

POLYPLOIDY IN *MONTANOA* CERV. (COMPOSITAE, HELIANTHEAE)V. A. Funk¹ and P. H. Raven²

Summary

Polyploidy is reported for the first time for *Montanoa* Cerv., in which $x = 19$; we here report species at the $6x$, $8x$, and $12x$ levels. The $12x$ count ($n = 110-120$) was originally reported, owing to a printing error, as *Melanthera aspera* (Jacq.) Rendl., and is significant as it is the highest reported number in Compositae.

Montanoa Cerv. (Compositae, Heliantheae) is a widespread New World genus of white-rayed shrubs and trees found as far north as Sonora, Mexico and as far south as Peru. The genus includes approximately 25 species, ranging in habit from small shrubs in semi-xeric areas to large trees in cloud forests. It is easily separated from others in the Heliantheae by the receptacular bracts which enlarge and expand during the fruiting stages to enclose the achene completely.

Chromosome numbers of six species of *Montanoa* have been reported previously (Turner and Johnson, 1961; Turner and Flyr, 1966; Powell and Cuatrecasas, 1970; Solbrig et al., 1972; Urbatsch, 1974), all as $n = 19$. The dodecaploid count of *Montanoa*, $n = 110-120$, was reported by Solbrig et al. (1972) but due to a mistake in proof it was not listed under the proper species. The count was listed for *Melanthera aspera* (Jacq.) Rendl. when it should have appeared two lines lower under *Montanoa*. This count is the highest known in Compositae and as such it is important that the record be corrected. It has been cited (Solbrig, 1979) as the highest number in the family and most workers have been at a loss to explain such a number in a genus previously containing only counts of $n = 15$. Only bivalents were observed, and it is very likely that the actual chromosome number was $n = 114$ ($12x$). This specimen was collected (P.H.R.) as a cultivated plant from Los Angeles, CA. Another specimen of the same entity, *Griffiths & Ayres 5612* (NA), indicates that the plant was obtained by Evans & Reeves Nursery, Los Angeles, prior to 1969. These specimens have been matched with a number of collections from Costa Rica and Central America where it is a large tree growing on mountain slopes. The identifications on these collections are incorrect but the distinguishing characteristics of long, stiff, tapering receptacular bracts during fruiting and rhombic leaves with long petioles are found on the type specimen of *M. guatemalensis* Robins. & Greenm.

Polyploidy is also reported for two other species in *Montanoa*. One of these, *Montanoa revealii* H. Robinson (Table 1), is a hexaploid with 57 bivalents (Fig. 1). This species is also a large tree, up to 20 meters, with a DBH of 45 cm. It is found in the cloud forests of Guerrero, Mexico, in which it is a principal constituent of the forests at around 2500-3000 meters. This species is distinguished by the heads, which have 15-25 yellow disc florets and 3-5, long, thin, white ray florets. The disc florets and the fruiting receptacular bracts are directed outward and give the head a "star-like" appearance.

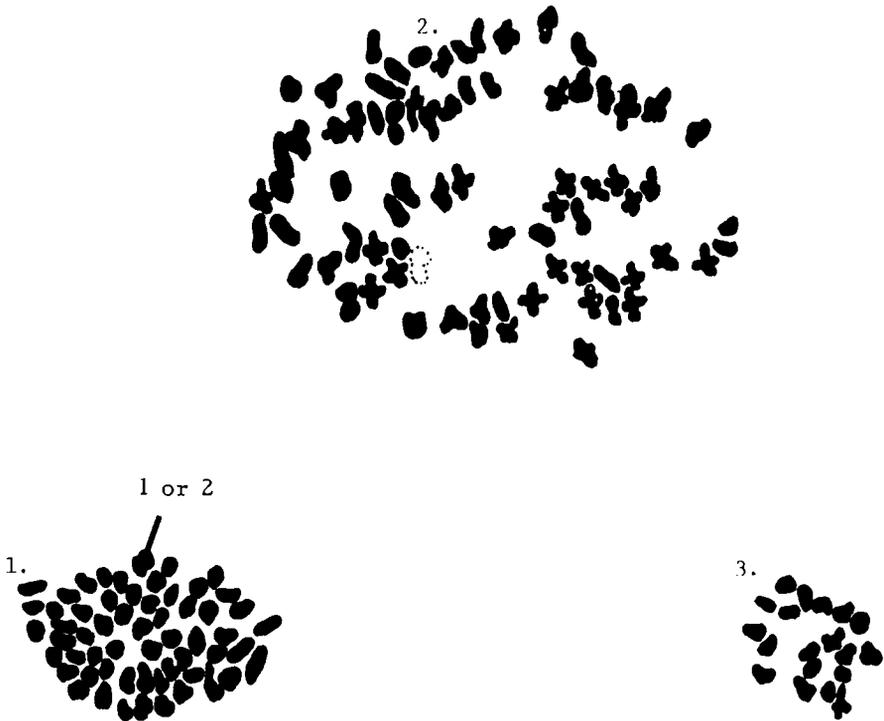
The remaining species that includes polyploid populations, *Montanoa guatemalensis* Robins. & Greenm. from Guatemala (Table 1), comprises both octoploid ($n = 76$; Fig. 2) and diploid ($n = 19$; Fig. 3) populations. It is variable in size. At

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Table 1. Chromosome counts for *Montanoa* Cerv.

Taxon	Haploid Chromosome Number ($n =$)	Locality and Voucher
<i>M. hexagona</i>	76±2	Quiché, Guatemala, <i>Funk</i> 2909
	75-80	Quetzaltenango, Guatemala, <i>Funk</i> 2920
	74±2	Quetzaltenango, Guatemala, <i>Stuessy</i> 4339
	19	Sacatepéquez, Guatemala, <i>Stuessy</i> 4359
<i>M. revealii</i>	57±1	Guerrero, México, <i>Funk</i> 2826
	56±1	Guerrero, México, <i>Funk</i> 2830
<i>M. guatemalensis</i>	110-120	Los Angeles Co., CA (cultivated), <i>Raven</i> 13843



Figs. 1-3. Camera lucida drawings of meiotic chromosomes, all figures are approximately $\times 2250$. 1. *Montanoa revealii* ($n = 56 \pm 1$), *Funk* 2830, indicated chromosome may be one or two bivalents. 2. *M. hexagona* ($n = 76 \pm 1$), *Funk* 2909, dashed chromosome was uncertain. 3. *M. hexagona* ($n = 19$), *Stuessy* 4359.

high altitudes (2500-3000 meters) it is a large tree up to 25 meters tall, but at lower altitudes (1500-1700 meters) it is a small tree no more than five meters tall. Populations sampled at higher elevations have been octoploid ($n = 76$), those at low elevations diploid ($n = 19$). This species is distinguished by its large (15-20 mm) glabrate, blunt-tipped, fruiting receptacular bracts which are deciduous with the achenes and by its large, relatively unlobed leaves. No consistent differences other than habit

have been observed between the high- and low-elevation populations.

All of the polyploids have two features in common: they are large trees up to 20 meters tall and grow at high altitudes. They are, however, not closely related and represent different subgenera of *Montanoa*.

No multivalents were observed in any of the polyploids. Whether they should be regarded as auto- or allo-polyploids is uncertain; meiosis in hybrids between diploid entities in the genus has not been studied. All three polyploids in *Montanoa* have apparently normal meiosis and form viable achenes.

Acknowledgements

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