

Apr. 29, 1948.

	Idu	Mal	Lac	Gal	Gna	Megal.	TI	Rec
182	++	+	-	+	±		S	
185	++	-	-	-	-		S	
187	- ^{thin}	-	-	+	+		S	
188	-	-	-	±	+		S	
189	-	-	-	- ^p	+		S*	
218	+ th	+	++	+ ^p	+ ^p		S	
239	-	-	-	-	- ^p		S	
243	+ ^{pop.}	-	-	+	+		S	
245	-	-	+	++	++		S	
253	±	+	+	+	±		S	
319	-	-	-	+	+		S	3
321	++	++	++	++	+		S	3
108	- ^{v.p.}	- ^{v.p.}	- ^{v.p.}	++	+		S	3

These are suspensions from fairly old cultures.

* v. few plaques.

- B
- 47
 - 72
 - 74
 - 76
 - 83
 - 87
 - ~~88~~
 - ~~89~~
 - ~~90~~

S.O. 321. on glucose lac
 245. on lac. (about 1/2) after. (maybe 1/2)
 218. p.p.
 182. lac for x 100.
 185. Idu
 108. S.O.

[Try O.P. effects on types thin on glucose].
 Many are "thinner" on glucose than on disaccharides - e.g. 187, 218,

S.O. 249 on lactose 90%+. Purify a ~~low~~ - for test as Lac₃.

243 on lactose. All colonies are slow ++. Broad streak is -. One (-) colony noted. Purify.

245 on lactose. - aged very faint ± colonies pedunculate, with numerous papillae +.

S.O. - colony on lactose EMB: all - colonies.

Test:	Lac	Mal	Lac	Gua	Gal	Stu	
	108 pur	-	-	+++	++	-	W108
	245 lac -	^P papillae	±	+	++	-	
184, 1-3.	243 lac ±	-	±	+	±	- th.	W381
	249 lac -	-	-	+	++	-	
	243 lac -	-	±	+	±	- th.	W243
	Restrains purified W108 on Lac						

249 is comparable to W108 and may be Lac₃ -. 243 lac + may be a sugarless poor. Call 243 lac - W243 as recovered, and 249 lac + = W381

Reconstitute all these stocks.

W185, checked out: Colonies small and slow on glucose. 95% +. ~~Some~~ - noted.
 Mannose All +.
 Sorbitol All -
 Fructose All +.

Recover ~~from~~ glu - and compare with + on extended series of sugars.

May 5 + 1948.

Streakout 177a, W-245/Mal on Mal EMB.

Pick 14 Mal+ colonies to Lac and Glu. at 37°.

a) All 14 are Lac++ Glu-

b) 3 Mal± colonies Lac± Glu-

1 Mal- colony Lac- Glu- asparent.

S.O. from a and b on maltose to purify. W397 + W398

	Megal.	Megal.	Megal.
	K-12	+++	
	W-108	+	
	243	+	
	260	-	
	261	±	
A	267	± (variable)	
	269	+	
	270	+	
	277	-	
-	280	+	
	284	-	
	285	-	
	292	-	
	297	± var.	
B	298	±	
	301	-	
	307	++	
	308	±	
	312	+	
-	249	+	
	257	-	
	258	-	
C	319	-	
	322	+	
	321	+	
	120	- n±	
	R5.1	+++	
	R5	+++	
	Y53	+++	
-	Y10	+++	
	1 112	+++	+++
	2 121	+++	+++
	3 276	-	-
	4 283	-	-
	5 286	-	-
	6 287	+++	+++
	7 313	+	-
	8 316	-	-
	9 317	+	++
	10 122	±	± (variable.)
	" 132	-	-

* 312 + 302 were found filled with water! Source?
SO on glucose.

Glucose - mutation run

180

April 28-30, 1948.

58-161R. 135 plates \times > 100 scoreable colonies
= ca 15,000 total.

15 tiny colonies picked. None mutants.

No mutants from ca 6 other sectors.

Formate mutation Run.

Y10. Spread on Glucose 1%, Formate .4% EM13 and irradiated as above. 46 plates \times > 500 / plate = 25,000 colonies.

Due to crowding it is not certain how efficient mutant recovery would be. Test some representative colonies.

Formate mutations.

180a.

May 1, 1968.

Company - (glucose EMB+) and + (-) colonies from
formate-glucose EMB on

- (a) Formate .5% N2 case & thalim .01% agar
- (b) Formate - phosphate N2 case gas tubes.

	EMB.
1.	1-
2.	1-
3.	1-
4.	1+
5.	1+
6.	2-
7.	2+
8.	3-
9.	3+
10.	4-
11.	5- (imp?)
12.	6-
13.	6+
14.	7-
15.	7+
16.	8-

(a)

(b)
+++



(c) EMB/formylase*
++

-
-
-
-
-
-
-
-
-
-

All cultures produce voluminous gas from formate broth

a) cannot be scored due to diffusion of alkali through agar.

Strains 1, 4, 6, 7, 8, 9, 12, 13 + 14, 15 on glucose EMB. Indistinguishable!

Test strains on formate-glucose agar.

+ + = data - 1/11

Transfer (b) to nutrient agar slant as W-385

~~For formi~~

Test N-12 on: 24h. 48h.

1. EMBO - 2% Na glycerophosphate · 5H₂O. Large - colonies. ✓
2. 1% Pectic acid, neutralized NaOH. N.S. Agar very soft. ✓
3. Hydrolyzed casein (HC) agar. Moderate colonies.
4. HC - Succinate - Chlorophenolendaphenol. Moderate colonies.
 Agar was decolorized after autolysing. Shows diffuse recoloration around colony groups.
 entire plate decolorized colonies greenish yellow
5. HC & succinate Cl₂ " v. slight lightening around colony mass
 colonies have p. no of 5.
6. HC - Nadi. No growth. Spontaneous coloration in agar over very lit.
7. HC - Indigo sulfate .01% Decolorized on autolysing & agar
 + Suc } Moderate colonies; no recoloration.
 - Suc
8. HC - starch, Iodine.
 + Suc. } Color discharged on pupation (I₂ reduced).
 - Suc } large, slightly brownish & transp. colonies.
9. Sorbitol 1% ++± Not quite so intense + as on glucose but unquestionably strong +.
 later mult. brown
10. Sorb. 5% + Galactose 5% +++ No inhibition
11. (Lactitol)
12. Galactose 5%. +++ ✓

K-12"; W-145; growth on synth. medium.

April 30, 1948.

Inoc W-145 lightly into T(m) T2B, BM + .1%

	24h.	72h.
1. Glucamate	-	+++
2. Glucose	+++	+++
3. Lactose	±	++
4. Maltose	+	+±

Incubate further and examine for sp. reversus. S.O. P3. on homologous media.

58-161 into.

1. Na dihydrophosphate .5H ₂ O	0.2%	24h.	+++	S.O. Sep plate
			Faint ± on EMB	
2. Pectic acid; neutr. NaOH.		±	+	faint growth in synth.
EMB.	58-161	-	72h.	
	410	-	+	

P3.

S.O. 1, 3 and 4 on homologous EMB agar.

- 1. No acid production; colonies very substantial
- 3. Numerous + colonies. Pick to grow EMB
- 4. Maltose - all -

5. 14 colonies all -. Purify on lactose EMB.
W-391

April 29, 1948.

V10 1 drop, etc. (Haworth lamp 5 sec.) on glucose EMB.

Most of 52 plates were heavily contaminated.

Select some likely colonies from 20 best cont. plates; ca 500 scoreable colonies

= 10,000.

3 Glucose - streak across T1. All V₁^S.

	Gluc *	Gal	Lac	Mal	Gua
1. W-382	-	+++	+++	+ pap.	+++
2. W-383	-	±	±	-	++
3. W-384	-	++	-	-	++

-382. Why papillae only on maltose? This appears to be the desired Glucose-specific mutant, for crosses with Gal-.

* produces acid strongly when left out at room temperature 2-3 hours! (Carpell 340).

~~Streak out 382 and 340 on each of two glu plates. Incubate overnight at 37°.~~ See 185

5-3-42

Strains out to form colonies of: (on EMB 1%:).

	Rhamnose	Glucose	Sorbitol	Fuctose	Mannitol	Mannose	Sucrose	Dulcitol	Mucicac	Xyl	Ar
1. 254 *	-	++	+++	++	✓	+++	+++	+++	✓	+++	✓
2. 108	-	++	-	-	-	-	-	-	-	✓	+
3. 185 B +	inhib	inhib	-	++	-	inhib	-	++	-	-	-
4. 185 B -	-	+	-	-	-	-	-	-	-	-	-
			Abp.	Abp.	-P	-P	-P	Abp.	+	-	-
5. 249	-	+	-	*	-	-	-	-	-	±	++
			✓	✓							Abp.
6. 351	-	++	+++	✓	+++	✓	+++	✓	+++	✓	-
											Abp.
7. 361	-	++	+++	✓	+++	✓	+++	✓	+++	✓	-
8. 58-161	+	++	+++	✓	+++	✓	+++	✓	+++	✓	-

410 - inositol

Ab some were ±

p = papillae, presumably recessed.

* S.O. on histology medicine, 16

Lac₃ Crosses

May 4, 1948.

Cross the following on EMS-Lac-B₁.

1. W-108 x W-249 (A conc. susp) T-L-B₁-Lac₃ x B-M-Lac_x
2. W-108 x Y-40 x B-M-V₁^r 1
3. W-249 x Y-46 x T-L-B₁-V₁^r

P7.

① Yield very poor.
By plate.

	+	-	
	0	1	to retest
	0	1	
	0	1	
	0	0	
	0	0	
	0	0	
	0	1	
A.	0	5	
A.	0	3	
A	0	4	
A	0	2	
	0	0	
	0	3	
A	0	1	
	0	2	
	0	1	
	0	0	
	0	2	
A	0	3	
A	0	4	
	0	2	
	0	38	1

~~After several days incubation, some lac⁺'s came up. Since these may represent reversions, do not use these plates.~~

②

+	-
2	31
1 ^s	25
6	34
2	52
2	30
4	50
0	32

$$\begin{array}{r|l} 17 & 254 \\ \hline & 281 \end{array} = 6.7\% \text{ Lac}_3+.$$

T-L-B₁-Lac₃-B+M+ } x
 T+L+B₁+Lac₃+B-M- }

Lac₃ is fairly closely linked to B₁M. (very near Lac₂)

Phage tests (on glucose plates).

Lac ⁺ :	6 ^R	2 ^S	8	All blue +	} % V ^R = 80%
Lac ⁻ :	48 ^R	13 ^S	61	All blue -	
Lac ⁻ :	51	12	63		
	99	25	124		

③. Very poor yield on a rather dense background.

0	1
0	1
0	0
2	0
0	0
1	0
1	1
4. 3	

May 3, 1948.

100 plates *Slu*EMB x 250/plate = 25,000.

17 tiny colonies streaked whole on glucose
 14 other possible S.O. on glucose.

3 - (1-3)

4	0	mucoid
5	0	+
6	0	+
7	0	+
(4) 8	0	-
(5) 9	0	-
10	0	+
11	0	+
12	0	+
13	0	+
(6) 14	0	slow?
(7) 15	0	- sm. cl.
16	0	+
17	0	+

1, 2, 4, 5 and 7 are T, S, and probably mutants.

3 is a yellow chromogen } almost certainly contaminants.
 6 a pink chromogen }

1.	386	-	-	+ slow	+	++
2.	387	±	±	+	±	++
4.	388	-	-	- th.	- th.	-
5.	389	+	+	+++	+++	+++
7.	390	++	++	+++	+++	+++
	391	+++	-	+++	±	-

> specifically bac +

May 5, 1948.

1. 108 x 58-161 on glucose ± B₁
2. 249 x 108 on glucose B₁
3. 382 x 249 on glucose, lactose
4. 382 x 58-161 glucose, lactose.

P7:

- B ₁	+	-	
	0	10	
	19	177	
	16	133	
	35	300	335
+ B ₁	21	163	184
	56	463	519

Too late to be properly counted

Some colonies are darkened

but probably not +

second
P103

2. Yield negligible (ca¹ per plate)

3. (glucose) Yield negligible - all -
lactose. All look "+" after prolonged incubation. Score on glucose, T₁.

4. Glucose - uncountable - no yield
lactose - all turned +.

Tetracycline

192a

May 7, 1948.

①. Make up varying concentrations of triphenyl tetracycline chloride in nutrient agar and autoclave. Streak Y100 on plates.

Per ml:

- 1 mg. Medium faint pink; all colonies intense deep red
- 150 r Medium sl. tinged; isolated colonies deeply red with heavy margins.
- 50 r As above. Medium less tinged
- 30 r As above for isolated colonies; confluent growth colorless
- 10 r Color more limited in colonies and sl. less intense.

1 mg. level shows slight initial growth inhibition

Lac 3 mapping. May 10, 1948

m lac and glu EMS (NF).

- ① W-108 x Y40.
- ② W-249 x Y46
- ③ W-108 x W-249.

3:

	-	+	
	24	0	
	55	0	
	9	0	
	10	0	
	31	0	
	67	0	
L	32	0	
L	24	0	
	22	0	
	25	0	
L	11	0	
	31	0	
L	26	0	
	31	0	
L	41	0	
L	24	0	
L	16	0	
L	17	0	
	5	0	
<hr/>			
Lac:	191	0.	
Glu:	310	0	
<hr/>			
Total	501	0	

501.

Both are probably lac₃-.

②. Plates v. unratified factory. Overgrown or no count. Some plates readable, esp. lactose.

	+	-
	18	2
	2	4
	16	4
	3	2
	3	0
	4	0
	4	1
	3	0
	7	0
	7	2
	<hr/>	<hr/>
	67	12
	/ 89..	

This count unsatisfactory except to indicate more + than -.

① Lac.

-	+
53	8
45	13
24	3
39	10
14	5
44	16
29	3
31	4
35	8
42	11
42	9
39	8
75	7
<hr/>	<hr/>
512	105
/ 617	

all scored (-) in glucose, probably due to uncertainty of medium. Test by streaking to fresh glucose EMB.

= 17% Lac+. 83% obac-

Test Lac+ on Glu, T1:

R	S
22	2
17	2
13	4
<hr/>	<hr/>
52	8
/ 60.	

= 13% among Lac+

Test Lac- on Glu. & T1

Test loc - segregants on T, (Glu or Gna EMS')

R	S	
15	5	20
14	6	20
14	6	20
13	7	20
<hr/>		
56	24	80 ✓

30%^s among loc -

The distribution is then:

m.d. (calculated from II)

-R	.58
-S	.25
+R	.15
+S	.022
<hr/>	
	1.00

<u>II</u>	.67
<u>III</u>	.26
<u>I</u>	.16
<u>IV</u>	
<hr/>	
	1.09

[cf 80 as previous estimates.

This gives a total for the V, segregation of 73% R; or 25% crossing

140. -- + R ++

over in region III which agrees very well with preceding data (v. thesis table 6) giving 27%.

108 ++ Ia. II S III --

Estimating x from these data:

$$\text{faul}^2 a = .022 \times .15 / .58 \times .25 = .0238$$

$$\text{" } b = .022 \times .58 / .15 \times .25 = .340$$

$$\text{" } c = .022 \times .25 / .15 \times .58 = .064$$

$\sqrt{.154}$	a
.154	.16
.583	.67
.253	.26
<hr/>	
	1.08

May 17, 1948.

1. 108 x y40 On Lac(-) and on Gna EMS'
2. W-67 X Y46 On Lac
3. W-126 X Y40. On Lac

1: gna: 4 ~~well~~ 510/plate. Test on glucose EMS: T1.

-R	-S	+R	+S	
22	8	1	1	32.

1: Lac.

-	+			
9	0	Lac+ : 6 ^R : 1 ^S		all ^R Lac +
20	0			
24	1	Lac -	R	S
1	0		27	6
5	0		18	6
4	0		21	9
2	1		16	12
13	1		82	33
4	1			115
3	0			
3	0			
10	2 ^S			
8	0			
6	0			
6	1			
4	0			
3	0			
3	0			
2	0			
130	7	137.		

5.1% -

All ^R Lac -
In these tests each colony
on amylose plate was
tested.

The distribution is:

- R	- S	+ R	+ S
.684	.275	.044	.007

Total V, R segregation:
28.2% ~~R~~ S

(2)

+	3	1
	1	0
	1	0
	2	0
	1	0
	1	0
	1	0
	3	0
	3	0
	1	0
	4	0
	4	0
	1	0
	3	0
	2	0
	1	0
	32	0

W-67 x 4.46.

B-M-lac - x T-L-β₁-V₁^R.

R S

29 2 | 31.

(3)

+	1	2
	0	3
	7	17
	6	13
	1	0
	10	3
	2	6
	2	15
	4	0
	4	3
	1	6
	16	33
	2	9
	1	8
	54	118

Lac-	R 11 11	S 4 6		-R 147
				+R 27
				-S 22
				+S. 104
			} 32	
lac +	2 8 19 20	3 0 3		<i>+S rather high, otherwise agrees with rep. of lac-1.</i>
			} 53	

31%+ (Maybe excessive)

On these plates, - colonies were much smaller than + possibly distorting ratios.

W-108 X Y-40.

p/187: 17+ : 254- on lactose. i.e. 6.7% Lac₃⁺

Among +, 6 V₁^R : 2 V₁^S.

- 99 : 25

80% R.

/191: 56+ : 463- i.e. 13% Lac₃⁺

Fragmentation of
Lac- segregation,

$$\chi^2_2 = 22.2$$

$$p < .001$$

/198: 105+ : 512- 17% Lac⁻

Among +, 52R:8S

13% S.

Among - 56R:24S

70% R among Lac⁻. → cf 187.

$$\chi^2_1 = 2.83$$

p = .09
for fit of U.R.

199. ~~130+~~ 130- : 7+ 5.1% Lac₃⁺

Among + 6R:1S

Among - 82R:33S

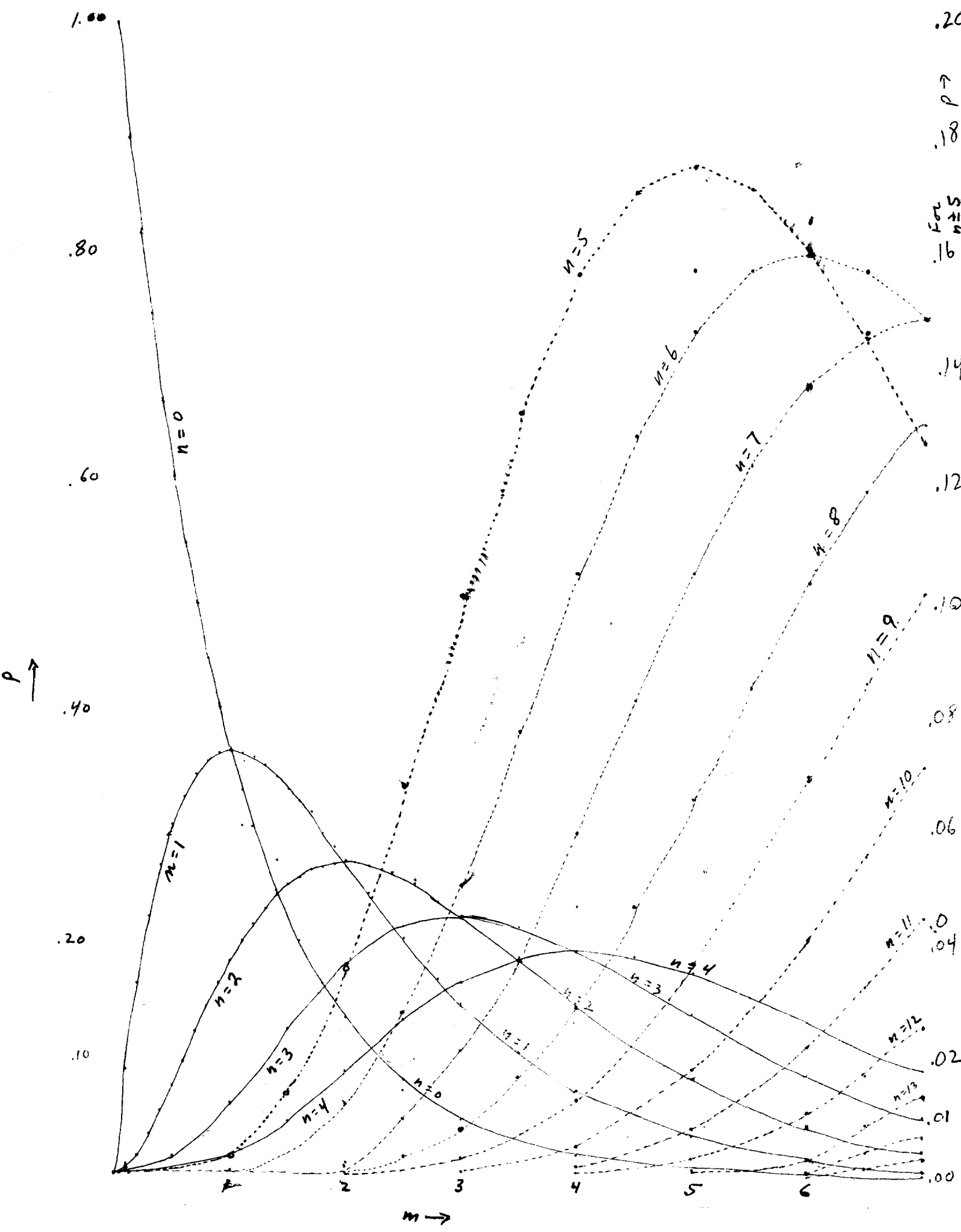
71% R.

199 (transf. from galactonate EMS).

		R	S
-	30	22	8
+	2	1	1

= 73% R.

All agree on Lac⁻ = 344
Lac⁺ = 344
on total tests for R.
= 344 5/21/198.



Myiobacteriales + Polyphaga

	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>Acetobacter</i>	<i>Salmon</i>	<i>Typicus</i>
Mektore	+			+	±	+
Sactore	±			+	-	-
Helikiose	+					
Dextriose						
Cellulose	+	same -				
Sucrose	±			+	-	
Trehalose	+					
Raffinose	±					
Salicin	±			+	+	
Amygdalin	+			+	-	

(C₂ + C₃) -

Compound.	<i>E. coli</i>	<i>E. coli</i>	<i>E. coli</i>	<i>Aerobacter</i>	<i>Salmonella</i>	<i>E. typhi</i>
Glyceraldehyde	+			+	+	+
Dihydroxyacetone	+			+		
Glycerol	+	-		+	-	+
$\text{CH}_3-\underset{\text{O}}{\text{C}}-\text{CH}_2$	-			-		
$\text{CH}_3-\text{CHOH}-\text{CH}_2\text{OH}$	+			+		
$\text{H}_2\text{C}=\overset{\text{O}}{\text{C}}-\text{CH}_2$	-			-		
$\text{HOCH}_2-\text{CH}_2\text{OH}$	-			+		

C4.

E coli coli coli Aerobacter salmonella E typhi

erythritol

-

-

-

-

Adonitol

-

+

C5

	Coli	K-12 Coli	Coli	Aerobac	Selen	Typhlo
d-Arabinose	+			+	+	-
L-Arabinose	+	+		+	+	-
d-Ribose	+			+	+	+
L-Ribose	+			+	+	-
D-Lyxose	+			+	+	-
D-Xylose	+	+		+	+	-
L-Rhamnose	+	K-12: -		+	+	-
araboni ac.	- +			- +	- +	-
xyloni ac.	+			+	+	-
d-methyl arabinoside	-			+	-	-
β -methyl xyloside	-			-	-	-
α -methyl mannoside	-			-		
d-cacbitol	-			+	-	

C6 + derivs.

(not done
Typhi...)

~~R-11~~ R-12

	Coli	Coli	Coli	Acrobacter	Salmonella	Typhi
glucose	+		+	+	+	+
mannose	+		+	+	+	+
galactose	+		+	+	+	-
sorbitol	+		+	+	+	+
dulcitol	±		-	-	±	±
inositol	-	+		+	-	-
mannitol	+		+	+	+	+

d-glucosamine	+			+	+	+
d-galactosamine	+			-	±	-
inosinic	±			±	±	-
d-saccharosamine	+			+	±	-
glucosamine	+			+	+	-
d-mannosamine	+			+	-	-
glycosamine	+			+	+	-
d-methyl glucoside	-	+	cloacal	+	-	-

occ. found.

See over.

β-methyl glucoside	+	✓	+		+	✓
d-methyl galactoside	+	-	+	-	+	-
β-methyl galact.	+	✓	+	-	+	✓
tetramethyl glucoside	-				-	
3-methyl glucose	-				-	
d-methyl mannoside	-				-	
β-methyl fructoside	-				-	

	Coli
α ϕ glucoside	-
β ϕ glucoside	-
α ϕ galactoside	-
β ϕ galactoside	+ (lactose adap.)