· include in account.

1. Reason why the maize controlling elements differ in some respects -- that is in producing variegation + mutation -- rests on the selective methods. Those producing variegation easily identifies

2. Why most plants were maintained heterozygous for a_2^{m-1}

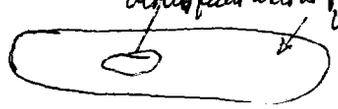
3. Tester stocks with a_2^{m-1} states - reason.

4. Inprogeny of 7308 D② with long duration of active phase of Spm, phase not altered by transposition.
This applies to transposed Spm in 7563A①, 7546⑧ + ⑨, also from ④ ear of 7109B②$^{t-1}$

5. Controlled times of change in phase of activity of Spm -
Examples from tables - from inactive to active
" active to inactive.

6. The contribution of the class I states to change in activity of Spm - { If only 1 Spm present class I states are evident for examining activity phase of Spm.

7. Relation of change in activity of Spm to control of subsequent change in phase - 7779; sector



From 7308D① ← 7778; sector of active Spm in 4 rows of 12 round ear
← 7777 " " inactive Spm in middle of ear

8. Independence of cycle of each Spm when combined in same plant.
1958 from ♀ inactive × ♂ active
1960 - 7780A plants.

9. Spm must be in the active phase for transposition to occur.

10. Cross of no Spm ♀ × active Spm ♂ : immediate action of Spm.
a_2^{m-1}

11 Selected kernels in class I states ~~[illegible]~~ each of vd type for behavior in them: Usefulness of class I states.

pale-dotted sequences -

1. shows grade of Spm activity
2. sectors in plants show grade of activity and what rate change in Spm occurs as individual event
3. Sectors in kernels shows change in grade of activity occurs in individual cells.

4. 7463 E-5 sequence: (7586-87)
   a) what rates grade change in tiller from - to + (full) is inherited. Arose from change of Spm
   b) Shows change from + to weak or - is result of event in single cell = the early sectorials.

$a_2^{m1}(A_2)$ BI | a_2^{3} bt no spin ½ + 7538 1 spin

of no. of ears.		uniformly dark colored		colorless with many colored spots		Few spots		colorless		Totals
		BI	bt	BI	bt	BI	bt	BI	bt	
538-9	6	494	33	439		6	= 44	75		

Control of dose of Spm on Time of cycle change of Spm - Use of pale-early asterter

♀ spm/spm - % fully active spm : breakdown

~~7816~~ - 7818 spm/spm♀ = 21 pale : 1 Breakdown (= 0.2%) : 507 fully active Spm

7816 - 7818 1 Spm = 1251 pale : 82 " (= 6.0%) ; 1269 " " Spm

1. germ line vs. soma -

a) inactive in germ line when rapid changes in soma from inactive → active → inactive.

Lack of correspondence between cob variegation and kernel types

Weak acting spm, turned on in kernels but irregular + weak + often late in dev.

Pollen - period of turning on -

Side branches " " " "

b) Active in germ line → active in ear regardless of on - + off in leaf + cob

include - Tests of spin in 7108 cultures - pale - spotted $a_2 m_1$.

" details of 7312 crosses.

Ratios of spin to no spin produced by crosses of 7308 D① × D②

Types of var. produced by each.

Test crosses of 7538 - to no spin

to Wx spin / Wx +

to Wx + / Wx spin

to Wx Wx ; 1 spin

active × inactive.

$a_1 sh_2 / a_1 sh_2$ + Spm Crosses 7965

		Date	Spm number	
7965A-1	7940A-1		2 Spm	
7957-4	7965A-1			
7958A-2	" "	7/24		
7965A-2	7972A-1		many spm	
7963C	7965A-2			
7965A-3	7955A-3		3 Spm	
7965A-4	7939A-4		2 Spm	
7958B-4	7965A-4			
7957-5	" "	7/30		
7958A-4	" "	7/24		
7967-6	" "	8/4		
7965A-5	7972A-4	8/8	4 or 5 Spm	
7955A-1	7965A-5	7/31		
7957A-1	" "	8/1		
7965B-1	7940A-3		High no. Spm	
" " C	7967-3			
7970A-1	7965B-1			
7972A-1	" "			
" " -3	" "			
7965B-2	7971A-3		1 Spm	
7965B-3	7972B-1		2 Spm	
7951A-4	7965B-3			
7973C-4	" "	8/2		
7965B-4	7973B-4		High no. Spm	Pr pr
7965B-5	7940A-3		4 Spm	Pr pr
7939A-4	7965B-5			
7940A-2	" "			
7951A-2	" "			
7958B-1	" "			
7972B-1	" "			
7973B-1	" "			

a1 sh2/a1 sh2 + Spm Culture 7966

♀	♂	date	Spm number		
7966-1 7874A-1	7971A-3 7966-1		+ Pr/Spm pr plus 2 Spm		C sh ♀ ex/C Sh Bz ex
7966-2 7973A-3	7973C-3 7966-2		1 Spm, not limited to pr		
7966-3	7973B-2		1 Spm	pr pr	Sh1 ex/sh1 ex
7966-4 7972A-4	7972B-1 7966-4		3 Spm	pr pr	
7966-5 " " t 7973C-5 7977B	7972A-1 7968-3 7966-5 " "		1 Spm	+ Pr/Spm pr	Sh1 ex/sh1 ex
7966-6 " " t 7973C-2 7969-20	7971A-4 7973B-2 7966-6 mean " " tube	8/24 8/7 7/30 7/13	1 Spm 2 Spm 1 Spm 2 Spm	Pr pr + Pr/Spm pr + 1 Spm	
7966-8	7972A-4		2 Spm		
7966-10 " -10 t	7973C-3 7968-3		3 Spm 3 Spm	pr pr	
7966-11 " " t " " t 7941-3 7953B-4 7956A-2 " A-6 t 7971A-1 7968-6 t	7971A-4 7972A-4 7973B-2 7966-11 " " " " " " " " " "		1 Spm	+ Pr/Spm pr	Sh Bz ex/sh ♀ ex
7966-12 " " 7942A-1 7971A-4	7973B-2 7973C-3 7966-12 " "		no Spm		
7966-13	7972A-4		2 limited Spm		

1957 Ext

A_2 kernels selected from ears of a_2^{m-1} (pale-spotted)

From pollen

7301 A

" B①

" B②

" B③

From ess parent:

7304 A = A_2 Bt p_2 / a_2 bt p_1. Stable with Spm

7305 A = var. plant. a_2^{m1} (pale-spotted) BI p_2 / a_2^s bt p_2

" B① = " " a_2^{m1} (" ") BI p_2 / a_2^s bt p_2

" B② =

" B③ = " " a_2^{m1} (pale-spotted) BI p_2 / a_2^s bt p_2

7463 A = " " a_2^{m1} (" ") BI p_2 / a_2^s bt p_2

7464 A = A_2 BI p_2 / a_2 bt p_2. Stable A_2 with Spm

---

2 A_2 : 4 a_2^{m-1} . Mutations to A_2 occur late. Few occur somewhat earlier. Expect difference in spermes if mutation occurs late

Spm - Origins

From a_1^{m-1}

Cuetenes

7296 - 7301

7302
7303
7304
7305 F+G
7317
7463 E
7464
7465
7467
7468
7469
7470

7544
7545 A (Spm^w - from Spm^s in A (4))
7548
7549 (Spm^w in 7549 D; from Spm^s)
7550
7551
7552 B
7553
7556 (+ 1 Spm from a_2^{m-1})
7557
7558
7559
7574
7579
7580 - Spm^w from Spm^s
7581 " " "
7608 (+ Spm from a_2^{m-1} possible)
7609 (+ " " " ")

From

a_2^{m-1}

7306
7307
7308
7309
7312
7313
7314
7315
7316
7318
7319
7320
7322
7455
7456
7457
7458
7459
7460
7461
7462
7463 C + D prob

7546
7547
7552 A
7554
7555
7560
7561
7562
7563
7564
7565
7566
7567
7568
7569
7570
7571
7572
7573
7575
7576
7577 - prob.
7578 - prob.
~~7580 - prob~~
7582

7583
7584
7585
7586 - prob.
7587 "
7588
7589
7590
7591
7592
7593
7594
7595
7596
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7598
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7601
7602
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7615
7616
7617

~~7308 D crosses TO "A2" state~~

1956	1957	1958
7113 B(7)^{II} (+)	7302	7302 A(3)^{t} × a2bt pyWx = 7553 7302 A(1)^{I} (+) = 7542
7113 B(7) × 7102 (7)	7303	7303 (6)^{t} × a2bt pyWx = 7552
7113 A(6) × 7103 (4)	7305	7305 D(1)$^{t-3}$ × 7308 D(1)$^{t-1}$ = 7564 " C(4)$^{t-1}$ × " D(2) = 7583 " " $^{t-2}$ × 7293 (36) = 7584
Wx+1 ex spm 7109 B(1)^{I} × 7102 (12)	7306	7306 A(1)^{II} × 7321 A(2) = 7560
7109 B(1)^{t} × 7102 (12)	7307	7307 A(3)^{I} × 7321 B(8) = 7561 7307 A(5)^{I} × " B(1) = 7562 7307 B(2)^{II} × 7293 (52) = 7572
7109 B(1)^{I} × 7102 (10)	7456	7456 A(1) × 7308 D(1) = 7566 7456 A(2) × " (1)$^{t-1}$ = 7567 7456 A(3) × " " = 7568 7456 C(3)$^{t-1}$ × 7293 (15) = 7600 7456 D(5)^{I} × " " = 7598 7293 (65) × 7456 D(5) = 7599
7271 B(2) × 7109 B(1)	7312	7312 (5) × 7321 B(1) = 7547 7312 (6) × 7293 (36) = 7582
Wx+1 ex spm 7109 B(2)$^{t-1}$ (+)	7308	[For 7308 D crosses, see separate sheet] 7308 D(2)$^{t-1}$ × $^{t-2}$ = 7538 7322 D(3) × 7308 D(2)$^{t-2}$ = 7539 7320 B(6) × 7308 D(1)$^{t-1}$ = 7543, " " × " D(1) = 7607 7308 A(1) × 7308 D(2) = 7569 " A(4)^{t} × 7293 (31) = 7546 " " (4)^{II} × 7321 B(4) = 7563 " " (4)^{I} × 7308 D(2) = 7570 7308 C(6)^{I} × 7293 (48) = 7573 " C(6)^{II} × " (17) = 7576 7293 (5) (40) × 7308 A(5) = 7554 " (37) × " " " = 7555
7103 (2) × 7109 B(2)	7310	7310 (2) × 7308 D(2) = 7575
7110 B(4)^{II} × 7273	7316	7316 D(3)^{I} × 7308 D(1) = 7588 " " (3)^{t} × " D(2)$^{t-1}$ = 7589 7293 (2) × 7316 D(3) = 7590
7113 C(8)^{I} × 7110 A(3)	7317	7317 C(9)^{t} × 7320 B(1) = 7608 " B(2)^{II} × " B(2) = 7609
7271 B(4) × 7273	7320	See 7308 D sheet; 7317 7320 C(3)^{I} × 7293 (48) = 7603

1956		1957		1958
7109C(4)^{I}	× 7102(3)	7455		7455B(2)^{I} × 7308D(2)$^{t-1}$ = 7591
				" " (2)^{II} × 7321B(1) = 7592
				" " (2)^{E} × 7293(39) = 7593
				7455C(2) × 7308D(1)$^{t-1}$ = 7597
				" C(5)^{II} × 7293(31) = 7594
				" C(5)^{I} × 7308D(2)$^{t-1}$ = 7595
				" C(5)^{E} × 7321B(6) = 7596
7108B(3)	× 7107(10)	7459		7459A(1) × 7308D(1) = 7565
				" A(3) × 7308D(1) = 7585
7113A(5)	× 7102(5)	7463		7463E(5)^{I} × 7293(17) = 7586
				" E(5)$^{t-2}$ × 7321B(4) = 7587
7113B(1)^{E}	× 7102(17)	7465A(1)		7465A(1)^{E} × 7308D(3)$^{t-1}$ = 7571
7113B(5)	× 7103(2)	7466		7470A(5)^{E} × 7466B(3) = 7581

1. Wx+1 wx Spm - counts in progeny of 7109D-1 x B_2

Behavior of Spm.

2. Inactive Spm selections

a) Counts in tests

b). Types of kernels in crosses with 7308D (A_2 state)

3. No Spm ♀ x 7308D - Kernel Types.

Tests of plants - ① "Spm" pattern

② High dose Spm pattern [Test of kernels: cultures 7566B, 7567, 7568

Changes in activity phase of Spm in kernels leaving 1 Spm.

What expected in plant.

4. Tests of plants from No Spm ♀ x 7308D ♂

Cultures - 7564 (pale) ~~7565 (pale)~~

7565 (pale)

7566 (A_2)

7569 (A_2)

7571 (pale)

7575 (A_2)

7601 (pale)

7602 (pale)

7605 (pale) → 7603 (pale)

6707 (pale)

5. Tests of plants from crosses of active spm x 7308D.

7570 (A_2) 7610 (pale)

6. Tests of plants from crosses of inactive spm x 7308D

7583 (pale) [illegible]

7585 pale - see

7588 (A_2) [illegible]

7591 (A_2) [illegible]

7595 (A_2) [illegible]

7597 (A_2)

7. With above (6) Tests of plants derived from same parents without spm from 7308D. See cultures in rep.

Direct tests of Spun from 7308D. "pale" states.

I "pale - early"; no Spun x 7308D

7601
7602
7605
7607

II "pale - spotted"; no Spun

7564
7565
7571

"H_2" state no spin × 7308 D

7566 : 7308 D①

7567 : " ①$^{t-1}$

7568 : " "

7569 : " D②

7575 : " D②

"pale" no spin × 7308 D

7564 : " D①$^{t-1}$

7565 : " D①

7571 : " D②$^{t-1}$

7601 : " D①$^{t-2}$

7602 : " D②$^{t-1}$

7605 : " D①$^{t-2}$

7607 : " D①

---

motive or delayed spin × 7308 D

7588 : × 7308 D①

7589 : × " D②$^{t-1}$

7591 : × " D②$^{t-1}$

7595 : " D②$^{t-1}$

7597 : " D①$^{t-1}$

7583 : " D②

7585 : " D①

♀ active spin × 7308 D

7570 : 7308 D②

7556 : 7308 D①

7610 " D②$^{t-1}$

Tests of spm action in progeny of different parts of same plant.

1956 - 7109B(1) + (2). See 1957 outlines.

1958 - ear I vs. tillers of 7463(5) = Cultures 7586, 7587
ear I vs II of 7455B(2) = " 7592, 7593

ear I vs pollen = 7598 vs. 7599.

7308A(4) I = 7562
II = 7563
I = 7546

7303(6) I = 7556
I = 7552

7308C(6) I = 7573
II = 7576

Tests of spm derived from 7308 D.① + ② using the "A_2" state.

1. no spm ♀ × 7308 D① ♂ — no spm ♀ × 7308 D②

7566 - A vs B

7567 - high dose spm

7568 - " "

7569 - 1 spm

7575 - [illegible]

2. Wx + /wx spm-active ♀ × 7308 D② ♂

7570 A to C

3. Wx Wx; 1 inactive spm × 7308 D① ♂ — by 7308 D②

7597 1 + 3 dose spm

7588

7591

4. Wx wx; 1 inactive spm × 7308 D②

7595.

Direct test of Spm from 7308D $a_2^{mi}(A_2)$ state

I. 7308A ① × 7308D ② = 7569 $a_2 = A_2$ 1 spm pattern
No Spm
Normal.

7569 = 7 plants. all var.

Plants ② ③ ⑤ ⑥ ⑦ = heavy var = 1 spm pattern

① ④ = 2 spm pattern.

① = I W×+/ w× spm spm - active sectional plant.
t " " " - active

② = I W×+/ w×spm - active II × 7538 ② not similar
t " " " "
~~II × 7538~~

③ = I W×+/ w×spm active only in sector.

t-1 " " "

t-2 " " "

④ I W×+/ w×spm - active. Very uniform pattern
II × 7538 (13) 1 spm - good

⑤ I W×/w× 1 spm not linked to w×. Transposed.

⑥ I W×+/ w×spm slightly delayed active
t-1 × 7538 ②
t-2 W×+/ w×spm active.

(7) I lox +/ ex spm in active

II " " " active in part. sector of "no spm" or inactive

7308C crosses for doses of Spm

7315

Test of action of inactive Spm in $a_{2^{m-1}}$ (pale) + active Spm –

Very delayed action Spm × 7308D = classes with large pale spts vs 0 pale spts

7273 $a_{2^{m-1}}$ = throws early mutation type.

Some component derived from 7108 culture that causes change in Spm activity

See 7458 to 7461, (1957) and 7565 + 7585, (1958)

See 7610 tests

Special selections 1958

7544 B -

7545 B - (pale-spotted) Breakdown = inactive Spm

" C - colorless, few A_2 specks = no Spm

7552 B -

7553 = colorless endosperm;

7554 B = altered chr. 5

7555 = " " "

7556 = a_2^{m-1}-spotted → early [check pale kernel for intensity of color]

7557 = " " → " kernel. Plant and kernels on ear = "a_2^{m-1} - pale-spotted

7558 = " " → " " " " " " "

7559A = " " → " " , Plant: early mut. pattern. Kernels = Early mutations

---

7559B = $a_2 \to A_2$. new mutant bt, like sh,

7565 B = few A_2 specks only from a_2^{m-1} (pale-spotted) no Spm × 7308D① 1 Spm

① = no evidence of Spm

② = delayed action Spm. Transposed Spm, [~~or~~ from 7308D①

7566 B, From: 1 "$a_2 \to A_2$" 2 Spm pattern from 7456A① no Spm × 7308D① =

Wx + 1 ux Spm + 2 Spm. See plant character. green + small A_2 streaks

[~~or Wx~~]

7567 From: 1 "$a_2 \to A_2$" high dose Spm kernel from 7456A② no Spm × 7308D①$^{t-1}$

Wx ux 3 Spm. See plant character = green + small A_2 streaks.

7568 From: 1 "$a_2 \to A_2$" 2 Spm kernel from 7546A③ no Spm × 7308D①$^{t-1}$

Plant A B^s. No Spm

7570 A to C = special selections for Spm dose 1 : 2 : 3 Spm selection from

Wx + 1 ux Spm - active × 7308D② ux + 1 ux Spm

7572 High dose Spm kernels. See Wx + 1 ux Spm Spm

See plant ④ c.o. - altered Spm action = delayed. See plant character

" " ⑤

" " ⑦ - regularity of pattern.

7573 A = "4 Spm pattern" From "$a_2 \to A_2$"; ux Spm/Spm + 1 Spm
B = "2 Spm " "

7576. From Spm/Spm + 1 Spm plant. Colorless (A_2 state) Quasi-spm: A_2 embryo.
Plant Wx + 1 ux. Spm

7577 - 7581

7582 A From 7312 (6) Wx + 1 ux Spm inactive except for "$a_2 \to A_2$" late sph. pale kernel = 7582 A.
Plant = very dark "A_2 B^s" plant. with green sectors in stalk + leaf (= inactive → active)
I = completely inactive Spm
II = " " " (× 7538 (14) 1 Spm)
Wx + 1 ux Spm - inactive

7603 A. pale-sph sectorial kernel From 7320 C (3) I × 7293 (48)

7610 C - pale-sph sectorial kernels. From 7322 A (7) × 7308 D (2) I-1

1957 - special selections · pale states of a_2^{n-1}

7305 E pale-spk sectorial kernel. Plant = no spin of any type

7305 H changed state

7316 C from "breakdown"

7459 B - pale-spk sectorial kernel

7460 B - " " " "

7461 B - " " " "

C to F.

7463 C + D = pale-spk sectorial kernels.

1958

Sectors showing changed Spm activity on ear.

7547 A ① t-2 $a_2^{m'}$(pale-spotted) / a_2^s × 7535 (31) a_2^s bt ... y ux
w+Spm / ux+

Ear shows many small sectors with different grades of Spm activity

---

7561 ④ I $a_2^{m'}$(A_2) BI / a_2^s bt w+Spm / ux+ × 7535 (19)

Large sector, running from base to tip, 4 rows in which Spm is inactive or absent.

7566 A ① $a_2^{m'}$(A_2) BI / a_2^s bt; w++ / ux Spm × 7535 ②

Sector of 4 rows, from base to tip of ear, in which Spm is active. inactive in remainder of ear

---

7569 ③ I $a_2^{m'}$(A_2) BI / a_2^s bt; w++ / ux Spm × 7535 (11)

Small sector in middle of ear in which Spm is active.

7569 ⑦ II $a_2^{m'}$(A_2) BI / a_2^s bt w++ / ux Spm × 7535 (30)

Basal sector of 4 rows. Extends half way up ear. No evidence of Spm in sector

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7571 ④ t-1 $a_2^{m'}$(pale-spotted) BI / a_2^s bt w++ / ux Spm × 7538 ④ t-1

6 rows = active Spm : 4 rows, no Spm or inactive

7595 A ⑤ J $a_2^{m'}$(A_2) BI / a_2^s bt w+ ux Spm × 7535 ⑤

Basal sector, small, with active Spm

7597 A ⑥ $a_2^{m'}$(A_2) BI / a_2^s bt w+ ux 1 Spm × 7535 ④

2 small sectors in which Spm is active

7600 (4) I a_2^{m-1} (A_2) BI / a_2^s bt tw++ / ux spm × 7535 (19)

Large sector, 5 rows (+6 in numerous ears) in which spm is inactive (in remainder of ear, spm is delayed in action).

7601 B (3) I (a_2^{m-1} (pale-early) BI / a_2^s bt × 7535 (2)

7616 D (1) II a_2^{m-1} (pale-early) bt / a_2^s BI × 7540 (6) a_2^s BI no spm

Large pale sector on ear

7564 (4) I × 7535 (2) Basal sector of late acting spm

7565 A (3) I × " (2) late sectoring on ear

7608 A (2) I × 7535 (35)