# Bionic Acids.

January ~~30~~ 29, 1948.

Remove most Ca from crude preps. Ca Maltobionate + Ca Lactobionate
Mpd. by KP Link by Bromine Oxidation. EMB tests.

Streak out, on ~~Lba~~. Lba:

| | | |
|---|---|---|
| Y10 | — | No papillae noted. |
| Y87 | — | Colonies markedly papillate 2-5 / colony. Streakout * |
| W45 | — | Occ. papillae 0-1-2 / colony. |
| W108. | — | Tiny but fairly numerous papillae! |

* → Lba − and Lba + types. Purify and describe as W115 Test on lactose:
Thus wild type Lac+ is Lba −.

Maltobionic Acid:

| | | |
|---|---|---|
| Y10 | — | No papillae noted. W60: may be very slow +. |
| W60 | — | |
| W56. | — | |
| W108 | — | Numerous small papillae (3-6 / colony). |

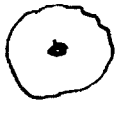
On second day, the original papilla restreaked on Lba did not remain + but all colonies were faint purple. On lactose W115 is +++ but, app. still Lba. −

Streakout papillae again. ~~Jan.~~ 2/1/48.

All Lba − negative! (What are the papillae??) (Oxal^R?)

58-161 } moi. into Lba minimal: No growth
Y10

The following sectors gave + and – colonies.

| | | Mal | glucose | T1 | w – |
|---|---|---|---|---|---|
| 41. | | + | + | S | 139 |
| 42. | | – | – | S | 164 |
| 43. | | – | – | S | 165 |
| 44. | | + | + | S | 140 |
| 45. | | + | + | S | 141 |
| 46. | | + | + | S | 142 |
| 47. | | + | + | S | 143 |
| 48. | | + | + | S | 144 |
| 49. | | – | – | S | 166 |
| 50. |  | A few lac+ in heavy streak. – | – | S | 167 |

~~Jan 31, 1948~~ Feb. 1, 1948.

182 plates × ca or > 500 colonies readable per plate, average. 410.

= ca. 100,000 colonies.

Most mutants are intact colonies rather than sectors. Streaks out on EMB Lac.

Irradiate $10^8$ cells/plate 75 secs. under Watson's low pressure Sterilamp. Killing very variable. Apparently smaller proportions of sectors among mutants. 1-39 intact white colonies. Test when pure:

| | Maltose | Glucose | Gal. | T1 | W- |
|---|---|---|---|---|---|
| 1. | − | − | ± | | 146 |
| 2. | + | + | + | | 120 |
| 3. | − | − | ± | | 147 |
| 4. | + | + | + | | 121 |
| 5. | − | − | ± | | 148 |
| 6. | + | + | + | | 122 |
| 7. | − | − | ++ | | 149 |
| 8. | + | + | ++ | | 123 |
| 9. | + | + | ++ | | 124 |
| 10. | + | + | Gal− | | 125 |
| 11. | − | − | ++ | | 150 |
| 12. | − | − | Gal− | | 151 |
| 13. | + | + | ++ | | 126 |
| 14. | − | − | ± | | 152 |
| 15. | − | − | Gal± | | 153 |
| 16. | − | − | ± | | 154 |
| 17. | + | + | ++ | | 127 |
| 18. | + | + | ++ | | 128 |
| 19. | − | − | ++ | | 155 |
| 20. | − | + | ++ | S | 145 |
| 21. | + | + | ++ | | 129 |
| 22. | + | + | ++ | | 130 |
| 23. | + | + | ++ | | 131 |
| 24. | + | + | ++ | | 132 |
| 25. | + | + | ++ | S. | 133 |
| 26. | − | − | ± | | 156 |
| 27. | − | − | ± | | 157 |
| 28. | − | − | ± | | 158 |
| 29. | + | + | ++ | S. | ~~134~~ 168 |
| 30. | | | | | ~~168~~ 134 |

plates too dry for T1 data

| | Maltose | Glucose | T1 | W- |
|---|---|---|---|---|
| 31. | + | + | | 135 |
| 32. | + | + | | 136 |
| 33. | + | + | | 137 |
| 34. | − | − | | 159 |
| 35. | − | − | | 160 |
| 36. | − | − | | 161 |
| 37. | + | + | | 138 |
| 38. | − | − | | 162 |
| 39. | − | − | | 163 |

Sectorial:

40.

41.

42.

43.

44.

45.

46.

39a:

Recover for Gal tests

| LM | Bal. |
|---|---|
| 1 | ± |
| 2 | ++ |
| 3 | ± |
| 4 | ++ |
| 5 | ± |
| 6 | ++ |
| 7 | ++ |
| 8 | ++ |
| 9 | ++ |
| 10 | − |
| 11 | ++ |
| 12 | − thm |
| 13 | ++ |
| 14 | ± |
| 15 | − th |
| 16 | ± |
| 17 | ++ |
| 18 | ++ |
| 19 | − th |
| 20 | +± |
| 21 | − th |
| 22 | ++ |
| 23 | ++ |
| 24 | ++ |
| 25 | ++ |
| 26 | ++ |
| 27 | ± |
| 28 | ± |
| 29 | ± |
| 30 | ++ |
| 31 | ++ |
| 32 | ++ |
| 33 | ++ |
| 34 | − th |
| 35 | ± |
| 36 | ± |
| 37 | ++ |
| 38 | − th |
| 39. | ± |
| 41 | ++ |
| 42 | ± |
| 43 | |
| 44 | ++ |
| 45 | ++ |
| 46 | ++ |
| 47 | ++ |
| 48 | ++ |
| 49 | ± |
| 50 | ±(th) |

.17

Gna (gluconic ac.) Mutation Run. 

Feb. 3, 1948.

Y10

A). $10^9$ cells per plate 3 mins. under Watson's Steilamp.
6 plates x 500 = 3000 colonies.

B). $10^8$ cells. 75 secs stei lamp. ca 1/3 unreadable.
40 plates x 500 = 20,000.

No very clear cut colonies or sectors. Streak out suspicious colonies.

1 slow on gluconic from A. (intact colony). W169.

2. Gluconic – from B.

1. intact W170

2. + W171
– W172

Compare:

| | glucose | galactose | Gluconic | Lactose | Maltose | Arabinose | T1 |
|---|---|---|---|---|---|---|---|
| W169. | – | ± | ± | – | – | ± | S |
| W170 | + v.s.c. | ++ | ++. v.sm. col. | ++ | ++ | ++ | S |
| W171 | ++ | ++ | ++ | ++ | ++ | ++ | S |
| W172. | ++ | + and – (diverse). | – | ++ | – | ++ | S |

48h

W169 is lactose slow or negative.

W172 is inexplicable! Gna – Maltose – Galactose ±?
Repeat these tests!

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| W145. | ++ | ± | – | – | – | | S |

W117 x Y40.

W108 - reversion or reverse mutation

Feb. 2, 1948.

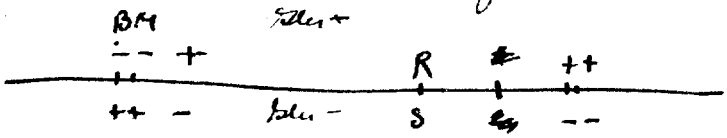
On EMS-glucose. Cross W117 (W118 glucose partial reversion) x Y40 (wild standard). and look for glucose-recombinants.

Feb. 5, 1948.

Glu+ easily distinguished from residue of Glucose- or ±. Two classes of latter cannot be directly distinguished on the EMS-glucose cross-plate. Majority of colonies Glu±.

Stuck out most likely Glu- on Glu EMB and compare with W108 and W117.

| Glu+ | Glu ± |
|---|---|
| 7 | 189. |




∴ ~~Glu- is located near TL. Most Glu+ should be~~
∴ Glu is located near BM. (in neighborhood of Mal₁).

Check by distribution of $V_1^R/S$

| Glucose ++. | $V_1^R$ | $V_1^S$ |
|---|---|---|
| | 13 | 5 |
| | 5 | 4 |
| | 16 | 4 |
| | 14 | 5 |
| | 12 | 5 |
| | 58 | 23 |

| Glucose ± | $V_1^R$ | $V_1^S$ |
|---|---|---|
| | 1 | 0 |
| | 16 | 3 |
| | 8 | 1 |
| | 11 | 6 |
| | 14 | 5 |
| | 50 | 15 |

This is essentially similar to behavior of Mal₁ (W-1).

Glucose- and Glu± are difficult to distinguish. Among ca 2000 colonies, pick the most likely - types and compare also with W108, W117 and Y10:
23 examined — 4 glucose- found. These are quite distinguishable from Y117. ∴, presumably a suppressor mutation can take over the functions of Glu₁-. ~~[illegible]~~

(over)

Purify the four glu- recombinants and compare with Y10 ~~and~~ W117 and W108 on glucose EMB.

| | 24h. | 48h. |
|---|---|---|
| Y10 | +++ | ✓ |
| W117 | — | ++ |
| W108 | — | — |
| -1 | — | — |
| -2 | — | — |
| -3 | — | — |
| -4 | — | — |

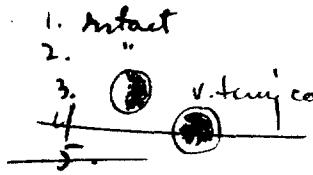
Feb. 4, 1948.

Inoculate 58-161 on Ar. EMB plates.

20 plates. Colony dimorphism as on galactose noted.
x 300 = 6,000 cols.

(A). Take $Ar^S$ and $Ar^R$ and test on Ar, gal. plates.
Same differential as glucose, Arabinose + galactose!

(B). β possible mutants noted.

| | Ar. | Gal. | |
|---|---|---|---|
| 1. intact | slow | | w-174 |
| 2. " | – | | w-175 |
| 3.  v. tiny colony. | + and – | + and – | w-176, 177 |

# Galactose mutation run.

Feb. 5, 1948.

Y10. 50 plates x ca. 150 scorable colonies → 7500 colonies.
3 suspicious colonies streaked on gal EMB.

1. + and − W-180
2. do. + and − W-181.
3. o

Feb. 6, 1948

58-161 (S and R) irradiate $10^8$ cells/plate 85 seconds. Watson's lamp.
on Lac E MB.

75 plates × 300 survivors = ca. 22,000 scorable colonies.

Picks. P7 & streak out. Following mutants obtained:

| | | W-~~#~~ | |
|---|---|---|---|
| Intact Cols. | 1. | 182 | – |
| | 2. | 183 | – |
| | 3. | 184 | – |
| | 4. | 185 | – |
| Sectorial | 5. | 186 | – |
| Critical | 6. | 187 | slow – +++ in 48 hours. |
| | 7. | 188. | – |
| | 8. O | 189 | slow growing. |

Retest:

| | Lac | Mal | Gal | Glu | Gna | Xyl | Ara |
|---|---|---|---|---|---|---|---|
| 182 | | | | | | | |
| 183 | | | | | | | |
| 184 | | | | | | | |
| 185 | | | | | | | |
| 186 | | | | | | | |
| 187 | | | | | | | |
| 188 | | | | | | | |
| 189 | | | | | | | |

# Cross-test Lac Mutants.

Feb. 6, 1948.

| Cross: | x. | A W-45 | Bugal | B Y-87 | | |
|---|---|---|---|---|---|---|
| W-120 | | ++ | + | +(1/300)* OK | | 1 plate each. Each plate had at least 500 scoreable colonies unless spec |
| 121 | | ++ | − | − | Lac, − | |
| 122 | | | | | | |
| 123 | | ++ | + | − | Lac, − | |
| 124 | | ++ | | − | Lac, − | |
| 125 | | ++ | − | +(2/50)* OK | | slow +. |
| 126 | | ++ | − | +(3/1000)* OK | | |
| 127 | | ++ | | − | Lac, − | |
| 128 | | ++ | − | − | | (Pls different) |
| 129 | | | | | | |
| 130 | | ++ | + | − (<100 cols.) | Lac, − | * OK ✓ |
| 131 | | ++ | | − | Lac, − | |
| 132 | | + | | | | |
| 133 | | ++ | − | ±(1+/1000)* OK | | |
| 134 | | ++ | | − | Lac, − | |
| 135 | | ++ | | − | Lac, − | |
| 136 | | ++ | | − | Lac, − | |
| 137 | | ++ | | − | Lac, − | |
| 138 | | ++ | | − | Lac, − | |
| 139 | | ++ | | − | Lac, − | ~~(Slow!)~~ |
| 140 | | ++ | − | 1/1000+ | | * OK |
| 141 | | ++ ✓ | | − (slow ±?) | Lac, − | |
| 142 | | ++ | | − | Lac, | |
| 143 | | ++ | | − | Lac, | |
| 144 | | ++ | | − | Lac, | |
| 156 ~~145~~ | | ++ | + | +(1/100) | | + OK (See 115a.) |

Note: either * streaks out ++'s. and repeat cross.

February 8, 1948.

W-145 is Lac- Mal- Str+.

Cross with W45, Y87 to exclude allelism and with (Y40) to determine whether one or more mutations are responsible for the Lac-Mal- state. Cross on Lac and on Mal mediums.

W145 × Y87 → ++ Lac+.

W145 × W45 → No colonies ✓ (Hold). } on ~~glucose~~ lactose EMS.

W-145 × Y40 on maltose → heavy growth in background; numerous +

(Plates may have had some peptone!) do. Lac.

Pick from Lacs to Mal EMS + vice versa.

Lac+ tested on Mal:

| Mal+ | Mal- |
|---|---|
| 98. | 0 ~~1? to be rechecked~~. |

Mal+ tested on Lac:

| + | − |
|---|---|
| 102 | 0. |
| 200 | 0 |

∴ No Recombinants found in which Lac- was separated from Mal-. in 200 tests.

W-117 / W108. 

Febr. 7, 1948.

A. On Glucose EMS:
W108 x Y40

B. W117 x Y40. C. (Feb. 8) W116 x Y40.

Both crosses give Glu ++ and Glu "−". Although, as a whole, the "−" colonies in B are darker than in A, they are not readily distinguished on this plate.
Pick "−" colonies at random from A and B and streak out on Glu EMB.

A. All − (15)

B. All ± (24).
+ after 2 days.

~~Streaked directly from B. as before.~~

C. 200 Glu + colonies. No −

C-source utilization & selective reversion.

Feb. 9, 1948.

1 (m) + .05%: Mor. W-117 P9.

| | A-11 * | D14 ** |
|---|---|---|
| 1. Glucose | +++ | ✓ +++ |
| 2. Lactose | ++ | ~~+++~~ |
| 3. Maltose | ++ | ~~+++~~ |
| 4. Ammonium Acetate | +++ | ~~+++~~ |
| 5. Sucrose | – | – |
| 6 " | – | – |
| 7 Raffinose | – | – |
| 8 " | – | – |
| 9 Cellobiose | ± | + |
| 10. α Meglu. | – | – |

11. Lactobionate No growth. Granular sediment. –

* Streak out.

| | ~~Lac~~ | Mal | ~~Glu~~ |
|---|---|---|---|
| 1. | | All – | |
| 2. | +++ and + colonies. | | |
| 3. | + and – | + and – | |

(~~Test Lac+ on Glucose.~~)

**

| | Lac | Mal | Glu |
|---|---|---|---|
| 1. | All – or –I | All – or –I | All + (117 type) |
| 2. | ++ and – | ++ and – | +++ and +117 (hard to score at 48h.) |
| 3. | ++ and – | ++ and – | do. |

Prify 3++ as W-

(See over.)

Evidently, selective pressure of glucose on W·117 is inadequate to force development of $Lac_3+$ types. Lactose, however, ~~[illegible]~~ and maltose, however, impose a more stringent differential so that the type $Sl_3 + Lac_3+$ develops.

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About 20 Mal+ and 20 Lac+ were tested on glucose. All +++.

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Test Lac+/Mal and vv.

February 16, 1948.

From 112 *** plates, Lac+ colonies were streaked on Mal, and Mal/Lac.

of 30 Lac+ colonies, 12 were Mal ±. 1-12

of 27 Mal+, 8 were Lac-. 13-20.

Recheck and purify on Lac + Mal. First readings: 24 h.

| | Lac | Mal | |
|---|---|---|---|
| 1 | + | − | |
| 2 | + | − | |
| 3 | + | − | W − 236 |
| 4 | + | − | |
| 5 | + | − | |
| 6 | + | − | |
| 7 | + | − slow ± | |
| 8 | + slow | − | |
| 9 | + | − | |
| 10 | + | − | |
| 11 | + | − | |
| 12 | + | − | |
| 13 | − | − | |
| 14 | − | − | |
| 15 | − | − | |
| 16 | − | − | |
| 17 | − | − | |
| 18 | − | − | |
| 19 | − | − | |
| 20 | − | − | |

February 19, 1948.

P18 from W108 heavily ~~too~~ into T(m)+.

A. Lac B. Mal.

| | | | P20 |
|---|---|---|---|
| P19. | Lac | +++ | ✓ |
| | Mal | – | +++ |

Streak out Lac on Lac and look for specific reversions. Do Mal 2/20

| | | Maltose | Glucose | |
|---|---|---|---|---|
| 112B1 | Lac+ m: | 69 – | 85 – | These reversions are apparently Lac+ Mal– Glu–! |
| 112B2 | | 0 + | 0 + | |

Most of the Mal– are faintly purplish.

Select 2 and streak out on the three media.

| | M. | B. | Lac. | |
|---|---|---|---|---|
| 1. Smooth, faint pink 48h. + purple. | – | = 24h. No pink. | ++ | W– |
| W108 | – | – | – | |
| W117 | – | ++ | – | |
| 2. Rough, white | | = 24h. | ++ | W– |

After 60 hours, most of the 69 Lac+Mal– turned a fairly dull purple on maltose as if ±, but were glucose–. Pick to slants as W-251 and W-252

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| | Maltose | Glucose | Lactose | |
|---|---|---|---|---|
| Mal+ m: (24h.) | | 71± 7– | 65+ 2– | |

Retest Sample of each group on each:

24h.
+24h.
48h.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | + | + | – | – | – | | W-327 M+B-L? |
| 2 | – | – | – | – | – | | |
| 3 | + | + | – | ± | + | | |
| 4 | + | + | – | ± | + | | |
| 5 | | | + | – | + | + | |
| 6 | + | + | – | – | + | + | W-328 M+B-L+ |
| 7 | + | + | – | – | + | + | |
| 8 | + | + | – | – | + | + | |

# Lac Mutation Run.

Feb. 12, 1948.

Y10 (S.C.I.) $10^8$/plate. 80 secs. (Watson's lamp).
90 plates x ca. 800 per plate. 70,000 colonies.

Sectors: w — w -

1. 190
2. 191
3. 192
4. 193
Not cal. subcr. 5. 194
6. 195
7. 196
8. 197.

Also: 32 intact white colonies.

Feb. 10, 1948.

Y87 (Lac, -) x : on EMS' Lac

| | Lac + | Lac − |
|---|---|---|
| 1. W-120. | 1 | 1000 |
| | 0 | 200 |
| | 1 | 1000 |
| | 0 | 1000 |
| | 1 | 1000. |
| | 3 | |
| | 1 | / 750. |

W120 Not Lac, −

| | | |
|---|---|---|
| 2. W-125. | 0 | 2 |
| | 6 | 9 |
| | 1 | 2 |
| | 1 | 2 |
| | 3 | 4 |
| | 12. | 19 |

W125 Not Lac, −. Not $\overset{al}{=}$ W-120.

| | | |
|---|---|---|
| 3. W-126. | 0 | 30 |
| | 0 | 30 |
| | 0 | 40 |
| | 2 | 300. |
| | 2 | 400. |

W126 Not Lac, −

| | | |
|---|---|---|
| 4. W130 | 0 | 100 |
| | 0 | 100 |
| | 0 | 100 |
| | 0 | 100 |
| | 0 | 100. |
| | 0 | 500. |

~~Allelism in doubt~~.

| | | |
|---|---|---|
| 5. W-133 | 2 | 100 |
| | 0 | 200 |
| | 1 | 100 |
| | 1 | 100 |
| | 2 | 500. |

Not Lac, −

Contd.

| | Lac + | Lac − | |
|---|---|---|---|
| W-140. | 0 | 100 | |
| | 1 | 200 | |
| | 1 | 200 | |
| | 1 | 200. | |
| | 0 | 200. | |
| | 3 | 900. | Not ≡ Lac, − |

| | | | |
|---|---|---|---|
| W-156. | 0 | 100. | |
| | 0 | 200 | Probably ≡ Lac, − |
| | 0 | 100 | |
| | 0 | 200 | |
| | 0 | 300 | Phenotypically Y53. ✓ |
| | 0 | 200 | |
| | 0 | 200 | |
| | 0 | 300 | |
| | 0 | 300 | |
| | 0 | 1900. | |

# Lac Cross-Tests.

Feb. 12, 1948.

On EMS-Lac

A. W-145 × W-45

B. W-145 × Y87. (1 or 2 plates).

C. W-145 × Y40.

D. W-128 × W-45

E. W-128 × Y87.

E:.

| Lac+ | Lac- |
|---|---|
| – | 100 |
| – | 100 |
| – | 300 |
| – | 100 |
| – | 200 |
| – | 400 |
| | 150. |
| | 800 |
| | 400 |
| | 100 |
| 0. | 2400 |
| 0 | 350 |
| | 2750. |

∴ W-128 is (Lac, –). Not phenotype and compare with Y53.

0 Recombinants in 2750 tests.

A. 4 plates. No colonies!

B. 6 4 + other small On adequate incubation 8+ : 288 –
6 ?
= 3% Lac+ recombinants.

C. ++ ++

D. 3 plates. No colonies. [What is wrong with W-45?].

Feb. 12

1.1% glucose

108 grown in YB Test on:

| Set up 12 N | Glu | Glu+Gal | Gal | Gra | Ara | Glu+Ar. | Bu Gal | Me Gal. |
|---|---|---|---|---|---|---|---|---|
| 230 | + | +++ | + | +++ | +++ | +++ | – | – |
| 430 | ++ | +++ | ++ | ✓ | ✓ | ✓ | – | – |

Reverted!? (W.117?). type

N.G.

# Characterization of Mutants.

Feb 9, 1948.

| | W- | Lac | Mal | Glu | Glucose | Xylose | Arabinose | Butyl gal. | Methyl gal. | GAL. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 182 | − − − | ± + | ++ | ++ | + | + ++ | + ++ | ± + | |
| 2 | 183 | − − − | ++ ✓ | ++ | ++ | + | + ++ | + ++ | − + ± | |
| 3 | 184 | − − − | ± ± ± | ++ | ++ | + | + ++ | + ++ | ± + | |
| 4 | 185 | − − − | − − (−) | − + ++ | − − − | − (−) | − ± | − − (−) | − − − | |
| 5 | 186 | − − − | ++ | ++ | + + | + | + ++ | + ++ | + ++ | |
| 6 | 187 | − − + | − − − | − − + | − − p − | + | + | + ++ | ± + | |
| 7 | 188 | − − ± | − − (−) | − − (−) | − | + + | − (+) | − ++ | − (−) | |
| 8 | 189. | − − ± | − − (−) | − − (−) | − | + p | − − (−) | − − + | − − − | |
| 9 | 108. | − − − | − − − | − − (−) | + | + | ± + | + + ✓ | − ± ± | |
| 10 | 174 | ± + ++ | ± + ± | − + ++ | ± + | + | − ± at + | ✓ | + ++ | |
| 11 | 175 | ± + | − + | ± ++ | + ++ | + | − − ± | ✓ | ++ | |
| 12 | 177 | ± + | − + | ± ++ | + ++ | + | + ++ | ✓ | ++ | |
| 13 | X ~~169~~ 112 | − − | ++ ++ | ++ | + ++ | + | + | − ✓ (−) | − − (−) | |
| 14 | ~~172~~ 143 | − − | ++ ++ | ++ | + ++ | + | + | + ++ | + ++ | |
| 15 | 145. | − − | − − (−) | ++ | − − − | + | − | − − − | − − − | |
| 16 | 116 | ++ ✓ | ++ | ++ | ++ ✓ | + | + | + ++ | ++ | |
| 17 | 117 | − − | − (−) | − + ± | − + | + | + | ++ | + + ± | |
| 18 | 180 | − ± + | ± ± | ++ | − − − | + | + | ++ | ++ | |
| 19 | 181 | + ✓ | − | − ± | − − − | + | + | ++ | ++ | |
| 20 | 120 | − − − | ++ | ++ ++ | + ++ | + | − | − − (−) | − − (−) | |
| 21 | 125 | − − − | ++ | ++ | − − ± | + | + | − − (−) p | − − p | |
| 22 | 126 | − − − | ++ | ++ | + ++ | + | + | − − (−) | − (−) | |
| 23 | 130 | − − − | ++ | ++ | ± | + | + | + ++ ✓ | + ++ | |
| 24 | 133 | − − − | ++ | ++ | ++ | + | + | − − ± | − − (−) | |
| 25 | 140 | − − − | ++ | ++ | ++ | + | + | − − (−) | − − − | |
| 26 | 156 | − − − | ++ | ++ | ++ | + | + | + ++ | + ++ | ✓ |
| 27 | 121 | − − − | ++ | ++ | ++ | + | + | + ++ | + ++ | |
| 28 | 123 | − − − | ++ | ++ | ++ | + | + | + ++ | + ++ | |
| 29 | 128 | − − | ++ | ++ | ++ | + | + | − − (−) | − − (−) | |
| 30 | 142 | − − | ++ | ++ | ++ | + | V | + + | + + | |

B on 6P9

— 8A10
— 2P10
— 6P10
— 9A11

Note 108 on Butyl-B-galactoside. Try W-108 on galactose and on glucose + galactose!

Lac Cross tests:

① BM muts × W-126.

Feb. 14, 1948.

On Lac EMS' W-126 ×

| | W | | |
|---|---|---|---|
| 1. | 35 | ++ ✓ | |
| | 40 ~~no growth~~ | ± 1/1000, 3/1000. | |
| | 42 " " | | |
| 2. | 43 " | | |
| 3 | 45 | ++ ✓ | |
| 4 | 48 | 0/500 0/600 | Allel. |
| 5 | 65 | 2/500 1/400 ± | |
| 6 | 67 | 0/600; 0/600. | Allel. |
| 7 | 72 | +± +± | |
| 8 | 74 | 2/400; 3/200 + | |
| 9 | 76 | 1/500 2/500 ± | |
| 10 | 83 | 0/500; 0/500 | Allel. |
| 11 | W87. | 3/600, 2/600. ±. | |
| | 182 | 1/600; 5/500 + | |
| | ~~Y53~~ 183 | 3/600; 2/600 ± | ~~W-126~~. |
| | 186 | 1/400, 3/400 + | |
| 12. | 182 × ~~[illegible]~~ Y53 | 1/600 0/600. ± ? | |
| 13. | 183 × Y53 | 0/600; * 0/500 | |
| 14. | 186 × Y53 | 0/600, 1/600 * | are these ++'s artifacts? |

Streak out parentals + the sole +'s.

* Streak out. 186B: good ++. do. 182B.

W-83; W-67; W-48 may be regarded as $Lac_4$ –

W-35, 45 and 72 are probably $Lac_2$ –

W-40, 65, 74, 76, 87, are probably additional loci.

Feb. 14, 1948. Test on EMB:

~~76. 54. Y40 UV — } Lac sectors~~
~~77 54 Y40 UV + } —~~

| | Glu | Gal | Gna | [redacted] | Me Gal | Bu Gal. |
|---|---|---|---|---|---|---|
| W-108 | — | ++ * | ++ | | + | +++ |
| Y53 | +++ | +++ | +++ | | ++ | +++ |
| W117 | ++ | +++ | +++ | | ++ | +++ |
| W45 | +++ | +++ | +++ | | — | — |
| W128 | +++ | +++ | +++ | | — | — |
| Y10 | +++ | +++ | +++. | | +++ | +++ |
| W145. | +++ | ++ * | — | | — | — |

* peculiar brilliant purple shade. Bleached in mass streak

108 on galactose is enzymatic.

[redacted] Streak out W-108 on glucose and galactose:

Glu All —

Gal Two types of colonies: ① Fairly strong Gal +
② Stained in center, clear periphery of colony.

Galactose is utilized by W-108. Maybe two colonial types.

Repeat, 2/15, 2/17.
Y108 is Glu - Gal + !

2/17/48. Gal Gna
W-2 on EMB. +++ +++
may be a little slow ⊙ ●

Characterization:



| | Glu | Gal | Gna | Lac | Mal | |
|---|---|---|---|---|---|---|
| ~~189~~ | | ++ | | | | |
| 190 | ++ | ++ | ++ | − | ++ | |
| 191 | − | + | ++ | − | − | 108 type |
| 192 | ++ | ++ | ++ | − | ++ | |
| 193 | ++ | ++ | ++ | − | ++ | |
| 194 | ++ | ++ | ++ | − | ++ | |
| 195 | − | + | ++ | − | − | 108 type |
| 196 | ++ | ++ | ++ | − | ++ | |
| 197 | ++ | ++ | ++ | − | ++ | |
| 198 | ++ | ++ | ++ | ++ | ++ | |
| 199 | ++ | ++ | ++ | ++ | ++ | |
| 200 | ± | ++ | ++ | + | ± | |
| 201 | ++ | ++ | ++ | − | ++ | |
| 202 | ++ | ++ | ++ | − | ++ | |
| 203 | − | + | ++ | − | − | 108 type |
| 204 | − | + | ++ | − | − | 108 type |
| 205 | ++ | ++ | ++ | − | ++ | |
| 206 | ++ | ++ | ++ | − | ++ | |
| 207 | − | + | ++ | − | − | 108 type |
| 208 | ++ | ++ | ++ | − | ++ | |
| 209 | ++ | ++ | ++ | − | ++ | |
| ? 210 | ++ | ++ | ++ | ++ | ++ | |
| 211 | ++ | ++ | ++ | − | ++ | |
| 212 | ++ | ++ | ++ | − | ++ | |
| 213 | − | + | ++ | − | − | 108 type |
| 214 | ++ | ++ | ++ | − | ++ | |
| 215 | ++ | ++ | ++ | − | ++ | |
| 216 | ++ | ++ | ++ | − | ++ | |
| 217 | ++ | ++ | ++ | − | ++ | |
| 218 | ++ | ++ | ++ | − | ++? | |
| 219 | − | + | ++ | − | − | 108 type |
| 220 | ++ | + | − | − | − | 145 type |
| 221 | ++ | ++ | ++ | − | ++ | |
| 222 | ++ | ++ | ++ | − | ++ | |
| 223 | ++ | ++ | ++ | − | ++ | |
| 224 | − | + | ++ | − | − | 108 type |
| 225 | ++ | ++ | ++ | − | ++ | |
| 226 | − | + | ++ | − | − | 108 type |
| 227 | − | + | ++ | − | − | 108 type. |
| 228 | ++ | ++ | ++ | − | ++ | |
| 229 | − | ++ | ++ | − | ± | 108 type |

Feb. 16, 1948

A. W-45⁻ × W−

B. Y-87 × W−

| | | A | Megalac.* | B | |
|---|---|---|---|---|---|
| 1 | 190 | ++ ✓ | | 0/100 | LAC₁ − |
| 2 | 192 | ++ ✓ | | +/1 col. | x |
| 3 | 193 | ++ ✓ | | 0/20 | ~~LAC₁ −~~ |
| 4 | 194 | ++ ✓ | | 0/200 | LAC₁ − |
| 5 | 196 | ++ ✓ | | 0/100 | LAC₁ − |
| 6 | 197 | | | 0/100 | LAC₁ − |
| 7 | 201 | ++ ✓ | | 1/100 | LAC x |
| 8 | 202 | ++ ✓ | | 0/100 | LAC₁ − |
| 9 | 205 | ++ ✓ | | 0/100 | LAC₁ − |
| 10 | 206 | ++ ✓ | | 0/100 | LAC₁ − |
| 11 | 208 | ++ ✓ | | 0/600, 0/700 | LAC₁ − |
| 12 | 209 | | | | |
| 13 | 211 | ++ ✓ | | * 0/200 0/500 | LAC₁ − |
| 14 | 212 | ++ ✓ | | 0/200 1/200 | x |
| 15 | 214 | ++ ✓ | | 2/400, 0/50 | x |
| 16 | 215 | ++ ✓ | | 1/300 1?/300 | x |
| 17 | 216 | ++ ✓ | | 0/200 0/200 | LAC₁ − |
| 18 | 217 | ++ ✓ | | 0/300 0/200 | LAC₁ − |
| 19 | 218 | ++ ✓ | | 3/3+ 7/10+ | x |
| 20 | 221 | ++ ✓ | | 0/500 1/200 | x |
| 21 | 222 | ++ ✓ | | 0/100 0/100 | LAC₁ − |
| 22 | 223 | ++ ✓ | | 0/500 0/300 | LAC₁ − |
| 23 | 225 | ++ ✓ | | 0/700 0/500 | LAC₁ − |
| 24 | 228 | ++ ✓ | | 0/600 0/200 | LAC₁ − |

W-188 × W-108.

+ and − colonies found. W-188 is Glu₂ −
Some intermediates possible. Streaks out

All Lac₁ − except: 192, 193?, 201, 212, 214, 215, 217, 218, 221. of these, 192 + 218 are in one group, the remainder in another

m glucose. 3 da.
W188 3-4+/200 −. Cross results uncertain. Needs purification.
No intermediates noted on purification of suspected prototrophs. (Change due to drying out + colony darkening.)

* Test streaks on Megalact. EMB 2/23/48.

Lac Mutants Cross-Tests

Febr. 16, 1948.

Cross on EMS-Lac $B_1$.

| | W-- | A x W-45 ($Lac_2$) A | B x Y-87 $Lac_1$ B | C x W-67 $Lac_4$ C | |
|---|---|---|---|---|---|
| 1 | 120 | ++ ✓ | 21/700 1/200 | 0/400 0/400 | |
| 2 | 122 | +++ ✓ | ϕ/300 7/400 | 0/500 0/400 | |
| 3 | 125 | ++ ✓ | ++ | ++ ✓ | Lac 6 |
| 4 | 132 | ++ ✓ | 0/600 0/600 | 0/600 0/600 | All. Lac, and Lac4 |
| 5 | 133 | ++ ✓ | 3/400 6/600 | 0/300 2/600 | "Nat Lac, or Lac4" |
| 6 | 140* | ++ ✓ | 0/200 0/200 ✓ | 0/500 0/400 | either (1) or (4) |
| 7 | 145 | +++ ✓ | ++ ✓ | +++ ✓ | |

* By mistake, 144 was given instead of W140. Cross was therefore attempted with cells scraped from stock slant of W140.

132 and 140 both gave no Lac + either $\bar{c}$ Lac, or $\bar{c}$ Lac4

133 gave Lac + $\bar{c}$ both. 120 + 122 are Lac4

Lac Mutation Run.

February 17, 1948.
58-161 S.C-1.
95 plates x ca. 200 (v. uneven) = 19,000 colonies.

| | | | Glu | Gal | Lac | Mal | Gua |
|---|---|---|---|---|---|---|---|
| Retest on EMB Streaks. 2/18. | W-237. | ◐ | ++ | ++ | − | ++ | ++ |
| | W-238 | ◑ | ++ | ++ | − | ++ | ++ |
| | -239 | ○ | − | N.G. | − | N.G. | ? |
| | -240 | " | ++ | ++ | − | ++ | ++ |
| | 241 | " | ++ | ++ | − | ++ | ++ |
| Slow + | 242 | " | ++ | ++ | + | + | ++ |
| | 243 | " | − | ++ | − | − | ++ |
| | 244 | " | ++ ++ | ++ | − | ++ | ++ |
| | 245 | " | − | − ! | − | − | ++ |
| | 246 | " | ++ ++ | ++ | − | ++ | ++ |
| | 247 | " | ++ ++ | ++ | − | ++ | ++ |
| | 248 | | | | − | | |
| | 249 | | | | − | | |
| | 250 | | | | − | | |

Types: Lac − 237, 238, 240, 241, 244, 246, 247

Glu − 239, 243, 245. See p. 128

February 10, 1948.

1. Streak out W-128 on ~~Ethyl~~ Methyl β-d-galactoside and on lactose
A 18 All - ; No papillae.

A 20 All - No papillae.

P 22 Do.

Heavy inoc. into T(m) + Lac + βmgal.
2/20 — —
P 22 — —

W-128 is completely stable.

(2.) Streak out W-138 on lactose & compare with ~~to~~ Y87; Y53.
[Esther says W-138 is slow +] A18. All -. No papillae [redacted]
Y87 is papillate

A 20. — Not slow +. No papillae.

A 21 — Slow + ! lactuals.