upper horizontal lines, respectively), and the range of the data outside the first and third quartiles (vertical lines); x = outliers; *C. parryi* “martirensis” = San Pedro Mártir Mountains populations of *Calyptridium parryi*. Statistical difference between a given taxon and all other taxa (via ANOVA Tukey post hoc test) is indicated as: ** = $P < 0.01$; * = $P < 0.05$; that between a given member of *C. parryi* and all other *C. parryi* taxa only is indicated as: ++ = $P < 0.01$; + = $P < 0.05$.

(2010) cite two other species of the genus as occurring in the Sierra de San Pedro Mártir, *C. monandrum* Nutt. and *C. monospermum* Greene. Based upon the morphological features presented in this paper, *C. parryi* var. *martirensis* is easily distinguished from *C. monandrum*, and neither of these annual taxa are likely to be confused with the more robust perennial species, *C. monospermum*.

Calyptridium parryi var. *martirensis* flowers from June to as late as early August and develops mature fruits from June to as late as October.

The derivation of the varietal epithet, *martirensis*, is after the Sierra de San Pedro Mártir, (“mountain of Saint Peter the martyr”), to which

this variety is endemic. We suggest the Sierra de San Pedro Mártir *Calyptridium* as the common name for the taxon.

Paratypes (see Fig. 4 for map of localities): MEXICO, BAJA CALIFORNIA. Sierra San Pedro Mártir, along sandy roadside in forest of Jeffrey pine and white fir, 31.03676°N, 115.473°W (lat./long. estimated from locality data), 2590 m elev., 24 July 1975, *Almeda* 2582 (CAS 611882); Sierra San Pedro Mártir, meadows along road heading S of Vallecitos towards La Encantada, base of Cerro Botella Azul, surrounding forest of *Pinus jeffreyi*, *Abies concolor*, *Populus tremuloides*, prostrate, succulent

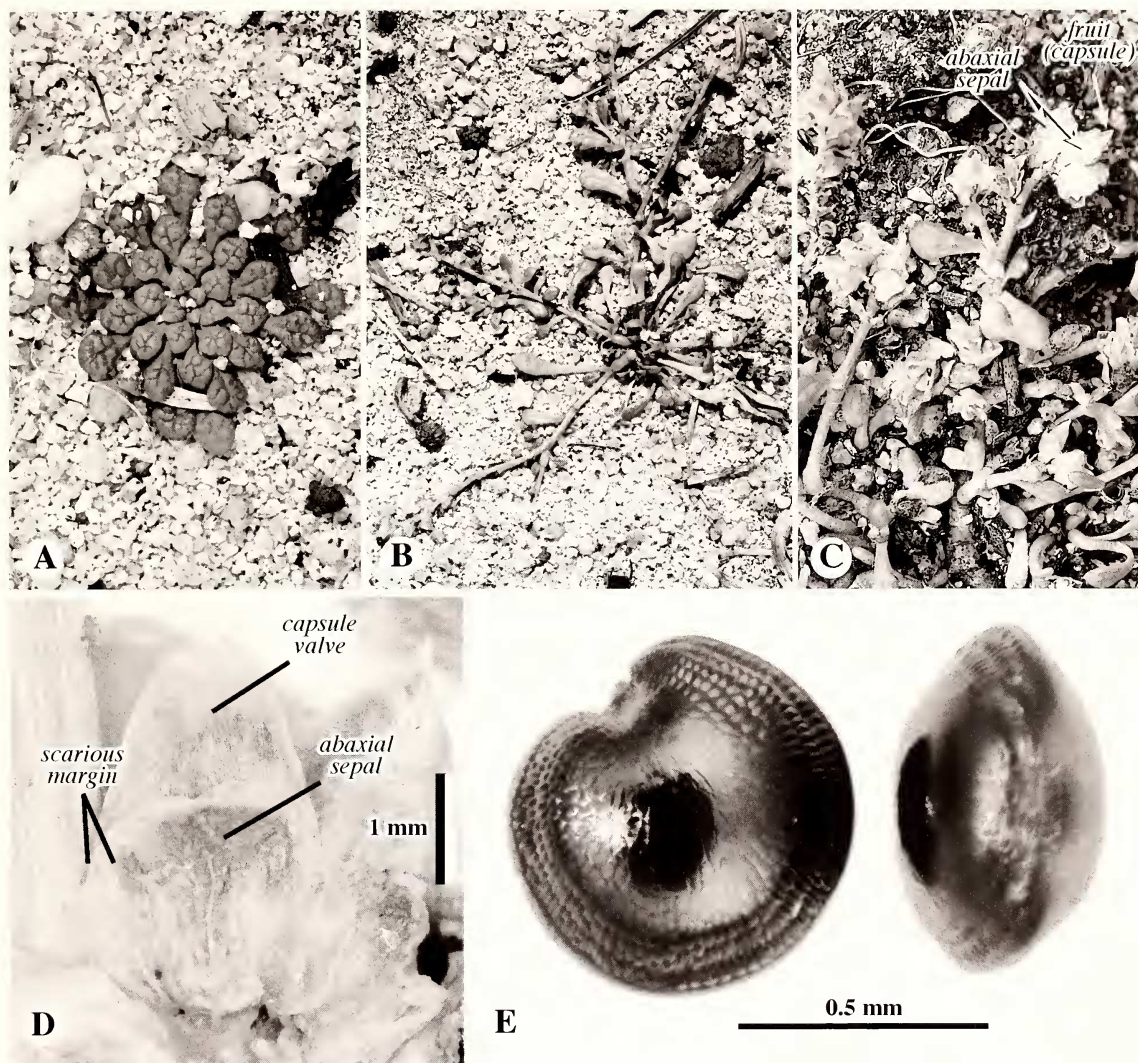


FIG. 2. A–C. Photographs of *Calyptridium parryi* var. *martirensis* in native habitat. A–B. Plant habit (*Rebman 15994*), at early stage (A) and mature stage (B). C. Close-up of fruit with abaxial sepal (*Rebman 16055*). D. Close-up of fruit and abaxial sepal from herbarium specimen (*Moran 24462*). E. Seed in face (left) and side (right) views, showing notch, papillate margin, and smooth/shiny central region (*Rebman 5407*, type specimen).

annual, common in sandy forest understory and drier, sandy areas of meadow, 30.9907°N, 115.4403°W, 2510 m elev., (lat./long. and elevation estimated from locality data), 19 July 1988, *Boyd 2645* (RSA 519524); Sierra San Pedro Mártir, canyon at base of Cerro Botella Azul, at end of road leading S of Vallecitos, surrounding forest of *Pinus jeffreyi*, *Abies concolor*, *Populus tremuloides*, *Cupressus montana*, locally common, prostrate, succulent annual, infrequent in sandy openings, 30.99071°N, 115.44030°W, 2509 m elev., (lat./long. and elevation estimated from locality data), 19 July 1988, *Boyd 2706* (RSA 519494); Yerba Buena, 31.000°N, 115.450°W, 2475 m elev., abundant in sandy soil, 16 August 1967, *Moran 14185* (RSA 225157); La Vibora, Arroyo la Grulla 4 km SW of La Grulla.,

occasional in dry sand by stream, 30.867°N, 115.508°W, 1900 m elev., 10 August 1977, *Moran 24462* (SD 97873); Rancho Viejo, 30.900°N, 115.483°W, 2050 m elev., fairly common in dry, sandy meadow, 11 August 1977, *Moran 24489* (SD 97766); a bit W of Vallecitos along trail from Prado del Corona to La Providencia, N end of high Sierra San Pedro Mártir, 30.98570°N, 115.51824°W, (lat./long. estimated from locality data), 2350 m elev., sandy, sunny flat, small, wide streambed; aspens, *Salix*, *Urtica* nearby, rosettes to 7 in. across, frequent, early to mid-bloom, 07 June 1962, *Ohmsted 4603* (RSA 170797); Sierra San Pedro Mártir, La Encantada meadow, S of Los Llanitos, leaves succulent, fruit shorter than *C. monandrum*, sepals round with small margins, 30.91667°N, 115.40000°W, 2200 m elev., 27 June

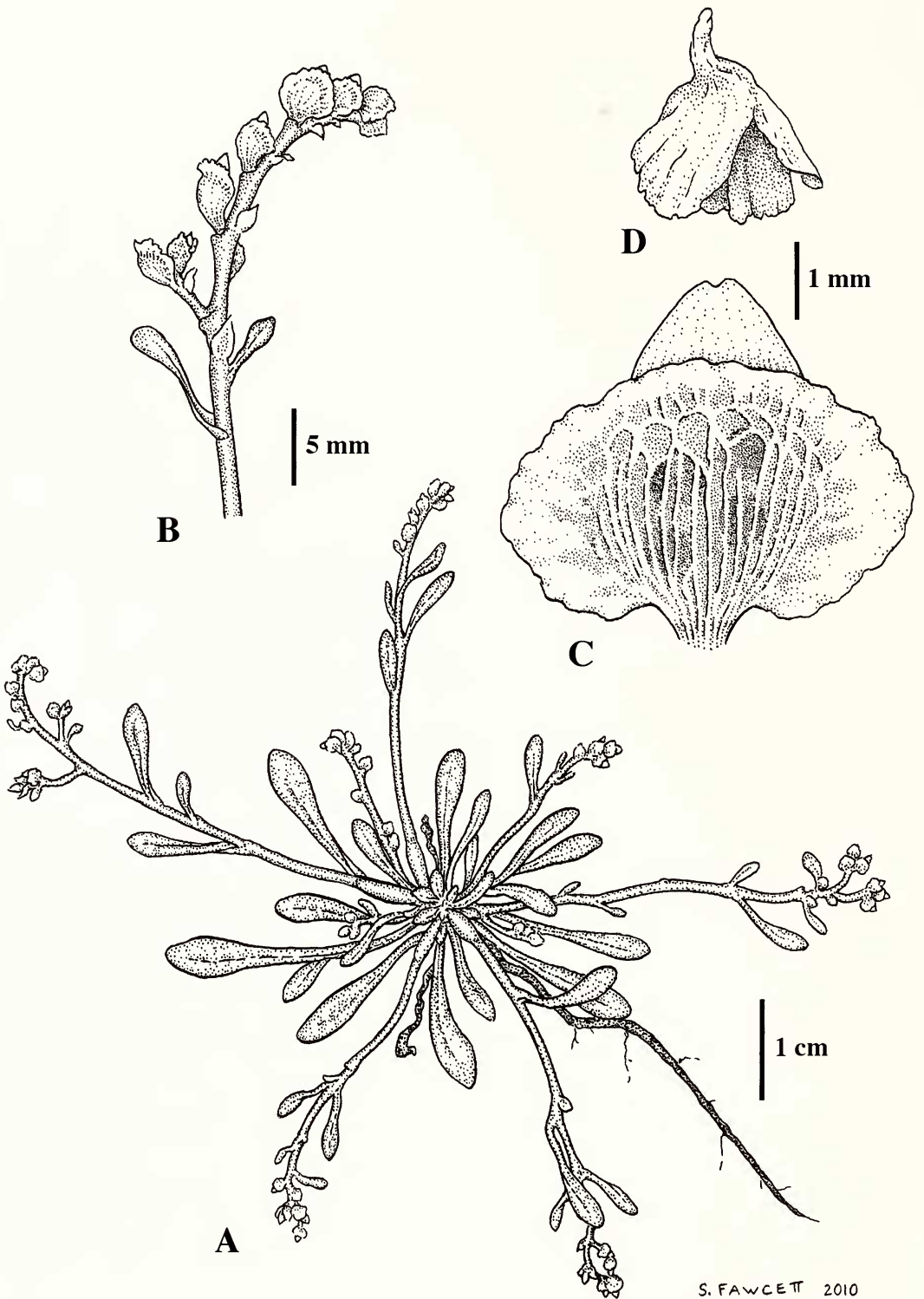


FIG. 3. Line drawings (by Susan Fawcett) of type specimen of *Calyptridium parryi* var. *martirensis*, from type specimen (*Rebman 5407*). A. Whole plant. B. Inflorescence unit. C. Fruit with adaxial sepal. D. Calyptra, removed from fruit.

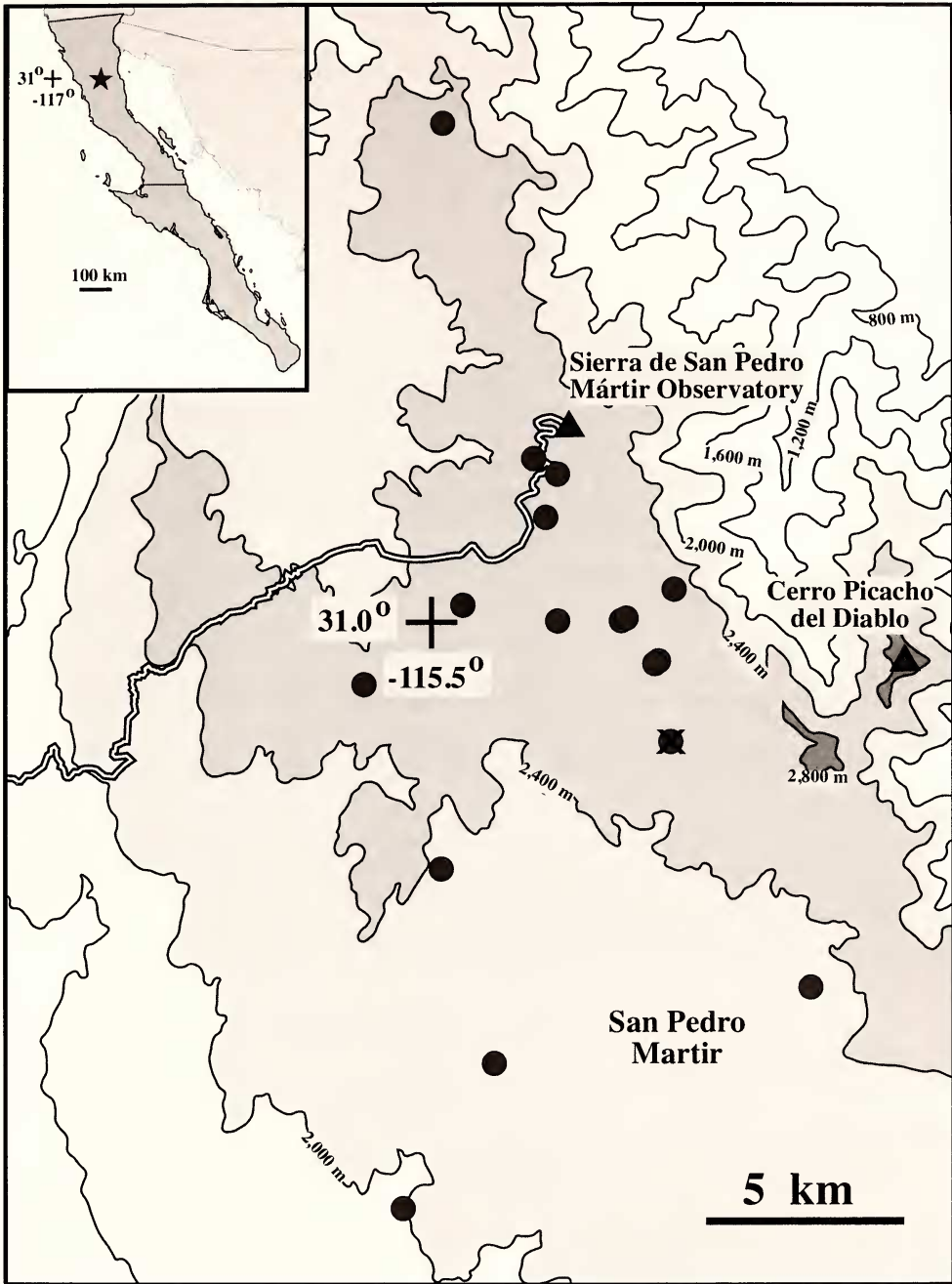


FIG. 4. Map showing the geographic distribution of the 17 known collections (circles) of *Calyptridium parryi* var. *martirensense* from Sierra de San Pedro Mártir. Locality indicated with "X" is that of the type specimen, *Rebman 5407*.

1996, *Rebman 3295* (SD 142900); Sierra de San Pedro Mártir, Vallecitos area, just S of the main road to the Observatory, *Pinus jeffreyi*, *Eriogonum wrightii* var. *oresbium*, granitic substrates, annual, note fruit differences from *C. monandrum*, 31.02333°N, 115.47000°W, 2415 m elev., 30 July 1997, *J. Rebman 4174* (SD 142899); Sierra San Pedro Mártir, La Tasajera region, SW of

Observatory, approx. 7 mi S of the Observatory Rd, *Pinus jeffreyi*, *Abies concolor*, *Populus tremuloides*, granite rocks and soil, 30.94389°N, 115.49722°W, 2285 m elev., 15 September 1998, *J. Rebman 5579* (SD 145561); Sierra San Pedro Mártir, SE of Vallecitos and approx. 3 mi S of the Observatory, along the highest ridge en route to Pedro's Dome, conifer forest with *Pinus jeffreyi*,

Abies concolor, *Eriogonum wrightii* var. *oresbium*, *Philadelphus microphyllus*, and *Callitropsis montana*, mostly granitic substrates, prostrate, annual, rare, 31.008°N, 115.436°W, 2630 m elev., 30 September 2008, *Rebman 15994* (SD 191485); Sierra San Pedro Mártir, meadow along the road to Tasajera approx. 0.75 mi S of the Observatory Rd in Vallecitos, meadow surrounded by mixed conifer forest with *Populus tremuloides*, *Pinus contorta*, *Pinus jeffreyi*, *Achillea millefolium*, *Calyptridium parryi*, and *Xanthisma wigginsii*, granitic substrates, 31.0042°N, 115.4925°W, 2465 m elev., 01 October 2008, *Rebman 16055* (SD 191486); Sierra San Pedro Mártir, “Corral Meadow” 7.5 km NW (340 degrees) of the observatory, decomposed granite soil on slopes, fine clay in meadow, slopes with mixed conifer forest of *Abies concolor* and *Pinus jeffreyi*, meadow with *Juncus*, *Poa*, *Carex*, etc., a fairly common annual on open flats, succulent leaves, 31.11250°N, 115.49722°W, 2520 m elev., 16 June

1988, *Sanders 7921* (UCR 52532); Vallecitos, near road to Observatory and camp-ground, open, sandy meadow and stream, dry, sandy soil of meadow, succulent, spreading annual, 31.033°N, 115.467°W, 2430 m elev., 18 June 1985, *Thorne 60834* (RSA 346089); Sierra San Pedro Mártir, study area 3, on observatory road 7.5 mi above Parque Nacional San Pedro Mártir boundary (=entrance station?), Jeffrey pine forest with *Blepharoneuron tricholepis*, *Aristida*, *Hymenopappus filifolius*, *Machaeranthera wigginsii*, *Muhlenbergia minutissima*, *Draba corrugata*, *Ipomopsis effusa*, *Potentilla wheeleri*, *Monardella macrantha*, *Gayophytum diffusum*, *Ophiocephalus angustifolius*, *Eriogonum hastatum*, etc., 31.033°N, 115.467°W, 2410 m elev., 17 October 1976, *Vasek, s.n.* (UCR 15269); Vallecitos, Sierra San Pedro Mártir, 31.000°N, 115.467°W, 2475 m elev., sandy ground near creek, 09 August 1969, *Witham 384* (SD 74689).

A Revised Key of the Varieties of *Calyptridium parryi* and Closely Related Species

- Fruit at maturity gen. <1 mm wide, >2.5 × longer than abaxial fruiting sepal; abaxial fruiting sepal <2 mm long; widespread. *C. monandrum*
- Fruit at maturity gen. >1 mm wide, <2.5 × longer than abaxial fruiting sepal; abaxial fruiting sepal 1.7–4 mm long; restricted in range
 - Seeds completely smooth, lacking papillae; fruit gen. 5.8–8 mm long. *C. arizonicum*
 - Seeds not completely smooth, with papillae at least along the margin; fruit 3–5.7 mm long.
 - Seeds with papillae throughout. *C. parryi* var. *parryi*
 - Seeds with papillae only on the margin
 - Fruit ca. 3–4 mm long, ≤1.5 × longer than abaxial fruiting sepal; Sierra de San Pedro Mártir, Baja California, Mexico. *C. parryi* var. *martirensis*
 - Fruit 3.8–5.7 mm long, 1.5(1.1)–2.5 × longer than abaxial fruiting sepal; mostly California and Nevada (rarely Utah, Arizona), USA
 - Seeds >0.6 mm in diameter; abaxial fruiting sepal reniform with a wide scarious margin; mostly Sierra Nevada and Panamint ranges, eastern California to western Nevada (rarely Utah, Arizona). *C. parryi* var. *nevadense*
 - Seeds <0.6 mm. in diameter; abaxial fruiting sepals usually ovate with a very narrow scarious margin or none; South Coast Ranges, California. *C. parryi* var. *hesseae*

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