Table 12

Transduction assay

Transd. ~~Wild type Rad Detection~~

Segregants

Lp	Rx	Recip. cells ~~idiotype~~	Lysate allotype		idiotype	allotype	amplitype	total
s	1⁻	[illegible]	+		9	0	0	9
+	1⁻	[illegible]	+		33	0	0	33
s	2⁻	[illegible]	+		16	0	0	16
+	2⁻	[illegible]	+	× (1) 2175 cult	20	0	0	20
		[illegible]	+	× (2) 1210 cult	15	0	0	15
s	4		+		46	0	0	46
+	4		+		20	0	0	20
s	1		2	× 3(1) 1210 lysate	6	1	0	7
				× 4(2) 902 lysate	1	0	0	1
s	1		4		1	0	0	1
+	1		2	× 5(1) (902) lysate	36	6	0	42
				× 6(2) (1210) lysate	18	3	0	21
s	2		1		20	0	0	20
			4		21	1	1	23
+	2		1	× 7(1) 1210 (cult)	19	2	0	21
				× 8(2) 2175 (cult)	14	3	2	19
+	2		4	× 9 (1) 1210 (cult)	22	1	0	23
				× 10 (2) 2175 (cult)	9	7	0	16
s	4		2	× 11 (1) 1210 lysate	17	2	0	19
				× 12 (2) 902 (lysate)	35	5	1	41
+	4		2	× (13) (902) (lysate)	16	3	0	19
R	4		2	× (14) (902) (lysate)	15	3	0	18
								450

(1), (8), (10) = cult 2175
(2) (7) (9) = cult. 1210
(3) (6) (11) = lysate 1210
(4) (5) (12) (13) (14) = ly 902

Table 13

Segregant Analysis via lysate action on known cultures.

(XX)

Recip. cells	by Genotype	Trans. lysate	Segregant: Ident type	Segregant: Cult type		Total
Gal_1^-	+	+	5	0		5
Gal_2^-	+ √(1) 2175	+	4	0		4
	(2) 1210	+	4	0		4
Gal_4^-	S	+	4	0		4
	+	+	4	0		4
Gal_1^-	+	Gal_2^- √(3) 902 ~~2175~~	4	5		9
		(4) 1210	0	3		3
Gal_2^-	S	Gal_4^-	0	1		1
	+√(5) 2175	Gal_1^-	0	2		2
	+√(6) 2175	Gal_4^-	4	0		4
	(7) 1210		0	1		1
Gal_4^-	S	Gal_2^- √(8) (W902)	16	3		19
		(9) 1210	0	1		1
	+	(10) 902	15	3		18
						79

Segregants from table 12 where classification was confirmed by the lysate action of ~~Segregants classified by means of their action of their lysates on known cultures.~~ known cultures.

~~Table~~ Segregants from ~~table 12 of~~ confirmatory classification by means of the action of their lysates on known cultures.

Table 14

(28)

Galactose negative cultures giving high frequency of haploid recombinants

Culture	Galactose 1,2 loci	Recip. cells	Treated lysate	Nature of Gal(+) revertants	NFT segregant	Nature of Gal(+) reversion NFT seg.
230-4	(+) Gal_1^-	Gal_1^-	Gal_2^-	unstable	Gal_1^-	stable
246A-15	(+) Gal_1^-	$Gal_1^- Gal_2^-$	Gal_1^- (+) Gal_2^-	"	Gal_1^-, Gal_2^- $Gal_1^- Gal_2^-$	"
241-14	(+) Gal_2^-	Gal_1^-	Gal_2^-	"	Gal_2^-	stable
241-19	(+) Gal_2^-	Gal_1^-	Gal_2^-	"	$Gal_1^- Gal_2^-$	none observed
1928-16	(+) Gal_2^-	Gal_1^-	Gal_2^-	"	$Gal_1^- Gal_2^-$	none observed (246)
257-2	(+) Gal_2^-	Gal_1^-	Gal_2^-	unstable	Gal_2^-	stable
257-4	(+) Gal_2^-	Gal_1^-	Gal_2^-	unstable	Gal_2^-	stable
153-1	(s) Gal_2^-	Gal_4^-	Gal_2^- lysate	unstable	Gal_2^-	—
153-4	(s) Gal_2^-	Gal_4^-	Gal_2^- lysate	"	Gal_2^-	stable
202-16	(+)(s) Gal_4^-	Gal_4^-	Gal_2^-	"	Gal_2^-	—
202-18	(+) Gal_4^-	Gal_4^-	Gal_2^-	unstable	Gal_2^-	stable
2478-1	(+) Gal_4^-	Gal_4^-	Gal_2^-	"	Gal_2^-	"

Basic

Table 16

Gal$_1^-$ Gal$_4^-$ Intraction

P. 72 (I) The transduction

282 Gal$_4^-$ Lp^s cells exposed to HFT ~~[illegible]~~ gal$_1^-$

	(+) colonies	(−) colonies	Colonies purified after 2 days
Lysate treated	0	408	2
Control	0	440	0

(II) The purified colonies gave mixed (+), (−) and papillating colonies

(A) streaked out / 24 pure (+) colonies picked and streaked out

(B) of the 24 colonies - 6 were found stable gal(+)

(C) of the 18 apparently (−) colonies (picked at 24 hours) derived from pure (+) tested against HFT 1$^-$ and HFT 4$^-$

Gal$_4^-$	Gal$_1^-$	Gal$_1^-$ Gal$_4^-$	Parental (−) papillating	Doubtful reaction
6	5	2	4	+ leave out

are colonies lambda resistant

2PS I the transduction

Gal$_1^-$ Lp^s cells treated with HFT gal$_4^-$

	(+)	(−)	papp. colonies	parental type
(A) Control ~~plating~~	0	465	6	0
(B) lysate ~~plating~~	0	316	2	38

II (A) the papillating colonies streaked out - Each gave (+), (−), papp (−)

(B) Colony 1 - 24 gal(+) cells streaked out - 11 were stable gal(+) (−) tested against HFT 1$^-$ and HFT 4$^-$ are lambda sens.

Gal$_4^-$	Gal$_4^-$	Gal$_1^-$ Gal$_4^-$	papillating (−) Parental
10	2	0	1

(C) Colony 2 - 48 gal(+) picked and streaked out - 23 (?) were stable (+) (−) tested against HFT 1$^-$ and HFT 4$^-$

Gal$_1^-$	Gal$_4^-$	Gal$_1^-$ Gal$_4^-$	Papillating (−)
4 *	0	0	22

v. 1-5

Table 16

The Gal1 - Gal4 Interaction

1 The transduction

Recipient lp^5 cells	Transd lysate	Numbers of Colonies: Gal (+)	Gal (-)	Papillating Gal-
Gal4-	broth (~~HFT Gal~~)	0	480	0
	HFT Gal1-	0	408	2
Gal1-	broth	0	465	0
	HFT Gal4-	0	316	2

2 Examination of galactose negative segregants from galactose positive clones found in papillating galactose negative colonies

Recip cells	Transd lysate	Classification of segregants: Gal4-	Gal1-	Gal1- Gal4-	Papillating Gal-
Gal4-	HFT Gal-	6	5	2	4
Gal1-	HFT Gal4	2	10	0	1

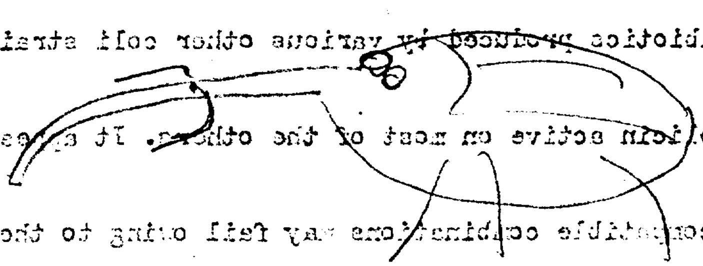


Table 17

Parents 2A x 22A | from Prototrophic Recombinants

~~Other markers have not as regards as freely a similar mutations in the~~

~~E. coli system:~~ the great majority of the prototrophs were Gal- Xyl-; however,

Galactose (+) | Galactose (-)

a very small number of the other combinations have been found also.

Gal_2 ± (1) | Gal_4

In one comparison of the Salmonella and E. coli systems, Davis' (1950)

Gal_4 - | Gal_2 ± (2) | 541 ** | 99

filtration experiment was duplicated. A U-tube with a sintered glass sterile

filter plate was filled with broth and inoculated with #2A and #22A respectively.
in the cross-limb, the two compartments

* unstable for galactose, galactose negative

From time to time, the liquid was flushed back and forth between the compartments

** 25 of 30 examined were unstable for galactose fermentation. Segregants, one from each of the 25, were all Gal_2 - .

by alternating suction. When the broth was saturated, the cells from each com-

partment were washed and plated separately on minimal agar. It was repeatedly 109/57

(1) control plating showed the ratio (+)/(-) ... 115/13

found that prototrophs appeared from the 22A culture, but not from the 2A culture. (about 10 ...)

Control experiments in which only one compartment was inoculated verified

the integrity of the filter.

This experiment appeared to show that a filtrable agent (FA) was pro-

duced by 2A that reacted with 22A to produce prototrophs. However, filtrates

prepared directly from 2A were inactive. The paradox was resolved when it

was found that the addition of a 22A filtrate, or of a lysate of 2A ~~cultivated~~

from a lysogenic phage secreted by 22A, provoked the formation of FA by 2A.

FA, then, is not a normal component of 2A, but is produced under the stimulus

of a latent phage. We have not succeeded in extracting significant FA activity

from 2A cells heat-killed, dried, or autolysed under conditions which do not

destroy FA activity.

page	lysate	Area of cells	Remarks	Thin lysate
176 b	D4t750	F11, 2050, 750, 2175,	(42/43)(420/16+)(2/2)(15/24)	—

(87)

reportedly

177	8421	518	4% of cell (+)	—
177 b	lysate sterility			
211	2175t750	F11,	solid smear	—

Summ. sheet 214 before - says 518+1421 t^a not authen

W2070 (= gal_6^- ?) derived from W1673 by UV.
tp^s

Page

135a - origin (three gal- obtained, one retained) (#1)

136 - [illegible] by (+) no add = 7
K12 (25') = 1560

137 - pop. check - 7/7 spontaneous (+) stbl.
7/7 lysate (K12) (+) unstbl.

145 - trsd. test no add 10
750 λ 54 — 4/8 (+) unstbl
902 λ 1256 — 5/8 (+) unstbl
84 λ 175 — 0/8 (+) unstbl.

245 - trsd. by T18, T19 λ to recover (- -) of the T.
lysates not active T18: 5/1 → apparent (+) unstbl found.
segregants tested
5 1⁻
2 2⁻
7

T19 = 7/2
apparently, (+) unstbl segregants found
of 16 examined 15 2⁻
1 1⁻ 2⁻
16

226 Stocks of 2070 λ⁺ made

Stability of transductions by reversion lysates.

1 cyc. Observation.

134 5178t $8Ug^{+}$ H5 7/8 stable $\frac{\text{transd}}{\text{control}} = \frac{3532}{30}$

135λ 8Ut $8Ug^{+}$ Ag 8/8 stable $\frac{\text{transduction}}{\text{control}} = \frac{291}{25}$

Correlation of lp change c Transduction

(85)

236A 2281 t K12

Pap	4^{RX}/2281	Sg	λ
1.	+	2-	R
2.	+	"	R
3.	+	"	R
4.	+	"	R
5.	+	"	R
6.	+	"	R
7.	+	"	R
8.	+		
9.	+		
10.			
11.			
12.	R or S	"	S
12			

236D 2281 t 760

Pap	$λ^{RX}$/1485	Sg	λ
19	+	2-	R
1	S or R	2-	S
20			

236C 2281 t 84

Pap	$λ^{RX}$/1485	Sg	λ
22	+	2	R
1	+	4	R
	+	2-4	R
24			

Crosses of $+^4$

P Cross and details

1-0 at seq. 811tK12 x 1436 73 (+) 14 (-)
at least 20/73 showed mosaic colonies on strk:1
all later shown unstable

518tK12 x 1436 86 (+) 1840 (-)
5/20 showed mosaics on strk-1
all " were mixed on strk 2

106 518tK12 x 1436 0 (+) 65 (-) ✓

811tK12 x 1436 27 (+) 2 (-)
shown unstable (107)

Total
518tK12
86(+) 1905 (-)
811tK12
100 (+) 16 (-)
1924tK12
27(+) 1944

112 1924tK12 x 1436 16 (+) 952 (-)
shown not to be lysogenic in cross broth.
11 (+) 992
may be higher medium not good → 27 (+) 1944
26 found non lys on 518 ← was this aerated
15 " " " " 518 1436?
Rpt 286(?) 3+/1(-) Ratio with non aerated cult.
← 30 prob picked at random found non lys.

279 902 met+ lp₂ 518 F⁻
① 2580tK12 x 1321 → 1(+)/c. 6000 (-) → strline cult. = $+^4$
F+ F-
6 seg tested = gal₂⁻

② 2580tK12 x 518 541 (+)/99 (-) → 30 picked 4 +^{stbl}
F- F+
25 seg all gal₂⁻

Table 17

HFT - historical - Why + " not found HFT ?

(87)

Page	Lysate	Assay Cells	Reaction	Lysate titer	
135	750 E 1821	811	2470 pap/ml	6.5X10^9	$\frac{10^4 + /ml}{10^{10} \lambda /ml} = 1^+/10^6 \lambda$
date 10/9/52	..	578	9630+/ml	..	
142	578 E 892-1	518	no pap. less than control	?	← lysate found not sterile
11/26/52	811 E 892	..	no pap. at all	?	
		2050	solid smear	?	lysate found not sterile
	518 E 892-1		.. ..	?	lysate found sterile
	811 E 892-1	"			
143	518 E 892-1	2050	solid smear	?	(1.8X10^9 λ/ml)
	518 E 892-2	..	solid ..	?	all lysates tested sterile in penassay (1 one)
	811 E 892-1	..	solid ..	?	control. 287 (very high)?
	811 E 892-2	..	188 pap.	?	small papillae - Spreader contam..?
157	518 E 892 → (-) say gal 2-	2050	solid smear	?	
			.. ..	?	
	518 E 892-1	"		?	
	1436 E 1612-1	"	227/22		
161	beclouded by contamination				
165, a, b	518 E 892-1 (good dilutions)	750, 518, 2050, 2175	solid smear.	1.8X10^9 (p 166)	
	D1 (518 E 892 → say gal 2-)	518, 750, 2050 (2175)	.. — not heard.		
168	D1 E 750, D4 E 750	stated as unstable	—	—	
169	D4 E 750	titer > 10^10	—	—	
170 b	D4 E 750 (1-10^3)	518	24/67	↑	

HFT NFT Summary (4+)

	Recipient cells	Lysate source	Test 1⁻	Test 2⁻	Test 4⁻
~~gal_2^- (2342) gal_1^- (2341)~~					
①	Gal_1^- ①	+	+++	++	+++
②	" ②	+	+++	++	+++
③	Gal_4^- (Hp^s)	+	+++	100	+++
④	Gal_1^-	Gal_2^-	+++	+	—
	others				
⑤	Gal_2^- ①	Gal_4^-	++	200	+++
	②		—	—	2 —
⑥	Gal_4^-	Gal_1^-	+++	+++	+++

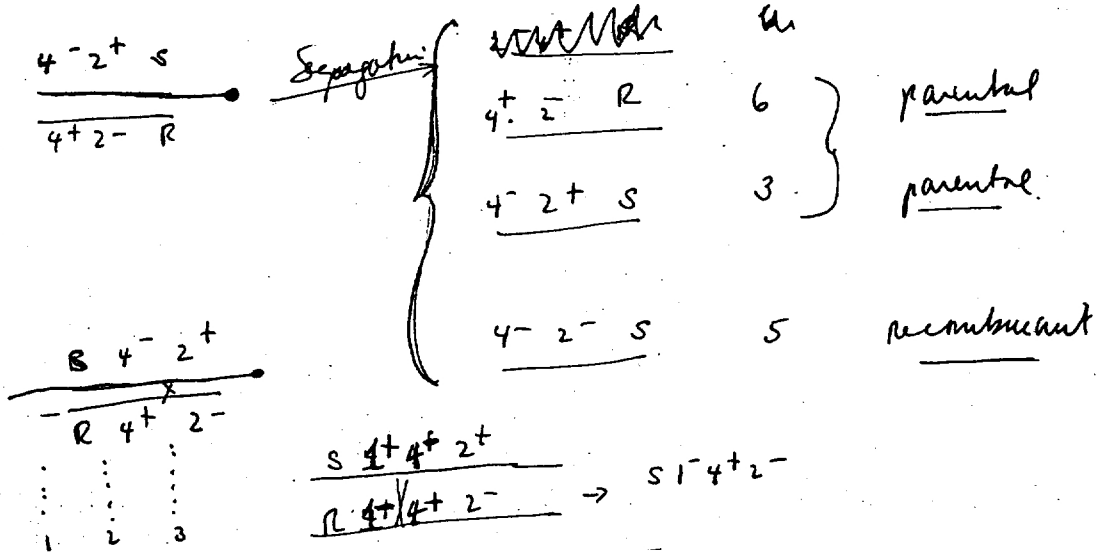
(?)

Culture	Recipient cells	Lysate	(-) Transd Genotype	HFT segregant	HFT unstable segregant as	NFT secondary segregant	Presumed structure of HFT
2342	gal_2^-	gal_1^-	$\frac{2^-\,1^+}{2^+\,1^-}$	2^-	12/12	$1^-\,2^-$	$\frac{2^-\,1^-}{2^+\,1^+}$
2346	gal_1^-	gal_2^-	$\frac{2^+\,1^-}{2^-\,1^+}$	1^-	4/5	1^- (8% rev. stable)	$\frac{2^+\,1^-}{2^-\,1^-}$
241-14	gal_1^-	gal_2	$\frac{2^+\,1^-}{2^-\,1^+}$	2	12/12	2 (1% stable)	$\frac{2^-\,1^+}{2^-\,1^?}$
241-19	"	"	"	"	12/12	$1^-\,2^-$ (-)	$\frac{2^-\,1^-}{2^+\,1^+}$
2464-15	$gal_1\,gal_2^-$	$\{gal_1^-$ + $gal_2^-\}$	$\frac{1^-\,2^-}{1^+\,2^-}$ → $\frac{}{1^-\,2^+}$	2^-	—	$1^-\,2^-$	$\frac{2^-\,1^-}{2^-\,1^+}$

Segregation from $4^- 2^+ Lp^s$ transformed cell

Sift N6

P 262



Remaining questions. 4/10/54. (90)

(1) Relationship of transduction + lysogenization.

— × diploids. Lp⁺/Lp⁺ from +/s ; s/s. (EML)

Marked λ ; Lp⁻.

(2) Hft basis: construct $\frac{s}{s}$ & $\frac{s \cdot H}{s}$ (R) & UV'd phage. Defect in λ

(3) Position effect (EML) (GW)

(4) Association of fragment + chromosome. (EML) (GW) × diploids; crossing behavior of various Gal⁺ transduction types. Size of fragment. Behavior from $\frac{+-}{-+}$. Crossover + segregation mechanisms.

(5) Other transducible loci ; other phages.

(6) Cytology of λ, Lp⁺ Hft.

(7) Lytic λ! (Especially when grown on $\frac{s}{s}$ How? types!)

(8) How many Gal⁻ types; mapping (exp. 12)

Morse 4/10/54

Table 8: Study absorption with multiplicity < 1. Heated cells? Hft. of Lp_2^s / Lp_2^r.

Table 9: Any Lp_1^s Clarify headings. Discuss $Gal_2^- \times Gal_1^-$ behavior.

Table 11 Explain Obs columns

12 Total: homo/heterotype + test homogeneity.

Hft: inductive behavior! (basis now studied)

Table 18. Again verify Gal⁻ types. p.12 Pp2: meaning?

Double⁻. Papillae ± mixed phage $\approx c^2$?

Fig 2. Or UV improves survival. Effect of excess UV'd incomp. ?

Variance in output of Hft.

{ $24^- \to 1^-$ ~~Ueotypic~~ allotypic
{ $12^- \to 4^-$ should fail

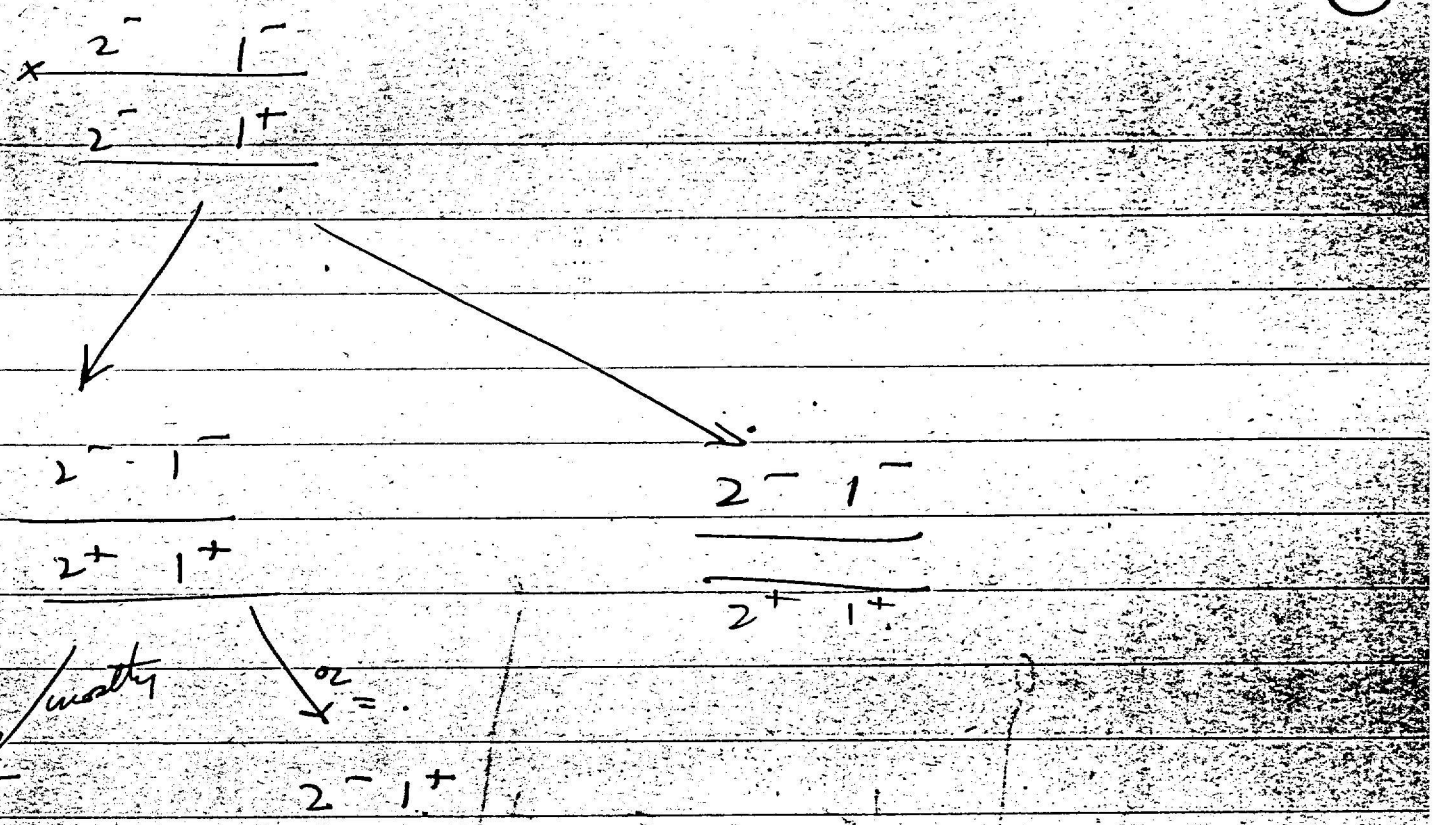
(92)

12. Behavior of $-- \to -$. Detail? $14^- \to 2$ should be OK

13. ? Are exchange + segregation independent? Many "segregations" may be automatic.

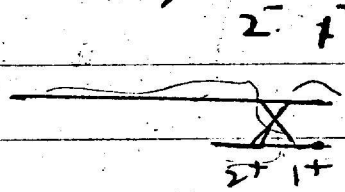
What's up c Cal's?

14. statistical adequacy.

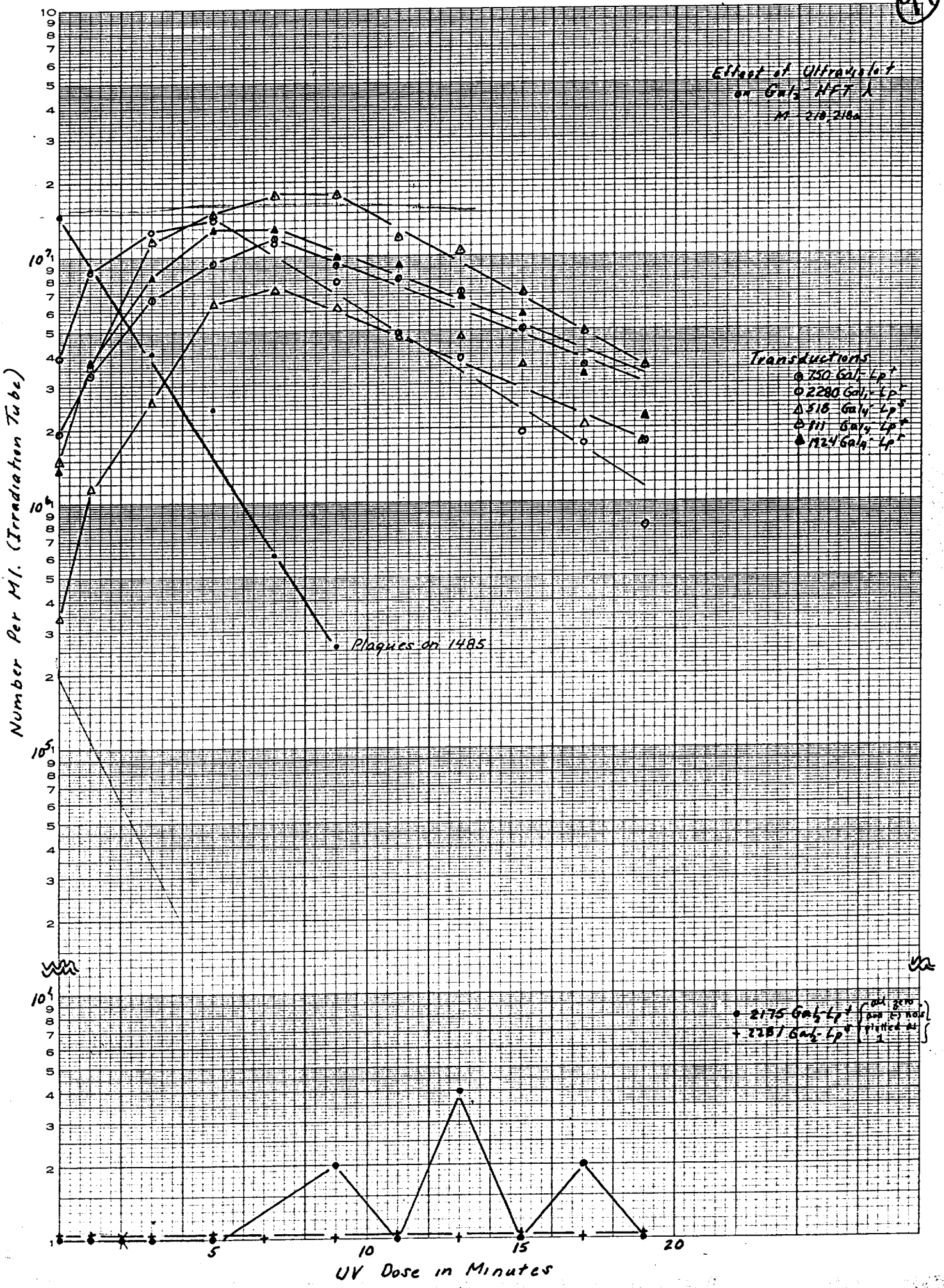


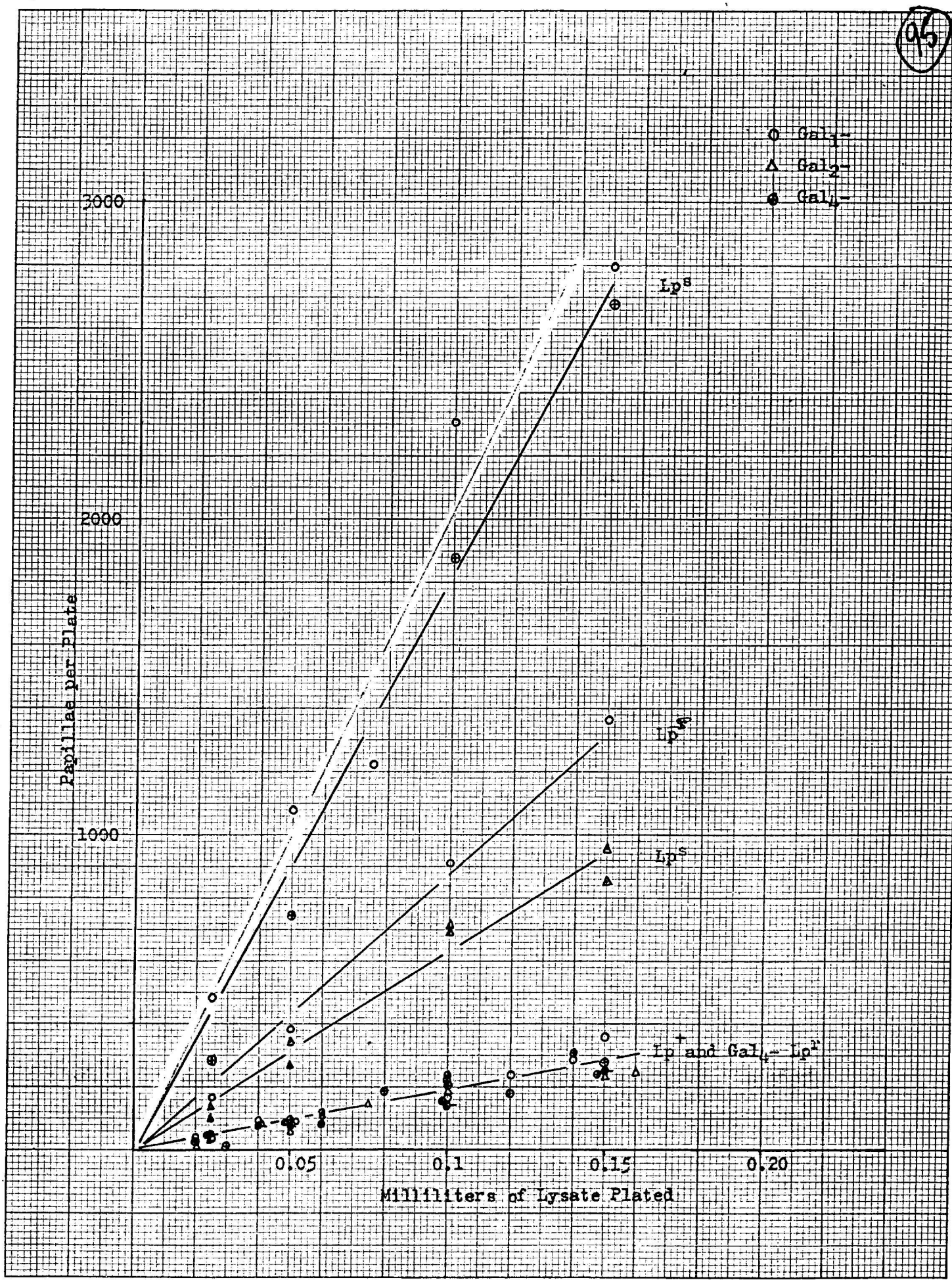
are the 2⁻ segments now ~~pos~~ hemizygous?

Suppose fragment is terminal.



Only 1 crossover type feasible! I.E. $1^- 2^+$ recombinant would be a fragment. Why no recessions of type $\frac{2^+\ 1^-}{2^-\ 1^+}$? These should give mostly the $2^+ 1^-$ type. Were enough tested?





EML - Regent 12/1/53

Action of X rays on transducing and plaque activity in hybrids

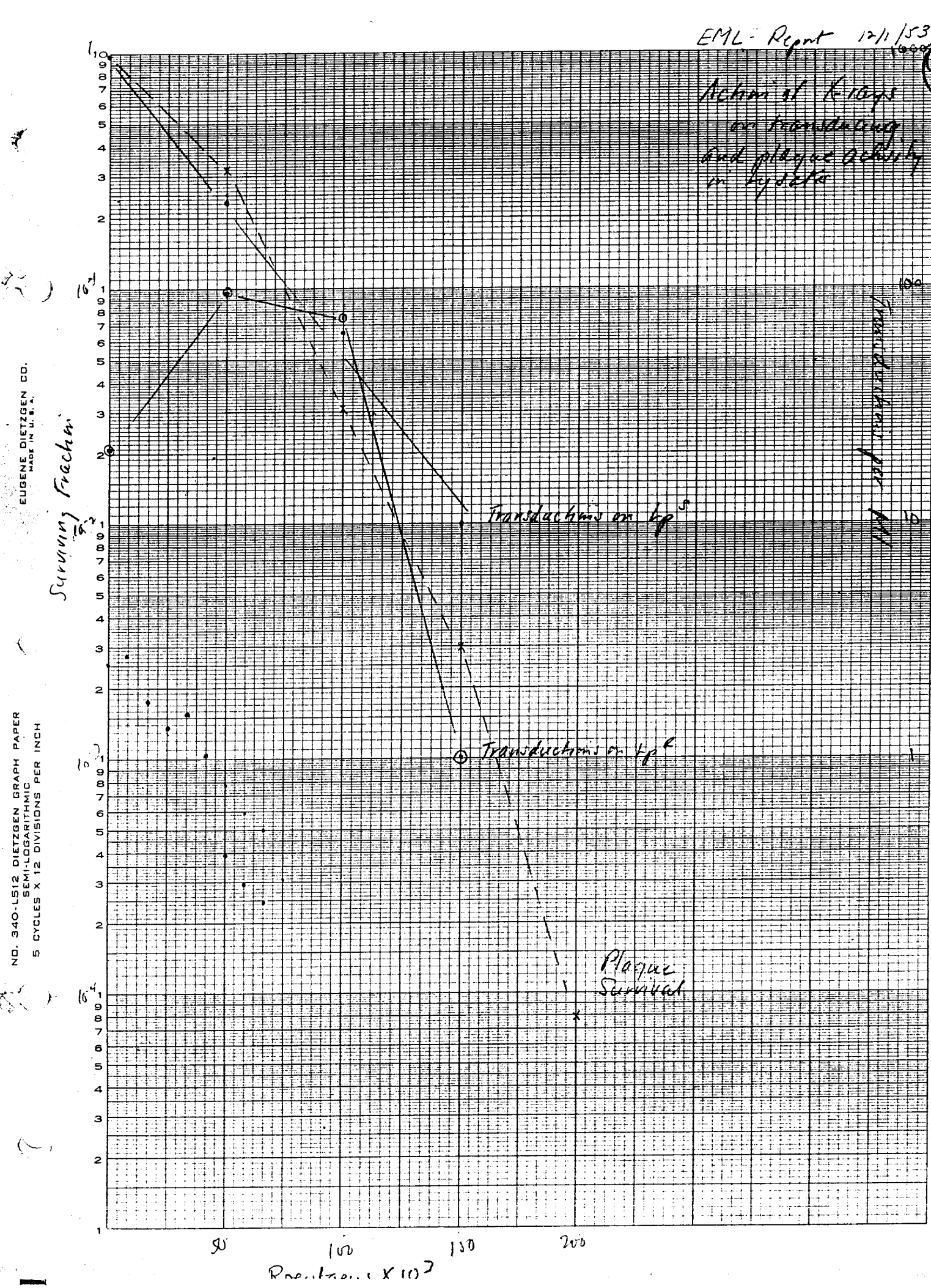


Table 1

Principal cultures

Wisconsin Stock Number	Genotype
W518	$F^+ M^- Lac_1^- Gal_1^- Lp^S$
W750	$F^+ M^- Lac_1^- Gal_1^- Lp^+$
W811	$F^+ M^- Lac_1^- Gal_1^- Lp^+$
W902	$F^- T^- L^- B_1^- Mal_1^- Gal_2^- Lp^+$
W1210	$F^+ M^- Lac^- Gal_2^- Lp^+$
W1436	$F^+ T^- L^- B_1^- Lac_1^- Gal_1^- Lp^S S^R$
W1924	$F^+ M^- Lac_1^- Gal_1^- Lp^R$
W2175	$F^+ Gal_2^- Lp^+$
W2229	$F^+ M^- Lac_1^- Gal_1^- Lp^S$
W2281	$F^+ M^- Gal_2^- Lp^S$

Genotypic symbols refer to the following characters:

F, compatibility status, F;
M, T, L, B, nutritional requirements for methionine,

Compatibility status, F;
Nutritional requirements; M, methionine; T, threonine; L, Leucine; B_1, thiamin;
Fermentation Reaction; Lac-, lactose negative; Gal-, galactose negative; Mal-, maltose negative;
Phage status; Lp^S, lambda sensitive; Lp^+, lambda lysogenic; Lp^R, lambda resistant, but not overtly lysogenic
Drug Resistance, S^R, streptomycin resistant.

Table 3 (Expansion) — Failures to transduce

(98)

Marker	Recip Culture	Donor	Pg
Lac₁	W112 (Lp_1^R)	K12	71
	" (Lp_2^R)	"	85
	" (Lp_2^R)	"	94 }
	" (Lp_2^s)	"	94 }
Semi or flagell	W1678	"	76
Leuc.	W1736	"	75
	W1736	"	78
	W 1476	(W928) W2046, (W931) W1954	113
Methionine	58-161	K12 (UV irradiated)	82
	W811	K12 (UV mod.) (lytic λ)	83 (280) (M added also to get B^+)
	W1821	K12	85
	W518	HFT 892(mix)	180 (on Bgal, replica to D(0))
Xylose	W1821	K12 (UV mod)	83
	W1821	K12	85
		W811	85
	W1821	K12	130
Streptomycin	W518	W1821	95
Proline	W2062	K12	104 (?)
	W2062	K12	105
	W2062	K12	106
	W1692	K12	96
	W1920	K12	96
	W2062	(prototroph) HFT 1 (2). (prototroph) HFT 2. (M-) HFT 4. (prototroph) Heterogenote.	220
	W2062	lytic λ (from M-)	227

Table 3 (cont)

Marker	Recip Cult	Donor	Page
Mal$_X$-	W2071	K12(?)	119
Mal$_1$-	W2347, W2331	HFT2	295, 275
Sra -	W2307	HFT2	298
F+	1321	HFT2	294

Frequency of Unstable Transductions -
lysates

Recip cells		(+)	1⁻	2⁻	4⁻
1⁻	Lp^s	9/22 ~~10/24~~ (41)	—	0/11 0	0/29 (0)
	Lp+ (1)	23/24 (96)	—	23/24 (96)	0/27 (0)
	Lp(+) (2)	17/24 (71)	—	24/24 (100)	—
2⁻	Lp^s (2281)	28/48 (58)	63/72 (88)	—	64/72 (89)
	Lp+ (1)(2275)	22/24 (92)	19/24 (79)	—	16/24 (67)
	Lp+ (2) (1210)	16/24 (67)	21/24 (88)	—	22/24 (92)
4	Lp^s	13/24 (54)	0/72 (0)	21/24 (88)	—
	Lp+	20/24 (83)	0/96 (0)	19/24 (79)	—
	Lp^R	29/48 (60)		16/24 (67)	—

Gal$_6$ Lp^s 6/8

Gal$_8$ = 1210, 2281 above

Lp (2273)

S = 56/102 (47/80) = 59%

+ = 98/120 = 81%

R = 29/48 = 60%

Table Total

484+^s / 609 total

609) 484.0 = 0.7 [illegible]