

ACKNOWLEDGMENTS

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MISCELLANEOUS CHROMOSOME COUNTS OF
WESTERN AMERICAN PLANTS—IV

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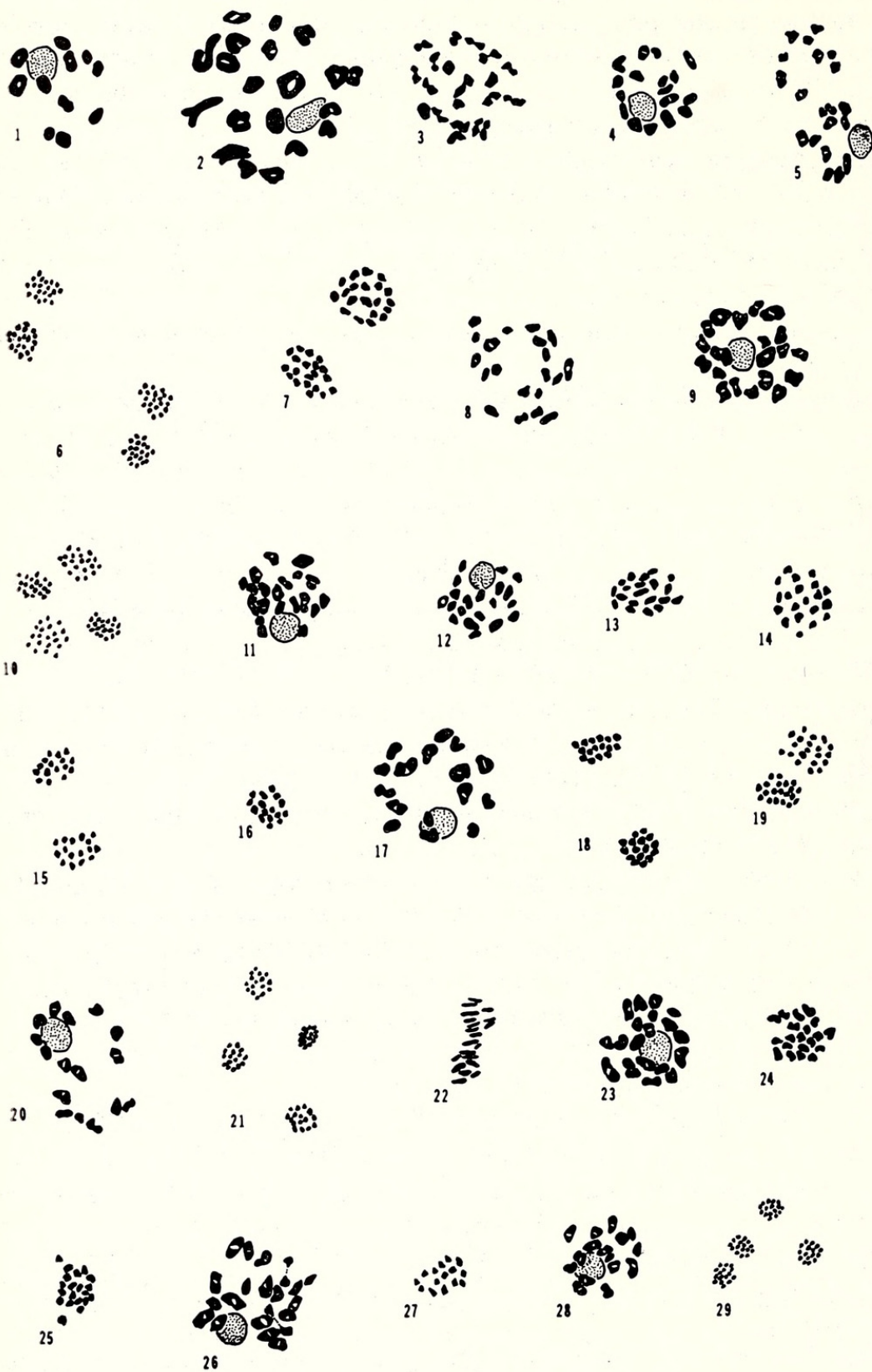
This series of papers, of which this is the fourth, reports chromosome counts of miscellaneous western American plants. Previous parts have dealt with plants collected of various floristic projects of the senior author (Reveal & Styer, 1973, 1974; Reveal & Spellenberg, 1976). The present contribution covers counts of plants collected in Baja California, Mexico, in February of 1973.

Flower buds were collected in developmental stages from plants growing in their native habitats, and were fixed in ethanol and glacial acetic acid (3:1). Anthers were squashed in acetocarmine and camera lucida drawings were prepared. The counts reported here were made by Reveal, but all of the species determinations except those of *Eriogonum*, or as indicated, were made by Moran. Voucher specimens are deposited at the San Diego Museum of Natural History (SD).

Chromosome numbers are reported for 31 taxa; for 26 of these we have seen no previous reports. Three counts represent first reports for the genus: *Chorizanthe* ($n = 20$), *Wislizenia* ($n = 20$), and *Errazurizia* ($n = 14$).

Garrya grisea Wiggins. $n = 11$. Voucher: M&R 20176 (Fig. 1), north slope of Cerro Azufre, ca 1600 m, B.Cfa.Sur (near 27°30'N, 112°36'W), 17 Feb 1973.

This first reported number for the species is common in the genus (Bolkhovskikh et al., 1969). The species has not been reported previously from south of Sierra San Pedro Mártir.



Chorizanthe pulchella Brandegees. $n = 20$. Voucher: *M&R* 19625 (Figs. 2, 3), 2 mi S of El Crucero, ca 530 m, B.Cfa.Norte (near $29^{\circ}14'N$, $114^{\circ}11'W$), 1 Feb 1973.

This is the first published count for the genus *Chorizanthe*. Judging from Reveal's understanding of *Eriogonum*, the basic number of the genus would seem to be $x = 10$. On labels for the voucher, the chromosome number was given incorrectly as $n = 15$.

Eriogonum elongatum Benth. var. *areorivum* Reveal. $n = 17$. Vouchers: *M&R* 19913 (Fig. 4), bed of Arroyo San José de Castro, ca 340 m, B.Cfa.Sur (near $27^{\circ}33'N$, $114^{\circ}32'W$), 7 Feb 1973; *M&R* 19930 (Fig. 5), bed of Arroyo Largo, 4 mi E of the mouth, ca 110 m, B.Cfa.Sur (near $27^{\circ}36'N$, $114^{\circ}45'W$), 8 Feb 1973.

This count agrees with that given by Stokes and Stebbins (1955) for var. *elongatum*.

Eriogonum encelioides Reveal & Hanson. $n = 20$. Vouchers: *M&R* 19813 (Fig. 6), Arroyo del Portezuelo, 9.5 mi S of San José de Castro, ca 275 m, B.Cfa.Sur (near $27^{\circ}26'N$, $114^{\circ}27'W$), 5 Feb 1973; *M&R* 19967 (Fig. 7), Arroyo de las Casitas, 2.5 mi above the mouth, ca 100 m, B.Cfa.Sur (near $27^{\circ}31'N$, $114^{\circ}36'W$), 9 Feb 1973.

Reveal and Hanson (1967) associated this species with *Eriogonum elongatum*. However, examination of the plant in the field clearly shows it to be a member of section Fasciculata Benth. and most closely related to *E. molle* Brandegees, of Cedros Island.

Eriogonum fasciculatum Benth. var. *fasciculatum*. $n = 20$. Voucher: *M&R* 20289 (Fig. 8), Colnett Mesa, 0.5 mi N of Colnett, ca 80 m, B.Cfa.Norte (near $31^{\circ}05'N$, $116^{\circ}13'W$), 25 Feb 1973.

This count agrees with previous reports for this variety (Stebbins, 1942; Stokes & Stebbins, 1955; Reveal, 1967).

Eriogonum fasciculatum Benth. var. *flavovirde* Munz & Johnston. $n = 20$. Vouchers: *M&R* 19629 (Fig. 9), Arroyo León, 5 mi N of Punta Prieta, ca 250 m, B.Cfa.Norte (near $29^{\circ}01'N$, $114^{\circ}12'W$), 1 Feb 1973; *M&R* 20163 (Figs. 12, 13), saddle on north side of Cerro Azufre, ca 1250 m, B.Cfa.Sur (near $27^{\circ}30'N$, $112^{\circ}36'W$), 17 Feb 1973.

FIGS. 1-29. 1. *Garrya grisea*, $n = 11$, diakinesis. 2. *Chorizanthe pulchella*, $n = 20$, diakinesis; 3, metaphase I. 4, 5. *Eriogonum elongatum* var. *areorivum*, $n = 17$, diakinesis. 6. *Eriogonum encelioides*, $n = 20$, telophase II; 7, anaphase I. 8. *Eriogonum fasciculatum* var. *fasciculatum*, $n = 20$, metaphase I. 9, 12. *Eriogonum fasciculatum* var. *flavovirde*, $n = 20$, diakinesis; 12, late diakinesis. 10. *Eriogonum fasciculatum* var. *emphreium*, $n = 20$, telophase II; 11, diakinesis. 14. *Eriogonum fastigiatum*, $n = 20$, metaphase I. 15. *Eriogonum inflatum* var. *deflatum*, $n = 16$, anaphase I; 16, metaphase I. 17. *Eriogonum intricatum*, $n = 16$, diakinesis; 18, telophase I. 19. *Eriogonum moranii*, $n = 20$, anaphase I. 20. *Eriogonum pilosum*, $n = 16$, diakinesis; 21, telophase II. 22, 24. *Eriogonum pondii*, $n = 20$, metaphase I; 23, diakinesis. 25. *Eriogonum preclarum*, $n = 20$, metaphase I; 26, diakinesis. 27. *Eriogonum repens*, $n = 16$, metaphase I; 28, diakinesis; 29, telophase II.

Shreve and Wiggins (1964) and Reveal and Munz (1968) considered this variety endemic to southern California, but on the basis of pubescence characters of leaves, involucre, and flowers, the plants from central Baja California can be referred only to var. *flavovirde*.

Eriogonum fasciculatum Benth. var. *emphereum* Reveal. $n = 20$. Vouchers: *M&R* 19660 (Fig. 10), Picachos de Santa Clara, ca 350 m, B.Cfa.Sur (near $27^{\circ}09'N$, $113^{\circ}40'W$), 3 Feb 1973; *M&R* 19690 (Fig. 11), north slope of SE peak, Picachos de Santa Clara, ca 475 m, B.Cfa.Sur (near $27^{\circ}07'N$, $113^{\circ}37'W$), 3 Feb 1973.

This recently proposed variety (Reveal, 1976) differs in its large flowers which may perhaps show past influence of gene flow by *Eriogonum pondii* Greene. No chromosomal abnormalities were noted in the several buds examined.

Eriogonum fastigiatum Parry. $n = 20$. Voucher: *M&R* 20282 (Fig. 14), Colnett Mesa, 0.5 mi N of Colnett, ca 80 m, B.Cfa.Norte (near $31^{\circ}05'N$, $116^{\circ}13'W$), 25 Feb 1973.

Eriogonum inflatum Torr. & Frém. var. *deflatum* I. M. Johnston. $n = 16$. Vouchers: *M&R* 19610 (Fig. 15), Arroyo San Francisquito, 4 mi NW of Las Arrastras, ca 350 m, B.Cfa.Norte (near $29^{\circ}36'N$, $114^{\circ}26'W$), 31 Jan 1973; *M&R* 20037 (Fig. 16), grade near Lucifer, ca 110 m, B.Cfa.Sur (near $27^{\circ}23'N$, $112^{\circ}24'W$), 11 Feb 1973.

This count agrees with previously reported counts (Reveal, 1967).

Eriogonum intricatum Benth. $n = 16$. Vouchers: *M&R* 19755 (Fig. 17), 8 mi NW of Asunción, ca 70 m, B.Cfa.Sur (near $27^{\circ}13'N$, $114^{\circ}21'W$), 4 Feb 1973; *M&R* 19894 (Fig. 18), Arroyo Malarrimo, 11 mi S of the mouth, ca 75 m, B.Cfa.Sur (near $27^{\circ}39'N$, $114^{\circ}29'W$), 6 Feb 1973.

This Baja California endemic belongs to the *Eriogonum inflatum* complex and has the same chromosome number as *E. inflatum*.

Eriogonum moranii Reveal. $n = 20$. Voucher: *M&R* 19611 (Fig. 19), Arroyo Calamajué, ca 330 m, B.Cfa.Norte (near $29^{\circ}24'N$, $114^{\circ}14'W$), 1 Feb 1973.

This count agrees with that published previously (Reveal, 1968).

Eriogonum pilosum S. Stokes. $n = 16$. Voucher: *M&R* 20214 (Figs. 20, 21), Arroyo de la Purificación, ca 500 m, B.Cfa.Norte (near $28^{\circ}10'N$, $113^{\circ}15'W$), 19 Feb 1973.

Shreve and Wiggins (1964) included this species with *Eriogonum scalare* S. Wats., and their description of *E. scalare* applies in large part to *E. pilosum*, while the description of *E. pilosum* applies mainly to *E. repens* (S. Stokes) Reveal (Reveal, 1976). The leaves of *E. scalare* are elliptic, nearly glabrous, 5–15 mm long, and 2–6 mm wide, whereas those of *E. pilosum* are oblanceolate to oblong, wavy-margined, pilose 0.8–3 cm long, and 4–8 mm wide.

Eriogonum pondii Greene. $n = 20$. Vouchers: *M&R* 19753 (Fig. 22), 8 mi NW of Asunción, ca 70 m, B.Cfa.Sur (near $27^{\circ}13'N$, $114^{\circ}21'W$),

4 Feb 1973; *M&R* 19932 (Figs. 23, 24), bed of Arroyo Largo, 6.7 mi E of the mouth, ca 175 m, B.Cfa.Sur (near 27°36'N, 114°43'W), 8 Feb 1973.

In 1967, Reveal and Hanson proposed var. *gentryi* for the mainland plants of this species, except for the strictly coastal populations, with var. *pondii* restricted to Cedros and Natividad Islands and the Turtle Bay area. After further study, the apparent differences upon which var. *gentryi* were based now seem too trivial for varietal distinction, and therefore it should be considered a synonym of *E. pondii*.

Eriogonum preclarum Reveal. $n = 20$. Vouchers: *M&R* 19814 (Fig. 25), Arroyo de Portezuelo, 9.5 mi S of San José de Castro, ca 275 m, B.Cfa.Sur (near 27°26'N, 114°27'W), 5 Feb 1973; *M&R* 19955 (Fig. 26), bed of Arroyo de las Casitas, near the mouth, ca 10 m, B.Cfa.Sur (near 27°29'N, 114°38'W), 9 Feb 1973.

The type of this newly proposed species (Reveal, 1976), *M&R* 19964, was also counted and determined to be $n = 20$, but is not figured.

Eriogonum repens (S. Stokes) Reveal. $n = 16$. Vouchers: *M&R* 19640 (Fig. 27), 1 mi N of San Angel, ca 50 m, B.Cfa.Sur (near 27°15'N, 113°10'W), 2 Feb 1973; *M&R* 20135 (Figs. 28, 29), Valley de Tortuga, ca 80 m, B.Cfa.Sur (near 26°35'N, 113°50'W), 15 Feb 1973.

Eriogonum thurberi Torr. $n = 20$. Voucher: *M&R* 20246 (Figs. 30–32), 2 mi NW of Desengaño, ca 580 m, B.Cfa.Norte (near 29°08'N, 114°05'W), 23 Feb 1973.

Streptanthus arizonicus S. Wats. $n = 14$. Voucher: *M&R* 20159 (Figs. 33, 34), north slope of Cerro Azufre, ca 1250 m, B.Cfa.Sur (near 27°30'N, 112°36'W), 17 Feb 1973; identified by Reed Rollins.

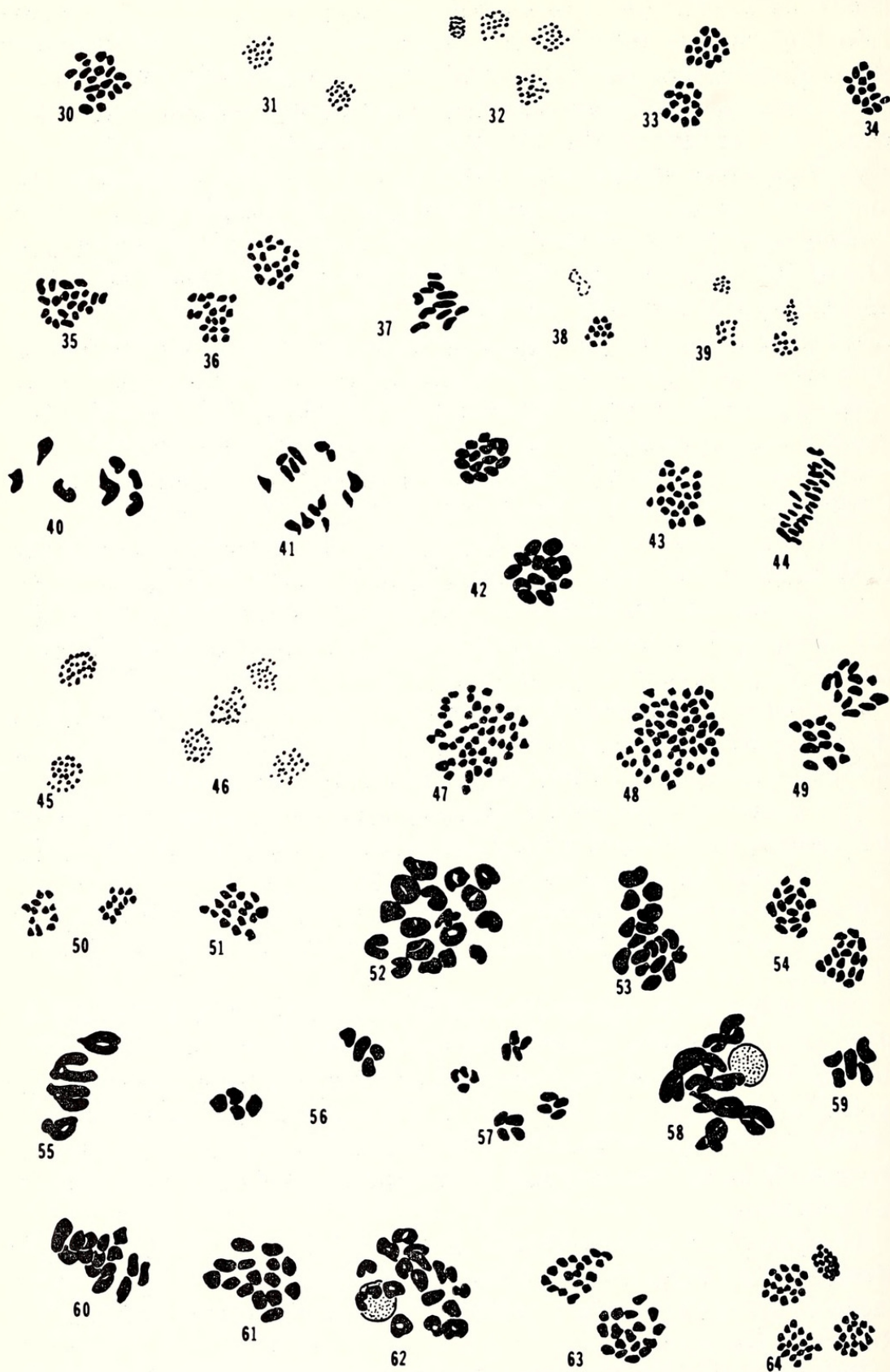
This collection represents a substantial southern range extension for the species, otherwise known from southern Arizona. *M&R* 20192 ($n = 14$) was also counted but is not illustrated.

Wislizenia refracta Engelm. in Wisliz. $n = 20$. Voucher: *M&R* 20096 (Figs. 35, 36), Pozo de San Juanico, ca 25 m, B.Cfa.Sur (near 26°14'N, 112°28'W), 14 Feb 1973.

This seems to be the first count for the genus. The specimens are atypical of the species in being perennials, with woody stems to 1.5 cm thick at the base; but they seem not to differ otherwise from the more typical annual phase of the species. We collected the perennial form (*M&R* 20153) also at San Zacarías, where it is known as “Joaquito”; tea made from the leaves is said to be used internally and externally for scorpion stings.

Astragalus magdalenae Greene var. *magdalenae*. $n = 11$. Voucher: *M&R* 19718 (Figs. 37–39), 4 mi NE of Abreojos, ca 5 m, B.Cfa.Sur (near 26°45'N, 113°34'W), 4 Feb 1973; identification confirmed by Rupert C. Barneby.

Dalea bicolor H.B.K. (unpublished new variety to be named by Barneby; pers. comm.). $n = 7$. Voucher: *M&R* 20158 (Figs. 40, 41),



northeast ridge of Cerro Azufre, ca 850 m, B.Cfa.Sur (near 27°31'N, 113°34'W), 17 Feb 1973; identification confirmed by Rupert C. Barneby.

This new form of *Dalea bicolor* will be named in honor of C. R. Orcutt in the near future.

Errazurizia benthamii (Brandege) I. M. Johnston. $n = 14$. Voucher: *M&R* 19865 (Fig. 42), Arroyo Malarrimo, 9 mi S of the mouth, ca 60 m, B.Cfa.Sur (near 27°41'N, 114°28'W), 6 Feb 1973.

This appears to be the first report for the genus.

Lupinus arizonicus (S. Wats.) S. Wats. var. *barbatulus* (Thornber) I. M. Johnston. $n = 24$. Voucher: *M&R* 19845 (Figs. 43–46), Malarrimo, ca 10 m, B.Cfa.Sur (near 27°48'N, 114°27'W), 6 Feb 1973; identification by David Dunn.

Castilleja aff. *lanata* A. Gray. Vouchers: *M&R* 20249 ($n = 48$, Fig. 47), north slope of volcanic hill at top of Jaraguay Grade, ca 875 m, B.Cfa.Norte (near 29°37'N, 114°37'W), 24 Feb 1973; *M&R* 20208 ($n = 60$, Fig. 48), north slope of Volcán las Tres Vírgenes, ca 1325 m, B.Cfa.Sur (near 27°29'N, 112°36'W), 18 Feb 1973; identifications by Noel H. Holmgren.

Holmgren reports that these two collections approach *Castilleja lanata* of southern Arizona eastward to Texas, but may be taxonomically distinct and deserve some formal recognition. In addition to the two ploidy levels reported here ($n = 48, 60$), Lawrence R. Heckard has found an even lower ploidy level which he will report.

Orobanche cooperi (A. Gray) Heller. $n = 12$. Voucher: *M&R* 19933 (Fig. 49), Arroyo Largo, 6.7 mi E of the mouth, ca 175 m, B.Cfa.Sur (near 27°36'N, 114°43'W), 8 Feb 1973.

Heckard and Chuang (1975) have reported *Orobanche cooperi* from Baja California, Mexico, and California, with counts of $2n = 48, 72$, and 96. Apparently, our count is the first diploid population reported for this species, and the first species of New World *Orobanche* with a haploid number of 12. Our plants differ from typical *O. cooperi* in having glabrous anthers.

FIGS. 30–64. 30. *Eriogonum thurberi*, $n = 20$, metaphase I; 31, telophase I; 32, telophase II. 33. *Streptanthus arizonicus*, $n = 14$, anaphase I; 34, metaphase I. 35. *Wislizenia refracta*, $n = 20$, metaphase I; 36, telophase I. 37. *Astragalus magdalenae* var. *magdalenae*, $n = 11$, metaphase I; 38, one complement of anaphase I; 39, telophase II. 40. *Dalea bicolor* var. *ined.*, $n = 7$, metaphase I; 41, anaphase I. 42. *Errazurizia benthamii*, $n = 14$, telophase I. 43, 44. *Lupinus arizonicus* var. *barbatulus*, $n = 24$, metaphase I; 45, telophase I; 46, telophase II. 47. *Castilleja* aff. *lanata*, $n = 48$, metaphase I; 48, $n = 60$, metaphase I. 49. *Orobanche cooperi*, $n = 12$, anaphase I. 50. *Salvia similis*, $n = 12$, telophase I. 51. *Encelia palmeri*, $n = 17$, metaphase I. 52. *Encelia stenophylla*, $n = 17$, diakinesis; 53, metaphase; 54, late anaphase I. 55. *Greenella ramulosa*, $n = 4$, diakinesis; 56, telophase I; 57, telophase II. 58. *Machaeranthera crispa*, $n = 5$, diakinesis; 59, metaphase I. 60, 61. *Porophyllum tridentatum*, $n = 15$, metaphase I. 62. *Viguiera lanata*, $n = 17$, diakinesis; 63, anaphase I; 64, telophase II.

Salvia similis Brandegees. $n = 12$. Voucher: *M&R* 20108 (Fig. 50), in an arroyo 3 mi SW of Cadejé, ca 50 m, B.Cfa.Sur (near $26^{\circ}20'N$, $112^{\circ}24'W$), 14 Feb 1973.

Encelia palmeri Vasey & Rose. $n = 17$. Voucher: *M&R* 20003 (Fig. 51), Arroyo Calvario, 6 mi N of San Andrés, ca 130 m, B.Cfa.Sur (near $27^{\circ}20'N$, $114^{\circ}26'W$), 10 Feb 1973.

Encelia stenophylla Greene. $n = 17$. Voucher: *M&R* 19678 (Figs. 52–54), north slope of SE peak, Picachos de Santa Clara, ca 350 m, B.Cfa.Sur (near $27^{\circ}07'N$, $113^{\circ}37'W$), 3 Feb 1973.

Shreve and Wiggins (1964) reported this species for Cedros Island but not for peninsular Baja California. Our collections show it fairly common not only at Picachos de Santa Clara but also from Turtle Bay to Arroyo Malarrimo and to south of San José de Castro, from about 25 to 850 meters elevation.

Greenella ramulosa Greene. $n = 4$. Voucher: *M&R* 19926 (Figs. 55–57), southeast side of Bahía Tortugas, ca 10 m, B.Cfa.Sur (near $27^{\circ}39'N$, $114^{\circ}51'W$), 8 Feb 1973.

This perennial species is restricted to the west coast of central Baja California. The only other species of the genus is an annual, found in Arizona, which likewise is $n = 4$ (Solbrig et al., 1964). The proposal by Ruffin (1974) to reduce *Greenella* to *Xanthocephalum* is not adopted here.

Machaeranthera crispa (Brandegee) Turner & Horne. $n = 5$. Voucher: *M&R* 20154 (Figs. 58, 59), San Zacarías, ca 170 m, B.Cfa.Sur (near $27^{\circ}08'N$, $112^{\circ}56'W$), 15 Feb 1973.

This count is consistent with the somatic number of $2n = 10$ given by Turner and Horne (1964).

Porophyllum tridentatum Benth. $n = 15$. Voucher: *M&R* 19965 (Figs. 60, 61), Arroyo de las Casitas, 1.5 mi above the mouth, ca 50 m, B.Cfa.Sur (near $27^{\circ}30'N$, $114^{\circ}36'W$), 9 Feb 1973; confirmed by John L. Strother.

Johnston (1965) published a count of $2n = 30$ for what he called *Porophyllum tridentatum* var. *crassifolium*; but that is a valid species in the opinion of John L. Strother (pers. comm.). Shreve and Wiggins (1964) reported *P. tridentatum* only from the Magdalena Plain and adjacent islands, some 325 kilometers to the southeast.

Viguiera lanata (Kellogg) A. Gray. $n = 17$. Voucher: *M&R* 19970 (Figs. 62–64), Arroyo de las Casitas, 8 mi above the mouth, ca 300 m, B.Cfa.Sur (near $27^{\circ}33'N$, $114^{\circ}35'W$), 9 Feb 1973.

Shreve and Wiggins (1964) reported this species as known only from Cedros and Natividad Islands, but they expressed the opinion that it should also occur on the mainland. Our collections confirm that expectation.

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FOUR NEW SPECIES OF CENTAURIUM (GENTIANACEAE)
FROM MEXICO

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Work on a taxonomic revision of the New World members of *Centaurium* (Gentianaceae) has resulted in the recognition of four previously undescribed species from Mexico. Three are known to me only from herbarium specimens, but living material of a fourth has been collected and observed.



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