CHROMOSOME NUMBERS OF CRUCIFERAE III[1]

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The chromosomes of the Cruciferae in general are hard to work with being both small and often resistant to the usual cytological techniques. There are exceptions to this and the chromosomes of such genera as *Physaria* and *Lesquerella* are not only larger than those of most other cruciferous genera but they are relatively easy to handle. The monotypic genus *Asta* from Mexico, which we have examined cytologically for the first time, has chromosomes much like those of *Physaria* and thus joins a select small group of genera of the Cruciferae with relatively large chromosomes that are reasonably easy to handle.

The following chromosome counts are based on two types of material: fixations of buds in the field, in which case the count was obtained from pollen mother cells (PMC) or immature pollen grains, the count given as *n;* or plants grown from seeds of wild plants where either root-tips were used with the count reported as $2n$ or, if buds were used in determining the latter type of material, the report follows the pattern of bud fixations from wild sources. The herbaria in which voucher specimens are deposited are indicated by the usual designations for herbaria (Holmgren and Keuken, 1974).

Arabis

A. aculeolata Greene

$2n = 32$: plants from seeds of *K. L. Chambers 3188* with Duane Isely, Rough and Ready Botanical Wayside, 5 miles south of Cave Junction on Hwy. 199, Josephine Co., Oregon, OSC.

This is an important count as far as North American *Arabis* is concerned because it helps establish that the two base numbers $x = 7$ and $x = 8$ are both present in strictly North American species. By far the largest number of species that have been counted from North America are based on $x = 7$. However, *A. alpina, A. hirsuta,* and *A. lyrata* are based on $x = 8$ both in Europe or Asia and in North America if the full taxonomic extent of each species is taken into account. Another species, *A. arenicola* (Richardson) Gelert, has been counted from West Greenland, $n = 8$ and $2n = 16$, by Böcher (1966) and from Ungava, Quebec, Canada, $2n = 16$, by Hedberg (1967). This is an exclusively North American species.

The situation now seems clear, as it was not earlier (Rollins, 1966), that those species of North America most closely related to *Arabis* of Eurasia have the same basic chromosome number pattern, i.e., $x = 8$, whereas

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those species with a somewhat different circle of close affinity are based on $x = 7$. Löve and Löve (1975) have seized this situation as a basis for erecting the new genus *Boechera* to accommodate species with $x = 7$. They did not give any reasons of consequence for doing this and I cannot agree that a different basic chromosome number alone is sufficient evidence to warrant making the kind of separation they proposed. In studying *Arabis* as it occurs in western North America some years ago (Rollins, 1941a), I concluded that truly natural subdivisions of the genus were not present and I have not seen clear evidence since then that dictates a splitting up of *Arabis* or a formal taxonomic ordering of it on an infrageneric basis. In my view, their describing a new genus to accommodate perfectly ordinary species of *Arabis* has no merit and should not be followed.

A. *drummondii* Gray

$n = 7$, $2n = 14$: plants from *Twisselmann et al. 19172*, Tulare Co., California, GH. This count is consistent with others we have of the species (Rollins, 1966).

A. *fendleri* (Wats.) Greene var. *fendleri*

$2n = 21$: plants from seeds of *Beatley and Reveal 10788*, Nye Co., Nevada, GH. Three plants were analyzed in detail. Two of the three were consistently $2n = 21$. In a tapetal cell of the third plant, the number $2n = 22$ was found. Random counts in other plants convinced us that $2n = 21$ is the most frequent and regular number of the population sampled.

Previous counts of $n = 7$, $n = 14$, $n = 21$ and $2n = 14$ have been found in A. *fendleri* including var. *spatifolia* (Rollins 1941, 1966).

A. *petiolaris* (Gray) Gray

$n = 14$, $2n =$ ca. 28: plants from seeds of *Barclay 3102*, Llano Co., Texas, GH. Somatic cells with reasonably good figures of chromosomes could not be read with complete accuracy. The haploid count in PMC's of $n = 14$ establishes the count for *Arabis petiolaris* but it does nothing to help clarify further the relationship of this apparently anomalous species. Gray (1849) originally described it as *Streptanthus petiolaris* probably reflecting the resemblance of the fruits and seeds to such species of *Streptanthus* as S. *platycarpus* and S. *carinatus*. The chromosome number fits with *Streptanthus* but it is also consistent with most North American species of *Arabis* which have a base number of $x = 7$. Certainly the flowers are not streptanthoid and it would be difficult if not impossible sensibly to admit *Arabis petiolaris* into the genus *Streptanthus*.

We have not seen any previous chromosome counts of *Arabis petiolaris*.

A. *holboellii* Hornem. var. *retrofracta* (Grah.) Rydb.

$n = 7$: plants from seeds of *Walter Knight et al. 2437*, Plumas Co., Calif., GH. Figures in a few cells seem to show $n = 8$ which could easily be the

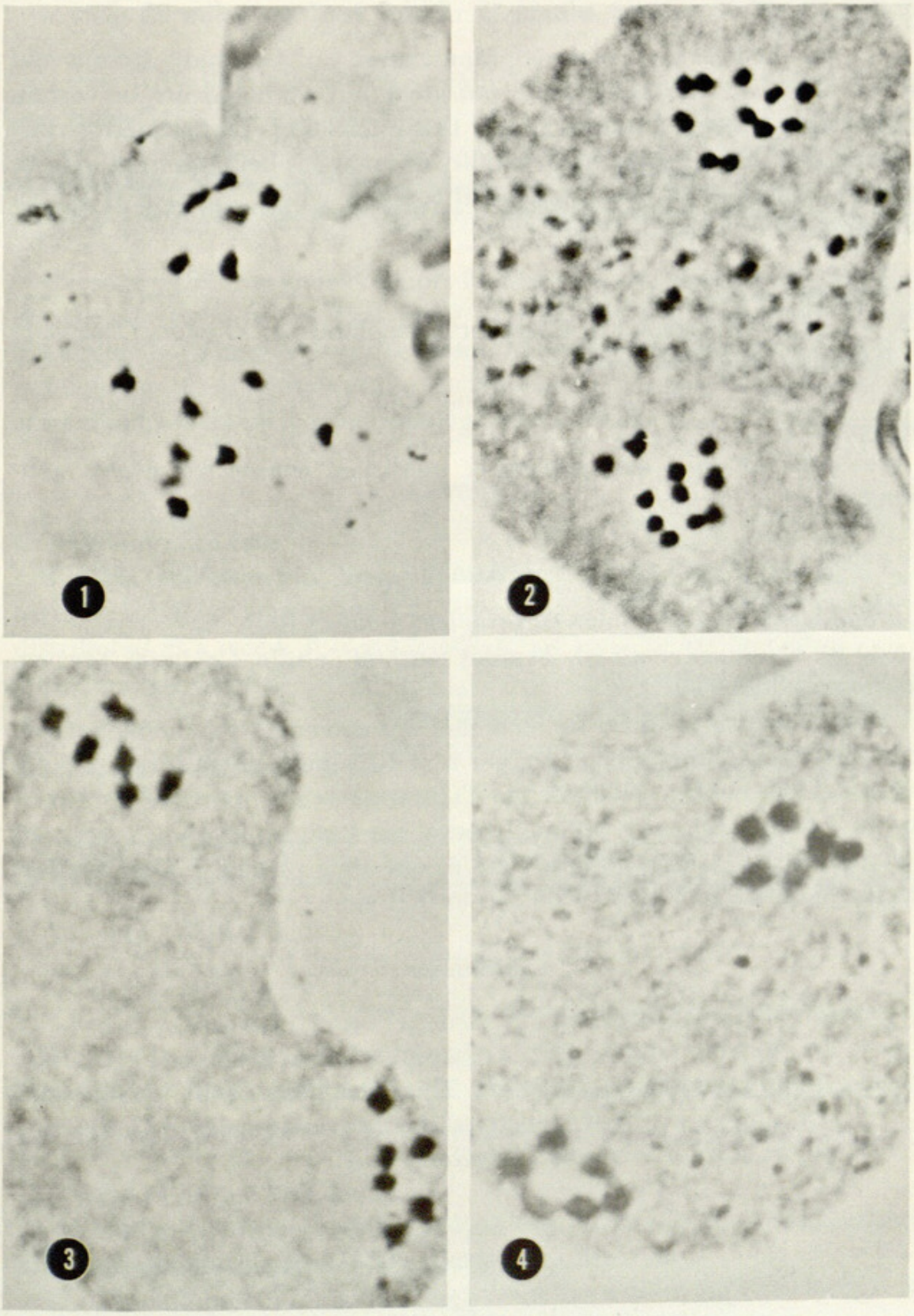

PLATE 1. FIG. 1, *Arabis petiolaris*, $n = 14$, Barclay 3102. FIG. 2, *Leavenworthia alabamica* var. *alabamica*, $n = 11$, Rollins 7163. FIG. 3, *Lesquerella fendleri*, $n = 6$, Rollins 7151. FIG. 4, *Lesquerella schaffneri*, $n = 6$, Rollins and Roby 74123.

case if the plants were members of an apomictic population. Apomixis is known to occur in *A. holboellii* var. *retrofracta.*

A. selbyi Rydb.

$2n$ = ca. 21: field fixed material, Montezuma Co., Colorado, *Rollins and Stafleu 7135,* GH. The fixation was not ideal and we could not be certain of the count. However, it does appear that a triploid is represented by this material and this suggests the possibility of apomixis being present. *Arabis selbyi* is a member of the *A. holboellii* complex where apomixis is known to occur.

A. subpinnatifida Wats.

n = 7: count by Kenton L. Chambers, Josephine Co., Oregon, *Chambers 2479* with George York, OSU.

n = 7: plants from seeds of *Ground and Muth 1788,* Josephine Co., Oregon, GH.

We have not seen any previously published counts for *Arabis subpinnatifida.*

Asta

A. schaffneri (Wats.) Schulz var. *pringlei* (Schulz) Roll.

n = 10: field fixed material, 29 miles south of Saltillo, Coahuila, Mexico, *Rollins and Roby 7491,* GH.

As far as we know, this is the first chromosome count for the monotypic genus *Asta.* The chromosome number n = 10 is sufficiently different from n = 8, which seems to characterize *Cibotarium,* to support the continuation of *A. schaffneri* as a unique genus (see Rollins, 1941b). Species of *Cibotarium* and *Asta schaffneri* were at one time placed in *Capsella* but they have only a remote relationship to that genus.

Cardamine

C. curvisiliqua Shuttl. ex Chapman

n = 16: plants transplanted to the greenhouse from Lake County, Florida, *Rollins and Roby 7311,* GH. This tetraploid count is consistent with a base number x = 8, which characterizes most species of *Cardamine* (see Mulligan, 1965, for counts and references).

C. hirsuta L.

$2n$ = 16: plants from seeds of *Rüdenberg 7305,* Madison Co., Alabama, GH. Agrees with previous counts.

Caulanthus

C. divaricatus Roll.

n = 11: plants from seeds of *Al-Shehbaz 6906,* Emory Co., Utah, GH.

Cibotarium

C. macropetalum Roll.

$n = 8$: 29 miles south of Saltillo, Coahuila, Mexico, *Rollins and Roby 7489*, GH.

$n = 8$: 9.6 miles west of Concepcion del Oro, Zacatecas, Mexico, *Rollins and Roby 74137*, GH.

C. stellatum (Wats.) Schulz

$n = 8$: 29 miles south of Saltillo, Coahuila, Mexico, *Rollins and Roby 7490*, GH.

These are the first known counts for the genus *Cibotarium*. By happenstance, the two species that grow together are the first to be studied cytologically. There was no evident hybridization between *C. macropetalum* and *C. stellatum* at the Coahuila site. It is assumed these species are genetically as well as morphologically distinct.

Coronopus

C. didymus (L.) Sm.

$n = 16$: Galveston Co., Texas, *Rüdenberg s.n.*, GH. This is in accord with several previous counts on Old World plants. The species is widely distributed as a weed. It is not native to the western hemisphere.

Descurainia

D. californica (Gray) Schulz

$n = 7$, $2n = 14$: plants from seeds of *J. Beatley et al. 11484*, Nye Co., Nevada, GH. As far as we can determine, this is the first count for *D. californica*.

D. pinnata (Walt.) Britt.

$n = 7$: Sarasota Co., Florida, *Rüdenberg 7301*, GH.

D. pinnata subsp. *halictorum* (Cockerell) Detling

$n = 7$: plants from seeds of *Beatley and Reveal 11247*, Nye Co., Nevada, GH.

$n = 7$: Quay Co., New Mexico, *Rollins and Stafleu 7155*, GH.

D. virletii (Fourn.) Schulz

$n = 14$: plants from seeds of *Rollins and Tryon 58210*, San Luis Potosí, Mexico, GH. First count for this species.

The chromosome number in *Descurainia* shows polyploidy but so far, no aneuploidy.

Dithyrea

D. wislizenii Engelm.

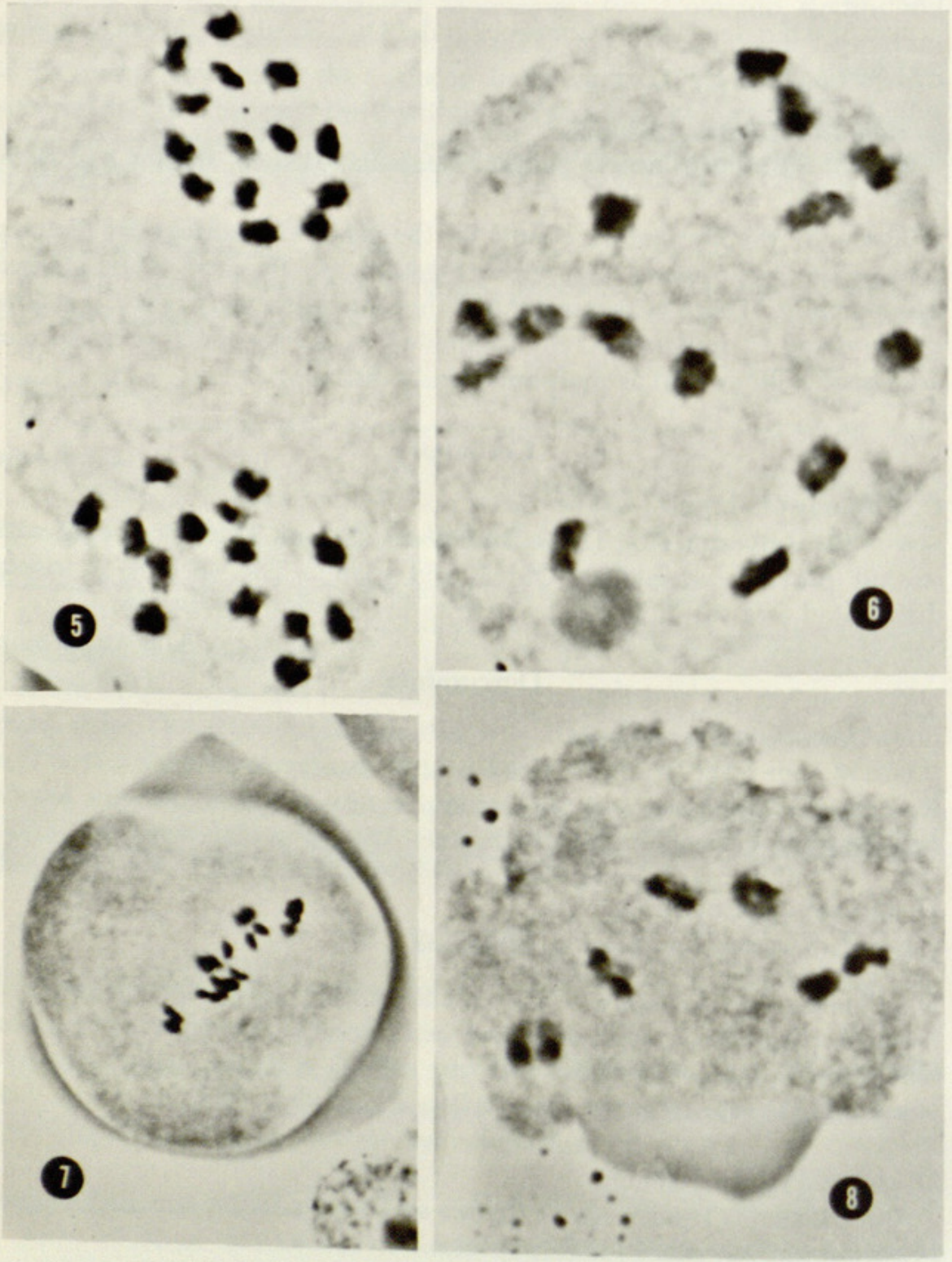

PLATE 2. FIG. 5, *Stanleya pinnata* var. *pinnata*, $n = 14$, Rollins and Stafleu 7129. FIG. 6, *Streptanthella longirostris*, $n = 14$, Rollins and Stafleu 7149. FIG. 7, *Halimolobos parryi*, $n = 16$, Rollins and Tryon 58204. FIG. 8, *Hutchinsia procumbens*, $n = 6$, Beatley 12903.

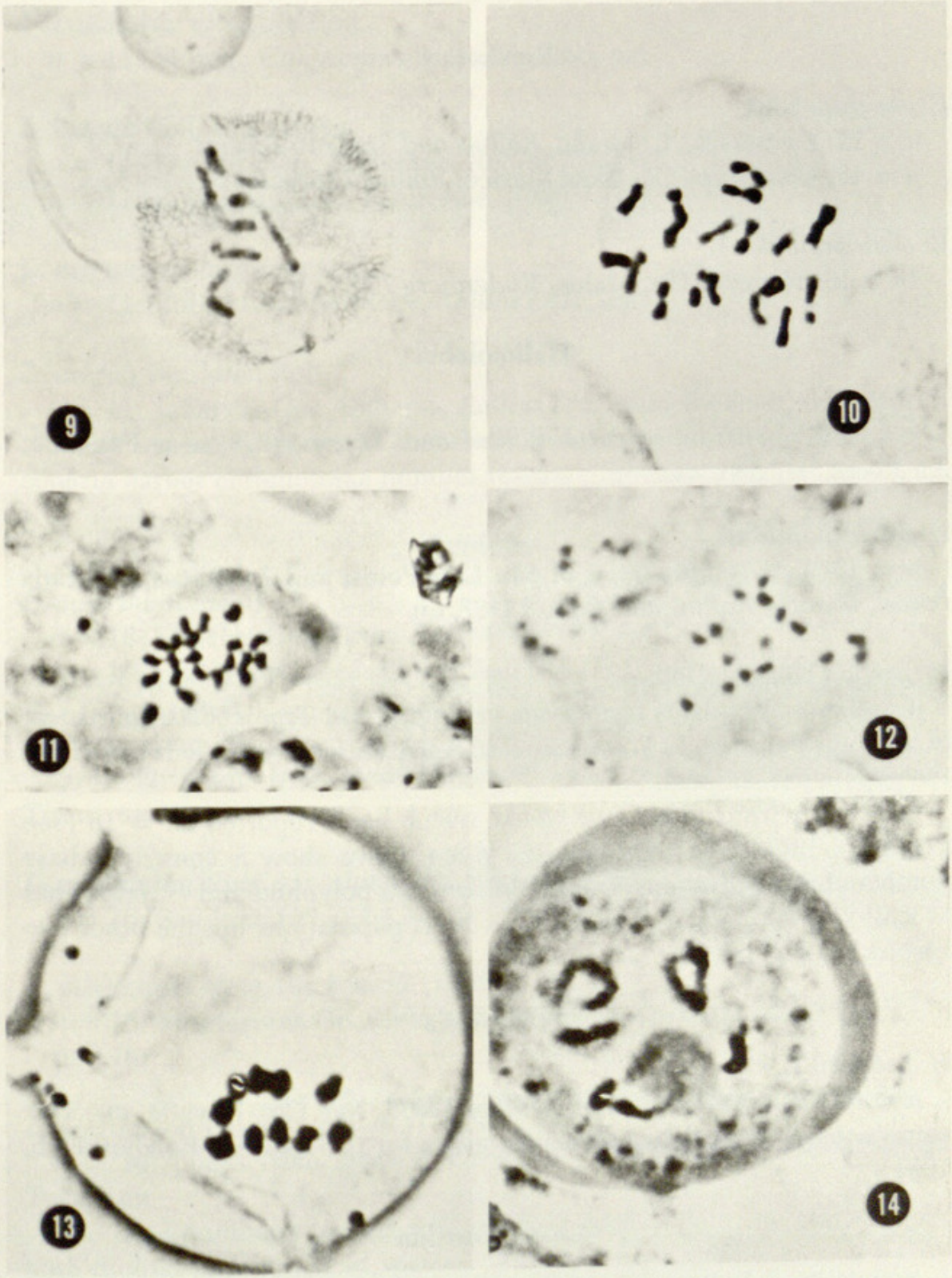

PLATE 3. FIG. 9, *Physaria acutifolia*, $n = 5$, Rollins and Stafleu 7130. FIG. 10, *Lesquerella grandiflora*, $2n = 18$, Barclay 3086. FIG. 11, *Arabis fendleri*, $2n = 21$, Beatley and Reveal 10788. FIG. 12, *Lepidium virginicum* var. *medium*, $n = 16$, Correll and Correll 38577. FIG. 13, *Synthlipsis greggii*, $n = 10$, Rollins and Tryon 58311. FIG. 14, *Lesquerella kingii* subsp. *latifolia*, $n = 5$, Beatley et al. 13056.

$n = 9$: Bernalillo Co., New Mexico, *Rollins and Stafleu 7127*, GH. Previous counts for this species are the same (Rollins, 1966; Rollins and Rüdenberg, 1971).

Erysimum

E. asperum Nutt.

$n = 18$: Pueblo Co., Colorado, *Rollins and Stafleu 7122*, GH.

$n = 18$: Guadalupe Co., New Mexico, *Rollins 7152*, GH.

E. cheiranthoides L.

$2n = 16$: Hancock Co., Maine, *Rüdenberg 7307*, GH.

Halimolobos

H. lasioloba (Link) Schulz

$n = 8$: plants from seeds of *Rollins and Tryon 58255*, near Fresnillo, Zacatecas, Mexico, GH.

H. minutiflora Roll.

$n = 16$: between the cities of San Luis Potosí and Zacatecas, San Luis Potosí, Mexico, *Rollins and Roby 74127*, GH.

H. parryi (Hemsl.) Roll.

$n = 8$, $n = 16$: plants from seeds of *Rollins and Tryon 58204*, northeast of San Luis Potosí, S. L. P., Mexico, GH. Apparently polyploidy is present in the population sampled.

Together with *Halimolobos mollis*, which has a reported $2n = 16$ (see Mulligan, 1964), the three species given above show a consistent base number of $x = 8$. *Halimolobos minutiflora* is a polyploid and *H. parryi* has at least some polyploid plants present in its populations but the other two species are diploid.

Hutchinsia

H. procumbens (L.) Desv.

$n = 6$: plants from seeds of *Beatley 12903*, Nye Co., Nevada, GH. This count accords with those previously given for the species (Bolkhovskikh, 1969).

Leavenworthia

L. alabamica Roll. var. *alabamica*

$n = 11$: Lawrence Co., Alabama, *Rollins 7163*, GH.

L. alabamica var. *brachystyla* Roll.

$n = 11$: Morgan Co., Alabama, *Rollins 7202*, GH.

$n = 11$: " " " *Rollins 7219*, GH.

L. crassa Roll. var. *crassa*
$n = 11$: Morgan Co., Alabama, *Rollins 7206*, GH.

L. crassa var. *elongata* Roll.
$n = 11$: Morgan Co., Alabama, *Rollins 7208*, GH.

L. exigua Roll. var. *exigua*
$n = 11$: Decatur Co., Tennessee, *Rollins 7222*, GH.
$n = 11$: Rutherford Co., Tennessee, *Rollins 7168*, GH.

L. exigua var. *laciniata* Roll.
$n = 11$: Bullitt Co., Kentucky, *Rollins 7231*, GH.

L. exigua var. *lutea* Roll.
$n = 11$: Jefferson Co., Alabama, *Rollins 7201*, GH.

There are no surprises in the above counts on *Leavenworthia*. These confirm earlier chromosome number reports (Rollins, 1963).

Lepidium

L. austrinum Small
$n = 16$: Hidalgo Co., Texas, *Rüdenberg 7502*, GH.
$n = 16$: plants from seeds of *Barclay 3076*, Webb Co., Texas, GH.

L. lasiocarpum Nutt. var. *wrightii* (Gray) Hitchc.
$2n = 32$: plants from seeds of *Correll and Correll 38576*, El Paso Co., Texas, GH.

L. montanum Nutt. var. *alyssoides* (Gray) Jones
$n = 16$: San Juan Co., New Mexico, *Rollins and Stafleu 7128*, GH.

L. montanum Nutt. var. *jonesii* (Rydb.) Hitchc.
$n = 16$: Montezuma Co., Colorado, *Rollins and Stafleu 7142*, GH.
$n = 16$: " " " *Rollins and Stafleu 7143*, GH.

L. virginicum L. var. *medium* (Greene) Hitchc.
$n = 16$: plants from seeds of *Correll and Correll 38577*, El Paso Co., Texas, GH.

The base number $x = 8$ is well established in *Lepidium* and there are both diploid and polyploid species (Manton, 1932; Mulligan, 1961). The counts given above are all of tetraploid plants.

Lesquerella

L. argyraea (Gray) Wats. subsp. *argyraea*
$2n = 30$: Zapata Co., Texas, *Barclay 3072*, GH.

L. argyraea subsp. *diffusa* (Roll.) Roll. and Shaw

$n = 7$: one mile southwest of Pinos, Zacatecas, Mexico, *Rollins and Roby 74106*, GH.

$n = 8$, $2n = 16$: 36 miles west of San Luis Potosí, S.L.P., Mexico, *Rollins and Roby 74125*, GH.

L. fendleri (Gray) Wats.

$n = 6$: Guadalupe Co., New Mexico, *Rollins 7151*, GH.

$n = 6$, $2n = 12$: 51 miles north of Monclova, Coahuila, Mexico, *Rollins and Roby 74207*, GH.

$n = 6$: 23 miles west of Saltillo, Coahuila, Mexico, *Rollins and Roby 7483*, GH.

$n = 6$: Val Verde Co., Texas, *Rollins and Roby 74205*, GH.

L. grandiflora (Hook.) Wats.

$2n = 18$: Atasco Co., Texas, *Barclay 3086*, GH.

L. kingii Wats. subsp. *latifolia* (Nels.) Roll. and Shaw

$n = 5$, $2n = 10$: plants from seeds of *Beatley, Ackerman and Bamberg 13056*, Clark Co., Nevada, GH.

L. lasiocarpa (Hook. ex Gray) Wats. subsp. *lasiocarpa*

$2n = 14$: Hidalgo Co., Texas, *Rüdenberg 7504*, GH.

L. schaffneri Wats.

$n = 6$: 10 miles west of San Lorenzo, San Luis Potosí, Mexico, *Rollins and Roby 74123*, GH.

Lesquerella argyraea continues to be something of an enigma as far as chromosome numbers are concerned. A given population appears to be relatively uniform as to number but different populations frequently show different numbers. Even subspecies *diffusa* now proves to have aneuploidy present whereas earlier the aneuploid series was known only in subspecies *argyraea*. The species as a whole is quite variable morphologically and there are recognizable trends usually correlated with geographic areas. However, in a careful study of a hundred or more herbarium collections, we could not discern distinct taxa that could reasonably be considered separate species (Rollins and Shaw, 1973). The gradual grading from one form to another was too consistent for us to do other than retain the species as a polymorphic one consisting of two subspecies. The cytological picture is unusual for a species and the problem should be studied, probably in an intensified way with an experimental design that would reveal whether apomixis is present or not.

The counts for the other species of *Lesquerella* are the same as those made previously except that the count for *L. schaffneri* is the first for that species. With the three counts given for *L. fendleri* the general

distribution of $n = 6$ is strengthened. The only aneuploid population ($n = 7$) so far discovered is the one from New Mexico reported by Rollins and Shaw (1973).

Mancoa

M. henricksonii Roll.

$2n = 16$: plants from seeds of *James Henrickson 13471*, collected 15 miles northeast of Estacion Comacho, Zacatecas, Mexico, GH.

This is the first chromosome count for any species of *Mancoa*. The young seedlings used for the purpose were produced from seeds of the type number and the species was only recently described (Rollins, 1976).

Nerisyrenia

In the course of our present chromosome survey of Cruciferae, we have sampled twenty-two populations of *Nerisyrenia* from New Mexico, Texas, and mostly Mexico. In these materials we have found chromosome numbers of $n = 9$, $n = 10$, $n = 18$, and $n = 20$. At this point, the identities of the collections have not been fully worked out. We await the publication of his thesis research on *Nerisyrenia* by John D. Bacon (1975) who has developed a substantially more complex classification than the one in current use.

Pennellia

P. longifolia (Benth.) Roll.

$2n = 16$: plants from seeds of *Robert Bye*, Sept. 20, 1972, northwest of San Ignacio, about 5 miles east of Creel, Chihuahua, Mexico, GH.

$n = 8$, $2n = 16$: 26 miles east of El Salto, Durango, Mexico, *Rollins and Roby 7423*, GH.

Material of *Pennellia* has not been available previously for the purpose of obtaining chromosome counts. The species of this genus have until recently usually been treated in *Thelypodium*. However, the chromosome number of $n = 13$ most frequently found in *Thelypodium* (Al-Shehbaz, 1973) is sharply different from that of *P. longifolia*. Thus, the cytological picture supports a status of independence from *Thelypodium* of at least one species now placed in *Pennellia*.

Physaria

P. acutifolia Rydb.

$n = 5$: San Juan Co., New Mexico, *Rollins and Stafleu 7130*, GH.

$2n = 10$: Montezuma Co., Colorado, *Rollins and Stafleu 7137*, GH.

These counts agree with those of Mulligan (1967) and apply to his revised interpretation of the species. Earlier counts of $n = 4$ and $2n = 8$ (Rollins 1939, 1966) refer to populations now interpreted to be *Physaria rollinsii* Mulligan. The cytological situation in *P. acutifolia* is complex

according to Mulligan's presentation and it appears that interspecific hybridization with *P. chambersii* may be one source of instability. The presence of several different chromosome races, $2n = 8$, $2n = 10$, $2n = 16$, and $2n = 24$, suggests the presence of an agamic complex. Such a possibility should be looked for when appropriate materials and circumstances permit it.

Rorippa

R. sylvestris (L.) Bess.

$2n = 48$: weed in experimental garden, Middlesex Co., Mass., *Rüdenberg 7229*, GH.

Selenia

S. aurea Nutt.

$n = 23$, $n = 69$: greenhouse grown plants from *Barclay 3087*, Muskogee Co., Oklahoma, GH. Three plants were $n = 23$; one was $n = 69$.

$n = 23$?: Montgomery Co., Arkansas, *Rollins 7120*, GH.

Bivalent chromosome associations were most frequent in the observed configurations but there were always some univalents, trivalents and quadrivalents present. That *Selenia aurea* is a natural polyploid seems quite certain from this evidence. The fact that one of the four plants examined turned out to have a very high ploidy level demonstrates this tendency in the species. *Selenia grandis* with $n = 12$ and *S. dissecta* with $n = 7$ are the other species of *Selenia* with known chromosome counts. Although, by comparison, it seems clear that *S. aurea* is a polyploid species, the $n = 23$ count is from only three populations in Arkansas and Oklahoma and does not represent an adequate sampling of the species throughout its natural range.

Sibara

S. virginica (L.) Roll.

$n = 8$: Madison Co., Alabama, *Rüdenberg 7010*, GH.

A previous count of $2n = 16$ from a population in Tennessee is consistent with the present one. *Sibara virginica* is mainly southeastern United States in its distribution and jumps the arid southwest to southern California where it occurs around vernal pools. A chromosome count from the extreme western populations would be of unusual interest.

Sisymbrium

S. altissimum L.

$n = 7$: Montezuma Co., Colorado, *Rollins and Stafleu 7144*, GH.

S. irio L.

$n = 7$: Hidalgo Co., Texas, *Rüdenberg 7503*, GH.

S. officinale L.

$n = 7$: Madison Co., Alabama, *Rüdenberg 7226*, GH.

These three species of introduced weeds have been counted many times, especially in Europe. The count of $n = 7$ is remarkably consistent.

Stanleya

S. pinnata (Pursh) Britt. var. *pinnata*

$n = 14$: San Juan Co., New Mexico, *Rollins and Stafleu 7129*, GH.

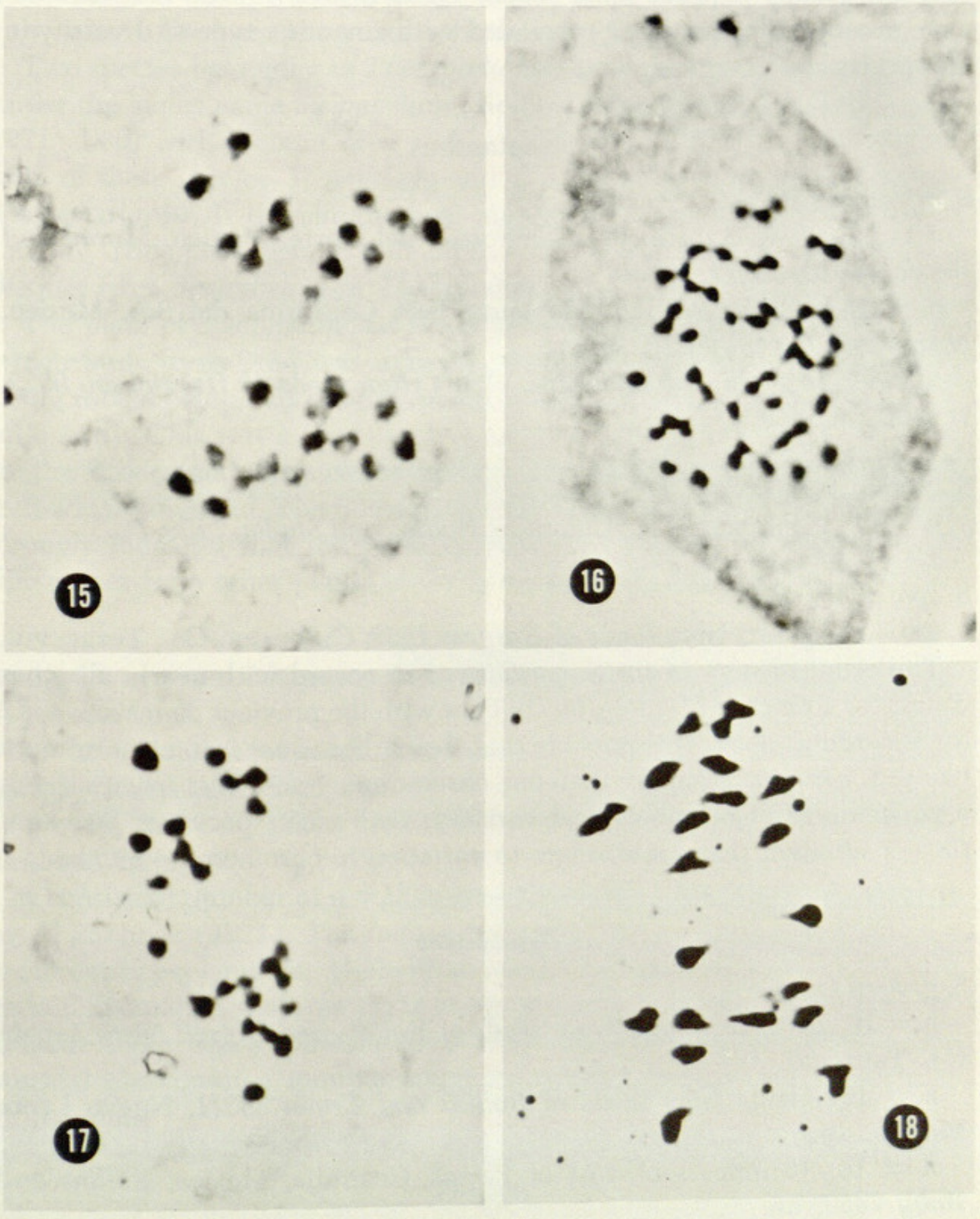

PLATE 4. FIG. 15, *Streptanthus arizonicus*, $n = 14$, Moran and Reveal 20210. FIG. 16, *Selenia aurea*, $2n = 46$, Barclay 3087. FIG. 17, *Selenia aurea*, $n = 23$, Barclay 3087. FIG. 18, *Synthlipsis greggii*, $2n = 20$, Rollins and Correll 5948.

Streptanthella

S. longirostris (Wats.) Rydb.

$n = 7$: Montezuma Co., Colorado, *Rollins and Stafleu 7145*, GH.

$n = 14$: " " " *Rollins and Stafleu 7149*, GH.

Previous counts on this species were at the tetraploid level. With the above information, it is now clear that both diploid and tetraploid populations exist in the wild. The species is widespread and abundant in the arid regions of southwestern United States. It is found in very diverse sites but usually requires some shade. There is no evidence that chromosome number differences are correlated with any other type of diversity in the species.

Streptanthus

S. arizonicus Wats.

$n = 14$: Cerro Azufre, Baja California del Norte, Mexico, *Moran and Reveal 20155, 20171*, SD, GH.

$n = 14$: Volcán las Tres Vírgenes, Baja California del Sur, Mexico, *Moran and Reveal 20210*, SD, GH.

$n = 14$, $2n = 28$: same locality, plants from seeds of *Henrickson 9022*, voucher at CSLA.

S. cordatus Nutt.

$n = 14$: Montezuma Co., Colorado, *Rollins and Stafleu 7138*, GH.

S. sparsiflorus Roll.

$2n = 28$: plants from seeds of *Burgess 1852*, Culberson Co., Texas, TTC.

The count of $n = 14$ for *S. cordatus* is in accord with nearly all other counts for species of *Streptanthus* but not with the previous count of $n = 12$ for *S. cordatus* itself. It is possible that the earlier count is in error or more likely, *S. cordatus* has more than one chromosome race. This species shows a wider range of morphological variation than most species of *Streptanthus*, a situation that could relate to variation in chromosome number.

Synthlipsis

S. greggii Gray

$n = 10$, $2n = 20$: plants from seeds of *Rollins and Correll 5948*, Zapata Co., Texas, GH.

$n = 10$: plants from seeds of *Rollins and Tryon 58311*, Nuevo Leon, Mexico, GH.

$n = 10$: 10 miles southeast of Parras, Coahuila, Mexico, *Rollins and Roby 7459*, GH.

$n = 10$: 8 miles east of Nieves on road to Estacion Comacho, Zacatecas, Mexico, *Rollins and Roby 74133*, GH.

The chromosome number of *Synthlipsis greggii* is now well established and appears to be unvarying throughout its range.

Thelypodiopsis

T. aurea (Eastw.) Rydb.

$n = 11$: Montezuma Co., Colorado, *Rollins and Stafleu 7148*, GH.

$n = 11$: San Juan Co., New Mexico, *Rollins and Stafleu 7133*, GH.

T. linearifolia (Gray) Al-Shehbaz

$n = 20+$: Cochise Co., Arizona, *Rollins and Roby 74196*, GH.

Two species belonging to *Thelypodiopsis* have previously been reported under the genus name *Sisymbrium* (Rollins, 1966; Rollins and Rüdenberg, 1971) both with a count of $n = 11$. Al-Shehbaz (1973) has transferred both of these species, *T. ambigua* and *T. linearifolia*, from *Sisymbrium* to *Thelypodiopsis*. If the chromosome number $n = 11$ stands up as characterizing *Thelypodiopsis*, it will bolster the recognition of this genus as distinct from *Sisymbrium* or *Thelypodium*.

The plant of *Thelypodiopsis linearifolia (Rollins and Roby 74196)* from which buds were fixed was unusual in having very large flowers and in being robust compared to other plants of the species found about one-half mile away. This was a lone plant, somewhat later in flowering compared to the others and because of greater overall size, appeared to be an individual polyploid. The uncertain count given, although not precise, still strongly indicates that the plant indeed is a polyploid. Other than size, differences from other plants of the species could not be detected.

Thelypodium

T. paysonii Roll.

$n = 10$: plants from seeds of *Johnston et al. 10349C*, Sierra de los Margaritas, Coahuila, Mexico, TEX.

$n = 10$, $2n = 20$: plants from seeds of *Johnston et al. 10361A*, locality as above, TEX.

A consistent number of $n = 13$ in nine taxa of *Thelypodium* was reported by Al-Shehbaz (1971). The failure of *T. paysonii* to continue this pattern is not easily explainable. Al-Shehbaz suggested that *T. paysonii* possessed certain anomalous features as far as the genus is concerned but he did not indicate there was a solid basis for removing it from *Thelypodium*. The unusual chromosome number suggests a closer look at the affinities of *T. paysonii*.

Thlaspi

T. montanum L. var. *montanum*

$n = 7$: Pueblo Co., Colorado, *Rollins and Stafleu 7125*, GH.

Previous counts of *Thlaspi fendleri* and *T. glaucum* are now to be referred to one or another variety of *T. montanum* according to the publication of P. Holmgren (1971).

Warea

W. carteri Small

$n = 12$, $2n = 24$: plants from seeds of *Rollins and Roby 7305*, GH.

To our knowledge, this is the first count for the genus *Warea*. It is interesting that the number falls nicely into line with other genera of the *Thelypodieae* as interpreted by Al-Shehbaz (*loc. cit.*).

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