Spreadout mustard-treated Y40 (see 426) on EMB-lactose +ca 4 per maltose, sucrose, glycerol plates and examine for mutants! Ca 400 per plate.

- lactose: 36. # of plates
- Immerse hood
- ca 15,000 colonies examinabl
- no fermentation mutants.

- mm x mm
- 2 plates + 2 sterile plates
- ca 1020 examined.

2 very small H-colonies noted. Streak on + fresh medium.
all M+.
Glycerol - slow utilization - compare passage on glycerol
Optizn.
Sucrose - very slow but definite utilization.
Fermentation contents - enrichment cultures.


<table>
<thead>
<tr>
<th>Sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>glucose</td>
</tr>
<tr>
<td>fructose</td>
</tr>
<tr>
<td>lactose</td>
</tr>
<tr>
<td>sucrose</td>
</tr>
</tbody>
</table>

Symbols: 
+ = high acidity, ++ = medium acidity, +++ = mild acidity,
- = none, m = acid, mm = weakly acid, mmm = slight acidity.

---

Streak out some apparently EMB - colonies from Y 34.

Contains with a typical EMB. - (b).

a) - Y 80.

b) +

Compare a, b + gly + enrichment culture above.

Y 80

EMB

No evidence of papillae.

Y 53 gly ± +

Y 53 gly + + +++ different from Y 53?

On BCP - medium, is not changed in color, cells show slightly different shades (+, ± = pinkish), + = translucent or white.

On DLE - BCP broth - DLE - for gly+ and gly+ all show slow acid + gas. (see our)
1. Enzymement for gly+

A5 - streak from gly tubes to new gly EMB

A8 - scoring OK, as before!
Resistance mutants - resistant.

Sticks out sup. of

N.5.  str. B.5.

Y77  ++*  --  --  !

Y78  --  ++

* dye in decolorized.

After 3 days, several hundred colonies appeared on the streaks. Y79.

Sticks Y77 over Y78/H5. to determine if decolorization is due to

effect of dye. No evidence of streaking of previously decolorized

(47') culture. Probably due to pH change.
### Inversion Tests: Summary

**Exp.**  | **Method. Tests:** | **Cumul. Yield Tests:**
---|---|---
426 | \( HN_2 \) & \( Y40 \times Y53T \); \( Y53 \times Y40T \), by seed, 0+6 | 20 tests, 17, 37, 0
433 | \( HN_2 \) & \( XN \) & \( Y53T \); by shoot, 0+6; 0+6 | 20 tests, 17, 37, 0
437 | \( Y40T \times Y53T \); ni only, x ray; 2 x 4/2 = 84 | 121, 0
508 | \( Y40T \times Y53T \); ni only, x ray; 2 x 14 = 28 | 149, 0


Trend of prototrophy mutation.

Pour 440x155 plates in T10. To exp. add also 10^{-6} N-12 cultured and washed similarly in order to compare rates of colony development.

See 445.
Plate 165 x 440

168 x 168.

m T(60) + T(81).

no prototrophi available.

not due to suppression of X in B, B'1, B'2 regions.
March 9, 1947

Y80 x Y81. cf. 435.

M1 → B1+ rescued. Pick up plate on EMIBlac + EMB glycerol.

Bacteriophage

\[ \text{Bae}^{-} \text{Bae}^{-} \text{lac}^{-} \text{lac}^{-} \text{Lac}^{+} \text{Lac}^{+} \text{Ble}^{-} \text{Ble}^{-} \text{Ble}^{+} \text{Ble}^{+} \]
**Note:** B₁⁺: 25/25 by ++
B₁⁺ + B₁⁻: 44/46 by ++

<table>
<thead>
<tr>
<th>A.</th>
<th>B诱人</th>
<th>C诱</th>
<th>D诱</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
<td>-</td>
<td>R</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>R</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>R</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>R</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>R</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>R</td>
</tr>
</tbody>
</table>

| T(0) | + | - | R |
| T(B₁) | - | + | R |
| ? | - | - | R |
| ? | - | - | R |
| ? | - | - | R |
| ? | - | - | R |

[scoring maybe]
[inaugurated]

When read again 4 hours later, series B had gotten considerably darker!

Tenebrio with the map!
March 6, 1947

Lac-V r
Lac-V s
Lac+ V r
Lac+ V s

Bₜ⁺: 15 9 0 1 25
all Bₜ⁺

Bₜ⁻: 20 19 5 0
Bₜ⁻: 1 (??)

This scoring of Bₜ⁻ line at 2da. resulted in some variation in intensity.

Note: 24 Lac⁻: 1 Lac⁺ + w. Bₜ⁺ (95%)!
46 Lac⁻: 5 Lac⁺ + w. Bₜ⁻.

1) Bₜ⁻|Bₜ⁺ 41 25 24 2 1 25 40 4 40 64 6 70
c x² = \frac{2}{0.04} \approx 0.2
\frac{1}{0.04}
\frac{1}{0.03}
\frac{1}{1.3}

improved standard:
18 24 7 1 25
51- 6 11 + 6 70
\chi^2 = \frac{12^2}{51} + \frac{12^2}{19} = 3.3
8.9
13.2

a) All data: 72% Lac⁻
\chi^2 = \frac{36}{18} + \frac{36}{7} = 7
d.f. = 1 00 8.

b) unselected 64% Lac⁻

peculiar segregation may explain peculiarities of Bₜ⁻ segregation.
if the sequence is defined
Segregation of drug resistances

A: Y77 x Y78

B: Y53 x Y78

C: Y40 x Y77

**Streptomycin** 5 μg/ml
**Neomycin** 100 μg/ml

<table>
<thead>
<tr>
<th></th>
<th>+</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lac</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>V</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Str</td>
<td>R?</td>
<td>R?</td>
</tr>
<tr>
<td>H.G.</td>
<td>R</td>
<td>R</td>
</tr>
</tbody>
</table>

**? probably S**

**Scoring uncertain**
due to selection of resistant residue

H.G. resistance
10-4
lac+HR lac+Ms lac+HR lac+Ms

C. Total

<table>
<thead>
<tr>
<th>Lac+ S</th>
<th>2</th>
<th>1</th>
<th>8</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lac- R</td>
<td>0</td>
<td>2</td>
<td>16</td>
<td>3</td>
</tr>
</tbody>
</table>

Scoring not certain

Lac+ S x Lac- R

Lac+ S x Lac- R

**Indicate of resistant** by solid, indicated linkage to B34.

should score on minimal plates to avoid selection for resistant contaminants.
Selection of recombinants with drugs

1. Mix YB cultures of Y77 (Hg²⁺) and Y78 (Str⁻²).

- 30° also use mixture of mut. plating technique of Y441.

   1. Plate culture in Hg + Str A 6 A 8.

   2. Y77 coloos, dieo. 3; 4/col.

   3. Y78 coloos. ca 100 minute clump. 1/col.

   4. Y77 + Y78. ca 10 with small A - as 3.

   A 6 - incubate at 36°.

   Indeterminate whether the multi. resistant colonies represent recombinants.

   Compare 4 (coloos) to 2 mutants of Sm Hg R to Sm Hg²⁺.

   Thus may be some synergism in view of the large log before colonies are detectable.

   7. See Y84 X Y79. plate in brilliant green. 7 + streptothricin.
March 4, 1947.

Red. 127,000 u. streptomycin from Woolley, Mach. non-strept ampicillin.
Suspend in 2.7 ml 95% alcohol for 3 hours. Add
10.3 ml sterile H2O to ca. 10,000 u/ml in 20% alcohol. Dilute further as required.

\[
\begin{array}{ccc}
100 & 1 & T \\
Y78 & Y53 & T \\
\end{array}
\]

\[
\begin{array}{ccc}
50 & T & 500 \\
Y78 & Y53 & 1,200 \\
\end{array}
\]

Steve Y78 on 5% agar to 10-
Y82 - streakout on 5% agar-

\[
\begin{array}{ccc}
100 & 10 & 100 \\
Y78 & Y53 & 100 \\
\end{array}
\]

Steve Y78 on 10% agar-
Y84 -

Y78

Streptomycin
in 5% agar gives colonies but not so large
as Y82.

Y83, Y84 ok on 10% agar.
Segregation of B\textsuperscript{+}, etc.

440 x 453. Mix cells in agar pour on malt plate.

A) 11
   15
   10
   15
   60
   m = 12.0
   m = 11.1

B) 20 B total: 18 B\textsuperscript{+}
   2 B\textsuperscript{-} (Lac\textsuperscript{-} R\textsuperscript{i}; Lac\textsuperscript{+} R)

C. Segregation of Lac, U\textsuperscript{b} in 0, B:\n
   0: -R -S +R +S 10 10 9 0
   24 0 4

   B\textsuperscript{i}: 16 12 13 0

Among O plate, streak out 11-12 on surface. These colonies appeared at same time as prototrophs (24 hours) and were of comparable size.
March 6, 1947.

Lac⁻ V regurgitation:

<table>
<thead>
<tr>
<th>Plate #</th>
<th>lac⁻ R</th>
<th>lac⁺ R</th>
<th>lac⁻ S</th>
<th>lac⁺ S</th>
<th>2 X V scoring unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>10</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>27</td>
<td>20</td>
<td>9</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>22</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
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<td>0</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
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<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>6 lac⁻ = 135/214</td>
</tr>
<tr>
<td>14</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>4 comp. at 70% peps.</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4 X = 190/214</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>23</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>5 comp. at 85% peps.</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>14</td>
<td>2</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>17</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>29</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>12</td>
</tr>
</tbody>
</table>

113 77 22 2 1/214.

The agreement of the Hart R lac⁻ S classes with the former results is very poor. Reexamine crosses of aberrant cultures.
There is a shift from lac → S to lac → R.

An action basis:

\[
\begin{array}{ccc}
& + & R \\
\text{a} & \text{r} & + \\
\text{b} & \text{s} & - \\
\text{c} & \text{TL} & - \\
\end{array}
\]

\[
\begin{align*}
\langle \text{lac} & < \text{brc} < \rangle < \text{a} \\
\langle \text{v}^\text{R} & < \rangle < \text{c} \\
\end{align*}
\]

\[
\langle \text{c} \ldots \text{c} \ldots \rangle
\]

\[
\begin{align*}
a = & + R \\
b = & - R \\
c = & - S \\
\end{align*}
\]

- It would not be augmented by the elimination of c.

or, another interpretation, is that:

The previous states were needed for Tor for L, c always decrease in the interval \( V - (\text{Tor} L) \).

- Compare types to what really intended

(i.e., low or high-S) biochemically.
# 446A

### Table: 446.

<table>
<thead>
<tr>
<th></th>
<th>lac-R</th>
<th>lac+R</th>
<th>lac-S</th>
<th>lac+S</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>33</td>
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<td>1</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>34</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

\[
8^2 - 76.52^23.2\bar{2}\bar{1}1/151.
\]

\[
189.129.44.3/365.
\]

\[
\chi^2 = \left(\frac{49}{92} + \frac{49}{106} + \frac{1}{76} + \frac{1}{70} + \frac{4}{27}\right)^2 = 1.86 \quad p = .4.
\]

These samples agree.

Homogeneity??

\[
.59 / 1.86
\]

.46

.02

.01

.45

.33
analysis of 426 vs. 359 summarized.

\[ -R + R -S + S \equiv \]

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>189</td>
<td>129</td>
<td>44</td>
<td>3</td>
</tr>
<tr>
<td>100</td>
<td>55</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>289</td>
<td>184</td>
<td>89</td>
<td>7</td>
</tr>
</tbody>
</table>

\[ \chi^2 = \frac{25}{105} + \frac{25}{184} + \frac{144}{67} + \frac{144}{117} + \frac{196}{36} + \frac{126}{63} + \frac{1}{4} + \frac{1}{3} \ldots \]

\[ = .2 \]

\[ = .1 \]

\[ = 2.2 \]

\[ = 1.2 \]

\[ 5.4 \]

\[ 3.1 \]

\[ 6.2 \]

\[ 3.3 \]

\[ 12.7 = \chi^2 \]

\[ 8.5 \]

\[ 8.2 = \chi^2 \]

\[ p = .04 \]

\[ \text{it is the difference in the frequency of} \]

\[ \text{which differentiates the distributions.} \]

\[ \chi^2_1 = \frac{25}{189} + \frac{25}{129} + \frac{25}{55} + \frac{25}{60} \]

\[ = \text{cay.} \]
March 7, 1947

Recover $446 - 22, 2-5 + 27$. In order to ascertain whether of disproportionate in ratios. Compare segregation of $lee + v = y40, y53$ stands.

$A$ 22: 8:10:0:0
$B$ 27:7: 9:6:0:0
$C$ 25:7:7: 5:14:2:0
$D$ $y40, y53$

\[
\begin{array}{cccc}
\text{A} & -R & +R & -S & +S \\
47 & 19 & 9 & 1 \\
44 & 20 & 7 & 1 \\
\text{B} & 26 & 12 & 16 & 0 \\
& 21 & 16 & 0 & 0 \\
\text{C} & 7 & 5 & 2 & 1 \\
& 7 & 5 & 2 & 1 \\
\text{D} & 30 & 20 & 19 & 0 \\
& 30 & 20 & 19 & 0 \\
\text{Total} & 52 & 38 & 39 & 6 \\
\end{array}
\]

This is homogeneous with

\[
\begin{array}{cccc}
\text{A} & \text{D} & 47 & 19 \times 9 + 1 \\
52 & 38 & 39 & \text{6} \\
99 & 57 & 49 & \text{205} \\
\end{array}
\]

Compare $A \neq D$.

\[
\begin{array}{cccc}
\text{A} & \text{D} & 47 & 19 \times 9 + 1 \\
52 & 38 & 39 & \text{6} \\
99 & 57 & 49 & \text{205} \\
\end{array}
\]

\[
\frac{7^2}{100} + \frac{100}{57} + \frac{9}{21} + \frac{4}{36} = 4.3
\]

\[
\frac{9^2}{18} + \frac{7^2}{21} = 5.6
\]

\[
\chi^2 = 10.1
\]

\[
p = .007
\]
\[ \chi^2 = 64\left(\frac{1}{58} + \frac{1}{90} + \frac{1}{18} + \frac{1}{31}\right) \]
\[ = 64\left(0.017 \cdot 0.010 \cdot 0.055 \cdot 0.031\right) \]
\[ = 64 \cdot 0.0005 \]
\[ = 0.073 \quad \rho = 0.007. \]

Therefore the total discrepancy is due to a difference in the proportion of V r cultures. In practice, this means a deficiency of V r cultures in the new group.
\[ -R + R - S + S. \]

A. 22 24 20 7 1 1
B. 25 13 16 0
C. 27 7 5 2 1

\[ 76 38 25 2 \]

D. - 30 22 19 0
O2 10 7 1 5 0
N2 6 5 6 1
SH 4 4 5 1

\[ \Sigma. 52 39 37 2 4\text{.7} \]

\[ 69 38 31 2 \]

Plate "A" plate

A
6 2 0 0
8 1 3 0
17 1 4 1
C
7 5 2 1

\[ \text{Cautie! Beautiful screwing \( V^3 \).} \]

\[ \text{compare +, -} \]

<table>
<thead>
<tr>
<th>89</th>
<th>41</th>
<th>130</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>40</td>
<td>140</td>
</tr>
</tbody>
</table>

\[ 189 81 270 \]
March 7, 1947

Using cells from Exp. 447, plate the Y55 components at a 10^-2 dilution into LB1 agar.

<table>
<thead>
<tr>
<th>No.</th>
<th>Titred</th>
<th>10 E.C.</th>
<th>25</th>
<th>10</th>
<th>1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td>10 E.C.</td>
<td></td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>72</td>
<td></td>
<td></td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There were stable differences in colonies, not apparently due to scoring difficulties.
March 7, 1947


Rin: 

NaHCO3; ascorbic acid; pyruvate-lactate; O2; Methylene Blue. Detoxified 2?

D1 ? - Try on B14 x TP.

T(0) - V40 x Y5/3 mix in agar & process pre- launder plates.

1. Controls

2. "O2 atmosphere" lead + lid plates

3. N2 atmosphere turbid plates; colonies very small, spread evenly on surface

4. NaHCO3 2mg -

5. Ascorbic acid 1% no colonies (pH 4.5) No turbidity

6. Methylene Blue 100F Feul. 0.5 classes 0 or 

The number of apparent colonies is correlated inversely to the growth turbidity, and was best in O2, next in N2. Both had no apparent effect; however, both in N2, no marked increase of colonies in the O2 atmosphere plates, but there which disappear are larger.
see Y41. Test Y18. mEMB+lactate. § Y53.

\[ \text{bac} \] 41A → lac + bact. - α + \text{glycerol}. \\
\text{Y78} (58-16) SmR. +gly. +gly. + glycerol! \\
58-161 - (± ??) \\
Y80 (58-161, V_i^R, X_l^-) -

Note. Y80 on v. long incubation forms a faint violet color, à la sucrose
from penicillin septa it noted.

\[ \text{Y53} \quad + + \]  \[ Y80 \quad 58-161 \quad + \]  \[ Y81 \quad + + \]  \[ Y40 \quad + + \]  \[ Y78 \quad + + \] relative

58-161 is slow, but wilksore vs. Y80. see Y53.
March 9, 1947.

Repeat 440

T(0)  16/16  red-  12/14  lac-  86%
T(18)  13/13  red+  58/72  lac-  78%

Note, this denotes absolute linkage of red and lac.

written 480 x 480
not 481 x 440

seem to be desirable!

Note (also) the segregation for lac may be distorted.

Data for 480 x 453: (71% lac-)
\[ \frac{440}{2} \]
\[ \frac{\text{mrd} + 440}{2} = 71\% \]
\[ 440 = 71\% \]
\[ 480 = \frac{71\%}{2} \]
\[ \frac{480}{2} = \frac{3}{2} \]

\[ \frac{480}{2} = \frac{3}{2} \]

\[ \frac{480}{2} = \frac{3}{2} \]
March 9, 1947.

Physical migration.

The above plants were allowed to stand 3 days before testing.

\[ B. \quad V_80 \times 453. \quad \text{Test } B_1^+ + (B_2^- + B_3^+) \text{ on } \text{ Slg}; \text{ Lac.} \]

a. \[ B_1^+ \quad 27 \text{ Lac}^- : 4 \text{ Lac}^+ \]
   \[ 35/35 \text{ Slg}^+ \]

b. \[ B_1^- \quad 50 \text{ Lac}^+ : 16 \text{ Lac}^- \]
   \[ \text{score uncorrected: } 1+ + 30 +/ 3 \]
   \[ 77 \text{ Lac}^- : 25 \text{ Lac}^+ \quad \text{ca} \quad 75\% \quad \text{Lac}^- \]

C. \[ \text{Y} \quad 81 \times 440. \]

\[ B_1^+ \quad 104 \text{ Lac}^- : 43 \text{ Lac}^+ \]

\[ B_1^- \quad 28 : 13 \]

\[ 132 : 56 \quad 188 \quad 70\% \quad \text{Lac}^- \]

This experiment is not homogeneous with the earlier \( 40 \times 453. \text{ LCO.} \)

D. \[ \text{Y} \quad 53 \times 450. \]

\[ B_1^+ \quad 33^2 \quad 28^2 \quad 25^2 \quad 14 \quad 18 \quad 18 \quad 0 \]

\[ 3 \text{ stand } X^2 = \frac{3 \times X^2}{75} \]

\[ \chi^2 = 3.5 \quad \rho = 2.2 \]

\[ 41 \]

\[ 51 \quad 40 \quad 27 \]

\[ 11^2 \quad \text{of standard} \quad \rho = 0.06 \]

\[ 76 \% \quad \text{Lac}^- \]
March 9, 1947.

Y 40 x Y 53 in broth medium. Rick colonies & H, O, +
moi; impaired in T(8) + T(4).

50 isolates. At 12 hours, 5 had 8- 

lac. V +

1 + R
2 + R
3 - R
4 - R
5 - R.

See 445

To summarize:

\[ R - S + R + S. \]

\[ R + R - S + S. \]

\[ H + H + O + I. \]

\[ o - s/12. \]

\[ \frac{V^2}{2} = \frac{4}{3} + \frac{9}{3} = 4.3 \]

\[ p = .14 \]

\[ T^2 = 5 + \frac{16}{9} = 7 + .03 \]

\[ 6 \quad 5 \quad 0 \quad 1 \quad 12 \]

A \( \frac{1}{-} \) 6 3 3 .36

B \( \frac{H-B}{-} \) 1.4 9 .86 1.4

\[ \text{average} \]

6.9 13.4
March 11, 1947.

Prove in a single glycerol plate (EMB-2%) the following:

<table>
<thead>
<tr>
<th></th>
<th>A12</th>
<th>B12</th>
<th>A13</th>
<th>B13</th>
<th>A14</th>
<th>B14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K-12</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>2</td>
<td>58-161</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>v40</td>
<td>-</td>
<td>-</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>4</td>
<td>v10</td>
<td>-</td>
<td>-</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>5</td>
<td>v53</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>v46</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>v04</td>
<td>-</td>
<td>-</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>8</td>
<td>178</td>
<td>-</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>9</td>
<td>177</td>
<td>-</td>
<td>-</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>10</td>
<td>v80</td>
<td>-</td>
<td>+</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>11</td>
<td>v81</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>12</td>
<td>172</td>
<td>-</td>
<td>-</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>13</td>
<td>173</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>14</td>
<td>174</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>15</td>
<td>182</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>16</td>
<td>183</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>17</td>
<td>184</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>18</td>
<td>179</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

16. v80: - + T T T: Translucent, creamy shade, not opaque pearl.
4/11/47

As various plates, streak: Senatina mucrosaccos.

Bacillus subtilis

Phytophthera infest颷ensis

Staphylococcus

\[ \frac{+}{-} \]

Von u/s of:

Malachite

Green

H.G. 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++

10 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++ 1 ++

50 \[ - - - - - - - - - - - - - \]

100 \[ - - - - - - - - - - - - - \]

B. G.

T.C.

100

Streptothcm. 5th 1 \[ ++ \]

5 \[ ++ \]

Streptomycin 5th 1 \[ ++ \]

Penicillin

V. 100 ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ +

Susceptible: N.A. ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ +

Dos 10 P.I. 1/4

Reading: 1st 1/20 4/12

6 P.I.

9 P.I.

Table: [values and results]
order of activity:

<table>
<thead>
<tr>
<th>M.G.</th>
<th>Sm</th>
<th>5th</th>
<th>Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staph.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.t.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.m.</td>
<td>S20</td>
<td>S21</td>
<td></td>
</tr>
<tr>
<td>S.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.21</td>
<td>Phyto</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use strains of following pepsilaces highly drug care for higher steps:

S20 / M6 50  or  B.G. 100
S.m / 5th 10
S20 / 5th 5
S21 / 5th 5  on higher 5th.
Staph  / 5th 5

S20
S21  / Sm  on higher Sm.
Staph
Resistance mutants

**Staph.** M.G. 1 turbid. ca 10 mg/l 100% inhibition of residue perfectly clear.

**Svn** 1 turbid. ca 10^4 Svn R.

**Pneumococcus 100.** turbid. ca 10^4 Svn R.

**Svn** 1 turbid. ca 10^4 Svn R.

**Sfta** 1 turbid. ca 10^4 Svn R.

**Prof.** turbid.

**S20** Bg 100 clear, no Bg R.

**Svm** 5 turbid.

**Prof.** turbid.

**S21** Bg 100 clear, no Bg R.

**Svm** 5 turbid.

**Prof.** turbid.

**Phpto.** M.G. 10 inhibition incomplete.

**Sfta** 50 inhibition, incomplete; some inhibition clear in percent.

**Svm** 50 incomplete inhibition clear. ca 100.0.

**Prof.** clear! -- ca 300 revertants.
Available:

Phyto

Sth 100
Sm 50
1kg 100

Sth 5
Sth 10
2kg 5

820
B.C.
Sth 10
Sm 5

S21
B.
Sth 10
Sm 1

Secretary
Sth 20
50
rearrangement
100

Sm 5
1kg 50
4/11/47.

As above in N.A. and T(0).

Protozoa showed as papillae in T(0) stage, justifying this technique. Throw out N.A. plates.

T(0) colony indicated zone

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>++</td>
</tr>
<tr>
<td>2</td>
<td>++</td>
</tr>
<tr>
<td>3</td>
<td>++</td>
</tr>
<tr>
<td>4</td>
<td>++</td>
</tr>
<tr>
<td>5</td>
<td>++</td>
</tr>
<tr>
<td>6</td>
<td>++</td>
</tr>
<tr>
<td>7</td>
<td>++</td>
</tr>
</tbody>
</table>

Studied further for colony of Y407 + Y537.

29. Too singular. N.A mix + plate is unreliably.
"Synthrophic colonies?"

See 752 for sources.

Colonies from 448 x 453 on B10 were picked to water + T(0), T(3)
minus. They grew as 5/50 which grew on T(0) only after
2-3 days. The T(0) and T(3) tubes were both streaked on
lac-V (agar).

\[
\begin{array}{cccc}
1 & T(0) & T(3) \\
2 & -S; +R & -S; +R \\
3 & -S; +R & -S; +R \\
4 & -S; +R & -S; +R \\
5 & +R & +R.
\end{array}
\]

Since -S and +R are the
parental configurations, the delayed
growth [and the original colony
formation] might be due to synthrophism.

Since -S and +R are the
parental configurations, the delayed
growth [and the original colony
formation] might be due to synthrophism.

Streak out T(0) tubes on EMB lac to purify.

Test - (a) and + (b) colony of each on B, O mediums.

<table>
<thead>
<tr>
<th>1a</th>
<th>1b</th>
<th>2a</th>
<th>2b</th>
<th>3a</th>
<th>3b</th>
<th>4a</th>
<th>4b</th>
<th>5a</th>
<th>5b</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Expt. 1. Synthrophic colony

2. Colony not picked; only intracellular
growth in agar. Requires repeating.
Stirred Y53 across T1 on EMB agar.
Suspended shiny growth from "intersections of bacteria + phage
mix" off streak out.

Note, at intersections of bacteria + phage, a zone of coloration of
the bacteria or if there were there same enzymatic activity.

---

mucoid colonies: Y53M.

N21. Pick from mid region + from mucoid colonies to water
and streak onto EMB b/c. (Y53/1).

Y53/1 same growth (probably resistant, lac- + lac+).

1. Y53M - all mucoid. Pick one colony + heat on T1
   also streak out →


3. Y53M3 - all mucoid. Pick to slant and work for subsequent
   analysis. Yes
Plate Y40 x Y53 consists of 14 \( \times \) 18 colonies with five largest (>) and smallest (<) colonies from each of 7 plates + compare the distribution:

\[-R -S +R +S.\]

\[
\begin{array}{cccc}
4 & 1 & 0 & 0 \\
3 & 0 & 2 & 0 \\
2 & 2 & 1 & 0 \\
1 & 0 & 0 & 2 \\
1 & 0 & 0 & 1 \\
\end{array}
\]

For large, +R > -R.

For small, +R > -R.

\[
\begin{array}{cccc}
18 & 4 & 13 & 0 \\
\end{array}
\]

\[
\chi^2 = 5.14 \quad p = .16.
\]

But, compare all 3 groups,

\[
\chi^2 = 12.61
\]

Random selection from these plates gave:

\[
\begin{array}{cccc}
27 & 12 & 30 & 1 \\
\end{array}
\]

\[
\chi^2 = 12.61
\]

\[
p = .013
\]

Selection may play a role.

\[
\begin{array}{cccc}
221 & 136 & 142 & 6 \\
\end{array}
\]

Is cumulative data.

Note that both in \( +R \) large and \( +R \) small selection types, there is marked deficiency in \(-S\) as compared to random selection + cumulative data!