Ratio of types:

15 [illegible]

A. 5 ml Y40 : 1 ml Y53. Group by plate (1-4) and colony size (L + S).

	−R	+R	−S	+S.	
1L	5	4	2	2	
1S	7	2	3	0	
2L	7	3	2	0	
2S	6	1	2	1	
3L	8	1	4	1	
3S	3	4	4	1	
4L	6	3	1	0	
4S	6	4	1	0	
L:	26	11	9	3	49
S:	19	11	10	2.	42
Σ :	45	22*	19	5.	/91.

no ev. of selection here!

O.K.

B. 1 ml Y40 : 5 ml Y53.

	2	0	1	1
	~~1~~	1	~~3~~	0
	5	1	0	0
L	7	1	0	0
S	7	2	0	0.
	~~21~~	5	~~2~~*	0
	22	5	4	1

same plate! ~~take~~ check for virus

no S/plate!

do not use this expt. no. too small anyhow

15 [illegible]

	-R	+R	-S	+S
B_1^+ ..	7	1	7	5
	4	0	6	1
	2	0	3	3
B_1^-	4	0	5	1
	17	1	21	10

	Lac-R	Lac+R	Lac-S	Lac+S
TL	2	0	3	2
BTL	2	0	0	1

Y80 x Y81.

~~Y80~~
Y61

Repeat 451 for Lac segr. test + forgly-segregation.
Plate is T(0), T(B), T(B_1).
1 plate – Y80 in B_2 to check on reversion of M.

$\bar{B}_1 >>> B_1^+$

++. 31/31 Glyt+
27/27
10/10
32/32
100/100.

from B plates: 42/42
20/20
8/8
28/28
98/98

Totals of Glyt+ segr.

Cross	
461.	198
451	29
441	~~30~~
	29.7

∴ 1. Linkage is very tight, perhaps requires a double X against interference
2. Cytoplasmic inheritance
3. Tridisperse reversions.

Y80/B ⇒ no reversions

Y80 x Y81.

Y62

March 20, 1947

Grow Y80 + Y81 in mixed culture, and plate out on EMB medium. Select Lac + colonies and test for Gly reaction to determine possibility of transformation.

plate too crowded. take up again.

Fermentation mutants.

March 22, 1947

More Y40T (mustard see Y40) and Y53T in YB P 22

Spread dilute (10^{-7}) cultures of Y40 on EMB-lactose 1% P23
of Y53 on EMB glycerol 2%

and incubate at 35°.

Y40 - lactose. ca. 13,000 colonies. no mucoid.

1. lac - 1. translucent pigmentation. Recover for test as mutants.

Read P24. ↑

Y87. Lac - ✓
V_1^R ✓
V_1^S ✓
V_3

Nutrition:

Y53 - glycerol. ca 29,000 colonies.

mucoid - 1 (2?)

gly - 1? (mucoid?)

gly - probably contaminant. Test by streaking on lac, V.

March 21, 1947

A. Y40 x Y53 B. 58-161 x Y64.

phage n:g. Lac- unreliable as they were scored on second transfer to lac- plate for checking on phage

		Lac-	Lac+
T(0)	rand.	20 +30	5 +15
	small	23	4
	large	18	6
B_1	random	27	17 !
	small	31	8
	large	39	14
		168	54 tot: 198:69

These data are too uncertain to be used.

B.

	−R	+R	−S	+S.
L	0	0	4	5
S	2	0	5	1

difference A + B $p = .1$

T(0)	rand	33	12
	small	15	13
	large	22	8
B_1	small	16	8
	large	15	7
		101	48

269 102 / 371 = 72.5%

Phage resistance as a means of selecting recombinants. 465

March 22, 1947.

Pick various resistance mutants directly to YB+ incubate 48 hours. Plate as indicated.

Phy / Pro. 100	M.G.	10.	turbid.	Phy/Sth	turbid	Pen 100.
		20	turbid			
		50	turbid.			
		100	sl. turbid. - keep.	ca. 100 resistants.		
	B.G.	100	turbid!			
Phy / Sth 100	Sm 50		clear - some resistants.	ca. 10^3		

Phy / Pro seems M.G. resistant also, to a certain ext.

Staph / M.G. 5	M.G.	5.	Irregular turbidity. some "resistants"	
		10	clear plate. ? "	
		20	" "	
		50	" "	
		100	clear	
	B.G.	100	clear	
	Pen.	1	turbid.	
		5	spots clear & resist.	
		10	turbid	
		50	turbid	
		100	turbid.	
Staph / Sm. 5	Sth	10	clear & resist. —	
		~~20~~	clear S	
Ser / Sth 100	Sm 5.		clear - small resists.	
Ser / Mg 50	B.G. 100		turbid.	
	Pen 100		turbid.	
S20 / Bg 100	Mg	0.5	irreg. turb.	S21 / Bg
		1	clear - one in center.	clear one in center (not mixed?)
		5	clear!	
		10	clear!	
	Pen 100		turbid.	
Sth 10	Sm 10, 5		turbid	Sth - turbid Sm 10, 5 turbid.

Chloroacetic acid resistance.

March 22, 1947.

See Penfold ~~1914~~ 1911.

Streak Y53 on NA + various conc. Monochloroacetate meth. ± NaOH conc. expr. as free acid.
Y/per ml

50 continuous growth
250 dense growth of streak ± ca 10 papilla of large size per streak.
500 Background growth less. do.
1000 = 1 " " very slight.

Pick papilla of 1 to new 1 CLA plate. Y24.
Isolated colony to ss slant: Y88

Inoc into fermentation tubes P26. (Bethesda Bl.)

		glucose 1%		glycerol 1%	
	Y53	A++	++G	A±	±G
12h.	Y88	A++	-G	A±	±
	Y53	A++	/+	A+	+G
36h.	Y88.	A++		A+	±G

see 468.

Segregation of Mucoid Resistance.

March 26, 1947

by T(O).

A Y66 × 58-161 — protoclegles rare (2/7 plates!)

B Y86 × Y40.

A. 8 mucoid, all resist. — 7 Lac− / 1 Lac+. — 1 Smooth. Lac− VRS ! [Mucoid different from resistance ?]. check.

B. 28 mucoid, all resistant. — 8 Lac+ / 20 Lac− — 1 Smooth Lac− VR

---

9 Lac+ : 27 Lac− — Smooth 2 Lac− : 0 Lac+.

Prepare Smith fermentation tubes ē Nutr. Broth + various supplements as ind.

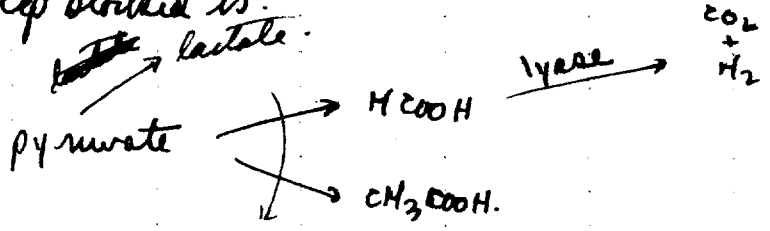
Formate includes M/20 phosphate buffer.

12 h.	control	formate 1/2%	F+gluc 1%	F+man 1%	gluc 1%	man. 1%	malt 1%	suc 1%	glycerol 1%
			H_2:CO_2 ca 2:1						
Y53	— ✓ —	+ + ++	+ +	++ +	+ ++	+ ++	+ +	± ∓	±? — —
		++				++	++	++	± ± ±
Y88.	— ✓ —	+ +	++±	+ ++	— ++	(±) ±	− ∓	− − −
		++			−	+±	±	− ± ±

	pyruvate 2%	lactate 1%	malate 1%	acetate 1%				
Y53	++ +	+	− −	−	−	−	−	second reading 72 h.
	++	✓	✓	✓				
Y88	± −	−	− −	−	−	−	−	
	−							

Formic hydrogenlyase is apparently intact.

∴ step blocked is:



Try: utilization of pyruvate in synthetic medium.

Carbon source utilization (T(0) − asparagine + TLB$_1$).

Suppl:	1 —	2 pyr 2%	3 lact 2%	4 gluc 2%	5 mannitol 1%	6 acetate 1%	7 glycerol 1%	8 malate 1%	9 formate 1%
Y53:	—	+	+	+±	++	? +	+	++	+ +++	—
Y88:	—	+	+	+±	+	++	(±)	+	++	+ +++	—

malate, mannitol } were most eff. carbon sources → major difference.

~~wild type : acid formation~~

W.T.	Mutant.	
	++	++ formate
+	++ +	— glucose } major differentiation
+	++ −	− pyruvate }
±	± ±	± glycerol
+	++ +	++ mannitol
+	++ ±	± maltose
±	± ±	− sucrose
—	− −	− acetate &c.

utilizes AcO ? ut. AcO

collect gas (if any) in Durham tubes & estimate gas ratio).

		acid	gas	ratio $CO_2 : H_2$
Y53.	glucose	+	+	< 1/5 H_2 ✓
	mannitol	+	+	< 1/5 no poptrand.
	pyruvate	±	+	< 1/5 H_2 ✓
~~Y70~~ Y88	pyruvate	—	—	~~< 1/5 H_2 ✓~~
	glucose	+	—	
	mannitol	+	+	< 1/5 H_2 ✓

March 28, 1947

Y77 x Y78. (= Y6Y x 58-161)

not a good expt.

	−R	−S	+R	+S.
0.	8	8	0	3
	3	1	0	0
	4	8	2	0
	15	17	2	3
B1.	6	12	0	3
	21.	29	2	6

This distribution is entirely different from the standard ~~Y6 x Y3~~.

R : S = 23 : 35 = 40% (1-60%)

− : + 50 : 8

= 86%.

Probably a definite alteration of frequencies ~~would~~ look for a lethal recombinant or for an additional mutation.

Test for M.G.^{R}; Sr^R.

	MG	S	R	Sr	S	R.
0:	−R		16/16.			4/16.
	~~+~~ S	lost; mostly R.				
	+R	S; R		S; S.		
	+S.	R; R; R		S; S; S.		

B1

−R
−S
+R
+S. ~~S; R; S~~ S; S; R. ~~all~~.

good + some ✓

not certain as at best only a dozen colonies appeared at site of trials.

−R are all MG^R

−S are > MG^R

+R
+S variable.

Formic Hydrogenlyase.

~~469~~
470

March 27, 1947.

Inoc Y53 heavily into Nutr. Broth + 2% glucose + ½% formate.
Grow 12 hours. Wash cells once + suspend 100ml ≡ in 5 ml of buffered (6.8 M/10 phosphate) ½% formate, aseptically ≡ Smith tube.
Gas production was marked within ½ hour. NaOH abs. ca ⅓ of gas.

Repeat ≡ K-12.

Inoc. 1) glucose-formate-broth + 2) 2% pyruvate broth heavily ≡ K-12 5 P 28.

Washed cells of 1) gave ++ gas on formate
2) gave no gas on pyruvate.

Segregation of Cla^R

March 28, 1947.

Y88 x Y40. on T(o).

Test 20 isolates.

	Lac V	Cla	Gas-gluc	pyr EMB
1	−R	S	+	−
2	−R	S	+	−
Yv 3	−R	R	+	−
4	−R	S	+	±
Yv 5	−R	R	+	−
6	−R	S	+	−
7	−S · −R	R	+	−
8	−R	R	−	−
9	−R	R	−	−
Yv 10	−R	R	+	±
11	+R ②	R		−
12	+R −	R	+	−
13	+R ?	R		−
14	−S ③	R ①		− ②
15	−R	R		−
✓ 16	−R	R		−
✓ 17	−R	S	+	+ (O.K.)
18	+R	R		−
19	−R	R		−
20.	−R.	R.		−

Many of the lac$^-$ colonies in groups 1 appear to be yellow suggesting possibility of contamination.

Repeat cross.

Isolate further, avoid "yellow" colonies.

② #14 seems OK however.

Y89

Streaks out on NA and Cla for use in metabolic studies.

all 3 sets show same no. of colonies on NA and on Cla ±.

~~Pick colonies from NA to 2 slants as Y89 – 1, 2, 3.~~

Reverse Crosses

March 28, 1947.

A. Y40 x Y53 B. Y64 x 58-161
on minimal.

A. α (large)

Plate	−R	+R	−S	+S
1.	6	1	2	0
2	6	2	1	1
3	3	1	4	0
4	7	1	3	0
5	6	1	8	0
6	3	3	3	0
rand.	6	7	2	0
	37	16	23	1

53 : 24 = 69% R/S.

	−R	+R	−S	+S
B. data	8	1	12	8

9 : 20 = 31%

β (small)

−R	+R	−S	+S.
2	4	5	0
3	5	0	0
0	0	1	0
3	1	0	0
6.	3	0	2
3	1	3	0
3	1	4	0
20	15	13	2

R : S = 35 : 15 = 70%

γ.

Compare A_L c̄ A_S. totals.

37 (.11)	16 (.53)	23	1. (.04)	77
20 (.18)	15 (.75)	13	2 (.06)	50
57	31	36	3	127

39

χ^2_2 =
.11
.18
.53
.75
.04
.06
1.67

OK. compare

	R/S	+/−
α	.69	.22
~~β~~	~~.70~~	~~.35~~
γ	.31	.31.

χ^2 = 3.14 p = .08 c̄ cumul. data —
< .07 for fit

perfect for reverse!

Cross-resistance - Y88.

April 3, 1947.

Agent.	conc./20	conc mg/ml	16 hours. Y53	Y88
Fluoacetate		.05	++	++
		2.5	++	++

intermediate conc. do.

Chloroacet.	1.0	±	++
Cl⁻ hydrin.	10.0	++	++
Iodoacetate .1 mg	5γ	++	++
	50γ	−	−
	250γ	−	−
	500γ	−	−
	1 mg	−	−
	2.5 mg	−	−

showed no resistants

resistant colonies appeared profusely in 36 hours (da^R). Y90.

a) mutational effect or manifestation

b) lethality of double mutant due to a metabolic cycle like.

Streak suspension on surface of poured NA plates. ++ indicates heavy confluent growth.

Y90: Sa-resistance.

April 7, 1947.

1. Streak Y53, Y88, Y90 on Sa plates (~~0~~, 100, 250 r/ml)

~~2. Streak out Y90 on 50 r/ml. Sa.~~

No growth on any plates by any of the cultures.

Acetate utilization

anaerobiosis.

April 8, 1947.

Broc. (lightly) T(m) + suppl. c K 12.

		24h	36h.	48h.	72h.	84h.	
1.	Acetate 1%	—	—	—	+	++	
2.	Acetate + ~~glycine~~ + malate .01%	—	—	—	+	++	
3.	Malate .01%	—	±	+	+	++	
4.	Glycine 1%	—	—	—	—	—	
5.	Glycine 1% + malate .01%	—	—	—	—	—	
6.	Malate 1%	±	++	✓	++	++	
7.	Glycine 1% + malate 1%	—	—	—	—	—	glyc inhib
~~8.~~	~~T(m) + glucose 2% (gestube)~~						
~~9.~~	~~T(m) + glucose 2% + yeast .5% (gestube).~~						
8.	Glycine ½% + Acetate ½%	—	—	—	—		
9.	Pyruvate 1%	—	±	+	+++	+++	
10.	Pyruvate + Malate .1%	—	±	+	++	+++	
11.	Acetyl-glycine		±	+	+	+	

Acetate seems to be inhibitory (cf. 1, 2 + 3). ∴ try K-12 on various acetate, glycine concentrations. Broc P11.

	T(m) +	A13	P13	
	Acetate.			
1	1%	—	—	
2	.5%	±	+	
3	.1%	+	++	More opt. conc.
4	.01%	±	±	
	Glycine			
5	1%	—		
6	.5%	—		
7	.1%	—		
8	.01%	—		
0	0	—		

Mutation of 679-~~5~~ 662

April 10, 1947.

r/10	aKG	glut	etc.	12h	24h.	36h.
1.	0	—			++	++ ++
2.	0	5r			+ ±	++ +
3	0	200r			++	++ ++
4	5mg.	—			++	++ ++
5	5mg.	200r			++	++ ✓
7	2.5mg				++	++ ✓
8	2.5mg		1mg isoleucine	±	++	++
9	2.5mg		1mg alanine + 100r B_{12}	±	++	++ ✓
10.	5mg	5r			+++	++

adaptation?

Proc. 679-183 into T(0) + threonine + indicated supplements to test nature of block of this glutamicless mutant.

indicates strongly the utilization of α-keto-glutaric acid by this mutant.

Test 10 single-colony isolates of 679-662.

Whus:

	T +0	T+glut	T+aKGlut	glut	24h
1	—	+++	+++	—	✓
2	++	+++	+++	—	✓
3	—	+++	+++	—	✓
4	++	+++	+++	—	✓
5	+	+++	+++	—	✓ ++
6	++	+++	++	—	✓
7	+++	+++	+++	—	✓
8	—	+++	+++	—	✓ +
9	—	+++	+++	—	✓
10	±	+++	+++	—	✓

no doubt of utilization of α-keto glutaric

T- OK.

transfer 1 and 2 as T-G- and T-GK resp.

Y89; K-12.

477.

April 10, 1947.

1.) m acetate 1%

	12h	24h	48h	72h.
K-12	=	±	++	++
Y89.	=	−	±	±

2) m glucose −

K-12 A G
Y89 A mg.

Formic H-lyase Activator

July 11, 1947.

NH_4Cl	5
Na_2SO_4	2
K_2HPO_4	3
KH_2PO_4	1
Malic acid	5g.
NaOH	3g.
Trace Elements	
$MgSO_4$	.2g.

= Formic hydrogenlyase basal. = FH(0).

Use = Durham tubes.

— = 11
— = gas.

	12h. K-12			36 Y89.			
1. FH(0).	—	—	—	+	—	+	—
2. FH - glucose 2%	±	—	±	++	—	++	—
3. FH - formate ½%	—	—	—	±	—	±	—
4 FH - glucose 2% + formate ½%	—	—	—	±	—	±	—
5. FH - glucose + formate + y.ex.	+	+	+	++	+++	++	+++
6. FH - glucose + formate + vits.	—	—	—	±	—	±	—
7. FH - glucose + formate + HC.	+	±	✗	++	+++	++	+++
8. FH - glucose y.ex.	—	+		++	++	++	—
9. FH - formate y.ex.	±	✗	±	++	++	++	++
10. glucose 2% + formate ½% + y.ex.		+	✗	±	++	+++	++	+++
11. T(0)	—		—	++	—	++	—

Formate is inhibitory, reversed somewhat by something in HC or in y.ex. perhaps by way of formation of formic dehydrogenase.

= Enzicase .5%

Hydrogenlyase coenzyme

April 13, 1947.

		K-12 12h. growth	K-12 12h. gas	Y89 12h.	Y89 12h. gas	K-12 24h.	K-12 24h. gas	Y89 24h.	Y89 24h. gas	K-12 36h.	K-12 36h. gas	Y89 36h.	Y89 36h. gas
1	FH 10) + glucose.	−	−	−	−	+	−	+	−	++	−	+	−
2	+ formate	−	−	−	−	−	−	±	−	±	−	±	−
3	+ glucose + Y.Ex.	++	+	++	−	+++	++	+++	−	✓		✓	
4	+ formate + Y.Ex.	±	+	±	++	++	++	++	✓	✓			
5	+ glucose + N2Case	++	±	++	−	+++	++	+++	−	✓		✓	
6	+ formate + N2Case	+	±	+	±	++	++	++	✓	✓			
7	+ glucose + HC	+	±	+	±	++	+	++	−	++	++	++	−
8	+ formate + HC	−	−	−	−	−	−	−	−	±	−	±	
9	+ glucose + EAA	±	±	±	−	++	−	++	−	++	±	++	−
10	+ formate + EAA	±	−	±	−	+	−	+	−	+	±	+	±
11	+ glucose + NAA	±	✓	−	±	−	++	±	+	−	++	+	+
12	+ formate + NAA.	−	✓	−	−	−	−	−	−	−	±	−	±
13	+ glucose + EA+NA+vits.	+	−	+	−	++	±	++	−	++	±	++	−
14.	glucose+tryptophane.	±	−	±	−	++	−	++	−	++	±	++	−
15	formate	−	−	−	−	±	−	−	−	−	−	−	−

Compare poor activities of NA. & high activity - N2Case & intermediate activity of acid-hydolyzed casein.

NA, tryptophane have slight activity.
by individual NA. & more by tryptophane

Oxidation tests.

Grow in Acetate 1% broth. Wash & adjust to ca. = densities.
1 ml (≅5 ml original) bacteria in 1/10 phosphate + substrate.

	K-12	Y89
	ca 10	ca 10
Acetate .1%	ca 10 min	ca 35 m (not complete)
Pyruvate .2%	ca 2 min	ca 3 min.

4:05.

K-12	1	—	ClAc.	
	2	Ac	—	
	3	Ac	ClAc	
contrs?	(4)	~~Ac~~ Pyr	ClAc	4:30.
	5	Form		< 4:20
	6	Form	ClAc	< 4:20

Carbon metabolism of 679-~~182~~ 662

	K-12	679-662	
1. T(Φ)(100γ/10ml).	—	—	
24h.			
2. T(Φ) + .1% glutamine	++	++	pellicular growth.

Quantitative response.

T(Φ) + glut	α-ketogl.	
0	0	+++
3γ		
↓	do.	
1mg/10ml		

∴ this strain has fully reverted & data on utilization are fallacious.

Reisolate from lyophil & check rigorously. OK ✓

necessary α ketoglutaric in lieu of glutamic for growth OK.

Utilization of Acetate

24 APR 1947

T(m) + Acetate	Glucose	36h. K-12	48h.	36h. 489 ~~490~~
.1%	—	+	+	± —
.1%	1%	++	++	+++
.2%	—	+	+±	± —
.2%	1%	++	++	+++
.5%	—	++	sic. ++	— —
.5%	1%	±	" ++	++.

? ↑ Mutant is acetate −. Not inhibitory.

are acetate + glucose inhibitory when auto claved together ?] Cf. 475. In prev. expt. test was in phosphate buffer.

Glycerine utilization data are mixed

autoclaved together.

T(m) +	Acetate	Glucose	Glycerine.
	.1%	—	—
	—	—	.1%
	—	1%	.1%
	.1%	—	.1%
	.1%	1%	.1%.
1	.2%	—	—
2	—	—	.2%
3	—	1%	.2%
4	.2%	—	.2%
5	.2%	1%	.2%
6	.5%	—	—
7	—	—	.5%
8	—	1%	.5%
9	.5%	—	.5%
10	.5%	1%	.5%
11	.5%	1%	—
12	—	1%	—

IAc Resistance etc.

2 [illegible] 1947

Prepare plates of NA + IA 50r, 100r/ml. etc. Streak thickly.

		Cla ± mg/ml	Cla ±	IA 50 r/ml.		NaN_3 100
Y53, Y40, Y88	24h.	± pap.	± pap	−		−
		± "	± pap	−	pap	−
		+++	+++	−		−
Y53, Y40, Y88	36h.	✓	✓	−	do. →	isolate for B-M-$V_1^R Ia^R$ Y90 (acid and gas on glucose!) test on 100r/ml
				−		isolate for B-M-$V_1^R Ca^R$ Y91 (acid, gas ± on glucose.)

1 small colony on Y40 streak. (Too conc. NaN_3).

Lack of Ia^R from Y88 + Y53 may be due to the more recent origin of these isolates, i.e. a smaller chance of accumulating mutants.

Y53, Y40, Y88	60h.	−pap.	1 small, 1 large colony	some residual growth in very tiny colonies.

Y92 A_2^R. note: zone of adjacent streak was v. strongly stimulated. pH effect likely.

Y93 = Y53 Ia^R

No Ia^R from Cla^R?? Are very nearly N24 — confluent growth. see Y97.

Segregation of cla^R.

~~Apl~~ APR 4, 1947

V40 x V89.

Held on ice box

Comp. 0; B_1 on Lac U segr.

T(0).

	Lac− V^R	Lac− V^S	Lac+ U^R	Lac+ V^S
	24	9	24	2
cla^R				
cla^S				
Gas+	14	6	3	2
Gas−	5	2	7	0

scoring is highly uncertain as tests were done on complete medium allowing the contaminants to go ahead. No. of tests sample tested.

T(B_1).

	20	7	9	0
	10	6	4	0
	30	13	13	0
cla^R				
cla^S				
Gas+	4			
Gas−	1			

Total 4/78 Surv. 2 − R
1 − S
1 + R.

Segregation of Cla^R

Y40 x Y88.

T10) Pick from Lac-V tests to water. Streak on Cla (1–2 mg/ml)

			Cla
1 –	1	Lac-V +R	R
	2	+R	R
	3	–S	R
	4	–S	(S)
	5	+R	R
	6	–S	R
	7	–R	R
	8	–R	R
	9	–S	R
	10	–S	R
	11	–R	R
	12	+S	R
	13	–R	R
	14	+R	R
	15	+R	R
	16	+R	R
	17	+R	R
	18	–R	R
	19	+R	R

			Cla
		Lac-V	
2-1	1	+R	R
	2	–R	
	3	–R	
	4	+R	
	5	–R	
	6	–S	
	7	+R	
	8	–S	
	9	+R	
	10	+R	
	11	+R	
	12	–R	
	13	–S	
	14	+R	
	15	+R	
	16	–R	
	17	–R	
	18	+R	
	19	+R	
	20	+R	
	21	–R	
	22	–R (S?)	
	23	–R	

Total: 56/58 = S
+ 18/20
74/78 = S.
R = 5%

			Cla
T(B$_1$) 4 –	1	–S	R
	2	–R	(S)
	3	–R	R
	4	+R	R
	5	–S	R
	6	–R	R
	7	+R	R
	8	–S	R
	9	–R	R
	10	+R	R
	11	–R	R
	12	+R	R
	13	–R	R
	14	–R	R
	15	–R	R
	16	+R	R

5	1	–R	(S) R
	2	–R	
	3	+R	
	4	–R	
	5	–R	
	6	–S (R)	
	7	+R	
	8	–R	
	9	–R	
	10	–S	
	11	–R	
	12	–R	
	13	–S	
	14	–S	
	15	–R	
	16	+R	(S)
	17	–R	
	18	–S	
	19	–R	
	20	±R	

test this group
in B$_1$–T(0).

+	−	−	S	+	R	+	+		S
B_1	B	M	Ca	Lac	V	T	L	...	Ca
−	+	+	R	−	S	−	−		R

mostly R. ∴ R near BM

~~R's are −S; −R~~

S's are −S; −R.

R between B, M?

Homogenicity of B_1^- : B_1^+

Y40 x Y53; Y64 x 58-161.

483

April 14, 1947

22 APR 1947

Use light mixtures Y40 x Y53. Add B_1.

Held in cold room after 2da.

ca 1 – 5 colonies / plate.

4/19 Streak out on EMB Lact

1. all lac –
2. " 6/6
3. "
4. "
5. "
6. "

6/6 const lac –

Should use B_1^+ on B_1^- plates.

Repeat with Y40 x 488 (Y53-Cla^R)