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THE CHROMOSOMES OF *BLOOMERIA* AND *MUILLA*
(LILIACEAE) AND RANGE EXTENSIONS FOR
MUILLA CORONATA AND *M. TRANSMONTANA*

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In his monograph of *Muilla*, Ingram (1953) recognized three species, *M. maritima* (Torr.) S. Wats., *M. coronata* Greene, and *M. transmontana* Greene. To this list Hoover (1955) added *M. clevelandii* (S. Wats.) Hoover, originally described by Watson and assigned by him to the genus *Bloomeria*. Except for *M. maritima* which is widely distributed in western central and southern California, the others are either rare or seldom collected. In his monograph, Ingram reported examining only three specimens of *M. coronata*. Following the favorable winter of 1972-73, when more than the normal amount of precipitation was received on the desert, both *M. coronata* and *M. transmontana* were collected in areas considerably removed from known earlier collections.

Muilla coronata was discovered in the eastern Mojave Desert of San Bernardino Co., one mile north on the road to Hard Cash Mine in Caruthers Canyon, 13 air miles east of Cima at an elevation of about 5,700 ft in pinyon-juniper woodland where it was growing on granite (Thorne 43338).

Muilla transmontana was found in San Bernardino Co. near Kelso in a sandy area just north of the Union Pacific building growing at an elevation of about 2,200 ft (Thorne 43136). The nearest known locality for this species is in Mono Co., on Twin Lakes road about 11.5 miles west of Bridgeport (Cantelow s.n. CAS). This is about 150 air miles north and west of the Kelso site.

In 1966, I reported a chromosome number of $2n = 20$ for a collection of *Muilla maritima* made in Los Angeles Co. Later counts from other collections showed that the chromosome number for this species varies between $2n = 14$ and $2n = 20$. Cave (1974) reported $2n = 14$ for two collections of *M. maritima*, one from Sonoma Co. and one from San Mateo Co. and she concluded that $2n = 14$ was the basic number for the species and suggested that my $2n = 20$ might have been a derivative from a triploid with $3x = 21$. Evidence presented here is that that is not the case.

Since 1966 I have had the opportunity to make chromosome determinations of the remaining species in the genus and additional material of *M. maritima* has made it possible to reexamine the chromosome situation

CHROMOSOME NUMBERS IN *MUILLA*

Name	Locality	Somatic number	Reported by
<i>M. clevelandii</i>	San Diego Co., S.D. State College Campus (<i>Harvey s.n.</i> RSA 12694).	14 (+0-2B)	
<i>M. coronata</i>	Inyo Co., 1.5 mi N. of Independence (<i>Munz s.n.</i> RSA 12677).	14	
<i>M. coronata</i>	San Bernardino Co., 13 mi E of Cima (<i>Thorne 43338</i>).	14	
<i>M. coronata</i>	Los Angeles Co., Ave. J & 170 St., outside Joshua Tree State Park (<i>Wilson s.n.</i>).	14	
<i>M. maritima</i>	San Mateo Co., north of Crystal Springs Res. (<i>Keator UCBG 67.1243</i>).	14	Cave 1974
<i>M. maritima</i>	Sonoma Co., Bayles Hot Springs (<i>Roderick UCBG 63.1296</i>).	14	Cave 1974
<i>M. maritima</i>	Riverside Co., Santa Rosa Plateau (<i>Thorne 37426</i>).	14	
<i>M. maritima</i>	Los Angeles Co., Chapman Ranch, San Antonio Canyon (<i>Thorne 37215</i>).	14	
<i>M. maritima</i>	Los Angeles Co., Tweedy Lake rd (<i>Lenz 24720</i>).	16	
<i>M. maritima</i>	Riverside Co., Hemet Valley (<i>Ziegler s.n.</i> RSA 13049).	16	
<i>M. maritima</i>	Los Angeles Co., Tweedy Lake rd W end of Portal Ridge (<i>Thompson s.n.</i>).	20	Lenz 1966
<i>M. maritima</i>	Los Angeles Co., Mt. Emma rd W of Little Rock Cr. (<i>Thorne 43565</i>).	20	
<i>M. transmontana</i>	San Bernardino Co., north of Kelso (<i>Thorne 43126</i>).	20	
<i>M. transmontana</i>	Nevada: Washoe Co., Peavine Mt. (<i>Williams s.n.</i> RSA 13059).	20	

in that species. Unless otherwise indicated the chromosome numbers reported here are those of the author and the localities are all in California unless otherwise noted.

All forms of *M. maritima* have five medium to long submetacentric chro-

CHROMOSOME NUMBERS IN *BLOOMERIA*

Name	Locality	Somatic number
<i>B. crocea</i> var. <i>crocea</i>	Los Angeles Co., Santa Monica Mts. (<i>Everett & Balls 10298</i>).	18
<i>B. crocea</i> var. <i>crocea</i>	Los Angeles Co., Catalina Is. (<i>Thorne 34467</i>).	18
<i>B. crocea</i> var. <i>crocea</i>	Orange Co., RSABG (RSA 9282).	18
<i>B. crocea</i> var. <i>montana</i>	Los Angeles Co., Tweedy Lake rd (<i>Lenz 12754</i>).	18
<i>B. crocea</i> var. <i>montana</i>	Kern Co., Oak Cr. Canyon (<i>Twisselmann 13541</i>).	18

Fig. 1.—a. *Muilla maritima*, $2n = 14$ (Thorne 37426).—b. *M. maritima*, $2n = 16$ (Lenz 24720).—c. *M. maritima*, $2n = 20$ (Thorne 43565).—d. *M. clevelandii*, $2n = 14$ (RSA 12694).—e. *M. coronata*, $2n = 14$ (Thorne 43338).—f. *M. transmontana*, $2n = 20$ (Thorne 43126).—g. *Bloomeria crocea* var. *crocea*, $2n = 18$ (RSA 9282).—h. *B. crocea* var. *montana*, $2n = 18$ (Lenz 12754). (15 mm = 10 μ m)

mosomes. The $n = 7$ cytotype has in addition, two short submetacentrics; the $n = 8$ cytotype has the two short submetacentrics and one short nearly metacentric chromosome; the 10-chromosome cytotype has four short submetacentrics and the one short nearly metacentric chromosome. The karyotype of *M. transmontana* is very similar to that of the 10-chromosome cytotype of *M. maritima*.

Muilla coronata has six medium to long submetacentrics and one short metacentric. *Muilla clevelandii* has five rather long submetacentrics and two rather short ones which are longer than the short ones in the other species of *Muilla*. Basically, the karyotype is similar to the other members of the genus and seems to support the conclusion that *M. clevelandii* is better placed in *Muilla* rather than in *Bloomeria*.

In his monograph of *Bloomeria*, Ingram (1953) recognized two species: *B. crocea*, with three varieties, and *B. clevelandii*. The latter species has since been transferred to *Muilla* by Hoover (1955) who in the same year described *B. humilis* as a localized endemic in San Luis Obispo Co. The species is known only from the type collection. Of the three varieties of *B. crocea* I have been able to study two.

The karyotype of *B. crocea* var. *crocea* and *B. c.* var. *montana* are similar. There are three long metacentric chromosomes, one of which has a longer short arm than the other two, there are two short metacentrics and four medium to short submetacentrics.

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