Further studies on this are also in progress to determine at pachytene if the partial homology from tripsacum [Tr7] has a greater affinity to teosinte chromosome 4 rather than to chromosome 4 or others of maize or if it is the mere presence of heterozygosity for maize and teosinte 4 which enhances the crossover potential for the tripsacum homeolog with one or the other of them.

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8. Comparative studies of American Maydeae and the Andropogoneae: II. Morphology of pachytene chromosomes of two collections of Elyonurus tripsacoides from Texas and Veracruz.

The morphology of the pachytene chromosomes of Elyonurus tripsacoides from Veracruz, Mexico, has been previously reported [MNL 1970, item 19]. The present study consists of observations at meiosis of Elyonurus tripsacoides from Texas. The two collections have different plant habits. Hence a detailed study of their chromosome morphology may have evolutionary significance.

Extensive studies of chromosomes at the pachytene stage of meiosis in the pollen mother cells have been made. Considerable difficulty was encountered in the identification of the chromosomes because of the poor spread in the material, as a result of which not even a single cell showed clearly all the 10 chromosomes. However, data from the individual chromosomes at pachytene from 300 observations have been analyzed and the ten chromosomes identified [Table 1].

Meiosis is regular. At pachytene the twenty chromosomes form ten bivalents. The individual chromosomes are distinguished by their relative lengths and arm ratios. There are no distinct features as knobs or chromomeres to demarcate one from the other. The adjacent regions of the centromere are more darkly stained, but this is not consistent hence cannot be taken as a criteria for distinguishing one from the other. The nucleolus organizing body is terminal with the satellited portion at the distal end and is on the short arm.

Table 1

Pachytene chromosome morphology of Elyonurus tripsacoides from Texas

Chromosome No.	Length in Microns			Arm Ratio
	Short Arm	Long Arm	Total	
1	22.7	31.0	53.7	1.5
2	11.5	32.1	45.4	3.1
3	17.3	24.1	42.8	1.4
4	10.1	22.7	34.6	2.3
5	13.3	19.5	34.6	1.5
6	13.7	18.7	33.8	1.4
7	12.2	14.8	28.4	1.2
8	9.0	16.6	27.4	1.8
9	10.1	11.9	23.4	1.2
10*	5.8	11.9	19.4	2.1

Arm Ratio - Length of Long Arm/Short Arm

*Nucleolus Organizing chromosome.

In their idiograms, the two collections of Elyonurus tripsacoides from Veracruz and Texas show similarities in the total lengths of the ten bivalents at pachytene. They are also similar in their arm ratios excepting chromosomes 2, 4, 6 and 10 [Table 2]. The nucleolus organizing chromosome is assigned the ninth position in the Veracruz material and the tenth position in the Texas material by virtue of the difference in their total lengths. The organizing body itself is terminal in both the materials and is situated in the long arm of the former and the short arm of the latter.

The chromosomes of Elyonurus tripsacoides, when compared with those of corn, are found to be shorter, but show similarities in their arm ratios with the exception of chromosomes 7 and 8. Elyonurus tripsacoides [Texas] resembles corn in having uniformly stained chromosomes, while the material from Veracruz is more similar to Tripsacum dactyloides in having differentiated chromosomes. The nucleolus organizing chromosome of the Texas material corresponds to the nucleolus organizing chromosome of corn in having the nucleolus organizing body

Table 2

Comparative pachytene chromosome morphology of maize, Elyonurus and Tripsacum

Ch. No.	Maize [Rhoades, 1955]		Elyonurus tripsacoides				Tripsacum dactyloides	
			Veracruz		Texas			
	Length μ	Arm Ratio	Length μ	Arm Ratio	Length μ	Arm Ratio	Length μ	Arm Ratio
1	82.4	1.3:1	53.5	1.1:1	53.7	1.5:1	48.6	1.7:1
2	66.5	1.2:1	44.6	1.4:1	45.4	3.1:1	45.0	6.0:1
3	62.0	2.0:1	40.0	1.8:1	42.8	1.4:1	40.3	3.1:1
4	58.8	1.6:1	35.8	1.5:1	34.6	2.3:1	35.3	2.1:1
5	59.8	1.1:1	30.9	1.4:1	34.6	1.5:1	32.4	4.6:1
6	48.7	7.1:1*	29.5	6.2:1	33.8	1.4:1	27.0	6.0:1
7	46.7	2.8:1	27.5	1.1:1	28.4	1.2:1	27.0	3.2:1
8	47.5	3.2:1	26.3	1.6:1	27.4	1.8:1	27.0	1.8:1
9	43.2	1.8:1	26.3	1.3:1	23.4	1.2:1	25.9	1.7:1
10	36.9	2.8:1	20.6	1.2:1	19.4	2.1:1	25.2	3.7:1
							23.4	2.7:1
							22.3	4.7:1
							21.6	3.5:1
							20.9	4.3:1
							20.9	2.1:1
							19.8	2.0:1
							18.0	1.9:1
							16.2	3.0:1

*The value of 7.1 for chromosome 6 of maize given in my article in Corn and Corn Improvement is incorrect. The original value reported by Longley is 3.1. M. M. Rhoades

situated in the short arm. The ten chromosomes of Elyonurus tripsacoides from both the collections are found to be more similar to the first ten out of 18 chromosomes of Tripsacum dactyloides in their relative lengths than they are to those of maize.

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1. Mutational analysis of R^{ch}.

The R stocks and the treatments employed. One of the various expressions of the R phenotype, such as determined by R^{ch}, is the production of anthocyanin in the aleurone, silks, pericarp, and other plant tissues.

The experimental evidence so far obtained suggests that R^{ch} is a complex separable into four components, symbolized P, S, Si, and Ch, controlling pigment synthesis in the plant, seed, silk, and pericarp tissues respectively. This evidence was provided by analysis (Sastry, 1970) of a series of mutants with colorless endosperm that appeared on ears of testcrosses involving R^{ch}/R^{st} plants. Three independent collections of R^{ch} were employed in this study. Two of them presumably carried a heterochromatic knob (K10) situated distally on chromosome 10, because they segregated preferentially for R. The majority of these mutants had lost pigment both in aleurone and in the sporophytic tissues. Because of their heterozygous R^{ch}/R^{st} parentage, either one of their parents is accountable for their origin. However, since 21 out of 25 carried the distal marker K10 it is likely that they were R^{ch} mutants. A minority of mutants had lost the aleurone pigmenting capacity but retained some of the R^{ch} features thus suggesting that R^{ch} is a complex of genes.

To find further information on this small chromosomal region, we designed additional tests. If R^{ch} is separable into various components, it should be possible to induce deletions involving two or more genes of the complex, and from a study of their pattern of loss, information