

While the original protective function of the cupule has been lost, it has acquired a new secondary function in giving structural stability and strength to the modern maize cob. The checkered arrangement of wide lignified cupules is a mechanically strong design which in effect increases the thickness of the rind.

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8. Cytological map of *Tripsacum dactyloides* ($2n = 36$).

Since the "Bussey clone" of *T. dactyloides* ($2n = 36$) of Manhattan, Kansas is the source of most of the extracted chromosomes from tripsacum which we are comparing cytogenetically to their homeologs in the maize genome, the preparation of an idiogram for its chromosome complement is basic to our approach in analyzing the evolution of the American Maydeae. Furthermore, the genome of this collection of tripsacum is part of a permanent bridge over which we will continue to extract the desired chromosomes of tripsacum for many years in the future. Its complement is maintained in a perennial amphidiploid hybrid with Mangelsdorf's multiple tester, the origin and use of which have been previously described (Galinat: MNL 34, 1960).

The spread of chromosomes at pachytene is extremely poor; there is considerable fusion of many of the terminal knobs and extensive non-homologous association of the centromeres. Occasionally, however, some of the chromosomes lie free of the rest, either individually or in groups of about 4 or 5 chromosomes, in each of the nuclei. Correlatable data obtained from 238 observations selected from over 500, on individual chromosomes 1 to 18, are presented in the following table.

Morphology of the Pachytene Chromosomes
of Tripsacum dactyloides (2n=36)

Chromosome No.	No. of Observations	Length in microns			Arm ratio	Remarks
		Short arm	Long arm	Total		
1	3	17.3	29.5	48.6	1.7	TKL, TKS
2	6	6.1	36.4	45.0	6.0	TKL
3	7	9.4	29.5	40.3	3.1	TKL
4	8	10.8	22.3	35.3	2.1	TKL
5	14	5.4	25.2	32.4	4.6	TKL
6	12	3.6	21.6	27.0	6.0	TKL
7	8	6.1	19.8	27.0	3.2	-
8	20	9.0	16.2	27.0	1.8	-
9	10	9.0	15.1	25.9	1.7	TKL
10	15	5.4	18.7	25.2	3.7	TKL
11	20	5.8	15.8	23.4	2.7	TKL
12	15	3.6	16.9	22.3	4.7	TKL
13	13	4.3	15.1	21.6	3.5	TKL
14	15	3.6	15.5	20.9	4.3	TKL
15	20	6.1	13.0	20.9	2.1	TKL
16	7	6.1	12.2	19.8	2.0	N.O Internal in LA - TKS
17	30	5.8	10.8	18.0	1.9	-
18	15	3.6	10.8	16.2	3.0	-

TKL - Terminal knob in long arm.

TKS - Terminal knob in short arm.

N.O. - Nucleolus organizing body.

Arm ratio - Length of long arm/short arm.

Total length includes centromere region.

The presence of the numerous knobs on the chromosomes of this collection of T. dactyloides, which made the spreading of its chromosomes so poor and the preparation of its idiogram so extremely difficult, now

renders a highly advantageous function in helping to cytologically identify the tripsacum chromosomes after they have been transferred to the genome of maize.

As a result of the preparation of this cytological map of T. dactyloides, a few of the cytogenetically analyzed chromosomes extracted from tripsacum have now been assigned to their respective positions within the complement of tripsacum, as described in another item of this MNL (item 16).

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9. Morphology of the homeolog for corn chromosome II derived from *Tripsacum dactyloides* (2n = 36).*

One of the *Tripsacum* chromosomes, as previously reported by us as well as Maguire (1956, 1961), is homeologous to the short arm of corn chromosome II and so far as is known covers the recessives ws, lg₁, gl₂, sk and fl₁. Its pachytene morphology, ascertained from addition disomic stocks in which the extra pair shows uniform and regular homologous pairing, is described in this report. Its probable identity within the complement of T. dactyloides is also suggested.

The total length of the chromosome is about 23 microns; the two arms measure about 8 and 13 microns to give an arm ratio of 1.7 and the long arm is terminated by a knob, by means of all of which this chromosome can be easily distinguished from those of corn in the pachytene nuclei.

These figures are at variance with the data of Maguire who reported a total length of about 35 microns and an arm ratio of over 3.0 for the homeolog identified in her material. While Maguire's data are based upon a univalent that had undergone an interchange (reciprocal) in an earlier generation, and therefore was possibly altered, the chromosome described now in its disomic condition is believed to be the unaltered form. Tantravahi (1968) reports normal pairing in the hybrid T. dactyloides x

*In this and following articles, the maize chromosomes are identified by Roman numerals and *Tripsacum* chromosomes by arabic numerals.