7. Possible premeiotic gene exchanges between corn and Tripsacum homeologs.

A higher rate of gene transfer than would be suspected on the basis of chromosome associations at meiosis has been occasionally observed in some addition disomics. Our studies on the synaptic behavior of the Tripsacum homeologs for corn chromosomes 7 and 9 indicate that at least part of this crossing over occurs at some stage prior to pachytene.

In 33 out of 46 PMC's in which the extra pair could be identified, the Tripsacum bivalents show normal, regular and complete pairing at pachytene. In the exceptional PMC's these two chromosomes are of unequal lengths and the extra segment of the longer partner shows nonhomologous pairing within itself and appears as a buckle. The buckle, showing the pairing configuration characteristic for duplication/deficiency chromosomes, is always internal but variable in its extent and position from cell to cell. In two cases a corn bivalent showing a similar buckle is recorded within the genome. In two other nuclei the two heteromorphic bivalents of corn and Tripsacum were seen to be paired for short segments at the region of the buckle.

Apparently these two bivalents represent the reciprocal interchange products. Since both the normal and the abnormal (heteromorphic) bivalents occur in different cells of the same plant (sometimes within the same anther) it appears that the concerned chromosome segments were exchanged earlier than pachytene, possibly in some premeiotic stage.

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8. Progress in the cytogenetic comparison of the genomes of corn and Tripsacum.

The present state of knowledge in our comparison of extracted chromosomes of Tripsacum on marker gene stocks of corn is summarized in Table 1.

A cytological map of the eighteen chromosome pairs in the Kansas form of T. dactyloides (2n = 36) from which the different homeologs have been extracted is not yet available. However, Tantravahi (Bussey Inst., Harvard Univ., 1968) reports complete and regular pachytene pairing in the T. floridanam x T. dactyloides hybrid and it may therefore be assumed

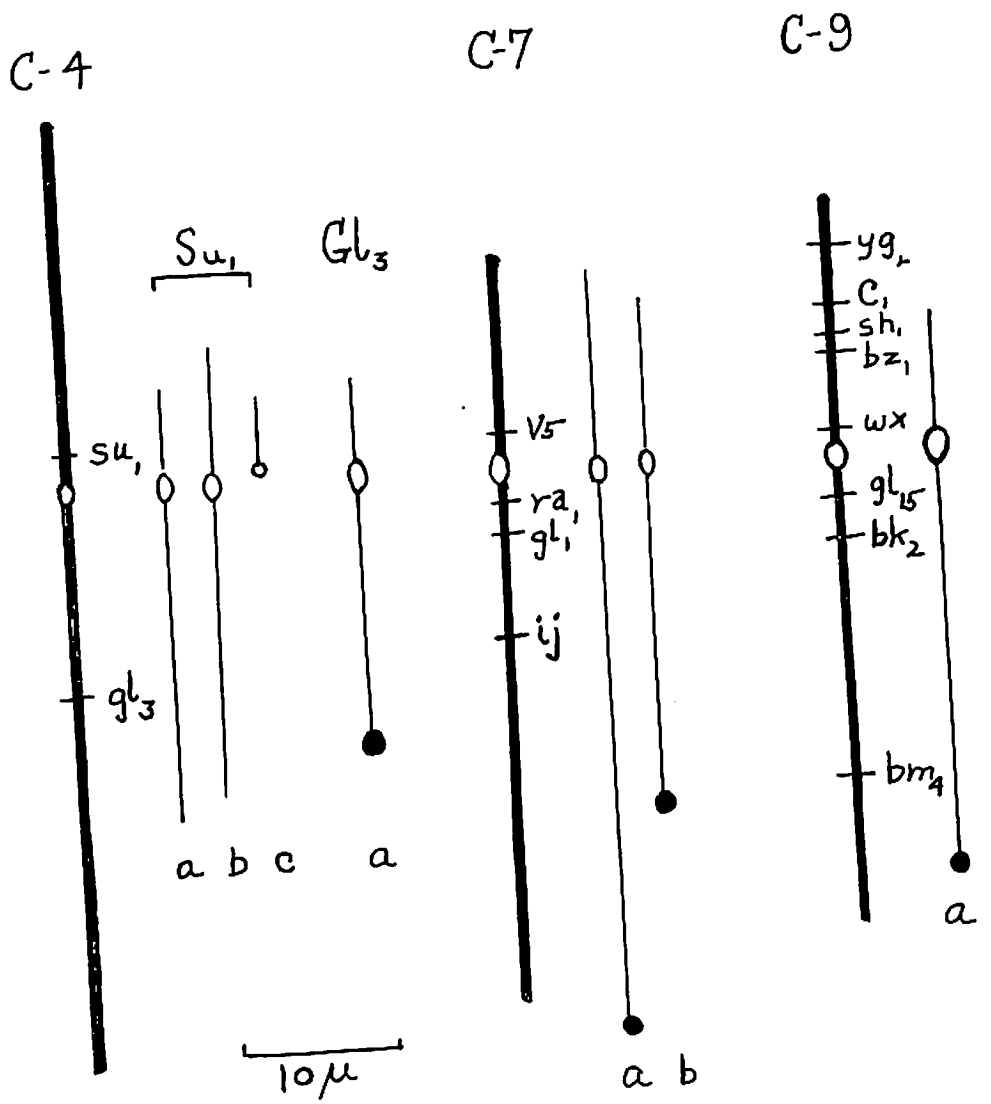

Fig. 1: Comparative idiograms of the corn and Tripsacum chromosomes and their known common Loci (Original forms shown as (a) while (b) and (c) are derived).

that the chromosomes of the two species are morphologically similar. To identify the extracted chromosomes of T. dactyloides, the relative positions accorded to similar chromosomes in the complement of T. floridanum (Tantravahi, 1968) are given tentatively.

Table 1

Cytogenetic correspondence of some corn and Tripsacum chromosomes

Known loci common between corn and Tripsacum	Chromosome no. in the complement of		Morphology of the Tripsacum chromosome		
	Corn	Tripsacum	Length u	Arm ratio	Remarks
Bm_2	1	*	-	-	
$Ws\ Lg_1\ Gl_2\ Sk\ Fl_1$	2S	-	34.0^M	$3.8:1^M$	TKL
V_4	2L	14 to 18	-	-	
A_1	3	*	-	-	
Su_1 (but not La)	4S	12	29.3	2.8:1	
Gl_3 (but not $Bm_3\ Ra_3\ J_2$)	4L	13	22.4	3.5:1	TKL
V_5:$Ra_1\ Gl_1\ Ij$	7S&L	4	45.0	2.8:1	TKL
J_1	8	*	-	-	
$Yg_2\ C\ Sh_1\ Bz_1\ Wx$:$Gl_{15}\ Bk_2\ Bm_4$	9S&L	7 or 8	34.0	4.0:1	TKL
G	10	*	-	-	

S - Short arm; L - Long arm; * - Not yet identified

M - data of Maguire (1961); TKL - Terminal knob

The morphological features at pachytene of the concerned corn and Tripsacum homeologs are compared in Fig. 1.

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