MAIZE GENETICS COOPERATION

NEWS LETTER

14

March 5, 1940

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

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

October 31, 1939

To Maize Geneticists :-

Call for material for the 1940 issue of the Maize Genetics Cooperation News Letters. Dead line is January 15th at Ithaca, New York.

The next issue of the News Letters will contain a revised list of all the Co-op stocks. Please send us your material which in your opinion would be desirable to include in the Co-op list. Also include anything that will be of value to other maize geneticists, such as your new linkage data, etc.

Members who attended the Genetical Congress at Edinburgh last summer are particularly requested to send in comments which might be of interest to maize geneticists.

Sincerely yours,

G. A. Lebedeff

G. A. Lebedeff
Secretary

Vol. 14

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

March 5, 1940

To Maize Geneticists:-

Dr. G. A. Lebedeff, secretary of Maize Genetics Coöperation has accepted a position at the Agricultural Experiment Station of the University of Puerto Rico, Rio Piedras, Puerto Rico. I am, therefore, for the present acting as secretary.

This News Letter is presented under the following headings:-

I. Maize gene symbols in publications.
II. General news items.
III. Maize publications.
IV. Inventory of Cooperation seed stocks.
V. Index to seed stocks.
VI. Historical Notes on Maize Genetics Cooperation.

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I. MAIZE GENE SYMBOLS IN PUBLICATIONS

The following statement is quoted from a letter written by Dr. L. C. Dunn, managing editor of Genetics, to Dr. L. J. Stadler, a member of the board of editors:-

> "The chief difficulty from the standpoint of publisher and printer comes from the frequent employment of subscripts which as you know have to be set in by hand and sometimes require special characters to be cast. This represents extra cost to the journals. If it is absolutely essential it must be done, but I'm not convinced that it is essential. In the present paper Al would serve as well as A_1 etc. except that the habit of subscripts has crept in through use. Jones had a rule against them but I notice that he didn't enforce it in Emerson's papers and I haven't either. There's no avoiding superscripts for multiple allelic series, but subscripts aren't generally essential and when both are required, e.g. A_1^b, the system approaches physical limits for the compositor and looks rather absurd. I don't propose any sudden revolution. I do suggest it might be discussed by the maize group,

> keeping in mind that a system needn't necessarily be frozen by the first ten years of use and that economies in publication, if done without harm to clarity and preciseness, give our journals greater stability and security for the future."

Dr. Dunn's example illustrates the confusion which might often result from following his suggestion. Arabic figure "1" in typed manuscript cannot be distinguished from l.c. letter "l". The symbol "al" might be read "a-one" or "albescent". If the literal part of the symbol were always italicized and the numerical part not italicized, there need be no confusion. Or, if the numeral is joined to the letter by a hyphen, there should be no trouble. Again, if the numeral could be set in smaller type than the literal part of the symbol, the printer's problem might be solved, but certainly not the typist's. It seems likely, however, that two sizes of type might be as bad as subscripts for the compositor. In a recent personal conference with Dr. Dunn, he suggested omitting the numeral "1" in all cases. No numeral would then indicate either that there is only one gene with that literal symbol or that it is the first one reported. Thus, we would have a (= a_1) a2, a3, etc. In order that you may see how you like it, the latter plan is followed throughout this News Letter. Let me know what you think of it. The principal difficulty noted in its use here appears first in Anderson's Table (p. 3) where gl3 = glossy 3 not golden 13. In the inventory of seed stocks l7 is not seventeen but luteus 7. Perhaps a period would help, thus: gl.3 and l.7.

R. A. Emerson

II. GENERAL NEWS ITEMS

California Institute of Technology, Pasadena, California

1. Translocations involving the left end of chromosome 1.

Translocation	Cytological position	Linkage map position					
T1-2c	S .7	T 1	sr	ts2	P		
1-9c	S .6	ts2	P	1	T		
1-2b	S .4	ts2	P	4	T		
1-6c	S .3	ts2	P	9	T		
1-3a	S .25	ts2	P	21	T	38.1	br
1-9a	S	ts2	P	20	T	38	br
1-5b		ts2	P	24.4	T	32	br
1-5c		ts2	P	23.6	T	25	br

T1-9a is known to be in the short arm from tests with homozygous T.

Location of br is probably about L .3.

The spindle attachment may be near the map position of as or between as and br.

2. Translocations involving chromosome 4.

Translocation	Cytological position	Linkage map position
T4-6b	S .8	Near Ts5; T 9 su
4-7	S .6	su ± 1.5
4-8	S .6	Near Ts5 and su
1-4		Near Ts5 and su
4-5c		su ± 1
4-10b		su ± 5.5
4-5d	L .2+	su 1 T Tu
4-6a	L .2	su 4.5 T 14.6 Tu
2-4a	L .4	su 3.6 T 13.9 Tu
2-4c		su 9.1 T 30 Tu
2-4d		Near Tu
2-4b		su Tu gl3 15 T
4-9b	L .6	su Tu gl3 21.9 T

Not listed above T4-5a, 4-5b, 4-6c, 4-9a
The spindle attachment is probably somewhere near <u>su</u>.

E. G. Anderson

3. Translocations involving chromosome 2.

Translocation	Cytological position	Linkage map position
T2-3a		close to lg
2-3e		close to lg
2-6b	S .75	gl2 4.2 T 1.4 B
2-3c		gl2 B 0.5 T sk
2-9a	S .65	Near sk
1-2b	S .6	Near sk
2-8		B 4.7 T 6.0 ts
2-3d		sk 8.5 T 12.6 v4
2-4d		sk 28.4 T 8.8 v4
2-6a		B 43 T
1-2a		T 11 v4 (Brink & Cooper)
2-9b	S .1	ts 5.3 T 7.8 v4
2-5a	L .1	sk 17.1 T 7.5 v4
2-5b		ts T v4
2-10	L .2	ts 11.4 T 6.6 v4
2-7b	L .25	ts 15.3 T 5.4 v4
2-7a	L .3	ts 7.2 T 1.1 v4
2-6 (78)		sk T 1.5 v4
2-6c	L .3	ts 11.4 T 1.6 v4
1-2c	L .3	ts 8.3 T 1.1 v4
2-4a	L .3	v4 ± 1.5
2-6d	L .4	v4 ± 5.0
2-7c	L .3 +	ts 13.5 v4 1.1 T
2-3b		ts 4v 4.0 T
2-4b	L .6	ts 4v 5.6 T
2-4c		ts v4 19.0 T 29.2 Ch

The spindle attachment appears to be about half way between <u>ts</u> and <u>v4</u>.

E. G. Anderson and I. W. Clokey

Division of Cereal Crops and Diseases. U.S.D.A., Washington, D.C.

1. Crosses were made in which pollen was collected from individual flowers located in white and green sectors, respectively, of the tassels of iojap plants. The pollen from each flower was used individually on the silks of a plant of an inbred line. The F_2 progenies of these crosses were obtained and grown to determine whether pollen from flowers of the two types of tassel tissue differed with respect to transmission of the iojap character. No differences of any kind could be observed between the F_2 progenies from crosses made with pollen from the two kinds of sectors.

2. Data obtained on a 4-point backcross involving 3039 individuals indicate the following order of the chromosome 7 genes involved:-

<u>o2</u> 8.2 <u>v5</u> 8.0 <u>ra</u> 2.4 <u>gl</u>

Data obtained on a 3-point backcross involving only 192 individuals indicate the order of the three loci involved to be as follows:-

<u>ij</u> 18.8 <u>Bn</u> 37.5 <u>bd</u>

3. In 1938 one of the selfed ears obtained from a selfed line previously inbred for 6 generations was segregating for sugary seeds. Since there was no evidence of out-crossing and none of the ears from numerous sister plants selfed in 1938 and in the same progeny replanted in 1939 from remnant seed segregated for sugary seeds, it seems certain that the sugary gene arose as a mutation. Crosses made in 1939 identified the mutant gene as <u>su</u>.

M. T. Jenkins

4. Deficiencies. A <u>v2</u> deficient plant from X-rayed pollen had a small internal deficiency in the long arm of chromosome 5 near the knob probably proximal to it. A <u>B</u> deficient plant from ultraviolet treated pollen had an apparently terminal deficiency of 2/3 to 3/4 of the short arm of chromosome 2.

5. Translocations from ultraviolet. In a population from pollen treated with ultraviolet 9 decidedly off-type plants (in addition to marked deficiencies) were examined. Presumably all were deficient, though the deficiencies were not marked. The diakinesis configurations were as follows:

- 5 plants had 10 II, 2 with obvious deficiencies.
- 1 plant had 8 II and a ring of 4, a typical interchange complex.
- 1 plant had 7 II and an open complex of undetermined number.
- 2 plants had 8 II and a 3 chromosome open complex.

In each of these last two plants with a 3 chromosome complex a chromosome bridge was frequently seen at anaphase I, and segregations of 9-10, 10-10, and 9-11 were observed. The diakinesis configurations and anaphase segregations can be explained on the hypothesis that two chromosomes with terminal deficiencies have united to form a single chromosome with two adjacent centromeres, the terminal portions having been lost. This hypothesis depends on the assumption that such a chromosome could persist through the life of the plant.

Lillian Hollingshead Hill

6. Summary of *Ws3* - *Lg* - *Gl2* backcross data.

F_1 genotype	0	1	2	1, 2	Total
+ + +	787 808	82 88	146 165	3 2	2081
ws3 lg gl2		8.2%	14.9%	0.2%	

These three loci are all in the short arm of chromosome 2. A high degree of interference is indicated by the coincidence value 0.15.

7. Summary of *Bm* *Bt* *Pr* backcross data

F_1 genotype	0	1	2	1, 2	Total
+ bt pr	135 462	8 3	92 268	2 2	972
bm + +		1.13%	37.04%	0.41%	

Bm-Bt = 1.5%   Bt-Pr = 37.5%

The inequality of the complementary classes is due to the poor germination of *bt* seed.

8. Summary of *Bm* *Bt* backcross data

Genes	Linkage Phase	Bm Bt	Bm bt	bm Bt	bm bt	Total	% Recomb.
Bm Bt	R B	11	359	900	8	1278	1.5

The inequality of the complementary classes is due to poor germination of *bt* seed.

9. Linkage of *Dt* with loci in chromosome 9. Data published in 1938 suggested that *Dt* was linked with *C*. To test this indication the following data ere obtained:

Genes	Linkage Phase	XY	Xy	xY	xy	Total	% Recomb.
Dt Wx	C S	1663	525	690	118	2996	41
Dt Wx	C B	682	465	472	677	2296	40.8
Dt Sh	C S	679	100	156	138	1073	27

These data definitely prove that Dt is in chromosome 9 and further indicate that Dt should lie close to yg2. Tests with yg2 have been handicapped by the fact that all available yg2 stocks are homozygous for recessive c and it has been necessary to extract a yg2 C stock.

10. Effect of varying dosages of Dt. Previous data have shown that a non-linear effect was obtained when different dosages of Dt were present in the aleurone. However the demonstration of several modifying factors affecting the a-Dt reaction made it necessary to secure data bearing on this relationship in an iso-genic stock. Such an iso-genic stock was obtained through repeated self-fertilization of a Dt dt stock -- heterozygous Dt dt seed being used in every generation to further the inbreeding. After 5 years of selfing the F_6 seed was classified into Dt Dt, Dt dt and dt dt classes. For the dosage relation between 1 and 2 Dt genes exact reciprocals were made between Dt Dt and dt dt plants. It was necessary to self Dt Dt individuals to obtain data on the effect of 3 Dt genes. The following data were obtained:

Pedigree	Mean number of mutations in Dt dt dt class (1 Dt)	Dt Dt dt class (2 Dt)	Dt Dt Dt class (3 Dt)
6134-13 x 6131-7 reciprocally	6.8	19.5	
6134-6 x 6131-14 reciprocally	5.9	19.6	
6134-1 x 6131-2 reciprocally	7.8	19.9	
6134-2 x 6131-9 reciprocally	9.1	23.9	
6385-24 x 6386-13 reciprocally	6.7	24.9	
6385-9 x 6386-19 reciprocally	8.3	26.6	
6389-11 x 6390-17 reciprocally	8.4	24.1	
	Mean ratio for 1 Dt : 2 Dt = 1 : 3		
6131-18 selfed			110.1
6131-8 selfed			126.7
6386-2 selfed			128.7

In each determination at least 50 seeds were used. The figures represent the average number of mutations (i.e. dots of color) in the aleurone layer. The mutation frequency in the 3 Dt class is too low. With such large numbers of dots per seed there is considerable overlapping of the mutant areas. Error also enters from the fact that an earlier mutation of one a allele will obscure a latter mutation of a second allele. In the case of 1 and 2 dosages of Dt this is an insignificant matter but it must be taken into account in considering the data from 3 doses of Dt. Due to the extreme difficulty in counting the dots on the 3 Dt class only 3 ears were counted. They were in no way different from the numerous uncounted ears of the same constitution. These data confirm the earlier conclusion that the effect of varying doses of the Dt allele is a non-linear one.

11. Effect of temperature on mutation rate of a allele when plants were matured at two levels of temperature after fertilization. Plants of a Dt constitution were grown at a temperature of approximately 70 degrees F. until flowering. Immediately after pollination they were divided at random into two lots and one placed in a greenhouse maintained around 60 degrees F. and the second lot placed in an adjoining house maintained at or near 80 deg. F. The two lots of plants were left at the two temperature levels until seed was ripened. The mutation rates at the two temperatures were determined by counting the number of aleurone dots. The average mutation rate was determined by counting the number of dots on fifty seeds of each ear except for those ears marked by asterisks where less than fifty seeds were available. The data obtained are given below:

	Mutations per seed	
Pedigree	60 deg. F.	80 deg. F.
6279 x 6329-2	50.2	2.9
" "	47.2	9.0
" "		11.5
" x 6329-3	37.5	9.9
" "	41.2	3.7
" x 6329-1	44.9*	14.5*
" x 6329-6	29.5*	13.5
Total	250.6	65.0
Mean	41.8	9.3

The results listed above are somewhat astonishing and to the writer entirely unexpected. A similar experiment is being conducted this year on a more extensive scale. If the same effect is found it should be possible to determine the critical period at which the temperature change has its effect. It also will permit inferences, or if you wish, guesses, as to the nature of the a-Dt reaction.

12. Mutation of a to different alleles. The frequency of mutation of recessive a in the presence of Dt to the a^p allele as compared to the frequency to the A and A^b alleles can be ascertained by the classification of the aleurone dots into pale and deep colored. However in the aleurone it is impossible to differentiate between the A and A^b alleles and to determine the relative frequency of mutation to these two alleles it is necessary to test the relatively rare

germinal mutations against the P gene. To date twelve germinal mutations giving deep colored aleurone and purple plants, with B Pl, have been tested. Eleven proved to be identical to the A allele while the remaining one gave brown pericarp. Since A^b produces a dominant brown pericarp it will be necessary to test this allele against A in order to find if the brown pericarp color is dominant to the red of A before one can draw the conclusion that it is a mutation to A^b. Irrespective of the outcome of this test it is an allele different from A and a^p and mutations of a to three different alleles have occurred.

There are only two a alleles of different origin. Both of these are mutable in the presence of Dt. It is of some interest that on four occasions mutations of an a allele unstable with Dt have apparently occurred to an a allele which is stable with Dt. Stadler has found an a allele stable with Dt which arose as a mutation in his ultra-violet treatments.

13. Linkage of reverted A alleles with lg2. Four different germinal mutations to A have been tested for linkage against lg2. As expected all four showed approximately 30 percent recombination with lg2. All evidence available indicates that the changes occurring at the a locus are true gene mutations.

14. Effect of Dt on P^{vv}. Plants heterozygous for Dt and carrying the variegation allele for pericarp color were backcrossed by dt p individuals. The F_1 seed was classified into Dt and dt classes and the ensuing ears graded for variegation in a way similar to that employed by Emerson in his studies on variegation. The data are as follows:

	Dt seed		dt seed	
	Number ears	Mean variegation grade	Number ears	Mean variegation grade
	23	4.09	34	4.12
	22	4.09	19	4.05
	22	3.82	31	3.87
	17	4.18	11	4.36
	32	4.06	35	4.00
	30	3.67	38	3.68
	21	4.67	28	4.68
Total	167		196	
Mean		4.08		4.11

These data show there is no effect of the Dt allele on the unstable pericarp gene.

15. Further studies with chromosome 10. Longley (1937, 1938) discovered that certain strains of maize as well as teosinte have an abnormal type of chromosome 10. It differs from the normal in that it has a very considerable piece of chromatin attached to the end of the long arm. Since the locus of *R* is known to be in the distal 22 percent of the long arm (Stadler, 1933) it should be possible to determine the amount of recombination between *R* and the end of the long arm if the extra piece is used as a marker. Dr. Longley was kind enough to furnish a strain with the abnormal tenth. His strain proved to be homozygous for recessive *r* and a ratio of 1 *R* : 1 *r* resulted when pollen from two different strains of *R r* constitution was applied. Plants from the colored seeds of each F_1, heterozygous for both *R* and the abnormal tenth, were backcrossed reciprocally by *r* testers with normal chromosomes 10. The following results were obtained (since the two F_1's gave similar results they are considered together): When the F_1 plants were used as the female parent the ratio of *R* : *r* was 2676 : 7214 while the reciprocal gave close to the expected 1 : 1 ratio. The shortage of *R* seeds suggests that the normal chromosome 10 fails to be included in the functioning megaspore. There are at least two possible explanations: (1) competition among the megaspores so that one with the abnormal tenth develops into the embryo sac irrespective of its position in the linear tetrad of megaspores or (2) selective segregation at meiosis so that the basal megaspore receives an abnormal tenth. On either basis, if there are no exceptions, the *R* class represents crossovers. There was no sterility on the ear proving that the abortion of *r* megaspores cannot be accepted as an explanation. Studies are under way to determine the cause of this unusual ratio as well as to ascertain the recombination value between *R* and the end of the long arm. In connection with the latter problem it is apparent that the true length of a genetic map can never be had from ordinary linkage studies because one never knows how much crossing over occurs beyond the most distally placed locus studied. It is only when cytological markers are used, such as terminal knobs, that the total map length can be measured. This has already been accomplished for the short arm of chromosome 9 by Creighton. This investigation is being conducted by Virginia H. Rhoades.

16. Crossover values in male and female flowers. Studies on the frequency of crossing over for different regions of chromosome 5 in mega- and microsporocytes have been continued. Earlier work by Emerson and Hutchison, Stadler, Eyster, Collins and Kempton, and Rhoades and Rhoades have shown no consistent difference in crossing over for chromosomes 2, 4, 9, and 10 in the male and female flowers. However, a considerable amount of data have been accumulated which show that this does not hold for chromosome 5. These data prove that in the male flowers the frequency of crossingover is greater than in the female. Because of ease in

classifying most of the data are for the a2-bt region. Two different stocks have been used. In one of them a relatively high amount of recombination occurs while in the second stock a much lower value was found. The difference between the high and low stocks is not known but in both higher crossover values in the male flowers was found. Exact reciprocals were made in obtaining male and female crossover percentages.

Summary of high a2-bt line (10 pairs of reciprocals)

	A2 Bt	A2 bt	a2 Bt	a2 bt	% Recomb.
Male	1156	420	414	1103	27.0
Female	1284	256	278	1290	17.2

Summary of low a2-bt line (16 pairs of reciprocals)

	A2 Bt	A2 bt	a2 Bt	a2 bt	% Recomb.
Male	2348	373	410	2590	13.7
Female	1902	110	120	1827	5.8

In addition to the above data on the a2 bt region, data have been obtained on the a2 bm, bm Pr and bt Pr regions. There is a consistent and highly significant increase in crossingover in the male flowers for all of these regions. The data also suggest that the greatest reduction occurs in those regions adjacent to the centromere, i.e. there is a proportionately greater reduction in the a2 bm and a2 bt regions than in the bm Pr and bt Pr regions but, owing to the difference in length of these regions, this point has not been statistically established as yet.

In order to determine if the crossover difference for the two sexes found for chromosome 5 is a cellular characteristic affecting all chromosomes indiscriminately or is peculiar to chromosome 5, tests were made involving the c wx region in 9 and the bm pr region in 5 simultaneously. No difference in crossingover in the two sexes was found for the c wx region.

M. M. Rhoades

Connecticut Agricultural Experiment Station, New Haven, Conn.

1. Further evidence indicating a physiological change in cell activity resulting from breaks and rearrangements of chromosome parts has been obtained from the paired mosaics in the endosperm. In the majority of cases of paired losses of C and Pr, C and Su, Pr and Su, no change in size, arrangement or numbers of cells is apparent. In a few cases marked changes in some or all of these respects are noted. In the same material one part of the paired mosaic area may be affected, in other cases the other part is affected. This means that many chromosomal rearrangements are without any effect upon cell activity other than the subtraction of the

usual action associated with the dominant allele. In the few cases where profound physiological alterations occur it seems apparent that specific places of breakage and reattachment are involved. If the alteration resulted from a shift of growth-controlling regions of the chromosomes or a general unbalance in amount or kind of chromatin material, paired alterations showing the changes in growth would be expected more frequently and both parts of the paired mosaic areas would be affected. A few cases of this latter type are noted but they are not general.

2. Height of plant is noticeably affected by shading. Short plants grown between tall plants at the time of rapid elongation are usually taller than when grown in an unshaded location. Several lots of hybrid sweet corn grown under tobacco shade cloth were taller than the same lots grown in the open. Some inbreds seem to respond to shading more than others. Iowa Kr (Osf) (from Lindstrom) grown between two first generation hybrids was taller in the middle of the row than at either end. Height graduated evenly from both ends toward the center where there was the most shading. Height is also affected by time of planting. Plantings of the same lots of seed at weekly intervals usually show the second planting to be taller than the first. This also may be due in part to the shading of the later plantings by the earlier.

D. F. Jones

3. Recessive sun red. A sun red that segregates as a recessive was obtained from a Whipple sweet corn inbred, 850-17. The color is intense, is sun limited, and the stock has wine colored silks, and red glumes and anthers.

4. Sectorial sun red (Genetics 24:108) induced by ultraviolet pollen treatment, is changed to sectorial purple when crossed by dilute purple A b Pl. Also sectorial sun red shows a linkage (F_2 data) with gl2 and v^4. C.O. percent gl2 and sectorial sun red = 19; between v^4 and sectorial sun red = 32%. These values approximate the crossover values with B, 19 and 21 percents respectively. This is evidence the recessive sun red represents a change from the original B factor that was treated and is not another independent factor acting upon the B gene. This character is being studied further.

5. Effect of female stock on the functioning of sp pollen. In 1938 pollen of sp su/ + + plants was put on two su inbreds Purdue 39 and Connecticut 81. The su seeds obtained (the crossover class with no sp survival) were 39 percent for P39 and 17% for C81. These figures are both too high for the crossover value (6%), and suggested the possibility that the two sweet inbreds had influenced differently the functioning of sp male gametes. Pollen examination of plants produced by these two pollinations verified this assumption. The su seeds from the P39 cross produced plants, 87% of which

were segregating for *sp*. There was only 56% of segregating plants from the C81 cross. By correcting the original "crossover" percents for *su* and *sp* in order to eliminate *sp* survival in the pollen, the true crossover values of 5.1 and 7.4 are obtained. These are both close to the 6% value previously found. These results are soon to be published in the Proc. Nat. Acad. Sci.

6. Fine mottling may completely inhibit color. On an ear segregating for coarse and fine mottling (Maize Coop. 1939 letter) there were six colorless seeds. These produced 5 plants in 1939. One was a contamination, a self-pollination. The other four were segregating for color. In the case of these four seeds the fine mottling factor completely inhibited color production.

W. R. Singleton

7. A method has been developed for studying mitoses in developing endosperm, particularly to correlate types of figures observed with the occurrence of endosperm and aleurone mosaics. Collections made six days after pollination usually had many divisions. Material was fixed according to Randolph's chromo-acetic formula (Randolph, L. F. J. Agr. Res. *53*:881-916). Whole mounts or free hand sections were stained by the usual Feulgen method with the omission of destaining or washing off excess fuchsin in SO_2 water (by putting the tissue from the fuchsin-sulphurous acid directly to water and, as the nuclei become stained, changing the water several times before the usual dehydrating and mounting). Preliminary observations show 4-10 percent abnormal divisions in endosperms collected from stocks giving high rates of mosaic formation.

8. In connection with a determination of the germinating ability of *sp* in competition with normal pollen it was found that pollen could be germinated by placing it on sucrose-agar (10% sucrose and .7% agar from Andronescu, 1915) in depression slides. The method seemed to be applicable, however, only if the humidity is low, since trials in the early summer when the humidity was very high resulted in failure as the pollen grains would burst before germination started.

F. J. Clark

9. A distinctive defective endosperm character was found in an open-pollinated variety that had been selfed one generation. The defectiveness is different from other defective endosperm characters on which histological work has been reported in that it does not result from arrested development but from a breaking down of the endosperm tissue after it has formed. A cavity is formed in the upper central part of the endosperm by the disintegrating process, and the mature seeds are smaller and have a dull mottled milky appearance. The defective seeds also show a tendency to germinate while still on the ear. This character, disintegrated endosperm, (*di*),

is controlled by a single recessive factor, and evidence indicates that it is located on chromosome 2 at approximately 25 crossover units from the B factor and 45 crossover units from lg.

L. M. Roberts

Cornell University, Ithaca, N.Y.

1. In tetraploid maize unimodal curves were obtained from hybrids between self-fertile and self-sterile lines back-crossed to the self-fertile parent; in the back-cross to the self-sterile parent a bimodal curve was obtained, 250 or more individuals being involved in each population. In the F_2 population of the same crosses unimodal or very weakly bimodal curves were obtained.

The F_1 of the incompatible matings between the self-compatible lines (B lg and su) of tetraploid maize reported in the last News Letter was found to be self-fertile, and the back-crosses to the parent lines were also compatible, as indicated by observations on 50 or more ears from each cross. An incompatible mating between the cross-sterile B lg line and a self-sterile B Lg line showed an intermediate degree of self-fertility (37%) in F_1. The backcross to the B lg parent was 37% compatible (28 ears) while the back-cross to the B Lg parent was only 15 percent compatible.

Harold E. Fischer

2. Monosomic Maize. A plant monosomic for one of the shorter chromosomes (undetermined) appeared as a parthenogenetic diploid in a tetraploid stock of maize. A detailed study of meiosis with special reference to the behavior of the univalent was made. The univalent in fifty percent of the 770 cases observed was found to go to one of the poles in division I. In the remaining cases the univalent was not included in the daughter nuclei of division I but remained in the cytoplasm forming a micro-nucleus. Most (74%) of these free dyad univalents were apparently reincorporated into the spindle of division II. This was indicated by a marked reduction in number of free dyad groups in metaphase II as compared with the frequency of micronuclei at interkinesis. Such cells produce microspores with a normal chromosome complement. In cases where the dyad univalent fails to be reincorporated in the spindle of division II, it often forms an independent spindle and divides. As a result of this, microspores containing a micronucleus in addition to the macronucleus are formed (in 1.8% of the microspores). The univalent was observed to divide in 10% of the first division figures. The resultant chromatids do not divide again in the following division but lag or move to one of the poles giving a 10-9 distribution in anaphase II. Pollen examination shows that 54% of the grains are abortive, due presumably to lack of a full chromosome complement. Selfing of the monosomic plant resulted only in diploid progeny and

the same result was obtained when it was used as a pollen parent with normal diploid plants.

Harold E. Fischer and John Einset

3. Vivipary designated as *vp5*, found in Dr. Wiggans' cultures, is closely linked with yellow endosperm, as can be seen from the F_2 data presented below. If it is *Y*, which it probably is, then *vp5* is located in chromosome 6. Classification of *vp5* is good. In cultures where germination has gone too far resulting in discoloration of kernels, classification of endosperm color is difficult.

Last summer's data in regard to *pb*-x confirm the previous observation of its close linkage to *Y*, as shown below. Four *pb* genes are listed in the Linkage Summary, all of them have been lost. Therefore *pb*-x will be designated as *pb5* although it has not been tested for allelism with the other four.

Backcross data for *vp5* and *pb5* follow:

Genes		Phase	XY	Xy	xY	xy	Total	% Recomb.
Vp5	Y	CB	1489	35	33	482	2039	3.3
Pb5	Y	CB	231	1	2	250	484	0.6

G. A. Lebedeff

4. Backcross data involving chromosome 7. Of the three cultures included in the three-point test, the first was grown in the greenhouse in the winter of 1938-39, the second in the garden in the summer of 1939, and the third in the greenhouse in 1939-40.

F_1 genotype	0	1	2	1,2	Total
$\frac{+ \quad v5 \quad gl}{in \quad + \quad +}$	1690-1661	137-48	254-298	71-21	4180
	1258-1258	72-36	137-134	81- 6	2982
	1426-1362	87-53	220-230	17- 6	3401
	4374-4281	296-137	611-662	169-33	10563
	8655	433	1273	202	
		4.1%	12.1%	1.9%	

The marked difference between complementary classes of region 1 and double crossovers are not to be accounted for by differential viability of recessives; for, of the total, *in* plants constitute 48.4%, *v5* plants 48.8%, and *gl* plants 50.1%. A comparison of frequencies of double recessives with those of corresponding double dominants shows that the one double recessive, *in v5*, is principally responsible for the differences between complementary classes. The frequency relations of double recessives to corresponding double dominants are as follows:

In V5 100	*In Gl* 100	*V5 Gl* 100
in v5 37	*in gl* 88	*v5 gl* 99

In view of the approximate equality of *V5* and *v5* plants in this back-cross progeny, it is hard to account for the deficiency of *in v5* plants either on the basis of errors in classifying or a suppressing effect of *in* upon the expression of *v5*, like that of *R* upon *j*. A further study will be made of this second possibility.

A two-point back-cross gave the following:

Phase	In Tp	In tp	in Tp	in tp	Total	% Recomb.
CB	147	65	60	124	396	31.6

The order of these genes is:

in 6 *v5* 14 *gl* *Tp*

A. C. Fraser

5. The g_{Sh} reported last year is allelomorphic with g^4.

6. *mg* often is completely germless. F_2s of one cross contained many germless or even completely empty seeds and few truly *mg* ones. F_2s of another cross had many fewer non-viable seeds and many truly *mg* ones. *mg* seeds are definitely slower to germinate (many never germinate) than normal seeds, and their plants seem to mature 7 to 10 days later than plants from normal seeds. However, the *mg* seeds produce normal sized plants.

7. Several crosses have produced seeds with purple plumules. From F_2 counts it seems that at least 3 and perhaps 4 dominant complementary genes are involved. Classification of *Pu* seems satisfactory in yellow or white seeds.

8. *sb* continues to be abnormal. Many *sb* plants last summer had stiff, very narrow leaves. In some cases these consisted of little but midrib. Plants with such leaves were usually sterile. Pollen was obtained from two for crosses. Ratios in *sb* crosses were again atypical. One F_2 contained 177N:34sb (5:1). Several back-cross cultures contained:

Culture	Sb	sb
1	40	30
2	46	36
3	50	31
4	53	30
5	45	46
Total	234	173

John Shafer, Jr.

My presence in Europe last summer had, it turns out, a deleterious effect on my summer's work at Ithaca - a result not un-fore-seen. For such results as I am able to report, I am indebted to Dr. Lebedeff who did my work in addition to his own.

9. Tassel-seed 3 and tassel-seed 6. - In the News Letter of March 23, 1937 (p. 6), Lindstrom reported *Ts*6 as about 26 units from *gs*. At about that time I had found that *Ts*3 and *an* were closely linked. Since *an* and *gs* are about 27 units apart and since both *Ts*3 and *Ts*6 are dominant genes, it seemed possible that the two were alleles. Data obtained during the past summer though not wholly satisfactory indicate that *Ts*3 and *Ts*6 are not allelic. The data follow. (See also Lindstrom's report in this News Letter.)

F_1 genotype	0	1	2	1, 2	Total
$\frac{+\ \ Ts3\ \ +}{an\ \ +\ \ gs}$	62-70 132	17-0 17 9.3%	5-22 27 14.8%	7-0 7 3.8%	183
$\frac{+\ \ +\ \ Ts6}{an\ \ gs\ \ +}$	58-37 95	16-6 22 14.4%	13-7 20 13.2%	10-5 15 9.9%	152
$\frac{+\ \ Ts3\ \ +}{an\ \ +\ \ bm2}$	59-26 85	10-1 11 7.8%	18-24 42 29.8%	2-1 3 2.1%	141
$\frac{+\ \ +\ \ Ts6}{an\ \ bm2\ \ +}$	81-41 122	23-4 27 17.5%	5-0 5 3.3%	0-0 0	154

If taken as they stand, these data indicate that *Ts*3 is between *an* and *gs*, while *Ts*6 is to the right of *gs* and probably to the right of *bm*2. It will be noted, however, that homologous recombination classes are far from equal. The first entry of the table shows a considerable deficiency of *Ts*3 plants and the second entry exhibits a similar deficiency of *an* plants. In the third and fourth entries, respectively, *Ts*3 and *Ts*6 are in excess of 50 percent, while *an* and *bm*2 are deficient. But such evidence as is available, if any, suggests that *Ts*3 is near *an* and *Ts*6 near *bm*2.

10. Locus of knotted. - In the News Letter of March 26, 1938 (p. 5), Bryan reported *Kn* 26 units from *br* and 24 units from *bm*2. These data suggest that *Kn* is between *an* and *gs*. The few data obtained last summer are in agreement with this indication, as follows:

F_1 genotype	0	1	2	1, 2	Total
+ Kn + an + gs	49-32 81	9-14 23 20.0%	0-8 8 7.0%	2-1 3 2.6%	115
+ Kn + an + bm2	56-44 100	26-7 33 18.6%	24-14 38 21.3%	7-0 7 3.9%	178

If, as is suggested above, *Kn* and *Ts3* are between *an* and *gs* and *Ts6* near *bm2*, *Kn* should show much closer linkage with *Ts3* than with *Ts6*. This is borne out only in part by the following back-cross data.

	XY	Xy	xY	xy	
Kn Ts3	3	9	16	2	= 16/30 = 16.7%
Kn Ts6	8	27	47	13	= 21/95 = 22.1%

11. The order of *br* *f* *an* . - There were published in the Linkage Summary 1935 (p. 35), three-point tests involving 960 individuals which indicated that the order is as given above. Bryan, in the 1938 News Letter (p. 5), reported four-point tests with 293 individuals involving *br*, *f*, *Kn*, and *bm2* which indicated that *f* is to the left of *br*. An attempt was made last summer to check this situation. A total of 1352 individuals were noted, but only 34 per cent of them were recorded as *f*. Moreover both orders of the genes indicated double crossovers as more numerous than singles in one region and equal to singles in the other region. It is obvious that many *f* plants were recorded as normal. This is not unlikely in cultures such as these in which *f* was poorly expressed. It seems likely that plants recorded as *f* were certainly of that nature. The following data, therefore, include only the *f* plants.

F_1 genotype	0	1	2	1, 2	Total
+ + + br f an	347	22 4.8%	77 17.0%	7 1.6%	453

12. Further data on chromosome 1 translocations. In my paper on *zl* (Genetics 1939, p. 382), in which many previously unpublished data from Anderson were used, it was shown that Tl-5b, 1-5c, and 1-3a have their breaks between *P* and *br*, and that the Tl-2c break is near *sr*. A few further data are now available, and are presented in the accompanying table.

F_1 genotype	0	1	2	1, 2	Total
T1-2c + + + sr P	6251 113	23 5 3.2%	2018 38 24.0%	0 2 2 1.3%	158
+ P + sr + T1-9c	99 112 211	17 22 39 15.1%	1 5 6 2.3%	0 2 2 0.8%	258
P + br + T1-9c +	30 21 51	1 4 5 5.9%	12 17 29 34.1%	0 0 0	85
T1-9c + + + br an	16 22 38	23 21 44 45.8%	3 8 11 11.5%	3 0 3 3.1%	96
+ + T1-5b sr P +	59 40 99	28 19 47 27.6%	8 12 20 11.8%	3 1 4 2.4%	170
P + br + T1-5b +	52 60 112	11 8 19 11.2%	16 18 34 20.0%	4 1 5 2.9%	170
T1-3a + + + br an	75 54 129	28 53 81 32.0%	13 15 28 11.1%	12 3 15 5.9%	253
T1-9b + + + br bm2	26 35 61	1 2 3 3.4%	10 15 25 28.2%	0 0 0	89

Although these data are not wholly consistent, they indicate that T1-2c is near _sr_ and to its left, that T1-9c is near _P_ and to its right, and that T1-9b is near _br_ and probably to its left.

13. Tests of miscellaneous genes with chromosome 1 markers. - Six genes, not previously linked, have been tested with several loci of chromosome 1. On the next page are shown the number of individuals and per cent of recombination in each F_2 test.

New	sr		ms17		P		br		an		gs		bm2	
genes	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%
at	149	50			113	42	149	51	49	60	49	60+		
na2	17	42	47	48	72	50			85	60+	85	60+		
ms5	148	43			100	40	290	50	142	47	87	34	55	51
ms43	80	32			258	49	258	45	83	29	95	47	83	43
yg3	44	8			38	53	82	55	38	55	38	60+		
v19					82	52	88	58	88	51			87	19 (-)

These tests, though mostly quite inadequate, are suggestive of one and perhaps two linkages (Relatively little seed was obtained from the Florida plantings last spring; adequate material is available for tests next summer.) Suggestion of linkage of ms^{43} with either sr or an is probably of no significance because of the great deficiency of ms^{43} in the one instance and of an in the other. There were few yg3 plants in the test with sr. It seems likely that v19 may be linked with bm2. The F_2 distribution was 42-25-21-0.

14. Differential dominance in number of kernel rows. - One of the F_1's used by Dr. Wiggans in the production of double-cross 29-3 is a cross of a 12-row inbred line #2 (Onondaga White) with an 8-row line #1 (Luce's Favorite). The F_1 plants show a high percentage of 8-row ears. Golden Cross Bantam, on the other hand, has a considerable percentage of 12-row ears, though also a cross of a 12-row line (Purdue 39) with an 8-row line (Purdue 51). This striking difference suggested a comparison of F_1's from crosses of the two 8-row lines, 1 and 51, noted above, with ten 12-row lines, including 2 and 39 noted above. The results of one season's test are given in summary form in the accompanying tabular statement which shows the mean number of kernel rows in F_1 of crosses between 8-row and 12-row inbred lines.

Inbred lines			F_1 crosses with Line 1		Line 51		Difference in number rows
Designation	Number plants	Mean number rows	Number plants	Mean number rows	Number plants	Mean number rows	
1	57	7.84					
51	88	7.95					
2	49	12.04	82	8.76	88	10.34	1.58
3	59	12.27	92	9.07	86	10.58	1.51
4	63	12.38	86	9.16	80	9.95	.79
39	95	12.02	71	9.77	90	11.36	1.59
II	59	12.34	56	9.57	86	9.93	.36
III	69	11.80	75	9.28	47	9.53	.25
VI	50	12.04	60	8.90	54	9.89	.99
VII	107	12.28	120	9.15	91	10.13	.98
B	97	12.10	85	9.04	73	10.41	1.37
G	74	12.11	93	9.05	37	10.05	1.00
Average 12-row and F_1 lines		12.14		9.18		10.21	1.03

In every case the F_1 row number was higher (0.25 to 1.59) where line 51 was the 8-row parent than where line 1 was used; and the average difference was one kernel row. Of the twenty F_1 lots, the lowest row number was in the cross of 1 with 2 and the highest in 51 with 39. The frequency distribution of the four F_1 lots from crosses of these four lines are as follows:

Inbred lines		Frequency distribution for row number					
8-row	12-row	8	10	12	14	Total	Mean
1	2	51	31			82	8.76
1	39	16	47	8		71	9.77
51	2	14	45	29		88	10.34
51	39	1	29	58	2	90	11.36

Not only do the two 8-row lines differ, #1 tending more strongly than #51 to give low row number in F_1, but #39 tends more strongly to give high row number than does #2.

15. Heterosis of number of kernel rows. - In every one of the crosses of the #1 8-row line with the ten 12-row lines, the average row-number of the two parent lines is greater than that of the corresponding F_1. Of the ten F_1's involving the same 12-row lines with 8-row line 51, four have mean row-numbers greater than, four less than, and two equal to the average of the two parental lines. It is perhaps noteworthy that the F_1 mean of the 1-2 cross differs from the parental average by -1.8 rows, of the 1-39 cross by -0.16, of the 51-2 cross by +0.35, and of the 51-39 cross by +1.38. If the last of these crosses alone had been under observation the result might well have been termed heterosis - and perhaps correctly so. There is certainly nothing in the general averages to suggest heterosis of row-number. The average of all F_1's involving line 1 is less than the average of parental means by 0.81 rows and of those involving line 51 is greater than the parental averages by one 0.17 rows.

Records were also obtained last season from F_1 cultures whose parental lines had approximately equal numbers of kernel-rows. The data are given in the accompanying table showing the mean number of kernel rows of inbred lines and their F_1 progenies.

Inbred lines			F_1 progenies	
Designation	Mean number rows	Average	Mean number rows	Differences
1 51	7.84 7.95	7.90	8.10	0.20
2 4	12.04 12.38	12.21	12.41	0.20
2 II	12.04 12.34	12.19	12.61	0.42
2 39	12.04 12.02	12.03	12.37	0.34
39 4	12.02 12.38	12.20	12.58	0.38

39 II	12.02 12.34	12.18	13.19	1.01
II 4	12.34 12.38	12.36	12.53	0.20

Individually, most of these differences in number of kernel rows are not statistically significant. They are, however, all positive and, as a whole, are definitely significant. In general it appears, therefore, that some, though slight, heterosis is shown in number of kernel rows.

16. Influence of soil fertility on kernel-row number. Some years ago two 12-row inbred lines and the F_1 cross were grown on sand of extremely poor fertility and on very rich soil. The test was carried on during two seasons and the number of plants involved were 281 on rich soil and 287 on poor. The row-number means are compared in the following table:

	Rich soil	Poor soil	Difference
Inbred A	12.6	11.1	1.5
Inbred B	12.3	10.6	1.7
F_1 A-B	12.4	11.5	0.9
All	12.4	11.1	1.3

The effect of extreme differences in soil fertility on number of kernel rows is obviously greater than that shown as heterosis. Neither effect is sufficient seriously to mask genetic differences in studies of kernel-row numbers.

R. A. Emerson

17. Brittle stalk-2 (bk2). Plant appears normal, but the leaves, stalk, ear, and all parts break easily under pressure. Viability good. Classification good at all stages of development by bending the leaves sharply.

The seed was originally received by the Maize Genetics Cooperation from L. C. Raymond, of Quebec. A test for allelism with *bk* was negative (News Letter, March 23, 1937, p. 1). Brittle stalk-x (*bk*-x) reported by Wiggans (News Letter, March 6, 1938, p. 12) proved to be an allele of *bk*2 (News Letter, April 15, 1939, p. 12).

*Bk*2 is linked with *sh* and *wx* in chromosome 9 as shown by the following F_2 data:

F_1 genotype	F_2 progenies			
$\frac{sh\ wx\ +}{+\ +\ bk2}$ selfed	sh wx +	29	sh wx bk2	1
	+ + bk2	37	+ + +	95
	sh + bk2	3	sh + +	11
	+ wx +	28	+ wx bk2	0
		Total = 204		

sh - wx = 22%   wx - bk2 = 15%   sh - bk2 = 35%

18. Chromosome 9. - Linkage of g^4 and wx:

Genes	Linkage Phase	G^4 Wx	G^4 wx	g^4 Wx	g^4 wx	Total	% Recomb.
G^4 Wx	CS	379	4	11	32	426	5

19. Vestigial glume (Vg) and Tunicate (Tu). The two dominant genes Vg (Sprague, 1939) and Tu (Collins, 1917) have opposite effects on the length of the glumes in both the staminate and pistillate inflorescences of maize. Vestigial glume, as the name implies, exposes the anthers and removes most of the glumes from the ear; whereas Tunicate incloses the anthers in long glumes and the individual kernels in husk-like structures. In view of these differences, would a plant with the genetic constitution Vg Tu be like Vg? or Tu? or neither of them? In the progeny of a cross of Vg/vg x Tu/tu four types of plants were observed:

Phenotype (length of glumes)		Probable Genotype
Staminate Inflorescence	Pistillate Inflorescence	
Vestigial	Long like Tu, but more narrow	Vg vg Tu tu
Vestigial	Vestigial	Vg vg tu tu
Tunicate	Tunicate	vg vg Tu tu
Normal	Normal	vg vg tu tu

Since ordinarily the length of the glumes in the tassel is directly correlated with the length of those on the ear, it is difficult to explain why, in plants with the genetic constitution Vg vg Tu tu, Vg shows epistasis to Tu in the tassel and not on the ear. It has been noted, however, that some times plants heterozygous for Tu do not have exceptionally long glumes in the tassel. Perhaps there is an upper limit to the length of glume that Vg is able to reduce to a miniature size. Further tests should be made to note the appearance of plants with the genetic constitutions Vg Vg Tu Tu, Vg Vg Tu tu, and Vg vg Tu Tu. This material would not be easy to obtain as plants homozygous for Tu are usually male and female sterile. Likewise, Vg Vg plants are difficult to produce as Vg vg must be grown under very favorable greenhouse conditions to obtain viable pollen.

D. G. Lamgham, Estacion Experimental,
El Valle, D. F. Venezuela

Cornell University and Division of Cereal Crops and Diseases

1. In an F_2 population of perennial teosinte obtained from seed brought from the original station in Mexico, an aberrant individual appeared in which the meiotic chromosome behavior was similar to Beadle's "asynaptic." Synapsis was essentially normal up to early diakinesis. Thereafter desynapsis caused an almost complete disappearance of quadrivalents and bivalents at metaphase. The scattered arrangement of univalents in the meta-anaphase stage strikingly resembled incompatible hybrid chromosome behavior. The mutant is highly cross- and self-sterile although the pollen was approximately 35% well filled. Fortunately, it can be maintained easily for further tests by vegetative propagation.

L. F. Randolph and Harold E. Fischer

2. Attempts to produce true breeding, highly self-fertile and highly self-sterile lines of tetraploid maize by inbreeding and selection thus far have not been very successful. Lines inbred 5-8 years continue to segregate for varying degrees of self-fertility. However, relatively high levels of fertility can be maintained by selecting the most fertile ears in each generation, and self-sterile ears tend to produce mostly self-sterile progeny.

3. Haploid frequencies reported in the News Letter of March, 1938, from untreated and X-rayed pollen involving 150,000 seedling counts indicated that X-raying the pollen materially increased haploid frequencies in maize. Since then additional counts have been made and the numbers at this time are sufficiently large to warrant a comparison not only of frequencies from X-rayed and untreated pollen, but also frequencies in different stocks. These stocks included an inbred line, designated A in the table; a 3-way hybrid involving this same inbred line as one of the 3 inbred parents (B); a commercial strain of Golden Bantam sweet corn (C); a genetic *a*-tester stock (D); and a group of miscellaneous stocks (E), no one of which was large enough for significant comparison. Haploid frequencies per thousand plants in the several stocks from untreated and from X-rayed pollen (1500 r) are given in the following table:

Stock	Number of plants untreated 2N	N	X-rayed 2N	N	Frequency per 1000 untreated	X-rayed	Difference
A	23,230	24	12,715	16	1.03	1.26	0.23
B	21,010	13	7,280	7	.62	.96	.34
C	51,845	27	30,735	27	.52	.88	.36
D	53,427	6	26,045	9	.11	.35	.24
E	21,922	20	7,480	10	.91	1.33	.42
Total	171,434	90	84,255	69			
Mean					0.64	0.96	0.32

There was a consistent increase in the frequency of haploids among the X-ray progenies, the average increase being 50 per cent. The dosage used (1500 r) decreased the yield of viable seed approximately 50 per cent and also materially increased the difficulty of making classifications. If odds of 40:1 be taken to indicate significance, the least significant difference in frequency of haploids per thousand between untreated and X-rayed pollen in any one stock is 0.18. The least difference observed (stock A) is 0.23 with odds of 66:1 against such a difference being due to errors of random sampling. By the same criterion, the least significant difference for the five stocks together is 0.11, while the observed mean difference is 0.32. The odds here are many thousands to one against so consistent a difference being due to chance alone.

A similar comparison of the different stocks shows that stock A is not significantly different from stock E, and B not different from C. Stock C, and possibly stock B, differs significantly from stock A, and stock D differs from all the others. (See also Stadler, this News Letter). It was expected that the haploid frequency in inbred lines and their hybrids would be relatively high, due to the elimination during inbreeding of deleterious genes which might be lethal in the haploid state; but there is no obvious explanation of the extremely low frequency noted in the *a*-tester stock (D). The haploids which did appear in this stock were as vigorous on the average as those in the other stocks with the exception of the inbred line and the 3-way hybrid whose haploids were uniformly more vigorous than those of the other stocks.

The identification of the haploids was made with the aid of recessive endosperm and seedling genes, stomate examination in the seedling stage, and final verification with root tip chromosome counts. The frequencies thus obtained are to be interpreted as minimum frequencies, since it is unlikely that all of the haploids were identified. Only seeds with hybrid (presumably triploid) endosperms were included in the study. All of the haploids obtained were maternals, although paternal haploids were looked for in some of the crosses which involved easily recognizable recessive seedling characters contributed by the pollen parent.

L. F. Randolph

Duke University, Durham, North Carolina

Lg3 is not an allele of *lg2*. This has been shown by the presence of normal plants in backcross and F_2 from the cross *lg2* x *Lg3*. The following three-point data indicate that *Lg3* lies about two points to the left of *Rg*. (The linkage map for chromosome 3 should have *cr* at the left end and *a* at the right. The Linkage Summary was in error.
R. A. E.)

F_1 genotype	0	1	2	1,2	Total
+ Lg3 +	483 441	136 155	10 11	5 4	
ds + Rg	924	291	21	9	1245
		23.4%	1.7%	0.7%	

H. S. Perry

Iowa State College, Ames, Iowa

1. Three point test on chromosome 1, involving a new dominant tassel-seed, *Ts6*, originating from a 'freak ear' in the Iowa Corn Show about 9 years ago:

F_1 genotype	0	1	2	1,2	Total
+ + Ts6	93 83	94 59	1 1	0 1	
br bm2 +	176	153	2	1	332
		46.1%	0.6%	0.3%	

Ts6 is recommended as a first class, useful marker exhibiting sharp segregation and producing good normal ears (rows characteristically irregular) when tassel is pulled early.

2. Two point tests on chromosome 1.

Genes	Phase	XY	Xy	xY	xy	Total	% Recomb.
Ts6 F	CB	21	17	20	32	90	41.1
Ts6 Gs	CB	128	37	46	113	324	25.6

Order of genes in chromosome 1 would then be: *br f gs bm2 Ts6*. (See also Emerson, this News Letter)

3. Natural mutation of *Y* gene from *Yy* to *yy* in one kernel among 12 crossed ears (totaling over 7200 kernels). Female parent in crosses was a standard long-time inbred yellow dent line; male parent a white, Hickory King inbred.

E. W. Lindstrom

Iowa State College and Division of Cereal Crops and Diseases, U.S.D.A.

4. The first group of F_2 data, below, suggests that g2 is on chromosome 7. Mumm's soft starch character, *hh*, carries an inhibitor for japonica. Neither *bm3* nor *vl3* show close linkage with *j*.

Genes	Phase	XY	Xy	xY	xy	Total	% Recomb.
G2 Lg	RS	353	102	116	40	611	47
G2 Wx	RS	371	109	98	33	611	48
G2 Rg	CB	75	69	62	74	280	47
G2 Ij	RS	310	118	101	3	532	20
Bd G2	RS	221	94	89	13	417	35
J Bm3	RS	216	81	65	13	377	41
J Vl3	RS	168	74	38	12	292	45

G. F. Sprague

University of Minnesota, St. Paul, Minnesota

1. I have tested yellow green-3 with a trisomic for chromosome 8, and have found evidence that yg3 is not in that chromosome.

2. The gl4 which was reported by Dr. Hayes to be linked with wx; is genetically different from the one that Sprague is calling glossy-4, as shown by an intercross between the two. Since the linkage relations of this one are known, may I suggest that this one be called gl4 and the one of Sprague's given a new number; unless there are some reasons why this is not feasible.

3. I spent most of my time last summer recuperating my stocks, some of which had reached such an age that I had difficulty in getting them to germinate. However, we had an extremely favorable season and in most cases I was able to get material established. I used a few of the trisomic stocks from the Coop. last year. While I did not study them intensively, it did seem that certain of them needed further checking to be certain that they are still satisfactory for linkage work. One of the difficulties seems to be the presence of B types which was mentioned by Dr. Langham at the time he sent them to me. However, one or two of the other stocks also seemed to have some other difficulties. The stock of No. 5, for example, did not seem to behave as usual; in fact I was unable to recognize any trisomic plants in the field.

C. R. Burnham

Burnham is not alone in having trouble with the trisomics. It's a job for some cytogeneticist - which I am not. R.A.E.

University of Missouri, Columbia, Missouri and Division of Cereal Crops and Diseases. U.S.D.A.

1. Etched endosperm-virescent seedling. This character symbol et, arose as a mutant in an X-ray progeny, and the endosperm and seedling effects are very closely if not completely linked. The endosperm is similar to some of the scarred endosperms previously reported but is more distinctly marked and usually permits a good separation. The seeds are sometimes reduced in size but have good viability. The seedling type is an excellent one, both for sharpness of segregation and for viability. Data from a three-point test, as given below, indicate the order of genes to be lg2 a et, with et the outermost gene on the long arm of chromosome 3, about 12 units beyond a.

F_1 genotpye	0	1	2	1,2	Total
$\frac{+\ \ a\ \ et}{lg2\ \ +\ \ +}$	126 135 261	60 55 115 26.9%	20 25 45 10.5%	3 3 6 1.4%	427

2. Notes on haploids. In seedling progenies grown from X-rayed pollen and ultraviolet treated pollen, a large number of haploids was found. The frequency of haploids in the ultraviolet progenies was somewhat higher than in the X-ray progenies, though in both cases the frequency was not very greatly increased over the control. An interesting feature was a distinct tendency for haploids to occur more frequently in progenies of certain female parents than of others; in fact, the untreated female parent had a greater influence on the haploid frequency than the treated male parent. This suggests that the factor limiting haploids may be their inability to survive to the seedling stage, and that a considerable number of haploids may be included among the "germless seeds" resulting from the use of irradiated pollen. (See also Randolph, this News Letter)

Fifty-five haploids were transplanted to the field and grown to maturity. They showed rather surprising fertility. Forty-one of them produced silks, several from two ears, and all of the ears were pollinated. Twenty-seven of the forty-one plants set seed, and ten of these yielded ten or more seeds per plant. The highest numbers of seeds harvested per plant were 97, 47, and 43 respectively, in each case from a two-eared plant."

L. J. Stadler

North Carolina Experiment Station, Raleigh, N. C.

1. Last spring a total of 1203 first generation selfed ears were examined for deficient kernels. Out of this lot 84 ears were found which appeared to be segregating for deficient kernels. This means that on the average 6.98% of all plants selfed in the eighteen Southern varieties were heterozygous for some deficient kernel character. Chi-square applied to these data proved definitely that these varieties do not have the same gene frequency for deficient kernels. Indian Chief has significantly fewer heterozygous plants (0.7%), Mathewson's Golden Prolific and Wood's Golden Prolific approached significance in having fewer than average heterozygous plants. Golden Queen (20.0%) and Biggs' Two Ear (10.5%) have significantly more heterozygous plants than the average of all varieties.

2. In an inbred strain of Yellow Horsetooth two selfed ears were found to be segregating for rootless. Dr. Jenkins pointed out this character last June in our breeding field. The rootless segregates have all the characteristics of plants of <u>rt rt</u> type (Jenkins, 1930; Cornell Memoir 180, p. 20, 1935). If crosses with <u>rt</u> stock prove it to be the same mutant it will be the second occurrence of this distinct root mutation. Our strain has never been grown in close proximity to any <u>rt</u> stock.

Paul H. Harvey

Agricultural and Mechanical College of Texas. College Station, Texas

1. Further studies on chromosome knobs of South American varieties have shown that the majority of varieties from Peru, Bolivia, and Ecuador have knobless chromosomes. This supports our previous suggestion that the Andean region, which we regard as the primary center of domestication of maize, is the only region where pure maize has not been largely replaced by Tripsacum-infected varieties. If this is true most of the stocks of North American maize with which the majority of genetic and cytological studies are conducted are probably polyploid for certain regions of the chromatin. This may account for the fact that some very minute deficiencies are quite deleterious while other larger deficiencies have no appreciable effect.

2. There seems to be a possibility that a wild or feral type of maize is still in existence in Paraguay. A botanical collector in Paraguay with whom we have been in correspondence has sent us a specimen of a maize plant which he claims to have found growing in a colony in a clearing in the forests miles away from human habitation. The specimen was small and earless but bore at the base of the unbranched tassel, pistillate spikelets enclosed in glumes. It differed from any stunted corn which we have previously seen in having the staminate and pistillate portions of the inflorescence distinctly separated. Seed of this peculiar type has not yet been obtained but seed from a variety cultivated by the Guarany Indians in the same general locality gave rise to plants with knobless chromosomes. This is the first variety of maize with knobless chromosomes which we have received from the lowlands of South America. We should, of course, on the basis of our hypothesis expect wild maize to have knobless chromosomes.

3. Additional linkage studies in crosses of Florida teosinte with various genetic stocks show that translocation segments A and C are located at opposite ends of chromosome 4, as indicated by our previous data. Both show linkage with su and gl3. Segment B is located on chromosome 1 showing fairly close linkage with P and a slight indication of linkage with bm2. Segment D appears to be located on chromosome 9 and shows linkage with wx.

4. When Chalco and New teosinte are crossed the F_1 hybrid has paired pistillate spikelets although both parents have unpaired spikelets.

Florida, Durango, Nobogame, and New teosinte have been crossed with a uniform inbred strain and the F_1 hybrid backcrossed to the same strain to obtain populations in which all the genetic variation is due to segregation of genes from teosinte. These populations show that the major part of the segregation is due to the four blocks of genes or translocation segments which we assume to have been derived from Tripsacum. Durango has the same four segments found in Florida, but they have less effect which suggests that they may be smaller and contain fewer Tripsacum genes. Nobogame teosinte contains only three of the four segments found in Florida and Durango teosinte. The New teosinte hybrids have not yet been classified. All of the data support our assumption that the Guatemalan teosintes represent the primary products of the hybridization of Zea and Tripsacum, while the Mexican teosinte are secondary or tertiary products.

P. C. Mangelsdorf and R. G. Reeves

III. MAIZE PUBLICATIONS

Maize publications that have appeared since the 1939 News Letter was issued together with a few earlier papers are listed below.

Abbe, L. B. - The histological background for dwarfism in Zea mays. Amer. Phil. Soc. Proc. 76: 743-747. 1936.

Anderson, E. G. - Translocations in maize involving chromosome 8. Genetics 4: 385-390. 1939.

Akemine, T. - Chromosome behavior in the intergeneric hybrids of Tripsaceae. Japan Jour. Genetics 14: 66-73. 1938.

Aleksandrov, V. G. and Iakovlev, M. S. - Die morphologie des korus und der bau des endosperms bei verschiedenen formen von Zea mays L. (Russian with German summary). Jour. Bot. U.R.S.S. 20: 245-281. 1935.

Arnason, T. J. - Cytogenetics of hybrids between Zea mays and Euchlaena mexicana. Genetics 21: 40-60. 1936.

Beadle, G. W. - Chromosome aberration and gene mutation in sticky chromosome plants of Zea mays. In Cytologia, Fujii Jubil. Vol. Tokyo, pp. 43-56. 1937.

____________ - Teosinte and the origin of maize. Jour. Hered. 30: 245-247. 1939.

Blaringhem, L. - Sur une variété nouvelle, a grains de teinte acajou, du Zea mays forme polysperma. Compt. Rend. Acad. Sci. Paris 203: 1477-1481. 1936.

____________ - Origines et destinee du mais a graines multiples (Zea mays var. polysperma). Contribution a l'heredite des caracteres acquis. Ann. Sci. Nat. X, Bot. 19: 33-42. 1937.

Brink, R. A. - Heritable characters in maize. XLIX. Pale midrib. Jour. Hered. 26: 249-251. 1935.

Burnham, C. R. and Cartledge, J. L. - Linkage relations between smut resistance and semisterility in maize. Jour. Amer. Soc. Agron. 31: 924-933. 1939.

Capinpin, J. M. - A lethal-linked kernel variation of Lagkìt corn. Philipp. Agr. 27: 866-874. 1939.

Collins, G. N. and Longley, A. E. - A tetraploid hybrid of maize and perennial teosinte. Jour. Agr. Res. 50: 123-133. 1935.

Collins, G. N. and Maxwell, L. R. - Delayed killing of maize seedlings with X-rays. Science 83: 375-376. 1936.

Cooper, D. C. - Macrosporogenesis and embryo-sac development in <u>Euchlaena mexicana</u> and <u>Zea mays</u>. Jour. Agr. Res. 55: 539-551. 1937.

Cooper, D. C. and Brink, R. A. - Chromosome homology in races of maize from different geographical regions. Amer. Nat. 71: 582-587. 1937.

Dawson, C. D. R. - An example of the quasi-factorial design applied to a corn breeding experiment. Annl. Eugen. 9: 157-173. 1939.

Emerson, R. A. - A zygotic lethal in chromosome 1 of maize and its linkage with neighboring genes. Genetics 24: 368-384. 1939.

Fraser, A. C. - Some materials for genetic instruction. Jour. Heredity 30: 375-378. 1939.

Groner, W. G. - Respiration of green and chlorophyll deficient types of maize. Amer. Jour. Bot. 23: 381-385. 1936.

Hadjinov, M. I. - A dominant mutable gene for purple colour in the <u>R</u> series of multiple allelomorphs in Maize. Compt. Rend. (Doklady) Acad. Sci. U.R.S.S. 23: 366-369. 1939.

Holbert, J. R., Flint, W. P., Bigger, J. H., and Dungan, G. H. - Resistance and susceptibility of corn strains to second brood chinch bugs. Iowa State College Jour. Sci. 9: 199-212. 1935.

Janaki Ammal, E. K. - A Saccharum-Zea cross. Nature 142: 618-619. 1938.

Jenkins, Merle T. - The effect of inbreeding and of selection within inbred lines of maize upon the hybrids made after successive generations of selfing. Iowa State College Jour. Sci. 9: 215-236. 1935.

Jenkins, Merle T. - Crop improvement. U.S. Dept. Agr. Yearbook 1936: 455-522. 1936.

________________ - New developments that may affect the corn industries. The importance of corn hybrids to the corn industry. Contr. Iowa Corn Res. Inst. 1: 208-212. 1939.

________________ - The segregation of genes affecting yield of grain in maize. Jour. Amer. Soc. Agron. 32: 55-63. 1940.

Jones, D. F. - Somatic segregation due to hemizygous and missing genes and its bearing on the problems of atypical growth. Proc. Nat. Acad. Sci. 21: 90-96. 1935.

____________ - Segregation of color and growth-regulating genes in somatic tissue of maize. Proc. Nat. Acad. Sci. 22: 163-166. 1936.

____________ - Sex intergrades in dioecious maize. Amer. Jour. Bot. 26: 412-415. 1939.

____________ - Continued inbreeding in maize. Genetics 24: 462-473. 1939.

Jones, D. F. and Singleton, W. R. - The improvement of naturally cross-pollinated plants by selection in self-fertilized lines. II. The testing and utilization of inbred strains of corn. Conn. Agr. Exp. Sta. Bull. 376: 653-691. 1935.

Johnson, I. J. and Hayes, H. K. - The combining ability of inbred lines of Golden Bantam sweet corn. Jour. Amer. Soc. Agron. 28: 246-252. 1936.

Kempton, J. H. - Modification of a Mendelian ratio in maize by pollen treatments. Jour. Agr. Res. 52: 81-121. 1936.

______________ and Popenoe, W. - Teosinte in Guatemala. Report of an expedition to Guatemala, El Salvador, and Chiapas. Mexico. Carnegie Inst. Washington Publ., 483: 199-218. 1937.

Khadzhinov, M. I. - New cases of liguleless in maize. Bull. Appl. Bot., Gen., and Pl. Breed. Ser. II. 7: 269-275. 1937.

________________ - Genes of rough sheath in maize. Bull. Appl. Bot., Gen., and Pl. Breed. Ser. II. 7: 247-258. 1937.

________________ - Genes of glossy seedlings in maize. Bull. Appl. Bot., Gen., and Pl. Breed. Ser. II. 7: 227-246. 1937.

Khadzhinov, M. I. - A new character in maize; ramosasilkless structure of inflorescence. Bull. Appl. Bot., Gen., and Pl. Breed. Ser. II. 7: 259-267. 1937.

Koehler, B. - Crazy top of corn. Phytopath. 29: 817-820. 1939.

Langham, D. G. - The inheritance of intergeneric differences in Zea-Euchlaena hybrids. Genetics 25: 88-107. 1940.

Lindstrom, E. W. - Genetic experiments on hybrid vigor in maize. Amer. Nat. 69: 311-322. 1935.

______________ - Some new mutants in maize. Iowa State College. Jour. Sci. 9: 237-245. 1935.

Longley, A. E. - Chromosomes of maize from North American Indians. Jour. Agr. Res. 56: 177-195. 1938.

______________ - Knob positions on corn chromosomes. Jour. Agr. Res. 59: 475-490. 1939.

Mangelsdorf, P. C. and Reeves, R. G. - A trigeneric hybrid of Zea, Tripsacum, and Euchlaena. Jour. Heredity 26: 129-140. 1935.

Mangelsdorf, P. C. - The origin of Indian corn and its relatives. Texas Agr. Exp. Sta. Bull. 574, 315 pp. 1939.

Marino, Antonio E. - Una variacion tardía en maiz. Instituto experimental de investigacion y fomento agrícola-ganadero Pub. Tecnica 15: 237-240. 1939. (Reprint from Revista Argentina Agronomia 6: 237-240).

Martin, John H. and Hershey, Arthur L. - The ontogeny of the maize plant - the early differentiation of stem and root structures and their morphological relationships. Iowa State College Jour. Sci. 9: 275-289. 1935.

Martinez del Rio, P. - La domesticacion del maiz y el problema de la antiquedad del hombre en America. Univ. Habana 22: 38-48. 1939.

Mather, K. - Competition for chiasmata in diploid and trisomic maize. Chromosoma 1: 119-129. 1939.

McClintock, Barbara - The behavior in successive nuclear divisions of a chromosome broken at meiosis. Proc. Nat. Acad. Sci. 25: 405-416. 1939.

Middendorf, F. G. - Cytology of dormancy in Phaseolus and Zea. Bot. Gaz. 100: 485-499. 1939.

Olson, P. J. - Exchange of certain alternative stable characters in crosses between dent and flint corn. N. Dak. Agr. Exp. Sta. Tech. Bull. 291, 38 pp. 1939.

Overbeek, J. van. Lazy, an a-geotropic form of maize. Jour. Heredity 27: 93-96. 1936.

Paddick, M. E. and Sprague, H. B. - Maize seed characters in relation to hybrid vigor. Jour. Amer. Soc. Agron. 31: 743-750. 1939.

Pardo Navarro, L. - Monografia sobre el maiz. Agricultura (Bogota) 11: 612-627. 1939.

Powers, L. and Clark, A. - Failure of chromosome pairing as evidence of secondary diploids in *Zea mays*. Jour. Genetics 35: 301-313. 1937.

Powers, Le Roy and Dahl, A. O. - Failure of diakinesis and metaphase pairing and the behavior during meiosis of univalent chromosomes in *Zea mays*. Jour. Agr. Res. 54: 655-668. 1937.

Psarev, G. M. - Physiological character of changes induced in maize by removing male inflorescence. (Trans. title). Compt. Rend. (Doklady) Acad. Sci. U.R.S.S. 22: 189-193. 1939.

Rhoades, V. H. - The location of a gene for disease resistance in maize. Proc. Nat. Acad. Sci. 21: 243-246. 1935.

Randolph, L. F. and Fischer, Harold E. - The occurrence of parthenogenetic diploids in tetraploid maize. Proc. Nat. Acad. Sci. 25: 161-164. 1939.

Russel, M. A. - Effects of X-rays on *Zea mays*. Plant Physiology 12: 117-133. 1937.

Shafer, J., Jr. - Physiology of lazy corn. Bot. Gaz. 101: 68-80. 1939.

Singleton, W. R. and Jones, D. F. - Early sweet corn hybrids, Spancross, Marcross, and Carmelcross. Conn. Agr. Exp. Sta. Circ. 138. 11 pp. 1939.

Sosa-Bourdouil, C. - Note biochimique sur l'hybride *Zea mays* x *Euchlaena mexicana* en premiére generation. Revue Bot. Appl. 15: 615-618. 1935.

Sosa-Bourdouil, C. and Miege, E. - Études des hybrides entre Zea et Euchlaena. I. Hérédité du taux de l'azote chez *Zea mays* x *Euchlaena mexicana*. Bull. Biol. France et Belgique. 70: 358-370. 1936.

Sprague, G. F. - Hybrid vigor and growth rates in a maize cross and its reciprocal. Jour. Agr. Res. 53: 819-830. 1936.

______________ - An estimation of the number of top-crossed plants required for adequate representation of a corn variety. Jour. Amer. Soc. Agron. 31: 11-16. 1939.

______________ - Heritable characters in maize, 50, vestigial glumes. Jour. Heredity 30: 143-145. 1939.

Stadler, L. J. - Loss mutations in maize. Iowa State College Jour. Sci. 9: 213. 1935.

______________ and Sprague, G. F. - Genetic effects of ultra-violet radiation in maize. Proc. Nat. Acad. Sci. 22: 571-591. 1936.

____________________________ - Contrasts in the genetic effects of ultra-violet radiation and X-rays. Abstract. Science 85: 57, 58. 1937.

Uber, F. M. - Ultra-violet spectrophotometry of <u>Zea mays</u> pollen with quartz microscope. Amer. Jour. Bot. 26: 799-807. 1939.

Weatherwax, P. - The phylogeny of <u>Zea</u> <u>mays</u>. Amer. Midl. Nat. 16: 1-71. 1935.

Yasui, K. - Genetical studies in <u>Zea</u> <u>mays</u>. L. Bot. <u>Mag</u>. Tokyo 49: 153-162, 234-246. 1935.

IV. INVENTORY OF COOPERATION STOCKS

The following is a complete list of all seed stock now in the possession of Maize Genetics Cooperation. The labels on the ears, in many instances, give no indication of the genotype concerned. In such cases, the record cards were examined for such information as they afford. This list was compiled and the index made by Dr. Lebedeff. The symbol (x) = selfed and # = sib crossed.

R. A. E.

1934 crop

Co 1 (x) y, segregating g3, 3 ears
" 2 (x) seg. d5, 4 ears
" 4 (x) seg. d5, may seg. gl2 py, few seeds
" 6 (x) b gs2 lg, 7 ears
" 7 (x) y lg gl2 v^4 in various combinations, 28 ears
" 9 (x) and # seg. Y pg2 d, 6 ears
" 10 (x) Y, g, may seg., pg d, 1 ear
" 11 (x) y, seg. d2 lg, 7 ears
" 12 (x) seg. d2 lg Pr, 6 ears
" 13 (x) and # seg. yt, 2 small ears
" 14 (x) y a C R pr wx lg, 1 small ear
" 15 (x) and # y a C R pr, seg. lg, 9 ears
" 16 # a ts^4 cr lg in various combinations, 20 ears
" 17 mostly # a ts^4 sr lg in various combinations, 15 small ears
" 18 (x) and # a pr, seg. lg ts^4 C R, 5 ears
" 19 (x) and # a wx, seg. cr lg ts^4, 4 small ears
" 21 (x) and # a lg, seg. g na ts^4, 3 small ears
" 24 # a na cr gl v5 Y, 2 small ears
" 25 # a na cr Y, seg. lg v5, 2 small ears
" 26 (x) sh cr ms3 pk in various combinations, also seg. v and g, 8 ears
" 27 (x) Y seg. sp su Pr, 6 ears
" 28 (x) seg. Y sp su, 4 ears
" 29 (x) Y y + + / lo su, 5 ears
" 30 (x) y lo + / + su, 9 ears
" 31 # pr, seg. bm tn, 2 ears
" 32 # pr, seg. bm tn, 3 ears
" 33 (x) bm, seg. pr sh bv v, 10 ears
" 34 (x) pr wx sh bm, seg. cr, 2 ears
" 35 (x) and # pr bt, seg. v2, 3 ears
" 36 (x) and # v2 pr, seg. ys sh, 6 ears
" 37 # pr bv v2, 3 ears
" 38 # A C R pr bm sh wx su, 6 ears
" 40 (x) and # A a2 C R B Pl Y, 7 ears
" 41 (x) seg. v3 Pr ys, 8 ears
" 43 (x) bm bt, seg. pr, 2 small ears
" 44 (x) and # A C R pr bm sh wx seg. su, 2 ears
" 45 (x) and # A C R pr bm sh wx seg. su, 3 ears
" 46 (x) and # pr sh bm, seg. ys, 4 ears
" 48 (x) pr seg. v bm vp2, 2 ears

Co 49 (x) Pr seg. vp2, 2 small ears
" 50 (x) and # A C R Pr, seg. v3, 7 ears
" 51 (x) A C R pr, seg. v3 su, 2 ears
" 52 (x) pr bv bm, may seg. v2, ms, 5 ears
" 53 (x) pr bm, seg. bv lg, 7 ears
" 54 # pr bm bv, seg. su, 8 ears
" 55 (x) seg. bm Pr ms18, pg, lg, 3 ears
" 56 (x) white aleurone, seg. pg, lg, 4 ears
" 57 (x) and # y pl sm, seg. b py, 3 ears
" 58 (x) and # Y pl sm, seg. b py, 5 ears
" 59 (x) and # Y A, seg. b pl sm py, 6 ears
" 60 (x) and # B Pl sm, seg. py lg, 7 ears
" 61 (x) and # pl sm, seg. b py, 7 ears
" 62 (x) and # Y ra gl sl, 1 ear
" 63 # ra sl, 2 ears
" 64 Tp/gl v5 x pr ra gl v5, 3 ears
" 65 (x) gl, seg. Y, 5 ears
" 66 (x) Y y gl, seg. fr fr2, 4 ears
" 67 (x) g4 sh ar Bn, seg. Y, 4 ears
" 68 # c sh wx bp, 6 ears
" 69 # P bp, 6 ears
" 70 (x) seg. c sh wx d3, 7 ears
" 72 (x) su, may seg. vl4, d3, 1 ear
" 73 (x) wx g4 cr, seg. sh lg, 5 ears
" 74 (x) and # seg. ms2, 17, and brachytic-like plants,
7 ears (17 = ell 7 = luteus 7)
" 75 (x) and # Y seg. ms2, 17, sh aleurone color and
brachytic-like plants, 9 ears
" 76 (x) and # seg. Y, sh, ms2, 17, and aleurone color,
8 ears
" 77-78 (x) and # seg. y sh ms2 17, 13 ears
" 79 (x) wx may seg. sh 16, 8 ears
" 82 (x) pk sh fl, seg. v, 4 ears
" 83 # A C R pr wx, homo for term. knob on 9, 1 ear
" 84 (x) sh wx, seg. wl1, 1 ear
" 85 (x) seg. sh wx wl1, 2 ears
" 86 (x) C sh wx, 5 ears
" 87 (x) C sh, seg. wx wl1, 2 ears
" 88 (x) sh wx, seg. c, 2 ears
" 89 (x) sh, seg. c wx wl1, 2 ears
" 90 (x) cr seg. Y vp4, 5 ears
" 91 (x) A C Rr Pr seg. vp, 8 ears
" 92 (x) y Pr pr, may seg. l4, 6 ears
" 93 (x) Pr pr may seg. l4, 8 ears
" 94 (x) Pr, seg. pg, R, 8 ears
" 95 (x) mottled aleurone, seg. R vl8, may carry l4, 8 ears
" 96 (x) y, seg. vl8, l4, 5 ears
" 97 (x) seg. Pr, vl8, l4, 7 ears
" 98 # lg, seg. v20, 6 ears
" 99 (x) and # pr. seg. Y, g, R, 6 ears
" 100 (x) pr, seg. Y, g, R, 5 ears
" 101 (x) pr, seg. l2, g, su, R, 6 ears
" 102 (x) seg. g, R Y Pr, 3 ears
" 103 # Y, seg. ms20, v, 5 ears
" 104 (x) and # Y, seg. ms20, gl v cr, 8 ears

Co 105 (x) and # A b pl R^{rg} pr P^{vv}, may seg. C, 10 ears
" 106 (x) y su r^{r}, 3 ears
" 107 (x) and # A, seg. R^{rg} R^{gg} Pr pg, 10 ears
" 109 (x) Pr R^{gg}, 6 ears
" 110 # A C R^{rj} Pr, 1 small ear
" 111 (x) A C R^{mb} r Pr, may seg. j, 6 ears
" 112 (x) and # A C R^{st}, 5 ears
" 113 (x) A C R^{mb} r Pr, seg. gl, 5 ears
" 114-115 (x) A B pl pr bv, seg. v4, 20 ears
" 116-118 (x) and # bm, lg, sk in various combinations,
also seg. Pr A B Pl Y, 50 ears
" 119 (x) B lg v2 pr, seg. Pl su, 6 ears
" 120)
" 121) (x) and # A B lg v2, seg. Pr
Pl su, 40 ears
" 122)
" 123 # a Bb lg Y pl R c wx pr su, 3 ears
" 124 # a j lg B C r^{r} pr Y pl, 9 ears
" 125 # A cr C R^{g} pr su y pl b lg j, 5 ears
" 126 (x) and # a B Pl C R Pr Y, 7 ears
" 127 # a pr in Y C R, 7 ears
" 128 # a B lg Pl Y c sh wx R Pr su, 1 small ear
" 129 # a pr in wx C R^{g}, seg. su, 10 ears
" 130 # A B lg y pl C R^{g} Pr Scx, 5 ears
" 131 # A C R Pr B Pl Y cr, 2 small ears
" 132 # A R^{g} c wx pr su P seg. sh, 3 ears
" 133 # a B Pl C R Pr Y lg, 7 ears
" 134 # A b pl C r^{r} pv lg bm2, seg. su, Bu j, 9 ears
" 135 # A R^{g} y pl b lg bm2 j, seg. C Pr In su Ts2 v,
11 ears
" 136 (x) and # A c R^{g} g pr In Y pl b lg, bm2, j, seg,
su ts2, 12 ears
" 137 (x) and # a C R pr in y j lg, 9 ears
" 138 (x) a P sh wx f, seg. su, lg, 7 ears
" 139 (x) a P sh wx su lg f, 5 ears
" 140 # a B Pl lg v4 Y, 8 ears
" 141 (x) and # ts4 lg B Pl in various combin., also seg.
a Y cr na, 20 ears
" 142 (x) su pr ts4, seg. Y and white aleurone, 6 ears
" 143 # a^{p} B P, seg. Pl and striped, 2 ears
" 144 (x) Y bl, 3 ears
" 145 (x) Y seg. fl2, su, gl, 9 ears
" 146 (x) and # Y fl2, seg. gl, 13 ears
" 147 (x) and # y gl2, 5 ears
" 148 (x) Y h, 8 ears
" 149 (x) and # Y O A B Pl, 4 ears
" 150 (x) y O2, 4 ears
" 151 (x) F_1 of rs x A B Pl Kn, 3 ears
" 152 (x) Pr, seg. v8 and d, 5 ears
" 153-156 (x) seg. v8 su d and de, 10 ears
" 157 (x) A c R^{g} su, seg. Pr, may seg. v9, 14 ears
" 158 (x) seg. Pr su, may seg. v9, 9 ears
" 161 (x) Y, seg. v7 striped, 6 ears

Co 162 (x) seg. Y v6 cr d, 10 ears
" 163 (x) y, seg. v6 d, 6 ears
" 164 (x) may seg. v6, seg. striped, 2 ears
" 165 (x) y, seg. v7, 6 ears
" 166 (x) and # Y, seg. sk, 8 ears
" 167 (x) and # seg. sk, v 9 ears
" 168 (x) and # Y, seg. sk d bl, 7 ears
" 169 (x) and # Y, seg. sk d bl, 12 ears
" 170 (x) and # Y, seg. sk, striped, 6 ears
" 171 (x) seg. bk v ts, 8 ears
" 172 (x) Y seg. bd, 10 ears
" 173 (x) ys x new ys, seg. Pr sh, 9 ears
" 175 # bt2, seg. gl, 5 ears
" 176-189, Stadler's X-ray mutants
" 176 (x) seg. Y d wx v, 20 ears
" 177 (x) seg. A Rd j b lg gld, 10 ears
" 178 (x) seg. d wx Pr R Y v, 10 ears
" 179 (x) seg. A R^g r^r Y wx yg, 12 ears
" 180 (x) pr, seg. A R^g r^r C Y wx new d, 6 ears
" 181 (x) pr, seg. A C R^g r^r Y wx new d, 11 ears
" 182 (x) seg. A R B lg j new fi, 15 ears
" 183 (x) seg. R Pr Y d wx glc, 15 ears
" 184 (x) seg. Pr R Y wx glb, 12 ears
" 185 (x) seg. A B j lg R d, new pg, 10 ears
" 186 (x) seg. su j lg Y, new pg, 10 ears
" 187 (x) seg. new pg, 7 ears
" 188 (x) seg. A R^g r^r Y wx su, new ar-like striping, 7 ears
" 189 (x) seg. A R^g r^r Y su wx, new pg, 12 ears
" 190 (x) seg. w w2 w3, 5 ears
" 191 (x) seg. w3 R C, 2 ears
" 192 (x) seg. w3 R C Pr, 6 ears
" 193 (x) seg. w2 R, few seeds
" 194 (x) seg. w2 R Pr, 1 ear
" 197 (x) Pr T4-8, 10 ears
" 198 (x) Y T8-9, 8 ears
" 199 (x) Y T3-5, seg. su, 4 ears
" 200 (x) y Ts-7b, seg. Pr, 10 ears
" 201 (x) T1-10, seg. Y Pr, 11 ears
" 202 (x) T1-2, 9 ears
" 203-214, Inbreds for smut resistance tests
" 203 (x) Cornell 11, 9 ears
" 204 (x) " inbred 10 years, 10 ears
" 205 (x) " inbred 11 years, 10 ears
" 206 (x) Leaming dent, inbred 8 years, 5 ears
" 207 (x) " " inbred 11 years, 10 ears
" 208 (x) U.S. # 204 dent, inbred 12 years, 3 ears
" 209 (x) Bloody Butcher, inbred 10 years, 12 ears
" 210 (x) Oil Dent, inbred 8 years, 7 ears
" 211 (x) West Branch dent, inbred 8 years, 7 ears
" 212 (x) Silver King inbred 13 years, 14 ears
" 213 (x) Onondaga White dent, inbred 11 years, 6 ears
" 214 (x) Dutton's flint, inbred 11 years, 4 ears
" 215 (x) Y cr, seg. pg2 lg wx, 7 ears

Co 216 (x) seg. as ms17 zl pr, 9 ears
" 217 (x) and # may seg. bm v2 ys pr, 25 ears
" 220)
" 221) (x) and # seg. A B Pl lg gl2 v4 ts, 6 ears

1935 crop

Co 225 (x) gl3, also x gl6 and glc, 4 ears
" 226 (x) gl5, also x gl, gl4, gl6, gl9, glb, 9 ears
" 227 (x) gl6, also x gl2, gl3, gl4, gl6, gl7, gl9, 13 ears
" 228 (x) gl7, also x gl, gl3, gl4, gl6, gl9, glc, glb, 17 ears
" 229 (x) gl8, also x gl, gl3, gl4, gl7, gl9, glc, glb, seg. w wx, 14 ears
" 231 (x) gl10, also x other glossies, seg. Bn sl, 9 ears
" 234 lg gl2 b v4 x gl5, gl6, gl10, 3 ears
" 236 gl3 su x other glossies, 3 ears
" 237 gl3 su Tu tu x other glossies, 4 ears
" 239 lg gl4 # and x other glossies, 13 ears
" 242 gl6 # and x other glossies, 5 ears
" 243 gl7 v17 x other glossies, 5 ears
" 246 # gl6, 5 ears
" 248 glc (x) and x other glossies, 4 ears
" 249 glc (x) " " , 4 ears
" 250 glc (x) " " , 5 ears
" 251 glb (x) " " , 5 ears
" 252 glb (x) " " , 6 ears
" 253 glb (x) " " , 2 ears
" 255 # seg. rs2 gl, 5 ears
" 256 (x) seg. Rs gl, 4 ears
" 258 # seg. at v gl, may seg. bv, 6 ears
" 259-260 # seg. bd, 12 ears
" 261 (x) cr3, very few seeds
" 262)
" 263) # bs (Hadjinov) similar to bs (Woodworth), seg. v.
" 264 # seg. ba v, 2 ears
" 265 # seg. ba2 v, 3 ears
" 266 (x) seg. variable bv, 6 ears
" 267 # f bm2, seg. P v5, 5 ears
" 268 (x) and # f bm2, seg. br, 6 ears
" 269-270 (x) and # seg. sr an bm2, few seeds
" 271 (x) bm2, seg. P, 4 ears
" 272 (x) lg, seg. gs2 B v4, 8 ears
" 273 # A B lg gl2 v4 pl, 1 ear
" 274 # A b pl lg gl2 v4, 6 ears
" 275 # A b pl lg g2 v4, 2 ears
" 276 # lg gl2 v4, seg. ts, 2 ears
" 277 # lg gl2, seg. v4 ts, 4 ears
" 278-279 # lg gl2, seg. v4 ts, 3 ears
" 280 (x) sb and x testers, 8 ears
" 281 (x) al " " " , few seeds
" 283 # seg. yt, may seg. a na ts4, 6 ears
" 284 (x) and # seg. a ts4 lg cr g, 5 ears
" 285 # a, seg. lg2 Dt su Y, 8 ears
" 286 # a, seg. Dt su Y, may seg. na ts4, 7 ears

Co 287 # d^s, 7 ears
" 288-289 # d^m, 11 ears
" 290 # d^s, 3 ears
" 291 # la su, 2 ears
" 292 # la su, seg. Tu gl3, 1 ear
" 293 # la su, seg. Tu gl3 pr, 1 ear
" 294 (x) pr bm, seg. ys v2, 7 ears
" 295 # A a2 C R, seg. pr Y, 9 ears
" 296 # v2 pr bm, 3 ears
" 297 # bm, seg pr bt, 5 ears
" 298 # A C R A2 a2 bv pr bt, 2 ears
" 299 # A A2 C R bv bt pr, 5 ears
" 301 # A A2 C R bv pr v2, 5 ears
" 302 # A A2 C R bv bt pr, 2 ears
" 304 # A B seg. Pl Y py sm, lg, 12 ears
" 305 (x) A B pl Y sm, 1 ear
" 306 (x) B pl Y zg3, 2 ears
" 307 (x) B Pl zg3, 1 ear
" 308 # ra gl ij, 2 ears
" 309-310 # gl ij, 12 ears
" 313 # gl ij ra, 1 ear
" 314 (x) seg. vp^4, 3 ears
" 315 (x) lg gl^4, seg. v, 5 ears
" 317 (x) seg. c sh wx v gl^4, 4 ears
" 318 (x) wx, hetero. for large internal knob on long arm of chrom. 9, 3 ears
" 319 (x) R g nl x zb5 cross, 8 ears
" 320 (x) lg g colorless aleurone, may seg. d7, 6 ears
" 321 (x) r zb5 colorless aleurone, 1 ear
" 322 (x) A C Rr g li, 1 ear
" 323 (x) li, seg. gl vl8, su, 1 ear
" 324 (x) y li, seg. gl vl8 su, 4 ears
" 326 (x) A B Pl Y3, seg. Y, 6 ears
" 327 (x) A B Pl, seg. Y, 4 ears
" 328 (x) A B pl Y, seg. Y3 al, 6 ears
" 330 (x) A B pl Y, seg. Y3, 6 ears
" 331 (x) A B pl, seg. Y3 al, 1 ear
" 332 (x) Y3, seg. Y Pl, 1 ear
" 334 (x) Y Y3, seg. Pl, 6 ears
" 336 (x) deep yellow endosperm, 8 ears
" 337 (x) and # A bm2 su y pl b lg j C R^g Pr in seg. ts2, 2 ears
" 338 (x) and # A bm2 su y pl lg b j C R^g, seg. v Ts2, 4 ears
" 339 (x) and # A bm2 pr in su y pl lg b j seg. cr na, 4 ears
" 340 # A c R^g g pr in y pl lg b j, bm2 P^{vv} Bn su, seg. ts, 3 small ears
" 342 (x) and # A c R^g g pr In Bn su y pl lg b j bm2, seg. ts, 5 ears
" 343 # A c R^g cr pr Bn y pl lg b j bm2, seg. g in su ts2 d, 5 ears
" 344 (x) A c R^g g pr Bn y pl b lg j bm2, seg. d in ts2, 2 ears

Co 345 (x) and # Y a C R^g pr in b pl Bn, 5 ears
" 346 # A C r^g sh wx, seg. su, 5 ears
" 347 # a C r pr wx y, seg. ys, 10 ears
" 348 (x) and # A c R^g P^{vv} wx pr su y in, seg. sh, 7 ears
" 349 (x) and # a C R^g pr in wx su, 5 ears
" 350 (x) and # a j lg B C r^r pl Y, 6 ears
" 352 (x) and # seg. bt vp, 10 ears
" 356 # seg. bt, 4 ears
" 357 # seg. tiny plants, 2 ears
" 358 o.p. Y Gaspe Flint, few seeds
" 359 (x) and # (ws x P br f bm2), 6 ears
" 360 (x) and # (a Pr lg2 x ws), 5 ears
" 361 (x) (su gl3 x ws2), 2 ears
" 362 (x) (Y Pl Py py x ws2), 2 ears
" 363 (x) and # seg. pr Y ws py, 7 ears
" 364 # (Bn gl v5 x ws2), 8 ears
" 365 (x) and # (j ms8 x ws2), 6 ears
" 366 # (ws x c sh / + wx gl4), 2 ears
" 367 (x) and # (R g li x ws2), 6 ears
" 368 (x) and # (P br f bm2 x nl2), 6 ears
" 369 (x) and # (A / + nl2 x a B Pl lg2), 7 ears
" 370 (x) and # (Pr nl2 x pr bm A cr d), 6 ears
" 371 (x) and # (su gl3 x nl2), 7 ears
" 372 (x) and # (bm pr v2 x nl2), 4 ears
" 373 (x) and # (gl v5 x nl2), 6 ears
" 374 # (A c R su x a C R nl2), 6 ears
" 375 # (A C r j x nl2), 6 ears
" 376 (x) and # A a nl2 x A R g nl), 3 ears
" 377 # seg. j ms8, 2 ears
" 378 # seg. j r^r ms8, 3 ears
" 379 # seg. j R^{mb} r ms8, 2 ears
" 380 # seg. j R^{rg} r ms8, 3 ears
" 381 # seg. j R^{gg} r ms8, 3 ears
" 382 # seg. j R^{nj} r ms8, 3 ears
" 383 (x) and # Leaming inbred 9 yrs., 4 ears
" 384 (x) and # Oil Dent inbred 9 years, 3 ears
" 385 (x) and # Bloody Butcher inbred 11 years, 6 ears
" 386 (x) U.S. # 204 inbred 13 years, 3 ears
" 387 (x) and # Silver King inbred 14 years, 8 ears
" 388 (x) and # Onondaga White inbred 12 years, 6 ears
" 389 (x) and # West Branch inbred 9 years, 9 ears
" 390 (x) and # Dutton's Flint inbred 12 years, 5 ears
" 391 (x) and # Northwestern Dent inbred 9 years, 8 ears
" 392 # Rustler (S44 x S46) F6, 6 ears
" 394 (x) and # Hays and Johnson S283, 6 ears
" 395 (x) and # Hays and Johnson 7 years, inbred Gold.
Bantam, 9 ears
" 396 A Bb Pl x lg gl2 b v4, 5 ears
" 397 lg gl2 b v4 x A B pl, 3 ears
" 401 # seg. j or ij and lg, 3 ears
" 402 # seg. po, 5 ears
" 403 # may seg. st, 6 ears
" 404 # a c r A2 pr y, 6 ears
" 405 (x) and # ap B Pl, few seeds

Co 406	#	a B pl, 2 ears
" 407	#	a b Pl, 3 ears
" 408	#	A B pl, 7 ears
" 409		open poll. a b pl, 6 ears
" 410-411	(x)	a b pl, few seeds
" 412-415		F_2 involving A B Pl sm py W, 75 ears
" 416	(x)	seg. 13, 2 ears
" 420	(x)	F_2 involving A B lg gl2 v4 Pl ts, 5 ears
" 422	(x)	F_2 involving A B pl gl2 v4 lg gs2, 5 ears
" 424	(x)	and # a yt na ts4 in various combinations, 6 ears
" 425	(x)	a lg2 Dt, very few seeds
" 428	(x)	A C R a2 b v2 pl, seg. bm2, 1 small ear
" 431	(x)	and # A Bb Pl sm, 7 ears
" 432	#	seg. ra gl ij bd, 2 ears
" 433	#	seg. j, ms8, few seeds
" 434	(x)	F_2 involving gl4 yg2 c sh wx, 9 ears
" 436	(x)	Pr g seg. R nl zb5, 1 ear
" 437	(x)	zb5, may seg. g nl, 1 ear
" 439	(x)	seg. bs vp, 4 ears
" 441	(x)	seg. bs vp and striped, 4 ears
" 446-448	(x)	j r / r^{r}, seg. su, 15 ears
" 449	(x)	j r/R^{mb}, 1 ear
" 450		seg. j r R^{mb} bm, 2 ears
" 451		seg. j r R^{mb} , 4 ears
" 452-454		seg. j r R^{rg} P^{vv}
" 456-457	(x)	j/+ r/R^{gg}, 3 ears
" 458	(x)	j/+ r/R^{nj}, 1 ear
" 459	(x)	j/+ r/R^{nj} Pl, 4 ears
" 460	(x)	j/+ r/R^{nj}, seg. sr
" 472	(x)	may seg. hf, 3 ears
" 476	#	A B Pl, seg. su ba2, 3 ears
" 479	#	may seg. bd, 3 ears
" 481	(x)	Tu su, 1 ear
" 485	(x)	Oil Dent inbred 10 years, 4 ears
" 486		U.S. # 204 x wx; br wx; bm3; A b pl lg gl2 v4, 4 ears
" 487		West Branch inbred 10 years, x g4 wx; A b pl lg gl2 v4, 2 ears
" 488	(x)	Dutton's Flint inbred 13 years, 2 ears
" 489	(x)	Rustler inbred 7 years, 1 ear
" 490		Kvakan's smut resistant x A C R a2 b pl v2, 1 ear
" 491) " 492) " 493)		Bryan's inbreds, 9 ears
" 494		Open pollinated. Au au2 sh, few seeds
" 495	#	du au au2 sh, few seeds
" 497	(x)	Dt, also na lg ts4 g in various combinations, 5 ears
" 498	#	g4 wx, may seg. 16, 2 ears
" 499	#	Tp gl ra v5 in various combinations, 3 ears
" 500	(x)	a, seg. Dt lg C R Pl, 5 ears
" 501	#	ar wx, few seeds
" 502		open pollinated g2 A b Pl, 1 ear

Co 505	(x)	A Bb Pl seg. Kn, 2 ears
" 507	(x)	gi, 2 ears
" 508	(x)	gl5, 2 ears
" 509	(x)	and # gl8, 2 ears
" 510	(x)	seg. Y su gl3 la, 5 ears
" 514	(x)	r, seg. mr Pr Mt, 6 ears
" 518	(x)	seg. f v, 5 ears
" 522	(x)	A C R a2 bt bv pr, few seeds
" 523	(x)	A C R a2 bt pr, v few seeds
" 524	(x)	A C R A2 bt bv pr, few seeds
" 525-526	#	fr2, seg. ij gl fr, 10 ears
" 528	#	Supergold Popcorn inbred, 6 ears
" 529	#	A B pl, seg. Y^4, It, 2 ears
" 531	#	Y^4 It a c r pr i, 3 ears
" 532	(x)	and # Y^4 g^4, seg. It, 5 ears
" 541	(x)	Y sk from Australia, 1 ear
" 544		Open pollinated No. 3 Trisome, 3 ears
" 545		No. 5 Trisome, 4 ears
" 546		No. 6 Trisome, 1 ear
" 552	#	P br f bm2, may seg. Ts2, 3 ears
" 554	#	A B pl, seg. yg2, 1 small ear
" 555		A C R^{st} x r mr Pr, 1 ear
" 556		"Sweet Brittle" (x) and x bs, 6 ears
" 557	(x)	Singleton C2 inbred, 3 ears
" 558	(x)	" C6 " , 2 ears
" 559	(x)	" C13 " , 5 ears

1937 crop

Co 37-1	Bryan's inbred (x) and x red pigment in seedling leaves, 7 ears
" 37-2	West Branch inbred (x) and x g^4 wx, 9 ears
" 37-3	U.S. No. 204 inbred (x) and x g^4 wx, 7 ears
" 37-4	" (x) and x ar wx, 4 ears
" 37-5	" (x) and x bm3, 8 ears
" 37-6	Oil Dent inbred x bm3, 1 ear
" 37-7	U.S. No. 204 inbred x ra gl ij bl, 9 ears
" 37-8	(x) and # lg B v^4 A Pl, seg. gl2 Ts, 1 ear
" 37-9	F2 involving g^4 gl^4 yg2 c h wx, 8 ears
" 37-10	" ra gl ij bd, 1 ear
" 37-11	(x) gl ij, seg. ra fr fr2, 7 ears
" 37-12	(x) F_2 involving ra gl ij bd, 3 ears
" 37-13	(x) A b Pl, seg. py sm, 2 ears
" 37-14 " 37-15	F_2 involving West Branch inbred and lg b gs v^4 gl2, 6 ears
" 37-16	Luce's Favorite (x) and x Onondaga White Dent, 10 ears
" 37-18	Cornell 11 (x) and x Luce's Favorite, 3 ears
" 37-20	(Luce's Favorite x Onondaga Wh. Dent) x (Bloody Butcher x Cornell 11), 11 ears
" 37-21	(Bl. Butcher x Cornell 11) x (Luce's Favorite x Onondaga Wh. Dent), 9 ears
" 37-23	West Branch (x) and x U.S. no. 204; pbx; Sx Pr; p ad an; yg3; bushy; c sh wx bp; 20 ears

Co 37-26		U.S. no. 204 (x) and x West Branch; c sh wx bp; zb5; p ad an; Ch; pbx; bushy; 25 ears
" 37-28	(x)	c sh wx bp, 2 ears
" 37-49		F_2 involving tu su dh, 3 ears
" 37-53	(x)	a lg2 Dt, few seeds
" 37-54	(x)	A C R a2 bt bv pr y, 2 ears
" 37-55	(x)	a na cr gl v5 Y, v. few seeds
" 37-57	(x)	A C R a2 pl B Y, 2 ears
" 37-58	(x)	v zb5 y, seg. nl, 5 ears
" 37-60	(x)	A C R a2 bt bv, seg. v2, 2 ears
" 37-62	(x)	g2 A b, seg. Pl, 2 ears
" 37-63	(x)	a y Dt, v, few seeds
" 37-64	(x)	a y Dt, seg. su lg2, 2 ears
" 37-67	(x)	v5 gl, seg. Tp ra, 5 ears
" 37-68	(x)	v5 gl Tp ra, 1 ear
" 37-69	#	a, seg. na lg2 ts4, 2 ears
" 37-72	(x)	au au2 sh, 2 ears
" 37-73	(x)	F_2 involving su gl3 j2, 2 ears
" 37-74	(x)	and # A C R A2 Pr, seg. Pl, 2 ears
" 37-75	(x)	seg. Pr vl2, 1 ear
" 37-77	(x)	and # seg. vl3, 3 ears
" 37-80	#	seg. va2, 4 ears
" 37-81	(x)	and # seg. wa, 2 ears
" 37-82	#	Pr Y, seg. ms2, 2 ears
" 37-84	#	seg. ms5 reddish yellow, 4 ears
" 37-85	(x)	and # seg. ms6 Pr, 2 ears
" 37-86		ms6 x West Branch, 2 ears
" 37-87	(x)	and # A B Pl Y, seg. ms8 lg, 3 ears
" 37-88	#	Y, seg. ms9, 4 ears
" 37-89	#	seg. ms10, 5 ears
" 37-90	(x)	and # seg. ms11, 6 ears
" 37-91	(x)	and # seg. ms12 white stripes, 4 ears
" 37-92	(x)	and # seg. ms13, 6 ears
" 37-93	(x)	and # seg. ms14, 7 ears
" 37-96	(x)	P^{vv}, may seg ms34, 3 ears
" 37-97	(x)	and # seg. ms37, 4 ears
" 37-98	(x)	and # seg. ms39 Pr Tu, 7 ears
" 37-99		ms42 x inbred, 2 ears
" 37-100		F_2 involving Pl sm pbx Pr, 2 ears
" 37-101	(x)	A B Pl j, seg. l w, 3 ears
" 37-103	(x)	and # seg. yellowish green seedlings, 4 ears
" 37-104	(x)	and # rather light green foliage, 10 ears
" 37-105	(x)	rather light green foliage, seg. a v, 5 ears
" 37-106 and 107		dark green foliage, 6 ears
" 37-109	(x)	vl2, seg. fr, 4 ears
" 37-110	(x)	y, seg. gl10, 6 ears
" 37-111	(x)	su^{am} du, 2 ears
" 37-114	(x)	F_2 involving A b pl Y su2 sb, 4 ears
" 37-116	(x)	y su2, may seg. sb, 4 ears
" 37-117	(x)	y, seg. pbx
" 37-119	(x)	Pr wx da ar sa, 3 ears
" 37-120	(x)	A B Pl Sx Pr, few seeds
" 37-121	(x)	Y b gs2 lg
" 37-122	(x)	sy, 10 ears

Co 37-123 (x) y, seg. Pc, 7 ears
" 37-124 (x) a lg2 d, seg. ts4, 3 ears
" 37-125 (x) and # A lg2 d, may seg. ts4, 3 ears
" 37-126 (x) Y a lg2 ra2, 5 ears
" 37-127 (x) su, silks all over ear, 3 ears
" 37-128 (x) F_2 involving Ga su cross, 5 ears
" 37-130 (x) Ch, seg. gl v5, few seeds
" 37-131 (x) p ad, seg. an, 5 ears
" 37-133 (x) F_2 involving Ga su, 5 ears
" 37-134 (x) F_2 involving Ts3 v4 Rg, 2 ears
" 37-135 (x) F_2 involving Ts3 v4 Rg C sh wx, also seg.
Pr Y, 4 ears
" 37-136 (x) p ad, may seg. an, few seeds
" 37-137 (x) seg. Pr bm3 yg3, 6 ears
" 37-138 (x) Y P, seg. Og, 5 ears
" 37-139 (x) Y Og, 3 ears
" 37-140 (x) su, may seg. w4, 1 ear
" 37-141 (x) F_2 involving Og and La inbred, 4 ears
" 37-142 (x) A B Pl 1, may seg. w, 1 ear
" 37-143 (x) A C R A2 pr i, 7 ears
" 37-144 (x) wl su gl3 in various combinations, 3 ears
" 37-145 (x) F_2 involving wl Ts5 su, 2 ears
" 37-146 (x) gl3, seg. su wl
" 37-147 (x) seg. su gl3 Y, 4 ears
" 37-148 (x) Ts5 su y, seg. gl, may seg. la, 3 ears
" 37-149 (x) a lg2, seg. Dt na, 4 ears
" 37-150 # na, seg. ts4, 2 ears
" 37-152 (x) seg. w, 1 ear
" 37-155 (x) Y gl, seg. de, 6 ears
" 37-156 (x) Y, seg. de, 5 ears
" 37-157 # Y a yt, seg. na, 1 ear
" 37-158 (x) Y, seg. bushy, 1 ear
" 37-159 (x) and # ij gl bd in various combinations, 4 ears
" 37-160 (x) y, seg. ra, 3 ears
" 37-161 (x) y br f, may seg. bm2, 1 ear
" 37-162 (x) seg. Y, 2 ears
" 37-164 (x) y pbx, 2 ears
" 37-165 # pr, seg. Vg, 2 ears
" 37-167 (x) an2, 1 ear
" 37-170 (x) Y fine stripe, 1 ear
" 37-171 B.C., seg. A b lg gl2 v4, few seeds
" 37-172 # seg. na2 su Pr, 3 ears
" 37-175 A lg gl2 b v4 Yx corrugated leaf, few seeds
" 37-176 (x) y Dt, seg. na ts4 lg2 su, 1 ear
" 37-177 # su, may seg. la, 1 ear
" 37-179 (x) y v2 A C R a2 b pl, 7 ears
" 37-180 (x) A C R A2 bv bt, seg. Pr, 4 ears
" 37-181 (x) Y A b Pl sm, seg. py, 2 ears
" 37-184 # j, seg. ms8, 1 ear
" 37-185 (x) yg2 lg c sh wx, seg. gl4, few seeds
" 37-187 (x) A C R a2 b pl v2 y, may seg. bm, 2 ears
" 37-188} (x) F_2 involving A C R^{st} r B (mottled red), 2 ears
" 37-190}
" 37-197 (x) Y, seg. bk, 3 ears

Co 37-198 (x) y gl, seg. bk, 1 ear
" 37-199 (x) F_2 involving bk bk2, seg. gl, 4 ears
" 37-200 (x) seg. de, may seg. mi, 1 ear
" 37-201 (x) seg. an2 d, 5 ears
" 37-202 (x) F_2 involving Trucker's Favorite and mi, 2 ears
" 37-203 (x) A C R a2 bv bt pr, 1 ear
" 37-205 (x) Wc Y, 1 ear
" 37-208 No. 2 trisome x U.S. no. 204, 3 ears
" 37-209 No. 3 " x " , 2 ears
" 37-213 No. 6 " x " , 1 ear
" 37-214 No. 7 " x " , 3 ears
" 37-215 No. 8 " x " , 1 ear
" 37-217 No. 10 " x " , 3 ears
" 37-219 # seg. j ms8 v16, 3 ears
"37-220 and 221 (x) yellow striped seedlings, 1 ear
" 37-222 (x) homo virescent seedlings, 2 ears
" 37-223 # yell. striped seedlings on very dark green
base, 3 ears
" 37-224 and 225 (x) virescent seedlings, 2 ears
" 37-226 (x) and # seedlings tiny, virescent and white
striped, 3 ears
" 37-227 # crinkly seedling leaves, 2 ears
" 37-228 (x) Amargo from Horowitz, 1 ear
" 37-229 # seg. v19, 1 ear
" 37-230 # su^{am} du, 2 ears
" 37-231 T 1-2b x T1-2b, 1 ear
" 37-233 Australian x Siamensis, 3 ears

1938 crop

Inbred I = U.S. No. 204 (W-R)
Inbred II = West Branch (W-W)

Co 38- 1 F_2 involving inbreds I and II, 1 ear
" 38- 2 (x) pr, seg. Y ms7, 3 ears
" 38- 3 (x) seg. Y ms12, 2 ears
" 38- 4 (x) Y, seg. ms42 su, 6 ears
" 38- 5 (x) F_2 involving H mg, 3 ears
" 38- 6 (x) F_2 involving inbred II and yg3 bm3, 2 ears
" 38-9 and 10 (x) F_2 of no tillers x many tillers cross,
15 ears
" 38-11 F_2 involving inbred II and c sh bp wx, 5 ears
" 38-12 (x) F_2 involving inbred I and c sh bp wx, 7 ears
" 38-13 (x) " " II and p ad an?, 1 ear
" 38-14 (x) " " I and " , 4 ears
" 38-15 (x) " " II and y pb+, 8 ears
" 38-16 (x) " " I and " , 7 ears
" 38-17 Inbred I x y ra sl; g4 wx; bm3, 3 ears
" 38-18 Inbred II x y ra sl; g4 wx; bm3, fx? Pu?, 4 ears
" 38-19 (x) In, seg. Pr w, 5 ears
" 38-20 # seg. sk, 2 ears
" 38-21 (x) Pr y sp su, 5 ears
" 38-23 (x) Y d6, 6 ears
" 38-24 (x) a3 g, seg. Pr, 2 ears
" 38-25 (x) y Og, may seg. a3, 3 ears

Co 38-27 (x) Y zb^4, 5 ears
" 38-28 (x) F$_2$ involving inbred I and zb5 and possibly nl g, 7 ears
" 38-30 (x) Y fs, 2 ears
" 38-31 (x) Y mg, 2 ears
" 38-33 (x) y Hs, seg. Tu, 3 ears
" 38-37 (x) dec y, 5 ears
" 38-40 (x) Y v7, 4 ears
" 38-44 (x) seg. ms, may seg. v19, 3 ears
" 38-45 (x) Y v20 lg, 2 ears
" 38-46 (x) Y o, 6 ears
" 38-47 (x) y o2, v. few seeds
" 38-48 (x) Y h, 3 ears
" 38-49 (x) Y f12 may seg. ms, 7 ears
" 38-50 (x) Y f12 gl, seg. su, 7 ears
" 38-51 (x) a C R^g pr in wx y, seg. su, 6 ears
" 38-52 (x) a C R Y pr in, 4 ears
" 38-55 (x) Pr, seg. vp, 4 ears
" 38-56 (x) Y, seg. vp^4, 1 ear
" 38-58 (x) rst, 1 ear
" 38-59 (x) R^{mb}, 2 ears
" 38-60 (x) A C R^{nj} Pr, 2 ears
" 38-62 (x) A C R^{rg} pr P, 2 ears
" 38-64 (x) y r^r su, 6 ears
" 38-65 # seg. ms2, 6 ears
" 38-66 (x) seg. ms2, may seg. 17, 5 ears
" 38-70 and 71 (x) and # seg. ms11 and ar-like stripe, 13 ears
" 38-72 (x) Y, seg. v, 7 ears
" 38-78 (x) F$_2$ involving lg2 pm d, 5 ears
" 38-81 (x) y, seg. d2, 1 ear
" 38-82 (x) Y sh, seg. d3, 7 ears
" 38-85 (x) Y, seg. d5, 4 ears
" 38-90 (x) sh wx, may seg. 16, 1 ear
" 38-92 (x) Y, seg. 17, 6 ears
" 38-93 (x) Y, seg. w2, 3 ears
" 38-95 (x) Y, seg. w3, 1 ear
" 38-96 (x) Y wx, seg. crinkly leaf, 3 ears
" 38-97 (x) sh wx Pr, seg. w11, 3 ears
" 38-98 (x) pr, may seg. v5, 4 ears
" 38-100 (x) seg. v9, 7 ears
" 38-101 (x) A c R^g su, seg. v9, 4 ears
" 38-102 }
" 38-103 } (x) seg. v13, 11 ears
" 38-104 (x) y v18, 1 ear
" 38-105 (x) y v18, may seg. 14, 1 ear
" 38-106 (x) and # lg gs2, may seg. gl2 v4 b, 2 ears
" 38-107 (x) and # ws3 lg, may seg. gl2, 7 ears
" 38-108 (x) F$_2$ involving Y gl2 lg v4 fl, 10 ears
" 38-109 # lg gl2 ts v4 in various combinations, 4 ears
" 38-112 (x) su gl3, seg. wl, 1 ear
" 38-114 # P Pl sm, seg. py, 2 ears
" 38-117 # seg. j ms8 v16, 3 ears
" 38-119 # Ts6 Og, 3 ears

Co 38-122 # wx g^4, 6 ears
" 38-123 # wx g^4, 1 ear
" 38-126 (x) bm3, 2 ears
" 38-131 # pr sk, 1 ear
" 38-132 # A B Pl Pr bm, seg. sk lg, 2 ears
" 38-133 (x) Pr lg, seg. sk, 2 ears
" 38-134 (x) may seg. lo, 2 ears
" 38-135 # Y, seg. hf, 6 ears
" 38-136 # seg. Pr T5-6 su, 3 ears
" 38-138 # y, seg. lg^3 Rg and possibly d, 1 ear
" 38-140 # Y wx, seg. ar, 5 ears
" 38-143 (x) and # Pr, seg. g tw3, 3 ears
" 38-144 (x) seg. bax, 1 ear
" 38-145 # seg. ba, 3 ears
" 38-146 # seg. ba2, 2 ears
" 38-147 (x) may seg. ra2, 2 ears
" 38-148 (x) Y a lg2 ra2, 2 ears
" 38-150 (x) F_2 involving pr zb f ys, 4 ears
" 38-153 (x) seg. at, 1 ear
" 38-154 (x) gl, seg. bk, 2 ears
" 38-155 (x) Y bk2, 3 ears
" 38-159 (x) Y gl fl2, 1 ear
" 38-179 (x) zb^4 br f, may seg. bm2, few seeds
" 38-187 (x) and # Og g li, 4 ears
" 38-189 (x) a B Pl C R Pr Y, 5 ears
" 38-191 (x) A C r g y, 3 ears
" 38-192 (x) A B pl C R^g Pr Scx y lg, 8 ears
" 38-193 (x) A b Pl Y sm, seg. py, 3 ears

1939 crop

Co 39- 1 (x) F_2 involving inbred I and g^4 wx, 8 ears
" 39- 2 (x) F_2 " " " and sl ra, 5 ears
" 39- 3 (x) F_2 " " " and bm3, 8 ears
" 39- 4 (x) F_2 " " II and sl ra, 7 ears
" 39- 5 (x) F_2 " " " and bm3, 10 ears
" 39- 6 (x) F_2 " " " and g^4 wx, 8 ears
" 39- 7 Inbred II x R^{mb}; In? Pr; Y o v2; zb^4 br f bm2; A C R^{rg} pr P; w3 lg gl2; sp su Pr; R^{gg}; R^{mb}; r^r y su; yg2 sh wx gl lg; a^p B Pl P; lg2 d; v7; Y fs; sk; y wx v gl^4; brown striped; zb^4; lg gl2 v^4 f; Y o v2; r^{st}, 32 ears
" 39- 8 Inbred I x lg gl2 v^4 fl; fs; sk; y wx v gl^4; a^p B Pl P; A C R^{rg} pr P^{vv}; v18; brown striped; Y o v2; zb5 nl?; R^{mb}; v7; sh wx v gl^4; sp su Pr; Pr In?; ws3 lg gl2; Y fs; yg2 sh wx gl^4 lg; r^{st}; lg2 d; zb^4 br f bm2; y wx v gl^4; R^{gg}; A C R^{nj} Pr; v7; a d lg2, 52 ears

" 39- 10 In Pr x inbred I, 2 ears
" 39- 11 # seg. sk, 3 ears

Co 39- 12 (x) and # sp su Pr, also crossed to inbred I and II, 6 ears
" 39- 13 # zb4, also crossed to inbr. I and II, 3 ears
" 39- 15 r^{st} x inbred I and II, 4 ears
" 39- 16 A C R^{nj} Pr x inbred I and II, 5 ears
" 39- 17 R^{gg} Pr x inbred I, few seeds
" 39- 18 A C R^{rg} pr P x inbred I and II, 4 ears
" 39- 19 r^{r} y su x inbred I and II, 6 ears
" 39- 20 Y v7 x inbred I, 1 ear
" 39- 25 (x) and # Y fs, 3 ears
" 39- 27 (x) lg Ts v4, 2 ears
" 39- 28 (x) lg gl2 ts v4 in various combinations, 3 ears
" 39- 31 # ws3 lg gl2, 1 ear
" 39- 32 (x) lg gl2 v4 fl, 3 ears
" 39- 35 (x) gs2 gl2 b v4, 1 ear
" 39- 37 (x) d and lg2 d, 2 ears
" 39- 38 (x) lg2 d, 1 ear
" 39- 39 (x) lg2 d, 1 ear
" 39- 41 # j, seg. ms8 v16, 3 ears
" 39- 43 (x) y sh wx v gl4, 2 ears
" 39- 44 (x) yg2 sh wx lg gl4, also crossed to inbred II, 3 ears
" 39- 45 (x) and # y wx v gl4, 3 ears
" 39- 46} # Y, seg. su Ts6 Pr, 3 ears
" 39- 47}
" 39- 48 (x) y zb5, may seg. nl, 1 ear
" 39- 49 (x) zb5, seg. Y, 1 ear
" 39- 50 (x) bm3, seg. Pr Y sh, 4 ears
" 39- 51 # seg. ms7
" 39- 53 # seg. ms42 gl, 5 ears
" 39- 55 (x) seg. d2, 5 ears
" 39- 60 (x) Y du2, seg. du su^{am}, 1 ear
" 39- 61 (x) Y seg. du2 du su^{am}, 1 ear
" 39- 67 (x) A b Pl Y sm P, 6 ears

G. A. Lebedeff

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VI. HISTORICAL NOTES ON MAIZE GENETICS COOPERATION

I. Mimeographed letter of April 12, 1929 mentions "Cornfab" held in Dr. Emerson's room in N.Y. hotel at the time of the Christmas meetings, 1928. Long folder of linkage information issued with this letter, considered News Letter 1.

II. Second folder of mimeographed information issued some time after the first one, perhaps late in 1929 or in 1930.

Cooperation of maize geneticists planned at Sixth International Congress of Genetics, at Ithaca, N.Y., August, 1932.

Letter of October 5, 1932 notifying corn geneticists of action taken at the Genetics Congress. Chromosomes assigned to different individuals. A second general letter sent out Dec. 12, 1932.

Correspondence by Dr. Emerson about possible grant of money for Maize Genetics Cooperation, January 1933.

III. Third Corn News Letter - Jan. 23, 1933. Long list of known genes of maize.

Letter of Nov. 13, 1933 gave samples of news items and asked for news contributions.

IV. News Letter - Dec. 18, 1933. Many news items contributed by cooperators. Letter of 12 pages.

V. News Letter - Jan. 25, 1934. Big inventory of corn stocks.

VI. Letter of Feb. 21, 1934. Discussion of nomenclature.

April 1, 1934. Rockefeller Grant available.

VII. News Letter - Sept. 13, 1934. 11 pages.

VIII. News Letter. November 24, 1934. 18 pages.

IX. News Letter - March 6, 1935. 20 pages.

X. News Letter - March 4, 1936. 22 pages.

XI. News Letter - March 23, 1937. 26 pages.

XII. News Letter - March 6, 1938. 38 pages, 2 maps.

XIII. News Letter - April 15, 1939. 22 pages.

XIV. News Letter - March 5, 1940. 56 pages.

Ithaca, New York
February 5, 1941

Dear Colleague,

As you may know, Dr. Emerson reaches retirement age this coming June, and at that time will have completed 27 years of active service at Cornell. While there is no indication whatever that retirement is going to affect in any way the active continuance of his corn genetics research here at Cornell, it does seem that this coming summer is an appropriate time to hold a reunion of his former students and coworkers in corn genetics.

Preliminary arrangements are now being made for such a reunion to be held at Ithaca in late August or early September, either just before or just after the summer meeting of the Genetics Society at Cold Spring Harbor. It is being planned as an informal family affair to last for at least a couple days. No formal program is being arranged but there will most certainly be a picnic at Taughannock, and you may rest assured there will be ample opportunity for reminiscences and much good talk. If the group is interested in having one or more informal round-table discussions of recent developments in corn genetics or an inspection trip to the Plant Breeding gardens, they will be arranged. And it is possible we may be able to handle a small amount of live plant material for exhibit purposes, if anyone has something new and exciting that he would like to have on exhibit.

The names of the persons to whom this invitation to participate in the reunion is being sent are given below. The word was passed around at the recent Philadelphia meetings that plans were under way for a get-together of this sort, and the response was 100 percent favorable. The names of those who indicated that they would plan to attend are starred. If this preliminary poll is any indication of the final trend, most everyone will be on hand, and this should be a memorable occasion for Dr. and Mrs. Emerson.

Another announcement will be issued later on when a definite date has been selected and other plans have materialized. Meanwhile, any suggestions you may have will be welcomed.

Cordially yours,

L. F. Randolph
A. C. Fraser

Anderson (*); Beadle (*); Brink; Brunson; Burnham (*); Clark, Frances; Creighton (*); Demerec (*); Emerson, Sterling; Eyster (*); Fischer; Hayes; Jenkins; Jones; Kempton; Langham; Lebedeff; Lindstrom (*); Longley; McClintock (*); Mangelsdorf; Perry; Reeves; Richey; Rhoades (*); Sharp (*); Singleton; Sprague; Stadler (*); Weatherwax

An Appreciation

At the close of the academic year in June, 1941, Dr. R. A. Emerson will have reached the age of retirement for university professors and will officially set down his old box of records after 27 years of service to Cornell University. Actually his corn genetics investigations began at Nebraska about 1911, so the present summer will mark over 30 years of research on maize. It seems highly proper at this time for The News Letter to call to the attention of the cooperators the services which Dr. Emerson has rendered to genetics in general, and to Maize Genetics Cooperation in particular.

One of his outstanding accomplishments in this long period has of course been his highly productive research in the field of maize genetics. A long series of publications testifies to his activity here. Younger men who are working with maize should remember that they have more tools to work with and they can go farther because of the foundation laid by R. A. Emerson. His researches would stand as a signal contribution even if he had done nothing else in the advancement of science.

Most men in university positions have an opportunity to influence students, to stimulate their interest in research and to instill in them certain ideals. The list of graduate students who have majored with R. A. Emerson and gone on to important positions in science is an impressive one. Many of these men are still corn geneticists, as they were in their graduate-student days, and most of them are maize cooperators along with us. One man retires, but several dozen carry on the work, with much of the same industry and high regard for the scientific approach.

By the late 1920's, the number of corn geneticists had grown considerably. Dr. Emerson began about that time to get these men together in his hotel room at the time of the A.A.A.S. meetings for so-called "cornfabs". These informal meetings served to keep the corn workers informed on what others were doing and helped them to plan for the future. They were the beginnings of Maize Genetics Cooperation. Not only has our own organization grown from these informal meetings, but corn geneticists have set an example in mutual confidence and cooperation which has been copied by several other groups.

We think that we are safe in saying that R. A. Emerson was the first to call the attention of plant geneticists to the advantages of the maize plant for genetic research, and that he did much to stimulate the present widespread interest in this plant. His writings have probably "converted" a number who did not come more directly under his influence as a teacher.

When you stop to think of it, he has done a thorough job. He has made many excellent contributions of his own, he has trained graduate students to "carry on", he has stimulated wide interest in corn genetics, and finally, he has insured, for sometime at least, the maintenance of maize stocks and a cooperation in maize research. These things will have far-reaching effects.

But this is not a eulogy. There seems to be "plenty of mileage in the old car yet", and the old record box still holds cards. The Dean of our Agricultural College has promised that office and garden space will still be available for Dr. Emerson's use, and perhaps if our New York winters get too monotonously disagreeable, southern California or Florida will come to the rescue.

Dr. Emerson, as the Maize Genetics Cooperation News Letter goes to press, your fellow cooperators take off their old straw hats to you in affectionate regard. We wish you years of real enjoyment in doing the things you most want to do.