

POLLEN MORPHOLOGY OF DALEA SECTION THEODORA (LEGUMINOSAE—PSORALEAE)¹

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ABSTRACT. The pollen morphology of *Dalea* section *Theodora* in the southwestern United States and Mexico has been studied. Four of the five species in section *Theodora* have a unique pollen type commonly referred to as "dogbone" with *Dalea mollis* possessing the typical prolate pollen type of the genus. A radial development of the pollen shape is evident from the prolate pollen type in the center of the geographic range of the section *Theodora* to the "dogbone" pollen type radiating outward to the north, east, and southeast. The pollen grains of *D. mollissima* represent the intermediate form between the prolate and the "dogbone" type.

After a preliminary study of the species of *Dalea* within the United States possessing an unusual pollen shape commonly referred to as "dogbone" pollen grains (Mahler, 1970), Barneby (pers. comm.) suggested that the pollen grains of section *Theodora* be examined. The section *Theodora*, as circumscribed by Barneby (pers. comm.), includes the following taxa: *Dalea mollis*, *D. mollissima*, *D. neomexicana* var. *neomexicana*, var. *longipila*, var. *megaladenia*, *D. simulatrix*, and *D. verna*.

MATERIALS AND METHODS. Pollen samples were taken from herbarium specimens and permanent acetolyzed pollen slides were prepared using the acetolysis method (Erdtman, 1960). Anthers were acetolyzed and the screening process was eliminated as the length of the "dogbone" grains, some over 140 μm long, did not pass through the 50 μm mesh screen except when oriented perpendicular to the screen. The pollen grains were mounted in glycerin on glass slides and sealed with paraffin. Herbarium specimens and the acetolyzed pollen slides are on deposit at their respective herbaria with duplicate slides at SMU (Table 1). The author is indebted to Rupert C. Barneby for access to his studies, additional materials, and suggestions regarding the manuscript. Gratitude is also extended to Blanche W. Meeson for the preparation of the pollen and photographs (MSM-2 Mini-SEM) and to Linda W. Laury for preparation of the plates.

RESULTS. The pollen grains of section *Theodora* are tricolpate, prolate to cylindrical (intermediate) to cylindrical with enlarged polar regions (dog-

¹ Descriptions of *Dalea* sect. *Theodora*, *D. verna*, *D. simulatrix*, *D. neomexicana* var. *megaladenia*, and the technical combination of *D. neomexicana* var. *longipila* will be published in a revision of genus *Dalea* by R. C. Barneby, currently in manuscript (Mem. N.Y. Bot. Gard. vol. 27).

TABLE 1. Pollen and collection data of *Dalea* section *Theodora*.

<i>Taxon</i>	<i>Collector & No. or Date</i>	<i>Average Pollen Length Per Collection</i>
<i>Dalea mollis</i>	*Nelson 11135a (M)	47.6
	*Orcutt 1889 (MO)	49.1
	*Orcutt 1890 (MO)	51.0
	*Parker, et al 7796 (MO)	52.3
	*Gould, et al 4131 (MO)	53.1
	Pinkava, et al 103382 (SMU)	53.3
	*Wiegand, et al 3593 (MO)	54.1
	Mahler 6046 (SMU)	55.1
	Mahler 6074 (SMU)	56.4
	Mahler 5501b (SMU)	58.1
	*Wiegand, et al 3590 (MO)	58.9
	*Palmer 67 (10020) (MO)	59.3
	Mahler 6045 (SMU)	59.5
	Parker 7976 (SMU)	59.9
	Mahler 6030 (SMU)	66.3
	Clark 11194 (SMU)	67.1
<i>Dalea mollissima</i>	Brenckle 51136 (SMU)	85.2
	*Maguire, et al 4856 (MO)	89.8
	*Isely, et al 7228 (ISC)	91.5
	*Heller 15962 (MO)	103.2
	*Hitchcock 12362 (MO)	104.0
	*Rose 38341 (MO)	106.3
	*Kennedy, et al 1906 (MO)	107.7
	*Goodding 2237 (MO)	109.7
	*Munz 12605 (MO)	112.5
	Spahr 26489 (SMU)	116.1
	*Jones 1897 (MO)	118.5
	Clover 8243 (SMU)	136.4
<i>Dalea neomexicana</i> var. <i>neomexicana</i>	Mahler 6095 (SMU)	97.8
	Beasley, Finzel 865 (NY)	113.5
	Warnock, Hinckley BG 208 (SMU)	116.9
	*Isely 8386 (ISC)	120.1
	Correll 13734 (SMU)	123.6
	Grimes 317b (SMU)	123.6
	*Moore, Steyermark 3270 (MO)	125.7
	Grimes 317a (SMU)	129.4
	*Jones 26156 (MO)	130.0
	Thieret 30981 (SMU)	142.9
	Mahler 5681 (SMU)	142.8
	Ripley, Barneby 14207 (NY)	141.8
<i>Dalea verna</i>	Mahler 5746 (SMU)	125.4

* Previously reported by Mahler (1970).

bone-shaped) and 47-142 μm in polar length (Fig. 1). The average pollen grain length per species is plotted in Figure 1, using horizontal bars. The average pollen grain polar length is relative as the number of collections per taxon differs because of the availability of suitable flowering material: *Dalea mollis*—56 μm ; *D. mollissima*—106 μm ; *D. neomexicana* var. *neomexicana*—122 μm , var. *longipila*—143 μm , var. *megaladenia*—142 μm ; *D. verna*—125 μm (Table 1). *Dalea simulatrix* possesses long “dogbone” pollen grains that are easily observed with a dissecting microscope but measure-

ments of acetolyzed pollen are unavailable (Fig. 2).

The locations of the collections used in this study are plotted in Figure 1 with *Dalea mollis* possessing the prolate and shortest grains. This taxon is correctly delimited in the preliminary study (Mahler, 1970). However, *Dalea mollissima* extends northward into southern Nevada according to Barneby (pers. comm.) with *D. neomexicana* var. *neomexicana* extending westward only as far as Cochise County, Arizona.

DISCUSSION. The tricolpate pollen grains of section *Theodora* are prolate (*Dalea mollis*), cylindrical (*D. mollissima* in part), or cylindrical with enlarged polar regions (dogbone-shaped: *D. mollissima*, *D. neomexicana*, *D. simulatrix*, and *D. verna*). The pollen of *Dalea mollissima* ranges in pollen length from an average per sample of 85 to 136 μm and is thus, intermediate in both shape and length between *D. mollis* and the other taxa of section *Theodora*. The development of the pollen shape appears to be radial from the prolate pollen type (assumed to be the primitive type) in the center

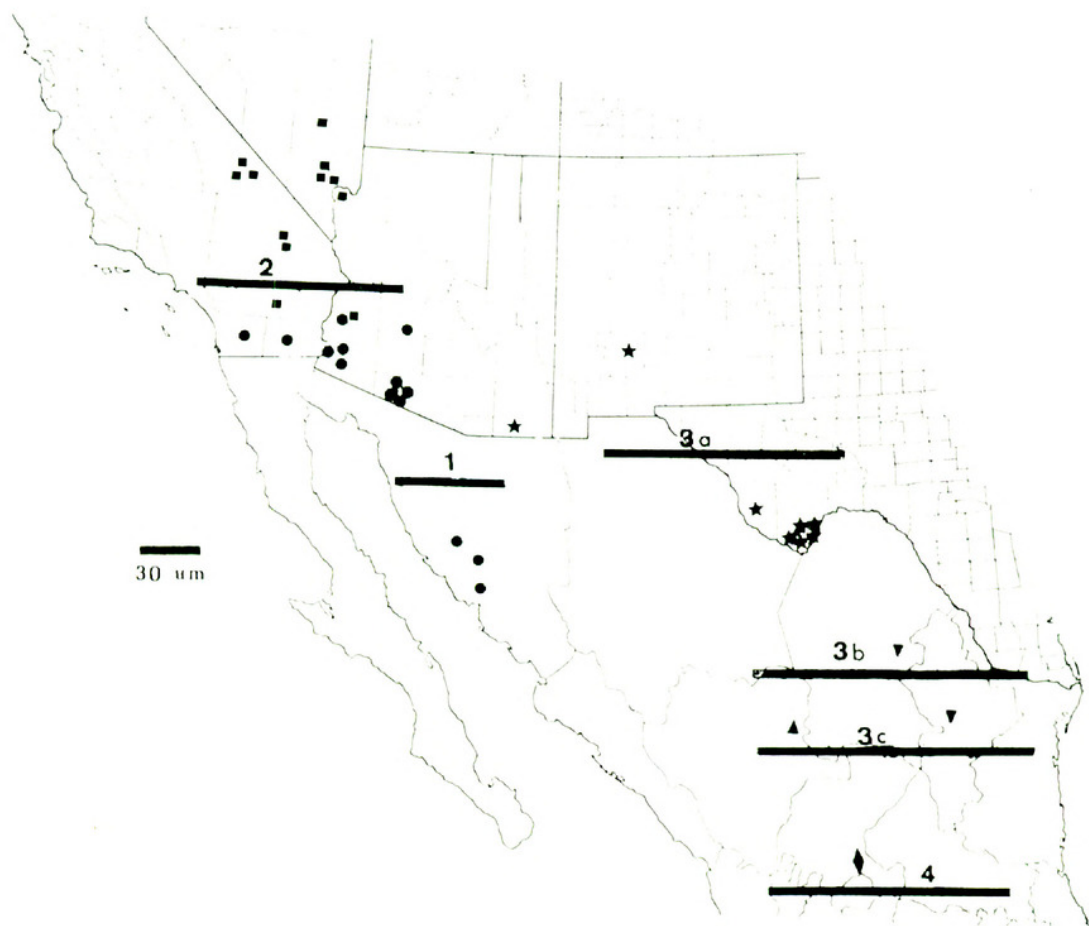


Figure 1. Distribution of collections of *Dalea* section *Theodora*. The average pollen polar length per species or variety is indicated by the horizontal bars (μm). 1. *Dalea mollis* (circles); 2. *D. mollissima* (squares); 3a. *D. neomexicana* var. *neomexicana* (stars), 3b. var. *longipila* (triangle points down), 3c. var. *megaladenia* (triangle points up); 4. *D. verna* (diamonds).

of the geographic range with the other taxa possessing the "dogbone" type at the periphery of the range of section *Theodora*.

In summary, *Dalea* section *Theodora* may be considered as the "dogbone" pollen grain group that includes *D. mollis* with the typical prolate pollen type characteristic of the genus.

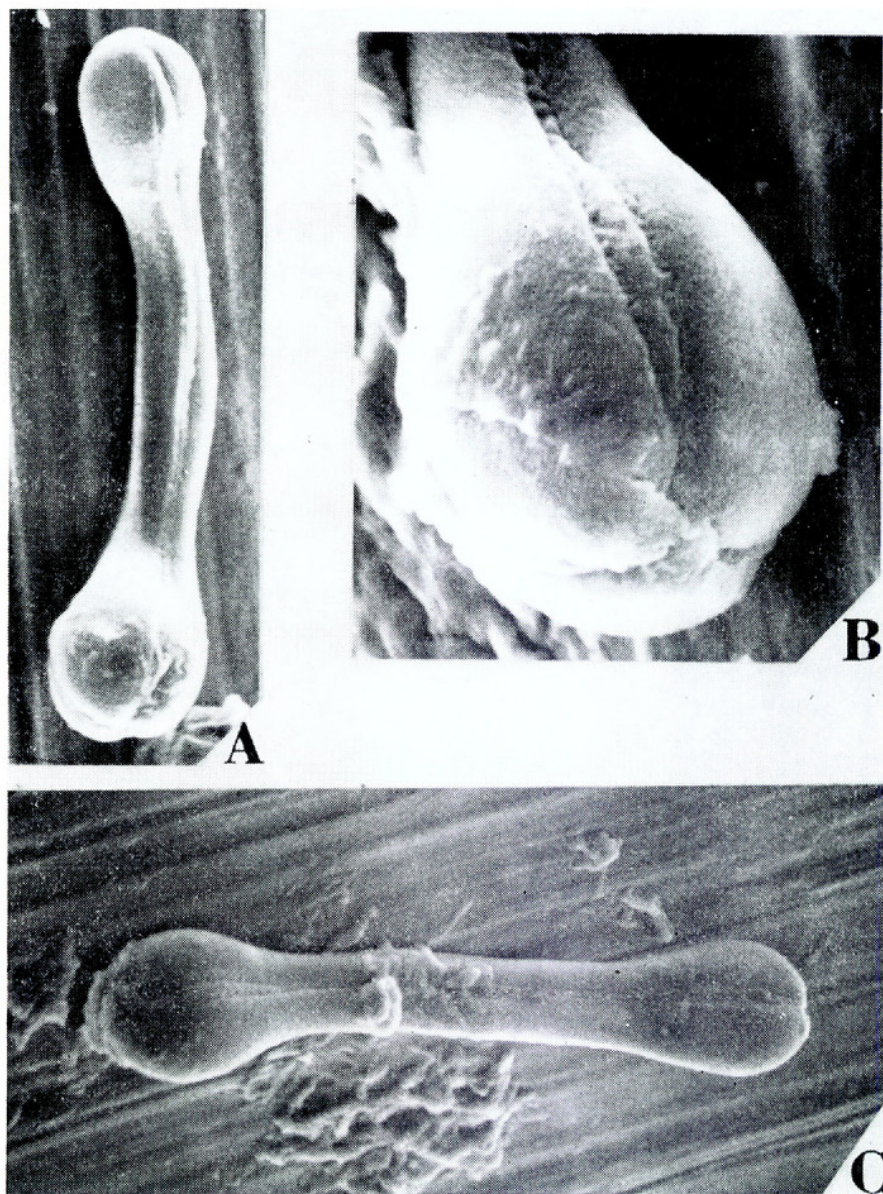


Figure 2. Pollen grains of *Dalea simulatrix*. A. 700X, note shape and furrow; B. 2000x, note tricolpate condition and smooth surface; C. 700X.

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