MAIZE GENETICS COOPERATION

NEWS LETTER

10

March 4, 1936

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

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MAIZE GENETICS COÖPERATION
DEPARTMENT OF PLANT BREEDING
CORNELL UNIVERSITY
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March 4, 1936

To Maize Geneticists:-

This letter contains information from many sources, arranged under the following heads:-

I. Collective publication of linkages.
II. General news items. Includes notes on linkage without data, lists of seed stocks, etc.
III. Linkage data.
IV. Seed stocks received, and those propagated in the Cooperation garden at Ithaca.
V. Tests of inbred strains for disease resistance.
VI. Special notices.

Most of these reports are given almost verbatim but are not put in quotation marks because in numerous instances they have been somewhat abbreviated and sometimes the phraseology has been changed (without, I trust, a change in meaning). Statements enclosed in brackets, [ ] , are gratuitous comments by your secretary.

I. <u>Collective Publication of Papers on "Linkage in Maize"</u>

Perhaps the most important matter presented in this news letter relates to the collective publication of separately headed and signed articles on linkage (see news letters of March 6 and November 30, 1935).

The response from cooperators has been wholly favorable and several have indicated their readiness to contribute to such a series of papers.

Dr. Hanson, representative for the natural sciences of the Rockefeller Foundation, has written as follows:

> "Regarding your request to use a small part of the fund for the publication of brief papers in Genetics, since this seems to you to be merely using a somewhat different mechanism than you originally contemplated for putting this maize material before the geneticists interested, the Foundation will have no objection to a small portion of the funds being used for that purpose.
>
> With kind regards, I am
>
> Cordially yours,
>
> (Signed) Frank Blair Hanson"

Dr. Dunn, editor in chief of Genetics, with reference to our proposal, says:

"I see no danger in this so long as we adhere to the basic rule for publication in GENETICS -- i.e. soundness, significance and permanent value of the material printed, and so long as we are just as free to accept or refuse such papers as any others. I think the publication of such material should differ as little as possible from other papers published; that is, it should not form a separate department of the journal which would constitute a special privilege and might bring resentment from other groups. I think we shall be able to make satisfactory arrangements and suggest that when ready, you send in some sample copy which we can use as the basis for settling form, etc. We go to press on February 15th (May Number) and thereafter on the first of each odd numbered month. If an arrangement is made, copy can be printed in two months (plus about five days) from receipt of mss.

Sincerely yours,

(Signed) L. C. Dunn"

See also suggestions by Jones (news letter March 6, 1935, pp. 19, 20).

Of course, we should not expect to receive preferential treatment from Genetics, and could not expect our papers to be accepted unless they meet the standards set for that periodical. I am anxious to try the plan this spring. It is obvious that we cannot get material ready for the May issue of Genetics. The July issue goes to press May 1 (I assume from Dunn's letter), and manuscripts should be in the editor's hands some time before that. I ask, therefore, that you send such material as you desire to include to reach me not later than March 31.

Manuscripts should be typed and ready for publication without change. When new genes are involved, a short, concise description of the characters differentiated by them might well be included. Well known genes should not require such treatment. Tables should be presented in summary form. Different cultures involving the same kind of data should not be listed separately unless that is essential in order to demonstrate significant differences between them. Of course F_2 and backcross data for coupling and repulsion must be entered separately in the tables. A single frequency distribution may often be displayed in the text to better advantage than in a table. Tables of data should be accompanied by such discussion only as is essential to make clear any points not obvious from an examination of the tabular data themselves, or as is necessary to indicate the relation of the reported observations to other linkage tests, etc. The tabular arrangement and headings used in the Linkage Summary are convenient and I, naturally, think them good.

No limit can be set now to the length of the individual contributions, but, unless a very considerable amount of date are presented, individual papers might well be kept to not over one or two pages of printed matter, and it is my hope that some may be not more than half that long.

II. General News Items

Maize Genetic Cooperation, Ithaca, N. Y. -

1. D. G. Langham, formerly of the State College, Ames, Iowa, and now a graduate student in genetics at Cornell, is to serve as assistant in the Maize Cooperation work.

2. Several glossies received from Hadjinov were crossed last summer with standard glossies and the seedling progenies have been grown and noted this winter. Pollinations were made by John Shafer and seedling tests by D. G. Langham.

These tests indicate that:-

Hadjinov's glossy 3 = gl_4
" " 6 = gl_6
" " 10 = gl_3.

Hadjinov's glossy 5 gave normal seedlings in crosses with glossies 1, 2, 3, 4, 6, 7, 9; with gl_3 it gave seedlings normal in appearance but which exhibited the behavior of glossies in holding sprayed water; it was not tested with glossies 5 and 8. Hadjinov's glossy 7 gave normal seedlings in crosses with glossies 1, 3, 4, 6, but has not been tested with glossies 2, 5, 8, 9. Hadjinov's glossy 8 has not been adequately tested.

In the records of Cooperation cultures, I find these notes by Rhoades:- "Hadjinov's 3 is possibly the same as gl_3 since it is linked with su", and "Sprague reports that Hadjinov's 10 is allelomorphic to Stadler's gl_c".

Cornell University, Ithaca, N. Y. -

1. Corrections to the linkage summary (Cornell Memoir 180):-

Page 13. Delete the gl_{10} (see news letter November 24, 1934). We missed this in proof reading.

Page 25. The stock of Demerec's w_4 having been lost, w_4 was assigned to a white seedling found by Lindstrom to belong to group 4 (see Linkage Summary, p. 46).

Page 52. The last item in table 15 should read

Ch + +	61	45	54	59	43	44	52	39		
+ bm_1 yg_1	106		113		87		91		397	Burnham
			28.5%		21.9%		22.9%			

Page 57, table 18. Gl_1 Ij, second line, read 11 not 1.1 per cent.

It will be helpful to all of us to have any other corrections called to my attention, so please send them on and observe my excellent imitation of pleasure.

2. To get for chemical studies material of the several plant color types with as uniform a genetic background as possible, I have tested the germination of seed samples stored in my cases for seven years. A brown plant, a_1 B Pl, was crossed with a dilute sun red, A_1 b pl, inbred strain, and a brown from F_2 of this cross was backcrossed to the same inbred strain. Ears of the several color types of F_2 of this backcross were tested. Four ears of purple, A_1 B Pl, averaged 4% germination, while 14 ears including some of each of the other color types, namely, sun red, dilute purple, dilute sun red, brown and green, averaged 95% germination. The observed difference between purple and the

other color types is interesting, but probably without significance.

The seedlings of all color types, however, gave striking evidence of the effect of age. Normally the primary roots of germinating seeds show before the plumules do and grow more rapidly for some time. In most lots of this old seed the plumules showed before the primary roots did, and in one lot that germinated 100% no primary roots were visible at any time, but secondary roots started after the plumule was one-half inch or more long. Moreover, many seedlings died after being potted in good soil. Of seedlings from lots ripened last summer, tho germinated two weeks later, and planted in the same soil, none have died and the lot as a whole is now (a month after planting) two or three times the size of those from old seed. This is so similar to Randolph's results in germinating seed and growing seedlings from kernels subjected to high temperatures while dormant as to make the problem seem worth further study.

R. A. Emerson

3. Quantitative studies on the frequency of chromosome doubling in corn seedlings treated at different temperatures for varying periods of time indicate that 20, 40, and 80 minute treatments at 36°, 38°, 40° and 42° C are effective in producing a markedly increased frequency of tetraploid sectors in the root-tips and stem-tips, more mutant sectors being produced in the roots than in the stems of the same treatment. Negative results were obtained from a study of the persistence in the mature plants of tetraploid sectors induced by heat treatment of the germinating seed. Over 300 plants were included in the experiment and no tetraploid ears or ears with tetraploid sectors, as determined by applying pollen from tetraploid plants to the treated plant and noting the set of seed, were obtained.

4. Heat treatments of diploid corn, barley and einkorn in early embryogeny and in the seedling stage induced an increased frequency of segregating mutant seedling types differing from the normal either in growth habit or morphology or in the amount of chlorophyll development.

5. Inbred stocks of tetraploid maize after four generations of selfing have good vigor, reasonably good uniformity, and in some cases an increase in fertility over the original parental tetraploid stock. Tetraploid strains of commercial yellow corn are being tested in cooperative bio-chemical and animal assay experiments to determine their vitamin A potency. Since the tetraploid yellow maize endosperm has six doses of Y rather than three as in the normal diploid yellow corn the vitamin A potency may be twice as great in the former as in the latter.

6. The tolerance of dormant seed to heat treatment varied with the moisture content of the seed. Corn and barley seed with 24 per cent moisture was killed with one 30-minute treatment at 100° C. With a reduction of moisture content to 9 per cent the seed was not injured by a 30-minute treatment at 100° C, but after 60 minutes germination was only 30 per cent, and after 2 hours only 10 per cent of the seed germinated. Seeds with 5 per cent moisture germinated perfectly after 2 hours treatment at 100° C, but were killed after 30 minutes at 115° C. Seeds with 2 per cent moisture, the reduction in moisture content being accomplished by drying approximately 3 weeks at 60° C, germinated well after 30

minutes at 115° C, but only 10 per cent germinated after 60 minutes, and 30 minutes at 130° C killed all of the seed. The corn seedlings from the sub-lethal dosages at the different moisture contents were weak and chlorotic, many failing to survive, but the development of normal green color was not similarly altered in the barley seedlings.

7. In further studies on the B-type chromosomes in maize the number in individual plants has been increased to 32-35, with no marked decrease in plant vigor but with an appreciable decrease in fertility among these extremely high numbered B-type plants. Both Florida and Durango teosinte occasionally have B-type chromosomes which are morphologically identical with those in maize, and exhibit the same synaptic behavior and breeding relationships. Plants of Florida teosinte with 5 B-type chromosomes and plants of Durango with as many as 10-12 have been obtained by inter-crossing plants with lower numbers. From an extensive survey of chromosome morphology in various stocks of maize and teosinte, primarily for the purpose of determining the origin of the B-type chromosomes, an extremely wide variation in prophase morphology in different stocks has been noted; maize stocks with as many as 13-14 sizable knobs and others with as few as 1 or 2 have been discovered, also Durango and Florida teosinte stocks with very few and other stocks with numerous knobs. However, a careful search for a chromosome arm in these diverse stocks similar to or identical with the B-chromosome has been fruitless thus far. This suggests that the B-chromosome may be a composite of several parts from different regions of the same or different A-chromosomes.

L. F. Randolph

8. Mosaic plants in part heterozygous and in part homozygous for a chromosome 5 deficiency. - Breakage in the spindle fiber insertion region of chromosome 5 resulted in two chromosomes, one a deficient rod-shaped chromosome and the other its reciprocal, a ring-shaped chromosome, each with an insertion region, the two equivalent genomically to one chromosome 5 (McClintock, Proc. Nat. Acad. Sci., 1932). Two such cases were described. In one case, known as the large deficiency large ring, the ring involved approximately one-sixth of the length of the chromosome, including the locus of Bm_1. In the other case, called the small deficiency small ring, the ring involved about one-twentieth of the length of the chromosome and also included the locus of Bm_1.

It has been found that the small deficiency can function through the eggs without the small ring being present also. Pollen having the large deficiency plus the large ring-shaped chromosome (the full genomic complement for chromosome 5) can function as well as normal pollen with an intact chromosome 5. When two such gametes fuse, an individual having the small deficient chromosome, the large deficient chromosome and the large ring-shaped chromosome is produced. As stated in the above publication, loss of the ring-shaped chromosome occurs in some mitotic divisions. In the plants resulting from the described cross, the nuclei and thus cells which arise after such a loss of the ring chromosome will be homozygous deficient for the amount of chromosome represented by the length of the small deficiency. Such plants should be therefore, a mosaic of heterozygous and homozygous deficient tissue if cells whose nuclei have undergone the loss of the ring chromosome can continue to propagate themselves. It was known that the heterozygous deficient tissues do not vary noticeably from non-deficient tissues. If, in these plants, the homozygous deficient tissue is viable and if the homozygous deficiency alters the structure of the cell, streaks of altered tissue should be detectable. Streaks of altered tissue were very obvious in the leaves of such plants. A histological study of the nature of the alterations is being conducted by Mrs. Lucy Abbe. From the appearance of the homozygous deficient tissue it is probable that such tissue would be inviable if not surrounded by normal tissue. The original "double-deficient" plants were obtained by crossing plants having a normal chromosome 5 with bm_1, a deficient chromosome 5 with no lucus for Bm_1 and the ring chromosome carrying Bm_1. The "double-deficient" plants were all Bm_1 except one plant which was variegated for Bm_1 and bm_1. The introduction of the bm_1 locus of the normal chromosome 5 into the deficient chromosome is believed to have occurred as the result of a non-homologous crossover between the normal and deficient chromosomes with a resulting shift in the position of the deficiency (as described by Stadler in the Amer. Nat., 1934).

9. Several inversions, two involving sections of chromosome 9 and one involving a section of the long arm of chromosome 4, have been detected and isolated by Miss Creighton and myself. One of the inversions on chromosome 9 should eliminate single cross-overs within the short arm of this chromosome, although the tests have not been completed.

10. Disjunction studies on interchanges have shown that sister spindle fiber regions do not separate in I, that crossing-over between the spindle fiber and the break is followed by disjunction of homologous spindle fiber regions, that the passage of two homologous spindle fiber regions to the same pole in I is increased when the crossing-over is decreased, and that whether 4 or 6 types of spores will be formed and their proportions depend upon the relative distances between the spindle fiber regions and the breaks coupled with crossing-over in these regions.

Barbara McClintock

11. Data from crosses of Florida teosinte with maize, back-crossed to maize, showed little or no crossing over in the short arm of chromosome 9, but between wx and v_1, there was from 6.4% (Creighton) to 40% (Allen) of crossing over.

Sylvia M. Allen and Harriet B. Creighton

12. An inbred strain of yellow dent corn, which, after having been selfed for nine generations, has been propogated by sib-crossing or mass pollination for three years, has given rise to two striking mutations, namely, yellow to white endosperm and normal stature to a slender dwarf type. All the white endosperm kernels germinate prematurely.

R. G. Wiggans

<u>University of Minnesota, St. Paul, Minn.</u> -

1. I have been studying an abnormal tassel type that I propose to call ramose tassel. It gives some variation in ear type. Some strains show crooked rows and generally a few sterile male

florets on the tip of the ear. In other cases the upper half of the ear is divided somewhat like ramose-1. In crosses, however, either of these types can be separated from ra_1 with considerable accuracy. Linkage studies of ramose tassel were made last year using F_2 data from crosses with representative genes of the ten groups. It is linked with na_1 cr_1 and py in group 3 [py is in group 6]. It has occurred to me that this may be the same factor or an allelomorph of ra_2 reported by Brink but not published. [Brink's linkage data (Linkage Summary, pp. 41, 42) give a_1-ra_2 51% and ra_2-Rg 34% recombination.]

2. I note your statement [Linkage Summary, p. 12] that floury is difficult to classify in many stocks. I have had no difficulty except where some of the virescent seedlings were concerned. I classify commonly over a ground glass with light underneath.

H. K. Hayes.

U. S. Dept. of Agric., Cereal Crops & Diseases, Ames, Iowa -

1. A branched ear was observed in F_2 (1923) of the station strain of Reid's Yellow Dent. It appears similar in all respects to the one described by Kempton as branched silkless, bd, and was reported by Rhoades (Maize letter, November 24, 1934) to be allelomorphic to that gene. F_2 data involving bd with two other genes show it to belong to group 7. [The data (see III, below) seem to place bd to the right of ij, near Bn_1. Hadjinov's data (Linkage Summary, p. 57) give about 36% recombination between his bd and Bn_1. His bd has not been tested with either Bryan's or Kempton's.]

2. A character similar to Brunson's cuzcoid was found in F_2 of the variety Krug in 1934. It tasseled very late but produced no ear shoots. It had about 50% more nodes than normal corn. It apparently is controlled by a single recessive gene.

A. A. Bryan

3. The study of the factor interaction of a_1 and Dt has been continued (see maize letter of November 24, 1934). On the basis of rather extensive counts the ratio of the average number of dots on seeds of a_1 a_1 a_1 Dt Dt dt to the average number of dots on seeds of a_1 a_1 a_1^p Dt Dt dt constitution is 3:2. The ratio for seeds of a_1 a_1 a_1 Dt dt dt to a_1 a_1^p a_1^p Dt dt dt constitution is 3:1. Since in the comparisons the Dt gene is held constant while the dosage of a_1 varies, it is apparent that the effect of increasing the dosage of recessive a_1, as indicated by the average number of dots, is an arithmetic one. In reciprocal crosses between two closely related lines (a_1 a_1 dt dt x a_1 a_1 Dt Dt) the ratio of the average number of dots on seeds of Dt Dt dt to seeds of Dt dt dt constitution was 4:1. Some data have also been obtained on the number of spots of Dt Dt Dt constitution. These data indicate that the effect of increasing the dosage of Dt may be geometric.

4. Further study with the chromosome 5 fragment (see maize letter of November 24, 1934) has placed the following genes in the long arm of chromosome 5: v_2, ys, pr, v_{12}, v_3, and bt. The loci of a_2 and bm_1 are in the short arm of chromosome 5. The fragment chromosome, which is composed of the short arm of chromosome 5 and has a terminal insertion region, occasionally passes

through the pollen. In the progeny of a selfed fragment plant there occurred an individual with the normal complement of 20 chromosomes plus two fragment chromosomes. In genetic constitution and appearance this 22 chromosome plant was identical with the secondary trisome found several years ago in which the single supernumerary chromosome was composed of two short arms of chromosome 5. Plants having a single fragment chromosome were studied at pachytene. As reported before, the fragment pairs with the two normal chromosomes 5 in approximately half the cells. It was occasionally observed in those cells where the fragment was unpaired that the terminal insertion region presented the appearance of being split. This observation may have some theoretical importance since some of the prevalent theories of meiosis assume that the reason the spindle fiber region undergoes a reductional division in the first meiotic anaphase is that the division of the insertion region is delayed to a late prophase stage while the split of the chromosome thread occurs in the early prophase stages.

5. An inbred strain gave in F_2 approximately 65% luteus seedlings (again see maize letter of November 24, 1934). The genetic constitution of this line was $\frac{sp\ +}{+\ l}$ with about 2 per cent crossing over between the sp and l loci. These two genes have been linked with factors in chromosome 10. They are very close to g_1 and give about 20 per cent of recombinations with R. The luteus gene is designated as l_g and the small pollen gene as sp_2. Seed available.

6. A triploid individual occurred in a cross of gl_1 x ws_3. The constitution of the triploid was Gl_1 Gl_1 gl_1 Ws_3 ws_3 ws_3 which suggests that the diploid number of chromosomes was contributed by the pollen parent.

7. During the harvesting of the fields in the Iowa Corn Yield Test several ears were found which had, to the writer, the appearance of triploid ears. Root tip counts of the progeny substantiated this hunch.

8. Half the plants in a small F_1 progeny of an R-g-li stock x Florida teosinte had narrow leaves, an unusual type of chlorophyll striping, and brown midribs. Neither of the parents showed this character. It seems possible that we have here a case of factor interaction between Zea and Euchlaena genes. Several crosses were made between the R-g-li stock and Florida teosinte and only one of the F_1 progenies showed this new character.

9. In the progeny of a plant trisomic for chromosome 6 there occurred an individual with 20 chromosomes plus a fragment composed of the long arm of chromosome 6. The insertion region is apparently terminal. Studies of the disjunction of the two normal chromosomes 6 and the fragment, utilizing the technic of McClintock in studying the number of nucleoli in the quartets of microspores, showed that in 2.4% of the cases the fragment chromosome went to one pole and the two normal chromosomes to the other pole. In the remaining cases the two normal chromosomes underwent disjunction.

10. Studies of some of the Iowa inbred lines showed that in those inbreds which are poor pollen producers there was a considerable number of unpaired chromosomes at Metaphase I. These unpaired chromosomes undoubtedly cause some of the sterility

found in these lines. Fertile inbred lines showed fewer univalent chromosomes. In the "sterile" inbreds the pairing pachytene was perfect and the unpaired homologous chromosomes showed at diakinesis an orientation to each other because of this earlier association.

11. In a selfed line homozygous for all the dominant aleurone factors there occurred seeds with colorless areas of varying size (Anderson had a similar character several years ago. He called it "Bald" aleurone.) The explanation for the appearance of colorless areas in this line is due to the failure of formation of the aleurone layer.

12. New stocks:

Tp-gl_1-v_5-ra
a_1-lg_2 Dt
a_1-na-ts_4 Dt
pr-bm_1-a_2 (probably)

13. Studies with P^{vv} and sm indicate that intensity of salmon color in silks depends upon amount of variegation on the ear. The silks have a uniform color, not variegated.

14. Golden-1, g_1, though not identifiable by external appearance, can be classified accurately in the seedling stage by cutting off the seedling stalk just above the ground. Golden-1 seedlings have a distinct golden color in cross section while non-golden ones are clearly green.

M. M. Rhoades

Agr'l Experiment Station, New Haven, Conn. -

1. We are informed by Eyster that his opaque-3 is the same as our o_1. [Eyster reported o_3 in chrom. 9].

2. A maternal stripe has been obtained from a series of Sweepstakes inbreds. It is more vigorous than those obtained by Demerec and Anderson.

3. The dwarf reported in maize letter of November 24, 1934 is not d_1. It segregates well and is viable but never produces an ear or even pollen at New Haven. Seed available.

4. The adherent reported in the same news letter is not ad_1. Viability good.

5. Seed of a stock of trisomic chromosome 4 is available.

6. F_2, 788 individuals, of $\frac{o_2 \; + \; +}{+ \; gl_1 \; ij}$ gave recombination percentages as follows:- o_2 - gl_1 27, o_2 - ij 37.

Another F_2, 323 seedlings, of $\frac{o_2 \; +}{+ \; gl_1}$ gave 22% crossing-over. Backcross data, 453 plants, give 17% crossing-over between o_2 and ra_1. These data indicate that o_2 is to the left of v_5.

7. We apparently have two complementary factor pairs for yellow endosperm. I have tentatively designated one of them Y_4 and the other It (intensifier). I have only one stock of Y_4 Y_4 it it, but It is carried by several white stocks, in fact, all so far tested except one a-tester. It might be an allelomorph of A. F_1 seed of the cross Y_4 Y_4 it it x y_4 y_4 It It is all yellow. The F_2 ears segregate fairly well into a 9:7 ratio for yellow and white, showing several intensities of yellow. I do not think the stock of Y_4 Y_4 it it is the same as Y_1. It is

much lighter in color and shows segregation well only in very flinty corneous stocks. The intensifier stocks, y_4 y_4 It It, also intensify the yellow color of Y_1.

W. Ralph Singleton

University of Florida, Gainesville, Fla. -

1. A few years ago an inbred ear segregated sharply (3:1) full yellow and pale yellow endosperm. The pale seeds produced almost 100% white seedlings and the others produced nearly all green seedlings. Brunson reported something similar, I think.

2. A first year inbred ear of Cuban Yellow Flint segregated sharply red and green seedlings and a range of intensity of yellow endosperm. The seeds were arranged in order of endosperm color and the darker 3/4 planted separately from the lighter 1/4. On this classification crossovers with anthocyanin were about 20%. The stock was grown through two more generations with selection of ears giving lesser crossing over and the crossovers reduced to about 10%. The reduction was attributed to selection for sharper segregation and more accurate classification of endosperm color. The anthocyanin difference was indicated at the R locus by outcrosses to Cornell aleurone testers.

Fred H. Hull

California Institute of Technology, Pasadena, Calif. -

1. Data on striate and interchanges place sr between P and br.

2. Summary of map positions of interchanges in chromosomes 1, 3, 9 and 10. Part of this is a repetition of what I sent last year.

Chrom. 1 -

Left of P. An undescribed 1-6 interchange gave the order T-P-sr with 6% crossing over between T and P.

Near P, order uncertain, 1-2b, 1-9c.

Between P and br 1-3a, 1-5b, 1-5c, 1-9a.

Near br 1-3d, 1-7b, 1-7c, 1-9b, 1-10a.

Between br and bm_2 1-5a, 1-4, 1-7d.

Chrom. 3 -

Between a and na 2-3d, 3-5c, 3-5b.

Nearer ts_4 1-3a, 2-3b, 3-7a, 3-8a, 3-9a, 3-10a, 3-10b.

Probably beyond ts_4 but order uncertain 3-10a, 2-3c, 1-3d.

Beyond ts_4 (27.2%) 3-7b.

Chrom. 9 - all tested are beyond waxy.

	% crossing over	No. of backcross plants
1-9a	9.2	239
1-9b	35.4	505
1-9c	12.7	237
2-9a	30.7	505
2-9b	7.5	628
3-9a	3.6	608
4-9a	25.1	426 (2 groups of data 31.0 and 11.6)
4-9b	3.1	193
6-9a	9.5	610
6-9b	3.7	731

8-9b	35.0	141 (data irregular)
9-10	about 3.5 (estimated from combined wx-T and T-R intervals)	

Chrom. 10 - crossing over with golden-1 (left of g_1)

	% crossing over	No. of plants
1-10a	15.0	137
2-10	6.2	80
3-10a	15.4	481
3-10b	20.0	328
3-10c	7.0	346
6-10	9.7	342
8-10a	17.0	427
8-10b	14.7	310
8-10c	22.8	535
4-10b (near g_1, order uncertain)		
9-10 (Right of R)		

3. Summary of map locations of interchanges on chromosome 2. Combined data of Clokey and Anderson.

Near B 2-6b, 2-9a.

Between B and v_4 1-2b, 2-3c, 2-8, 2-3d, 2-10, 2-4d, 2-7b, 2-9b.

Far right of B but not yet tested with v_4 2-7c.

Near v_4 2-4a, 2-4b, 2-5b, 2-7a, 2-7b.

Beyond v_4 2-4c (v_4 - T = 35).

E. G. Anderson

University of Buenos Aires, Buenos Aires, Argentina -

1. In Garrapata corn from the Province of Salta in Argentina and from Bolivia, spotted aleurone is due to a dominant r modifier giving mottled aleurone.

Mottled x a and c testers gives self color

Mottled x r testers gives mottled F_1,

but in F_2 some colorless kernels appear. The modifier is independent from pr and from a and c but seems to be linked with r. The r modifier is designated Mr. The backcross: r Mr Pr/r mr pr x r mr pr gave

Mottled purple	66
Mottled red	59
White	126
	251

[Mr has been used by Kvakan for midrib (Linkage Summary, p. 15) but the stock has been lost. Seeds sent look like "stippled", which is either an allelomorph of r or very closely linked with it.]

2. Six "glossies" were obtained from selfed Amargo and other varieties. They are designated temporarily by the following symbols:

gl_{33a}	Same as gl_2
gl_{33b}	Different from gl_1, gl_2, gl_3, and gl_{33a}.
gl_{34a}	From sample of floury corn from Humahuaca (Jujuy, Argentina), different from gl_1 and gl_2.

gl_{34b} From a yellow flint; being tested with other glossies.

gl_{34c} From the Amargo variety; different from gl_2.

3. A barren-stalk type was found in the stock of gl_{34c}.

4. A liguleless stock was found in Amargo corn. A planting of 100 selfed seeds gave 56 green and 28 lethal white leaf base seedlings. Of the normal green plants that lived to the age of three months, 28 had normal and 20 had liguleless leaves. This is at present designated lg_{34a}.

5. A selfed plant of Amargo produced, from 50 seeds, 22 normal plants and 7 dwarf plants with bifid leaves and the midrib prolonged into a conspicuous awn, like the flowering glume of Aveneae. The character is called aristifolia and its genetic symbol is given as af. The aristifolia character is not known in grasses, so far as I am aware, except in a small genus of Mexican grasses (Jouvea), the taxonomic position of which is uncertain.

6. Lazy, la_{34a}, appeared in the progeny of a selfed plant of the variety, "Maiz Canario de 8 filas", which consisted of 47 normal and 15 lazy plants. Has been crossed with su gl_3.

7. Siamensis, sn, is a recessive character of variable expression obtained from an Amargo strain. Of the double seedlings, the "paracite twin" aborts early in some instances, leaving normal appearing individuals. A homozygous strain of sn exhibited the following types:

Seedlings with marked duplications - 12
Seedlings with different abnormalities - 32
Seedling normal - 1.

8. Male steriles: A male sterile, ms_{33a}, from a strain of maize from Tabacol (Salta, Argentina) gives a sharp 3:1 segregation. Another, ms_{34a}, from Humahuaca (Jujuy, Argentina) is linked with aleurone color. The stock is segregating for R r.

9. Tassel seed, ts_{34a}, has been found in a yellow flint from San Luis, Argentina.

10. Germless seeds, gm_{33a}, from a selfed ear of Piamontés, a flint corn, had 112 normal and 30 germless kernels.

11. Silky, si_{33a}, came from the same Piamontés strains.

S. Horovitz

<u>Instituto Agronomico de Campinas, Sao Paulo, Brazil</u> -

Attention is called to a bulletin from Brazil: Effeitos da primeira autofecundacao em tres variedades de milho. Technical bulletin #19, p. 19, with 37 photographic illustrations (five colored plates). Published in Portuguese with an abstract in English, as follows:

"The Genetics Department of the Instituto Agronomico started in 1932 a large maize breeding project based on the production of pure lines to be used for hybrid seed production. Over 3000 vigorous plants of 3 main commercial varieties were self-fertilized and part of the seeds of 1812 selected inbred ears was planted out for further selfing. In this paper the author describes some of the more prominent variations found among the selfed ears and also in the progenies. Most of these off-types are compared with similar variations worked out by American geneticists. The variations described here are: (1) premature germination of the seeds on the ears; 2) several cases of defective endosperm; 3) endosperm color (yellow-white); 4) mealy endosperm; 5) Aleurone colors; 6) Pericarp colors; 7) white seedlings; 8) yellow seedlings; 9) zebra striped seedlings; 10) virescent seedlings; 11) pale green seedlings; 12) zebra striped leaves; 13) several kinds of striped leaves; 14) oily spots; 15) several kinds of dwarfs; 16) narrow leaves; 17) crinkly leaves; 18) ramosa (?); 19) rolled leaves; 20) ragged (?); 21) branched ear; 22) several kinds of abnormal sex distribution: male and female plants, extreme cases of 'tassel-seed', etc. -- It is the author's intention to exchange seeds of his genetic material with American geneticists in order that some of the supposed new variations may be conveniently worked out and their genes be located in the maize linkage groups".

C. A. Krug

University of Zagreb, Jugoslavia -

1. Attention is called to a recent paper dealing with the inheritance of number of kernel rows in maize (Tavčar, Alois - Beitrag zur Vererbung der Kornreihenanzahl an Maiskolben. Zeitschrift für Züchtung, Pflanzenzuchtung, 20: 364-376. 1935). A 4-rowed type is described and its genotype is assumed to be Rw_1 Rw_1. Crosses of 4-rowed with 8-rowed forms exhibit monohybrid F_2 and backcross ratios. To the genes differentiating these two forms are assigned the symbols Rw_2 rw_2. 4-row = Rw_1 Rw_1 rw_2 rw_2; 8-row = Rw_1 Rw_1 Rw_2 Rw_2. Rw_1 and Rw_2 are inherited independently of each other and of P and Y_1. [Since, on the author's assumption, Rw_1 is homozygous in both the 4-rowed and 8-rowed types used in these crosses, no evidence is presented for the independence of Rw_1 from Rw_2, P and Y_1. Of course Rw_1 could be used as a symbol for the residual genotype of a 4-rowed form, but there seems no more need for such a symbol here than in many other cases.]

2. Four-rowed ears have two rows of kernels on either side of the cob, the two pairs of rows being separated by smooth areas (rachis without paleae). It is necessary to distinguish between palea and rachis color as well as between these and pericarp color, all of which belong to the P allelomorphic series. Ten genotypes have been found, as follows:

Genotype (with A)	Pericarp color	Palea color	Rachis color
P^{rrr}	red	red	red
Prrw	"	"	white
Prwr	"	white	red
Prww	"	"	white
Pwrr	colorless	red	red
Pwrw	"	"	white
Pwwr	"	white	red
Pwww	"	"	white
Porr	orange	red	red
Poww	"	white	white

An account of this series will probably be published in Zeitschrift fur induktive Abstammungs - u. Vererbungslehre.

A. Tavčar

John Innes Horticultural Institution, Merton Park, London -

1. There is pronounced indication of linkage between a gene for fasciated ear and white endosperm.

2. In a cross between fasciated-cherry-japonica and golden, the majority of the F_1 plants were not-golden not-fasciated but were japonica. F_2 segregation was normal for the first genes but gave 89 japonica in a total of 189 plants. When japonica was crossed with dwarf-3 all F_1 plants were green, not japonica.

3. In a cross between a line with coloured aleurone and rr lines, four alleles of R could be distinguished by their different effects on aleurone colour. Otherwise the plants were of the constitution AA CC bb Pl Pl. At least one of the R alleles involved seems to be a cherry allele. Two alleles were the normals, at present designated R and r. A third may be identical with the allele recently discovered by Rhoades, and designated here r'. The fourth is a very weak dominant called R'. The four heterozygotes when selfed gave

Rr	25% colourless
Rr'	35% "
R'r	50% "
R'r'	mostly 66%, in one case 75% colourless

It seems possible to obtain colourless R' homozygotes by selection of modifiers. The ratios 63:1 after selfing and 1:7 after backcrossing seem to indicate the presence of at least three complementary recessive modifiers.

4. The intensity of aleurone colour in the crosses mentioned under (3) depends upon two complementary modifiers giving 9 deep to 7 pale after selfing.

5. A large set of data was analysed with the help of efficient statistical methods in order to see how many ratios were disturbed by linked genes for pollen tube competition. Indications of such competition have been found in connection with the following segregations:

purple-1 and brittle-1 (see 6 below)	Brieger
deep and pale aleurone	"
yellow-white endosperm	Tidbury
deep-pale yellow endosperm	"
c and sh	Tseng.

6. The distance between pr_1 and bt_1 has been found to be 17.5%. The gametophyte factor ga_2 is located between pr_1 and bt_1 about 12.8 units from pr_1 and 4.7 units from bt_1. The amount of elimination in Ga/ga heterozygotes has been found to vary and has been studied in both types of heterozygotes, i.e.

$$\frac{Pr_1\ Ga_2\ Bt_1}{pr_1\ ga_2\ bt_1} \text{ and } \frac{Pr_1\ ga_2\ Bt_1}{pr_1\ Ga_2\ bt_1}$$

The data vary round the means 5%, 15% and 40% instead of the expected 50%.

7. Random pollination of unprotected plants has been found to be of rare occurrence in the experimental plots both at Berlin and Merton. Selfing predominated if unrelated lines which, however, flowered nearly simultaneously, were interplanted. Random pollination was found only if the plants were nearly identical in composition.

8. Experiments on earliness and yield were started in order to find types well suited to the English climate. A number of varieties were tested in randomised blocks. The plants were sown in three lots. The variation within each lot was very small. Plants sown on April 17th and planted out in May were far the slowest, those sown on May 21st and planted out on June 14th were quicker and needed about two weeks less. Plants sown in the field on June 5th gained another seven days. The differences between the varieties were partly very significant. I am convinced that part of the failure in the cultivation of maize in Northern Europe is due to the fact that the seeds are sown too early and kept too long in pots.

9. A fairly large coupling F_2 of C Sh/c sh and I Sh/C sh has been produced (9053 grains in the first and 7226 in the second case) to see whether there is any significant difference between the recombination values. All the data from the individual ears as well as the totals form a homogeneous sample around the common mean of 5.1%. A backcross for C Sh/c sh gave 4.3% in 6648. The difference between all F_2's and the backcrosses is just over twice the error. Experiments will be made to test reciprocal backcrosses.

F. G. Brieger

Honan University, Kaifeng, Honan, China -

1. A white waxy strain of maize from the province of Szechuan was crossed to al y Pl, white seeded of course. The F_1's were all yellow seeded. F_2 gave 146 yellow and 87 white, a case of complementary factors. Linkage tests are in progress.

2. From selfed strains of corn collected from Honan Province, one ear was found to have prematurely germinated seeds that seem to be linked with y. On selfing again one ear was found to have 159 yellow and 59 white seeds. All the white seeds had germinated on the cob. This may be a case of complete linkage. Progress is being made to ascertain this.

H. W. Li

III. Linkage Data

1. Four-point tests, group 2. I. W. Clokey

$$\frac{+\quad +\quad +\quad +}{lg_1\ gl_2\ B\ v_4}$$

0		1		2		3		1-2		1-3		2-3		1-2-3		
124	186	40	29	55	42	101	83	1	10	15	11	13	16	1	5	
310		69		97		184		11		26		29		6		= 732
		9.4%		13.3%		25.1%		1.5%		3.6%		4.0%		0.8%		

lg_1-gl_2 15.3%, gl_2-B 19.6%, B-v_4 33.5%

2. Trisomic and backcross tests, group 2, involving albescent, liguleless-1, and yellow endosperm. H. S. Perry

F_2 data from the cross of #2 trisome carrying lg_1 x al show that al is in chromosome 2.

+ +	+ lg_1	al +	al lg_1				% lg_1	% al
81	61	14	0	=	156	-	39	9
490	42	47	0	=	579	-	7	8
Total					735			8.3

The suggestion of close linkage between al and lg_1 seems to be confirmed by a diploid F_2 progeny, as follows:

+ +	+ lg_1	al +	al lg_1		% lg_1	% al
101	51	43	0	= 195 -	26.2	22.1

Per cent crossing over < 15.

F_2 progenies involving Y_x and al have indicated close linkage between these two genes. Backcross counts confirm this linkage, as follows:

Yellow		Not yellow	
Al	al	Al	al
186	0	0	169

Two seedlings from seeds with yellow endosperm and one from non-yellow, are still too small to classify.

3. Two-point tests, group 7. A. A. Bryan

X	Y		XY	Xy	xY	xy		
Bd	Gl_1	RS	804	254	268	53	= 1379	- 43%
Bd	Ij	RS	806	252	282	39	= 1379	- 39%
Gl_1	Ij	CS	1030	42	58	249	= 1379	- 16%

[All three genes involved in the same F_2 cultures.]

4. Three-point tests, group 7.

	0	1	2	1-2		
$\frac{+\ \ +\ \ Tp}{v_5\ gl_1\ \ +}$	148 133	18 13	16 9	3 0		
	281	31	25	3	= 340	M. M. Rhoades
		9.1%	7.4%	0.9%		
$\frac{+\ \ +\ \ +}{ra\ gl_1\ ij}$	337 423	23 11	113 104	3 1		
	760	34	217	4	=1015	I. W. Clokey
		3.3%	21.4%	0.4%		
$\frac{+\ \ +\ \ +}{v_5\ ra_1\ gl_1}$	1259 1281	70 44	24 41	2 0		
	2540	114	65	2	=2721	A. C. Fraser
		4.2%	2.4%	0.1%		
$\frac{+\ in\ \ +}{v_5\ \ +\ gl_1}$	1585 1537	153 36	143 102	57 40		
	3122	189	245	97	=3653	A. C. Fraser
		5.2%	6.7%	2.7%		

5. Four-point test, group 7. I. W. Clokey

$$\frac{T3\text{-}7a\ \ +\ \ \ +\ \ \ +}{+\ \ \ ra_1\ gl_1\ ij}$$

0	1	2	3	1-2	1-3	2-3	1-2-3	
210 222	2 16	5 17	25 40	0 0	1 0	1 0	0 0	
432	18	22	65	0	1	1	0	= 539
	3.3%	4.1%	12.1%		0.2%	0.2%		

T-ra_1 3.5%, ra_1-gl_1 4.3%, gl_1-ij 12.4%

Normal and semisterile (T) plants considered separately:

	T-ra_1	ra_1-gl_1	gl_1-ij
Normal -	5.4%,	5.8%,	13.6%
Semisterile -	1.2%,	2.5%,	11.1%.

The large difference in per cent of crossing over in the two cases is unexplained.

6. Three-point test, group 10. V. Rhoades

	0		1		2		1-2		
	108	107	74	68	20	16	9	8	
$\frac{Rp\ +\ +}{+\ g_1\ R}$	215		142		36		17		= 410
			34.6%		8.8%		4.1%		

7. Linkage Data for Chocolate, group 2. (?)

Ch V_4 CB 71 66 42 76 255 42% Burnham

I have some later material of the same sort for more data.

With a_2 [Chrom. 5] I had only F_2 material (furnished by Clokey, segregating also for c, r), but it gives absolutely no indication of linkage. Chas. Burnham.

Some miscellaneous linkage data with Ch are all negative. The earlier indication of linkage with T5-7c is washed out with further data. E. G. Anderson.

[See discussion in Linkage Summary, p. 51.]

IV. Seed Stocks Received

1. M. M. Rhoades, Ames, Iowa:- Stocks involving Eyster's Y_2.
2. H. K. Hayes, St. Paul, Minn.:- v_{21} (chrom. 8).

[Records Genetics Soc. Amer. No. 4, 1935. Abstract.]

3. J. H. Kempton, Washington, D.C.:- Annual teosinte from Lake Ratuna in Southern Guatemala.
4. M. T. Jenkins, Washington, D.C.:-

la su $\frac{Tu\ \ tu}{tu}$ gl_3

Homozygous A_1 C R a_2 bt bv pr (This bt stock gives good field germination.)

Same as above, but segregating V_2 v_2.

Homozygous A_1 C R A_2 bt bv pr

$\frac{fr_2\ gl_1\ ij\ fr_1}{+\ \ +\ \ +\ fr_1}$ x $fr_2\ gl_1\ ij\ fr_1$

$\frac{fr_2\ gl_1\ ij\ fr_1}{fr_2\ \ +\ \ +\ \ +}$ x $fr_2\ gl_1\ ij\ fr_1$

5. W. Ralph Singleton, New Haven, Conn.:-

Y_4 Y_4 it it

y_4 y_4 It It

y_4 y_4 It It x Y_4 Y_4 it it.

6. S. Horowitz, Buenos Aires, Argentina:-

su_1 gl_3 Y x la_{34a}

gl_{33a}

gl_{33b}

lg_{34a}

$\frac{r\ \ +\ \ Mr\ \ Pr}{r\ \ g_1\ \ +\ \ +}$ x r g_1 mr (R-tester)

af_{34a}

sn

7. Queensland Agricultural High School and College, Gatton, Australia:-

Ten packages of seed, labeled I - X [no letter].

8. Ithaca, N. Y. Stocks grown by Maize Genetics Cooperation. Pollinations by John Shafer:-

Inbred strains. Selfed or sib-crossed ears of all the inbred strains in disease resistance test (see V, below), except C70-34, which did not germinate.

Glossies 1, 2, 3, 4, 6, 7, 9; gl_5, no germination, gl_8 too late to ripen. Hadjinov's glossies 3, 5, 6, 7, 10 (H3 = gl_4, H6 = gl_6, H10 = gl_3, see II above); H8, all normal seedlings, supposed to be $+/_{gl}$ but some certainly homozygous normal.

Hadjinov's Rs_1, rs_2, at, bd, cr_3, bs?, vb (variable brachytic).

Perry's Yx and yx, in various combinations with Y_1 y_1, Pl pl, Al al.

Brunson's pale yellow endosperm.

Wiggans' brittle stalk.

Segregating cultures from W_1 w_1 x A_1 b Pl py su.

Plant colors:- A_1 B Pl, a_1^p B Pl, a_1 B pl, a_1 b Pl, a_1 b pl.

Tester stocks:-

Group 1. - P-p f_1 bm_2, P-p br f_1 bm_2, P-p br f_1 an_1, p sr an_1 bm_2, P-p gs_1 bm_2, p as.

Group 2. - lg_1 gl_2 B b v_4, lg_1 gl_2 ts_1, sb, al.

Group 3. - a_1 na_1 ts_4, d_1^s, d_1^m, a Rg.

Group 4. - la su Tu tu gl_3.

Group 5. - ys_1 bm_1 pr_1 v_2, A_2 a_2 bt bv pr_1, bm_1 bt pr_1, bv pr_1 v_2.

Group 6. - Y_1 Pl sm py, Y_1 pl (zg_3?), po y.

Group 7. - v_5 ra_1 gl_1, ra_1 gl_1 ij, v_5 gl_1 Bu_1.

Group 8. - j_1, msg.

Group 9. - c sh wx v_1, yg_2 c sh wx.

Group 10.- nl_1 g_1 R, r zb_5, d_7, li g_1 Rr.

Multiple testers:-

ts_2 bm_2 lg_1 b su_1 A_1 na_1 cr_1 pr_1 y_1 pl in j_1 C R^g.

bm_2 lg_1 b A_1 su_1 pr_1 y_1 pl In Bn_1 j_1 c R^g.

P^{vv} A_1 su pr_1 y_1 in c sh wx R^g.

A_1 A_2 Pr pr C-sh-wx g_1-R-r.

A_1 A_2 B-lg_1 Y-y-Pl Su-su-Tu-tu.

Other stocks previously listed are, for the most part, still available.

New seed stocks listed under general news items (II) in this letter but which have not been sent for the Cooperation collection, should be received as long as possible before planting time (May 15).

V. Tests of Inbred Strains for Disease Resistance

Last spring seed of five inbreds furnished by Professor Hayes and eight by Professor Wiggans were sent to eight cooperators in various parts of this country. All these strains were supposed to be more or less resistant to smut. Some of them were shown to be less smut resistant than expected, several proved very susceptible to bacterial wilt (Stewart's disease) and a few susceptible to rust.

1. Smut.

I have attempted to present a summary of the observations on smut in tabular form, below:-

			Per cent smutted plants					
1934 culture No.	Variety	No. years selfed	St. Paul Minn.	Ames, Ia.	Morgantown, W.Va.	New Haven, Conn.	Ithaca, N.Y.	Average
S54	Golden Bantam	7	10.4	0	0	36.4	0	9.4
S42	Northwestern Dent	9	6.0	5.0	0	0	4.0	3.0
C70-34	Minnesota 13	5	0	-	-	0	-	-
S283	Rustler	5	10.3	0	0	0	4.0	2.9
C86-34	Rustler	6	0	0	0	0	0	0
206	Leaming	9	0	0	3.0	0	2.0	1.0
208	U.S.204	13	6.5	17.1	30.0	93.7	67.0	42.9
209	Bloody Butcher	11	31.6	8.5	0	18.7	4.0	12.6
210	Oil Dent	9	14.3	3.8	3.0	7.1	2.0	6.0
211	West Branch	9	7.5	0	0	14.3	0	4.4
212	Silver King	14	31.0	2.3	0	21.1	0	10.9
213	Onondaga White Dent	12	92.9	42.9	0	15.4	0	30.2
214	Dutton's Flint	12	0	3.0	0	0	0	0.6

Minnesota cultures grown under smut-epidemic conditions. Longfellow variety had 65.6% smut. H. K. Hayes.

Iowa season excellent for testing smut resistance; smut infection in general was one of the heaviest in several years. A. A. Bryan.

West Virginia check variety showed 75-80% smut. C. Burnham.

Notes of smut infection -

Line C86-34, no smut reported; 214, little smut at Ames, Ia. only; 206, light smut at Morgantown, W. Va. and Ithaca, N.Y.; S283, light smut at St. Paul, Minn. and Ithaca, N.Y. only; S42, light smut at St. Paul, Morgantown, and Ithaca; 211, some smut at St. Paul and New Haven.

Line 208, showed medium to high percentages of smut infection in most tests; at Morgantown, New Haven, and Ithaca, smut with one exception limited to light tassel infection, but at Ames five ears were smutted.

Lines 212 and 213, showed heavy ear-smut infection in some tests.

Line C70-34, little to no germination in all tests.

2. Rust.

Pasadena, Calif. Little smut in 1935, none on strains in test. Lines 208 and 211 very badly rusted; 209 moderately badly rusted; 210, 212, and 213 lightly rusted; 206 and 214 free from rust and easily the most desirable for this locality. E. G. Anderson.

Ithaca, N. Y. Lines S42 and 211 some rust; 208 much rust, but too late to injure plants very seriously. There is some rust present every year at Ithaca, but it usually comes too late to be a serious disease. During two widely separated seasons, however, when rust had been introduced inadvertently with seedlings transplanted from the greenhouse early in summer, a very severe epidemic occurred. Many of the more susceptible stocks were killed before flowering time. If conditions should arise by which early infection were brought about, rust would be our most serious disease. R. A. Emerson.

New Haven, Conn. "Apparently one of our inbreds, Connecticut 2, an inbred out of the Whipple variety of sweet corn, is completely susceptible to rust. We had no rust here during the years that we were inbreeding Whipples from 1925 to 1928. Sometime later, I think in 1929 or 1930, we noticed considerable rust on this one inbred. Aside from rust Connecticut 2 has proved to be our best Whipple inbred and the one we are using in a great many crosses. It is used as the pollen parent and is never damaged so much that it will not make sufficient pollen. It always makes a good crop of seed when planted early. Last year the Eastern States Farmers' Exchange at Springfield, Mass. planted about an acre of Connecticut 2 for increase. They planted this late in order to avoid contamination from the pollen of sweet corn growing near by. This field of Connecticut 2 was so badly damaged that it did not make a single ear. I am doing some convergent improvement on this inbred and using Rhoades method of inoculating the seedlings so I can get a similar inbred resistant to wilt." Of the inbreds in the cooperative test the only one seriously affected by rust was 208 in which about 80% of the leaf area was covered by rust pustules. Somewhat susceptible strains were, in order of susceptibility: 211, 30%; 209, 20%; 206, 213, and S283, 10%, the latter had a few scattered pustules on the leaves of all the plants. W. Ralph Singleton.

3. Bacterial blight (Stewart's disease).

Morgantown, W. Va. Lines S54 and 209 very susceptible to wilt; C86 and S42 poor plants, wilt (?) susceptible. Chas. Burnham.

Washington, D.C. At Arlington Farm, resistance to bacterial wilt is of much greater importance than smut resistance. We seem to have universally heavy infections of wilt and susceptible lines are almost completely wiped out. Such was the case this season. Dr. Wiggans' lines 206, 208, and 210 were outstandingly the most resistant. Merle T. Jenkins.

4. Lodging.

Washington, D.C. Lines 206, 208, and 210 looked better than everything else until late in the season. In the heavy storm we had in September, 206 and 210 lodged somewhat, whereas 208 remained erect. Merle T. Jenkins.

Morgantown, W. Va. Lines S283 and 211 no lodging; 206, 208, and 214 some lodging; 210 and 212 badly lodged. Chas. Burnham.

Ames, Iowa. Lodging recorded by grade: 1 = little or none, and 5 very much lodging. Roots and stalks noted separately to determine whether lodging due to weak roots or weak stalks.

Line	Lodging grade Roots	Stalks	Line	Lodging grade Roots	Stalks
206	3	3	213	2	4
208	3	2	214	2	2-1/2
209	2-1/2	3-1/2	S42	2	2
210	3-1/2	2-1/2	S54	2	3
211	2-1/2	2	S283	2	2
212	3	3	C86-34	2	1

A. A. Bryan.

5. Firing.

Ames. Line 209, top leaves burned badly just prior to tasseling. A. A. Bryan.

St. Paul. Line 213, some firing; 209, upper leaves rather heavily fired. H. K. Hayes.

6. Ear notes.

Ames.

Line	Seed set	Quality	Line	Seed set	Quality
S54	poor	poor	209	excellent	fair
S42	fair	good	210	good	good
S283	fair	good	211	good	good
C86-34	fair	fair	212	poor	fair
206	good	fair	213	fair	poor
208	good	fair	214	very poor	poor

A. A. Bryan.

St. Paul. Line 211, rather undesirable ears at harvest. H. K. Hayes.

Ithaca.

Line	Ears	Line	Ears
S54	good	209	good
S42	good	210	poor
S283	good	211	good
C86-34	fair	212	good
206	fair	213	fair
208	poor	214	good

Obviously these inbreds differ widely in ability to produce sound and well filled ears at Ames and Ithaca. R. A. Emerson.

7. Summary.

The lines most generally resistant to smut are, in order of greatest resistance:- C86-34, 214, 206, S283, S42, 211. Line 208 showed the highest percentage of smut, but in most instances the infection was light and in the tassel only.

In rust susceptibility, line 208 showed the most infection, 209 and 211 much rust, and 206, 210, 212, 213, S42, and S293 some rust.

Bacterial blight was most injurious to lines S54, 209, C86, and S42. Lines 206, 208, and 210 were most resistant.

At both Ames and St. Paul, line 209 showed bad firing.

In set of seed, quality of ear, amount of lodging, there was little uniformity.

The following comments are of interest:-
Line 211, "excellent". A. A. Bryan, Ames.
Under Arlington Farm conditions, I don't think there is any question but that 208 is by far the best line of the whole lot. M. T. Jenkins.
[Lines 206 and 210 were good except for lodging.]
The starred lines [206, 208, 211, 214] I consider good enough for use in crosses with genetic testers. C. R. Burnham.
My choice of these lines would be about as follows, starting with the best: 214, 206, 210, 213, 211, 208, 212. E. G. Anderson.
Line 208, very nice strain, vigorous. Lines S42, S283, 206, 210, 211, 212, 214, desirable types. C86-34 fair, 209 and 213 undesirable. H. K. Hayes.

From all these comments, it would seem that lines 206, 210, 211, 214 have rather wide adaptability and that, where rust and smut are not troublesome, line 208 may prove satisfactory. Sprague, however, reports that at Columbia, Mo., none of the lines have value.

8. Some cooperators have indicated a willingness to test these lines further and to include some of their own. Any of you, whether or not you helped in the test in 1935, who are willing to conduct a test in 1936, will be furnished seed in so far as it is available or can be obtained. If any of you have other inbred strains, thought to be highly resistant to diseases and which might be adapted to a relatively wide range of climatic conditions, I shall be glad to arrange for tests. We shall probably be unable, however, to handle any large number of strains.

VI. Special Notices

1. Manuscripts for inclusion in the proposed collective publication of papers on Linkage in Maize must reach me not later than March 31. (See I, above). Some of the data included in this news letter might well form the basis of short papers.
2. New seed stocks should be received at an early date - certainly by May 1 - so that plans can be made for their multiplication in the Cooperation garden.
3. Those having disease resistant inbred strains of possibly wide adaptability which they desire to have tested this year should indicate the fact at once and send seed by April 1. Those willing to cooperate in making the tests will please communicate with me at once.

R. A. Emerson,

Secretary