MAIZE GENETICS COOPERATION

NEWS LETTER

8

November 24, 1934

Department of Plant Breeding
Cornell University
Ithaca, N. Y.

V8

MAIZE GENETICS COÖPERATION
DEPARTMENT OF PLANT BREEDING
CORNELL UNIVERSITY
ITHACA, NEW YORK

November 24, 1934

Vol. 8

To Maize Geneticists :-

This letter is composed of data and information which you have generously contributed so that we can all keep in closer contact and be better informed about the work in the different laboratories. The response to our request for news items has been good and the information included in this letter will be of interest and value to everyone. Most, if not all, of the information listed in this letter has not been published so we wish to emphasize, in order that there will be no misunderstanding, that the appearance of information in these series of corn letters does not constitute publication. If you wish to refer to any data you should ask the direct consent of the contributor.

Since these corn letters are a cooperative affair it seems just that only those who show sufficient interest to cooperate should receive the letters. Not everyone will have something to contribute and no one will be dropped from the mailing list for that reason. This office should, however, receive an acknowledgement of the request for news items even though you have nothing to contribute. We feel that anyone who does not value these letters sufficiently to include his own data has no claim to the unpublished data of others who have generously cooperated.

News items from Ithaca

1. Zebra$_5$ (zb_5) which shows in seedlings as a virescent and in mature plants as a zebra stripe (transverse bands of green and yellow tissue) shows no crossing over with d_7. Order is zb_5-R-g_1. Classification excellent and viability good. Singh.

2. Zigzag stalk (zg_2) is linked closely with Pl and sm. Exact order unknown. Classification satisfactory. Singh.

3. A dominant gene (Dt) interacts with a_1 to give dotted aleurone. Dt does not interact with a_2, c or r. Seeds of a_1^p a_1 A_2 C R Dt constitution have a pale purple background on which appear the more intense dots. The ratio of the number of dots on seeds of a_1 a_1 a_1^p A_2 C R Dt Dt dt genotype to the number of dots on seeds of a_1 a_1 a_1 A_2 C R Dt Dt dt constitution is 2 : 3, while the ratio for seeds of a_1 a_1^p a_1^p A_2 C R Dt dt dt to seeds of a_1 a_1 a_1 A_2 C R Dt dt dt constitution is 1 : 3.8. These ratios suggest that the dosage of a_1 affects the number or else that a_1^p has an inhibitory effect which is

proportional to the dosage of a_1^p. Dt is not linked but is independent of a_1, a_2, c, r, su and lg. Rhoades.

4. Plants which have 20 chromosomes plus the short arm of chromosome 5 are intermediate in appearance between disomes and trisomes for chromosome 5. The fragment has a terminal insertion region as the break occurred exactly at the spindle fiber region. In 50% of the cases a trivalent group is formed at metaphase I, and in 50% of the cases a bivalent and the fragment as a univalent are formed. When a trivalent is formed the disjunction in anaphase I is such that the fragment passes to the same pole as one of the normal 5 chromosomes. The two normal chromosomes rarely, if ever, pass to the same pole and fragment plants have never thrown the primary trisome. Through a study of genetic ratios in plants carrying the fragment it has been possible to assign certain genes in chromosome 5 to the long and short arms, respectively. The available data suggest that v_2 ys pr and bt are in the long arm of chromosome 5, while bm_1 and a_2 are in the short arm. Whether a gene shows a 5 : 3 or a 1 : 1 ratio in a back cross using the fragment plants as female determines if a given gene is in the long or short arm. Rhoades.

5. An inbred strain gave in F_2 approximately 65% of luteus seedlings. This aberrant ratio was caused by the linkage of a gene for small pollen with the normal allelomorph of the luteus gene. Small pollen (sp) has 2% crossing over with luteus. A variable percentage of the eggs with the small pollen gene abort giving in different F_2 populations a range from 55 to 90% of luteus seedlings. Small pollen germinates as rapidly as normal pollen but never, or rarely, succeeds in fertilization. Cytological examinations at pachytene showed no visible deficiency. The gene for small pollen is being tested with sp_1. Rhoades.

6. White sheath$_3$ (ws_3) is in chromosome 2 according to trisomic tests. ws_3 shows as seedling and can be classified until shortly after flowering. Rhoades.

7. $\frac{+ \quad bm_1}{bt_1 \quad +}$ x bt_1 bm_1 gave 128 + bm_1 : 1 ++ : 2 bt_1 bm_1 : 119 bt + which gives 1.2% crossing over. Rhoades.

8. $\frac{+ \quad + \quad +}{v_2 \quad pr \quad bm_1}$ x v_2 pr bm_1.

0	232
0	235
1	194
1	201
2	77
2	84
1-2	40
1-2	46
	1109

region 1 = 43.4% crossing over
region 2 = 22.3% crossing over
Coincidence = .80.

Rhoades.

9. Branched ear (be) is allelomorphic with branched silkless (bd). Rhoades.

10. The studies on mutation and tetraploidy induced by heat treatments are being continued. The first seedling crop in the greenhouse this fall gave two new mutations, a glossy and a white seedling, from less than 100 F_2 ears tested. Randolph.

11. Treatments to obtain 4N commercial hybrid strains were repeated this past summer. A number of 4N plants from commercial inbreds treated a year ago looked very promising early in the season but failed to mature seed, due largely to unfavorable cultural conditions. Randolph.

12. The B-type chromosomes produce marked sterility when present in numbers higher than 16 or 18, and are structurally unstable. Randolph.

13. A survey of chromosome morphology in different strains of maize has revealed types of Indian corn from the southwest which are more nearly like teosinte than any previously known. Randolph.

14. Perennial teosinte in the greenhouse this fall was pollinated abundantly with corn pollen from liguless brown plants to obtain haploids, and odds are being offered (3 : 1) that if any are obtained they will be annual. Randolph.

15. A summary of all data now available indicate recombination percentages as follows for the group of genes near the end of the known linkage map for chromosome 1 :-

	Number of individuals	Per cent of recombination
P-ts_2	3296	1.3
P-zl	2567	1.6
P-ms_{17}	2706	3.0

The order of these four genes is unknown. Emerson.

16. My collection includes the following aleurone, anther, and silk color combinations, in which "+" indicates colored and "-" colorless :-

	aleurone	anther	silk
R^{rg}	+	+	-
R^{gg}	+	-	-
r^{rr}	-	+	+
r^{gr}	-	-	+
r^{gg}	-	-	-

I need the following :-

	Aleurone	anther	silk
R^{rr}	+	+	+

The nearest approach to this in my former collections was Navajo-patter colored aleurone, colored anthers, and colored silks. Colored anthers appear always to be associated with some color in glumes, sheaths, brace roots, etc. and, except in the presence of B, colorless anthers with colorless glumes, sheaths, and brace roots. It is of interest to note that, if this series of supposed allelomorphs is an example of very close linkage, Webber was probably the first to report linkage in corn (Webber, H. J. - Rept. Amer. Breeders' Assoc. 2: 76-81, 1906). Emerson.

News items from Columbia, Mo.

1. V_3 is located on the longer arm of chromosome 5, not far from the insertion region. This is the cytological position of Df 5_1, which includes V_3. Linkage data indicate the Df is between Bm_1 and Bv, very close to Bv. The Df does not include Bm_1, Bt, or Bv. This internal deficiency markedly reduces crossing over, both in the Bm-Bv region and in the Bv-Pr region. This shows that in maize crossing over may be inhibited by deficiency outside the region homologous to the Df, which appears not to be the case in Drosophila. Stadler.

2. A new high-mosaic strain gives endosperm mosaics with a frequency higher than that ordinarily found in heavily X-rayed ears. The various endosperm loci show differing frequencies of loss corresponding at least roughly to their relative frequencies in common maize. The high frequency of chromosomal aberrations is limited to the early divisions in endosperm development, the proportion of small sectors being hardly more than normal. The factor responsible for this effect is transmitted through both male and female gametes. The chromosomes derived from both the male and the female parent are affected in endosperms which have received this factor from either parent. In an F_2 progeny segregating for an unknown yellow seedling factor and for the high-mosaic factor, seedlings sectorial for the yellow seedling character were common in the progenies with high mosaic frequency. Plants heterozygous or homozygous for the high-mosaic factor are normal in development and have normally fertile pollen and ears. Stadler.

3. Dr. Sprague and I have begun some work on ultra-violet treatment of pollen, with the collaboration of Dr. F. S. Brackett of the Smithsonian Institution. The experiments haven't gone very far as yet, but it is clear that ultra-violet treatment of pollen induces genetic changes which show up as both whole endosperm and mosaic endosperm deficiencies at rates rather

surprisingly high. A single progeny now growing in the greenhouse also shows about 10% of the plants with segregating pollen sterility. The results thus far therefore correspond to the changes to be expected from an X-ray treatment of pollen, with frequencies corresponding to a dosage of X-rays considerably lower than the maximum. However, the doses of ultra-violet radiation used were also well below the maximum. Results from filtered and monochromatic ultra-violet radiations are not yet available. Stadler.

4. Linkage data :-

Gene		Linkage phase	Number of individuals				Recombinations No.	%
X	y		XY	Xy	xY	xy		
Gs_2	Lg	RBC	37	53	81	19	56	29.5
Gs_2	B		162	4	8	170	12	3.5
Pc_2	R		128	95	58	2		16.5
Pc_2	G		204	19	30	30		21.5

Order $R-Pc_2-G$

Sprague.

News items from Morgantown

1. New linkage stocks :-

Chromosome 1 p f_1 an bm_2
p br f_1 bm_2 (pale yellow endosperm)
p f_1 bm_2 y
P f_1 bm_2 (segregating ts_2).

Chromosome 5 pr bt_1 bm_1 (not homozygous for ACR).

Chromosome 7 ra gl_1 ij (or at least the F_1 in coupling).

Burnham.

2. New characters :-
Several characters are either segregating or are in homozygous condition in the inbred lines here at Morgantown. Among them are the following: glossy seedling, tassel seed, ramosa tassel with normal ears, purple seedling leaf color which is dilute sun red in mature plant. This last character is a dominant.
Burnham.

3. Linkage data including a few tests with unlinked genes - 2 point tests :-

Genes x y	Linkage phase	Number of individuals: X Y	X y	x Y	x y	Total	New combinations No.	%
ra ij	R S	437	112	201	4	754	-	19.0
v_2 ys_1 *	C B	113	48	51	113	325	-	30.5
bm ys_1 *	R B	153	276	308	123	860	276	32.1
	C B	150	37	33	111	331	70	21.1
$\frac{bm_1\ +}{+\ bt}$ x $\frac{bm_1\ +}{bm_1\ bt}$	---	260	465	172	0	897		less than 1%
bm_1 v_2	C B	211	101	198	115	625	299	
	R B	182	133	221	130	666	312	
bm_1 ch *	C B	104	98	106	89	387	204	
yg_1 ch *	C B	113	103	97	84	387	200	
bm_1 yg_1 *	C B	163	136	142	148	589	278	47.2
bm_3 ch	C B	57	48	46	36	187	94	
g_2 ch	C B	59	57	61	47	224	118	
X Y Yg_1 - T4-5a	C B	32	15	5	17	69	20	29.0
Bn - T5-7a *	R B	5	128	95	14	242	19	7.9

* These include those in the 3-point tests.

Burnham.

4. Linkage data from a 3 point F_2 test :-

Genetic constitution		Pr Bt +	Pr Bt vp_2	Pr bt +	Pr bt vp_2	pr Bt +	pr Bt vp_2	pr bt +	pr bt vp_2	Total
$\frac{Pr\ +\ vp_2}{pr\ bt\ +}$	⊗	431	207	53	1*	84	14	200	1*	991

* Not certain that these are vp_2 grains. The recombination percentages are calculated as though these were vp_2.

pr - vp_2 = 23%

bt - vp_2 = 10%

pr - bt = 15%

Burnham.

5. Linkage data from 3 point back crosses :-

Genetic constitution	Regions 0	1	2	1, 2	Total
+ + + * / pr ys v_2	79 - 70 149	20 - 15 35 15.8%	42 - 33 75 30.8%	6 - 1 7	266
bm_1 + + / + pr ys	81 - 87 167	13 - 21 34 16.8%	6 - 5 11 6.1%	1 - 1 2	214
+ + + / bm_1 pr ys (also seg. v_2 3:1)	118 - 79 197	21 - 21 42 17.8%	11 - 10 21 9.8%	0 - 5 5	265
+ + Ch / bm_1 yg_1 ch No linkage	61 - 45 106	39 - 52 91 46%	59 - 54 103 49%	43 - 44 87	387
+ T5-7a bn / gl_1 + Bn	36 - 40 76	6 - 1 7 10.5%	2 - 8 10 12.6%	0 - 2 2	95 (bn-gl_1 18%)
T5-7a + + / + gl_1 v_5	142 - 72 214	30 - 51 81 25.5%	12 - 31 43 14.5%	5 - 2 7 2.0%	345
+ + T5-7a / ra gl_1 +	107 - 74 181	4 - 3 7 4.0%	39 - 42 81 31.0%	3 - 1 4	273
T_1-7 + + / + gl_1 ij	292 - 201 493	6 - 7 13 2.6%	20 - 25 45 8.3%	1 - 0 1	552

* v_2 classification was not entirely satisfactory.

Burnham.

6. Notes on the above data :-

The linkage of T4-5a with yg_1 is the first found for yg_1. If it is in chromosome 5 it must be out in region where v_2 is or even nearer the end. Of course it may be in chromosome 4. The break in each chromosome was near the subterminal knob. The data on chromosome 7 are mostly from interchanges. In T5-7a both breaks were near the subterminal knobs, while in T1-7 the break in 7 was on the long arm not far from the spindle fiber insertion. The data indicate that Bn is out toward the end of the long arm, with ra near the break in 1-7 and gl_1 in between. Vp_2 apparently is on the bm_1 side of pr. Burnham.

News items from New Haven

1. Technique.
A map measure (K & E) has been found very useful in measuring the length of chromosomes. By tracing the camera lucida drawing with the map measure the length (in inches or centimeters) is registered on the dial of the measure. This is useful in determining arm lengths and relative lengths of the chromosomes. The map measure was suggested by an engineer, George W. Burke, on an FERA project here at the Experiment Station. Singleton.

2. Additions or Corrections to last year's notes.
a) The gene ramosa has appeared in another stock, a Leaming inbred. It has proved allelomorphic with ra_1. This makes the fourth occurrence of this gene in our stocks.
b) Preliminary tests with la_2 give an indication of linkage with su. No crossovers occurred in a row of 20 plants. It is probably allelomorphic to la_1.
c) Micropyle color Mc is a modifying factor of the P factor, rather than allelomorphic. Backcrosses of $\frac{PMc}{pmc}$ to pmc showed a segregation into PMc, Pmc and p plants, which could not occur if Mc were allelomorphic to P. Singleton.

3. New data.
a) The factor o_2 has shown linkage with ramosa (C.O. 18 per cent on the basis of F_2 data). Backcross data will be available next year.
b) Backcross data have shown that both lo and sp are on the Ts_5 side of su. They may be allelomorphic.
c) Backcross data of material sent by Dr. Emerson indicate that wl is between Ts_5 and su. The order probably is Ts_5-wl-su-Tu. Singleton.

4. New genes or reoccurrence of known genes
a) ramosa Sweepstakes inbred. It is being tested with ra_1.
b) brown midrib - Sweepstakes inbred.
c) $glossy_1$ Country Gentleman inbred.
d) glossy (not 1, 2, or 3) Sweepstakes inbred.
e) crinkly - Sweepstakes inbred.
f) adherent tassel - Sweepstakes inbred.
g) yellow stripe - Sweepstakes inbred.
h) yellowish japonica - Sweepstakes inbred
i) yellowish threaded - Sweepstakes inbred.
j) dwarf - Sweepstakes inbred.
k) fine stripe (may be allel. to f_1) - Sweepstakes inbred.

Singleton.

5. Soft starch (h) of Mumm is different from both opaque 1 and opaque 2. Singleton.

News items from College Station, Texas

1. Amylaceous sugary (su^{am}) is allelomorphic with su. This new sugary gene is expressed only when another gene, du, which produces a dull endosperm similar in appearance to waxy but staining blue instead of red, is also present in the recessive condition. Ratios in most crosses are 15 : 1. The gene su^{am} shows the same linkage relations as su while the gene du is located in the R-g group. The new sugary is not as good a character as the original sugary but it has some bearing on the inheritance of pseudo-starchiness. A synthetic pseudo-starchy can be produced by crossing amylaceous sugary with true sugary. Seed are available. Mangelsdorf.

2. In Tripsacum hybrids with maize the number of Tripsacum chromosomes can be determined by an examination of the pollen. Plants with 20 Zea chromosomes plus one Tripsacum chromosome have 50 per cent normal and 50 per cent small pollen. Plants with two Tripsacum chromosomes have 25 per cent normal, 50 per cent small, and 25 per cent empty pollen. Apparently a single Tripsacum chromosome causes reduction in size while two or more cause complete abortion of the pollen. Extra chromosome plants can be readily identified in the field by pollen examination. We now have a large number of stocks all having 20 maize chromosomes and one extra Tripsacum chromosome. We are attempting to identify these extra Tripsacum chromosomes by crossing with corn stocks in which the chromosomes are marked by two or more recessives. We are badly in need of multiple recessive stocks for this work. Mangelsdorf.

3. A few stocks which we have developed for Texas conditions and which are available to other maize geneticists in the South are :-

   B lg
   aa Bb Pl pl Lg_2 lg_2
   Pp Br br F f Bm bm Lg lg Gl gl Ra ra - F_2
   Pp Br br F f Bm bm su wx - F_2
   Lg lg su wx
   Lg lg Gl gl Ra ra su wx
   Y Pl B lg su Tu wx
   aa Pp.

   Mangelsdorf.

4. We have a number of F_1 plants of diploid Zea x tetraploid Tripsacum which can be propagated by division. Anyone wishing some of this material is welcome to it. Mangelsdorf.

News items from Ames, Iowa

1. Linkage data :-

Pedigree	Genes X	Y	Linkage phase	XY	Xy	xY	xy	Total	Recombinations No.	%	Authority
9415	G	A_3 [1]	R S	260	65	96	3	424		22.5	Lindstrom
9451	R	A_3	C S	120	24	49	20	213		40.3	"
9419	Pl	A_3	C B	86	73	80	64	303	153	50.5	"
9232	Su	W_4 [2]	R S	2366	977	980	159	4482		37.0±0.9	"
9429	Tp	A_3	C B	31	33	59	58	181	92	50.8	"

[1] A new recessive anthocyan gene.

[2] Assigned w_4 because the original w_4 in the mimeographed sheets is not shown to be linked with anything, and since the gene is on the new 4th chromosome.

Lindstrom.

2. New genes not described or tested for linkage :-
   a) Dominant chlorophyll striping. Old gold striping (Og).
   b) A new dominant sorghum tassel. Will not be named until tested with Ts_5 and Ts_6.

Lindstrom.

News items from Washington, D. C.

1. In back cross counts involving 227 plants rootless (rt) showed 18.5% crossing over with Rg_1. Jenkins.

2. Lazy (la) shows 11.4% crossing over with su and is on the opposite side of su from Tu and gl_3 as based on a 4-point back cross test. Jenkins.

3. A 3-point back cross test with ra_1, Tp and ij indicates the order to be ra-Tp- ij with the total ra-ij distance about 11 units. Jenkins.

4. Branched silkless (bd). Our results agree with those of Hadjinov in that (bd) is not located in the fourth chromosome with Tu. Our latest progeny in repulsion phase with su gives Su Bd 261 : Su bd 82 : su Bd 42 : su bd 14 with x^2 less than 1. The deficiency of su plants is accounted for by the poor stand. Kempton.

Linkage data from Madison

1. $\frac{A_1\ lg_2\ rg}{a_1\ Lg_2\ Rg} \times a_1\ lg_2\ rg$

$A_1\ lg_2\ rg$ / $a_1\ Lg_2\ Rg$	703
$A_1\ Lg_2\ Rg$ / $a_1\ lg_2\ rg$	406
$A_1\ lg_2\ Rg$ / $a_1\ Lg_2\ rg$	138
$A_1\ Lg_2\ rg$ / $a_1\ lg_2\ Rg$	68
Total	1315

$A_1 - lg_2$ = 36.0% c.o.
$lg_2 - Rg$ = 15.7% "
$A_1 - Rg$ = 51.7% "

Brink.

2. $\frac{A_1\ Na\ ts_4\ rg}{a_1\ na\ Ts_4\ Rg} \times a_1\ na\ ts_4\ rg$

0	$A_1\ Na\ ts_4\ rg$ = 235 $a_1\ na\ Ts_4\ Rg$ = 216	—	451
1	$A_1\ na\ Ts_4\ Rg$ = 42 $a_1\ Na\ ts_4\ rg$ = 81	—	123
2	$A_1\ Na\ Ts_4\ Rg$ = 140 $a_1\ na\ ts_4\ rg$ = 105	—	245
3	$A_1\ Na\ ts_4\ Rg$ = 24 $a_1\ na\ Ts_4\ rg$ = 27	—	51
1 & 2	$A_1\ na\ ts_4\ rg$ = 32 $a_1\ Na\ Ts_4\ Rg$ = 56	—	88
1 & 3	$A_1\ na\ Ts_4\ rg$ = 4 $a_1\ Na\ ts_4\ Rg$ = 9	—	13
2 & 3	$A_1\ Na\ Ts_4\ rg$ = 14 $a_1\ na\ ts_4\ Rg$ = 3	—	17
1, 2 & 3	$A_1\ na\ ts_4\ Rg$ = 2 $a_1\ Na\ Ts_4\ rg$ = 3	—	5
	Total	=	993

Crossing-over

a_1 - na = 23.1%
na - ts_4 = 35.7%
ts_4 - Rg = 8.7%
na - Rg = 40.9%

Brink.

3. (lg_2 x na) ⓧ

No lg_2 na plants appeared among about 5000 offspring. This result does not tally with expectation on the basis of the above results, viz. (lg_2 - Rg = 15.7% c.o., and na - Rg = 40.9% c.o.) (a_1-na = 23.1%, and a_1-lg_2 = 36.0%).

Brink.

4. $$\frac{Lg_2\ d_1}{lg_2\ D_1} = lg_2\ d_1$$

$D_1\ lg_2$, $d_1\ Lg_2$ } 162

$D_1\ Lg_2$, $d_1\ lg_2$ } 96

Total 258

Crossing-over

$lg_2 - d_1$ = 37.2%

Brink.

5. $$\frac{d_1\ Rg}{D_1\ rg} \times d_1\ rg$$

d_1 Rg, D_1 rg } 291

D_1 Rg, d_1 rg } 94

Total 385

Crossing-over

Rg - d_1 = 24.4%

Brink.

6. $\frac{\text{na Pm Rg}}{\text{Na pm rg}}$ x na pm rg

pm = pale midrib

	Numbers	
na Pm Rg =	125	
Na pm rg =	189	314
Na Pm Rg =	109	
na pm rg =	57	166
Na pm Rg =	13	
na Pm rg =	21	34
na pm Rg =	1	
Na Pm rg =	5	6
	Total =	520

Rg - na = 40.8% c.o.

Rg - pm = 7.7% "

pm - na = 33.1% "

Brink.

7. $$\frac{A_1\ Ba_1\ Rg}{a_1\ ba_1\ rg} \times a\ ba_1\ rg$$

$A\ Ba_1\ Rg$ / $a\ ba_1\ rg$	}	20
$A\ ba_1\ rg$ / $a\ Ba_1\ Rg$	}	18
$A\ Ba_1\ rg$ / $a\ ba_1\ Rg$	}	10
$A\ ba_1\ Rg$ / $a\ Ba_1\ rg$	}	1
Total = 49		

Crossing-over

$A - ba_1 = 38.8\%$

$ba_1 - Rg = 22.4\%$

$A - Rg = 61.2\%$

Brink.

8. $$\frac{Rg\ Ra_2}{rg\ ra_2} \times rg\ ra_2$$ ra_2 = ramosa-2

$Rg\ Ra_2 = 38$
$rg\ ra_2 = 67$

$Rg\ ra_2 = 26$
$rg\ Ra_2 = 29$

Total 160

Crossing-over

$Rg - ra_2 = 34.4\%$

Brink.

9. $$\frac{A\ B\ Pl}{ra_2} \times \text{same}$$

$A\ Ra_2 = 152$
$A\ ra_2 = 29$
$a\ Ra_2 = 43$
$a\ ra_2 = 9$

$$\frac{ad}{bc} = \frac{1368}{1247} = 1.1$$

c.o. = ca 50%

Brink.

News items from Pasadena

1. New stocks - chromosome 2

$lg_1\ gl_2\ b\ v_4$ segregating c sh wx
$lg_1\ gl_2\ B\ v_4$
$b\ sk\ v_4$ segregating lg_1 and gl_2
$B\ sk\ v_4$ " " " "
$b\ ts_1\ v_4$ " " " "
$B\ ts_1\ v_4$ " " " "

Clokey.

Chromosome 5

$$\frac{a_2}{v_2\ pr\ bm_1} \times \frac{a_2}{v_2\ pr\ bm_1}$$

$$\frac{a_2}{Ch\ Ch} \times \frac{a_2}{Ch\ Ch}$$

Ch Ch x v_2 pr bm_1

Clokey.

Chromosome 7

ra_1 gl_1 ij

Clokey.

2. Linkage data :-
   On a back cross of 1100 plants for ra_1 gl_1 ij the order from the first 700 plants is ra_1-gl_1-ij with a cross over value of 4-5 per cent between ra_1 and gl_1. Clokey.

3. Data from cross $\frac{+\ \ sm\ \ +}{Pl\ \ +\ \ py}$ x pl sm py

Py plants	
0 :pl sm:	150
1 :Pl sm:	17
2 :Pl + :	26
1-2:pl + :	0

py plants	
Pl + :	131
pl + :	37

From Py plants only - Pl-sm = $\frac{17}{193}$ = 8.8%

sm-py = $\frac{26}{193}$ = 13.5%

From all plants - Pl-py = $\frac{80}{361}$ = 22.2%

Order is therefore Pl-sm-py.

Anderson.

News items from Sao Paulo, Brazil

a) Ear and seed characters	No. of strains available
1) premature germination (3:1)	1
2) several kinds of defective endosperms (shrunken, floury, etc.)	6
3) variegated pericarp	1
4) mottled aleurone	1

	No. of strains available
5) brown pericarp	1
6) aleurone colors	2
7) semi-tunicate grains*	1
8) branched ear	5
b) <u>Leaf characters</u>	
1) concentric spots*	1
2) oily spots (?)*	8
3) crinkly (?)	3
4) rolled leaves	12
5) ragged (?)	6
6) narrow leaves	1
7) hairy sheath	2
c) <u>Chlorophyll-deficient types</u>	
1) white seedlings	7
2) yellow seedlings	2
3) several kinds of striped	14
4) zebra striped seedlings (?)	7
d) <u>Genes affecting the whole plant</u>	
1) several types of dwarfs	13
2) ultra-dwarf	1
3) ramosa (?)	1
e) <u>Abnormal sex-distribution</u>	
1) tassel-ear, tassel-seed	4
2) hermaphr. flowers on the ear	1
3) male flowers on the ear* (upper half of ear is ♂)	1
4) female plants*	1

The characters marked with * are <u>supposed</u> to be new ones. Some of the abnormalities appeared in more than one strain, but they may not be allelomorphs.

Krug.

Results of first inbreeding three corn varieties :-

Type of Variations Found	Varieties: "Amarello" (688 ear-rows) No.	%	"Crystal" (1052 ear-rows) No.	%	"Amparo" (72 ear-rows) No.	%	Total (1812 ear-rows) No.	%
White seedlings	12	1.74	60	5.70	2	2.8	74	4.08
Yellow seedlings	5	0.73	5	0.47	0		10	0.55
Transv. striped lvs.	5	0.73	12	1.14	0		17	0.93
Light green lvs.	19	2.76	6	0.57	1	1.4	26	1.43
Striped leaves	15	2.18	9	0.85	1	1.4	25	1.37
Concentric spots	1	0.14						
Ragged (?)	1	0.14	11	1.04	0		12	0.66
Rolled leaves	6	0.87	15	1.42	1	1.4	22	1.21
Crinkly	6	0.87	0		1	1.4	7	0.38
Oily spots (?)	4	0.58	5	0.47	1	1.4	10	0.55
Narrow leaves (?)	0		2	0.19	0		2	0.11
Hairy sheath	0		2	0.19				
Dwarfs	5	0.73	5	0.47	1	1.4	11	0.60
Abnormal sex distribution	25	3.63	8	0.76	2	2.8	35	1.93
Ramosa (?)	0		1	0.09	0		1	0.05
Branched ear	4	0.58	4	0.38	0			

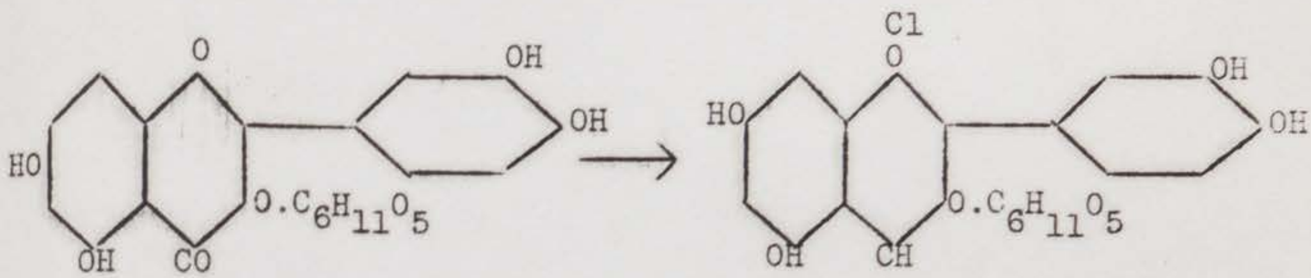
In 1932 we selfed about 3,000 plants of these three varieties. Among the selfed ears we found a great many with defective endosperm seeds, one case of "premature germination" (3:1), one with semitunicate grains, besides a great number of diversily diseased ears which were eliminated. From these 3,000 ears we selected only <u>1812</u> for further planting; the variations found among these ear-rows are given in the above table.

Krug.

Sando's work with plant color pigments

In a former paper Sando and Bartlett showed that the pigment in aa BB Pl Pl plants was a yellow flavonol glucoside, isoquercitrin. Sando, Milner and Sherman have a paper in press on the nature of the pigment in AA BB Pl Pl plants. This purple pigment proves to be the anthocyanin of isoquercitrin, chrysanthemin.

To quote Sando: "If it is assumed that the anthocyanin in purple-husked maize is formed directly from the flavonol glucoside the reduction representing the possible formation of chrysanthemin (as chloride) from isoquercitrin may be expressed briefly as follows:



isoquercitrin - $C_{21}H_{20}O_{12}$ Chrysanthemin Cl - $C_{21}H_{20}O_{11}$ H Cl.

Inbreds resistant to smut

In the corn letter of September 13, 1934, we stated that we had several inbreds which were resistant to smut under field conditions here at Ithaca and that it seemed desirable to cross some of the more susceptible genetic stocks to these inbreds providing they proved resistant when grown at other stations. Hayes writes that they have made extensive tests for smut resistance at Minnesota and have inbreds which were resistant to smut brought in from various localities. This material should be ideal for our purposes and Hayes has kindly offered to supply a limited amount of seed for testing next summer. We should like very much to send small lots of seed to four or five different stations. If you are willing to grow this material and note its resistance to smut under your field conditions, please notify this office.

Miscellaneous

The following changes and corrections should be noted :-

1. The symbol dt was originally given to the character dotted leaf. No description of this character was ever published, it was never linked, and the stock has been lost. Therefore, the symbol Dt has been assigned to dotted aleurone (see news items from Ithaca).

2. gl_{10} was erroneously reported in the news letter of last year as being linked with f_1. The striped character proved to be v_5 instead of f_1 and the glossy is gl_1 instead of a new gene. Nl_2 was reported as showing linkage with a_1. More extensive counts failed to substantiate this linkage.

3. The names of A. E. Longley and C. E. Sando have been added to the mailing list. Both are with the U. S. Department of Agriculture at Washington, D. C.

We hope to issue another corn letter in the spring. This letter will include such news items as are sent in and a more complete list of genetic stocks.

Sincerely yours,

M. M. Rhoades
B.

MMR:B M. M. Rhoades