August 28, 1949.

a) Large series of lac- and Mal- mutants obtained from W1069 and W1077 ca 8/25. (W1140 = LyMe-Trypo-Lac-; W1141 = Hist- dbVal-Mal-).

0) N28. Mix W1140, W1141 in Penassay tubes.

N30. Wash and plate on T(0); EMS Lac

P31. 1 colony/15 plates.
Streaked out on T(0) agar. 4 s.c. picked and streaked on lac; Mal EMB
Non-coliforms dominate, but contamination with a lac+ Mal+ seen.
Purify and test nutrition:

These derivatives of W1045 show no signs of recombination.

# Hfr crosses.

August 28, 1949

Mix heavily in Penassay:

A) W1059 + W814

B) W1059 + W1084

A). Malac ~~5~~ 5 x 100. 13% Malac − 3/500 Malac v.
Test on other sugars, ~~T1~~ T1.

Lac 25 x 100. >1% Lac v.

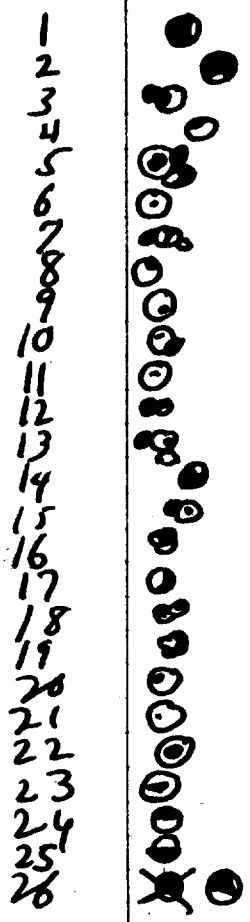
Mal+ "tested on lac" 33 L− (2 L+) (1 or 2 indef.) were (B). → Mal+ Xyl+
Mal− 10 L− 50 L+

B) Malac 10 x 100 = 1000 No Malac− !
Mal 5 x 100 = 500. 6 Mal v ?
Lac 25 x 150

Mal+ : 56 Lac−.
33 Lac− 2 Lac+
Mal+ : 89 Lac− 2 Lac+

(from Malac platings, all Mal− are Lac+).

A) loc & colonies



602A count

337+ : 102−

L+ : 60 : All Xyl−, All Gal−(?), Mal−

L− :

Maltorescoring unlfinite because of fading on 1% Mal EMB. Used 1.5% henceforth to avoid this difficulty

| | M | ? | X | Mal | Gal |
|---|---|---|---|---|---|
| 1 | − | | − | − | − |
| 2 | − | | − | − | − |
| 3 | + | | + | + | + |
| 4 | − | | − | − | − |
| 5 | + | | + | + | + |
| 6 | + | | + | + | + |
| 7 | − | | − | − | − |
| 8 | + | | + | + | + |
| 9 | + | | + | + | + |
| 10 | − | | − | − | − |
| 11 | − | | + | + | + |
| 12 | − | | − | − | − |
| 13 | + | | + | + | + |
| 14 | − | | − | − | − |
| 15 | − | | − | − | − |
| 16 | − | | − | − | − |
| 17 | − | | − | − | − |
| 18 | − | | − | − | − |
| 19 | − | | − | − | − |
| 20 | − | | − | − | − |
| 21 | − | | − | − | − |
| 22 | − | | − | − | − |
| 23 | − | | − | − | − |
| 24 | − | | − | − | − |
| 25 | − | | − | − | − |
| 26 | + | | + | + | + |
| | + | | + | + | + |
| | + | | + | + | + |
| | − | | − | − | − |
| | + | | + | + | + |
| | − | | − | − | − |
| | + | | + | + | + |
| | + | | + | + | + |
| | − | | − | − | − |
| | + | | + | + | + |
| | − | | − | − | − |
| | − | | − | − | − |
| | + | | + | + | + |
| | − | | − | − | − |
| | − | | − | − | − |
| | + | | + | + | + |
| | + | | + | + | + |
| | − | | − | − | − |
| | − | | − | − | − |
| | + | | + | + | + |

24M−
25M+

Random isolations show 77% L+X− etc.−
11% L−M+ 11% L−M−

September 2, 1949. xyl tests

| | Lac + | Lac − |
|---|---|---|
| 1. | − | − |
| 2. | − | − |
| 3. | − | + |
| 4. | − | + |
| 5 | − | − |
| 6 | − | + |
| 7 | − | + |
| 8 | − | + |
| 9 | − | + |
| 10 | − | + |
| 11 | − | + |
| 12 | − | − |
| 13 | − | + |
| 14 | − | − |
| 15 | − | + |
| 16 | + | 1 − |
| 17 | − | − |
| 18 | − | − |
| 19 | − | − |
| 20 | − | + |
| 21 | +, − | + |
| 22 | − | + |
| 23 | − | + |
| 24 | − | − |
| 25 | − | + |
| 26 | − | − |

of 25 Lac v, 10 were Xyl − Lac −

15 Xyl + Lac − // Xyl − Lac +.

| | | Rec. | Par. | |
|---|---|---|---|---|
| Among Lac − | Seg. Cols. | 10) | 15 | 35 |
| | Whole pop. | 24 | 25 | |
| | | 34 | 40 | |

# Hfr selection.

Sept 2, 1949.

602A = mixture of Lac-Mal- recombinant colonies (5).
Grow overnight in Penassay.

A) Assay cultures

| | $\times 10^7 ml^{-1}$ | $\bar{m}$ |
|---|---|---|
| 602A | 2,5 | 3 |
| K-12 | 42,64 | 53 |
| 1033 | 20,27 | 23 |
| 58-161 | 40,56 | 48 |
| Y10 | 35,33 | 34. |

Sept. 2.

B) Inoculate .001 ml 602A + following: into Penassay tubes.

| | | | |
|---|---|---|---|
| A | K12 1ml | 46+/59- | 31+/27- |
| B | W1033 .5ml + Y10 .5ml | 213+/0- | 136+/0- |
| C | 58-161 .5ml + Y10 .5ml | 71+/2- | 156+/3- |

Plate out 2q $10^{-7}$ Sept 5, 1949.

~~Lac Mal~~

B. 17 Lac u. Test +, - on Maltose. (5 each)

1-16 parentals only.

#17. 4 Lac+Mal-, 1 Lac+Mal+, 5 Lac-Mal+

Hetastoli Maltose - uv mus.



September 7, 1949.

Irradiate W466 and W477 on EMB Mal 7 secs. uv.
25 plates each. ca 200/

W466 12 mutants purified. #3 is glucose -
All but #3 and #10 are maltose - slow. T.O.

| | | | |
|---|---|---|---|
| #3 | Mal - | Glu - | |
| #10 | Mal - | Glu + | 1187? |

W477 16 mutants purified.

#3, 7, 13 are glucose -. #2 is "thin".
#s. 1, 2, 8, 11, 14 are maltose slow
#12 forms minute colonies.

| | | |
|---|---|---|
| #3 | Glu - | 1178-1188 |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | Glu - | |
| 9 | | |
| 10 | | |
| 12 | | |
| 13 | Glu - | |

Check for 30° fermentation of Glu - — None were temp. sens.

W466 Mal −

60.ca

September 15 ff. 1949.

ca 604. W466. 20 Mal EMB plates; 200/ = 4000.

# 1-8 are slow or weakly − fermenters of maltose. Test on Dslen

#9, 10 are Mal −. Streak out. (Dslen+); W1208-1209

# 11 as streaked from 1st isolation had mostly Mal−(slow) colonies, but 3 colonies sectoring in maltose. [These may be suggested to be $\frac{\text{Mal+}}{\text{Mal−}}$ $\frac{\text{Lethal}}{=}$]. No Mal+ were seen. Streak out on Mal EMB.

N18 When streaked out, Mal$\underline{v}$ colonies above gave mixtures of pure + and − and no apparent Mal$\underline{v}$. One possible Mal$\underline{v}$ (more bluish conglomerated) was noted. Streak out: These colonies are very difficult to interpret, mainly because there were no pure + colonies on the original plate. Conceivably, there had been induced an unstable intermediate allele which usually shifted to Mal− but rarely (i.e., with ~3 colonies) reverted to Mal+.

Test cross for Mal,-



September 13, 1949

(cont'd)

W1178 – 1183 × W1014 } Mal EMS (B,).

W1187 (WV86) × W814

| | Mal+/Total perth. | |
|---|---|---|
| 1187 | 20% + | |
| 1178 | 0/100 | MAL, |
| 1179 | 30% | |
| 1180 | 1/3 (ca 20 colo.) | |
| 1181 | 80% + | |
| 1182 | 30% + | |
| 1183 | 0/100 | MAL, |

677 SR × W478
= W1177

cultures purified

612

M. Doudoroff

| culture | from | Malt. | Streptomycin | Lactose |
|---|---|---|---|---|
| 1 | malt Synth | + | − | − |
| 2 | " | + | − | + |
| 3 | " | + | − | − |
| 4 | " | + | − | − |
| 5 | " | + | − | − |
| 6 | " | + | + | − |
| 7 | " | + | − | + |
| 8 | " | + | − | + |
| 9 | " | + | − | + |
| 10 | " | + | − | + |
| 11 | " | + | − | + |
| 12 | " | + | − | + |
| 13 | " | + | − | − |
| 14 | " | + | − | + |
| 15 | " | + | − | + |
| 16 | from Malt Synth + B' | + | − | + |
| 17 | " | + | + | − |
| 18 | " | + | − | + |
| 19 | " | + | − | + |
| 20 | " | + | − | + |
| 21 | " | + | − | − |
| 22 | " | − | + | + |
| 23 | " | − | + | + |
| 24 | " | − | + | − |
| 25 | " | − | + | − |
| 26 | " | − | + | − |
| 27 | " | − | + | − |
| 28 | malt. Synth | − | + | + |
| 29 | " | − | + | + |
| 30 | " | − | + | − |

| | | lac+ | lac− | Total. |
|---|---|---|---|---|
| Strept resistant | malt+ | 0 | 2 | 2 |
| | malt− | 4 | 5 | 9 |
| Strep sensitive | malt+ | 13 | 6 | 19 |
| | malt− | 0 | 0 | 0 |

| | | Total organisms tested | | Tested for lactose | lac+ | lac− |
|---|---|---|---|---|---|---|
| Strep sensitive. | Malt+ | 30 | | 26 | 16 | 10 |
| | Malt− | | 0 | 0 | 0 | 0 |
| Strep. resist. | Malt+ | 8 | | 5 | 1 | 4 |
| | Malt− | | 44 | 36 | 6 | 23 |
| | | 38 | 44 | 31 36. | 17 6 | 14 23 |

612a
H.D.

Cross - 677 SR (1177) X 478.
4 persistent diploids selected, Segregated

| Original diploid | Segregant | Lactose | Synth | Resistant Streptomyc |
|---|---|---|---|---|
| 1 | 1 | − | − | + |
| | 2 | − | − | + |
| | 3 | − | − | + |
| | 4 | − | − | + |
| | 5 | − | + | + |
| | 6 | + | + | + |
| | 7 | + | − | + |
| | 8 | + | − | + |
| | 9 | + | − | + |
| 2 | 10 | − | + | + |
| | 11 | − | + | + |
| | 12 | − | + | + |
| | 13 | − | + | + |
| | 14 | − | + | + |
| | 15 | + | − | + |
| | 16 | + | − | + |
| | 17 | + | −* | + |
| | 18 | + | − | + |
| 4 | 19 | − | − | + |
| | 20 | − | − | + |
| | 21 | − | − | + |
| | 22 | + | −* | + |
| | 23 | + | − | + |
| | 24 | + | − | + |
| | 25 | + | −* | + |
| | 26 | + | −* | + |
| | 27 | − | − | + |
| | 28 | + | − | + |
| 6 | 29 | − | − | + |
| | 30 | − | − | + |
| | 31 | − | − | + |
| | 32 | − | − | + |
| | 33 | + | − | + |
| | 34 | + | − | + |
| | 35 | + | − | + |
| | 36 | + | − | + |

Dark!

Diploids grew on streptomycin ER1B, showed segregation into lac+ and lac−, all growing on streptomycin. Diploids could be reisolated from streptomycin plates.

*Some colonies grew

??

Hence: Streptomycin resistance is dominant, [redacted] recovered in all segregants for lactose fermentation & nutrient deficiencies sensitivity is lost in cross. Hemizygous?

677 SR × 478

612b
M. Rockoff

cultures not purified

| | Streptomycin Synthetic glucose | Lactose Synthetic | maltose |
|---|---|---|---|
| Prototrophs 1 | + | + | − |
| 2 | + | − | + |
| 3 | − | + | + |
| 4 | + | − | − |
| 5 | − | − | − |
| 6 | + | − | − |
| 7 | + | + | − |
| 8 | + | − | + |
| 9 | − | − | + |
| 10 | + | − | − |
| 11 | − (+ colonies) | + | + |
| 12 | + | + | − ? |
| 13 | − | + | + |
| 14 | + | + | − |
| 15 | − | + | + |
| 16 | + | − | + |
| 17 | − | − | + |
| 18 | − | − | + |
| 19 | + | − | − |
| 20 | + | − | − |
| 21 | − | − | + |
| 22 | + | + | + |
| 23 | − | + | + |
| 24 | + | − | − |

| | Streptomycin Synth. glucose | Lactose Synth | Malt. |
|---|---|---|---|
| Prototrophs 25 | + | − | − |
| 26 | + | − | − |
| 27 | + | − | − |
| 28 | + | + | − |
| 29 | + | − | − |
| 30 | + | − | − |
| 31 | + | − | − |
| 32 | + | − | − |
| 33 | + | − | − |
| 34 | + | − | − |
| 35 | + | − | − |
| 36 | + | − | − |
| 37 | + | + | − |
| 38 | + | − | − |
| 39 | + | − | − |
| 40 | + | − | − |

| | | Lac+ | Lac− | Total |
|---|---|---|---|---|
| Strep. sensitive | mal+ | 3 | 4 | 7 |
| | mal− | | 1 | 1 |
| Strep. resistant | mal+ | 1 | 2 | 3 |
| | mal− | 6 | 21 | 27 |

| | | maltose |
|---|---|---|
| Proto 6 | 1 | + |
| | 2 | + |
| | 3 | − |
| | 4 | − |
| | 5 | + (+ colonies) |
| | 6 | + |
| | 7 | − |
| | 8 | − |
| | 9 | + |
| | 10 | + |
| | 11 | + |
| | 12 | + |
| | 13 | + |
| | 14 | + |
| | 15 | + |
| | 16 | + |

| | Lactose Synthetic | maltose |
|---|---|---|
| 1 | − | + |
| 2 | no gr. | + |
| 3 | " " | + |
| 4 | + | + |
| 5 | no gr. | + |
| 6 | " " | + |
| 7 | + | + |
| 8 | − | + |
| 9 | − | − |
| 10 | no gr. | − |
| 11 | " | − |
| 12 | " | − |
| 13 | " | − |
| 14 | − | − |
| 15 | no gr. | − |
| 16 | − | − |

| | | malt+ | malt− |
|---|---|---|---|
| Strep sensitive | | 4 | 0 |
| Strep resistant | | 3 | 8 |

W 108 mutations occurring spontaneously on nutrient agar.

| Strain | Isolated as + on: | Gluc | Galact | malt. | Lact. | Xylose | Mannitol | Treh |
|---|---|---|---|---|---|---|---|---|
| 1 | Glucose | + | S | [illegible] | S- | | | |
| 2 | " | + | S | [illegible] | S- | | | |
| 3 | | + | S | [illegible] | S- | | | |
| 4 | | + | S | - | S- | | | |
| 5 | | + | S | - | S- | S | — | + |
| 6 | maltose. | - | + | + | [illegible] | | | |
| 7 | | - (S-) | + | + | + | + | +- | - [illegible] |
| 8 | | - | + | + | + | | | |
| 9 | Galact | - | + | S | S- | | | |
| 10 | | - | + | S | S" | + | + ? | - [illegible] |
| 11 | | - | + | S | S' | | | |
| 12 | Lactose | - S- | + | S- | + (not very strong) | + | - (S-) | - (S-) |
| 13 | | - " | + | S- | + | + | - " | - " |
| 14 | | - " | + | S- | + | + | - " | - " |

D. D. 9-15-49 613

Fermentation tests on Shapiro's cultures.

| | Sucrose | Rhamnose | Arab | Inositol | Xyl | Mtl | Gal | Mal | Glu | Sorbitol |
|---|---|---|---|---|---|---|---|---|---|---|
| W1115 (1) | + | All show + | + | − | + | + | + | + | + | |
| W1116 (2) | −+ | | | | | | | + | | |
| W1113 (3) | ± | | | | | | | + | | |
| W1114 (4) | −+ | | | | | | | + | | |
| W1045 (5) | ± | | | | | | | + | | |
| W1176 (6) | ± | | | | | | | + | | |
| Sh 7 | ± | | | | | | | + | | |
| 8 | ± | | | | | | | + | | |
| 9 | ± | | | | | | | + | | |
| 10 | + | | | | | | | + | | |
| 11 | ± | | | | | | | + | | |
| 12 | ± | | | | | | | + | | |
| 13 | ± | | | | | | | + | | |
| 14 | ± | | | | | | | + | | |
| 15 | ±+ | | | | | | | + | | |
| 16 | − | | | | | | | + | | |
| 17 | + | | | | | | | + | | |
| 18 | + | | | | | | | + | | |
| 19 | ± | | | | | | | + | | |
| 20 | +± | | | | | | | + | | |
| 21 | + | | | | | | | | | |
| 22 | ± | | | | | | | | | |
| 23 | − | | | | | | | | | |
| 24 | ± | | | | | | | | | |
| 25 | ±+ | | | | | | | | | |
| 26 | − | | | | | | | | | |
| 27 | ± | | | | | | | | | |
| 28 | ± | | | | | | | | | |
| 29 | ± | | | | | | | | | |
| 30 | +± | | | | | | | | | |
| 31 | − | | | | | | | | | |
| 32 | ± | | | | | | | | | |
| 33 | ± | | | | | | | | | |
| 34 | ± | | | | | | | | | |
| 35 | − | | | | | | | | | |
| 36 | + | | | | | | | | | |
| 37 | +− | | | | | | | | | |
| 38 | −+ | | | | | | | | | |
| 39 | −+ | | | | | | | | | |
| 40 | −+ | | | | | | | | | |
| W1222 | | | | | | | | | | |

−+ are mutabile

# Het h-crosses.

Sept. 16, 1949.

| | | | | | |
|---|---|---|---|---|---|
| A. | 58-161 × W1178 | *6 tests; | all Lac++; 96 tests. | 1 Lac v | 2? |
| B. | 58-161 × W1183 | 52 tests. | 2? Lac v; 60 tests | 6 Lac v | 2? |
| C. | W478 (Mal+) × W1178 (Mal−) | 100 tests. | 4 Lac v | | |
| D. | W478 × W1183 | 52 tests. | 1 Lac v | | |

A. #2, 3 (?)

B. 1 het ← Lac v Mal++ — 614-B1

C. 1-4 Lac v Mal++ — 614-C: 1-4 — [#1 and 2 thrown off frequent Lac-prototrophs I.

D. 1 Lac v Mal++ — 614 D1

B. 1-6 Lac v × 7, 8 Lac ? — 5, 6, 7 are Mal+, − 8 is Mal+ Lac++.

1-4 are Mal−

* M.O. Misinoculated.

See 618

Het ou[redacted]es.

September 17, 1949.

| | | Rx EMS Lac ; | EMS Mal. |
|---|---|---|---|
| A. W1178 | x W828 | | 52 tests 1?? Lac v |
| B W1178 | x W836 | | 100 tests. 45 Lac v 6-7? |
| C. W1178 | x W760 very infertile | ~~6 tests 1 Lac v~~ | 6 tests. 2 Lac v. |

In 615 B, both on Mal EMB and Lac EMB, — colonies seem to grow better than + ! Streaked from Mal EMB:

A Mal —

B: 1-4 Mal — — 5: Mal + (v ??) ; 6 M +, - 7 Mal - (Recheck on resolution)
All Lac v. Isolated Lac v of 5, 6 were pure Mal +, Mal - resp.

C 1-2 Mal -

See 618

September 17, 1949

D. W1189 × W1195 [Val$^{A\cdot C}$ Arg$^{1}$ Mal− × Leu Tryp Lac$^{2}$− ]

E. W1189 × W1205 [Val$^{AA}$ Arg$^{1}$ Mal− × Thr His$^{3}$ Lac− ]

F. W1195 × W1191 [Leu$^{CC}$ Tryp$^{2}$ Lac− × Thr His$^{4}$ Mal− ].

Wash cultures from 42. Conc. 5x. Use .1 ml/plate

Controls:

1 (W1189) 4 colonies / 4 plates Lac+ Mal−

2 (W1195) 0 " / " "

3 (W1205) 0 " / " " Lac− Mal+

4 (W1191) 8, 12, 16, 11 / 4 plates ca. 12/plate !

D. 2 colonies / 9 T(0) plates 2 Lac+ / 4 EMS Lac plates

E. 7 colonies / 9 T(0) plates 1 Lac+ / 2 "

F. 10, 6, 2 / T(0) plates

W1189 and W1191 appear to be exceptionally unstable. Their nutrition should be carefully checked.

---

Tests on "cross" prototrophs

P19

| | Mal | Lac |
|---|---|---|
| D: 1-4 | + | + |
| E 1, 6 | + | − |
| 2-5, 7 | + | + |
| F 1-16 | + | + |

These prototrophs are clearly either contaminants or recombinants, probably former. Parents had been checked on EMB and found pure −.

Tests on "reversion" prototrophs

A20

| | | |
|---|---|---|
| 1 | Mal+ Lac+ | } must be contaminated !! |
| 4 | Mal+ Lac+ | |

| | | | | |
|---|---|---|---|---|
| 1 | 0, 2, 2 | 1113 | Thre Hist. x | Val Arg. |
| 2 | 1, 2, 2 | 1113 x 1114 | " | Val-Leu, Arg. |
| 3 | 2, 1, 4 | 1113 x 1115 | " | Leuc Trypt. |
| 4 | 0, 0, 0 | 1113 x 1114 | Val Arg | Hist Leuc |
| 5 | 0, 2, 1 sm sm | 1113 x 1115 | " | Thre Hist |
| 6 | 1, 2, 0 | 1114 x 1114 | Val Leu Arg | Hist Leuc |
| 7 | 2, 0, 0 | 1114 x 1115 | " | Thre Hist |
| 8 | 7, 4, 8 | " | " | Leuc Trypt. |
| 9 | 0, 0, 0 | 1115 x 1115 | Thre Hist | " |
| 10 | >15. | 1113 1115 | Val Arg | Thre Hist |

Prototrophs occur amidst matter heavy syntrophism!

Pick colonies from #8, #10 + streak on T(0).
Each of 12 tested from #8 and #10 grew out as single colonies on T(0), and were further picked to EMB Lac, Mal, Xyl on which they agreed with their parent in being ++.

September 25, 1949.

Collect following heterozygotes: 4 = 614 5 = 615.

5A = 1178 × 828
5B = 1178 × 836
5C = 1178 × 760

4A = 58-161 × W1178 4B = 58-161 × W1183
4C = W478 × W1178 4D = W478 "

mEMS lac

614 A.
1 Lac+ Mal+
2 Lac+ Mal+ } Resol!
3 Lac+ Mal+

614B
0 1? 2? 3 Lac v Mal+ or v ?! Mal+.
1 Lac slow? Mal −
2 Lac slow? Mal −
3 ~~Lac +~~ v Mal −
4 ~~Lac v~~ v "
5 Lac+ "
6 Lac+ "

C
1 Lac v Mal v?
2 " Mal +
3 " Mal v?
4 " Mal +

D Lac v Mal+

615
B 5 (4 tets) #1, 4 Lac v ; All Mal+ but #1 shows mottling on Mal. but Mal+

6 (4 tets) All Lac v Mal − (segregating blue + white) Use for Rev

$6_0$ (1 tet - broad streak) Many Lac v Almost completely Mal −.

615 B5 = Lac v Mal+ See 615 for data on other Lac v.
615 B6 = Lac v Mal −

Mal$_1$ - x-ts of W466 mutants — 619

Sept. 23, ff. 1945.

W466 Mal$_x$ - × W677.

A) W1208 × W677.
2 Mal+ / 600 Mal -.

B) W1209 × W677
5 Mal+ / 600 Mal -

4 plates Mal E MS

In view of rarity of Mal+ in W$^{Mal+}$466 × W677, that low frequencies do not necessarily speak for close linkage.

Steals out + prototrophs:

A) Pure Mal+

B) 3 Mal u ; 4 Mal ++.

Resolate [ to use for Lac reversion studies ].

# Coli new crosses.

September 28, 1949.

Mixtures grown together 48 hours. Plate ca. .5 ml = 0/plate T(0).
Inc. 48 hours.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | W1189 | 0 | 0 | 0 | | | Lac+M- Val Leu Sh 3 |
| D | W1191 | 0 | 0 | 0 | 0 | 0 | Lac+M- Th His Sh 1 |
| E | W1195 | 0 | (1) | 0 | (1) | | Const? L-M+ Leu Try Sh 1 |
| F | W1205 | (5) | (1) | (5) | 0 | L-M+ Th His Sh 3 | Prototrophs grew more poorly on T(0) agar than those below. |
| G | W1189-1195 | 2 | 3 | 5 | 4 | | |
| H | W1189-1205 | 3 | 1 | 2 | 0 | | |
| I | W1195-1191 | 0 | 0 | 0 | 0 | | |

Picks, dilute and test on Lac; Mal:

| | | | |
|---|---|---|---|
| E | 2 | Lac- Mal+ | |
| F | 10 | All Lac- Mal+ | |
| G | 12 | All Mal+; 8 Lac- 4 Lac+. | |
| H | 6 | Lac+ Mal+ | IIII |
| | | Lac- Mal+ | II |

These results strongly suggest recombination between W1189 and either W1195 or W1205. However, there is a curious instability of the individual parents. The Lac+ Mal+ prototrophs are, however, unique.

Repurify and retest parents!