(49) Total Review of pedigree expts. APR 18 1956

Exp.		1954	SW666
1137	✓	2-15	12
2	✓	16	12
3	✓	17	12
4	✓	18	12
8	✓	3-1	967
41	✓	9	12
42	✓	11	960
43		16	60
44		17	60
47		30	60
49		4 2	60
50		12	60
51		14	22 × 578
36		2 23	12
37		26	× 967
40		3	92
46		3 19	9 × 967

Tabular resume of pedigrees.

APR 19 1956

a = minimum interval of branching.

Exp. ☐ Initial.

Interval of latest branching: a b

interval of termination: c d

how many intermediate branches.

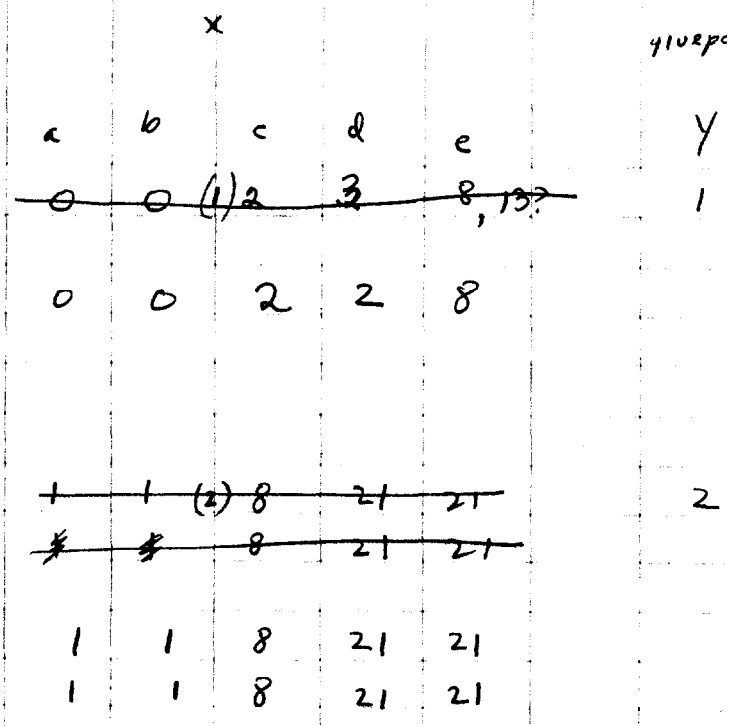
max yield per branch

APR 19 195

#			a	b	c	d	e followed to	Yield
1131	CD	followed 3 generations. All cells became immotile. Separated at n_3, 1 cell gave a swarm; D3. the others non motile clones. On further isolation, D3 was mixed → 12⁻ : 8⁺, the latter all i, the former x — FA10 → b.	0	—	—	—	1sw/n_4.	1s
	C5	all nm at n_{13}	0	13 (0)	13	13	13	1
	B5	" "	0	13 (0)	13	13	13	1

APR 19 1956

1132 E5 Unicat. 2 divisions.
8: all⁻ at n_3, and at n_8



D5. dicat, branch at n_1.

APR 19 1956

1133 E5 pure swarm / late isol.; 1/4 inv. 3/4 → H_1^i

	a	b	c	d	e	Y.
D5	1	11	11	11	11	
C5	0	10	10	10	10	1
B5	0	10	10	10	10	

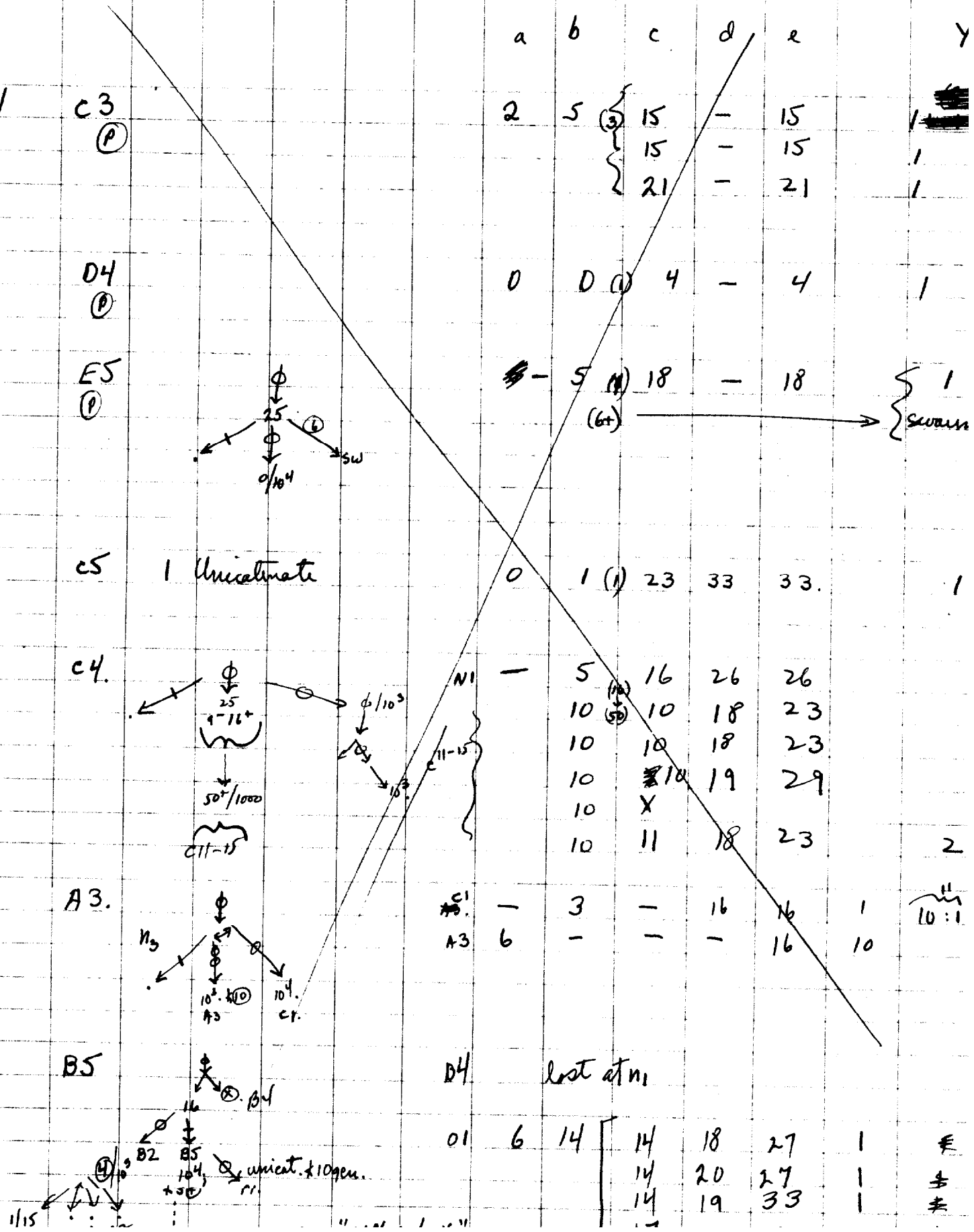
test for swarm essentially

(P) in notes

APR 19 1956

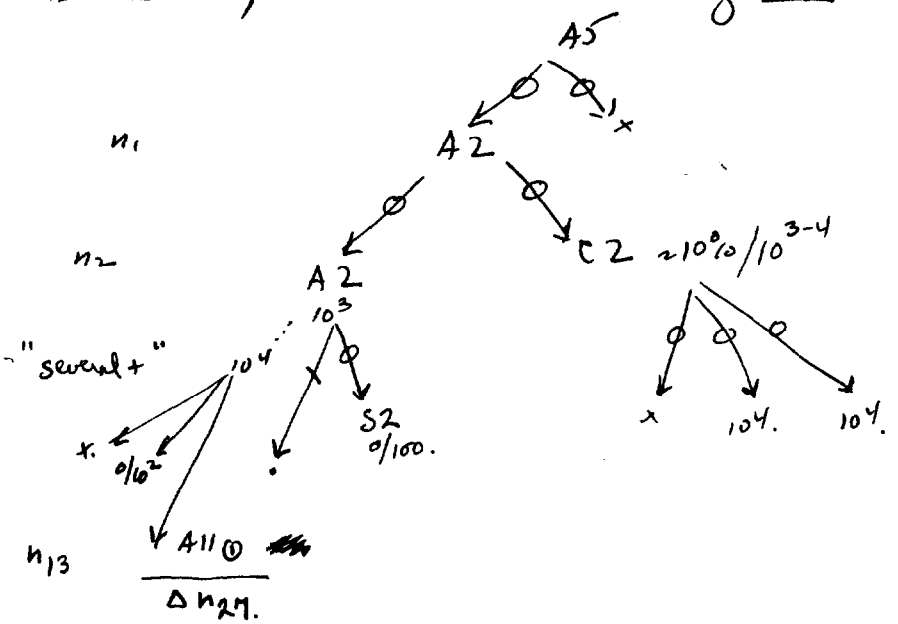
how many + at this time

		a	b	c	d	e	y
1134	c3 (P)	2	5	(3) 15	–	15	1
				15	–	15	1
				21	–	21	1
	D4 (P)	0	0	(1) 4	–	4	1
	E5 (P)	–	5	(11) 18	–	18	1
				(6+) →			scram
	c5 1 Unicellmate	0	1	(1) 23	33	33.	1
	c4.	N1	–	5	16	26	26
				10 (5)	10	18	23
				10	10	18	23
				10	10	19	29
				10	X		
				10	11	18	23	2
	A3.	c1.	–	3	–	16	16	1	11 10:1
		A3	6	–	–	–	16	10	
	B5	D4		lost at n1				
		01	6	14	14	18	27	1	✱
					14	20	27	1	✱
					14	19	33	1	✱



note: B5 was impropriately diagnosed as a swarm as a first ex. of a pluricatenate clone.
Exact number not specified. 5 isolated.
P1 was taken as an early sample

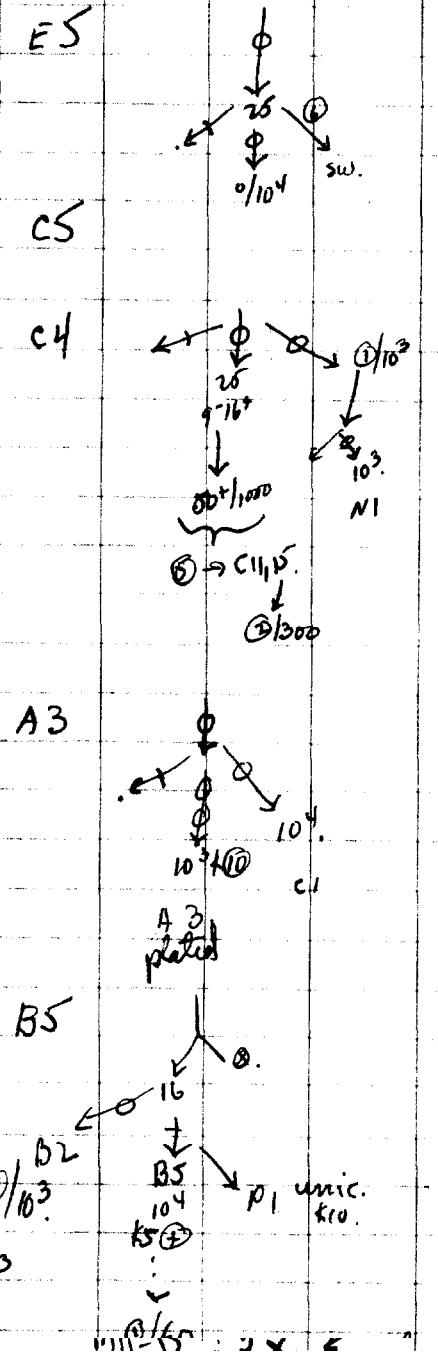
translate P1. cell isolated at n_{22} was a chain for at least Δn_7 and seen again at n_{39}, n_{42} as no motiles. The chain had sibbranches between n_5 and n_2. a should read, ~~earliest~~ latest time that branching must have ceased for that chain.



so corrected.

4/21/5

		a	b	c	d	e	Y
1134	C3 (P)	D1	3	5	15	—	15	3
		D2	3	5	15	—	15	
		D5	3	5	21	—	21	
	D4 (P)		0	0	~~5~~ 4	—	4	1
	E5		1	4	5	17	17	1+x
			2	→			swarm	
	C5		0	0	23	33	33	1.
	C4		4	5	16	26	26	
			6	10	10	~~18~~	24	
			6	10	10	18	24	
			6	10	19	27	27.	
			6	10	~~19~~ x			
		C16	~~11~~	~~18~~	~~18~~ 18	26	26	
	A3		3	3	3	17	17	1
			6	13	—	—	13	10
	B5	B4	1	x				
		P1	5	13	23	33	33	
		01	6	14	18	—	25	
		91	6	14	14	18	27	
		2	6	14	14	20	27	
		3	6	14	14	19	~~33~~	
			5	13	—	21	21	



4/21/56

1134 A5

see for partition (P) '10:10?

terms observed.

	a	b	c	d	e	x	y
A5	1	—	—	—	1		
S2	6	12	12	19	22		
A11	6	15	42	42	47		
12	6	15	x.				
13	6	15	—	22	22		
D11	6	14	x				
12	6	14	—	27	27		
13	6	14	—	27	27		
~~1~~	~~5~~	~~12~~	~~—~~				
	1	5	12	—	12		
	1	5	20	—	20		

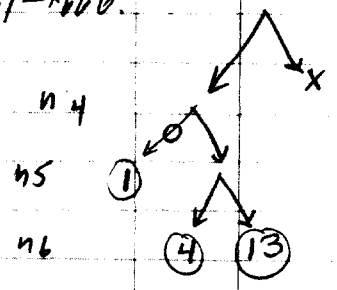
A4

see (P) for hp tests and terminal statings

4/21/56

1138
B4

967–666.



	a	b	c	d	e
F21	5	5	44	45	51
			19	28	28
D22	8	15	[illegible]	[illegible]	[illegible]
23	8	15	[illegible]19	[illegible]24	[illegible]31
24	[illegible]8	15	32	44	44
E24	8	15	28	28	38
A21	10	16	18	—	18
22	10	16	19	32	32
23	10	16	17	29	29
24	10	16	32	-	32
25	10	16	31	35	42
B22	10	16	32	—	32
23	10	16	17	29	29
24	10	16	19	26	26
25	10	16	33	38	38
C21	10	16	20	20	30
22	10	16	19	32	32
E21	10	16	29	[illegible]34	39
22	10	16	44	50	54

4/21/.

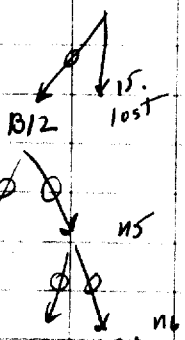
V.S.

1138

	a	b	c	d	
F21	5	5	44	—	44.

967 × 666. most lost.

B4:



n4 B12 15. lost

F21 n5

-chain
$\Delta n = 39$

D21 B21 n6 → 10^3.

9/400. 11

D22 A21-25
23 B22-25
24 C21-22
E24 E21-22.

E21 n_{13} → B32 term.
E22 n_{13} → B33 n_2; n_8 → E31 → n_1 n_1 n_1 E32 n_2 < n_6 carried to n_{10}.
E23 n_{13} → B34 < n_5.
E24 n_{13} → C31 term., to minimize.

A21. unicat n_2, → C23
A22 " n_3 C24
A23 " n_1 ; term < Δn_{13}
A24 " n_3 → C25.
A25 n_2 → D25
B22 n_3 ; n_{13} → A31 ×
B23 n_1 ; term < Δn_{13}
B24 n_3 < Δn_{10}
B25 n_2 n_2 E23
C21 t.f. n_4:
C22 n_3 ; < n_{13}
C23 1 — lost
C24 1 < n_{13}
C25 1 n_{13} → A32 ×
~~D21. E24~~
D22 n_4 , < n_{13}
D23 n_1 → B31 term < n_5 + n_7

see over for tabulation.

1141 — 13 init. 1E (33)
3 died
1 lost
8 E.

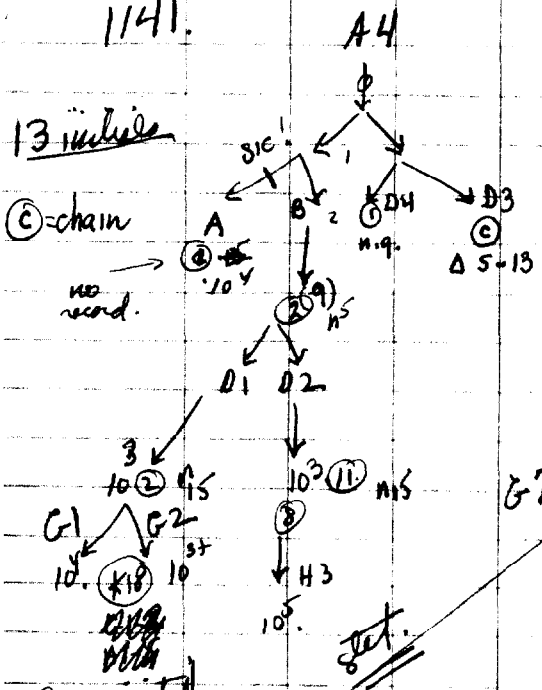
4-22-5

see cut pp.

1141.

13 initials

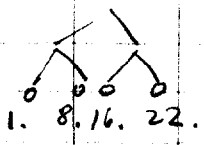
Ⓒ = chain



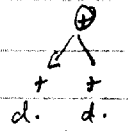
		a	b	c	d	e
A4 A		2	2	15	—	15
D4		2	—	—	—	2
D3		2	2	7	13	13
G1		6	16	16	29	29
g 1		19	27	28	32	32
2		19	27	28	37	37
3		19	27	28	40	40
4		19	27	28	32	32
5		19	27	27	32	32
h 1		19	27	28	32	32
2		19	27	40	47	50
3		19	27	29	27	× snake
4		19	27	28	41	41
5		19	27	28	41	41
A3	8 cells.	8	15		29	29

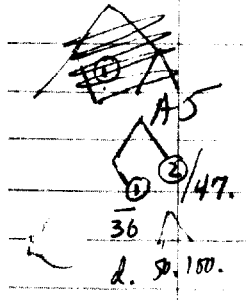
persisted ①

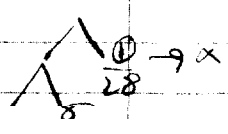
Partitions of 1:1:1:3



a		2	2	6	6	11
b		2	2	7	7	20
c		2	2	5	5	18
d		2	2	2	2	15
1A1	② d after 1 fission	1	—	—	—	1
B5	① n.q. — persisted 48h. cosmotile.	0	—	—	—	0.
A3	① died overnight	0	—	—	—	0
A5		1	5	—	—	5
		2	5	—	11	12
		2	5	—	12	18
B1		0	0	1	2	18
B2.		no data				
	①	0	0	1	1	15







APR 24 1956

1141A4.

	a	b	c	d	e	
A4A	2	2	15	—	15	
D3	2	2	7	13	13	
D4	2	—	—	—	2	persisted
H3 - 8 cells D2	8	15	—	29	29	
G1	6	16	—	29	29	

G2 K18 (+)

a	b	c	d	e
19	27	28	32	32
19	27	28	37	37
19	27	28	40	40
19	27	28	32	32
19	27	27	32	32
19	27	28	32	32
H2 19	27	40	47	50
19	27	29	27	x sn.
19	27	28	41	41
19	27	28	41	41

On alt. interpretation, 1141A4 for G2 subst. → H2.

	a	b	c	d	e
H2.	6	16	31	—	31

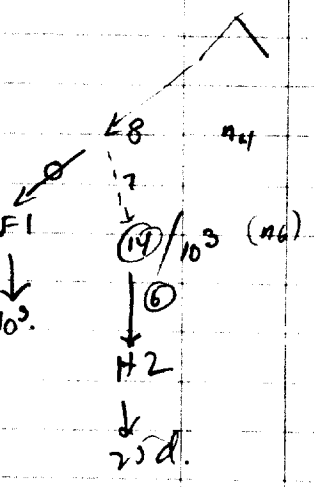
1141B4 : G2 series

~~4~~	~~[illegible]~~		
13	21	etc.	

subtract [6] from above.

APR 24 1956

114/B4.



	a	b	c	d	e
F1	4	—	—	14	14

Note: notes are confusing on the G2-H sequence. cf. A4:

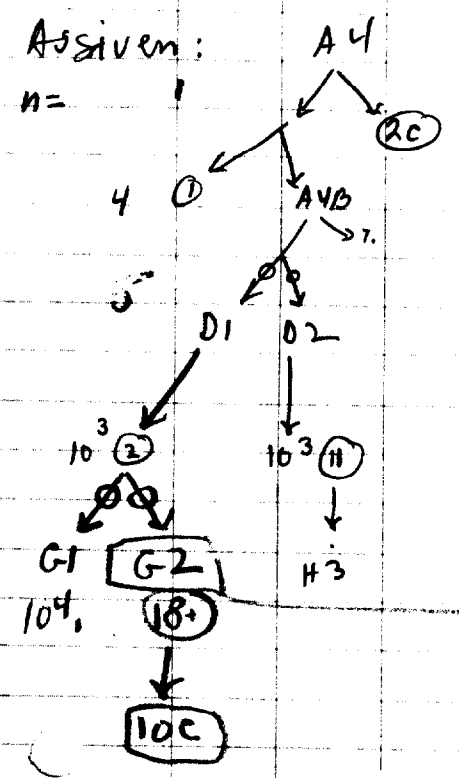
Note 14: partition.

H2	6	—	—	—	6 (lost by drying).

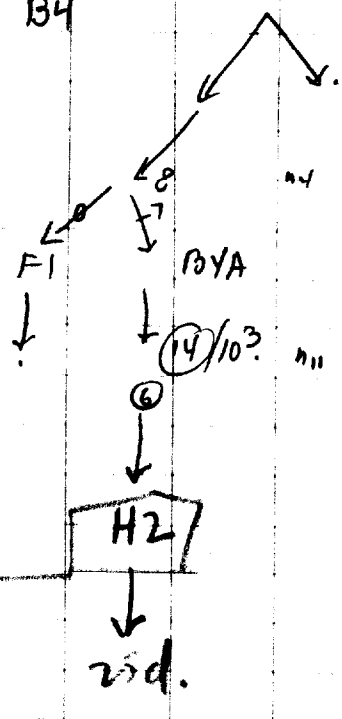
A4 and B4 pedigrees may have been mixed at G2 <-> H2 so following interpretations are ~~possible~~ indicated. This seems

Assiven:

n= 1



B4



An account of H1, the given interpr. seems most likely, but it should be recorded with reserve.

APR 28 1956

1142
60 → × 666
1/2 for plating

No early separations: survey of yields of ①.
A1-5 B1-5 } ⑩ were ess. inviable.
C-D followed EFGH plated.

Yields at first examination	+	/tot
C2	2	2⁻
C3	>50	3
C4	10	3
C5	1	4
D1	>100	4
D2	3	3
D3	0	3
D4	0	3
D5	1	3

		a	b	c	d	e	
C3 {	C3, C4, C1 }	6	10	10	23	23	} ...
	C2	6	10	23	29	33	
	C5	6	10	31	37	41	
D1 {	(3)	7	13	–	26	26	
	(1)	7	13	14	–	14	
		7	13	26	–	26	
		7	13	26	28	36	
		7	13	26	31	36	
		7	13	26	29	36	
		7	13	26	31	36	
		7	13	26	31	36	

C3
↓
⑩ /10³

⑤ → 105: C1-2-3-4-5
↓ ↓ ↓ ↓ ↓
10⁴. ①/10⁴ 10⁴. 10⁴. ①/10⁴

106 C1 → 50.

C2 ①/100 → ①/2 → 50., 10³.

D1
↓
>100/10⁴
⑩

105 (D,E)(1-5) } 3: 10⁴
1: 0 (S²)
6. 10⁴/①

108

D2	C5	0.
D5	B5	4.
F1 →	B1	28.
F2 →	B2	8.
F3	B3	50.
F3	B4	[illegible]

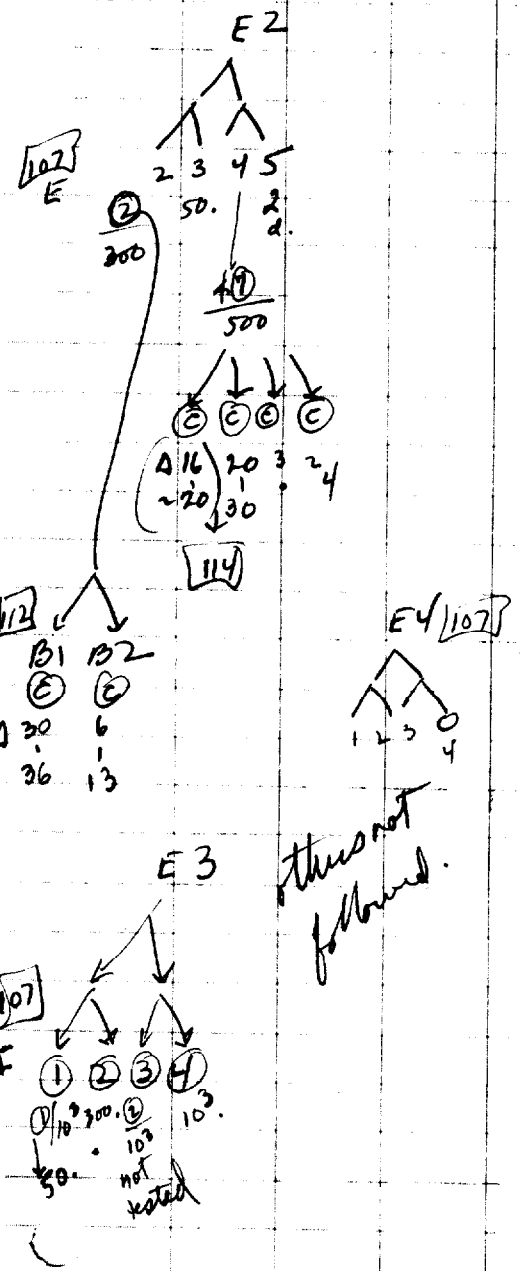
Platings: 16 "cells" plated → 9 grew
↓
residues

1 swa
3 minor
5 colon

1143

Plating : ~~[illegible]~~ 14/16 had dup colonies; no T or S.

[110] E1-5 to [107]



others not followed.

	a	b	c	d	e
	~~10~~	~~40~~	~~[illegible]~~		
	~~40~~	~~16~~			
	3	10	40	46	46
	3	10	16	23	23
E3	2	—	—	8	8
E4					
E5	2	—	—	3	3
B3	~~[illegible]~~ 3	11	27	31	31
4	~~[illegible]~~ 3	11	34	41	41
5	~~[illegible]~~ 3	11	14	17	~~[illegible]~~ 19
C5	~~[illegible]~~ 3	11	—	15	15
F 4	2	—	—	12	12
~~2~~ 3	2	—	—	10	10
1	2	2 ~~[illegible]~~	12	18 ~~[illegible]~~	18 ~~12~~

1144 B4

A B

0 ↓14. + snake

¢11/50 ↘.

n_7

A	B	C	D	E	F	G	H	I	J	K	C.
0	15	0	0	0	3	2	1	1	4	1	2^8 each

n_{15}

v.i.

A1

A40 D2 C1

A50

B1 --4-8.

3-8-8

C2

B5

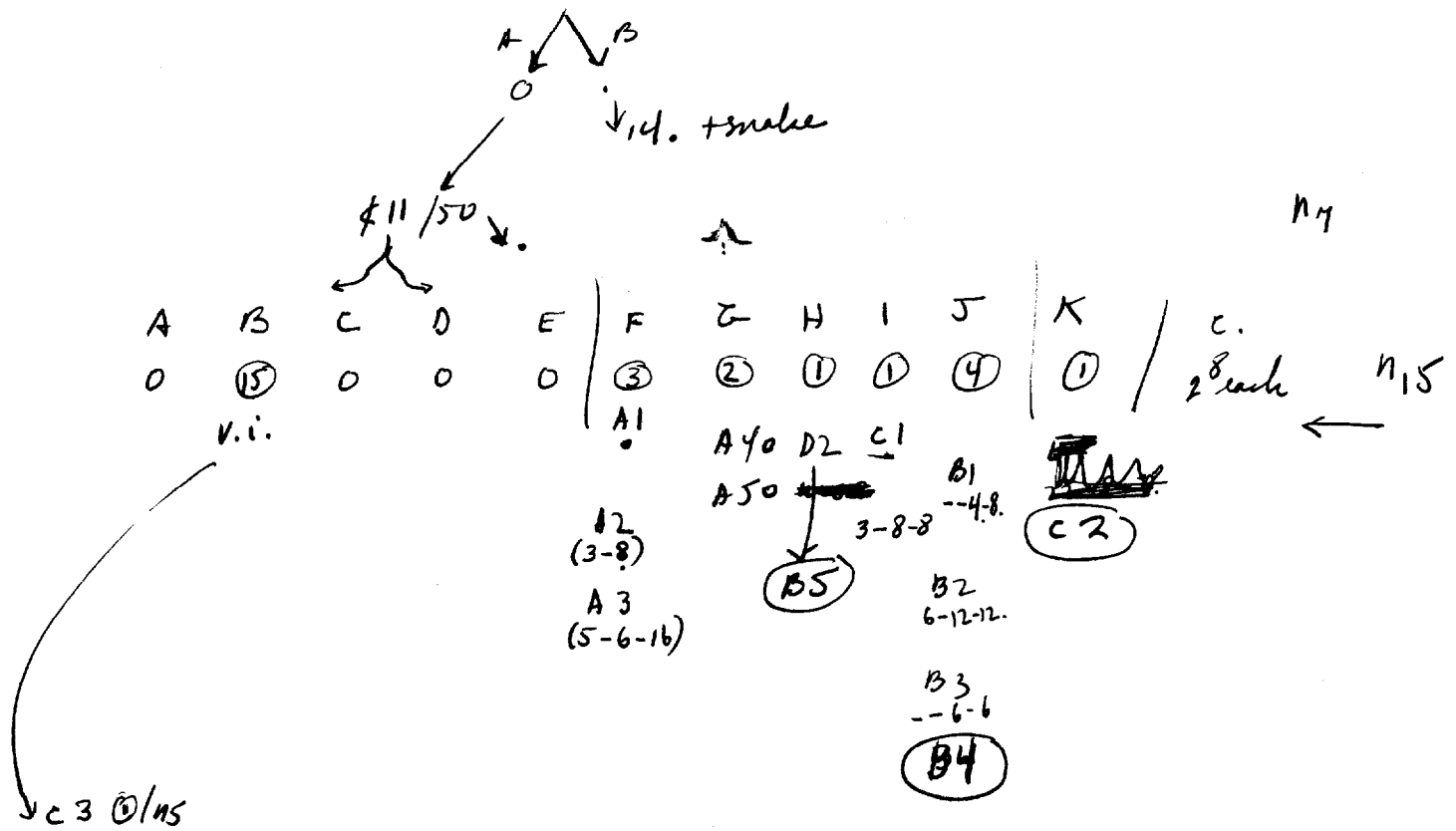
B2 6-12-12.

B3 --6-6

B4

A2 (3-8)

A3 (5-6-16)



C3 ①/n_5

C4 n_6.

C5 ①/n_5

D1 71.

D2 n_5 n_8.

D3 — n_6 n_{10}

D4 - n_5 n_{10}

D5 — n_4 n_{10}

E1 - 22-28-28

E2 · n_5 n_5

E3 · n_4 n_7

E4 · n_4 n_7

E5 · n_5 n_9

F2 · n_5 n_9

F3 n_5 · n_{11} n_{11}

$[\bar{x} = ①/2^x]$

$\boxed{115}$

Σ 34-38-39 C2 $\bar{n}_6$ $\bar{n}_1$ $\bar{n}_6$ $\bar{n}_1$ $\boxed{H3}$ n_{32} $\bar{2}$ $\bar{1}$ $\bar{5}$ $\boxed{H1}$ $\bar{1}$ $\bar{1}$ $\bar{4}$ $\boxed{G2}$ $\bar{2}$ $\bar{2}$ $\boxed{F2}$ $\bar{1}$ $\bar{1}$ 4 5.

Σ 21-23-31 B4 $\bar{10}$ $\bar{1}$ $\boxed{H2}$ n_{32} $\bar{5}$ $\boxed{I2}$ $\bar{1}$ $\bar{4}$ $\boxed{H2}$ n_2. n_{10}.

Σ 37-37-37 B5 $\bar{5}$ $\bar{7}$ $\bar{3}$ $\boxed{H1}$ n_{36} $\bar{7}$ $\boxed{I1}$ $\bar{1}$ $\bar{3}$ $\boxed{H3}$ $\bar{1}$ $\bar{10}$ $\boxed{G3}$ 0

But see notebook for missing items: how K → C2

But acc to notes, $\left\{ \begin{array}{l} C2 \text{ is } n_{27} \\ H3 = n_{32} \end{array} \right\}$ {

other doms OK; there must have been an n_3 interval between K → C2, H3 ; H $\xrightarrow[n_5]{}$ B5

114434 any other summaries?

5/2/56

			a	b	c	d	e	
(11) isolat n_7			7 – 4 cells O.					
	H	B5	5	7	44	44	44	duel at n_{44}
	I	C1	5	7	10	15	15	
	K	C2	5	7	41	45	46	
(27)					both d.			
(2) isolat n_{15}	G	A4 A5	9	15	–	–	15	
(3) isolat n_{15}	F	A1	9	15	–	–	15	✓
		A2	9	15	18	23	23	
		A3	9	15	20	21	31	
(4) " " n_{15}	J	B1	9	15	–	19	23	✓
		B2	9	15	21	27	27	✓
		B3	9	15	–	21	21	✓
		B4	9	15	36	38	46	✓
(15) " " n_{15}	B	C3	11	15	27	32	32	
		C4	11	15	–	21	26	
		C5	11	15	20	25	25	
		D1	11	15	–	21	25	
		D2	11	15	–	20	23	
		D3	11	15	–	21	25	
		D4	11	15	–	19	25	
		D5	11	15	–	19	25	
		E2	11	15	–	20	20	
		E4	11	15	37	43	43	
		E3	11	15	19	19	22	
		E4	11	15	–	19	22	
		E5	11	15	–	19	24	
		F2	11	15	–	20	24	
		F3	11	15	20	26	26	
Isolated at n_8, n_{15}	H	B5	6	7	59	59	59	
	I	C1	5	7	10	15	15	
	K	C2	5	7	52	56	57	

3/30/56.

1144 8 clones started

109 A2

① 52

d.

A5

① 26

10^2.
10^4.

B1

⑩ 50

⑯ /100.

not pursued!

B2

⑩/25 ns

10^0

$0/10^3$

$\cancel{8}$ 10^3

$\cancel{6}$ 10^3

$\cancel{1}$.

not pursued.

A3

②/64

① ①

300 200

D1 D2

114 G1 G2

150. 60.

10^4. 10^3.

B5

③/57.

lost.

B4

See next page.

	a	b	c	d	e	
A2	0	0	6	–	6	
A5	0	0	5	12	17	
B1	3	–	–	–	–	
B2	5	15	–	–	10	① → 0
	6	16	–	–	15	① → ①
	8	~~7~~ –	not isolated			① → $\cancel{6}$
	8	–				① → $\cancel{8}$

B3 Pure swarm Pure gm saved.

A3	1	6	14	21	27
	1	6	14	20	24

B5 { 2 6 – – – 3 cells lost }.

5/2/56.

1147

This expt. "designed for swarms; did not search diligently for oligocalenates.
• = 0 or 1 or 2 Fla+.

35 Fla+ [118] 3 n.g. 4 swarms; 1 $\frac{K8}{200}$ G3; 19 few (+)
8 few or no (+).

SWARMS: (2 hours)

B4: pure motile
G1: pure motile variable expression. Question of phenotypic variability.
H2:
H3: ↖↗ both pure S. low manifest

H2 → F1 — 2 cells / slb { a 2, b 14, c –, d 24, e 24
about 1–10% Fla+ swarm.
cont 1/5 – key progeny test
∴ ≯ 20% + in H2B.
at least 2 generations segregation. cf B4, G1, H3 not segregating, esp H3.

H2 B
(2)/10⁴ (100)/10⁴
(1) (1) (20)
[119F1] 10³. F2 10³. sw. not yet
some +, some – definite

Note: some late isolates had 50%+, but were lost. These probably showed incomplete expression but late segregation not excluded.

F2
119E3, E4 (1) (2)
10² . 10³

Expl. nonsegr? (esp. H3)

118 G3 K8/200
(3)
750/10⁴
119F4 (20)
121F3 (K2)/10⁴

ignore as incomplete

1148

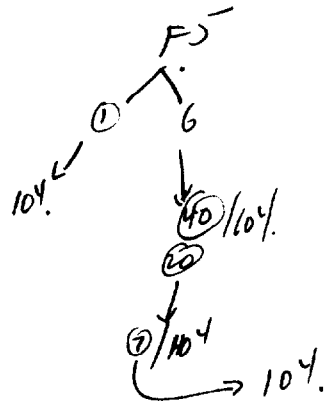
10 cells: 2 ng
2 ⓪
4 ~~2~~ ①
2 plus cat

B1. ⑩/300

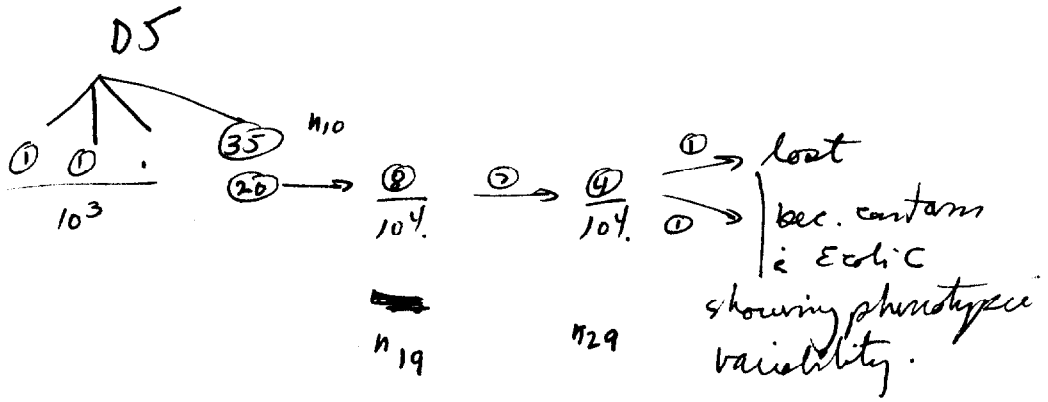
B4. ~~39~~/10^3. no pattern data.

Cat
120

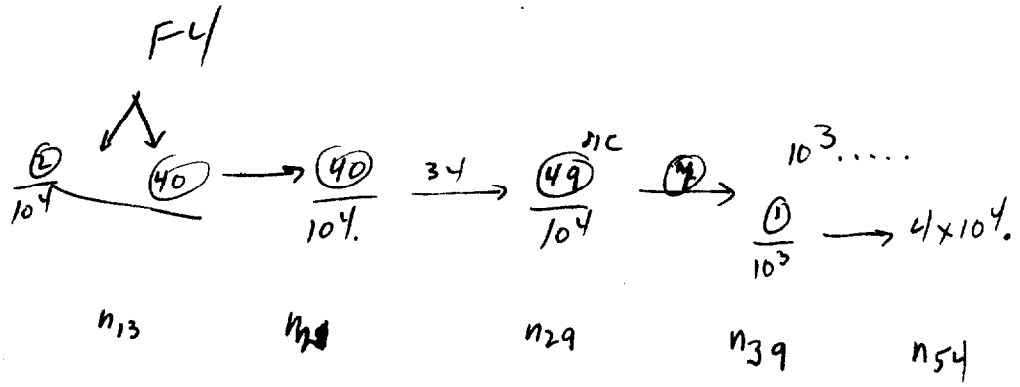
1149



Not certain when single chains



Remarkable problem of variability in Flat clones



1149

122 → 123

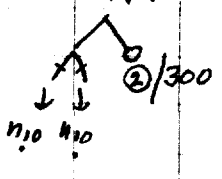
37 (1) → 2 swarms B5 F5
pure pure

(11) → 1 swarm Z1.

intended to separate early clones but too many to handle. primarily for segregation of clones.

gave no (+) at n_{10}: A2, A3, A4, A5 B1 B2 B3 B4 C1 C3 C4 C5 D2 D4 E1 E2 E3 E5 F1 G1-G2 G3 G4 H2 H3 H4 (marked ✓ = "uninteresting") = 26 clones.

A1

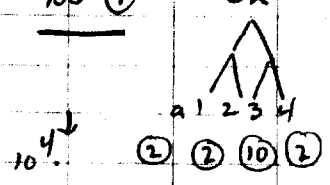


These pedigrees generally are not useful except for partitions as no intermediate isolations were made. Note 2 pure swarms. Some late isol were lost.

No induration of late replications.

B5 (+)

C2

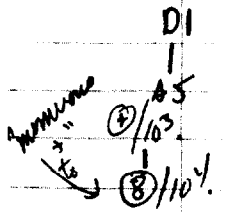


Partitions at 1st div.:

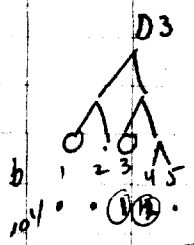
2 : 0
2 : 2 : 2 : 10
0 : 0 : 1 : 12
1 : 1 : 0 : 35
1 : 40
2 : 20
2 : 40

sw : pure
sw : pure.

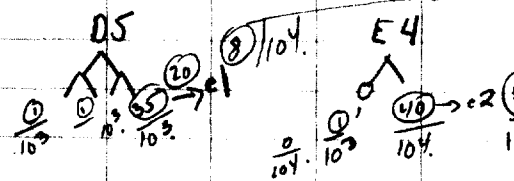
D1



D3



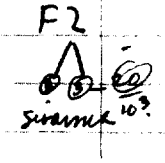
D5



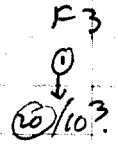
E4

	a	b	c	d	e
(not use F4	6	39	—	54	54

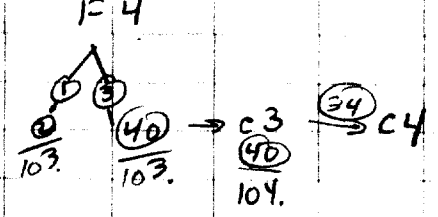
F2



F3

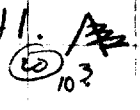


F4



F5 sw. (+)
pure

H1.



1149B Crossovers among trail ends.

35 from 1149 x-FA60., x-FA90 → only b

F1 H5 D3 F2 all ++.
but 60C dubrovis lysate as it transformed 967!

Found that SW967 is lysogenic on SW666 for a -x phage

1150

60 — x 666

Isolates at 2½-3+ hours. 40 isolates

(134). A2 < pure swarm. Divide at n_1, n_2 when possible. Partitions or yields.

↓

126

No further pedigrees.

	at n_{10+}	
A3	1 : 1	
A4	1 : 0	orig mot
A5	(1) (1)	
B1	0 2	
~~B2~~	~~(+)~~	
B3	(1) (1)	
B4	(1) (1)	
B5	(1)	
C1	(2) (1)	
C2	(1) 0	orig nm
C3	(3) (1)	
C4	(3) (1)	
C5	(1) (1)	
D1	(1) 0 0 0	
D2	(1)	
D3	0 0	
D4	0 (1)	
D5	(1) (1)	
E1	(1) (1)	
2	(1) 0	
~~3~~	~~(4) (8)~~	
~~4~~	~~4 (+)~~	
~~5~~	~~(1) (+)~~	
~~F1~~	~~(+) (4)~~	
~~F2~~	~~30 [illegible]~~	
~~F3~~	~~(+) (+)~~	
4	(1) (3)	
5	(5)	
~~G1~~	~~.... (+) 126 H4~~	
2	(1) 0	
3	(1) (2)	
4	(1)	
5	(1)	

H1 (3) (1)
0 0 · 0 orig (1)
(1) (2)
(+) → H3 126
(2)

Interesting partitions

E3
(4) (8)

E4
(7) (+) 126 G2
(13)

A1
(1) · (43)

F3
(30) · (6)

E5
(1) · (20)

H4
(50).

G1
(26)

F1
(4) · (27)

B2
(12)

Are pluricatenates delayed?

—X paralytics

1151

5/16/56.

TM2 —X SW578. Most ⊕ proved invable, and motility sluggish.

~~4+5~~ 16 inv.

10 → 100⊕/10^3.

3: i chemis

B1 ~~2-3~~ 5/10^3.

C1 ~~3-4~~ 7/10^3. These ⊕ proved very sluggish + could not readily be followed.

E2 ~~3~~/10^3.

F1 2/10^3.

also remarks on stability of Fla^+ in E coli C.

at this point these expts. were interrupted for pair isolation.

5/22/56.

1212
Resumé

Representations and splits, early.

	Splits	at n		n		n	Σ n
A1.	3, 3	1					6
B1	1, 1	1					2
C1	7, 6	1	7, 0	2			13, 7, 6
			4, 2	2	3, 1	3	
B3	6, 3	1	6, 0	2			9, 6, 3
			3, 0	2			
D1	7, 4	1					11
E1	1, 1	1					2
F1	1, 7	1					8
G1	1, 1	1					2
H1	4, 2	1	3, 1	2			6, 4
C3	lost						—
D3	nf						—
E3	2, 0	1					2
F3	swarm	save. (prob prime)					sw. no seq?
G3	1, 1	1					2
H3	4, 1	1	2, 2	2			5, 4
B5	1, x	1					—
C5	24, 2	1	21, 3	2	20, 1	3	26, 24, 21, 3
					2, 1	3	

17 12 deletes.
A - x.

5/16/56.
5/17/56.

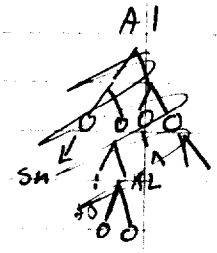
notes

Recapitulation

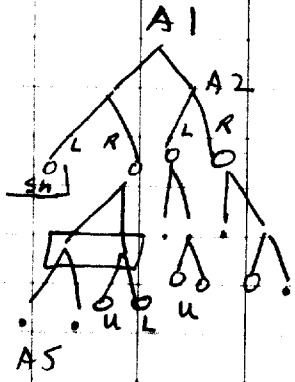
(18 real from 22 → 666 (3 hours)

37 → 666

count subclones at n_{10}.

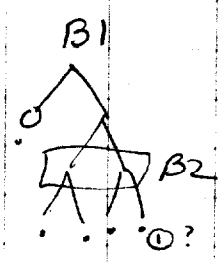


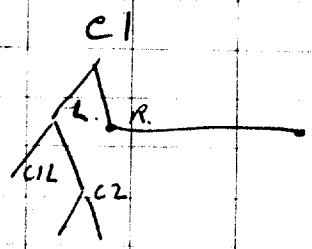
no + at n_{10}.



F3 swamp.

prob pure.





ch.

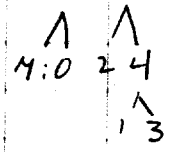
See protocol sheets.

Significant patterns.

A1: (3) (3)

B1: (1) 1:1

C1: 4:6

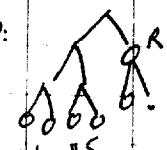


at n_1 unless indicated.

B3: 6:3

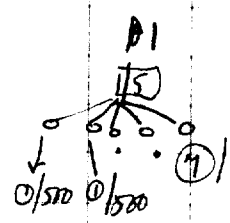
H1: 4:2

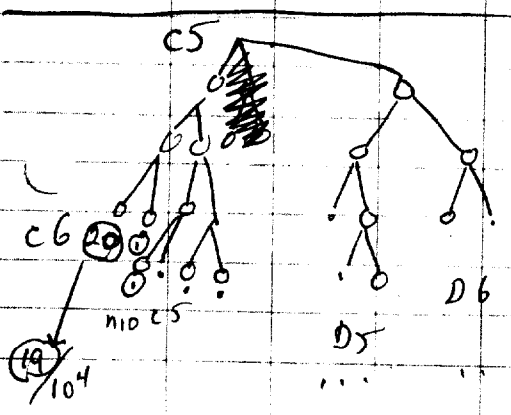
H3:



4:1

C 3 1:1 C





24:2 n_1

(21:3) n_2

(20:1) n_3