CHROMOSOME COUNTS OF COMPOSITAE FROM MEXICO AND THE UNITED STATES¹

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ABSTRACT

Chromosome counts of Compositae are reported from Mexico and the United States. First generic counts are from *Egletes* ($n = 27$), *Hydropectis* ($n = 9$), and *Pippenalia* ($2n = \text{ca. } 60$). First counts also are reported for 22 specific and infraspecific taxa in *Baccharis*, *Erigeron*, *Flaveria*, *Gnaphalium*, *Grindelia*, *Helenium*, *Heterotheca*, *Melampodium*, *Montanoa*, *Perymenium*, *Piqueria*, *Senecio*, *Stevia*, *Verbesina*, *Xanthocephalum*, and *Zaluzania*. Additional counts also are provided for 123 populations of taxa counted previously, of which eight are new numbers. Taxonomic implications of certain counts are discussed.

THIS PAPER is a continuation of our studies (Keil and Stuessy, 1975) on chromosome numbers in the Compositae principally from the western United States and Mexico. As before, we have adopted the policy of reporting new populational counts of previously documented taxa as well as first reports for genera, species and varieties. The materials and methods involving conventional acetocarmine squashes of buds for meiotic stages are the same as those mentioned in our earlier paper. All voucher specimens are on deposit in the herbarium of the Ohio State University (OS).

RESULTS—The chromosome counts obtained are listed in Table 1. First counts are reported for three genera, 20 species, and two varieties; 123 additional counts are for taxa counted previously, eight of which are new numbers. The first counts for genera are from *Egletes* Cass. ($n = 27$), *Hydropectis* Rydb. ($n = 9$), and *Pippenalia* McVaugh ($2n = \text{ca. } 60$), and first counts for species are in *Baccharis* L., *Erigeron* L., *Flaveria* Juss., *Gnaphalium* L., *Grindelia* Willd., *Helenium* L., *Heterotheca* Cass., *Melampodium* L., *Montanoa* Cav., *Perymenium* Schrad., *Piqueria* Cav., *Senecio* L., *Stevia* Cav., *Verbesina* L., *Xanthocephalum* Willd., and *Zaluzania* Pers.

DISCUSSION—As in our earlier paper (Keil and Stuessy, 1975), the discussions are restricted to

first or new counts or significant comments. The order of commentary follows the sequence of tribes in the classification of Hoffmann (1890-94; with the additional recognition of the Tageteae as a separate tribe [Rydborg, 1915-16]), which is the same as that used in Table 1. References for statements regarding the broad range of chromosomal variation within genera will not be given; documentation for these counts comes from available chromosomal indices (Darlington and Wylie, 1955; Cave, 1958-65; Ornduff, 1967-69; Fedorov, 1969; Moore, 1970-74).

A number of first reports for taxa are consistent with previous counts for the respective genera. These are listed here and will not be discussed further: *Baccharis heterophylla*, $n = 9$; *Erigeron dryophyllus*, $n = 9$; *Flaveria robusta*, $n = 18$; *Gnaphalium* cf. *chartaceum* and *G. stramineum*, $n = 14$; *Grindelia tenella*, $n = 6$; *Heterotheca chrysopsidis*, $n = 9$; *Montanoa pyramidata*, $n = 19$; *Senecio arizonicus*, *S. flaccidus*, and *S. wootonii*, $n = 20$; *Stevia aschenborniana*, $n = 11$; *S. berlandieri* A. Gray var. *berlandieri*, $n = 12$; *Verbesina tequilana*, $n = 17$; and *Zaluzania discoidea*, $n = 18$.

Eupatorieae—Our count of ca. 84 I for an undetermined species of *Ageratina* is indicative of the cytological complexity of this genus. Based upon previous reports at the diploid, tetraploid, and apparently pentaploid levels, King and Robinson (1970) postulated a base number of $x = 17$ for *Ageratina*. Our count probably represents a pentaploid ($5x = 85$). Insight into the biological complexity of *Ageratina* is hindered by the lack of any published revision of the Latin American taxa. King and Robinson (1970) listed over 200 species for the genus (most as transfers from *Eupatorium* L.) but provided no keys, descriptions, or other means of identification.

Our count of $n = 20$ for *Eupatorium sagitta-*

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tum is the first polyploid count for this species. Diploid counts of $n = 10$ have been reported previously (Turner and Flyr, 1966; Keil and Pin-kava, 1976), also from Sinaloa where this taxon is common (Robinson, 1926).

Five species of *Piqueria* have been counted before as $n = 10, 11, 12$, and 24 . Our first report of $n = 12$ for *P. cf. triflora* conforms to the known chromosomal diversity. Our voucher differs from the typical *P. triflora* in having glabrous rather than hirtellous phyllaries and stems.

Astereae—*Achaetogeron*, a genus of about eight species, has had two chromosomal levels reported previously: $n = 9$ from *A. pinnatifidum* A. Gray (Turner and Flyr, 1966) and *A. griseus* Greenm. (DeJong and Longpre, 1963); and $n = 27$ from *A. forreri* Greene (DeJong and Longpre, 1963). Our count of $n = 36$ for *A. cf. forreri* is not only a new chromosomal level for this species, but also the first report of the octoploid level for the genus.

Our count of $n = 27$ for *Egletes viscosa* is the first for the genus. An ancestral base number of $x = 9$ for *Egletes* is suggested, especially because two related genera (Hoffmann, 1890–94; Shinn-ers, 1949), *Grangea* Adans. and *Dichocephala* DC., are known also as $n = 9$.

Our two populational counts of $n = 8$ for *Gutierrezia glutinosa* are the first reports of a tetraploid chromosomal level for this species, which has been counted before as $n = 4$ (e.g., Powell and Turner, 1963; Reveal and Spellenberg, 1976). Intraspecific euploidy is not uncommon in *Gutierrezia*, and it has been reported (Solbrig, 1960a) from *G. bracteata* Abrams ($n = 8$ and 12), *G. microcephala* (DC.) A. Gray ($n = 8$ and 16), and *G. sarothrae* (Pursh) Britt. & Rusby ($n = 4$ and 8).

Two chromosomal base numbers are known in *Xanthocephalum*: $x = 4$ and 6 . Our first report of $n = 6$ for *X. benthamianum* fits well with its close morphological relationship to *X. gymnospermoides* (A. Gray) B. & H. (Solbrig, 1961) which is also $n = 6$ (e.g., Solbrig, 1960b). However, *X. benthamianum* also bears a strong overall morphological resemblance to some species of *Grindelia* ($x = 6$). The possibility that the species of *Xanthocephalum* with a base of $x = 6$ are more closely related to *Grindelia* than to the $x = 4$ species of *Xanthocephalum* needs to be examined critically.

Heliantheae—Many chromosome counts have been made in *Bidens*, and the genus is clearly on a base of $x = 12$. *Bidens reptans* var. *urbani* has been counted before at the tetraploid level of $n = 24$ (Turner, Ellison, and King, 1961). Our new count of $n = 12$ indicates the presence of infraspecific euploidy. Two populational counts of $n = 11$ also have been reported for *B. cf. reptans* (Powell and Turner, 1963).

Counts have been published previously for 27 of the 37 recognized species of *Melampodium* (Stuessy, 1970, 1971; Keil and Stuessy, 1975). Of particular interest, therefore, are the first chromosome counts for two additional species, *M. repens* ($2n = 54$) and *M. tepicense* ($n = 12$). The former taxon and the related *M. bibracteatum* S. Wats. constitute section *Bibractiaria* (Stuessy, 1971), which has been the only section of the genus still unknown cytologically. The relationships of this section with other sections are difficult to assess due to the extreme reduction of floral features in both species. The chromosome number of $2n = 54$ seems probably based on $x = 9$, which would place this group closest to section *Zarabellia* with the same chromosomal base (counts of $n = 9, 18$, and 27 have been reported). Morphologically, *M. longifolium* Cerv. ex Cav. would be the species possibly linking the two sections, although the connection is distant. The high ploidy level (probably hexaploid) of *M. repens* corresponds with its specialized prostrate growth habit and reduced floral features. On morphological grounds, *M. tepicense* is most closely related to *M. divaricatum* (Rich. in Pers.) DC. and *M. dicoelocarpum* Robins. of section *Serratura* (Stuessy, 1972). The first chromosome report for *M. tepicense* of $n = 12$ fits well with the sectional base number of $x = 12$ and corroborates the placement of the species on morphological criteria.

Our two chromosome counts of $n = 18$ for *Parthenice mollis* confirm two recent reports from this species of the same number (Urbatsch, 1975; Sauck, 1975). The firm establishment of a chromosome number for the monotypic *Parthenice* is of particular interest to the junior author, because in a previous paper (Stuessy, 1973) the genus was transferred from the subtribe Melampodiinae to the Ambrosiinae near *Parthenium* based on overall morphological resemblance. The chromosome counts of $n = 18$ for *Parthenice* fit well with the presumptive base of $x = 18$ for the entire Ambrosiinae (Payne, Raven, and Kyhos, 1964). Recent pollen studies on *Parthenice* (Bolick and Skvarla, 1976) do not contradict this placement in the Ambrosiinae.

The previous chromosome counts ($n = 15, 30$, ca. 45, ca. 86) in *Perymenium* are based clearly on $x = 15$. Our first report of $n = 30$ for *P. buphthalmoides* (var. *tenellum*) suggests a tetraploid species. Two previous counts of $n = 15$ (Turner, Beaman, and Rock, 1961) and $n = 45$ (Strother, 1976) have been reported for *Perymenium mendezii*. Our count of $n = 30$ completes the euploid series within this taxon. *Perymenium nelsonii* Rob. & Greenm. is the only other species known to have infraspecific euploidy ($n = 15$ and ca. 86; Turner, Ellison, and King, 1961; Solbrig, Kyhos, Powell, and Raven, 1972).

Verbesina crocata has been counted previously

TABLE 1. *Chromosome counts of Compositae from Mexico and the United States*

Taxon	Gametic chromosome number	Voucher
EUPATORIEAE		
* <i>Ageratina</i> sp.	ca. 84 I ^a	MEXICO: Durango: 1 mi NE of Los Angeles, RK 10246 ^b
<i>Brickellia glomerata</i> Fern.	9	MEXICO: Michoacán: 9.7 mi S of Uruapan, SR 3750 ^c
<i>Eupatorium greggii</i> A. Gray	10	MEXICO: Coahuila: 53 mi E of turnoff to San Pedro on rte 40, RK 10415. Durango: jct rtes 45 & 30, RK 10405.
* <i>Eupatorium sagittatum</i> A. Gray	20	MEXICO: Sinaloa: 37 mi SE of Culiacán, K 8803A ^d
** <i>Piqueria</i> cf. <i>triflora</i> Hemsl.	12	MEXICO: Sinaloa: Loberas, RK 10202.
** <i>Stevia aschenborniana</i> Sch. Bip.	11	MEXICO: México: ca. 19 mi SE of Zitacuaro, SR 3718.
* <i>Stevia berlandieri</i> A. Gray var. <i>berlandieri</i>	12	MEXICO: Nuevo León: Chipinque Mesa, RK 10424; 26 mi W of Linares, RK 10474.
<i>Stevia elongata</i> H.B.K.	ca. 35 I ^a	MEXICO: México: ca. 19 mi SE of Zitacuaro, SR 3714.
<i>Stevia eupatoria</i> (Spreng.) Willd.	ca. 33 I ^a	MEXICO: Durango: Río Mimbres at rte 40, RK 10351.
<i>Stevia organoides</i> H.B.K.	11	MEXICO: Durango: 11.5 mi SW of La Ciudad, RK 10261.
<i>Stevia salicifolia</i> Cav.	12	MEXICO: Durango: 5 mi W of Durango, RK 10336.
<i>Stevia subpubescens</i> Lag.	12	MEXICO: Michoacán: ca. 8 mi SE of Zitacuaro, SR 3707.
<i>Stevia trifida</i> Lag.	11	MEXICO: México: ca. 19 mi SE of Zitacuaro, SR 3716.
<i>Stevia</i> sp.	22	MEXICO: Sinaloa: Loberas, RK 10199.
ASTEREAE		
* <i>Achaetogeron</i> cf. <i>forreri</i> Greene	36	MEXICO: Durango: 10 mi W of El Salto, RK 10327.
<i>Astranthium orthopodum</i> (Robins. & Fern.) Larsen	3	MEXICO: Durango: 3 mi E of Navios, RK 10364.
** <i>Baccharis heterophylla</i> H.B.K.	9	MEXICO: Durango: 16 mi E of Navios, RK 10344. Sinaloa: 5 mi NE of Loberas, RK 10226.
<i>Baccharis sordescens</i> DC.	9 + 1B	MEXICO: Morelos: 6.5 mi E of Jiutepec, SR 3690.
<i>Conyza coronopifolia</i> H.B.K.	9	MEXICO: Durango: 16 mi E of Navios, RK 10345.
<i>Conyza coulteri</i> A. Gray	9	MEXICO: Durango: 18 mi SW jct rtes 30 & 45, RK 10399.
*** <i>Egletes viscosa</i> (L.) Less var. <i>dissecta</i> Shinnars	27	MEXICO: Sinaloa: Mazatlán, RK 10170.
<i>Erigeron</i> cf. <i>coronarius</i> Greene	9	MEXICO: Durango: 5 mi W of Durango, RK 10338.
** <i>Erigeron dryophyllus</i> A. Gray	9	MEXICO: Nuevo León: 21 mi W of Linares, RK 10470A.
<i>Grindelia</i> cf. <i>inuloides</i> Willd.	6	MEXICO: Durango: 2 mi SW of turnoff to Villa Carranza, RK 10385.
** <i>Grindelia tenella</i> Steyererm.	6	MEXICO: Nuevo León: ca. 20 mi S of Monterrey, RK 10449.
* <i>Gutierrezia glutinosa</i> (Schauer) Sch. Bip.	8	MEXICO: Coahuila: W of Saltillo, RK 10421. Nuevo León: ca. 20 mi S of Monterrey, RK 10431.
<i>Gymnosperma glutinosum</i> (Spreng.) Less.	8	MEXICO: Nuevo León: 18 mi W of Linares, RK 10459.
** <i>Heterotheca chrysopsidis</i> DC.	9	MEXICO: Nuevo León: 18 mi W of Linares, RK 10458.
<i>Heterotheca villosa</i> (Pursh) Shinnars	9	MEXICO: Durango: 5 mi W of Durango, RK 10337.
<i>Heterotheca villosa</i> (Pursh) Shinnars	18	MEXICO: Nuevo León: 21 mi W of Linares, RK 10468.
<i>Machaeranthera boltoniae</i> (Greene) Turner & Horne		MEXICO: Durango: 16 mi E of Navios, RK 10346; 2 mi SW of turnoff to Villa Carranza, RK 10383.
<i>Solidago velutina</i> DC.	9	MEXICO: Coahuila: W of Saltillo, RK 10420.
** <i>Xanthocephalum benthamianum</i> Hemsl.	6	MEXICO: Durango: 10 mi W of El Salto, RK 10325.
INULEAE		
<i>Gnaphalium</i> cf. <i>attenuatum</i> DC.	14	MEXICO: Michoacán: ca. 8 mi SE of Zitacuaro, SR 3708.
** <i>Gnaphalium</i> cf. <i>chartaceum</i> Greenm.	14	MEXICO: México: ca. 19 mi SE of Zitacuaro, SR 3715.
<i>Gnaphalium purpureum</i> L.	14	MEXICO: Sinaloa: Loberas, RK 10204.

TABLE 1. Continued

Taxon	Gametic chromosome number	Voucher
** <i>Gnaphalium stramineum</i> H.B.K.	14	MEXICO: Durango: 5 mi W of Las Adjuntas, RK 10303; 11 mi W of Llano Grande, RK 10329.
HELIANTHEAE		
<i>Aldama dentata</i> LaLave & Lex.	17	MEXICO: Tamaulipas: ca. 5 mi N of Aldama, SR 3630.
<i>Bidens laevis</i> (L.) B.S.P.	12	MEXICO: Sonora: Imuris, RK 10141.
<i>Bidens pilosa</i> L.	36	MEXICO: Durango: 1 mi E of El Diablo, RK 10248.
<i>Bidens pilosa</i> L.	12	MEXICO: Durango: 1 mi NE of turnoff to Villa Caranza, RK 10390. Nuevo León: ca. 20 mi S of Monterrey, RK 10451.
* <i>Bidens reptans</i> (L.) G. Don var. <i>urbanii</i> (Greenm.) O. E. Schulz	MEXICO: Colima: 11.1 mi S of Colima, SR 3768.	
<i>Coreopsis tinctoria</i> Nutt.	12	
	13	UNITED STATES: Oklahoma: Sequoyah Co.: ca. ½ mi E jct rtes 40 & 10, RK 10057.
<i>Cosmos bipinnatus</i> Cav.	12	MEXICO: Durango: 1 mi NE of turnoff to Villa Caranza, RK 10389.
<i>Desmanthodium fruticosum</i> Greenm.	18	MEXICO: México: ca. 38 mi SE of Zitácuaro, SG 3129. ^o
<i>Dracopis amplexicaulis</i> (Vahl.) Cass.	16	UNITED STATES: Oklahoma: Sequoyah Co.: ca. ½ mi E of jct rtes 40 & 10, RK 10059.
<i>Eclipta alba</i> (L.) Hassk.	11	MEXICO: Nuevo León: ca. 20 mi S of Monterrey, RK 10448.
<i>Engelmannia pinnatifida</i> Nutt.	9	UNITED STATES: Texas: Medina Co.: 5.2 mi N of Castroville, <i>Stuessy & Fischer 2006</i> .
<i>Guardiola rosei</i> Robins.	12	MEXICO: Durango: Río Mimbres on rte 40, RK 10331.
<i>Guardiola thompsonii</i> Van Fassen	12 + 2f	MEXICO: Michoacán: 9.7 mi S of Uruapan, SR 3749.
<i>Melampodium americanum</i> L.	10	MEXICO: Veracruz: 4 mi S of Villa Cuauhtemoc, SR 3636; 8.5 mi N of Palma Sola, SR 3650.
<i>Melampodium cupulatum</i> A. Gray	10	MEXICO: Sonora: 16.3 mi SE of Navajoa, <i>Keil & Canne 8731</i> .
<i>Melampodium divaricatum</i> (Rich. in Pers.) DC.	12	MEXICO: Sinaloa: 6.9 mi E of Chilillos, SG 3052.
<i>Melampodium microcephalum</i> Less.	9	MEXICO: Sinaloa: 5.6 mi E of Chilillos, SG 3051.
<i>Melampodium nutans</i> Stuessy	11	MEXICO: Colima: 11.1 mi S of Colima, SR 3763.
<i>Melampodium pilosum</i> Stuessy	10	MEXICO: México: ca. 15 mi SE of Zitácuaro, SG 3119.
** <i>Melampodium repens</i> Sessé & Moc.	27	MEXICO: D. F.: La Cima, <i>Anderson 3515</i> (KSC). [†]
** <i>Melampodium tepicense</i> Robins.	12	MEXICO: Nayarit: 8.1 mi E of jct rte 15 & rd to Jalcoctan, SG 3062.
<i>Melanthera nivea</i> (L.) Small	15	MEXICO: Veracruz: 8 mi S of Cerro Azul, SR 3642; 25 mi S of Gutiérrez Zamora, SR 3649.
<i>Milleria quinqueflora</i> L.	15	MEXICO: Nayarit: ca. 0.2 mi N of Tepic, SG 3058B.
** <i>Montanoa pyramidata</i> Sch. Bip.	19	MEXICO: México: ca. 5 mi N of Ixtapan de la Sal, SR 3699.
<i>Parthenice mollis</i> (A. Gray) A. Gray	18	MEXICO: Sinaloa: 1.3 mi E of Cofradía, SG 3032. Sonora: 8.4 mi S jct rte 15 & rd to Querobabi, SG 3007.
<i>Parthenium hysterophorus</i> L.	17	MEXICO: Nuevo León: ca. 20 mi S of Monterrey, RK 10447. Sinaloa: 2 mi E jct rtes 15 & 40, RK 10163.
** <i>Perymenium bupththalmoides</i> DC. var. <i>tenellum</i> (A. Gray) McVaugh	30	MEXICO: Durango: 2 mi W of Cruz de Piedra, RK 10376.
* <i>Perymenium mendezii</i> DC. var. <i>mendezii</i>	30	MEXICO: Durango: 5 mi W of Durango, RK 10333.
<i>Ratibida columnifera</i> (Nutt.) Woot. & Standl.	14	UNITED STATES: Oklahoma: Pittsburg Co.: 2.5 mi N of Canadian River on rte 69, RK 10062.
<i>Rudbeckia laciniata</i> L.	19	UNITED STATES: Arizona: Graham Co.: Pinaleno Mts, Wet Canyon, RK 10085.
<i>Sanvitalia ocymoides</i> DC.	16	MEXICO: Nuevo León: 26 mi W of Linares, RK 10473.
<i>Simsia calva</i> (A. Gray & Engelm.) A. Gray	17	MEXICO: Nuevo León: 18 mi W of Linares. RK 10456.

TABLE 1. Continued

Taxon	Gametic chromosome number	Voucher
<i>Simsia eurylepis</i> S. F. Blake	17	MEXICO: Tamaulipas: 8.1 mi NE of Manuel, SR 3635.
<i>Simsia foetida</i> (Cav.) S. F. Blake	17	MEXICO: Jalisco: S limits of Atenquique, SG 3088.
<i>Spilanthes americana</i> (Mut.) Hieron.	26	MEXICO: Veracruz: ca. 38 mi S of Villa Cuauhtemoc, SR 3640.
<i>Tithonia tubaeformis</i> (Jacq.) Cass.	17	MEXICO: Puebla: ca. 5 mi S of Atlixco, SR 3681.
<i>Tridax procumbens</i> L.	18	MEXICO: Sinaloa: 32 mi E of jct rtes 15 & 40, RK 10184. Tamaulipas: 8.1 mi NE of Manuel, SR 3633.
<i>Trigonospermum melampodioides</i> DC.	15	MEXICO: Michoacán: 21.9 mi W of Ciudad Hidalgo, SR 3731.
* <i>Verbesina crocata</i> (Cav.) Less.	17	MEXICO: Puebla: 10.8 mi NNW of Tuzantlán, SR 3685.
<i>Verbesina encelioides</i> (Cav.) A. Gray	17	MEXICO: Sinaloa: Mazatlán, RK 10169.
<i>Verbesina helianthoides</i> Michx.	17	UNITED STATES: Kentucky: Caldwell Co.: 5 mi E of Princeton, RK 10022.
** <i>Verbesina tequilana</i> Coleman	17	MEXICO: Nayarit: 8.1 mi E of jct rte 15 & rd to Jalcocotán, SG 3063A. MEXICO: Durango: 3 mi E of Navios, RK 10363.
* <i>Viguiera cordifolia</i> A. Gray var. <i>latisquama</i> Greene	17	
<i>Viguiera dentata</i> (Cav.) Spreng.	17	MEXICO: Durango: 18 mi SW of jct rtes 30 & 45, RK 10401. Morelos: 6.5 mi E of Jiutepec, SR 3689.
<i>Viguiera ludens</i> (Shinners) M. C. Johnston	17	MEXICO: Coahuila: 9.4 mi S of Rancho Los Charcos, K 8163A.
<i>Viguiera stenoloba</i> S. F. Blake	17	MEXICO: Coahuila: 53 mi E of turnoff to San Pedro, RK 10419. Durango: 28 mi SW jct rtes 30 & 45, RK 10395. Tamaulipas: ca. 33 mi S of San Fernando, SR 3626.
** <i>Zaluzania discoidea</i> A. Gray	18	MEXICO: Chihuahua: 42.9 mi W of Chihuahua, K 8299A.
<i>Zinnia grandiflora</i> Nutt.	21	MEXICO: Durango: jct rtes 45 & 30, RK 10411.
HELENIEAE		
<i>Bahia absinthifolia</i> Benth. var. <i>dealbata</i> (A. Gray) A. Gray	24	UNITED STATES: Texas: Brewster Co.: 71.9 mi S of Alpine, Stuessy & Stuessy 2084A.
<i>Flaveria anomala</i> Robins.	18	MEXICO: Tamaulipas: 16.6 mi SE of jct rtes 101 & 180, SR 3628.
<i>Flaveria</i> cf. <i>floridana</i> J. R. Johnston	18	UNITED STATES: Texas: Kenedy Co.: 6.7 mi N of Norias, SR 3624.
** <i>Flaveria robusta</i> Rose	18	MEXICO: Colima: 10.2 mi S of Colima, SR 3759.
<i>Florestina liebmanni</i> Sch. Bip. ex Greenm.	10	MEXICO: Veracruz: 8.5 mi N of Palma Sola, SR 3652.
<i>Helenium amarum</i> (Raf.) Rock	15	UNITED STATES: Kentucky: Marshall Co.: 2 mi E of jct rtes 299 & 80, RK 10024.
** <i>Helenium apterum</i> (Blake) Bierner	17	MEXICO: Durango: 1 mi W of Las Adjuntas, RK 10306.
<i>Helenium elegans</i> DC. var. <i>amphibolum</i> (A. Gray) Bierner	13	MEXICO: Nuevo León: ca. 20 mi S of Monterrey, RK 10445.
<i>Helenium laciniatum</i> A. Gray	13	MEXICO: Sonora: ca. 9 km NW of Vicam, RK 10147.
<i>Helenium quadridentatum</i> Labill.	13	MEXICO: Michoacán: 13 mi W of jct rtes 37 & 120, SR 3740.
<i>Hymenopappus scabiosaeus</i> L'Her. var. <i>corymbosus</i> (T. & G.) B. L. Turner	17	UNITED STATES: Texas: Sutton Co.: ca. 3 mi E of Sonora, RK 10070.
<i>Hymenoxys odorata</i> DC.	12	UNITED STATES: Texas: Sutton Co.: ca. 3 mi E of Sonora, RK 10073.
<i>Palafoxia rosea</i> (Bush.) Cory var. <i>robusta</i> (Rydb.) Cory	11	MEXICO: Veracruz: 7.3 mi N of Palma Sola, SR 3653.
<i>Perityle crassifolia</i> Brandg. var. <i>robusta</i> (Rydb.) Everly	19	MEXICO: Baja California Sur: 4.8 mi NE of La Paz, SG 3045.
<i>Perityle microglossa</i> Benth. var. <i>microglossa</i>	34	MEXICO: Sonora: ca. 10 km N of Cd Obregon, RK 10150. Sinaloa: Mazatlán, RK 10156.
<i>Perityle turneri</i> Powell	17	MEXICO: Durango: 1 mi E of El Diablo, RK 10247.
* <i>Pseudoclappia arenaria</i> Rydb.	19	UNITED STATES: New Mexico: Sandoval Co.: ca. 3 mi N of San Ysidro, K 10879.

TABLE 1. Continued

Taxon	Gametic chromosome number	Voucher
<i>Psilostrophe gnaphalodes</i> DC.	16	MEXICO: Coahuila: 53 mi E of San Pedro, RK 10416.
TAGETEAE		
<i>Chrysactinia mexicana</i> A. Gray	15 II + 15 I ^a	MEXICO: Nuevo León: 31 mi W of Linares, RK 10476.
<i>Dyssodia acerosa</i> DC.	13	MEXICO: Durango: 18 mi SW jct rtes 30 & 45, RK 10400.
<i>Dyssodia pinnata</i> (Cav.) Robins. var. <i>pinnata</i>	13	MEXICO: Nuevo León: 26 mi W of Linares, RK 10471.
<i>Dyssodia porophylla</i> (Cav.) Cav. ssp. <i>cancellata</i> (Cass.) Strother var. <i>cancellata</i>	13	MEXICO: Tamaulipas: 8.1 mi NE of Manuel, SR 3632.
<i>Dyssodia setifolia</i> (Lag.) Robins.	ca. 26	MEXICO: Durango: 18 mi SW jct rtes 30 & 45, RK 10398.
<i>Dyssodia tagetiflora</i> Lag.	13	MEXICO: Veracruz: 4 mi S of Villa Cuauhtémoc, SR 3637.
*** <i>Hydropectis aquatica</i> (S. Wats.) Rydb.	9	MEXICO: Chihuahua: Cd Guerrero, McGill, Brown, & Pinkava 9780.
<i>Tagetes lucida</i> Cav.	11	MEXICO: Durango: 7 mi W of Las Adjuntas, RK 10296; 9 mi W of Durango, RK 10341.
<i>Tagetes tenuifolia</i> Cav.	12	MEXICO: Puebla: ca. 5 mi S of Atlixco, SR 3680.
ANTHEMIDEAE		
<i>Achillea lanulosa</i> Nutt.	36 I ^a	MEXICO: Durango: 10 mi W of El Salto, RK 10324.
<i>Anthemis arvensis</i> L.	9	UNITED STATES: Missouri: Mississippi Co.: 1.5 mi W of Mississippi River on rte 80, RK 10029.
SENECIONEAE		
<i>Odontotrichum sinuatum</i> (Cerv.) Rydb.	30	MEXICO: Durango: 11 mi W of Llano Grande, RK 10328.
*** <i>Pippenalia delphinifolia</i> (Rydb.) McVaugh	ca. 60 ^a	MEXICO: Durango: 6 mi E of La Ciudad, RK 10289.
** <i>Senecio arizonicus</i> Greene	20	UNITED STATES: Arizona: Coconino Co.: Oak Creek Canyon, K 10795.
<i>Senecio douglasii</i> DC. var. <i>longilobus</i> (Benth.) L. Benson	20	UNITED STATES: Arizona: Coconino Co.: 13 mi S of The Gap, K 10803. New Mexico: Sandoval Co.: Albuquerque, K 10724.
<i>Senecio fendleri</i> A. Gray	23	UNITED STATES: Colorado: Fremont Co.: Royal Gorge, K 10702.
** <i>Senecio flaccidus</i> Less.	20	MEXICO: Durango: 7 mi W of Las Adjuntas, RK 10299.
<i>Senecio glabellus</i> Poir.	23	UNITED STATES: Missouri: Mississippi Co.: 1.5 mi W of Mississippi River on rte 80, RK 10027.
<i>Senecio imparipinnatus</i> Klatt	23	UNITED STATES: Texas: Jefferson Co.: Port Arthur, Somers & Keil 10627.
<i>Senecio multilobatus</i> T. & G. ex A. Gray	23	UNITED STATES: Arizona: Coconino Co.: Oak Creek Canyon, K 10798, 10 mi E of Jacob Lake, K 10814. Utah: Grand Co.: Arches Natl Park, near Devil's Garden, K 10851.
<i>Senecio neomexicanus</i> A. Gray	23	UNITED STATES: Arizona: Graham Co.: Pinaleno Mts., K 10790; Coconino Co.: 10 mi S of Mormon Lake, K 10800.
<i>Senecio runcinatus</i> Less.	20	MEXICO: Veracruz: 0.8 mi NW of La Joya, SR 3674.
<i>Senecio</i> cf. <i>toluccanus</i> DC.	20	MEXICO: Durango: 10 mi SW of La Ciudad, RK 10273; 5 mi W of Las Adjuntas, RK 10304.
<i>Senecio tridenticulatus</i> Rydb.	23	UNITED STATES: Colorado: Fremont Co.: Royal Gorge, K 10703. Kit Carson Co.: Near Seibert, K 10697.
** <i>Senecio wootonii</i> Greene	20	UNITED STATES: Arizona: Cochise Co.: Chiricahua Mts, Rustler's Park, K 10760; Graham Co.: Pinaleno Mts, Heliograph Peak, K 10791.

^a Sporophytic chromosome number; ^b RK = Roberts & Keil; ^c SR = Stuessy & Roberts; ^d K = Keil; ^e SG = Stuessy & Gardner; ^f counted by L. C. Anderson (2n = 54).

* First report for variety; ** species; *** genus.

+ New reported number for taxon.

as $n = 18$ (Turner, Ellison, and King, 1961; Turner, Powell, and King, 1962). Our new count of $n = 17$ indicates possible aneuploidy in the species, and suggests continued study of other populations.

Viguiera cordifolia has been reported previously as $n = 17$ (Heiser and Smith, 1955) from the typical variety; our count of the same number is from var. *latisquama* as recognized by Blake (1913). *Viguiera ludens* (= *Helianthus ludens* Shinnery), $n = 17$, counted previously by Powell and Sikes (1970) and Yates (1971), has until now been collected only from the type vicinity in Culberson County, Texas. Our voucher was obtained ca. 500 km away in southwestern Coahuila. At the type locality, *V. ludens* grows as a weed in a cotton field. Our report supports the suggestion of Heiser (1969) that *V. ludens* probably is a Mexican species only recently introduced into Texas.

Helenieae—*Helenium apterum* ($n = 17$, first reported here) and *H. scorzoneraefolium* (DC.) A. Gray ($n = 17$; Bierner, 1972) are the only two species of sect. *Hecubaea*, regarded by Bierner (1972) as the most primitive section in the genus. Although three of the five sections in *Helenium* have aneuploid series, sect. *Hecubaea* is chromosomally uniform.

Our count of $n = 12$ for *Hymenoxys odorata* is of interest because of the recent reports of descending aneuploidy ($n = 15, 14, 12, 11$) in the species (Sanderson and Strother, 1973). The previous counts of $n = 12$ have come from populations near Del Rio in Val Verde County, Texas. Our count from adjacent Sutton County extends the known range of the cytotype in this general region.

Pseudoclaippia arenaria is known from previous counts as $n = 18 \pm 1$ (Powell and Turner, 1963) and $n = 18$ or 19 (Reveal and Spellenberg, 1976). Our count of $n = 19$ establishes this as a firm level for the genus.

Tageteae—Rydberg (1915–16) divided the Tageteae into two subtribes, the Pectidinae and the Tagetinae. The Pectidinae comprised *Pectis* and *Hydropectis*; the remaining genera of the tribe were placed into the Tagetinae. Our count of $n = 9$ for *Hydropectis aquatica* is the first report for the genus, and also is the first report of $n = 9$ for any member of the Tageteae. This chromosome number is closer to the base numbers of *Dyssodia* ($x = 7, 8, 13$), *Urbinella* ($x = 8$), and *Nicolletia* ($x = 10$) of the Tagetinae than to that of *Pectis* ($x = 12$). On the basis of morphological and physiological evidence both the senior author and Dr. J. L. Strother (personal communication) have concluded that *Hydropectis* would be better placed in the Tagetinae than in the Pectidinae.

Senecioneae—The monotypic genus, *Pippenalia* McVaugh, was established recently (McVaugh, 1972) to include *Odontotrichum delphinifolium* Rydb. This species was treated by Pippen (1968) in his revision of *Odontotrichum* as an excluded taxon of doubtful affinities but which (p. 435) "... should probably be referred to the Heleneae [sic]." McVaugh (1972) continued this discussion (p. 470) with the statement that: "The correct taxonomic position of the genus is still open to question. In habit the plants are very like those of what Pippen has called the 'cacalioid' members of the Senecioneae; the styles are at least not unlike the Senecioid type; the plump naked achenes suggest those of some members of the Heliantheae, but are unusual if not unique among the North American Senecioneae." Robinson and Brettell (1973) placed *Pippenalia* in the Senecioneae near *Psacalium* Cass. and *Psacaliopsis* H. Robins. & Brettell, but Nordenstam (in press) regards the genus as closest to *Senecio* of the same tribe. Chromosomally, species of *Odontotrichum* and *Psacalium* are known as $n = 30$, whereas *Senecio* has many reported numbers of which $n = 20, 30$, and 40 are common. Our first report for *Pippenalia* is $2n = \text{ca. } 60$, with a complex meiotic configuration of over 20 bivalents, many univalents, and possibly a few multivalents. Pollen stainability in our voucher is 75% as shown by a sample of 300 grains in acetocarmine. The meiotic irregularities and reduced pollen stainability suggest a possible hybrid origin of *Pippenalia*. This is an interesting possibility because, being monotypic, *Pippenalia* could have originated from an intergeneric cross. More populations of this species obviously need to be found and examined cytologically.

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