

without spermine (0.05%), a stabilizing agent, were injected by puncturing repeatedly into the area of the growing point, and half of the treated seedlings and controls were x-rayed promptly (1000 r) in hopes of opening membranes, inhibiting nucleases, and providing sites for incorporation. Seedlings, were injected at 1 to 2 weeks, 3 weeks, and 4 weeks after planting, including some repeated at all three stages. Although variable leaf-streaking simulating Yg was seen in a few plants, no B sectors or purple anthers were observed in over 250 treated survivors. In over 26,000 seeds obtained from intercrosses among the plants, five exceptional seeds were found (4 C Sh Wx, 1 C sh? Wx), in both treated and control material; these are presumably contaminations but are to be tested. Half of the 26,000 seeds were planted in the sand bench and scanned for Yg; no exceptions were found.

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1. Chromosome knobs of North Carolina inbred lines.

Cytological examination was made of the inbred lines of two varieties which have been and are being studied for quantitative analysis. The objectives are: 1) To find inbreds from both varieties with identical knob constitutions to provide material for further studies involving K10 effects on genetic variances and recombination and, 2) to provide a characterization of the differences between the two varieties with respect to frequency of various knobs which, in turn, may provide a useful background in planning experiments to study the nature of quantitative genetic differences between varieties.

Two sets of inbred lines have originated in 1953 from 300 random selfed ears of varieties Jarvis Golden Prolific and Indian Chief, and each ear was used to establish an inbred line. In order to minimize selection during the following inbreeding period, every line in every generation was raised from a single selfed ear of the first plant in the row in the preceding generation. Currently available are 64 lines of Jarvis and 125 lines of Indian Chief.

Table 1
Knob constitution of the inbred lines from Jarvis

Line No.	Total Knob No.	Position and size of each knob*											
		1S	1L	2L	3L	4L	5L	6L ₂	6L ₃	7L	8L ₁	9S	9L
18	3							t	t	m			
21	4						t	t	t	l			
30	5						t	t	t	m	m ^a		
15	5						l	t	m	l	m		
4	5						t	t	l	l	l		
34	4						l		t	m	m		
68	5							t	t	m	m	t	
22	4						t		t	l		t	
20	5						t	t		l	m	t	
9	5					l	t	t		l		t	
13	5					l	m	t		l		t	
10	5					11		t	t	l	l		
3	6		l		l	t	t			l	m		
5	6		l		l	t	t	s		m			
19	7		s		l	l	t			l	l	t	
7	7		l		11	m	t			l	l	t	
14	8		l		l	t	t	s		l	m	t	
8	3		l			l				l			
78	4		l			l		t		l			
11	4		l				t			l		t	
32	4		l					t		m		t	
65	5		11				t	t		m	l		
16	5		l			t	t			l	l		
17	6		11			t	t	t		l	m		
6	6		11			m	t			l	l	t	
2	5		l			l		t		l		t	

Table 1 Continued

Line No.	Total Knob No.	Position and size of each knob*											
		1S	1L	2L	3L	4S	5L	6L ₂	6L ₃	7L	8L ₁	9S	9L
73	5			1			s	t			m		t
42	7			1			t	t	t	m	m		t
76	5			11			t		t	m			t
12	6			11	11 ^b		l	t	t	m			
46	6					1	t	t	t	m			t

*t=tiny, s=small, m=medium, l=large, ll=very large.
Knobs are all homozygous except (a), which was homozygous in 2 plants, heterozygous in 3 plants, and none in 2 plants.

b-extra large knob.

Table 2
Knob constitution of the inbred lines from Indian Chief

Line No.	Total Knob No.	Position and size of each knob*											
		1S	1L	2L	3L	4S	4L	5L	6L ₂	6L ₃	7L	8L ₁	9S
166	3				s				t				l
165	4				s				t		t ^a		l
119 & 172	4				s				l		t		l
140	5				s				t	t	t		l
135	5				s				l	t	t		m
139	4			1	s				t				l
163	5			11	s				l		t		l
190	5			1					t		t		l
216 & 227	4								l		t		m
179	4				s				t				m
116	5	m			s				t				l
168	4	s							t		t		m
169	4	s							t		t		l
125	6	s		1	s				t				l

*t=tiny, s=small, m=medium, l=large, ll=very large. All the knobs are homozygous.

^aHomozygous in 4 plants but none in 5 plants.

Out of them, 31 lines of Jarvis and 16 of Indian Chief were chosen at random. Knob composition of each line was determined by examination of the first five plants whenever it was identical for all of them, but more plants were examined in a few cases in which it was different among individual plants. In addition to the pachytene stage, late pachytene or early diplotene stages were examined to determine whether knobs are homozygous or not, although these lines are inbred. All knobs were classified into five arbitrary categories: tiny, small, medium, large, and very large, for a truly objective method of determining knob size and shape is not possible. The results are shown in Tables 1 and 2.

There were no two lines with identical knob composition for lines of Jarvis; every line of 31 examined differs from every other in knob composition. Contrasting to the above, two sets of lines with identical knob composition were found out of 16 lines examined for Indian Chief. This situation, diversity in Jarvis and close relationship in Indian Chief, agreed well with the facts which have been indicated by analyses of certain quantitative traits.

A series of data is available of inbreeding depression between those lines providing sets of lines indicating a large value (.2700-.3650) or a small value (.0400-.1100) (unpublished data by Dr. R. H. Moll). Attempts were made to find any association between inbreeding depression and knob composition, e.g., knob number, number of knob positions different as to presence vs. absence of knobs, or presence or absence of particular knobs. No consistent association was found.

Three sets of lines, so far, were determined to have almost identical knob compositions, that is, identical knob positions with a slight difference in size at one particular knob (Table 3). Lines of these sets will be used for the experiments to evaluate the effects of abnormal chromosome 10 on the recombination frequency among linked genes which affect quantitative traits. Incorporation of abnormal chromosome 10 into these lines is already under way.

Table 3
Comparison of knob constitution of selected inbred lines

Line	Position and size of each knob					
	2L	3L	5L	6L ₃	7L	8L ₁
CI 21			l	t	l	m
# 34 of Jarvis			l	t	m	m
# 216 & # 227 of Indian Chief			l	t	m	s
NC 45	l		t	t	l	
# 78 of Jarvis	l		l	t	l	
# 165 of Indian Chief		s	t	t	l	
# 119 & # 172 of Indian Chief		s	l	t	l	

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1. Inheritance and nitrogen metabolism of a lutescent maize mutant.

Characterization of a recently reported (MNL 38:116) lutescent mutant from the viewpoint of classification and expression, inheritance information and nitrogen metabolism is being investigated. Classification is generally good, but expression has been shown to be light and/or temperature sensitive, being much better under field conditions than in the greenhouse. Viability is rather good, but seed set and vigor are only fair.

The mutant was crossed with several standard inbred lines; selfs of these crosses produced 269 normal green and 81 mutant plants. Crosses were made with Dr. E. G. Anderson's waxy-marked translocation series involving all chromosomes. All F₂ populations showed normal 3:1 segregation except those involving wx 5-9c and wx 8-9d from which the following data were collected. Waxy seeds of the 5-9c translocation material gave 38 normal: 0 mutants; non-waxy seeds gave 3 normal: 1 mutant. Waxy seeds of the 8-9d translocation gave 29 normal: 2 mutant; non-waxy seeds gave 12 normal: 0 mutant. These data suggest that the gene is located on chromosome 5.