Tuesday 12/23/52

– 902 Lp_1^5 – transduction c̄ old culture – Repeat using younger cell.

	EMB gal	addition	no. pap 3 days	
	1	no add	14	
2.4 X 10¹⁰	2	0.1 750 λ – 1	52	.38
	3	0.1 902 λ – 1	11 –	
3.8 X 10⁹	4	0.1 892 λ – 1	51	.37
c. 10¹⁰	5	0.1 811 λ – 4	43	.29

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

values low because of cell age? Repeat.

– 578

EMB gal	addition	no pap 7 days
1	no add	72
2	0.1 1485 λ	131
3	0.1 K-12 λ 12/20	1/16 = 120 = 1920

high?

(booked)

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

(2/2) 1485 λ = 1.1 X 10⁹ 59/1.11

K-12 (12/20) λ = 2.3 X 10¹⁰ 1848/23

59 X 23/1.1 = 1233

"mut." λ = 1233

"wt" λ = 1848

Thursday 12/26/52

811 prototrophic gal+ – To test the hyp that gal+R of 811 not transducing 811, 578 are reversions to an allele with not sufficient selective advantage on EMB gal to allow detection of transduction

EMB gal ↓	addition	no pap 4 days		
1	none	23		
2	(811 λ) – 4	18	This lys. doesn't work on EMB?	
3	(811 g+ -1) – 1	15		
4	(811 g+ -2) – 1	22		
5	(811 g+5) – 1 untreated (ONAoo)	214	all work on EMB	
6	(811 g+5) – 2	465		
7	(811 g+ -8) – 1	309		
8	(K-12 λ) 30 – 1	164		

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

2050 gal₃ – galduction – Repeat – has high background – Make purified

	EMB gal	2050 – addition	no pap. 2 days
	1	none	296
> 2.4 X 10¹⁰	2	750 λ – 1	1/4 = 255 = 1020
4.9 X 10¹⁰	3	902 λ – 1	1/4 = 476 = 1904
3.8 X 10⁹	4	892 – 1	288
	5	811 – 4	1/4 = 208 = 832

} these counts all low – large nos of small pap –

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

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

Sunday 12/28

–874 galduction = another lysogenic out of 518

EMB gal	Addition	no pap 3 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

behaves as 811 with greater transducibility by K-12?

(–) from single transduction

D = 518 + 892 gal- segregants → purified thru 3 single col. isolation - examination for ~~stable~~ 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 - recentrifuged - test 0.1ml

10^8 - 15

8

23 = 2.3×10^9

Tuesday 12/30/52

Exp D = Repeat examination of segs - from 518 t 892 - Seg purified thru 3 pickings -

Pop. 2 days

	Gal-bal	Model	811λ-9	892λ-2	Probable gal locus	/1485	From Strak
strk all	1	40	142	253	(?)	Segs	Recheckers - unreliable
892	2	53	35	69	4	"	Rechecks
84	3	22	40	87	4	"	not t/811λ
all	4	8 (few small)	59 (all small)	173 all small	(?)	"	Rechecks - unreliable
	5	27 >5	32	71	4	"	
811	6	32 >5	40 >5	74 >5	4	"	not t/811λ
	7	28 >small	40	99 >5	4	"	
	8	40	36	90	4	"	
	9	29 >small	37 >small	88 >5	4	"	
892	10	43 no small	46 no small	79 no 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	lost - but both a and low in pop.		73		"	
	15	21 all small	121	275	(?)	"	Recks - mistakes
	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 - unreliable
	20	27 some small	101 most small	324 all small	(?)	"	" "
	21	5	40	146	(?)	"	" "
892	22	45	35	61	4	"	Rech t 892
892	23	58	36	87	4	"	" "

5/23 translocated by both 811λ 892λ

5/23 probably new type!

Checks

Pop #	D1t811			p1 t892			D2t892			D3t811			D4t811			D4t892			D6t811			D10t892			D12t892		
	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

Pop #	D13t892			D15t811			D15t892			D17t892			D19t811			D19t892			D20t811			D20t892			D21t811		
	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	mix	mix	mix	mix
2.	"	mix	mix	"	+	+	"	"	"	"	+	+	"	"	"	"	+	+	"	"	"	"	"	"	"	+	+
3.	+	mix	+	"	mix	mix	"	"	"	"	+	+	"	"	"	"	mix	mix	"	"	"	"	"	"	"	mix	mix
4.	mix	+	+	"	mix	mix	"	+	+	"	mix	mix	"	"	"	"	"	"	"	"	"	"	"	"	"	+	+
5.	"	mix	mix	"	+	+	"	mix	mix	"	+	+	"	"	"	"	"	"	"	"	"	"	"	"	"	+	mix
6.	+	+	+	"	mix	mix	"	"	mix	"	mix	mix	"	"	"	"	"	"	"	"	"	"	"	"	"	mix	+
7.	mix	+	+	"	"	mix	"	+	+	"	mix	mix	"	"	"	"	"	"	"	"	"	"	"	"	"	+	+
8.	"	+	+	"	"	mix	"	+	+	"	+	+	"	"	"	"	+	+	"	"	"	"	"	"	"	"	mix

single colony isolation

Check on Exp D = 5̄18 t 892 Second run

Pap	D21 t 892 (1)	D21 t 892 (2)	D21 t 892 (3)	D22 t 892 (1)	D22 t 892 (2)	D22 t 892 (3)	D23 t 892 (1)	D23 t 892 (2)	D23 t 892 (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

EMB gal	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

EMB gal		
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%+

maybe be suspect — 902 culture possibly contain (+) cells

second cross D1X902 pg 166 = (4.2)%

$\frac{0.042}{18.01}$ [illegible]

243
179
422

Tuesday 12/31

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

	EMB gal	Adsorber	Pap. 2 days			
	1	none	S (per plate)			
2.4×10^10	2	750λ-1	71	52	66	6.6×10^3 / 2.4×10^10 = 1/3.6×10^6
	3	902λ-1	14	11		
3.8×10^9	4	892λ-1	102	51	97	9.70×10^3 / 3.8×10^9 = 1/2.6×10^5
8×10^10	5	811 - 4	51	43	46	4.6×10^3 / 8×10^10 = c. 1/2.2×10^6
	6			pinning?		

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 1	2	3	902/902λ 1	2	2	902 t 892 1	2	3	902 t 811 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.	"	+	+	"	+	+	"	W+	mix]	"	+	+

[stock: make]

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 pap 8 days
	1.	none	32
>2.9×10^10	2.	750λ - 1	109+ many small
4.9×10^10	3.	902λ - 1	1/8 = 132 = 1056 " "
	4.	892λ - 1	130 " " ← large no? See examination below
	5.	811λ - 4	1/4 - 55 = 210 " "

$\frac{7.2\times10^{2}}{2.9\times10^{10}} = \frac{1}{3.3\times10^{7}}$

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

- Sunday 1/4/53

2050 above - stability examination

Papillae #	2050t750 1	2	3	2050t902 1	2	3	2050/892 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 -	mixture		"	+	+	+	+	+	"	+	" (?)

1/7/53
Wednesday (Held over from 1/6/53)

Exp E = 2050 + 811 - gal- segregants

Disregard

? → 2050

Segregant #	Wood.	811λ-4	2050λ-1	1985 lys	Probable genotype (?)	
1	61	1/8 = 57 456	1/2 = 102 204			
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	on 1/12/53 this plate of 2050λ = c. 360
9	* 116	1/4 = 197 ~~188~~ 388 *	182 *	..	3 (2)?	
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. 157	c. 10	..	3?	
18	c. 200	c. 100	c. 10	..	? -	
19	17	1/8 = 80 640	1/8 = 62 496	..	? -	11 (3)
20.	c. 10	c. 150	c. 20	..	3	9 (?)

* ~~many small~~ Nearly all plates have large numbers of small papillae making counting and interpretation difficult. - In general results suggest the same confusion suggested by the 5180 ~~[illegible]~~ results.
892

Sunday 1/11/53

– B-7 X 902 – Repeat cross B7 = 518t902 → (–) seg transduced by cul ? but 902 ?

		(+)	(–)
EMS gal	1.	3	222
	2.	7	276
	3.	9	315
	4.	7	239
		26	1052

26/1078 = 2.5%

These results suspect since probably 902 culture 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

$gal_4^- x\ gal_3^-$

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

0/595

811 X 902

$gal_4^- x\ gal_2^-$

		(+)	(–)
EMS gal	1.	1	143
	2.	0	230
	3.	0	129
		1	602

1/603 = 0.16%

811 culture probably contaminated ignore these results.

2050 · Galduction

EMB·gal Pap 2 days

1. no add. 22
2. K-12 (304) 32 what happened?
3. 1436 t K-12-1 227
4. D1 (see pg 153 solid smear of pop 5000?
5. 518t892-1 solid smear of pop 5000?

D1 deriv of 518t892
518t892 results as previous.

D1 = 518t892 → (–) seg characterized by gald as 902, unknown by crossing data?

5/20/53 Tuesday et seq.

		no pcp 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 = K12 duction		c. 87	543
{leaves 1.8 ml {add 0.9 ml 811-4 λ - adsorb 5 min			
{centrifuge + respd. 1.7 ml → assay 0.1 = 1st 811 effect		c. 59	233
{add 0.8 ml to 1.7 ml remain - adsorb 5 min {centrifuge - respd in 1.7 ml → assay 0.1 = 2nd 811 effect		c. 44	169

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

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

518 vs 518C892

10x cell dil!

1.0 ml : 0 } adsorb 5 min
1.0 : undil 1 ml } centrifuge, resusp 1 ml + plate assay — lysis
1.0 : 1-10 1 ml }
1.0 : 1-100 1 ml }

all diverted (?)

this plate shows almost confluent lysis

Titer these 518C892 811C892 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/950 SW in dil of 10^6 - titer c. 10^9

Wg 16 }
Wg 14 } auxotrophs catalogued
data on pp 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}

518 & 892-1
10^7 - 195, 166+ 1.8×10^9

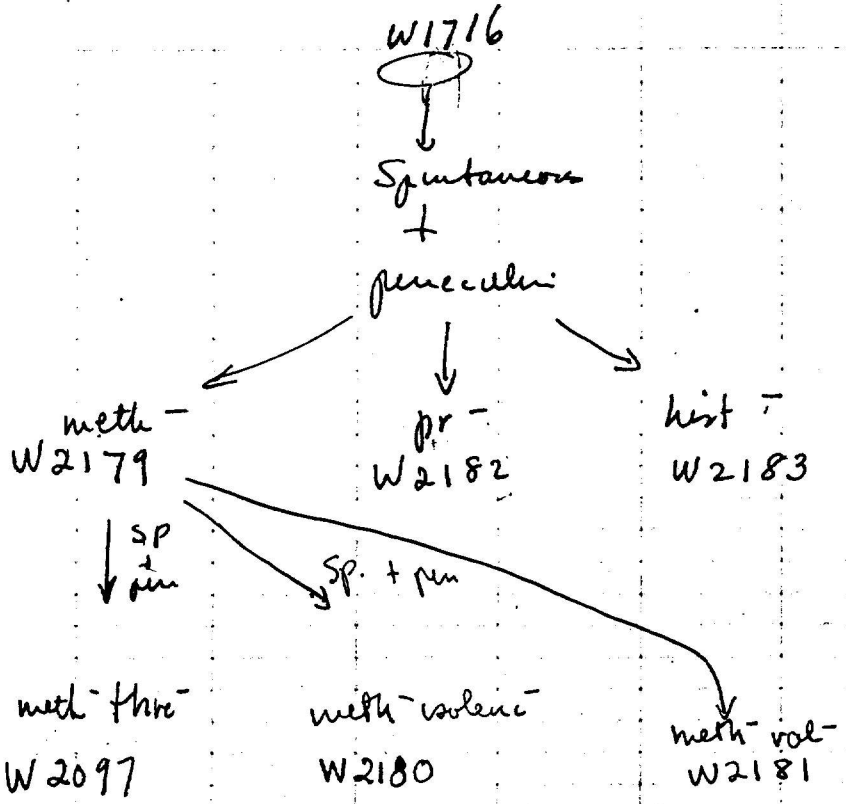
$\frac{2 \times 10^5}{2 \times 10^9} = \frac{1}{10^4}$

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 -

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

D1 lysate · Examination

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

~~7. 2050 K12~~

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 acid reaction no use of lac?
lac Sm " " " " " " " " " also St
mal - " " " " " - no use of mal?
xyl - light blue colonies - utilization of xyl?

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

518 cell susp. → 0.1 × 10 × 100 × 100 × 125 = 6³ 69 ?

$66 \times 10^8 \times 1.28 = 84.5 \times 10^8 = 8.5 \times 10^9$

Tube	Cells added	Saline	K-H (Gal)	Centrifuge/decant	No. reps	No. cells involved
1.0 → 1	1.0 ml	1.0 ml	0.1 ml		69	4.2×10^9
2	5 (1-2)			rapid	25	2.1×10^9
3	5 (1-4)				81	1.15×10^9
4	5 (1-8)			1.0 ml	58	5.75×10^8
5	5 (1-16)			Assay	52	2.87×10^8
6	5 (1-32)			0.1 ml	20 (nitrogen mar)	1.73×10^8
7	5 (1-64)				12 bkgrd?	7.1×10^7
8	5 (1-128)				14	

no bkground assay mode gt. c 20.

[redacted] titer = 71 - (bkgrd) × 10 ×

518 × 892

	Exp'mt	Prototrophs (+)	(−)	total
Cross plates	1.	0	4	4
base	2.	2	2	4
cysteine	3	1	1	2
added	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

5+/30 = 0.166 = 16.6%

B8 lysate
A3 titer
{ 513 adsorpt.
{ 1412 adsorpt

cross 513 x ... 2050 mutants

124, 123,
125, 126

{ 513 tp^S gal_1^- gal_3^+ }
{ 892 tp^+ gal_1^+ gal_3^- }

Make Tms

1. Series A lysates – A1, A3 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 subline
5. 513 adsorpt.
6. 1

cell mos → λ K-12 (30:1)

	Cell mos	λ K-12	Centrifuge / decant	
1.	1.0 ml c 10X conc	0.1 ml	"	
1-2	1.0 ml + 1.0 ml sal	"	"	
1-4		"	"	– plate 0.1 ml
1-8		"	Resuspd	
1-16		"	1.0 ml	
1-32		"	sal	count
1-64		"	"	x 10
1-128		"	"	= total ml

1-10⁴ { 0.1 + 10
1-10⁶
1-10⁷ → 0.1 ml for count

Expt. A SIBTK-12 → seg (-)

A 3 X 1436 EMS gal

	(+)/total
1.	0/212
2.	0/192
3.	0/194
4.	0/172
5.	0/205
	975

A 11 X 1436

	(+)/total
1.	0/179
2.	0/189
3.	0/273
4.	3/291
5.	0/216
	1048

A 13 X 1936

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

In all of these segregation of lysis in some colonies - tendency of some colonies to appear sector also - pale pink -

SIBTK-12 lysate -

108 = 17,25

Wednesday 2/4/53

$518^{s}_{,\ h^r}$, $1412^{r}_{,\ lp_2}$ preliminary adsorption

K-12 λ (12/20) used - 1.0 ml added + some 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 = 518 c K-12 → (-) seg A3

10^7 = c.500, 500 = 5×10^9

D1 λ titer (D = 518 c 892 → (-) 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	18	18
2.	0	19	19
3.	1	23	24
4.	0	19	19
5.	0	21	21
	(1)	100	101

101) 1.000 = 0.0099 ; 909 ; 910 = 0.99%

see pg 163 there recomb = 16.6%

this (+) confirmed nEMBgal

750 X 892 on EMB gal – no S added

	(+)	(–)	total
1.	0	19	19
2.	0	19	19
3	1	25	26
4.	0	27	27
5.	1?	22	23
	1 (2?)	112	114

114) 1.000 = 0.0087 ; 912 ; 880 = ~~0.87%~~

0/119 %

these not confirmed on ✓ – both (–)

518 transductions.

EMB gal	Addition		Pap. after 2 days	
1.	none		40	
2.	518t892-1 und.		solid smear	
3.	518t892-1 1-10		>10⁴	$2.1\times10^3\times10\times10^2 = \frac{2.1\times10^6 \text{ transductions/ml}}{1.8\times10^9\ \lambda\ /\text{ml}} = 1t/8.6\times10^2\lambda$
4.	" -1 1-100		1/16 = c.180 = 2080	
Exp. P 518t892 ↓ (–) by — 5.	D1	und.	Solid smear	
6.	"	1-10	" "	$6.4\times10^3\times10\times10^2 = \frac{6.4\times10^6 \text{ transd}}{9.6\times10^9\lambda} = 1t/1.5\times10^3\lambda$
7.	"	1-100	1/32 = c.200 = 6400 ← evidence of lysis – plaques around margin	
8	A1	und	9 (lysis?)	
used for ctl of (–) exp. → 9.	K-12 (11/20)	und.	1/16 = c.120 = 1920 no evidence of lysis + cultures	$\frac{1.9\times10^4 t}{2.3\times10^{10}\lambda} = 1t/1.2\times10^6\lambda$

2/5/53
Thursday

2175 transduction

	EMB gel	Addition		No. Pap. 2 days	1 day plate
1.		none		13	
2.		518C892-1	und	$>10^4$	
3.		"	1-10	$\frac{1}{16} = 85 = 1360$	
4.		"	1-100	$\frac{1}{2} = 138 = 276$	
	DI + 518C892				
5.		DI	und	19	
6.		"	1-10	9	
7.		"	1-100	19	
8.		A3	und	29	

$\frac{1.4\times10^3 \times 10 \times 10}{1.9\times10^9\,\lambda} t = \frac{1.4\times10^5}{1.9\times10^9} = 1\text{t}/1.3\times10^4\,\lambda$

$\frac{2.76\times10^3 \times 10 \times 10^2}{1.9\times10^9\,\lambda} t = \frac{2.76\times10^5}{1.9\times10^9} = 1\text{t}/7\times10^3$

apparently no effect — if DI is like B4 and like Thor's This ✓ with ability to be transd.

DI ~~not~~ tr. by 902 λ

Indicates DI is gel 1/19/53

2050 transduction

	EMB gel	Addition		No. Pap 2 days	
1.		none		22	
2.		518C892-1	und	$>10^4$	
3.		"	1-10	$\frac{1}{32} = 121 = 3872$	
4.		"	1-100	$\frac{1}{16} = 85 = 1360$	
5.		DI	und	solid smear	
6.		"	1-10	" "	
7.		"	1-100	$\frac{1}{16} = 93 = 1488$	

$\frac{3.8\times10^3 \times 10 \times 10}{1.9\times10^9\,\lambda} t = \frac{3.8\times10^5}{1.9\times10^9} = 1\text{t}/5\times10^3$

$\frac{1.4\times10^3 \times 10 \times 10^2}{1.9\times10^9} = \frac{1.4\times10^6}{1.9\times10^9} = 1\text{t}/1.3\times10^3$

$\frac{1.5\times10^3 \times 10 \times 10^2}{1.6\times10^9} = \frac{1.5\times10^6}{9.6\times10^9} = 1\text{t}/6.9\times10^3$

750 transduction

	EMB gel	Addition		No. Pap 2 days	
1.		none		1	
2.		518C892-1	und.	solid smear	
3		"	1-10	$>10^4$	
4.		"	1-100	$\frac{1}{32} = c.100 = 3200$	
5.		DI	und	solid smear	
6.		DI	1-10	$>10^4$	
7.		DI	1-100	$\frac{1}{32} = c.200$ 6400	

$\frac{3.2\times10^3 \times 10 \times 10^2}{1.9\times10^9} = \frac{3.2\times10^6}{1.9\times10^9} = 1\text{t}/5.9\times10^3$

$\frac{6.9\times10^3 \times 10 \times 10^2}{9.6\times10^9} = \frac{6.9\times10^6}{9.6\times10^9} = 1/1.5\times10^3$

Sunday 2/8

Crosses · 518 X 892 — mixed cell-strains — 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 = 3.8 % (+) 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 → (-) ag. = gal$_2$- by transd.

D1 X 902

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

4/4 strains after 3

422 / 18.00 = 0.0426 = 4.26 %
16 88
1120
944
2760

probably not valid 902 contains (+) cells

confirmed on EMS gal

D1 X 892

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

9 / 1.0 = 0.111 = 11.1 %
9
10
10

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

confirmed on EMS 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 — ~~m~~ 165 = Arg+. F

Monday 2/9/53

4" 9"

98

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

	Δ or R	/1985
1.	S	n. lys
2.	S	"
3.	S	"
4.	S	"
5.	S	"
6.	R	lys
7.	R	lys
8.	S	n. lys
9.	R	lys
10.	R	lys
11.	R	lys
12.	S	n. lys
13.	S	n. lys
14.	S	n. lys
15.	S	n. lys
16.	S	n. lys
17.	R	lys
18.	R	lys
19.	S	n. lys
20.	R	lys
21.	R	lys
22.	S	n. lys
23.	S	n. lys
24.	R	lys
25.	S	n. lys

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

14 S 4p^S = 13 4p^S gal-
11 lys 4p^R = 11 4p^R 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	120
3.	0.1 750 λ - 1	707

D4 transduction

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

518X892 pg 166 Linkage study not possible

(+) proto trophs picked all grew 40/40
some mixed culture

(–) proto trophs picked 8/40 grew — why?

518X892 EXPT F: Examination of (–) prototrophs from the cross for their transd. behavior

Proto. #	80 att	811 λ-4	2050 λ-1	Comment	Probable Locus	/λ-2	Lp Class. 1967
1	Gal + prototrophs –					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 (looks like 4)	29	39	Lp_2^R?	(?) –	S	lys –
10	2 (like 3⁻)	40	2		3	S	lys
11	117 (looks like 3⁻)	~~171~~ (527)	(171)		~~4⁻~~ 3	S	lys
12	47 (like 4?)	15	57	Lp_2^R? no	(?) – 4⁻	S	S
13	44 (looks 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 l + 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 of tiny pg.	3 see pg. 1706	S	lys
19	57 (like 4)	25	44	Lp_2^R? no	(?) –	S	S
20	3 (like 3⁻)	122	2		3	S	lys
21	1 (like 3⁻)	202	2		3	S	lys
22	30	21	44		(?) 4⁻?	S	S
23	c. 400 (large + small) (60)	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

Margin notes: no gal contains state. about appear. of plate-pg. appearance.
blue (2); blue (11, 13); 8/8 stable after 2 (11); 8/8 stable after 2; 3/8 unstable after 2; blue (18); blue (22); blue (23)

2/8 unstable after 2   8/8 stable after 2   8 clear cut 3⁻   all Lp^+

gal⁻ λ on gal₄⁻ has a tendency to lower the no. of spontaneous pg⁻. On this basis no's 2, 3, 4, 5, 8, 12, 13, 15, 16, 19, 22, 23, 25 could be 4⁻

8   3⁻
13   possibly 4⁻
4   unknown

Wednesday 2/11/53

Transduction - Spot Method

Trial 1 - Using K-12 12/20 λ

	no. pap.
518 - 0 add	0
+ K12 λ	61
811 - 0 add	0
+ K12 λ	15

Trial 2

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

B8 = 518 t 902 ⟶ (−) seg

14/14 spontaneous papillae stable thru 3 purification streaks —

(B8 t 750 unstable)

D1 = 518 t 892 ⟶ (−) seg   gal₂- by tr and dense test
~~not gal₂- by x 902~~ ok //
possibly gal₄ - by cross x 1486

7/10 ~~16/10~~ spontaneous papillae
unstable after 3 pickings

(D1 t 750) unstable

(D1 x 892 (+) prototrophs unstable still after 4)

D4 = 518 t 892 ⟶ (−) seg   ~~gal~~ as D1

13/13 spontaneous papillae stable thru + after 3 pickings

(D4 t 750 unstable)

Tuesday 2/17

750 X Y-10 & obtain gal,- prototroph:
c. 2(-)? / 300 prototrophs.

Lysates.

750-2 (2 bottles)
10^8 = 312, 296 = 3.0×10^{10}

811-5
10^8 = 49, 49 = 4.9×10^9

B8 - 518 t 902 (+) seg
10^8 = 699, 785 7.43×10^{10}

Expt. G : DI apart. 5th + (unstable) (+) segregants to observe their pattern of transduction.
Numbers 1-5

Cr H - 518 t 1012 (+) seg tested against 2-, 4-

04 t 750
10^7 dil = >1000 titer > 10^{10}

Friday 2/20/53

Expt. G. 01 = 510t 892 → (-) seg. By transducibility ~~[illegible]~~ = 2⁻
" donor = 2⁻
" X 902 ≠ 2 or this smae 902 cult. (+)

Dispose of mixed culture

01 spont. gal+ are unstable.

'5(-) seg from 01 - from seg segregation.

G-1, 2, 3, 4, 5,

Addition	No. pap. ~~G1~~ 8 days	~~G2~~	~~G3~~	~~G4~~	G5
1 none	58	12	25	75	10
2 750λ-1	½=38 304	½=69 552	¼=69 276	¼=91 364	⅛=49 392
3 702λ-2	54	16	32	32	28
4 2000λ-1	108	42	69	62	47
5 811λ-5	102 ✓✓	49 ✓	65	55 ✓	53
Prob. locus	2⁻	2⁻	2⁻	2⁻	2⁻

Streak of middle plate
1. 7/8 mixed 1(-) | 8/8 mixed | 8/8 mixed, 1 (+) | 5/6 mixed, 1(-)
2. 7/7 pure + | 4/8 mixed | 8/8 mixed | 5/5 (+)
3. | 6/8 mixed | 5/8 mixed |
stable | some of these may be slow | stable

G-2-3 1. 7/8 mix, 1(-)
2. [crossed out]
3. [crossed out]

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

G-1-9 1. 8/8 mixed
2. 7/7 mixed
3
indicates one cont. transd. by 4⁻

G-5-2 1. 4/8 mixed, 1(-)
2. 6/6 (+)
3
indicates no. 2⁻ transd.

Friday 2/20/53

Exp. H. = 578tK-12 → (-) seg from 21 separate transductions

No.	Add			Probably lives	
1.	27	43	1/4=36 144	4-	pure(+) on 1st streak -
2.	29	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 (appears seg.)
13.	36	29	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 (appears 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-	
21.	40	44	1/4= 50 208	4-	

All lysogenic prime λ reaction 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 occur on purification (selecting a (-) colony) and replating - plating out on EMB gal and picking spot + papillae no unstables found after 2 - No of sp.th/pop about 30-40/plate

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

18/18

Test some of them for λ + for allele test

Friday. 2/20/53

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

2062 – isolation of double mutants.
colonies in

und
1-10
1-20

} suitable for replication to D(0)5 pr.

510 x 882 (marked) prototroph #18 gal– – alkaline rx on EMB gal; B(c)
suspicious that it is 3⁻4⁻?

After 3 days EMB gal

2 no add – c. 100 pap mostly small
2. 750λ-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

Thursday 2/26/53 — mixed culture

578 X 892 B_1 added to X plates

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

Confirmed on EMB gal

0.042
47) 2.0000
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

0.0426
211) 9.00
844
560
422
1380

Error 4.32

SOME OF THESE PROTO-
✓ ON PG 173 FOR
λ, λ_{12}

578 X 902

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

0.0038
1289) 5.000
3867
11330
10312

= 0.38 %

confirmed in EMB gal – stable after 2 s.c. isol.

811 X 902

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

(Estimated < 0.14 %)

0.0014
707) 1.000
707
2930

Friday 2/27/53 — mixed culture

2068 pr. A⁻ X 892
EMB gal

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

102) 5.00 = 0.049 = (4.9%)
408
920

NO ~~Indicates 2068 gal₃⁻ distinct from 892 gal₃⁻~~ what gal⁻

gal₄⁻ x gal₃⁻

/ streakings on crosses

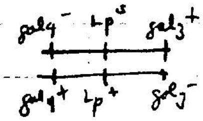
D1 X 902, D4 X 902 } repeat crosses to see if initial results (contradictory in that (D1, D4) were gal₂⁻ by donor + recip. transd. tests) was caused by + cont. in 902

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 gal₂⁻ gal₃⁻ as suggested in last cross

811 pure (−) on EMB gal

2/28/53 Sat. — mixed culture



578 X 892 Prototrophs-cross on pg 171.

Proto	gal rx	/λ	/λ-2	/1485	Probable
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	—	~~s~~ r	s	~~n.l.~~ lys	
14	—	s	s	n. lys	· 4
15	—	r	s	~~n.~~ lys	
16	—	r	s	~~n.~~ lys	
17	—	r	s	~~n.~~ lys	
18	—	r	s	~~n.~~ 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	

(margin note beside 1 and 2: one of these possibly unstable)

Probable on limit lys gal-

D1 X 892 – unstable + prototroph.
still seg (–) on EMB gal after 5 s.c. isolations.
homogeneous (–) on {EMB / Lac}

---

578 X 892 – above (+) possible unstable
s.c. 1. mixed (+), (–)
2. mixed (+), (–)

Sunday 3/1/53

1655 X 1177 on EMS gal to obtain gals - 4pr[S]
25 gal - tested against t2 - all 4pr[R]

~~~

811 X 902 on EMB gal - purity of parent 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%

0.0011
907 / 1.000
907
930

~~~

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
	0	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 gal - res.

D1 from dextran = mutant ?

Thursday 3/6/53

Crosses with 902 B7, B8, D1, D4, 811 all checked on EM13 gel all found (-)

811 X 902

EM13 gel	(+)	(-)	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 EM13 gel

total to here

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

1365 / 1.0000 = 0.00073 = 0.073%
7655
4450

578 5/1589 = 0.38%

6/2654

Rechecks on crosses with 902 - 902 gave gel -

D1 X 902

EM5 gel	(+)	(-)	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