Tuesday 12/23/52

– 902 Lp2^5 – transduction c̄ old culture – Repeat using younger cells.

	EMB gal	addition	no. pgs 3 days	
	1	no add	14	
2.4×10^{10}	2	0.1 750λ – 1	52	38
	3	0.1 902λ – 1	11 –	
3.8×10^9	4	0.1 892λ – 1	51	37
$c.10^{10}$	5	0.1 811λ – 4	43	29

$\frac{3.8 \times 10^3}{2.4 \times 10^{10}} = \frac{1}{.63 \times 10^7} = \frac{1}{6.3 \times 10^6}$

values low because of cell age? Repeat

– 578

EMB gal	addition	no pgs 2 days –
1	no add	72
2	0.1 1485λ	131
3	0.1 K-12λ 12/20	$\frac{1}{16}$ = 120 = 1920

high?

– ✓ λ titer of this – appears about as expected since it titer is about 1/10 that of K-12 λ 12/30

(2/2) 1485λ = 1.1×10^9 59/1.11

K-12(12/20)λ = 2.3×10^{10} 1848/23

$59 \times \frac{23}{1.1} = 1233$

"nat." λ = 1233

buoy λ = 1848

booked

Thursday 12/26/52

811 prototrophic gal$_9$ – To test the hyp that gal+R of 811 not transducing 811, 578 are reversions to an allele without sufficient selective advantage in EMB gal to allow detection of transduction

EMS gal – ↓	addition	no pgs 2 days	
1	none	23	
2	(811λ) – 4	18	~~[illegible]~~
3	(811g+-1) – 1	15	This lys. doesn't work on EMB
4	(811g+-2) – 1	22	" " " " " "
5	(811g+5) – 1 untreated (DNA ex)	214	all work on EMB
6	(811g+5) – 2	465	" " " "
7	(811g+-8) – 1	309	" " " "
8	(K-12λ) 30-1	164	" " " "

No success – presumably gal+-1, gal+-2 are mimic mutations closely linked to Lp

2050 gal$_3$ – galduction – Repeat – has high background – Make purified

EMB gal	2050 – addition	no pgs 2 days
1	none	296
2	750λ – 1	1/4 = 255 = 1020
3	902λ – 1	1/4 = 476 = 1904
4	892 – 1	288
5	811 – 4	1/4 = 208 = 832

$> 2.4 \times 10^{10}$

4.9×10^{10}

3.8×10^9

these counts all low – large nos of small pgs –

$\frac{7.24 \times 10^3}{2.4 \times 10^{10}} = \frac{1}{3.3 \times 10^6}$

$\frac{1.608 \times 10^4}{4.9 \times 10^{10}} = \frac{1}{3.1 \times 10^6}$

Sunday 12/28

-874 galduction = another lysogenic out of 518

EMB gal	Addition	no pap 2 days
1	none	17
2	0.1 750λ -1	77
3	0.1 902λ -1	518
4	0.1 892λ -1	167
5	0.1 811λ -4	23
6	0.1 K-12λ 30-1	1067

believes as 811 with greater transducibility by K-12?

D = 518 + 892 ↙ (-) from single transduction gal - segregants - → purified thru 3 single col. isolation - examination for ~~[illegible]~~ by transducibility test - ~~transduced by~~ exposed to 811 and 892

12/29 - 1402

duction to see if 1821 deficiency is also 1402 def. - apparently is -

EMB gal	Addition	no pap 3 days
1.	none	17
2.	0.1 750λ -1	28
3.	0.1 902λ -1	61
4.	0.1 892λ -1	31
5.	0.1 811λ -4	22
6.	0.1 K-12 30-1	85

purification begun - streak several single colony isolations / λ2

892-2λ not sterile discarded

902-2λ sterile -

892-1λ - recovered - last 0.1 ml

10^8 - 15

8

23 = 2.3×10^9

Tuesday 12/30/52

Exp D = Repeat examination of segs. from 51 & 892 - Seg purified thru 3 pickings -

Page 2 days

	Gal-bal	Model	811λ-9	892λ-2	Probable gal locus	1985	From Strain
strk all	1	40	142	253	(?)	Segs	Recheckers - unstable
892	2	53	35	69	4	"	Rechecks
811	3	22	40	87	4	"	not t/811λ
all	4	8 (few small)	58 (all small)	173 all small	(?)	"	Rechecks - unstable
	5	37 >5 (obj segs)	32	71	4	"	
811	6	32 >5	40 >5	74 >5	4	"	not t/811λ
	7	28 >small	40 >small	99 >5	4	"	
	8	40	36	90	4	"	
	9	29 >small	37 >small	88 >5	4	"	
892	10	93 all small	46 all small	79 all small	4	"	Rechecks
	11	35	34	71	4	"	
892	12	52 >5	59 >5	81	4	"	Rechecks
892	13	47 >small	31 small	82	4	"	Rechecks
	14	last - but both are low in pop.		73		"	
	15	21 small	121	275	(?)	"	Recks - unstable
	16	30 (custom)	33	68	4	"	
892	17	39 >small	35 >small	60 >5	4	"	Rechecks
	18	35 >small	44	75 >5	4	"	
	19	27 (all small)	95 (all small)	256 (all small)	(?)	"	Rechecks - unstable
	20	27 all small	101 all small	324 all small	(?)	"	" "
	21	5	40	146	(?)	"	" "
892	22	45	35	61	4	"	Rechecks 892
892	23	58	36	87	4	"	" "

5/23 transduced by both 811λ 892λ

5/23 probably new type!

Checks

Pop #	D1 t 811			D1 t 892			D2 t 892			D3 t 811			D4 t 811			D4 t 892			D6 t 811			D10 t 892			D12 t 892		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1.	mix	mix	mix	mix	mix	mix	mix	+	mix	+	+	+	mix	mix	mix	mix	mix	mix	mix	+	+	mix	+	+	mix	+	+
2.	"	"	+	"	"	+	"	+	+	+	+	+	"	"	"	"	"	"	"	+	+	"	+	+	"	mix	mix
3.	"	"	mix	"	"	+	"	mix	mix	+	+	+	"	"	"	"	"	"	"	+	+	+	+	+	"	+	+
4.	"	"	mix	"	"	+	"	+	+	mix	+	+	"	+	+	"	"	"	"	+	+	mix	mix	mix	"	mix	mix
5.	"	+	+	"	"	+	+	+	+	+	+	+	"	mix	mix	"	"	"	"	+	+	"	mix	"	"	mix	mix
6.	"	mix	mix	"	"	+	mix	+	+	"	+	+	"	+	+	"	+	+	+	+	+	"	mix	"	"	+	+
7.	"	"	mix	"	"	+	"	+	+	"	+	+	"	mix	mix	"	mix	mix	+	+	+	+	+	+	+	+	+
8.	"	"	+	"	"	+	"	+	+	"	+	+	"	+	+	"	"	"	mix	+	+	mix	mix	mix	+	mix	mix

single colony isolation

	D13 t 892			D15 t 811			D15 t 892			D17 t 892			D19 t 811			D19 t 892			D20 t 811			D20 t 892			D21 t 811		
1.	mix	+	+	mix	+	+	mix	mix	mix	mix	+	+	mix	mix	mix	mix	mix	mix	mix	mix	mix	mix	mix	mix	mix	mix	mix
2.	"	mix	mix	"	+	+	"	"	"	"	+	+	"	"	"	"	+	+	"	"	"	"	"	"	"	"	+
3.	+	mix	+	"	mix	mix	"	"	"	"	+	+	"	"	"	"	mix	mix	"	"	"	"	"	"	"	mix	mix
4.	mix	+	+	"	"	mix	"	+	+	"	mix	mix	"	"	"	"	"	"	"	"	"	"	"	"	"	+	+
5.	"	mix	mix	"	+	+	"	mix	mix	"	+	+	"	"	"	"	"	"	"	"	"	"	"	"	"	+	mix
6.	+	+	+	"	mix	mix	"	"	"	"	mix	mix	"	"	"	"	"	"	"	"	"	"	"	"	"	mix	+
7.	mix	+	+	"	"	mix	"	+	+	"	mix	mix	"	"	"	"	"	"	"	"	"	"	"	"	"	-	+
8.	"	+	+	"	"	mix	"	+	+	"	+	+	"	"	"	"	+	+	"	"	"	"	"	"	"	"	mix

Check on Exp D = 518t892 Second run

Pap	D21t892 1	2	3	D22t892 1	2	3	D23t892 1	2	3
1.	mix	mix	mix	+	+	+	mix	+	+
2.	"	+	+	mix	+	+	+	+	+
3.	"	mix	mix	+	+	+	mix	mix	mix
4.	"	+	"	mix	+	+	"	+	+
5.	"	mix	"	"	mix	mix	"	mix	mix
6.	"	+	"	"	+	+	"	+	mix
7.	"	+	"	"	+	+	"	mix	mix
8.	"	mix	"	+	+	+	+	+	+

1/6/53 Tuesday. Recheck on D4, D15 1/11/53

D15

EMBgal	Addition	No pap 2 days
1.	none	14
2.	750λ-1	½=151, 302
3.	902λ-1	22
4.	2050λ-1	40
5.	811λ-4	73

1/12/52
>70

D4

EMBgal		
1.	none	12
2.	750λ-1	½=180 360
3.	902λ-1	12
4.	2050λ-1	50
5.	892λ-1	365
6.	811λ-4	90

D4X902	(+)	(-)
1.	0	88
2.	2	96
3.	2	130
4.	3	109
	7	423

7/430 1.6%+

may be suspect - 902 culture possibly contains (+) cells

second cross D1X902 pg 166

$$\begin{array}{r} 0.042 \\ 422 \overline{)18.00} \\ \underline{16.88} \\ 1120 \end{array} = 4.2\%$$

245
177
422

Tuesday 12/30

2175 = 902 Lp_2^S - Repeat duction c̄ aerated culture

	EMB gal	Addition	Pap. 2 days			
	1	none	5 (poor plate)			
2.4×10^{10}	2	750λ-1	71	62	66	$\frac{6.6 \times 10^3}{2.4 \times 10^{10}} = 1/2.6 \times 10^6$
	3	902λ-1	14	"		
3.8×10^9	4	892λ-1	102	51	97	$\frac{9.70 \times 10^3}{3.8 \times 10^9} = 1/2.6 \times 10^5$
$c \cdot 10^{10}$	5	811λ-4	51	43	46	$\frac{4.6 \times 10^3}{c \cdot 10^{10}} = c \cdot 1/2.2 \times 10^6$
				previous?		

1402 Examination of parent stock for possible presence of Lp_2^R
6 isolated colonies tested against λ-2 - all sensitive

902 Lp_2^S = 2175 ABOVE - Stability

	902 t 750			902/902λ			902 t 892			902 t 811		
	1	2	3	1	2	2	1	2	3	1	2	3
1.	mix	+	+	mix	+	+	mix	+	+	mix	mix	mix
2.	"	mix	mix	"	+	+	"	mix	+	"	mix	"
3.	"	mix	mix	"	+	+	"	+	+	"	mix	+
4.	"	+	+	"	+	+	"	+	+	"	+	+
5.	"	mix	mix	"	+	+	"	+	+	"	mix	mix
6.	"	+	+	"	+	+	"	+	+	"	+	+
7.	"	+	+	"	+	+	"	mix	+	"	+	+
8.	"	+	+	"	+	+	"	mix	mix	"	+	+

[stock: made]

STOCK OF 1655 X 902 → gal_2 - Lp_2^S
made - Entered in Stock book = 2175

Sat. 1/3/53

- 2050 gal3 - Reexamination of galduction using a single colony isolation from stock to lower background -

EMB gal	Addition	No pop 3 days
1.	none	32
>2.4×10^10 2.	750λ - 1	104+ many small
4.9×10^10 3.	902λ - 1	1/8 = 132 = 1056 " "
4.	892λ - 1	130 " "
5.	811λ - 4	1/4 = 55 = 210 " "

$\frac{7.2\times10^2}{2.4\times10^{10}} = \boxed{1/3.3\times10^7}$

$\frac{1.0\times10^4}{4.9\times10^{10}} = 1/4.9\times10^6$

← large no? See examination below

- Sunday 1/4/53

2050 above - stability examination

Pajiduc#	2050t750 1	2	3	2050t902 1	2	3	2050/892λ 1	2	3	2050t811 1	2	3
1	mixed	+	+	mixed	+	+	mixed	+	+	+	+	+
2	"	+	+	"	+	+	+	mixed	mixed	mix	+	+
3	"	+	+	"	+	+	mixed	"	mixed	"	+	+
4	"	+	+	"	+	+	+	+	+	"	+	+
5	"	+	+	"	+	+	+	+	+	+	+	+
6	"	+	+	"	+	+	+	+	+	mixed	+	+
7	"	+	+	"	+	+	+	mixed	mixed	"	+	mixed?
8	pure -	mixed		"	+	+	+	+	+	"	+	" (?)

1/7/53
Wednesday (Held over from 1/6/53)
Exp E = 2050t 811 - gal - segregants

Disregard
? → 2050

Segregant #	Wood.	811λ-4	2050λ-1	1985	Probable gal tocum
1	61	1/8=57 456	1/2=102 204	lys	(?)
2	* 75	1/8=76 608	** 111	"	3 (?)
3	15	1/8=33 264	14	"	3
4	c. 30	c. 200	c. 10	"	3
5	c. 20	c. 200	c. 20	"	3
6	17	c. 300	18	"	3
7	12	1/4=34 136	22	"	3
8	69	1/2=83 166	48	"	3
9	* 116	1/4=147 588	* 182 *	"	3 (?)
10	c. 10	c. 200	c. 20	"	3
11	20	1/2=78 156	20	"	3
12	* 28	1/4=96 384	89	"	(?) –
13	18	1/2=41 82	11	"	3
14	1/2=147 294	1/4=154 many small 616	1/4=148 many small 592	"	(?) –
15	50 > 31 >	c. 400	c. 200	"	(?) –
16	c. 10	c. 80	c. 10	"	3
17	c. 100	c. 150	c. 10	"	3?
18	c. 200	c. 100	c. 10	"	? –
19	17	1/8=80 640	1/8=62 496	"	? –
20	c. 10	c. 150	c. 20	"	3

on 1/12/52 this plate of 2050λ = c. 360

11 (3)
9 (?)

* ~~[illegible]~~ Nearly all plates have large members of small papillae making counting and interpretation difficult. – In general results suggest the same confusion suggested by the 518t ~~[illegible]~~ 892 results.

Sunday 1/11/53

- B-7 X 902 - Repeat cross B7 = 578t902 → (-) seg transduced by cul λ but 902 λ

		(+)	(-)		
EMS gal	1.	3	222		
	2.	7	276		
	3.	9	315		
	4.	7	239		
		26	1052	26/1078	= 2.5% ←

These results suspect since 902 culture probably contaminated c̄ (+)

- B-8X902 B8 same as B7

EMS gal	1.	3	105		
	2.	4	94		
	3.	3	98		
	4.	4	88		
		14	385	14/399	3.5% ←

811 X892

gal4 x gal3

		(+)	(-)	
EMS gal	1.	0	132	
	2.	0	156	
	3.	0	123	
	4.	0	184	
		0	595	0/595

811 culture probably contaminated ignore these results.

gal4 x gal2

811 X 902

		(+)	(-)	
EMS gal	1.	1	143	
	2.	0	230	
	3.	0	129	
		1	602	1/603 = 0.16%

2050. Galduction

EMB-gal		Pop 2 days	
1.	no add	22	
2.	K-12 (30-1)	32	what happened?
3.	1436tK-12-1	227	
4.	D1 (see pg 153	solid smear of pop	5000?
5.	578t892-1	solid smear of pop	5000?

D1 (-) seg of 578t892
578t892 results as previous.

D1 = 578t892 → (-) seg characterized by gald as 902, unknown by crossing data?

5/20/53 Tuesday et seq.

		no pap 2 days	
518 ab° 874		518	874
2 ml cell susp. → no add assay 0.1 ml		12	19
1 ml K-12 (30-1) → adsorb 5 min			
centrifuged / resuspd 2.0 ml → assay 0.1 ml = K-12 duction		c.87	543
leaves 1.8 ml / add 0.9 ml 811-4 λ - adsorb 5 min			
centrifuge + resp'd 1.8 ml → assay 0.1 = 1st 811 effect		c.59	233
add 0.8 ml to 1.7 ml remain - adsorb 5 min / centrifuge - resp'd in 1.7 ml → assay 0.1 = 2nd 811 effect		c.44	169

these plates add - growth doesn't look like 518. Sp. pap small after 2 days

Exposure to sicomp. λ seems to reduce pap. - Better recheck

518 vs 518t892

10x cell dil.

1.0 ml	0	adsorb 5 min
1.0 :	undil 1 ml	centrifuge resusp 0.1 ml → assay lysis
1.0 :	1-10 1 ml	lysis
1.0 :	1-100 1 ml	this plate shows almost confluent lysis

all divided (λ/2)

Titer these 518t892 811t892 preps and see if oddity observed is due to low titer - recheck on 2050 - Is this phage lytic? - different from λ, λ-2 ?

SW927 Rough

1st lysate shows 1 plaque / SW 950 in dil of 10^6 - titer c. 10^9

Wg 16 }
Wg 14 } auxotrophs catalogued
date on pg 120-130.

1/23/6

Lysate titers

811-4
10^8 - 113, 67 = $90 \times 10^8 = 9 \times 10^9$

902-1
10^8 - 93, 90 = $91 \times 10^8 = 9.1 \times 10^9$

902-2
10^8 - 24, 19 $22 \times 10^8 = 2.2 \times 10^9$

902-3
10^8 - 100, 48 7.4×10^9

2050
10^8 - 314, 263 2.9×10^{10}

518E892-1
10^7 - 195, 166 1.8×10^9

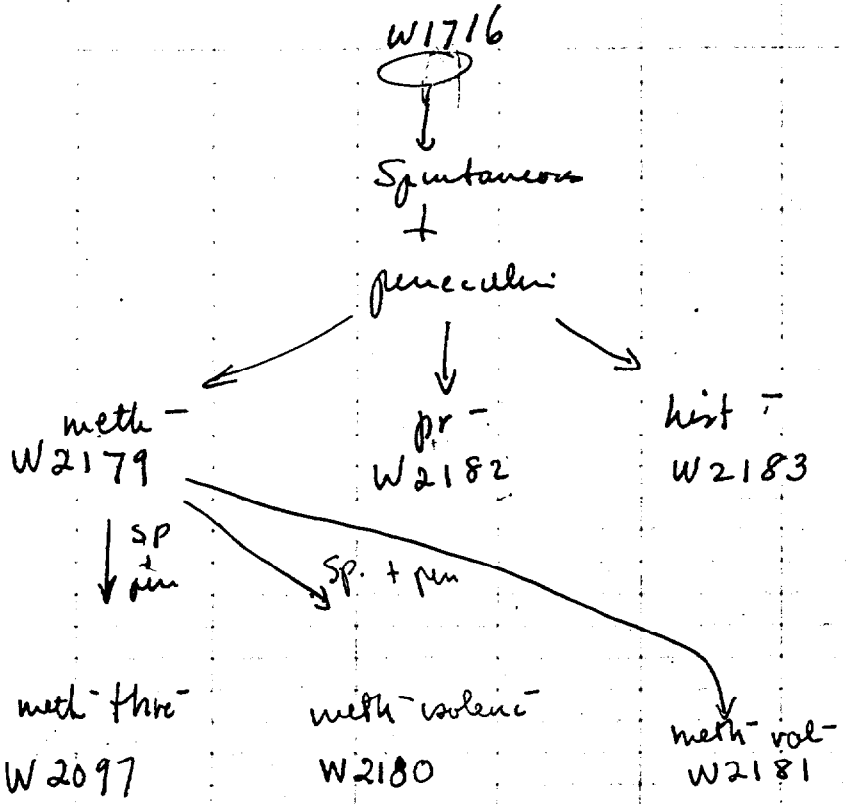
$\frac{2 \times 10^5}{2 \times 10^9} = \frac{1}{10^4}$

01
10^8 105, >87 9.6×10^9

K-12 - (12/20)
10^6 = 244, 213 2.3×10^{10}

1485
10^7 = 129, 96 1.1×10^9

Wg 16


W1716
Spontaneous
+
penicillin
meth⁻
W2179
pr⁻
W2182
his⁻
W2183
SP
+
pen
sp. + pen
meth⁻ thre⁻
W2097
meth⁻ isoleu⁻
W2180
meth⁻ val⁻
W2181

1/26/53 Monday -
- Recovering -

518tB92 λ - examination for lytic phage present.
streaked against 1485 = lysis
902 = no lysis } suggests lytic is λ - not λ-2

D1 lysate · Examination

			no. pap
1.	518 alone	-	c. 30
2.	518 + D1 lys	-	solid smear - 10⁴ pap. suggestion of lysis
3.	902 alone	-	smeared - 10⁴ pap. lysate added by accident? 902 contaminated
4.	902 + D1 lys	-	smeared - " " " c (+)
5.	2050 alone	-	c. 10
6.	2050 + D1 lys	-	solid smear - 10⁴ pap.

902 pr strength

~~7. 518tK12~~

518 for the purpose of examining a larger no. 518tK12 gal-seg.

1. control alone c. 30
2. 0.1 K-12 (12/20) c. 500 (1½ days incubation)

Blue contaminant on EMB

EMB lac - blue colonies - indicating alk. reaction - no use of lac?
lac Sm " " " " " " " " also St
mal - " " " " " - no use of mal?
xyl - light blue colonies - utilization of xyl?

518 No gaed. as function of cell no's.
Adsorption expt.

518 cell susp. → 0.1 X 10 X 100 X 100 X 128 = 63, 69 = 66 X 10^8 X 1.28 = 84.5 X 10^8 = 8.5 X 10^9

Tube	Cells added	Saline	K-TL λ (30-1)	Centrifuge decant	No. pigs	No. cells involved
1.0 → 1	→ 1.0 ml	1.0 ml	0.1 ml		69	4.2 X 10^9
2	(1-2)			resusp'd	75	2.1 X 10^9
3	(1-4)				82	1.15 X 10^9
4	(1-8)			1.0 ml	58	5.75 X 10^8
5	(1-16)			Assay	52	2.87 X 10^8
6	(1-32)			0.1 ml	20 (many small)	1.43 X 10^8
7	(1-64)				12 bkgrd?	7.1 X 10^7
8	(1-128)				14	

No bkground assay made est. c 20.

1.0 ml vol + 0.1 ml lys

~~[illegible]~~

tiler = 71 (bkgrd) X 10 X

mixed

518 X 892

EMS gal	Prototrophs (+)	(−)	total
1.	0	4	4
2.	2	2	4
3	1	1	2
4.	0	1	1
5	0	6	6
6	1	1	2
7.	0	1	1
8.	0	3	3
9.	0	3	3
10.	1	3	4
	5	25	30

Cross plates have cysteine added

5+/30 = 0.166 ~~0.125~~ = 16.6%

B8 lysate
A3 tiers
{ 518 adsorpt.
{ 1412 adsorpt

Cross 518 X 0.1 –
2050 mutants

behavior

124, 123,
125, 126

{ 519 lp^5 gal_4^- gal_3^+
{ 892 lp^+ gal_4^+ gal_3^-

Make Tiers

1. Series A lysates – A1, A3 ok – ok
2. Crosses 1436 X A1, A3, A11, A13
3. ~~Transduce c 1, 2, 3, 4 A1, A3 A11, A13~~
4. Make lysates K-12, B8 → strk out B8 test sub-lines
5. 518 adsorpt.
6. 1

	as cell nos	λ K-12	Centrifuge / decant	
1.	1.0 ml c10X unc	0.1 ml	"	
1-2	1.0 ml + 1.0 ml sal	"	"	
1-4		"	"	
1-8		"	resuspd	– plate 0.1 ml
1-16		"	1.0 ml	
1-32		"	sal	count
1-64		"	"	X
1-128		"	"	"

total ml/λ

1-10^4 (0.1 + 10
1-10^6
1-10^7 → 0.1 ml for count

Expt. A S18tK-12 → seg (−)

A 3 X 1436 EMS gal

(+)/total
1. 0/212
2. 0/192
3. 0/194
4. 0/172
5. 0/255
975

A 11 X 1436

(+)/total
1. 0/179
2. 0/189
3. 0/273
4. 0/191
5. 0/216
1048

A 13 X 1436

1. c. 300 (−)
2. c 300 (−)
3. c. 250 (−)
4. c 200 (−)
5. 0/195
.1250

in all of these suggestion of lysis in some colonies - tendency of some colonies to appear gal slow also - pale pink -

S18tK-12 lysate -

$10^8 = 17,25$

Wednesday 2/4/53

518 Lp_2^S, 1412 Lp_2^R

preliminary adsorption

K-12λ (12/20) used - 1.0 ml added + 20 ml conc. {518 / 1412} to sed. Cells stored in broth overnight.

518 10^6 = c.600, 600 = 6.0×10^8 λ/ml of sup.

1412 10^8 = 3,1 = 2×10^8 λ/ml of sup.

initial λ titer = 2.3×10^{10}

Better check this - looks like Lp_2^R adsorbs?

750λ titer (unfiltered prep)

10^8 = 28,94 = $\frac{122}{2}$ = 6.1×10^9 lousy assay replate

A3 λ titer (A = 518tK-12 → (-) seg A3

10^7 = c.500, 500 = 5×10^9

D1 λ titer (D = 518t892 → (-) seg D1

10^7 = 64,0

0.5 ml D1 + Pen —— sterile —

Thursday 2/5/53

$Lp^s\ gal_4^-\ gal_3^+ \times Lp^+\ gal_4^+\ gal_3^-$

518 X 892 on EMB gal · no S added – an aerated culture of 892

	(+)	(-)	total
1.	0	$^3/_{18}$	$^3/_{18}$
2.	0	19	19
3.	1	23	24
4.	0	19	19
5.	0	21	21
	1	100	101

$101 \overline{)1.000}$ = 0.0099 = 0.99 %

see pg 163 there recomb = 16.6%

this (+) confirmed on EMB gal

750 X 892 on EMB gal – no S added

1.	0	$^3/_{19}$	$^3/_{19}$
2.	0	19	19
3	1	25	26
4.	0	27	27
5.	1	22	23
	1 (1?)	112	114

$114 \overline{)1.000}$ = 0.0087 = ~~0.87 %~~ 0/119 %

these not confirmed on ✓ – both (–)

518 transductions.

EMB gal	Addition	Pop. after 2 days
1.	none	40
2.	518t892-1 und.	solid smear
3.	518t892-1 1-10	$>10^4$
4.	" -1 1-100	$^1/_{16}$ = c.180 = 2080
5.	D1 und.	Solid smear
6.	" 1-10	" "
7.	" 1-100	$^1/_{32}$ = c.200 = 6400 ← evidence of lysis – plaques around margin
8	A1 und	9 (lysis?)
9.	K-12 (12/00) und.	$^1/_{16}$ = c.120 = 1920 no evidence of lysis – contrast

Exp. P 518t892 (-) seg

used for isol of (-) seg.

$2.0 \times 10^3 \times 10 \times 10^2 = \frac{2.1 \times 10^6 \text{ transductions/ml}}{1.8 \times 10^9\ \lambda\ /\text{ml}} = 1t/8.6 \times 10^2 \lambda$

$6.4 \times 10^3 \times 10 \times 10^2 = \frac{6.4 \times 10^6 \text{ transd}}{9.6 \times 10^9 \lambda} = 1t/1.5 \times 10^3 \lambda$

$\frac{1.9 \times 10^4 t}{2.3 \times 10^{10} \lambda} = 1t/1.2 \times 10^6 \lambda$

2/5/53
Thursday

2175 transductions

EMB gal	Addition		No. Pap. 2 days
1.	none		13 ← dup plate
2.	518t892-1	und	$>10^4$
3.	"	1-10	$\frac{1}{16}=85 = 1360$
4.	"	1-100	$\frac{1}{2}=138 = 276$
5.	D1	und	19
6.	"	1-10	9
7.	"	1-100	19
8.	A3	und	29

D1 = 518t892 ← ↓ say
gal₂ - by t test
not gal₂ by cross

apparently no effect — if D1 is like A4 and the Thurs this ✓ with ability to be transd.
D1 not tr. by 902λ

indicates D1 is gal₂⁻
1/14/56

$\frac{1.4\times10^3\times10\times10}{1.9\times10^9\lambda}t = \frac{1.4\times10^5}{1.9\times10^9} = 1t/1.3\times10^4\lambda$

$\frac{2.76\times10^2\times10\times10^2}{1.9\times10^9\lambda}t = \frac{2.76\times10^5}{1.9\times10^9} = 1t/7\times10^3$

2050 transductions

EMB gal	Addition		No. Pap 2 days
1.	none		22
2.	518t892-1	und	$>10^4$
3.	"	1-10	$\frac{1}{32}=121 = 3872$
4.	"	1-100	$\frac{1}{16}=85 = 1360$
5.	D1	und	solid smear
6.	"	1-10	" "
7.	"	1-100	$\frac{1}{16}=93 = 1484$

$\frac{3.8\times10^3\times10\times10}{1.9\times10^9\lambda}t = \frac{3.8\times10^5}{1.9\times10^9} = 1t/5\times10^3$

$\frac{1.4\times10^3\times10\times10^2}{1.9\times10^9} = \frac{1.4\times10^6}{1.9\times10^9} = 1t/1.3\times10^3$

$\frac{1.5\times10^3\times10\times10^2}{9.6\times10^9} = \frac{1.5\times10^6}{9.6\times10^9} = 1t/6.9\times10^3$

750 transductions

EMB gal	Addition		No. Pap 2 days
1.	none		1
2.	518t892-1	und.	solid smear
3.	"	1-10	$>10^4$
4.	"	1-100	$\frac{1}{32}=c.100 = 3200$
5.	D1	und	solid smear
6.	D1	1-10	$>10^4$
7.	D1	1-100	$\frac{1}{32}=c.200$ 6400

$\frac{3.2\times10^3\times10\times10^2}{1.9\times10^9} = \frac{3.2\times10^6}{1.9\times10^9} = 1t/5.9\times10^3$

$\frac{6.4\times10^3\times10\times10^2}{9.6\times10^9} = \frac{6.4\times10^6}{9.6\times10^9} = 1/1.5\times10^3$

Sunday 2/8

mixed culture

Crosses · 518 X 892 gal$_4^-$ x gal$_3^-$

EMS gal	(+)	(0)	total
1.	0	1	1
2.	1	12	13
3.	0	5	5
4.	0	5	5
5.	0	6	6
6.	0	3	3
	1	32	33

1(+)/33 = 3.3 %(+) recomb.

p. 165. 0.99 %
p. 163. 16.6 %

Crosses 518 x 902 gal$_4^-$ x gal$_2^-$

EMS gal			
1.	13	216	229
2.	8	218	226
3.	8	170	178
4.	19	171	190
5.	19	160	179
	67	935	1002

1002) 67.00 = 0.0667 = 6.67%
6012
6880
6012
7680

probably not valid - 902 contains (+) cells.

D1 = 518 t 892 → (-) seg. = gal$_2^-$ by transd.

D1 X 902

4/4 stable after 3

EMS gal			
1.	11	234	245
2.	7	170	177
	18	404	422

422) 18.00 = 0.0426 = 4.26 %
1688
1120
844
2760

probably not valid 902 contains (+) cells

confirmed on EMB gal

D1 X 892

1.	1	5	6
2.	0	3	3
	1	8	9

9) 1.0 = 0.111 = 11.1 %
9
10
9
10

stability examined
1st streak - mixed +, -
2nd " - "
3rd " - "

confirmed on EMB gal

D1 X 1436

1.	0	166	166
2.	0	153	153
3	0	128	128
	0	447	447

0/447 = < 0.22%

518 X 892 - pg 165 = Expt. F

Monday 2/9/53

518 X 892 prototrophs - all gal (-) except #1 = gal (+)

	λ Rx	/1985		λ Rx	/1985
1.	s	n. lys	14.	r	lys.
2.	s	"	15.	s	n. lys.
3.	s	"	16.	s	n. lys
4.	s	"	17.	r	lys
5.	s	"	18.	r	lys
6.	r	lys	19.	s	n. lys
7.	r	lys	20.	r	lys
8.	s	n. lys	21.	r	lys
9.	r	lys	22.	s	n. lys
10.	r	lys	23.	s	n. lys
11.	r	lys	24.	r	lys
12.	s	n. lys	25.	s	n. lys.
13.	s	n. lys			

← blue on EMB(0) ← does this indicate a double (-) ?

14 s Lp^s = 13 Lp^s gal -
11 lys Lp^+ = 11 Lp^+ gal -

B8 transduction

EMB gal	Addition	No. pop 3 days
1.	none	75
2.	0.1 2050 λ - 1	106
3.	0.1 750 λ - 1	556

D1 transduction

EMB gal	Addition	No. pop 3 days
1.	none	101
2.	0.1 2050 λ - 1	130
3.	0.1 750 λ - 1	707

D4 transduction

EMB gal.	Addition	No. pop 3 days
1.	none	~~[illegible]~~ 48
2.	0.1 2050 λ - 1	100
3.	0.1 750 λ - 1	536

518X892 pg 166 Leakage already not possible

(+) proto troples picked all grew 40/40 — (-) proto troples picked 8/40 grew — why?

one picked all three

578X892 EXPT F: Examination of (-) proto troples from the cross for their transmission behavior

Proto. #	80 adult	811 λ-9	2050 λ-1	Comment	Stockable Locus	λ-2	Lp Chas. 1967
1	Gal + proto troples —					S	—
2	c. 400 (large small)	c 100 large small	c. 200 large small		?	S	S
3	63 (like 4)	38	68	Lp_2^R ? no	? — 4-	S	S
4	45 (l. 4-)	15	35	Lp_2^R ? no	? — 4-	S	S
5	38 (like 4-)	21	49	Lp_2^R ? no	? — 4-	S	S
6	13 (like 3-)	96	4		3-	S	lys
7	13 (like 3-)	118	15		3-	S	lys
8	29 (like 4-)	11	16	Lp_2^R ? no	? —	S	S
9	28 (rocks like 4-)	29	39	Lp_2^R ?	? —	S	lys —
10	2 (like 3-)	40	2		3	S	lys
11	117 (rocks like 3-)	~~527~~	171		~~3~~ 3	S	lys
12	47 (like 4?)	15	57	Lp_2^R ? no	? — 4-	S	S
13	99 (rocks like 4-)	21 many small	76		? 4-?	S	S
14	3 (like 4-)	11	5	Lp_2^R ?	? —	S	lys —
15	c 300 (large small)	c. 100 Lp S	c. 100	Lp_2^R ? no	? — 4-	S	S
16	53	14	61		? — 4-	S	S
17	0	36	0		3 —	S	lys
18	0	0	0	minute film 2 tiny Lp.	3 see pg. 1706	S	lys
19	57 (like 4)	25	44	Lp_1 ? no	? —	S	S
20	3 (like 3-)	122	2		3	S	lys
21	1 (like 3-)	202	2		?	S	lys
22	30	21	49		? 4-?	S	S
23	c. 400 large small	c.100 (l. 6)	c. 300 (l. 60)		? — 4-?	S	S
24	3 (like 4-)	11	5	Lp_2^R ?	? —	no growth	lys —
25	37 (l. 4-)	29	68		? 4-?	S	S

blue blue — 8/8 stockable after 2 — 8/8 stockable after 2 — blue blue — 3/8 unstable after 2 — 2/8 unstable after 2 — 8/8 stockable after 2

Lp cross contains stable about appear. of plate-lys appears.

8 clear cut 3- and Lp^+

gal- λ cross gal+ has a tendency to lower the no. of outcrosses pos. On this basis nos 2, 3, 4, 5, 8, 12, 13, 15, 16, 19, 22, 23, 25 called be 4-

8 3-
13 possibly 4-
4 unknown

Wednesday 2/11/53

Transductions - Spot Method

Trial 1 - Using K-12 12/20 λ

	no. pap.
518 - 0 add	0
+ K-12 λ	61
811 - 0 add	0
+ K-12 λ	15

Trial 2

518 - 0 add	0
+ K-12	66
811 - 0 add	1
+ K-12	32

B8 = 518t902 ⟶ (-) seg

14/14 spontaneous papillae stable thru 3 purification streaks -

B8t750 unstable

D1 = 518t892 ⟶ (-) seg gal₂ - by tr and donor test
~~not gal₂ - by x 902~~ ok
possibly gal₉ - by cross x 1436

7/10 spontaneous papillae
unstable after 3 pickings

D1t750 unstable

D1x892 (+) prototrophs
unstable still after 4

D4 = 518t892 → (-) seg as D1

13/13 spontaneous papillae stable thru + after 3 pickings

D4t750 unstable

Tuesday 2/17

750XY-10 to obtain gal, - prototroph:
c. 2(-)? /300 prototroph.

Lysates.

750-2 (2 bottle)

10^8 = 312,296 = 3.04×10^{10}

811-5

10^8 = 49,49 = 4.9×10^9

B8 = 518t902 (-) seg

10^8 = 699,785 7.43×10^{10}

Expt. G = D1 spont. gal + (unstable) (-) segregants to observe their pattern of transducibility.

Numbers 1-5

Ex H = 518tK-12 (-) seg tested against 2-, 4-

D4t750

10^7 dil = >1000 titer > 10^{10}

Dipole mixed culture

Friday 2/20/53

Expt. G. D1 = 510t 892 → (−) seg. By transducability test = 2−
" donor " = 2−
" X 902 ≠ 2 ← this since 902 cont. (+)

D1 spont. gal+ are unstable.

5(−) seg from D1 − from sep segregations.

G-1, 2, 3, 4, 5, Addition		No. pap days G-1	G-2	G-3	G-4	G-5
1	none	58	12	25	75	10
2	750λ-1	1/8=38 304	1/8=69 552	1/4=69 276	1/4=91 364	1/8=49 392
3	902λ-2	54	16	32	32	28 ← no 6
4	2050λ-1	108	42	69	62	47
5	811λ-5	102 ✓✓	49 ✓	65	55 ✓	53
Prob. locus		2−	2−	2−	? 2−	? 2−

Streak of no. add plate 1. 2. 3.

	7/8 mixed 1(−)	8/8 mixed	8/8 mixed, 4 int. (+)	5/6 mixed, 1(−)
	7/7 pure +	6/8 mixed	8/8 mixed	5/5 (+)
	stable	6/8 mixed	5/8 mixed	stable

some of these may be slows

G-2-3 1. 7/8 mix, 1(−) 2. 3.

G-2-4 1. 7/8 mixed, 1(−) 2. 4/7 mixed, 3. 7 indicates transduct. by 4−

G-1-4 1. 8/8 mixed 2. 7/7 mixed 3. indicates one cont. transd. by 4−

G-5-2 1. 6/8 mixed, 2(−) 2. 6/6 (+) 3. indicates no. 2− transd.

Friday 2/20/53

Exp. H. = 518tK-12 → (-) seg from 21 separate ~~segregation~~ transductions

No.	Add				
–	~~[illegible]~~	811A-5	902/~~[illegible]~~	Probably lines	
1.	27	43	1/4=36 144	4–	pure(+) on 1st streak –
2.	24	32	1/4=42 168	4–	
3.	35	29	1/4=27 216	4–	
4.	15	22	1/4=61 244	4–	
5.	32	36	1/4=71 284	4–	
6.	32	42	1/4=73 292	4–	
7.	31	30	1/4=56 224	4–	
8.	28	37	1/4=45 180	4–	pure(+) 1st streak –
9.	(+) cell contamination?			?	
10.	17	27	1/4=54 216	4–	
11.	27	31	1/4=42 168	4–	
12.	(+) cell contam?			?	no add plate 1st (appear seg.)
13.	36	23	1/4=63 252	4–	
14.	30	33	1/4=59 236	4–	
15.	26	31	1/4=55 220	4–	
16.	27	31	1/4=42 168	4–	
17.	(+) cell contam?		–	?	no add plate 1st (appear seg)
18.	32	31	1/4=59 236	4–	
19.	31	39	1/4=61 244	4–	
20.	31	24	1/4=64 256	4–	
01.	40	44	1/4=~~52~~ 208	4–	

All lysogenic since λ's reactions not recorded

H-9-0 – 8/8 stable after 2 isolations,
H-17-0 – 5/5 unstable after 2 "
H-12-0 – 6/6 unstable after 2 "

} probably contamination since on purification (selecting a (-) colony) and replating – plating out on EMB gal and picking sp + papillae no unstables found after 2 – No of sp.(+)pop about 30-40/plate

From the transduction data these (-) seg appear to be 4–

18/18

test some of them for (X 4–) for allele test

Friday. 2/20/53

518	Addition	No. Pap 2 days
1.	none	67
2.	D4 t 750 1-10³	24
3.	" 1-10⁵	11
4.	" 1-10⁷	80
5.	" 1-10⁹	46

2062 – isolation of double mutant.

colonies in cmd 1-10, 1-20 } suitable for replication to D(0)+ pr.

510 X 892 prototroph #18 gal – alkaline rx on ~~[illegible]~~ EMB gal, B(0)

suspicious that it is 3⁻4⁻?

After 3 days EMB gal

2 No add – c. 100 pap mostly small

2. 750-λ-1 – c. 300-400 pap (larger than no add)

3. 912-λ-2 – c. " " " " " "

4. 2050λ-1 – c. 75 pap mostly small

5. 811λ-5(?) – c. 300-400 pap larger than no add.

Concluded this is a 3⁻ but slow in response for some reason

mixed culture

Thursday 2/26/53

518X892 B, added to X plates

EMS gal	(+)	(−)	tot
1	0	9	9
2	0	12	12
3	1	13	14
4.	1	12	12
	2	45	47

Confirmed on EMB gal

SOME OF THESE PROTO-
✓ON PG 173 FOR
L_p, L_{p_2} R

$$47 \overline{)2.0000} = 0.042$$
188
120

= 4.2%

p. 166 = 3.3
p. 165 = 0.99
p. 162 = 16.6
This 4.2

(+)	(−)
1	32
1	100
5	25
2	45
9	202

211

$$211 \overline{)9.00} = 0.0426$$
844
560
422
1380

Error 4.3%

518X902

EMS gal	(+)	(−)	tot
1	2	381	383
2	1	278	279
3	0	341	341
4	2	284	286
	5	1284	1289

$$1289 \overline{)5.000} = 0.0038$$
3867
11330
10312

= 0.38%

confirmed on EMB gal - stable after 2 p.c. isol.

811X902

EMS gal	(+)	(−)	total
1	0	198	198
2	0	151	151
3	0	184	184
4.	0	173	173
	0		706

(Estimated < 0.14%)

$$707 \overline{)1000} = 0.0014$$
707
2930

Friday 2/27/53

mixed culture

2062 pr - A - X 892

EMB gal	(+)	(-)	total
1	3	64	67
2	2	33	35
	5	97	102

$$102 \overline{)5.00} = 0.049 = 4.9\%$$
408
920

~~Indicates 2000 gal3 - distinct from 892 gal3 - what gives~~

NO

gal4 - x gal3 -

1 streakings on crosses

D1 X 902 } repeat crosses to see if initial results (contradictory in that
D4 X 902 } (D1, D4) were gal2 - by donor + recip. transd. tests) was caused by + cont in 902

D1, D4, 902 pure (-) on EMB gal streakings of washed susp.

811 X 902 - to see if 811 is different from 518 re apparent linkage gal4 - gal3 - as suggested in last cross

811 pure (-) on EMB gal

2/28/53 Sat. — mixed culture

⊙

gal_4^- Lp^s gal_3^+

gal_4^+ Lp^+ gal_3^-

518 X 892 Prototrophs - cross on pg 171.

Proto	gal rx	/λ	/λ-2	/1485	Probable on link up gal_3^-
1	+	r	s	lys	
2	+	r	s	lys	
3	−	s	s	n. l.	4
4	−	r	s	lys	
5	−	s	s	n. l.	4
6	−	r	s	lys	
7	−	r	s	lys	
8	−	r	s	lys	
9	−	s	s	n. l.	4
10	−	r	s	lys	
11	−	s	s	n. l.	4
12	−	r	r	lys	
13	−	r	s	lys	
14	−	s	s	n. lys	4
15	−	r	s	lys	
16	−	r	s	lys	
17	−	r	s	n. lys	
18	−	r	s	lys	
19	−	r	s	lys	
20	−	r	s	lys	
21	−	r	r	lys	
22	−	r	s	lys	
23	−	r	r	n. lys	
24	−	s	s	n. lys	4
25	−	s	s	n lys	4
		7 s	23 s	8 n.l.	
		18 r	2 r	17 lys	

one of these possibly unstable

DIX892 - unstable + prototroph.
still seg (-) on EMB gal after 5 s.c. isolations
homogeneous (-) on {EMB / lac}

518X892 - above (+) possible unstable
s.c. 1. mixed (+),(-)
2. mixed (+),(-)

Sunday 3/1/53

1655 X 1177 on EMS gal to obtain galg - Lp_2^S
25 gal - tested against λ_2 - all Lp_2^R

811 X 902 on EMB gal - purity of parents checked on p. 172

	(+)	(-)	total
1.	0	65	65
2.	0	41	41
3.	0	32	32
4.	0	62	62
	0	200	200

total to here 0+/907 = < 0.11%

$$\begin{array}{r} 0.0011 \\ 907\,\overline{)\,1.000} \\ 907 \\ \hline 930 \end{array}$$

D1 X 902 on EMS gal - to recheck on D4 since 902 culture could have been contaminated with (+) cells.

	(+)	(-)	total
1.	0	209	209
2.	0	265	265
3.	0	134	134
4.	0	265	265
		873	873

0/873 not in agreement with previous

D4 X 90 as D1

	(+)	(-)	total
1.	0	248	248
2.	0	154	154
3.	0	175	175
4.	0	122	122
		699	699

0/699 = not in agreement with earlier results - probably correct - test D4 for galg- ness

D1 from
[illegible] = mixed λ

Thursday 3/6/53

Crosses with 902 B7, B8, D1, D4, 811 all checked on EMB gal all found (-)

811 X 902

EMB gal	(+)	(-)	total
1.	0	77	77
2.	1?	49	50
3	0	52	52
4	0	105	105
5.	0	75	75
	1?	358	359

1? confirmed on EMB gal

total to here

	(+)	(total)
p. 171	0	706
p. 174	0	200
above	1?	359
		1365

1365 / 1.0000 = 0.00073 = 0.073%
9555
4450

578 5/1289 = 0.38%
6/2654

Recheck on crosses with 902 - 902 pure gal -

D1 X 902

EMS gal	(+)	(-)	total
1.	0	273	273
2.	0	339	339
3.	0	247	247
4.	0	296	296
			1155

0/1155

D4 X 902

1.	0	1/8 = 237	1896
2.	0	1/8 = 249	1992
3	0	1/8 = c. 300	2400
4.	0	1/16 = 109	1744
			7932

0/7932

B7 X 902

1.	0	1/2 = 264	528
2.	0	1/2 = 292	584
3.	0	1/2 = 239	578
4.	0	1/2 = 271	542
			2232

0/2232

B8 X 902

1.	0	1/2 = 203	406
2.	0	1/2 = 176	352
3.	0	1/2 = 191	382
4.	0	1/2 = 227	454
			1594

0/1594