Lwoff Effect.

January 1, 1951.

A = K12
B = 1485.

Young cultures from YZ. Irradiate 2 ml samples in 10 cm plates.

1. Pre-irradiation control.
2. After 120 seconds uv.
3. After 80 minutes incubation in YZ.

Inoc 1:10 in YZ
No lysis observed.

A	1	ca 2×10^9 cells.	10^{-7} λ. (1 plaque)	B1	ca 2×10^9 cell
	2	ca 3×10^6 cells	10^7 λ (1 plaque)	2	ca 3×10^7 cells
	3	2×10^5 cells	No λ at 10^{-7}	3	

Although K-12 liquid survival appears diminished, no marked lysis or release of λ was detected. Aeration may be minimal, or medium may be unsuitable.

≡ Inconclusive ≡

Test for release of λ on EMB agar
Dilute fresh K12 10^{-5}, spread .1 ml on EMB Lac.
Irradiate uv 50 cm. 0, 5 sec, 10, 20, 30, 40, 60, 120., dupl. plates.
A) set add drop W578 immediately + spread.
B) " incubate _____. spread W578.

Count K-12 as papillae
λ as plaques.

	λ	0	K12	10	20	40	60	180	secs.
A.	11	ca 1000	202	≮1000	322 351	421 ~~342~~ 109	198	14± 0	5
B	21	"	255	≮1000	342 392	ca " do.	118	7± 0	7

January 3, 1951.

Compare sensitivity of λ+ and λ^s strains: All loses 30 secs.
Dilute to 2×10^{-7} each. Mix 1:1.

A K12
B 1485
C 518.

Immediate mixtures

	UV 0		UV 30s.		
	Lac+	−	+	−	
A+C	109	109	10	61	
A+B	186		30		$5\lambda^{(+)}R$ $15\lambda^{s}$.
B+C.	135	108	29	49	

K12 and W1485 are both more sensitive to UV than W518.
Test A+B UV for proportion of λ^s.

Repeat 801. K12 40 sec. 2×10^{-7}

	λ	UV 0 K	λ UV	40. K.
K12	1	204	54	10±
delay 90 mins before spreading	2	271	58	12±

90 minutes on agar not long enough for burst!

Conditions of uv·λ burst.

January 4, 1951.

Effect of old culture; D(Lac); on uv λ effect.

A. = K12 36 hour culture in YZ — Dilute to ~~2~~ x 10^{-7}

B = " overnight " " D(Lac). — 2×10^{-7}.

B: Immediate plating with W518

	K	λ (mm K)
	126	5
20 sec uv	96	43
40 "	17	45

	K	λ
uv 0. 12^{00}	100	2
uv 30 (smeared) 12^{00}	18	70±
uv 30 no 518	146. 16 24 17	
uv 30 2^{30}	179.	

Increase in λ? Uncertain.

Should use ~~you~~ young cells in YZ + assay super. from time to time.

Crossing sun-inactivated cells.

Jan. 8, 1951.

W1269 grown overnight (+) in 50 ml YZ. 12 40 PM Add sun to 9 ml samples of broth culture and incubate at 37.C. Expose 2 hours. To estimate survival: standard loopful:

a. loopful. = L.

b. L/1ml. L.

c. L/1ml : L/10ml : L.

Wash cells 2x. Add 1ml to pellets of 1269; 2ml to pellet of W1177. Mix W1177 .4ml with 1ml 1269. Plate .1ml samples on EMS Lac. Also streak out mixtures on EMS Lac.

1000 units give only ca 1-10% survival! Results indeterminate except that sun has poor killing power under these conditions!

Prototrophs seen in each series.

Standard heterozygotes.

January 3, 1951.

W1490 x W660. on EMS Lac.

1st Run: 28 colonies pulsed. (Poor differentiation on EMS MH Many mucoid).

A) ~~12, X, 13, MH v~~

~~6 ace MH –~~

~~18, 20 v. pu[illegible] MH – Very flat on EMS Lac.~~

~~others MH +~~

~~λ in 19?~~

B) MH EMS poor differentiation.

Lac: 38 tests: 8 likely Lac v. 25, 33, 35, 24, 32, 13, 11, 12

Reisolate on EMS Lac.

MH: 100 tests (not necessarily +!)

1-12 9 MH – #5 v?

13-100 47 – #26, 33, 47, 66, 71, 72, 77, 85, 87, 98.

(12 on Xyl rather than MH).

	MH	Lac	Xyl.	
1	–	+	–	
2	–	+	+	
3	v	v	v?	–
4	– +	– +	– +	
5	–	–	–	
6	+ λ?	–	+	
7	–	–	v	–
8	+	+	+	
9	~~M~~ –	+	+	
10	v ~~y~~	v?	v	–
11	~~M~~ + λ?	–	?	

C 1490 x 660 100 isolates from EMS MH. Poor differentiation! 17 MH+ 6 MH v? Remainder –

D 478 x 660 Differentiation v. poor. on MH or Lac!

Colonies tested on EMB, EMS MH before streaking. 27/50. MH+. Of these: 7 MH v.

49/100. +

[illegible]

803 K

33'

	1	58	20	71 - 28
	2	59	21	72 - 29
	3	60	22	76 - 30
	4	61	23	77 - 31
1	5	62	24	79 - 32
10	6	64	25	80 - 33
23	7	66	26	
26	8	70	27	
28	9	80	28 - 34	
29	10	86	29 - 35	
30	11	87	30 - 36	
39	12	91	- 37	
41	13	92	- 38	
42	14	93	- 39	
48	15	94	- 40	
51	16	95	- 41	
52	17	96	- 42	
53	18	97	- 43	
54	19	98	- 44	

810

45

iii . OK!

and structured m

me. nay se Mtl + Le

39

59 60

80

3	1
6	2
19	3
21	4
22	5
23	6
24	7
26	8
32	9
33	10
35	11
37	12
38	13
44	14
45	

811

esp

9	91	92	93	94	95	96	97	98	
10	101	102	105	107	109	110			
11	112	115	118	120					
12	121	122	123	128					
13	140								

See 810
J

See 811
K

Heterozygotes :

January 3, 1951

1/6/51.

A	1435 ×	1446
B		1449
C		1451

Lac−	Lac+
22, 35, 27	0, 3, 1
5, 10	1, 0.
11, 10, 7, 5	3, 6, 0, 3
1,	1
0, 1, 0, 0	2, 4, 4, 1

Pick + streak Lac+ on EMB, S, Lac.

A). 5 ~~tests~~ tests. #2 v. ?

B) 12 tests. No v. Some Lac+ are λ^s.

C) #2, 10, 11.

Restreak from D(0) to EMS, EMB Lac.

Lost on faulty EMS!

1/29/51. Repeat A, C.

A: ca 1% +. 100/plate.
4 Lac+
But #4 apparently Mal v
(mostly Mal−, one clear ✱)

→ This colony → ?? Mal v. Lac+ MTL+
From EMS, only pure +. Retest.

C. Mostly +. Lac v : ? 2, 5 3.
130 Lac+ tested Restreak
a, C1, C2

	MTL	Mal	Lac
1	−	−	
2	+	+	

not diploid

Differential uv sensitivity — λ

W811 x W1274.

January 7, 1950.

			Gal+ = λ⁻	Gal− = λ⁺	Adj. Ratio λ⁻	Adj. Ratio λ⁺
A	Control	(.05)	45	80	1.	1.
	uv	(.1)	116	155		
B	10	(.05)	48	53	.9	.64
		(.1)	105	99		
	20		80, 84	72, 68	.71	.45
	30		73, 57	34, 57	[illegible]	[illegible]
	40		67, 56	24, 19	[illegible]	[illegible]
	60		22, 13	0, 2	[illegible]	[illegible]
	80.		1, 2	0, 0	[illegible]	0

Young cultures of W811 and W1274 grown in Penassay, diluted ca 10^{-6}; mixed; .1 ml spread on EMB-Gal. Expose plates to uv lamp.

Effect maximal at 40-60 sec. exposure. Effect may not be so pronounced on EMB agar. Cf. nutrient broth.

uv – λ^+ and λ^s heterozygotes.

Dilute H226, H232 to 10^{-7}, spread .1 ml on EMBLac, irradiate plates (50 cm.).

H226.

	✓	–
0	41	58
10	5	59
20	0	14
30	0	3
40	0	1

H232

	✓	+	–
0	58	1	4
10 s	70		20
20	50		12
30	19	1	8
40 s.	17	1	9

λ + seems to be more sensitive than λ^s. However, similar, but less dramatic haploidization effect noted. These effects may be residual, and the experiment should be supplemented by comparison of H232 and reinfected H232. See 808

Reinfection of λ^s diploid

1/16/51. ff.

H232. (= W518 λ^R × W588) cross streaked with λ on D(0) & EMS lac.
Single colonies picked and tested against λ on EMS lac.
Ca 12/25 were / λ. Restreak thereon EMB, EMS lac, saving latter.
Single EMB colonies restreaked on EMB lac; tested against λ^s (W1321) on EMB-0.

	lac	λ	(518) λ
1	V	R	+
2	V - plaqued.	R?	plaqued
3	V	R	+
4	V	R	+
5	V very stable!	R	+
6	V	R	− or ±
7	V very stable	R	+
8	?+ V	R	+
9	+	R	+
10	V	R	+
11	?	R	+
12.	V	R	+

In fact streaking may be ~~that~~ segregating? λ^s and λ^+.

all λ+. No sign of λ^s segregants.

(K-12)

From uv experiment, 801 one rather clear plaque noted, distinguishable from λ on W518. Isolate single plaques.
Attempt to induce lysogenicity. Many autolytic colonies.
Streak one of these out: Test non-autolytic colonies on ~~W518~~ 1371.
~~In this streak of W578λ'~~ numerous clear plaques. Basis?

30 tests. 7 autolytic 32 non-lysogenic 1 lysogenic.

Restreak as W 1516 lost

λ' OK.

Analysis of 803 J

Stream D(MH) or D(Lac)		EMB MH	EMB Lac	EMB Mal	EMB Xyl	EMS MH		Rechute single cols. ← single col to EMS MH
M	1	V	V	—	V			
M	2	V	V	—	+v V			
M	3	V	—	—	V			
M	4	V	V	—	V			
M	5	V	V	+v +	+v +			
M	~~6~~	~~+~~		~~+~~	~~+~~			
M	7	V	—	—	~~+~~ V			
M	8	V	—	—	V			
M	9	V	V	—	V			
M	10	+v V	V	—	—			
	~~11~~	~~+v +~~	~~—~~	~~+v +~~	~~+v +~~ mucoid			
M	12	V	—	—	V			
M	13	V	V	—	— V v?			
M	14	V	V	—	— V	+ — →	MH-Lac+ MH+Lac v.	++ —
M	15	V	V	+mot +	+V +			
M	16	V	V	—	—V			
M	17	V	V	—	V			
M	~~18~~	~~+ ? +~~	~~+~~	~~+ ? +~~	~~+~~			
M	19	v ? V	—	—	+ ?			
M	~~20~~	~~+~~	~~+~~		~~—~~			
L	21	V	V	—	V	+ —	MH+Lac v MH-Lac —	all +
M	22	V	+-v? v	—	V		Lac v are MH v ; Lac — MH+ or — ∴ subseq pair seg.	
L	23	V	V	—	V			
L	24	? +v	V	v ? +	V			
M	25	V	—	—	V	+ —	MH+Xyl v MH Xyl —	++, —
L	26	V	+	+mot +	+			
L	27	V	v+	V —	V			
M	28	V	—	+mot +	+v			
	~~29~~	~~+~~	~~+~~	~~+~~	~~+~~			
L	30	V	V	—	V			
L	31	V	V	+v +	+v +			
L	32	V	V	—	V			
L	33	V	V	—	V			
M	34	V	—	—	—V			
L	35	V	V	—	V!			
L	36	V	V	—	— , +			
L	37	V	V	—	V			
L	38	V	V	+v +	+v +			
	39	—v V	—	—	—v V			
M	11 ~~40~~	V	V	—	—v V	+ —		++
M	20 ~~41~~	V	V	—	V	+ —	MH + Lac v MH — Lac —, + Replate original	+, —
	29 ~~42~~	V	V	—	V			
M	30 ~~43~~	V	—	—	V	+ —	MH —: Xyl — MH+ Xyl v	++, —
	~~44~~	~~+~~	~~+~~	~~+~~	~~+~~			

No evidence of segregation

all others pure +.

Test — for v mother seg.

{ MH — Lac —
MH + Lac v

810 B - refers to Lac + reversions

810 C - refers to Mal+ reversions

2/15 ff.

Tests on Lac reversions of J Lac – diploids. From papillae on EMS Lac. Essentially all from separate colonies.

Lac

(6, 7, 8, 12, 19, 20, 28, 34, 39).

	Repur.	Pure	Lac	Mtl
6: Reisolate	4	0	; ; ; ;	
7: "	4	0	~~; ; + v~~	; ; ; ;
8: 2 ✓ 2 "	2	2	v v v v	v v v v
12	2	2	v ; v v	v ; v v
19	2	2	v ; v +	v – v –
25	1	3	; ; + v	; ; + v
28	0	4	; + + v	– – – v
34	3	1	v v v v	v v v v
39	2	2	+ ; – +	– – – –
			; ; v v	– + v v

; indeterm. owing to impurity

Mal

		Mtl	Mal
1	1	–	+
	1	–	+
	2	–	+
	2	–	+
	3	+	+
	4	–	+
	4	–	+
	4	–	+
	6	–	+
	10	v +v	+ m +v (1)
11	12	–	+
	12	–	+
	11	–	+
	14	–	+
	14	–	v ? or –
	14	–	v ? or –
	14	–	+
	19	v +v	+ mot +v (2)
	19	v v	+ " +v (3)
	19	v +v	+ " +v (4)
21	20	–	+ , –
	20	–	+
	20	–	+ , –
	20	–	–
	30	–	+
	30	–	–
	30	–	+
	30	–	+
	35	–	+
	35	–	+

		Mtl	Mal
31	36	v v	+ m +v (5)
	36	–	+
	37	+	+
	37	+	+
	32	–	+
	33	v v	v ? +v (6)
	33	v v	v ? + (7)
	39	–	+
	~~39~~		

Most threads already segregated, unfortunately.

Lac v preliminary reading on appearance of colony. Should be confirmed.

2/#17/51. Restreak single EMS Lac colonies to EMB Lac; Mtl for verification of Lac v

EMS Mal spots to EMB Mal to verify Mal +

Restreak all Mtl v on Maltose or Lac from single EMS colonies.

2/18/51.

Lac. Filtrates from 810 a., single colonies from EMS Lac.
Tests showing Lac = → Lac +

	Lac	Mtl	
6	– – – –	– – – –	
7	– – – –	v v v v	
8	v + v v		3
12	– + v +	– – v –	1
19	v – + v	v v + v	2
25	v	v	1
28	v v v v	v v v v	4
39	+ v +	+ v –	1

Lac v designations based upon presence of v and – colonies from single EMS +.

EMS plates faded (owing to storage during Chicago trip), and therefore some were "mispicked".

Test Lac+ for pail s.g. Lac.

Revisions. (Mal

810C

2/28/51 ff.

M+.

1-13	39.
14-15	12
16-21	1
21-31	35
32	10
33	8
34-37	3
38-39	7
40-42	34
43-51	25
52-60	6

Check stock cultures from D'(MH) to EMB MH.

Lac −:

(3): Lac v Mal v ✓
6 OK
7 ca 1/2 Mal v 1/2
8 OK.
12 OK
19 Mostly MH+, some v
25 " " +
28
34 OK
39 OK

	Lac	Mal
1	−	+
2	−	+ − no v
3	−	+
4	−	+
5	−	|
6	−	|
7	−	|
8	−	
9	−	|
10	−	|
11	−	|
12	−	|
13	−	+
14	−	+
15	−	+
16	−	+
17	−	+
18	−	+
19	−	+
20	−	+
21	−	|
22	+	|
23	+	|
24	+	|
25	+	|
26	+	|
27	+	|
28	+	
29	+	|
30	+	|

	Lac	Mal
31	+	|
32	+	
33	−	|
4	−	|
5	−	|
6	−	
7	−	+
8	−	+
9	−	0
40	−	+
	−	|
	−	|
	−	|
	−	
	−	|
	−	|
	−	|
	−	
50	−	|
	−	|
	−	|
	−	|
	−	|
	−	|
	−	|
	−	
	−	|
	−	|
60	−	|

Completely n.g. owing to segregation! Note pattern of 22-32!

810
J

See 823

all Mannitol v.

		Lac	T6	Mal	Xyl	Sm	Type	Repeat T6 on further growth	Tests for homozyosity Lac = (810B)	Mal −/ (810C)
1		− v	SR°	−	v	S	A	R		·
2		v	SR	−	v	S	A	R		·
3	H283	v	SR°	−	v	S	A	R	· Lac v !	·
4		v	SR	−	v	S	A	R		·
5	v or +v	v	SR	+	+ *	R	C	R		
6		−	S	−	v	S	B	R	· ||| 18.	·
7		−	S v	−	v	S	B	S	· ||||	·
8	H282	−	S	−	v	S	B	R	|||| |||	·
9		v	SR	−	v	S	A	R		·
10		v	SR	−	−	S	E	R		/
11		v	v	−	v	S	A	R		·
12		−	S	−	v	S	B	R	||	·
13		v	v	−	v	S	A	R		·
14		v	v	−	v	S	A	R		·
15	v or +v	v	v	+	+ *	R	C	R		
16		v	v	−	v	S	A	SR		·
17		v	v	−	v	S	A	R		·
18		?	R			R	F	R		·
19		−	S	−	v + *	S	B	S	|| |||	|||
20		v	v	−	v	S	A	R		·
21		v	v	−	v	S	A	R		·
22		v	v	−	v	S	A	R		·
23		v	v	−	v	S	A	R		·
24		v	v	+	v	R	I	R		
25		−	v	−	v	S	G	R	/	·
26		+	R	+	+ *	R	J	R		
27		v	v	+	v + *	S	H	R		
28		−	v	+	+ v *	R	D	R	||||	
29		v	v	−	v	S	A	R		·
30		v	?*	−	v	S	A	R		·
31		v	v	+	+	S	H	R		
32		v	v	−	v	S	A	R		·
33		v	v	−	v	S	A	R		||
34		−	S	−	v	S	B	R	·	·
35		v	R	−	v	S	J	R		·
36		v	v	−	−	S	E	R		/
37		v	v	−	v	S	A	R		·
38		v	v	+	+	R	C	R		
39	H284	−	v v	−	v	S	G	R	|||| ||| ·	·

see 823

1 Lac v Mtl v Rev.
· Lac + Mtl − (or +)".

* V_6^R on EMS
V_6^{RS} on EMB.
SR = V
V° might be V_6^S in mandate lysis.

Analysis of 803K

D(Lac)		Lac	Mtl	Mal	Xyl	Lac EMS
	1	+	−	−		
1 * ✓	2	v	v	−		
	3	+, −	−	−		
2 * ✓	4	v	v	−		
	5	+	v? −	−		
	6	+	−	−		
3 * ✓	7	v	v?	−		
	8	+	−	−		
4 *	9	v	−	−		− only found.
5 *	10	v?	−, v?	−		Lac + and −
	11	−, +	−	−		
	12	−, +	+	+		
	13	−, +	−	−		
	14	+	+	+		
6 *	15	v	−	−		+
7 *	16	v	v	−		+
8 *	17	v	−	−		+
9 *	18	v	−	−		+, −
10 * ✓	19	v	v	−		

Mal & Lac −

811
K

	Lac v	Mal	Mtl	Xyl	Sm
1	+	—	v	+	s
2	✓	—	v	v	s
3	+	—	v	—	s
4					
5	+	—	v	—	s
6	v	—	—	—	s
7	+	—	v	+	s
8	v	—	—	—	s
9	+	—	—	+, —	s
10	v	—	v	v	s

2/4/51.

A. W1490 × W660 on EMS Mal; EMS Lac (for sec.)

B. W1490 × W1177 on EMS Mal (for S^R allelism)

C W1435 × W1446 } See 804.
D " × W1451 }

A. About 1% or less are sectored on EMS Mal or Lac.

1-4 Mal
5-8 Lac

see A8PA sm } Test Mal+ on SM. 2/21 doubtful S^S. Restreak for Mal v.
3/20 all S^S on EMS; #3 and #7 S^R on EMB. These are
4/20 others Mal++ mixture of Mal+ and Mal- on EMB. Restreak on EMS Mal
ca 812AB:1,2

B Pick Mal+ and brush on sm. 12 tests: 3 sensitive!
∴ not allelic?? Purify & streak out; test parents! all 3 are Mal −

D 58 tests: no diploids found. (#38?, 24

C Most colonies appear Lac − for first two days on EMS plate, then turn +. 62 tests: #7 only diploid. #16?.

	Mal	Lac (Isolate to D(Lac))	Mtl
C1	+	+, v? ✓	+
C2	+	+	+
D1	+	+, − v? ⊗	+
D2	−	+ (slow)	+

A 1-99 tested: 7 likely Lac v. Restreak on EMB Lac

Duplex prototrophs. 812A.

2/~~8~~4/51.

Incubator difficulties made scoring on EMB very doubtful

	LacEMS	MalEMS	LacEMB	MalEMB	MtlEMB	XylEMB	+	−	see if any
1		+, −, v?	++, −	+ −	+	+ −	Mal+, Mal−, ~~Lac+~~	Mal+ and −	
2		++, −, λ?	++, −	+ −	+	+	Mal+ Lac+	Mal− lac−	
3		+, − v?	−	+ −	− +	+ −	Mal+, Lac−	−	+ +
4		+, − v? muc?	−	+ −	+	+	Mal+ Lac−	Mal−	
5	+ −	+, −	+ −		+, −	−	Lac−	Lac+ Mal−	+, − (v?)
6	(+) −	+, −	+ −			+	Lac−	Lac+ Mal−	
7	++	−	++			−	Lac−	Lac+, +,	+, − v?
8	++, −, v?		+, − v?	++	+?		Mal+		

Repute from EMS.

No diploids represented.

812 A sm

Test Mal+ prototrophs from W1490 & W660 for $S^{r/s}$. Retest S^S Mal+ as possible Mal^v.

61 tests: 9 S^S. 2 of these S^R on EMB. Retest as 812A sm 1-2.

160 tests. 22 apparent Mal+ S^S.

Retest: 3 are S^R
19 S^S Mal+. But concordant on EMS, EMB Mal.

Retest by streaking out on EMB Mal

Of these 22,
#7: "mostly +" ; #14 "+ and v?" → not v.

See 817

2/2/51.

Hemolytic colonies from W-1 irradiated on blood agar.
9 colonies picked as hemolytic. Streak out; test for λ from single colonies.

	Hem	λ
1a	+	− R
b	+	+
2a+b	+	+
3	+	+
4	±	+
5	−	+
6	−	+
7	+	+
8	+	+
9	−	+

Peculiar appearance on EMB Lac.

Restreak, single colonies of 1a, b. 2. on EMB lac; Hem; ....
remainder on blood agar.
1b is mixed in morphology. Some colonies flat; others mixed.

Results. 1a: each of 10 colonies hemolytic, λ^{-R}.
1b.: flat λ^{-R} hemolytic.
normal λ^+ " ", possibly less so.

Pick 1a to slant as W-1529 ~~2 as W-1530~~

2nd run:

	Hem.		Lac EMB
1	strongly hemolytic	not coli.	n.f.
2	"		flat mucoid
3	"		" non "
4	v. sl.		normal colony
5	"		" and discolored colonies
6	"		" " " "

None λ^s

Restreak 2 and 3.
Test against λ.

Hemolysis evidently not necessarily correlated with λ reaction

February 12, 1951.

C 1435 × 1446
E " × 1449

C	21	no v	(lac)
E	150	"	"

2/16/51

W478 Mal- mutants: Test for Mal$_1$ allelism

(x W1177). Reisolate from vials: check for purity and mutability.

		Papillation	Prototrophs (2 plates) Mal+:
1	W 960	±	2/300?
2	961	+	3/200
3	965	±	0/200
A 4	966	+ gummy	0/100
5	968	+	×
6	969	+	×
7	970	+	×
8	971	±	1 - col
9	972	−	0/100

2/19/51 Repeat where doubtful:

1	W 965	0/60	1/100	3+ /100	1/100.	Mal+ ✓	all S^S	EMS and EMB
2	966	0/50	0/50	0/100				
B 3	970	0/10	0/3	1/5		+ or ~~+~~ ✓	S^R	
4	971	2-, 0, 0						
5	972	0/150,	0/50	1?/100	0/200	+ or ~~+~~ ✓	bac - S^R	EMS + EMB. Mal+ not v.

Repeats possible to verify.

W966 is most likely Mal$_1$ -. W971 is infertile.

Recheck # for Mal v (tr closely linked allele!)

2/21/51 EMS Mal.

C 1. W966 x W660 No+ 2? in 12 plates x 250 cols. = 1800 tests.

2. W972 x W1177 Pick+, streak out on EMB Mal for Mal v

Spot on EMS Mal.

C 2:

+	−
9	99
10	140
7	79
2	69
9	97

C1. 2 colonies are clear Mal+ (not Mal v)

C2. 100 picked : all Mal~~++~~ ~~(no Mal v)~~ (no Mal v)

See 815'

2/26/51

W1177x on EMS Mal for Mal v.

A W960
B W965
C W966
D W972

①. No special treatment ②. Expose uni plates to UV 50cm. 10secs.

A. 1 2 x 200 3 Mal+?
2 6 x 300 15 "

B 1 3 x 200 6 "
2 4 x 300 12 "

all Mal+ no Mal v! Scoring on EMS Mal very difficult

C 1 3 x 200 } 1200 No Mal+ seen.
C 2 4 x 150 }

D1 2 x 300 No Mal+ seen. Scoring?
Pick to Mal EMB: 60, all Mal −.

Contradictory results?

Repeat D1. Ca. 1% Mal+ found. ∴ W972 is not allelic, but close. Scoring of these Mal+ among preponderance of Mal is not satisfactory. However, W1532 (from W466 Mal, −) should serve the same purpose, (if it is truly allelic to Mal,).

Suppressor: Lac_3 Lac_1

February 12, 1951.

W1531 $\frac{A}{B}$ × W1490 on EMS Lac. Look for Lac − to verify persistence of Lac_1 −.

A ca 600 all Lac+.

B. ca. 700 prototrophs, all Lac+.

Do $SLac_3$+ an allele of Lac_1?
If so, it should be detectable among Lac_1 − revertants.
Check for a) × Lac_3 −
b) Constitutive lactase

10 recombinants from A seemed to have constitutive lactase! (from DNZ Glu plates; spot test)
Recheck from synthetic D(o).:

K-12 Prototrophs
1531 A + B
W1490
} are Cst −

W1301 Cst +.
∴ none of these Lac+ suppressors are Cst + like SL_3 previously examined!

See 822

2/10/51

Are : 812B, where $S^R \times S^R \rightarrow S^S$.

Recheck parent stocks.

A. W1490 single clones 105 tests : all S^R

B. W1177 " " 100 tests : all S^R

C. Cross again. 160 tests all S^R

812B might represent a mixup with A.

W1490 + W660 ctd.

2/13/51
Cross "A" is W1490 x W660

A. Lac EMS 100 + streaked out; 33 retained for recheck.

B Mal EMS 100 Mal+ picked + streaked out. Recheck: 50, 53, 98, 100.

2/20/51. 30 added: all +
2/21/51 16 " " "

	Mtl	Mal	Lac
1	+	+, − ?	+, − v?
2	−	++ − ?	+
3	+	++ − λ?	+
4	+	+ − v?	+

} : No Mal v. Repeat Cross:

λ in 2? on Mal

Recheck from single EMS colonies

C (= 812 A sen). from EMS Mal single + cols

1 Mal++
2 "

B

1 "
2 "
3 "
4 "

} no Mal v found > 100 tests

A.

	Lac	Mtl	~~Mal~~ Xyl	Mal
1	v	−	v	−
2	v	v+?	~~+~~	−
3	v	v	v	−
4	v	v	v	−
5	− v v	~~v~~?	~~v~~ v	− + (trim)
? 6	+ v	v(+?)	+ v	+ v
? 7	+ v	v	v	−
8	v	v	v	−
9	v	−	−	−
10	v	+	+	−
11	v	+	+	−
12	v	+ v	v	+
13	v?	+ v	+ v	+ v
14	v? v	v v	v +	−
~~15~~	~~− +~~	~~− +~~	~~− +~~	~~−~~
16	+ v	− v	−	−
17	v	v	+ v	−
~~18~~	~~+~~	~~−~~	~~−~~	~~−~~
19	v?	+	+	+
20	− v	− v	− v	−

	Lac	Mtl	Xyl	Mal
21	v	+ v	+ (v?)	+
22	v	−	+	+
23	v	−	−	−
~~24~~	~~+~~	~~−~~	~~−~~	~~−~~
25	v	v	v +	~~+~~ −
26	v+?	v	− v	~~+~~ −
27	v	v	v	−
28	v	+ v	+	−
29	+ v	+ v	−	−
30	v	v	v	−
~~31~~	~~+~~	~~+~~	~~+~~	~~+~~
32	v	−	−	−
~~33~~	~~+~~	~~− +~~	~~− +~~	~~− +~~

5 : 4 Lac v are Xyl v
14 : 8 Lac v are Mtl v, Xyl v

Diploid : Reverse cross ; Mal

819

2/18/51

W1532 (BM ~~Lac~~ Mal,- het) × Y53 (TLB, Lac,-)

on EMS Lac
(and Mal for +:- ratio).

Mal: + 103 − 17 (Reversed ratio, as expected).

Lac. : 100 picked as "v+" and streaked out on EMB Lac, spot on EMS Lac
About 57 of these scored as probable Lac v. Restreaks on EMB Mal, EMS Lac to detect a) possible Mal v, b) Mal-Lac v for hemizygosity test, and to purify for further study.

(814a)
Conclusion : In reverse cross (from BM × TLB, Mal-) the Mal- is also hemizygous, [illegible] to the [illegible] that m, e.g., 8[illegible] the Mal- are also hemizygous.

Query : is Lac- also hemizygous in reverse cross?
~~W1532~~ W466 × W660 Lac+ on EMS Mtl.
(W478 Lac-)

See 829.

819a

	Lac V	Mal-	Lac V ✓
1	2	—	+
2	3	+	+
3	4	+	
4	5	+	++
[illegible]	6	+	
6	7	+	
7	8	+	#
8	10	+	#
9	12	—	
10	1[illegible]	+	
11	14	—	
12	17	+ ✓	
13	18	+	
14	19	+	
15	20	+	
16	21	+	
17	22	+	
18	23	+	
19	24	+	
20	[illegible]	—	
21	26	—	
22	27	—	
23	28	+	
24	29	+	
25	30	— +	
26	31	+	
27	32	+	
28	34	—	
29	35	+	
30	39	—	
31	41	+	
32	42	—	
33	45	—	
34	46	+	
[illegible]	49	— +	
36	50	+	
37	52	+	
38	53	+	
39	54	+	
40	56	+	
41	57	+	
42	58	—	
43	69	+	
44	72	+	
45	73	+	
46	74	+	
47	76	+	
48	78	—	
49	79	+	
50	80	—	

51	83	+ ✓
[illegible]	84	+
[illegible]	86	−
54	87	+
[illegible]	90	+
56	9[illegible]	+
[illegible]	9[illegible]	+

Note: 15 ~~16~~ Mal −
41 Mal +.

a) Recheck Mal v possibilities) from EMS Lac Bunches
b) Recheck Lac v / Mal −.

Mal Revusions test for hemi zygosity

		Lac v ✓	Mal EMB		
1	1	✓	−	1 Lv M+	
2	~~10~~ 9	✓	−	(1M+L+)	2 Lv M+
3	11	—	−		
4	20	✓	−		
5	21	✓	−		
6	22	✓	−		
7	25	✓	−	(1)	1 Lv M+
8	30	✓	−		3 Lv M+
9	32	✓	−		2 Lv M+
10	~~35~~ 33	+	−		
11	~~42~~ 35	✓	−	1M+Lv.	(3)
12	~~48~~ 42	✓	−	1M+Lv	
13	~~53~~ 48	✓	+		
14	~~(13)~~ 53	+ ✓ ?			
n.gr. ~~[illegible]~~					
~~16~~					

Total 11 Mal Revusions still diploid: each Mal++ (not Mal v)

Recheck 819-78! Mal − Lac probably misprinted.
But do not pursue!

15	12	Mal++
16	52	Mal++

Those which ✓ above are available for further work as Lac v Mal − Revusions on Mal tested:

Save 819-b8 as Lac v Mal −
and 819-15 as Lac v Mal +

Irradiation of λ+ and λs diploids

February 20, 1951.

A) H232 B) H278.

Dilute 10^{-6}. Irradiate at 50 cm. Plate .4 ml on EMB Lac, EMS Lac.

0, 20, 40 sec.

For 60 sec, dilute 10^{-4}, plate .1 ml.

	uv	Lac +	−	v		Gal +	−	v	Σ
A:	0	2	7	65		2	7	55	64
		4	8	70					
		7	4	59					
UBLac	20	3	inc-v 17 ~~6~~	6		1 (14-v)	8	3	18
		24	3						
	40	3?	6	~~0~~1		3	-v 6	0	9
		1?	10						
	60 (100x)	35	49	4		14	101	inc-v 46	161
		48	134	13					
		121	25	16					
B	0	1	18	189		1	11	129	141
		3?	21	146					
			22	112					
		170	0						
	20	1	70	18		6	34	57	97
		5	83	22					
		66	3						
	40	2	23	11		2	20	8	30
		19	6						
	60	~	~	60	Σ 291	14	187	119	3.32
		41	+						

Gal-Lac- similates Lac+ esp. Gal-Lac+

Hypogynity 1 ea. A, B.

If anything, λ+ seems more resistant than λs!

Rubik! (use 70 sec)

February 20, 1951.

W1502 (478 λ^s) × W660

100 Lac+ picked from EMS Lac and streaked on EMB Lac for Lac v.

1	9	✓
15	12	?
16	15	?
17	18	?
2	19	✓
3	21	✓
18	22	?
4	24	✓
19	28	?
20	29	?
5	33	✓
6	35	✓
7	38	✓
11	44	?
12	45	?
13	50	?
8	51	✓
[illegible]	52	?
[illegible]	54	?
26	[illegible]	×
27	61	?
9	62	✓
10	64	✓
11	68	✓
12	72	✓
27	75	?
28	79	?
13	91	✓
14	99	✓

2/23/51. 1-14: all λ^+ λ^R.

~~Replica~~ Repeat 2/26/51. 100 Lac+ streaked EMB Lac.
no λ^s diploids.

Esther provided H285 - but this proved not to be heterozygous, although peculiar mottling was observed on Mtl and Xyl.

February 23, 1951.

See 816.

W1510 (grown on NB + Kgna) × W1301 on EMS Lac Mtl
= Lac,- Glu- Cst+ Lac,+

to verify: persistence of Lac,- suppression by Cst+.

W1510 checked on Lac, Glu OK from suspension used in cross.

a) Pick directly from plates. (may be impure)

	Lac	Glu	L	G	L	G	L	G
3	±	−+	±	−+	±	+	−	−
	±	−	±	−+	±	+	−	−+
	+	+	±	−+	±	+	−	+
	+	+	±	−+	+	−	−	−
	−+	+	±	−+	−	−	−	−
	+	+	±	−+	−	−	−	−
	··	+	+	+	±	−	−	−
	−+	+	±	−+	±	−	−	−
	+	+	±	−+	−	−	−	−
	±	−+	±	−+	±	−	−	−
2	±	−+	±	−	−	−	−	−
	±	+−	±	−	−	−	−	−
	+	+	±	−	−	−	−	+
	+	+	±	−	−	−	−	−−
	+	+	+	+	−	−	−	−
	+	+	±	+	±	−	−	−
	+	+	+	+	±	−	+	+
	+	+	±	−	−	−	−	−−
	±	−	+	+−	−	−	−	−
	+	+	±	−	−	+−	−	−+
1	+	+	+	+	−−	+	−	+
	+	+	±	−	−−	−	−	−
	+	+	±	−	−	−	−	−
	±	−+	−	−	−	−	−	−
	±	−+	−	−	−	+	−?	+
	±	−+	±	−	−	+	−	−
	+	+	−	−	−	+	−	−
	±	−+	+	+	−	−	−	−
	±	−+	−	−	−	−	−	−
	±	+	−	−+			−	−

Pick possible +− (A) and −+ (B) types and retreak on EMB Glu or Lac resp.

(See over)

Y87 and Y53 Lac+ revertants selected to test for constitutive lactase:

1-8 Y87	#	5	9	14	15	maybe Cst+ ??
9-15 Y53.			7	11	12	— .

Recheck!

Photographs picked at random & purified. Stroke test on EMB Gly, Lac.

G	L	G	L	G	L	G	L	G	L	G	L
−	+	−	−	−	+	−	+	−	−	−	+
−	−	−	−	−	−	+	++	−	−	−	+
−	−	−	−	−	−	−	−	−	−	+	++
−	+	+	±?	+	±	−	−	−	−	−	−
−	±	−	+	−	±	−	+	−	−	−	+
−	±	−	−	−	±	+	−	−	−	−	−
−	±	−	+	−	+	−	+	−	+	+	++
+	++	−	+	−	+	−	−	+	++	−	+
−	−	−	+	−	−	+	++	−	−	−	−
+	++	−	−	+	−	−	−	−	−	+	++

Mostly G−L− ; G+ L+. Pick possible well marked recombinations.
Restreak G−L+ on EMB glu; G+L− on EMB Lac
Streak Lac+Glu+ on D(0)

Partial segregation and coupling of Lac v reversions from Lac- (810B)

March 2, 1951.

a). 810B cultures purified & grown in D(Lac), stored at 37 C. ca 10 da.
Plate out on EMS Lac to look for Lac-Mtl v partial segregants.

	Lac	
B8-1	Few cols: repeat:	0/200+
B12-1	Ca 1/2 Lac-	54 : all Mtl- ! Also 24 bunches: do. → 78: all-
B19-1	no cols	
B25-1	49+ : 3-	6 Lac- all Mtl-
B28-1	0- : 50+	
B39-1	0- : 100+	

Results summarized on 810.

b) Coupling: Streak out 810B81 (H282L+) and compare c̄ H283.

Streak out 8 Lac v, test +, - segregants on T6. All are T6^S ! Retest Lac- cultures!

	V6
7	S
34	S
39	SR
12	S
6	S
19	S
8	S

∴ 39 = H284 is sole Lac- culture warranting use in coupling- repulsion tests of Lac+ reversions. ~~Verify by streaking out and less~~ (Also recheck #1). All these diploids should be retested against T6

March 10, 1951.

+S = cis
+R = trans

H284 independent Lac+ revisions.

(#5 is Lac++). Streak out single Lac v colonies. Test on V_6.

	R	Lac+ S	R	Lac- S	Type
1	0	4	3	0	cis
2	3	1	0	4	trans
3	4	0	0	4	"
4	0	4	3	0	cis
~~5~~					
6	0	4	3	0	cis
7	4	0	0	4	trans
8	4	0	0	4	trans.

TOTALS

CIS	TRANS
~~IIII~~	~~IIII~~
~~IIII~~ ~~IIII~~	~~IIII~~
I	~~IIII~~
	IIII
15	20

Save 823-1 and 823-2 as type cis; trans respectively: H286-H287

9 (3)	4	0	0	4	trans
10 (10)	0	4	3	0	cis
11 (12)	0	4	2	0	cis

L+: MH- V_1^R 3- 1+ V_1^P 3MH- 1MH+ V_1^P

L- 1MH+ V_1^P 2MH- V_1^R 1 " V_1^R MH- V_1^R 2MH- V_1^R

almost all MH-!

(9 others were Lac+ (1 Lac-) MH-)

12 (8) 16 others were Lac+ Xyl- gave a 2 2 2 2 arrangement.

Reisolate single EMS Lac+ and retest.

cis cultures are predom. Lac+ trans Lac-

12A	0	4	3	0	cis	Lac+ predominant
12B	0	3	4	0	"	
13	3	1	0	4	trans	Lac- "
14	4	0	0	4	trans	Lac- "
15	0	4	2	0	cis	Lac+
16	3	0	0	4	trans	-
17	0	4	2	0	cis	+
18	0	4	4	0	cis	?
19	2	0	0	4	trans	-
20	3	0	0	4	trans	-
21	4	0	0	3	trans	+ (-)
22	0	4	4	0	cis	+
23	2	0	0	3	trans	- (+)
24	0	4	2	0	cis	+
25	3	1	0	4	trans	-
26	4	0	0	4	trans	-
27	4	0	0	4	trans	-
28	0	4	2	0	cis ~~trans~~	+
29	2	3	2	1	~~cis~~ trans	+ -
30	2	1	1	4	trans	+ - +
31	1	3	3	0	cis	+
32	3	1	0	4	trans	-
33	2	1	0	4	"	-
34	0	4	3	0	cis	+
35	2	2	0	4	trans	-
36	0	4	1	1	cis	+

R | V_6 | S

20 revisions 5 Lac v

37 revisions 8 Lac v MH+ others Lac+ MH-

Reisolate Lac v!

~~Ho~~ April 2, 1951

Resolate lacv from streakings of 29, and 30 for verification. Score lac+, − from individual lacv.

29.	b	4 − S	3 + R	(1 lacv)
	a	3 − S	2 + R	(2 lacv)
	c	4 − S	2 + R	2 lacv
	d	4 − S	3 + R	1 lacv
		15 − S	10 + R	

(poor destruction of lac+, lacv ~~→ [illegible]~~) lac+ less frequent.

30	a	4 − S	3 + R	1 v
	b	4 − S	0	2 v
	c	4 − S	2 + R	2 v
	d	4 − S	4 + R	0
		16 − S	9 + R	

both are trans

~~bad [illegible]~~ !

Resolate and compare with 1, 2.

13

Totals 15 cis

20 trans

$\chi^2 = \frac{25}{35} = 5/7$ $p = .4$

March 7, 1951.

W466 × W1577 on EMS Xyl, MtL for Lac = (nurse cross)

~~E~~36 MtL; 48 Xyl+.

84 tested

all streaked on MtL.

a: 10 possible MtL v. Restreak from EMB:

a	MtL	Xyl	Lac	Mal
~~1~~	~~++~~	~~++~~	~~+ v?~~	~~++~~
2	v	v	v	++
	~~++~~	~~+ v~~	~~+ v~~	~~++~~
3	v	v	+	−+ v
4	v	+ v	v	−
	v	v	+ v	−
	v	v	+ v	−
7	v	+ v	+ v	+
8	~~+~~ (v?)	+ (+v?)	−	~~+~~
	−	+	−	−

~~obs. not Mal~~ ~~Retest.~~ v Mal v ~~H287~~

Recheck possible v from EMS.

37 addnl. tests from Xyl (17) and MtL (20)

9	−	−	−	−
	v	−+ v?	v	−
11	v	v	v	+ v
12	v	−	v	−
	v	v	v	−
	v	v	v	−
	v	+ v	v	+ v
	v	v	v	−
17	+ v	v	v	−

not too carefully scored re Mal, Xyl.

Rechecks: "3", "8". 824-8 still uncertain. Colonies have somewhat mottled character on EMB MtL. Restreak on MtL: MtL v Xyl+ Lac− Mal− H288

3: although apparently clean single cols. from EMB Mal gave +, − and ?v, colonies from EMS MtL gave pure Mal+ and Mal− (Xyl v)

~~Restreak~~ Replate from gross streak to EMB, EMS Mal.

18 MtL Xyl Lac v Mal −

~~19~~

20 " " " "

	Lac	Mtl	Xgl	Mal
21-	✓	✓	✓	—
2	✓	✓	✓	—
3	+	✓	✓	—
4	✓	✓	✓	—
5	+	✓	✓	—
6	+	✓	✓	—
7	+	✓	✓	—
8	✓	✓	✓	—
9.	✓	✓	✓	—

no lac – here as required!

3/19/51. ~~40~~ 65 addnl. tests. 2 possible MHr? : 824-30-31

100 addnl. " 30 " "

? ?

Typing mouse coli pairs (CP Miller) 825

March 8, 1951 HL
(All numbers represent 776 - designations.) q.v.

1	A+B	H 322 - F 23	Both Suc± Ck-	
2	A+B	F 335 - H 36	Su±Ck+ ; Su++ Ck-	
3	A+B	H 346 - F 47	Su++ Ck-	(3B maybe Ck+).
4	A+B	H 348 - H 49 !	Su- ; Su-? Ck+	

a. Streak out on EMB sucrose.

3/9/51. 1. A+B indistinguishable on EMB sucrose. Both Sucr±.

2. A. Sucr ± (dist. from 1A+B - somewhat lighter). B Sucr ++ Obviously distinct

3. A } Indistinguishable Not separable from 2A.
B } Sucr ++. a few slow colonies.

4. A Sucr ÷ with + wedges
B " ore. " colonies.
Restrek single ÷ colonies to compare stability.

Each of these is resistant to phages T1 - T7, and P except for indecisive reactions to T4, T2 Also Ck^R (Ck_V, Ck_B).
also all Ck^R (DAEFCHI) 3A?/CkG

Typing coli

April 2, 1951.

" Bolenhoff # 41-46 (A) 49-50 (B) 61-62 (C) for comparisons.

= 776-457-8
776-468-9.

A 1-6 Identical on EMB sucrose, faint ± cols with darker centers.

B 1-2 1: Su − Ck ± 2: Su ± Ck −

C 1-2 Su − Ck +++

Recherch Ck, Su, character, and response to φ, Ck.

A: 1-6 show identical Su ± Ck +. character on W618.

B 1 resembles A 1-6. B2 Ck? Su ±
but Ck ÷

C Inhibited on EMB Mannitol!
Ck ++