S. ~~abortus~~ equi

3/2/53

p2 SW726 = Edwards 25. Susc. to PLT22

A. Mot enx S.S.
B " a-enx "
C " " " + FA 54 (Ziga 30)

} A 1/: no swarms. all negative 3/7/53. T.O. enx sufficient to block.

3/7 D 726 → FA18 [enx serum] 3/10: no spread! Isolate rough trans 3/15
E " " FA22 [enx serum] 3/15 finally grew through. → a a (own)

3/6. F 726 (FA58) —x SW666 : +++ Isolate ± 6 ss. tests.
-b +++
+b no swarms after 38h. — ~~to~~ swarmed: appearing → a. (check ax c enx!)

A8 P8 A10 SW985

3/7 G 58 —x LT-2¹ [i,1,2] — — — Isolate incomplete gro 3/15 still c
H 58 —x LT-2² [i,1,2] ++ +++ → enx: —

3/9–10. SW985 migrated promptly through enx; was immob. in a. Repeat c exp 985
Motiles appeared → poorly aggl, but v. weak b, z_{33} +.
58 H1 remained immobile in enx SS! (possibility of contamination?) excluded later

Why is 726 un-transducible? Note stability of H1.

3/10 Mot 726, H1 in eh SS: 3/11 no swarm! 3/13 still immobile 3/15 " " T.O.

Possibility that H1 is ab. equi contam? Try Rhamnose ferm:
24h.
LT-2 : AG+
H-1 : AG +
726 : AG ± and sparser growth. Not decisive difference. Should be repeated. (Try 950 - 2/4)

note "985" itself agglutinates weakly in b, z33. Recheck purity —
985 repurified was immobile in a

,026 D, E

ni a serum, nitrite, dil, beds from surface.

↓

enx

Probably a spontaneous enx: a.

Check stability of these enx phases. (grow poorly on nutrient agar)

3/21.

S. abortus equi

10266.

3/13. —x 726 have failed. x— typhi murium gave peculiar result (enx: —)
—x SW666/b gave "a": —, apparently cross-reacting i b or 333.
(985 might be mixed). [From past experience, enx does not hinder 1,2— str.] J.

M FA58 —x SW 891 < 24h. → enx: — after 42 hours:
N " 959 " → enx: — still enx
O " 960 slow but only 1, 48h → 3/16 a, (enx?) unfixed and retest

G2 58 —x SW950 (heavy FA). → enx: — OK, Cal -. SW 986 (22R)
G3 " —x LT 2 → enx:
P 58 —x SW703 II → enx: 3/19

(not.l.)
S SW726 x— FA18 (LT2 II) } very limited if any spread. S2 recover
T 40 (sendai II) } shows some rough blebs. → eventually 1,5: — SW998
U 24 (703 II) } → eventually gave SW1001 1,2: 3/24 Rough! Try to recover smoother isolate though not-gar
VWX 55-57 (—1,2) } K (55—x) SW1000 resumed 3/19: 1,2 —

R SW985 (58—x SW666, a) /a gave a "b, 333+". S.C.-1, nothing, gave same response. Also, 985, upon first, gave similar "weak b"., but did not produce a swarm though a again. Probably mixed / impurity.

Thus enx of abortus equi is intrinsically monophasic, even when transduced to another strain. ∴ its homologies are not directly deducible.

O. 9 single colonies all a+++. 4/4 tested weak enx? broc single colony and mass in a, enx serums. single colony and mass migrated through a, and O-1 not at all hindered in enx:

O /a → 1,2 ~~(enx? Not sure)~~

O-1 /a → 1,2

Note SW726 itself was poorly motile in first transfer in motility agar.

S2 → a. 22^R

↓

enz readily. ~~Test place stability 4/5/53~~

rather rough T.O.

need test to discriminate spont vs. transduc. origin of these a: enz types. Prefer smoother ab-equiv strains

S. aborticus equi

1026c

3/20/53. Repeat S, V, W, X (726 mut × FA18·22; 55, 56, 57 - resp.) but no swarms appear. Title carried 726/enx.

3/27 FA18 (~~#~~ TM12[2]) × 726 gave a. = 102652 (of D/E)

3/29 others still immobile. Seal off whatever swarms

D-E. Note enx → a → enx. Test diphenicity.

D/enx gives scattered buds overnight, but these remain rather rough. and move very slowly.
E/enx goes fairly promptly. → a.

∴ 1026E is now a: enx diphenic Was this a transduction of a modifier or simple selection of the same?

1026D moved very erratically and slowly through enx, but these buds are a. Probably rather too rough

Are these a: enx now a spontaneous enx: a or a transduction of a variability modifier?

3/29. 26V SW100 appear to be monophenic in 123

H1 G2 26M S3 eb. enx immobile → ~~still enx~~ in enx

3/31 enx +++ i + (quite slower)

Smoother cultures of ab. equi would be essential for further studies. (Write Morag)

3/30

18-x726
726M'
2603
26P
726'

26H1

exc

still exc

4/3/53 ab equi (−:enx) × TM (i:1,2) gave (+−:enx). SW986.

① attempts to obtain i phase by selection: have failed

② Try to substitute a scribble and distinguishable diphasic H. allelo.
FAVO (sendai²) × SW986 1 attempt → a:enx
This cannot be interpretable as sendai itself is a:1,5

③ 1026G2 /enx 1 passage gave enx +++ i ++ (i slower but fully developed). This variant also shown by single colonies.
Possibility of i enx: enx Compare unselected culture.
also eb+++.

Compare sequences of (same rather old)

4/13/53.

		a	i	enx
1	SW986 (stab stab)	−	++	+++
2	SW986 stab	+	−	++
3	SW986B (/enx)	−	+	++
4	SW986B2 (/enx/enx)	−	++	−
5	(fresh SW986-1 /enx)	−	+++	−

Thus SW986 goes through sequence:

enx (a) → enx i → i,

but relations of a reactions are somewhat obscure. Restreak each culture for isolation.

4/5.c.i. each from (tested as a, i, enx) stab stab:

	1	2	3	4	1026G3 1026H1
1	enx++ i+ a−	do.	do.	do.	enx++ i− enx++ i− a−
2	a++ enx+	do.	a+++ enx±	a++ enx±	
3	i++ enx+++ →				
4	i+++ enx− a− →				

SW986.

1026 e.

Recap. 4/13/53 From FA58(aborticus-equi) → SW950 following cultures were thus obtained, verified by single colony tests:

		s.c. Vx	alt. phase
2	SW986 (slant) Gal-or ±	: a, enx	
1	SW986 (stab) Gal-	: i, enx	
3	SW986B = 986(e1 or e2?)/enx	: i, enx	i
4	SW986C = 986e3/enx (thru 2 passages)	: i	—

Save each of these mesolations for further study. Also note.

5 = 1026e1/enx i.

From similar experiments, 1026G3 and 1026H1 had been isolated (both → TM2). These now react as pure enx, as SW986 was originally reported. (It could have been overlooked as a stray i.) Gal- character, even of #2 (which is the most puzzling) seems to rule out any possibility of confusion, e.g., a 1026G2 (= FA58 → SW726). Recheck gal character of SW726. Actually, 1026e2 shows some fermentation of EMB Gal! Disregarding 2, there may have been an increase in i-reaction since SW986 was first isolated. Cf. G3 and H1. Since above vx all come from single colony isolations, 3 and 4 are definitely different, presumably not mixtures or mutability.

-2 is weak Gal+ as is 2652 and SW726.

4/14. Try SW986e1 in i., 986e4 in i; G3 and H1 again in enx.

		overnight		
e1	i	++	→ e1'	i- or ± enx + s.c. i → enx+++ i++ (delayed
e2	i	—	} no reign.	4/25 still very limited spread: i, no enx
G3	enx	—		" " " " : enx+++ i — (or i+ v. long delay)
H1	enx	dense bulb	48h: slow spread. →	4/25 : enx+ i —

Cf. 1039 SW950 is also monobac (more or less i: i 1,2!)

e1' indistinguishable from SW986

Thus enx → TM1 makes the latter monophasic vis-a-vis either i or enx.

Try → SW950 to restore diphasicity.

→ 950 shows the double reaction; → TM2 more typically —: enx

enx i : —
— : i

Cf. SW986 in i, enx seems vs. phases of SW924 or 941

3/2/53

Mor SS tubes i + ii ILT22

	FA 12 (sera)	PA 22	Control	motility	36h. 48+ FA22		H:
962	±	+.	+	++	+		i: 1,2
963	—	÷	—		+	✓	i: 1,2
4	—	÷	—		+		i
5	—	—	— slow spread	slow +	+.	irregular +	
6	++	++	—		+		b
7	++	++	—		+		gm+
8	++	++	—		+		gm+
9	++	++	—		+	✓	gm+
970	++	++	—	—	—		
1	++	++	—		+		gm+
2	++	++	—	—	—		

A)

970, 972 only non-motile unmotilized. Grow PA22 / 970, 972

(Plan FA9 → x to obtain Fla,⁻ ?)

Single colonies of 962 were motile, agglutinable at first isolation!
miss
stock culture is actively motile!

3/6/53 ~~Also try~~ FA 9 → x NM's

Repeat: see also 1029

	47(12h.)	36h.	FA9	FA11
963	short T.	longer trails	.	.
964	—	—	.	.
965	+ short	slow ✓		
966	++ T+S			
967	T. very pronounced	no Sw. T no S.	.	.
970	—	—		.
971	—	—	.	.
972	—	—		.

B)

send to [illegible]

note: 9 → x 967 trails continue to elongate! (complementary allele of Fla,⁻ ?)
Try in gm serum. (But note SW662: 553 → x 646 → 92)

Non Motiles

3/11/53.

3/6/53 9-x 967 gave a continuously extended track. Mark at 8^{30} A10, 10P10, 8P11.

3/10/53

Tubes:

~~553~~ 2-x 553 } no T or S

9-x 553 1 Track.

~~[illegible]~~-x 553

22-x 553 T+S. 1 gen → no sw.

(C)

Later: sw: i

1027C1:
s.c. i : — 3/15
3/19 gen though still i.

plates (D)

2-x 967 no T or S
967

9-x 967 [10-x?] ~~numerous T+S~~ numerous T, no S (?)
" T (tube)

12-x 967 numerous T+S.

10-x 967 numerous T, ~~1~~ swarm

tube 22-x 967 1 gen sw no sw. later → swarm: 1027C2: i, gen±, 1,2 — pv ++ [illegible]

Repeated later i 60, 6A

60-x 553 Tracks! [used 967M for FA60? comparison of FA22? Repeat FA prep.]

60-x 967 " !

60-x 666 Sw +++ /b →

60, 60A -x 967 gave 0.
60A-x 666 gave sw.

gen±? Try gen on gen serum. SW993 Later (gen)+ v. [illegible]

Repass s.c. i in mot agar
v pv++ gen± i

~~[illegible]~~

972-x 967 T+S

970-x 967 "

970-x 972 0

972-x 970 0

Could one show that these strains are double mutants?

	1 (pw.)	2	3	4	5	6	7	8	9	
control	—	—	—	—	—	—	+	—	—	✓
970-x	+	—	=	=	+	—	+	—	+	3-4-6-8 —
972-x	+	—	=	=	∓	±	+	=	+	3-4-5-8 —
FA22-x	+	—	+	+	+	+	+	+	++	all +

Testers:

F/a	
1	543; 666
2	SL13
3	(also [illegible])
4	544
5	545.
6	541
7	SL15
8	548 = 5?
9	549

Repeat 9-x 967: gives numerous tracks, v. rare swarms

10-x 967 " " and swarms. Need direct comparison of efficiencies and b : gen ratio.
See 1033.

3/2/53.

= SW979

Use 732-49 unless otherwise stated. PLT-22^s; strong rx c̄ 1,5 not lw when first examined (also z_6, presumably cross-reaction).

A) Test stability in 1.. sera:

1,5 bulin restricted mor. all gave swarms out.

1,5 (kb) " " later swarmed out → lw + (phase 1)

1,2,3. diffusing mounds, definite swarms

1,2 3 and 1,5 (bulin) did not swarm pro- presumably. as allowing ~~fastest~~ kb may be preferred serum speed of swarm c̄ sharpest inhibition.

N) see 1023 N However, control for N) grew out in lw + 1,2

3/2 abony^2 → x javiana [lw: 1,2] 3/3 2 ~~control~~ expts. swarming Control fixed.

(✓PLT22^S) two colony sizes, both lw^{A,B} N1 enx: lw Lp^s = SW980

(larger probably partially rough) N2 enx lw Lp^R

eventually secured D 284-0

aggl. faintly in lw, 1,5. same

B) FA59 → x SW666 c̄/s b serum ++, +++ growing lt. Recover lw,) —
(979^I) SW984. titrate c̄ lw, 1,5... No rx on slides c̄ 1,5
of javiana (1)

C) FA10 → x [redacted] SW980 [lw; enx] for "stable" b: enx

1 980^1 } numerous blbs but no extensive spread at first. very slow spread further.) both still lw.
2 980^2

3/13: abony is distinctly retarded in lw: enx serum but does eventually migrate. SW942 did not agglutinate in lw to 1:100, but ++ in b. 1/1000. This might account for failure of C. 546 is not delayed. 942:

D 980^{1,2} x— FA22 164. → i: enx

E x—

F } v. slow x— 23 (fecal b:12) 3/18: b: (or inaggl.?) F1 - still lw.

G } buds x—

H x—

(over)

3/29. Seal off incomplete buds of 1028:

1	980' x— 14	all lev
2	' x— 5	
3	2 x— 5	
4	2 x— 14	
5	' x— 22	

3/3/53

			XII
•	P 1	75	
	2	76-53 (2)	2
	3	66-53 (2)	2
•	4	2292-51 (3)	3
	5	4823-51 (XII 2)	2
	6	5462-52 (2 3)	2 3
	7	5464-52 (2)	2
	8	5839-52 (3)	3
	9	5840-52 (2, 3)	2 3
	10	6319-52 (XII 2 3)	2 3
	11	6689-(3)	3
	12	6694-52 (2, 3)	2 3

PLT-22 3/4/53 + FA22 on motility agar

all S.

all negative 3/7.

Store at 30° subcultures

	EMB Mal	EMB Gal	D(B)
P	—		—
SW970 weak +			
972 " "			
G	+		— +

all X

all +

weak

G 1	•	74
2		2923-49
3		2927-51
4	•	309-53
5		3728-52
6		3966-52
7		3968-52
8		4614-52
9		5285-52
10		5522-52
11		5933-52
12	•	6299-52
13		6475-52

all S.

see over

still negative 3/10.

throw out.

P1, P4, G1, G12 selected for further study. PLT22 grown on each for FA. Then try on SW666, EMBGal; SS.
(Stocker found PLT22/gallinarum 558 to have v. low e.o.p. on LT-2 (<3×10⁶/10¹⁰) or 534.)

see 1043

B. Test P1 ... + PLT22 for ~~gall~~ lysogenization

	A7	A8 ×666 not.	×666 EMBGal
P1	–	–	0
P12	–	–	0
G1	–	–	1
G4	–	–	1
FA22	+++ T+S		
±b: SW970	+++		
±b: SW972	+++ T+S.		

/b:

gm+ SW983 +++
gm+ SW982 +++

hold further for Mal+ pullorum plan later work for intra-strain transductions.

(over)

G8 × ~~FA~~ FA 22 showed faint fuzzy

extension 3/10.

Remove ± FA22 and reincubate.

ditto 972. no motility whatever to 3/19

(probably precipitation).

~~22 × P1,~~

P1 × FA 22, 972, G4, G1 all 0 on EMB Mal.
FA 10

~~P1 ×~~

955 × P1 P12 control FA9 FA10 on EMB Gal
5 3 5 5 8

970 972 G4 G1
8 6 5 9

no likely effect.

P1, G1 × 967, 971 all negative except a single swarm (i flare) in ~~one~~ 1/3 plates of P1 × 967 ✓ Both P1 × and G1 × 967 gave (gm) + 1 each.

P1, G1 both give trails + occ. swarms (d) on 0901. (presumably i ±) × H901 /d. Both gave mass. plaques that later rented slowly, i d

"Antibacterial i"

1030

See 1001. i FA12 –x 666, b swarms were delayed relative to i!

P6. Inoculate motility tubes i 666; ii could not show motility differences later

A7. Add 10^{-7} ml sw 680, 681... 11AM 10^{30}A8

i A. 680/666 mm. 50, 53, 48, 38

B 680/ i cells 64 = bottom = +

b C 681/666 61+, 60+, 64+, 66+

D 681/— 66+

Thus 680 i! was slowed prior to 681 b! (Inherent motility differences not determined: further controls needed. Differences in inhibition presumably to 666 larger not readily discernible. Use B+D as motilized cultures in further expts.

Remix → B, D Mainly 10:~~40~~AM 3/8 — 4PM:

B 23mm., 23 large tube 17

D 29, 28 " " 22

∴ Intrinsic difference in motility. 991C should be repeated to provide raw material comparable to 1001.

D still > B after motility selection.

3/19/53. Repeat 999C1C: Dilute FA12 –x sw 666. Ca 2-3 swarms per tube (5-10 x .01 ml samples of FA12 1/300). 6 early 2 later swarms. Therefore ~~4~~: 2b 2i 0.6 respectively. Result previously stated may have been a coincidence! - See 1001 (ov.)

1 b
2 b
3 i
4 i
5 i
6 i med
7 i late
8 b late

} early

} all 22^R Test 12.

Monophasics.

A. SW942 (N97 : b –) in b SS tubes = D3 see **D**
Edwards dug up some other N97, "1,2" presumably. In view of possible doubt as to ancestry do not use these unless essential.

B. ① 3550 – 51 "b" } "monophasic" [illegible] → "b" reactions, 1,2 –.
② " " "12" ⟶ was [illegible] viable.
Mor. b SS 3/13.

C. 546 in ② } single test Immobile
12 } Immobile
[illegible] } k6:
C2: still 1,2.

Reality of D. 546 liv. agglutinates in b (Edwards) 1:100 but not b (Colindale – absorbed?) [illegible] serums may be imperfect for phase selections!

3/7 D. 942 in b — 164:
123 (Colindale) +++
12·E + def. retardation! (cf. Spicer's letter)
D 3+ … single colo / b. 3/10/53
3/12: D6 → { 2 3,3+ / 1,2 + }
Note: in tube agglutination, 942 reacts c 1,2 E (#157-serum) to > 1:200, < 1:800
c Colindale 123. 1:200+++ 1:500÷

E FA 54–x 666 ++. → (SS) ++ → (SS+b) d: (v. weak in slides) SW987
55 – x ++ –
56 – x – –
57 – x ++ –.
} Repeated 3/19 c same result. Is FA56 inactive? Try on SW967 Alsover

F 959/1,2 magg. at first, later after SS → 1,2 ++, ② ++. Repass in 1,2,3
959/3: reacts **D**, also c ! ??

G [illegible]891/1,2 7 passes in 1,2,3 : magg. (pr)

H = 960/1,2 7 passes in 1,2,3: → still 1,2

} Save and send to Edwards as **B**

~~E~~

942: 12 1:100 : +++
1,5/23 : —
k6 : —
same lv + purified
b 1:1000 +++

∴ cross-reaction
c̄ java 1,2 only.

In repetitions of E, FA56 was inactive (4 content?)
55,57/b gave nothing (maybe useful as H_1^0).

56 × 967 also gave no swarms.

Try 55 ×, 57 × } 967 | both gm.+ numerous swarms.

~~55 57 × pvis slow outgrowth at times.~~

gm → 57: still (gm)+

Mycoplasmas : stability

3/7 SW942 in b SS

D.

1	direct from stock	3/13	→ z_{33}	V. sharp	→ sci
2		3/13	→ z_{33}	✓	→ sci
3					
4		3/17	→ z_{33}		
5					
6		3/12	→ z_{33} + 1,2+.	Rep.:	z_{33} + 1,2? Titrate (after s.c.i.)
7		3/19	→ z_{33}		
8	T.O others 3/29				

z_{33}: — T.O 3/29

following what appears to be an initial stage, a dense well demarcated bed, diffuse spread sometimes later ensues as if in two steps.

C. SW546 in 1,2,3 SS. 5 single colonies 3/14.

3/24 1. Stief 1,2 ± 2 ?

others T.O 3/29.

SW997 B: 3550-51 (= 1031B3) in b SS 3/13. 3/15 slow migration. Pullout after limited travel and reinoculate. = B1, after second pass, with z_{33}? mag. = z_{33} (weak) but through SS 4p

3/15 Single colonies after motility agn: 2-4

B2 → Rough! B3-B4-(Rough) z_{33}.

FGH Conclude that 959, 960, 891 are substantially stable. Present ~~FH~~ pups inadequate to elicit non-b from SW966.

031
JKL

J 891 } K 959 } L 960. } × — FA15 (abnz² enx) / 1,2 colon. ③ 1,2 3 ① ② serum. ②

Buds + swarms in 20 hours. Fastest progression in 1,2,3 (Zelindale) = ① then ②, ③ slowest.) ~~these ran through later.~~

sic ! J1 b: slow → 1,2 ; K1 b: — at first → z_{33}! ; L1 b: (slow).

b: 1,2 → b (single colonies next b, 1,2 ++ ?) then next primarily 1,2 (over)

b: 1,2 → b — Test reversibility

Became diphasic again. (try in b, 1,2!)

cf: zega × JKL, same pattern! Is phase II intrinsically poorly motile? ~~[struck out]~~ Pass 891... in motility agar! (31-50...):

A16 J·0 moderate +. K·0 v. slow initially, gave fast bud. L·0 moderate +

Note 959/3 finally gave (after 2 passes 1,2 3 serum & 2 mot agar, + s.c.i.) a phase reacting, in slide aggl. b: ++ z_{33}: ++ (i, 1,2 ± ?) In tubes at 1:1000 b++ i ± 1,2 ± z_{33} + ? Record as b, (i, z_{33}, 1,2 ?)

SW 992 After passage through b, ~~still reacts b-z_{33}~~ → 1,2 readily.

SW 99 { J2 b+++ enx? ; K3 b ± enx +++ ; L2 b+++ enx ± ; L3 b+++ enx ± (Interpretation:)

Assume that b: 1,2 and : enx are both formed, but that the b phase usually predominates.

(K3 gives v. slow progression, "bands" i.e. zigzag (enx))

L3, L2 eventually gave through: still b.

Select J2, L2, L3 swarms in b: 1,2 agar to isolate possible residual —: enx forms. [Similar sit. c d: z_6]. No alternative phases appeared (already pure!) No further test except K3 enx: — 3/11

Hereafter, use motilized J0-K0-L0 in further experiments. These are still pure —: 1,2.

Try ① separating b from z_{33} colonies ② b, z_{33}, b + z_{33} selection? ↓ ↓ 1,2

Record as b, (z_{33}?): 1,2

(see over for summary)

J1': 1,2 (primarily) doubtful b reactions
in several single colonies

Put in 1,2 serum for " .
negates in 2/4. → b.

---

single colony swarmed directly through b, 1,2 but
not b+1,2

∴ J1' is now b:1,2 reversible.

Summary: 891 and 960 x— abony have given so far
only b:1,2 becoming
diphasic.
① b:— (z_{33}) might not be transductions.

SW959 x— abony has given
② —:enx

Alt phases: SW959 → 959/3 which acts b(z_{33}:1,2):1,2
not clear whether now diphasic.

These selections need to be repeated using motile of SW959.

3/29/53.

STATUS.

W.J. ~~AEC~~ ~~L+Edwards~~ Ass:

1. v53-666-948.... (See 1008).
Combinations, tracks, etc. in progress.

2. Monophasic 1,2's.
a) no first phases clearly produced (Reducks b from 959 - of Edwards 1...)
b) →x other stocks. Failed on abony, no explanation. ? Ref.
c) →x 666 to reveal first phases. No swarms 0901 - Felix '30
→x 967 " " " In progress (ex. Fla.*)
959—x abortus equi gave 1,2: — (sw1000) This is the only transduction from these monophasics. Possibly phage titers are low? Should be checked.

a) →x 959-960-891... d:z6 gave d:1,2 in each case (977 may be d: - ?) 976-8
(a) enx a:1,2 sw994
b: enx b:12
(959 seems to give stable types d: - , b: — and: enx). Use 959 motile further exp.
(. also z6: -)

3. Abortus equi. —→x TM or para B gives —: enx! (SW986)
—→x ~~[illegible]~~ 960... a:1,2 ...
x←— 959 —:1,2
x←— para B 2 —:1,2
x←— TM (not yet seen in control) a: enx!
Need smoother culture for further work on O-lacking' monophasics and ② substituting enx ...
Prepare FA 9, 10, 11, 12.

			H_1	H_2	H_2	×	H_1	H_1	H_2		H_1 H_1 H_2
	N976 ×	abony	b	1,2	–	{	b	–	emx		b (1,2) emx
										1074	(b) 1,2 emx
	TM		b	"	1,2	–	{	i	– 1,2	SW 1026 1050	b i –
										SW 1049	i 1,2 –
1029: i obtained.	SW1026 ×	sendai	b	i	–		a	–	1,5	SW1031	a b –
	SW1031	altendorf	a	b	–		c	–	1,7	SW1052	c b
										SW1053	a c
	SW1053	abony	a	c	–		b	–	emx		a (c) emx
											c (a) emx
	SW1049.	abony	i	1,2	–		b	–	emx		b 1,2 –
											(a) 1,2 emx
1036D	N976'	× TM ✓					b → 1,2 → b				b 1,2 SW1027
	1007b	× meini ✓									b – 1,5 SW1028
	(1009 1,2	abony ✓									1,2 – emx
	SW1043 N976	lanalinda a emx ✓									b emx
	SW1026 i	meini									i 1,5
wh. 1046.	SW1031a	SW1046									a 1,2
	b	"									b 1,2

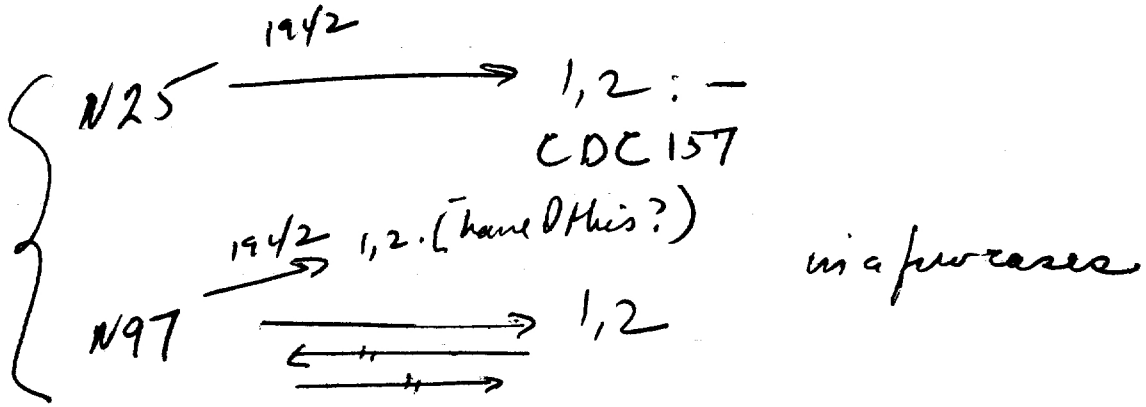
Recip.	Donor	Prod	SCW ...	
N97b	abmy	eux → b	no b, eux	1074C.
SW1007b	SW1043B2 "	eux → 1,2 → eux		
"	FA10 i:	a → b → a		SW1026 1036E
	N97 b = TM	i → b		SW1030 1038C
SW1009b	FA10	i → b		1038H
"	TM	i → b		G
SW1043 = N97b	TM	i → 1,2 → i		SW1049 1046C
~~N97b~~	~~abmy~~	~~eux~~ → b		
SW1026i,	sendai	a → b → a → b ✓		10385 SW1031
↓	~~[illegible]~~	~~[illegible]~~		~~[illegible]~~
SW1051a	attendorf	c → b		1049A SW1052
⋮ b		c → a ✓		B SW1053
↓				
SW1053a	abmy	eux → a → eux	no c	SW1054
c	"	eux → c → eux	no a.	SW1055
SW1049	abmy	eux → 1,2 → eux ✓		
		b → 1,2 → b		
But. SW1043	"	~~eux → 1,2 → eux~~		

updated.

1057...

SW1053 → SW666.

stated in 1946 that $b \rightarrow 1,2$ only once
1,2's are stable



"AMS" source of N97?

1036 - 1046.

N97 ⟶ 1,2 sc ⟶ 0

type 3b.

1046A1

1036B1

N97 ⟶ 1,2 ⟶ b ⟶ 5sc ⟶ 00000

mass

SW1009

SW1007

sc ⟶ b

SW1009b

5sc ⟶ b b b b b ⟶ 0 0 0 0

1036G1

N97 ⟶ 1,2

mass

SW1043

8 s.c. ⟶ 1,2 ⟶ 0,0

⟶ 1,2 ⟶ b ⟶ 0

⟶ 1,2 ⟶ 0

⟶ 1,2

⟶ 1,2

⟶ 1,2

⟶ 1,2

⟶ 1,2

1046B1

bagam

⟶ 1,2 ⟶ 0

⟶ 1,2 ⟶ 0

1,2 ⟶ 0

⟶ 1,2

⟶ 1,2

⟶ 0

History of cultures.

COC-157 = S para B N25 — 1,2

Ky Bull 1939 Ky Ag Exp Sta Circ 50.

[Useful to obtain a Vi$^+$ H$^-$ strain of Ty 2].
[Phase reversal in Tokyo]

Sw 66 = 0248 = Jersey taft+.

11/53 – Phil offered other cultures from same outbreak.
received? Saved?

{ N25 / N97 } from an outbreak in C.Z. c 1942
nonetypable (Cherry)

{ N25 / N97 } → COC 157 tartrate pos.

Same outbreak

1025.

4. z_{33}. SW981 is typ. z_{33}: enx (Try prioffate for *i:12)

SW26 → x i:1,2 failed. (inadequate ♂?)

5. Monophasics 1031-36. No recurrences of 1,2 phases in available material tested. Others underway. 3550-51 (SW991); 942 gave only z_{33}. 546 gave nothing new. [Try to get viable 3550-51 (1,2)].

6. S. javiana SW980 ✓ IX XII enx: l z_{28}

996 1028F2 inaggl. x — para B 1.

990 IX XII i: enx

980 — x 666 → l z_{28}: —

Iw seems to inhibit b.

7 Nonmotiles. See 1027. Homology tests on SW970, 972 incomplete. H_1 - F la ~~tra~~ Linkage of SW553-561-8-9 in process.

8. Pullorum-gallinarum → x 0901 → P_6^+. Other homologies not extensively tested.

9. Motility-F. 58-161 2/6 F^- 1 $P^{+++ Hfr?}$ W1678 1/4 F^- hyfatile

10: Traits: 3/27/53 On basis of Morse' findings on segregation of Gal_2 x Gal_4 → + → both Gal_4, Gal_2 − trait may have other genotypes than receptor strain

<u>Selection for H.f. transducer.</u>

3/10/53

(cf. Morse' contemporary experiment):

FA22 → SW950 on EMB Gal to isolate transducer phage.
Isolate 32 papillae. After purification, grow mixed culture c̄ LT-2 and grow phage. Assay 1 drop of each phage c̄ SW950/EMB Gal. 1–22 individual, 23-28, 29-32 as pools.
Look for marked discrepancies as compared c̄ SW955 + LT2. PLT22+2? preparations.

#'s	<50	50-100	>100
	9	13	
	8	22	
	7 (2)	11	
	6		
	15		
		18	
	19		
	20		
	21		
	5		
	16		
	FA22		
	11		
	14		
	1		
	0 (0)		
	29+		
	23-28		
	10		
	955		
	4		
	3		
	2		
	12		

	papil.	plaques/10^7	ratio
A1	~~88~~ 131	773	.169
A2	241	1251	.193
A3	93	576	.161
A4	296	1456	.204
FA22	~~144~~ 231	1448	.160

later platings ↗ too high for accurate count!

ratios in fairly good, consistent accord; about 1.75 transductions per 10^7 φ.
(cf. earlier determinations for this factor, which is fairly incompatible)

Some of these are very crudely estimated. Save nos. 11, 22, 13, 7 [2 3 4 1] for further assay as 1032 A(1–4). Assay <u>φ, FA Gal+</u>. Also pass papillae further test of same sort.

Note: In spite of being kept over $CHCl_3$ in t.t., the preps became obviously contaminated, presumably c̄ LT-2. This is apparent in terms of overnight papillae. A2-3-4 show this property. Initial readings, however, are probably OK, so repeat assays after reheating and shaking c̄ chloroform in closed vials.

(over)

169
193
161
204
} transductions per 10⁹

160

Repick 4 papillae from A4 = B1-4 for recard pass
Assays, .1 ml → x sw950

3/27/53.

B1	315
2	352
4	307
3	480

~~[redacted]~~ Pick 4 papillae for C.

11/7/53

C1	57
2	131
3	116
4	3 (probably nonbacteriophage)
FA 22	113

---

no effect obvious. Note variation in assay (little value as indicator).

Isolate C2 and save.

SW684 is sole Val^{v}

K. SW684. ~~Val+~~ colony (selected by MLM, must ~~be~~ Val^{v}) + culture Luoffed. But in pest test lysate gave 0 Val+! / SW666.

of 973B K1 K2.

L. Reisolate SW684 Val^{v}.

not recoverable 4/53.

s. dublin NM. Fla, ? 1033

cf. 1027

3/19/53 FA22 —x SW967 / gm. → after 48-72 hours swarms: again c.
Unless 2-step transduction is involved, which seems doubtful, SW553
also shows limited transduction.

Recapit: 1. SW967; 553 —x SW666 does give Fla+ b and gm.
[Compare b:gm ratio with NM and motile SW967....]

2. SW666 —x SW967 gives (only?) gm
3. LT2 —x SW967 gives mostly gm. i selectively.
[Unselected ratio gm: i].
[b from 666 -x 967? Note rarity of any swarms.
cf. swarm: trails 666, 666F6]

4. FA9 —x 967 5/5 gm save 2 22s
5. 12 —x 967 6/6 gm
6. 10 —x 967 54/54 gm save 2. 22s
7. 22 —x 967 67/71 gm 2i 2 rough. 4g 2i } save 6 22s

1. SW1045 Review some of these for sensitivity to PLT-22 for further tests.

These confirm occurrence of "limited" transductions.

Detection of suppressed phases:

			−gm	+gm serum
8	FA55	(SW959)		
9	56	(SW960)	—x SW967 ± gm.	
10	57	(SW891)		

cf. 3/19: —x SW666 ± b. 55, 57 give swarms c but not c b, cf. 1031 E

JAN 25 1955

FD58 = abortus equi supposed to be H_1^-.
Better to use SW1067 which may actually be H_1^-

F/a, ... : Track segregation

3/29/53 A. (666) FA9 –x SW967. B. (609) 10 –x 967 C. (623) 12 –x ~~???~~ 666.

D. FA60 (SW967) –x SW666.

3/30. A has almost no Tor S. (new prep. of FA9 may be low titre)

3/30. Repeat B, C, D 10 AM.

B. Most plates too heavy: isolate tracks (and purify for ???.) from 1 plate

C, D. Too heavy

B. Pick 6. #6 shows a few motile cells – sp.
Repurify all 6, but test 1-5 also directly
c̄ FA(2)8. (1-5) x— 58 → gm, not b. Also test each x–60
6 x— 22 → gm not b

#3 ?
~~12~~ tested others gm
< 5 ??? + #3.

A. After 24 hours tracks appeared. Pick 17. Spot on SS ± FA22.
all → gm +

3/31. Repeat A 9^{30} AM. Use 928 lwoffate –x SW967. 30 tracks picked 21-50

B	10A –x 967	33 picked #7–~~39~~.
C	12 –x 666	± b, i serum
D	60 –x 666	
E	60 –x 948	
F	9 –x 948	
G	10 –x 948	
H	22 –x 948.	

4/1 and 4/2 A. After 15 hours, tracks and swarms are completely inhibited by gm serum. Swarms are reduced in number but tracks are scarcely affected (numbers) by b serum. s̄ serum, tracks and swarms are very profuse
Pick tracks away from vicinity of swarms

C. Tracks are not very numerous compared to swarms. In b, i serums numerous ~~swarms~~ swarms (somewhat reduced?); no tracks at all. b+i: a few inhibited swarms No tracks that could be isolated.

B. Dilute plating. Pick isolated occasional tracks

What was 1033 expt? ① look for recessives ② Semm effects

JAN 2 4 1955

A: (SW666 → × SW967.) T × — FA22 all gm (17 tested)
all × # FA60.

S.50: all gm

B (SW609 → × 967 / much heavier guild than A).
T × — SW726
or TM2 → 6 all gm.

~~No record of Flx dropping, but note to do it.~~

Repeated. ♀ semm lost. ♀ gm semm, no Tor S from A.
no offset of ♂ semm. (cf ♂ → ♀ ! / or gm → ♂)

C. 12 → × 666. Note that T ≈ S. Dor inhibited T.

D. (60 → × 666) S 6♂, 4 gm ♀♀
T (4) × — TM2 → ♂.

G. Found that (948 × — PM0) T was more susceptible of transduction.
T: S ratio here is 120:10

D. Occ. trailers and swarms. Picked possible. + FA22 4/trailers ↘ b.
6b 4/gm.

E. No swarms, rare trailers E2 x — FA22
E1 + 22 several trailers, no sw.

F. No swarms or trailers (smeared)

G. Rare trailers G1 x — rare trails G2 x +++ G2, G3 x — FA22

H. Rare trailers H1, H2 x — FA10 rare trailers.

A 1-17 tested x — FA60 (SW967) No swarms. All trailers are 22^S
(1 diff. plaqued)

♂ G2, 948 x — FA22 for diff. transduc, etc. 948, G2 both 22^R.,
G2 may carry some ♀/SW950 ?
(0. small plaques)

[Test A (original) 50 swarms all gm, no b.
♂. 0. $6, 22^R : 44, 22^S$]

Set up FA22 2 : SW948, G2 1. Shoc .02ml samples on nut agar.

18 hours: → × 948 no T or S this time.

	T	S	
→ × G2	28	5	G2 is apparently selected as more amenable to transduction
	47	3	
	45	2 + ?	
	120	10 (all a)	(X11 form variant ??)

Possibility that G2 has had a substitution of Fla_1^-? But derived from FA10 → ×.

O transduction.

Serum marked Typhi murium O 1:2", presumably absorbed on typhi, ~~but for~~ found to react c̄ alcoholized LT-2, not H901. (Crossmarked by CCS " 1X only: O", presumably incorrect.

In slide tests, stock cultures of eltendorf, zga, [Sandiego] were not agglut. but abortus equi (though already rather rough) was.

Mixed host c̄ abortus equi and sandiego.

Use 2 ml SS agar + .05, .1, .2 ml O serum. (presumably mostly 10)

3/24 None inhibited.

~~Try LT-2 in 2ml ...~~

abony x FA60, FA61 and control in .2 ml serum / ca 4 ml SS.

=C control (punctured surface) swarmed nearly through overnight.

A, B expts had gone ca 2 cm in 24 hours. Seal off these and also reincubate

A: 4/4 still O0+ TO −

B: 3/3 rather rough, but B+ T −

O901 T+ B−

Results inconclusively negative

3-20-53. Motilize abony 1 and 2. Prepare FA 14C and 15C resp. from single colonies.
Plating of lysate before heating showed: 14C 24 b : 1 enx colonies
15C 0 b : 20 enx
These FA should behave substantially pure.

Prepare suspensions of TM2 and SW950, phases i and 1,2 from single colonies. Plate mixtures with FA on i:12 serum SS agar.

9P26

A. SW 950 (i) + TM2 (1,2) x— 14C [b:enx] .1 ml 1:1 culture mix + .2ml FA pipette spread.

B. i- 12+ x— 15C b:enx

C. SW 950 (12-) + TM2 (i+) x— 14C 10A27: All plates rather overspread (medium still too moist; insuff. antiserum?)

D. x— 15C

Pick whatever swarms as possible, and stationary growth (A_o, B_o...). Streak these out as well as inocula.

	gross slide agg.		Colonies on EMB Gal	Individual colonies		
AB inoc	i++	12++	- = +	5+ all 12	5- all i	all ok/
CD inoc	"	"	- = +	all i	all 12	
Ao	±	12++	ca 5+:1-	all 12	all i	ok
Bo	+	++	3+:1-	4i 1(12)	"	
Co	++	++	+=-	5 i:4i 1i(12)	all i:12	?
Do	++	++	+=-	5 i(12)	all i:12 !	?

A30

Co and Do reacted very poorly directly from colonies and were therefore reinoculated into broth and then tested. It is still mysterious that they should show this diphasicity. Restreak and cf. C-D inoculum.

In first run, A and C gave discrete swarms; B and D were badly overspread, and must be regarded as pooled (and possibly biassed) swarms.

A: 1-5 all Gal- b
C: 1-3 Gal+ b

These are in agreement with result of 979JK, and may also show directive preference of recipient phase (homophasic)

B: 1 Pred. Gal- (5/5 b); few + (5/5 enx) Count 1 b- 1 enx+
2 almost pure Gal+ 5/5 enx ." "
3 pred,. Gal + (5/5 enx);few - (5/5 b) " "
4 pred. Gal+ (2/5 enx 3/5 12*) - 5/5 b " "
3 b- 4 enx+
3 b+ .....

D: 1-3 All virtually pure Gal+ b.

P28 Rerun B,D using smaller inocula (same suspensions). Still overspread, but mod. well isolated swarms.

B: 2 Gal- b : 2 Gal- enx [sic]

D: 11 Gal+ b : 2 Gal+ enx : 1 Gal- enx

Total	homoph b	heteroph b	homo enx	heteroph enx
A	* 5	—	—	—
B	* 5		* 4	2
C	* 3	—	* —	—
D	14		* 1	2

4/8/53

See → for summary.

FA15C × TM2 ¹ 1 swarm: enx

² 7 swarms: enx

(old suspension) v. dilute FA. well-isolated swarms.
(This fits previous data much better.)

4/10 .. FA15C mixture 5 swarms: enx
dil. → AB gal: 3+ : 2i
35B' (swarm) (homoplt) (heteroplt)
Ca = gal+ : −
5+ = 1,2
5− = i
(of 4:2 previously!)

35D' comparable to above. discrete swarms only.
+ plate was heavily inoculated → pool
4/13.
mix CD streaked out. predom Cal+ 5+ {1 i, 1,2+ / 4 i
5− {5 i 1,2

(of AB inoculum! There are much more unstable)

15C × CD. Discrete swarms:
25b all Cal+
9 enx 3 Cal−
6 Cal+

These mixtures are peculiar. save as 10 35 C, D, CD.

D: pool, streaked out ca 10 Cal+ : 1 Cal− . pool mass matings.
Pick 10− enx
10+ b

C-D show the major discrepancy. Possible sources of error:

1. Impurity of FA. (in spite of preliminary control!) Repeat with other preps.

2. Intrinsic motility difference favoring Gal+, or i cells. But cf. A.

3. Differential effect of the serum preparation, favoring b:- over enx.

4. cf. peculiarity of phase of $C_0 - D_0$!

5. Contamination of FA15 with abory. (Test some D for phase 2) but B is also discrepant. Not likely.

---

2) 2/2/53. Mac AB mac CD mac / mot agar

At margin, streak out: AB pure + (1,2)

CD ~~pure~~ 20: 1 + (1,2)

Try TO1₂ through motility agar: 2 passages: reacted 1,2+++ i -
∴ phase 2 is more motile.

Isolates of s.c.i. from A-B-C-D mac,

950(1,2) showed mixed cultures in broth from each of two s.c., no others.

E. 4/8/53. Test quality of FA15C, at dilutions to permit discrete swarms.
→ × TM2' 1 swarm enx Same susp. as 1035.
→ × TM2² 7 " enx.

B' 4/11 FA15C → × AB. 5 swarms: all enx, 3 Gal+ 2 Gal-
Control AB 5 Gal+ : 1,2
5 Gal- : i

D' 4/13. Same suspensions, diluted FA.
FA15C → × C (SW950² + TM')
Control: pudan Gal+. [5+ : 4i 1 i,1,2. 5- : 5 i+1,2

Discrete swarms: 25 b all Gal+ Cf. 3/28 D - quite homogeneous.
9 enx 3 Gal-
6 Gal+

pooled swarms, ca 10 Gal+ : 1 Gal-
10 Gal- : 10 enx
10 Gal+ : 10 b.

Thus if we regarded Gal- only (= 1,2, in this case,) all would be homophenic, but 25 : 6 of the Gal+ (TM' !) are b. Swarms may have been too crowded still. TM has not, as a rule, given any difficulty in scoring i vs. 1,2 but should be examined further.

Cumul. totals (discrete swarms only): • homophenic

		Gal+ b	Gal+ enx	Gal- b	Gal- enx
A, B	i- plus 1,2 +			5 •	
C, D	i+ plus 1,2 -	3 •		2	2
		36	8		4 •
E	1,2+		7		

See 1039 for further analysis of TM; SW950.

3/26/53.

see 1031

A. "7-119" from Cheny 2/53. "Peters Serum Co" Shipp Nov. 1942
S. paratyphi B & type 3b. Monoph. nonsp. tactate +.
= SW 1006.

SS = sarcolid In my hands — rather rough. Rapid smoothest colony for stock.
1+ = agglutinable. Original + Isolate Does not swarm through SS agar either 37° or 30°.
3/28 Microscopically: occasional cells (ca 10^{-4}) show definite motility, others stationary. Some diffusion in SS, but no progressive swarms or blebs. These obsd. stationary under microscope. (nutr. req. for motility?) — Check with Cheny. On SS plates, numerous blebs appear, enlarging to swarms which are markedly inhibited near margin — probably accounting for failure in SS tubes which are more restricted. [Antarctibody system?] 2 swarms: 1, 2 ++, b ±. A smooth-looking colony (in SS solution) was actively motile. Note: self-plugged!

B N97 "A.M.S. Source unknown type 3b Monoph. sp. tactate +"
v agglutinable in b. ~~Treatment for single colonies & mass. b serum.~~
~~Stock~~: grew through b in 48 hours (after def. inhibition) = 36B1 = 1, 2 — = SW1009
Herethus 3/29. N97 orig lost. Put mass 36B1 through
SW1007 (recovered from mass 1036B1) = b. for reversal 1, 2, 3 N97, if any.
Treatment and test single colonies in b serum.
4/5. 1036B1, s.c., also gave b after prolonged incub in 1, 2, 3
∴ N97 is reversible b: 1, 2. (and first isolate of pure. N97)

Stock tubes inadvertently discarded

C. "N97 (3) 1" java nsp. Grew very slowly in Kressay or nutrient. Test swarm through sarcolid — 1, 2.

NoTE.

SW 1007 (= N97 or ?), and most other b phases
react b++ z33 — (including SW1027, 942,)

SW 1009 = N97 ph. 2 = 1, 2, not z33.

SW1009 ⟶ SW1009b (ph. 1?) but this is bz33.

In 1036 G, the b phases are all from a single ~~[illegible]~~ selection of
SW1009 /1, 2, 3 and are evidently all bz33.

For comparisons, F1–F5 should be compared. F1b is recorded as
being b++ z33 —

SW 1009b (b1) does not revert to 1, 2, 3 .. but slowly gives z33.
Other b's from SW1009 should be checked.

SW1026 is stated as FA12 (SW623) → x SW1007 (and not → x 1009b)
It was isolated in i phase, readily → b, but the b phase
(4 colonies of 1 isolate) gives only z33. The b phase has
little or no z33.

1036 H

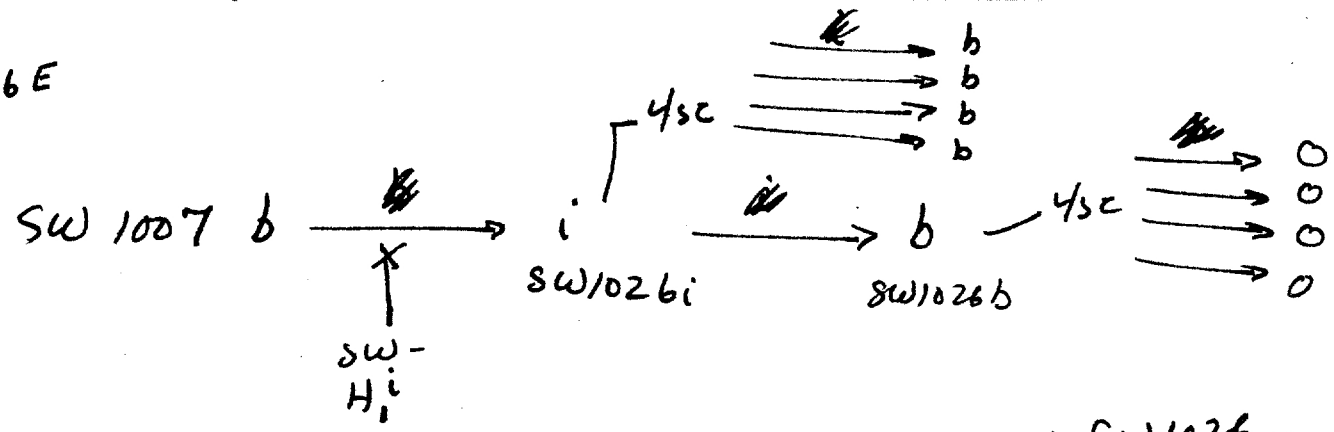
① SW945 | 1, 2 3 1 [illegible] though actively motile

② 1000-C1 | 1, 2, 3 often not → slow spread 1, 2 ++ / 1, 5 — + [illegible]

original [illegible]

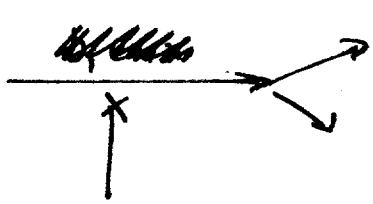
1, 5 [illegible]; 1, 2 both ++ for main ph 2

1036E



∴ SW1026 is b:i

1036D. ✓ S. abony b:enx → 1,2 → enx; 1,2 → cnx



1038B S. miami a:1,5 → SW1007 b → b → 1,5

D TM i:1,2 → 1036G-1 b → b → 1,2 → b

1038E SW1007 b → TM → i → b SW1030

SW1009b b → TM → i → b G, H.

ditto FA10

TRANSDUCTIONS WITH (N25 and) N97 derivs. as Recipients.

(A)

Recip.	Phenotype	(Inferred Genotype)	Donor	Phenotype	Genotype	Prod.	Inf. Genotype	Label
1036E	SW1007	b	$\underline{H_1^b}\ H_1^{1,2}$	FA10	H_1^i	$i \to b \to 0$	$H_1^b\ \underset{\sim}{H_1^i}$	SW102
				TM		$i \to b$		SW103
1038H	SW1009	b	$H_1^b H_1^{1,2}$	FA10	H_1^i	$i \to b$	$H_1^b\ \underset{\sim}{H_1^i}$	1038H
1038G	"	b	"	TM	$H_1^i H_2^{1,2}$	$i \to b$	$H_1^b\ \underset{\sim}{H_1^i}$	1038G
1046C	SW1043 N97	b	"	TM	"	$i \to 1,2 \to i$	$\underset{\sim}{H_1^i}\ H_1^{1,2}$	1046C SW1049
1038J	SW1026	i : b	$\underset{\sim}{H_1^i}\ H_1^b$	sendai	$\underset{\sim}{H_1^a}\ H_2^{1,5}$	$a \to b \to a \to b$	$\underset{\sim}{H_1^a}\ H_1^b$	SW103
1046DE	SW1031	a : b	$\underset{\sim}{H_1^a}\ H_2^b$	Saltzman	$H_1^c H_2^{1,5}$	$c \to b$ (1)	$\underset{\sim}{H_1^c}\ H_1^b$	SW10
						$c \to a$ (2)	$\underset{\sim}{H_1^c}\ \underset{\sim}{H_1^a}$	SW105
1051GH	SW1053a	a : (c)	$H_1^a\ H_1^c$	S. abony	$H_1^b H_2^{env}$	$env \to c \to env$	$H_1^c (H_1^a) H_2^{env}$	SW105
	SW1052			b : env				
	SW1053c	(c) a	"	"	"	$env \to a \to env$		SW100
1046	SW1049	i : 1,2	$\underset{\sim}{H_1^i}\ H_1^{1,2}$	S. abony	"	Small → i? $env \to 1,2 \to env$	$(H_1^i) H_1^{1,2} H_2^{env}$	
K	SW1043B2.2	1,2 : b	$\underset{\sim}{H_1^b} H_1^{1,2}$	b : env		$b \to 1,2$ $b \to 1,2$	$\underset{\sim}{H_1^b}\ H_1^{1,2}$	
						$env \to env$	$(H_1^b) H_1^{1,2} H_2^{env}$	
1074C	N97	b : 1,2	abony env			env → b → 0	$(H_1^{1,2}) H_1^b H_2^{env}$	

SW1074.
10V96 3d → i? extant

N97... donors.

1038B	1007b → miami ✓	b → 1,5	SW1028
1038D	• 1036G1 = N97b' → TM ✓	b → 1,2 → b	SW1027
1036D	1009(1,2) → abmy ✓	1,2 → enx (2)	
	N25 1,2 → " ✓	" "	
1074A	N97b → miami ng ✓		
B	SW1043 → lanalinda a enx ✓	b → enx	
1038K	1026i → miami	i → 1,5	⇒
1046 D	SW103/a → SW104/6 (=?)	a → 1,2 → a (2)	
E	b	b → 1,2 → b (2)	

	N25 1,2 → 666	1,2
	typhi	1,2
	→ miami	1,2 : 1,5
	→ abmy ✓	1,2 : enx
lobster.	→ TM?	
1,2 —	← abmy	b — dead 1,2 : enx
	← TM	i : —

D...

D. Cf. above × FA50 (N25 1,2:-) (A) → 1,2: enx
× FA71 (N97 sw1009 -:1,2) (B) 1 → 1,2: enx
2 → 1,2: enx
∴ sw1009 is also $H_{1,2...}$! The 1,2 phase should be studied closely, and the reversibility to b confirmed.

B. Receipt.
Stock N97 received. Rec in b serum. Alt. phase grew out in 48 hours.
= sw1009 (1,2) = 1036B1
Stock acc. discarded. Recover sw1007 from unpurified inoculum of 1036B1 back in 123 serum. This grew out fairly promptly.

sw1009 purified, s.c.i in 1,2 serum → (about 3-4 da.) a b phase again. [Is sw1007 original N97 or N97: b:1,2:b ?]
1036B2-6 are added. s.c.i of sw1007 in b serum. 2-5 grew through in 3 days: all z_{33}
6 grew through in 4 " " "

(Apparent monophasicity might be due to b-1 cross-r ?)

~~Test by E~~

E. FA 12 (i:-) × sw1007/b serum. swarm: i: → b (sc.!)
4/11 PM. Restrict each phase.

F. sw1009 s.c.i. /1,2,3.
1 no g. in 24h. (poorly agglut. – Try after motilizing)
2 trabilled through 24h → 36F2b
3 "
4 "
5 "
b (not z_{33}) ← not
F1 probably just poorly motile to start 48h

G = sw1009/1,2,3 → b. (from stock sw1009, repetition of expt in B. Test s.c.i in b, cf. B2-6. Use one colony = G1 as stock for further experiments, but 2-6 are separate colonies from the first plating of 1009/1,23. ✓ reversibility.

4/13 G7 = F2b, restricted, s.c.i. /b

4/14: G1, 2, 3, 4.

(over)

The hypothesis that para B java might be
$H_1^{1,2} : H_2^{b}$ had occurred to me
(and FA sw1007, G1, was initially tested)
just prior to reading the result of $\bar{t}$!

---

	b	z_{33}	
sw1007	++	− (or v. delayed +)	✓ repeated 4/16.
sw1009b	++	++	

∴ these are distinct.

~~of sw1027~~ sw1009 = $1,2^{++}$ z_{33}^{-} b^{-}

sw945, 10001 $1,2^{++}$ z_{33}^{-} 942 b^{++} z_{33}^{-}

$G3_0$ $b^{++}\ z_{33}^{++}$ $\xrightarrow{b}$ $G3_1$ $b^{-}\ z_{33}^{++}$

C2 " $b^{-}\ z_{33}^{++}$

G4 " $b^{-}\ (?\ z_{33}^{++}$

G7 " $z_{33}^{++}\ b^{-}$ (roughish)

4/17 G1 " $z_{33}^{++}\ b^{-}$

SW1026 b:i ? 1036E

4/12/53

[E1.] isolated from FA12 → x SW1007/b in tube = SW1026
↳ i swarm. After s.c.i., to i serum for second phase.
After 3-4 days yielded further swarm, reacting b!
For further verification, restreak SW1126i and SW1026b and
a) plant these colonies in homologous serum
b) restreak for further purif.!

a) 1026i [illegible] colonies i +++ b -
[illegible] 1026b [illegible] b +++ i —.

4/14 1036EA 1-4 4 i colonies from above / i → all four gave b in 24 hours. do not save

EB 1-4 4b colonies from above.
[illegible] [illegible] single colonies, b ~ (faint i?) from EB-1 (mix)

(EB5-8 = restreak 1026b(1).)
#9 in 48, 24h. respectively.

z33+ b+
4/14 EB5 → z33++ b—
EB2 ✓ → z33++ b— ✓
EB1 → z33++ b± save
3,6 " " of 7038

That SW1026 is i:b is confirmed.

From the relative stability of EB series, the b phase seems to be more "fixed". (cf. [illegible]F-6).

✓ tube agglutination 1:1000 [illegible] i, b

	serum i	b
i	+++	—
b	—	+++

(over)

(Also check SW674 phase [illegible] 1.

	[illegible]	[illegible]	[illegible]
1		+++	2 [illegible]
2	—	—	+++

PRE [illegible] phase 2

[illegible] 12g..! [illegible] [illegible] te.

It was noted that SW1009b (1036G1) reacted strongly with ±33 as well as b, leading to further tests

	b	i	±33	1,2
SW1026 (i)	−	+++	+	−
1026 (b) } 36EB5) }	++	−	+	−
1027b	++	−	−	−

SW1007 and other isolates of SW1009b should be rechecked.

~~b ±33~~

36F	1b	++	±
	2b	++	+
	3b	++	±
	4b	++	++
	G1	++	±
"1009b (thought to be G1)		++	++

considerable "quantitative" variation.

Strains should be matched for more detailed comparison.

S. napoli

3/25/53 ff. Stock culture (#187 Edwards) appeared resistant to P22, but one single colony isolate found sensitive (and smoother). (nasted [illegible]. After [illegible] → (ω) + .)
Attempt two FA preps (P.122 — FA 70, 70A — from phase [illegible])
70B from lez.
But these preps. have no action on SW666 / mot. agar.

A) 70A → 967 : occasional trails.
B) 70A → 666 1? swarm - b / (spont ?) no trails, no Gal+ — May have strong lytic action on mot agar; not apparent on EMB. (normal ?)

These preps have no Gal+ transd. activity for SW900 : presume negligible phage content

---

S. napoli rec'd from AMS (also #187). Plate out lyophil tube, and test individual colonies / PL722, 2/11 showed distinct sensitivity. = 887 A1, A2. Prepare FA + P22, P7. lysis abilility but no FA or phage!

4/13/53.

A. FA42 (SW942 = N25b) → x miami /a, 1,5 — N.C.

B. FA73 (SW1007 = N97b) → x " — b: 1,5 ✓ SW1028

C. FA74 (1036G1 = N97b') → x " — C1: (z33 b−) : 1,5

D. FA74 → x TM (1035CD mixture) /i, 1,2 — → SW1027 b: 1,2 : b Gal+ (not z33)

Note previous experiments: (1000:

A	SW588 → x 942 (FA25)	4	1,2: −	Numerous swarms!	SW945
C	abony[2] → x 942 FA15	1	1,2: −	1000 C1 saved.	

Concluded at that time that N25b was homologous with #157 1,2:− As these are macrophasic, and in view of C, the conclusion is unsafe. Retest stability.

3/13. Make new FA preparations. 1031B1 appears to be resistant to FA10, 22 (or 22P). SW1007-1009b, 942 are susceptible to both. Beccles and Jersey are susc. only to FA10. (possibility that this Jersey b:− is equivalent to Kauffmann 248?)

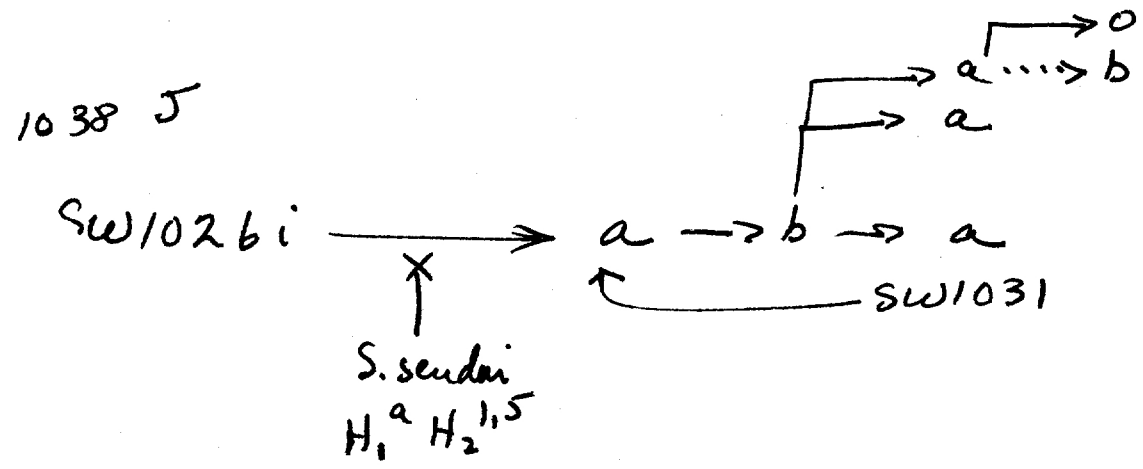
(margin: 2 types of N97 b N25?)

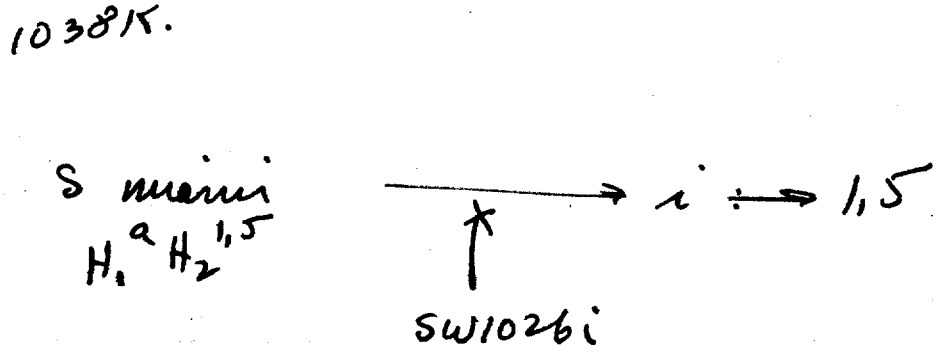
D: hypothesis that SW1009b is $H_1^{1,2}H_2^{b}$ is contradicted by finding SW1027, which implies the homology of b c TM i. → x SW1007 should be repeated, as well as by C. For further analysis, the homologies of the b, i phases of SW1026 will have to be examined in a similar way.

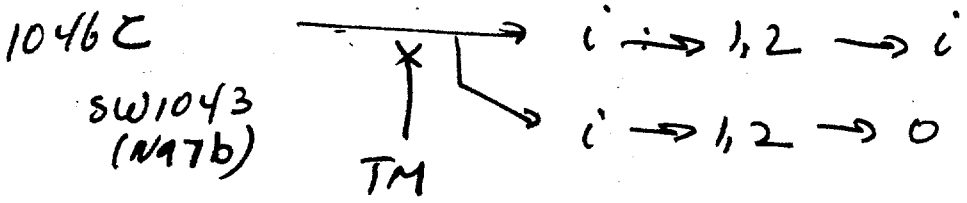
E	SW1[illegible]7 → x	FA22			E1 → i : b = SW1030
F	" → x	10	2: both	z33	
G	SW1009b → x	22			G1 → i : [redacted] b)
H	" → x	10	1:		G2 → i : [redacted] b
J	SW1026 → x	sendai (FA40)	1	2	~~a: env! SIC Reinforce not.~~ a : b : a SW1031
K	SW1026 i → x	miami	1 i: 1,5 2 no outgrowth		~~Stocks labelled J+ is~~ env. Must
L	" b → x	"	2 no outgrowth		
M	FA22 → x SW942		i: −	v. slow progression after 9 days, seal off. → still i	~~assume substitution~~ = 26812a Save for H1? 2 type sometimes

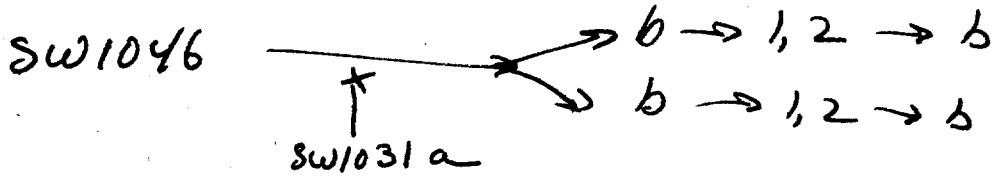
"51" = env assumed contamination. Study as 33 → a. Pure Gal+. Pass through env

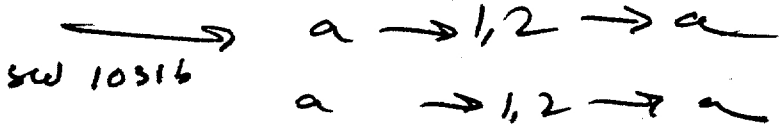
K1 − nonagitating in (i + 1,2) serum.

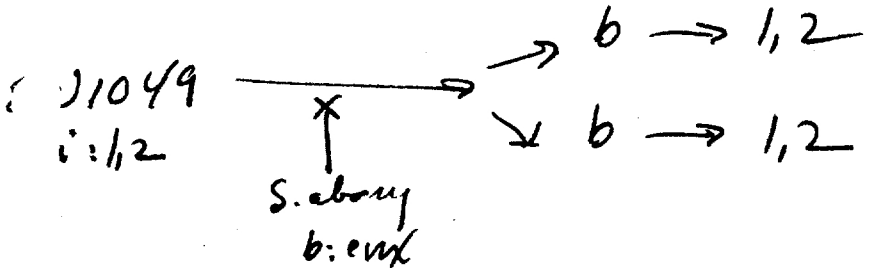

1038 J
SW1026i
a → b → a
a
a ⋯→ b
o
SW1031
S. sendai
H1a H21,5

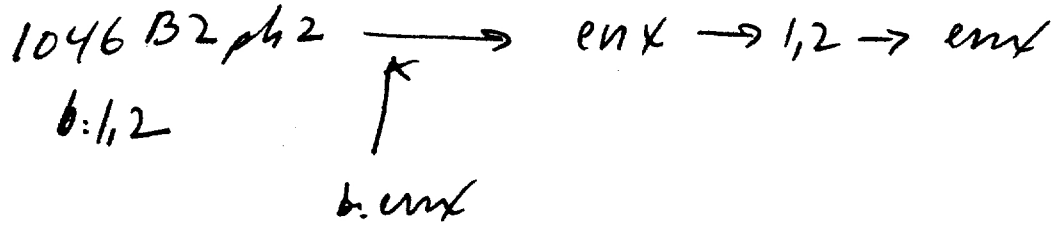

1038K.
S miami
H1a H21,5
i → 1,5
SW1026i


1046C
SW1043
(N97b)
TM
i → 1,2 → i
i → 1,2 → 0


SW1046
SW1031a
b → 1,2 → b
b → 1,2 → b


SW 1031b
a → 1,2 → a
a → 1,2 → a





1049.

SW1031 seems to be reversible a:b:a.

4/29. Retest
1. SW1031 b stock (once pure)
2. Second semis, s.c.i from SW1031b:
21 → a
22 → a (after 3 days). Compare 1036F1

1 and 2 promptly gave an a phase again. 22 few light blobs 2 days.
~~Restreak 21, 22 to exhibit difference in possible stability.~~

Assume that stock SW1031b is uniformly b:a.
Test 38521a in /a for trial reversal test.
5/6. } v. small blobs overnight. ~~→ stays b.~~
5/12 } eventually swimmed → still a.
Also, motility 521a, then into a (ca 5/9). By 5/12 still no progress. → 5/15 b.

Thus, SW1031 goes a:b:a:b (very sluggish).

B. N97b → S. marini → SW1028 b:1,5 ∴ b initially is H_1^b

c. ditto N97b' but gave z_{33} rx.
→ S. TM → SW1027 b:1,2 " " .

M. TM → N25 → i:— (so far). N25 possibly ≠ N97.

E-H TM → N97b, N97b' → i:b:— e.g. SW1030

J a:1,5 → SW1026 (i:b:) → SW1031 a:b:a ✓ — i being checked.

K 1026i → marini → (i:1,5):— worked ½ ∴ = i of $H_1^{b:i}$ ~~SW~~ K1

L 1026b " n.g. indecisive. (cf. 1044)

~~need to repeat L; prepare FA from SW1030 a; b phages for homology tests.~~ 77

From previous results, 1,2 (N97.1,2) → marini → SW1020 was stable in 1,2,3 serum. (did not carry over likelihood of → $b_{z_{33}}$).

and i (SW1026) → marini (K1) was stable in i,1,2 3.

If 1031 is irresible, prepare FA's.

L
1026b →
FA77 i,b →

abony → × TM phases.

3/14/53. Reisolate ~~TM1, TM2~~, TM2' and 2, ; SW950', 2. cf. 1035
Incc for TM1', 2 and 950' from slants; 950² from 1035 broth.
Also Reisolate a 950² from plating of prev. 950' (1/15 colonies mutated i, 1, 2, 3.)
= 1039 d2

1039-( )-1: TM2' a 1
TM2² b 1 → 5 colonies each i − 1,2 +++
950' c 1
950² d 1, d 2. → " " i ++ 1,2 +++

Restreak motilized (a-d)1 and d2 to imitate fresh mouse for transduction
P16 exp't: All motilized cultures react 1, 2 +++, 1,5 +++. 2: +++ c and d
also react i ++ (delayed). This seems to bear out previous observation
that SW950 is either phase-variable or phase-mixed. Restreak c1, d1
SW950 may thus be unsuitable for phase var. study.
1039 d2 → i 1,2 colony → 20 colonies all i: 1,2 ++ sal −
[Incc i, 1,2 SS. to attempt phase separation = 39 d 2.] over.
abcd 3 = s.c.i. from 1035 ABCD. To 5 ml broth: shake agglutinations:

	a	b	c	d
i	+++	−	+++	++
1,2	−	+++	−	+++
		Gal+		

Try b+c.

of SW986 which is SW950+ and i: 1 enx +

P17. A FA14 → × b+c (FA 2:1, large type)
B FA15 → × b+c (FA 2 small type)

A. 38 swarms: all Gal−. all b ++ # 1, 3, 21, 22 enx ± ?

B. 25. 17 b ~~all Gal−~~ (#1 ? b+ Gal+ enx ++)
All 4/B 7 enx all Gal+ #3, 5, 16 Gal− ± (mixed − mostly, +)
Of these, #8-16 were "least crowded swarms",
included 6 b: 3 enx. (not noticeably different)

AB₀ (mix) Gal− broth: all i ++ 1,2 − (I was 1,2 ± rough?)
Gal+ " : all i − 1,2 ++.

1039 d 2 /i → 1,2,3+++ i++ (delayed) i.e. same as original. selection unlikely to give pure 1,2,3 phase.

1039 d 2 /1,2,3 → i+++ 1,2,3 —.

SW 414: s.c. from stock. 5/33 tested with 1,2 were ++.

These < 2 i - 1,2++
- . .. ++. (from the s.c.)

	1st test colony	sat →	broth	Removed to broth	NSA plate
1	i - 1,2++	—	all i++, 1,2++		
2	i — 1,2++	—	1,2++		
3	i + 1,2++	—	1,2++	ditto.	all i++ 1,2 ++ or +
4	i ++ 1,2++	—	1,2 —		
5	i ++ 1,2++	—	1,2 —		

In general, i reaction stronger from broth, 1,2 from agar.

1039e. Repeated: 4/15 1,2++ i++. < NSA i++ 1,2+
broth i++ 1,2 —
from SW 414 stock.

TM2: 5/5 s.c. broth → i++ 1,2 —.

4/21/53

See 1039.A -B.

B 1-8 are bal+ enx. Brothers also react i :
9-25 are b bal-.

pthals out A: 1-8. S.C. react enx++ i- from agar.

		bal	
1	1	+	
2	9	+	
3	11	+	
4	15	+	
5	20	+	
6	(25)	+	
7	24	−	
8	21	+	

exc. #6a: b, i, enx, 1,2 − pv +. ±?

4a: i++ enx−
b "
c "
d "

broth or.: (= HLB #9) i+++ enx++

66: enx±

b.

S.c. brothers 1−5, 8 are all enx++ i −
#6 is b. Original broth (HLB 39-25) is enx+++ b+ i+
#7 s.c. is enx+++ i++. Pthals on EMB bal.

Original brothers all stated to react somewhat i i.

Note: most unstable or mixed enx: i appears to involve → sec) 950 (bal−) & previous enx +.

Purify original brothers:

#6 = bal+/− ca equal ratio. Test bal−, + <−: b+++ 1,2 − ; +: enx+++ i −) save for stability checks

#7 = pure bal− 5/5 react strongly i enx from EMB bal. #3, 4 also i i.

4/25 Broc #1, 3 to broth. but as #1, 2

4/4 s.c. from #7 s.c. above, NSA, behave similarly (i− enx+++).

Broc 2 to broth as 3, 4. → all 4 brothers react enx+++ i ++).

4/26 suspensions from NSA magglut.

Cannot verify here whether i reaction is due to simple vaccinal instability.

Save as 1041-7

4/25/53.

SW1033-5 rec'd from Edwards

see 1052

As rec'd: (by slide agg.)

		a	cnx
A	1033	—	++
B	1034	+++	+ delay-ed.
C	1035	+++	± " .

Restreak for further experiments. Abortus cultures as rec'd in homologous serum = A1, B1, C1. — no motility in 3 days in cnx, 9, a resp.

Sp motility not tested.

5/3/53. Received ETS26 and -41-D-1 from Army. Label single colony cultures as SW726A and SW1042 respectively.

Rec 726A in motility agar: essentially immotile 24 hours incubate. SW1042 grows slowly, rather rough on plates.

726A appears smoother than 726 (Edwards). Agglutinates strongly in cnx, ca 30-40% of cells in broth culture V. active. But spreading is delayed.

5/6 Rec 1033–1035 in motility also.

ca 5/2. SW1033 (s.c. but not motile) — 2 beg. small buds

3 tubes each. ← FA22 5/6 1 budding

← FA18 " 2 budding + 1 beginning

5/8 5/10

2/3.

42A 1 SW1033 —

2 — x— 22 1 tube

3 — x— 18 3 tubes } all 4 are a/+++ (rough + cnx). Test in a S.S.

1 2 a:

A2 — 1 48h. A2 a

A3 (1-2-3)/a + few bubs. → A3 { 1 — 5/26/53 → 5/26/53

A1 — 2 sm 3 cnx →

A2 → a: 5/16/53 cnx

u: —

a: cnx: a 5/18

a: cnp:

a: — cnx 5/18

see 1052 ✓

1035 - 1039 - 1041

4/29/53

		Cal+	Cal−	Cal+	Cal−	Total %
①	b: enx → i: 1,2	3	43	0	0	all b
②	b: enx → i: 1,2	39	23	9	3	12/74 = 16% enx
③	b: enx → i: 1,2	5		0		all b
④	b: enx → i: 1,2	0	0	21	4	all enx

① / 3 and 3/4 show predominant role of FA, or

$b^+ > 1,2^-$ ⑦ $b^+ > 1,2^+$ ③ $enx^+ > i^-$ ④ $\underline{enx^+ \leq i^+}$ ② in TM

note: i: 12 → b: enx grouped role of FA also,

i^+: 1,2 → b: enx → mostly i^+ $i^+ > enx^+$ ⑤.

i: $1,2^+$ → b: enx → mostly $1,2^+$ $1,2^+ > b^+$?

contradicts ③

unless b: enx are mostly $enx^+ b^-$

of ⑤ $i^+ > enx^+$ and ② $enx^+ \leq i^+$ discrepancy?

Mal+ pullorum; S. gallinarum 1043

4/25/53.

Rec'd SW1032 from Edwards as 2479-50. Restreak for further tests. Test culture as rec'd for motility, Mal fermentation, PLT22's

On streakout of both culture to EMB Mal, two colony types were noted: typ. Mal- and small Mal+.
These reacted similarly in fermentation tubes. Mal+, however, was a coccus. In tubes, 24 hours:

Mal-	—
Mal+	A
Mal+, -	AG.

Restreak original stab culture. Rare + papillae noted. Repicks and reisolated to EMB Lac, Mal.
FA72 → x 1032 and 1032 → x SW666 gave no motile.

5/2/53. see 1029

				48h.-72h.	
A	Gallinarum' → x SW1040 /a (= stock 74.)	1	++	(gm)+ = SW1041	
		2	++	(gm) " = 1043A2	
		3	—		
B	Pullorum' → x SW1040 /a	1	—		
		2	—		
		3	—		

note: 74 did not grow on D (B,) agar. Typical gallinarum?

prepare PA from other gallinarum, pullorum.

- C. Gallinarum 1-10 and Pullorum 2-9 → x SW666 /+
  D. → x SW1040 /a.

After 60 hours: C all —

D: G 2, 3, 4, 5, 7, 8, 10 are + to ++. P2-9 all —. (Repeat G1, 6, 9)
+ after 2 days. (P2)

C↓

G 1 (gm) see above	G6
G 2 (gm)	G 7 (gm)
G 3 (gm)	G8 (gm)
G 4 (gm)	G9
G 5 ~~(gm)~~ a as sent	G10 (gm)

why are G6, G9 negative? streak out for S.

G5 a otherwise gm.

↓

cultures were typed directly from swarms, then streaked out and (hastily) single colonies picked & rechecked. G5 is a as pointed out by PRE

Repeat 6/2/53 ← → G5-2 (gp) +.

Control SW1040 a/a → no swarm 6/5/53 T.O.

Transductions: TM, miami, abony.

FA →x B

A 1 S. miami →x S. abony a b
2 a enx
3 b: enx 1,5 b
4 1,5 enx

] No transductions. T.O. FA (22/miami) repeat c FA 12/miami 5/3/53: still no swarms on b-enx.

B 1 S. miami a →x TM i+1,2
2 " 1,5 46 " i, 2

C. 1 S. abony →x S. miami b a 2/2: enx.
2 enx a 12/12: enx
3 b 1,5 1/1: enx
4 a, 1,5 enx 1,5 2/2: enx + 1 enx + 1?

D. 1 TM2 →x S. miami mixed. i (22) } a+1,5 7/7
2 a, 5 serum 1,2 (18) } i / 1? not still? pr±.

Also note v. small blebs in C1 ; v. numerous trails in C2, C1, mostly subsurface.
#1,2,4 still 1,5
#3,5 possibly b (poor aggl.) - streak out
Trails and blebs became very definite in C1
Two delayed swarms in C4 — 10 tested, all

A2, A4 showed very dense surface blebs. A1, A3 were smaller, less distinct
Surface growth in C was rather sharply restricted. Moderate spread on A, D, most on B.

Repeat C1: on a 1,5 agar / a 5 → 1 swarm → enx.
save 1-8 several days: all b: (5) → 22/22: b = C5 - #1 = SW1038.

Conclusions: 1,5 serum may inhibit b (colindale 1,5 - of k6...)
FA miami n.g.? - Remake. (of 970).
Now SW1038 in a: 1,5
inhibited for several days, finally grew out → still b.

(over)

E1 isolated from JL. 5/8/53. History from ca. 4/29
ca 95% of culture

E2 5/9/53 ca 30%. symptoms terminated.

typed: IX XII a:1,5
sensitive to FA10
~~to~~ not to 22
SW1004: 22 S±.
both 44E1 and SW1004 ~~lysogenic for SW~~

E1. 5/8/53. History from 4/29±1. Symptoms most acute 4/29-30. almost negligible thereafter. ca 95% −

E2 5/9/53. ca 30% −

5/10/53: no PM sample obtainable.

5/11. E3. Inoc sample directly in motility; in EMB; on S-S.

EMB ca 10% − / a   S-S − blank. (few colonies from heavy streaking of purified E2).

Streak out from motility of E3 (E3M): → pure Lac −

5/11 PM − mild headache + malaise (try Sunday?)

5/12. v. mild d. [illegible] AM E4 → no lac+ on EMB direct plate

Test motility selection: → agglutinates in a serum. streaking: pure lac −

His's method may be advantageous. (Try combining c̄ tetrathionate or butyl galactoside.

5/13 AM v. mild symptoms continue / Plate on EMB, Motility; S-S.

5/14 AM E5 no sympt. → pure lac+; leading growth pure lac − a; not typ. salm. → E5a

C = E. coli types

5/15 AM E6 → SS − v. rare colonies, incl. 1 black → black colony a → lac+ and −; other → lac − E6a
→ EMB − ca 1% lac − → a −
→ motility − fair progression → a
see EMB lac. pure Lac −

5/16. N E7: EMB: pure lac+
Mot swarmed → a

→ E5a, E6a } Lac − non-motile inagglut. not susc. to φ3 Salm! ~~eventually degen to swarm~~. Mal − on EMB, Glu +

5/19 E8 − EMB pure lac+ Mal+ Motility
SS − no swarm ~~overnight~~ to 5/27.
↓
2 colonies only a ++

(over)

E9. 5/25/53 1 lact on SS → not a → lac+

E10 5/27/53 pure lact on EMB.
SS – 3 colonies not a → on EMB lac
pure lac+.

no further Salmonella?

E5a: eventually motile.

no marked papillae on EMB lac (10 days)
but repute → . no +.

E11 6/7/53. (M, Id?? sypic)

EMB lac – pure + two types: Is hum?

SS → pure lact / EMB Lac

MOT - irregular swarm →

5/13.

in b sem.n } N25b (several). z33 [#157 = —:1,2]

N97b → (b) SW1007 b — z33 (frequent)
N97b → (b) 1,2 → SW1007 b
N97b → (b) SW1009 (1,2:b)

numerous
1046B1 1,2: — and
1046B2 1,2: b: —

not clear whether difference is already inherent in N97b: or whether both kinds are $H_1^{1,2}$.

SW1009 (1,2:b)
↓ 1036F
SW1009b (bz33) : —
(b)

x TM   i: —   i:1,2

1038G1 i:b several

several (SW1026)
i:b → z33
a ↓ SW1031
a:b:a:

→ x i:1,2 or a:1,5

b:1,2 1038D

b:1,5 (1038B)

1,2 → x b: error other testers:
#157 : $H_1^{1,2}$

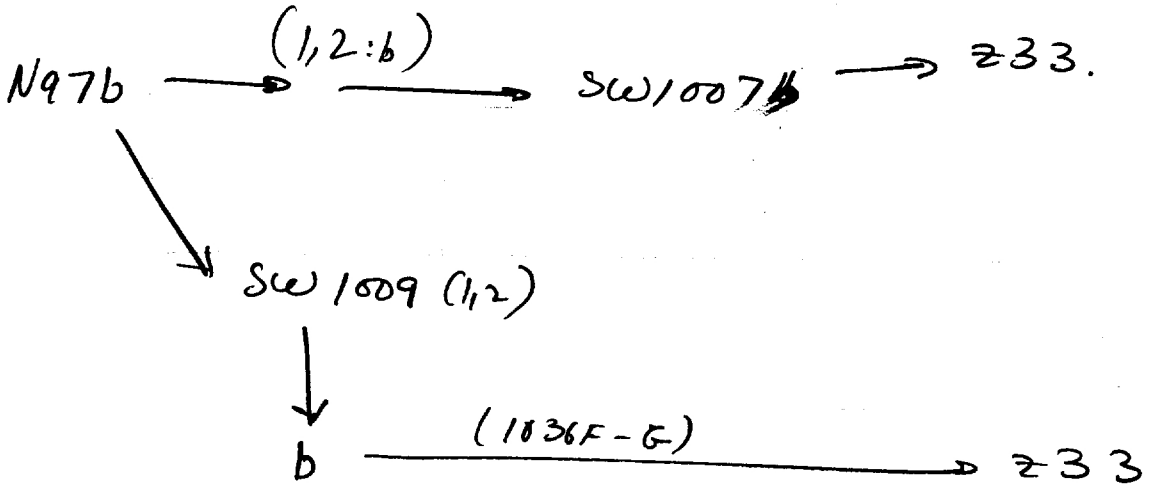
SW1009 $H_1^{1,2}$

S 031 → x TM → b:1,2
1026i → x minus → i:1,5
Ctype ?

∴ SW1007b has behaved just like SW1009b (possibly excepting z33 X)

5/13

1036:



b 1,2 b.

1046 N97 → A1. 1,2 : —

- B1 (SW1043) → 1,2 : — ('FA86.a)
- B2 → 1,2 → b : —
- B3 → 1,2 : —
- ~~B4~~
- B5 → 1,2
- B6 → "
- ~~B7~~
- B8 → "

Single domain.

∴ N97 b consistently → 1,2. Some of these → b : —
others are 1,2 : —

86a → × ~~102~~ 1022 or above | FA (1046B2, 2)

para A transduction

29/1/53.

A SW928 lw → x 1033 G2 numerous T+S. see 1033, 1008
B SW944 lw → x 1033 G2 (over)

22 → x 1033 G2 s.c. 1, 2, 3 and original) gave almost nothing: rare trailers...
→ x 948

Question of better transduction of G2 is left open. Compare A on s.c., and on SW 948.

C. SW944 lw → x S. paratyphi A SW701 } 3 days. no swarm
D. " " " 702 /a
C. " " " 694 (diazzo XII 2)
E. → x " SW948 a+ (1045B1 mepor.)

Repeat 22, 944 lw → x ...

		overnight
22 → x 948		—
	G2-1 [illegible]	—
944 → x 948		1-2 swarms
	G2	5-6
	G2-1	5-6
	-2	15-20 num. trailers
	-3	4-5.

Save G-2-2 as SW1048

	24h.	48h	5 da.
F. SW944 → x 45B1 (per. and control)	—	—"	—
G. FA22 → x 45B1	—	—"	—
45B1 /a	—	—"	— 5/26 — T.O.

1045B1 should be transducible! Check other similar isolates; might be rough.

H...

	→ x 948	→ x 1048
SW944 lw.	1 swarm.	20-30 sw, numerous trailers
SW967(60)	1 sw	2 swarm trailers.

} 2 a
1 gm = 1045H1

SW1048 seems definitely more transducible by SW944 than SW948.
But efficiency c̄ PLT22/2 still very low.
Fla⁻ (SW1048) not allelic c̄ SW866 or SW967!

J. SW944 → x SW694 /a after 2-3 days. + b:
K. "
L. "

over

A.

18 strains all a

B. 36 29a 7b

prob. significantly different.
save a b as 1045B1
us sw / to 5/27.

On EMB Xgl:

	papillae
SW701 grew poorly	+
702-694 moderately	1? 1?
1048 fairly well. (2 a few self-lysed or rough colonies)	–

use Xgl as transduction marker? cf. SW 702 - 694 - 948 - 1048.

5/3/53. Fresh culture of N97 (b) received from Edwards. = SW1043.
A. Inoc in b serum as is. → after 24-36 hours a 1,2 phase (cf 1036B). Save as 1046A1. ~~A2~~ overnight.
B Streak out. Inoc single colonies in b serum. 1-8.
All but #6 spread in 24 hours → #1,2,3,5,8 all b— 12+++
~~Inoc #6 in ... agar.~~ (#4,7 n.gr.) (acc. killed)
in 48 hours → 1,2.
Save 1046B1 orig. as SW1043 (b) and streak out #1 as SW1043 (1,2)
SW1043 appears to differ from SW1007 in recurrently → 1,2. → z33 5/17.
Why is N97 classified as b: — ? B1. 12 / → — (two trials ... not) B2 " / 12 → b: — → z33 B3 " → — 1 trial eventually still 1,2
Prepare FA from each phase.
C. FA22 → x SW1043 /b,12
1. 24h ++ → i: + 1,2 24h.
2. ++ → i: ± ~~1,2~~ 3 days → 1,2. SW1049 = 1,2 ph. . i: 1,2: i
0 (control) — → 5/16. z33. i: 1,2: — single.
B. SW1043.2 in 12 only small blebs. Repeat c motilized SW1043. → SW1043"
46A1.2 " " " "
D SW1031 b (hw) → x 1046 { b: 1,2: b 24h+:
E " a " → x 1046 { b: 1,2: b
a: a: 1,2 a
a: a: 1,2 a
5/11/53 Repeat (3) single colonies of B1 and B2 (original b) in b agar. F=B1 G=B2
overnight: all — F1 5/14 1,2 → 1,2 G1 5/14 1,2 → 1,2 → 1,...
24-36 hours ± to ++ F2 5/14 1,2 → — G2 —
F3 5/14 1,2 → 1,2, z33? G3 5/14 1,2 → b z33 5/26
for homology test. J abony (18) → x SW1049 /i 1.2 J1 b: 1,2 2 days all inoc in 1,2 N15. exc. 0 2
K. " " → x 1047 B2.2 /b.12 J2 b: 1,2 : 1,2 (2 dmin
! 6 → K1 enx: 1,2: enx

χ phage tests (for diphasic Fla⁻ testers) 1047

5/11/53

		χ 942D	SW χ 942	22	10
PB	703	−	±	+	++
PB	704	−	±	+	++
TM	714	−	±	++	++
stanley!	715	++	++	−	−
heidelberg	716	−	−	±	±
albany	803	−	−		
TM	1046	−	−		
Cana linda	874	±	±	+	+
	miami	−	±	−	+
TM.	LT-1	++	++	++	++
typhi	H901	+	+	−	−
PA	701	−	−	±	±
PA	702	−	−	−	−

		χ
motilized	703	+
	704	+
	SW 422	−

It may be feasible to adapt χ to 703-704.

LT-1 seems most generally satisfactory of these. Possibility of adapting 703-4, 714 ?
Check motility: pass through motility.

5/12. Continue ē mutant hunt using LT-1.
① Inoculate motility agar for optimum sensitivity.
② streak out on NSA for single colonies.
③ streak out tests above (microscopically non-motile). → 1/5 non-motile = 1047A. 4/5 mici motile; 5/5 " "
④ Inoculate available auxotroph mutants of LT-1.

Note: 2 "LT-1" strains: of #84 and # 306 TM1 = LT-1 (84).

	χ
LT-1 84	+
" 306	−
SW 202	+
SW 411	−

SW 411, 422 may be presumed # 306 derivs.

However SW 202 stocks ... D(0) agar. Reisolate single colonies! ↳ no prototrophs.

B. Inoc 20 s.c. TM1 motile in broth tubes, add diluted χ. Incubate. Streak out.
Pick 1 colony each to broth. (see over)

C. TM1 for bal - 10 plates 9-10 secs. only 20-30 survivors/plate. Repeat 8 sec.

(over)

Prepare push X: add X/sw592 to TM1 in 100 ml broth

Incubate overnight. Filter (sheat). Test samples for sensitivity to chloroform, heat.. Save (60° 20m.)
aliquot in freeze also.

B. 4/20 were substantially immotile by mici. test.
" " Restreak and test
May have had rare spinners". #1 did not swarm out immediately
directly on motility agar. #2-4 did (not homogeneously).
ignore these unstable Fla⁻ for the present
all other isolates here mentioned also swarmed out
(sw703-4/X; 202/X; TM1/X).
T.O.

B1: Retest single colony. → swarmed!

D: Plate TM1 swarm dilutions:
".1 ml X": At 10^{-6} ca 100/plate 20 streaked
out single colonies in broth. 17+ 3 occ. spores
no Fla⁻!

modifications of motility agar.

5/17/53 ±.

① Summarize HLB expts.

② Add $NaNO_3$ (.1, .2, .4 ml. 25% soln. per tube)

TM-1 not. sl. inhibition of spreading but growth considerably denser at each level.

Consider incorporation of .5% $NaNO_3$ in basic medium (replace NaCl by $NaNO_3$).

③ Add Methylene blue: (.1 ml of .1% per tube): distinct demarcation of bacterial spread, but substantial inhibition.

gas bubbles noted in MB and — tubes above; absent in presence of $NaNO_3$.

MB + NO_3 inhibit as above; decoloration very slight.

5/17 ④ Tetrazolium ± $NaNO_3$ (1)

⑤ glucose to .1% ± $NaNO_3$ (1).

	—	TGN	TG	TN	NG	T	N	G
not.	+++	++ not colored dense uncolored	+++ dense color blown up.	++ dense not colored	± very dense yellow color	++ colored	++± dense growth	++ exploded dense

5/19/53.

A SW1031 a x— FA3 (c) 2 tubes 1 → overnight: small blebs only. SW1052 c:b:

B " b x— FA3 (c) 3 tubes. 1 → 2 → overnight ++ ++ SW1053 c:a: c:a:

C. " a x— FA59 (l_{z70} to simulate wien). no swarms 48 hours.

note A1 and B3 carried 1% $NaNO_3$, and these did not swarm! See 1048. nitrate did not seriously inhibit motility.

D TMi (22) —x S. wien / lb lac ~~2 tubes~~ — no sw (lw++ b+)

E " —x S. derco... / lw enx 3 ~~2~~ tubes no sw (lw++ enx−)

F " —x S. sal...tes / enx 1 → d, 2 → d: (d± enx++)

G (=1046J...)

~~abony enx (15c) —x SW1049 i:1,2 / i,b,1,2~~

H SW1026 i·b ~~x— FA59 ((of C)~~ still i.

J SW 1026 i :b. x— FA60 1/2 —

K " i :b ✱— FA60. 1. ... s.c.i

	/enx	1,2/1,2	1,2/1,2 enx (d).	enx/1,2 enx (c) maybe rough.
G → 1 enx	1,2	~~enx~~ (...)	— mot. senx —	
2 "	1,2	enx	magg → magg.	
3 "	1,2	enx	i? → i++ b+?	
4 "	1,2	enx	no sw. 6/5 J.O.	
5 "	1,2	enx	i? (or rough?) → magg.	

J.C. stsm 2,5 delayed.

Note: SW926 and SW938 (1,2:enx) each in both phases / 1,2, enx mot. agar. In 10 days, neither swarmed.

6/3. Recheck 49G1 d after mot + s.c.i.

6/4 " G5d "

(over).

Retest possible i phases of 1049 ♂: 1, 3, 5...

G 3d is only culture to show definite i-reactions after motilysation. Rechecks after s.c.i.

5/27/53

para B type		#	FA10	22	X
A	1	B76	+	−	++ → nonmotile broth streakout
B	2	B300	±	−	
C	3a	B62	++	++	
D	~~3a~~ 3b	B97	++	++	
E	BAOR	B2227	++	±	
F	3aI	B624	−	−	
G	Dundee	B3590	++	++	
H	Taunton	B2253	++	++	++
I	Jersey 2	B4182	Beales = B1742		

(all showed some rx. most distinct ++)

Isolate 1,2 phase; pure FA for → X a:enx → motile broth.
Streakout 50A for origins of fla.

50A1. From initial 50A/X test
18 colonies on semi-solid.
1 (initially) non-motile. Restreak + recheck.
→ swarmed later. Microsc: ~~several~~ ca 1% motile cells
occ. spheroids (L?)
and 1 amusing pair of cells  followed in gyrations 5-10 m.
(cf Hfr × F- coli).

6/3 Note also, FA from IV XII types for later study

		FA 10	22
PB #	7	S	S
PB	8	S	R
TM	11	S	S
TM	12	S	S
TM		S	S
TM	159	S	S

Should have tested X also.

6/6 50A. 10 s.c.i inoculated to 1 ml Pennassay + X. after 24 hrs, 2d transfer.
1/10: mostly nonmotile (culture also lysed). 9/10 actively motile.
= 50A1.
streakout → not

1050A- 10 p.c. in broth + X. Bottle immobile
streak out, test 2 c.c. from each on next day:
all Fla+!

Need to induce higher incidence of Fla-?

6/18 Repeat
50A-11 → SG1022 / a: exp

6/1/53.

A ⇒ after unadulteration, b
C ⇒ b
D =
E → b
G =
H =

T. O.

J FA 50 (SW546) =
K. FA 24 (PB#3 ph 2) —

→ × along /b: ex

most trials, no swarm!! A, C, E magnified! Repeat.

6/19/53.

→x SW1022/9,enx —

A x b : enx : b ← need 9, b, enx to express b.
~~B~~
C b : enx
D b : enx
E • b : enx
G → b : enx
H
K FA24 •
L 50 •
71
SW707 b : enx
P SW708 •

others T.O. 6/26/53

Save enx phases (v after s.r.i OK)

as 1050 A... N

and b of 1050A as

→ SW 1059

Each preparation therefore has some FA, but only b phase came through (any reason??). In previous experiments, FA50 and FA71 $\frac{1,2}{x}$! Present sera maybe questionable.

These results do not answer previous question of homologies of the 1,2 phases. Should be repeated one by one.

Demobilize above-2.

7/5/53. Repeat →x above A1, C1, L1... (3 each)
b : enx

A-1-3 L3- grew through (still b); C1-3 no migr. to 7/8.

L1-2 : → 1,2 (7/11) melt off limited serums

L1 : b 12 enx —1,2→ b 12' enx 2/3 :
 − ++ − − − ++

L2: ✓+ ++ − (delayed +) − ++ s.c.✓ 4 show weak, delayed b+.

5. sc show same

hoz 1,2+enx serum.

no swarm from L2 or L2'.