

Review what of science and patterns of discovery in light of my own history. (How questions arise? Resources to answer.)

Bacterial sex.

T/9

B+T → FSR idea of bacterial genetics

Avery — biochemical. bacteriophage.

! Transposon Neurons.

Convergence of ideas

(a) opportunity of technique ↔ 1) answer and 2) question

! Δ prior

! open a field

Didn't work. — revisions.

— validate method

Discover new question

Try it!

Worked.

Exploitation!

Conjugation mechanism

map + biology — "genes in bacteria"

physiol genetics. genes → enzymes.

Get a lot of mutants.

What's working.

# Schwartz

Theoretical background - prior to expt.

E coli x ; K-W schema

Schwartz ~ Enterobact, medically important  
had developed mutants

Idea of heteroalkaline: ∴ different strains, like cyan

Rigid canvas of ab x cd.  
essentially worked.

FA! L-form side track. (Series ...)

Question: What was FA? <sup>epidemiology of prod.</sup> produced by phage.  
? HT-E felt to suggest it? ( ? Boyd's phages  
o lysogenes? )

It's phage! → Idea of transduction.

- - verify gene transfer.
- preferred crossing for genetic analysis.

Expt . Unstructured K-W. / collab. i Edwards.  
analyze H<sub>1</sub>-H<sub>2</sub>

accidental. - trails - BAPS noted & guessed.

muticulous pedigrees ( ? remove ab hand.

notes?  
o details from BAPS.

Experiment. (p 21)

Extract + characterize enzyme. Canonical.

Did I Estaway  
the method  
ups?

Discovers.

specificity -  $\text{K}_{\text{MPS}}$

$\text{Na}^+/\text{K}^+$   
any dec. why find?

specificity  
? to substrate  
? to ions?  
or interdependency.

Basal:!

[internal control]

Needed better assay. NO<sub>2</sub> & phenol. hydrolyse assay.

utilize K. Pink; Seelma - where?

Reason. - -

method

Other lab work.

Isolation of mutants (+ reversions)

many other projects.  
chemistry based  
small group; no facilities

codged mutants - P. guinis, G. d. d.

read as possible as you can.

induced  
substrates.

Needed mutants  $\rightarrow$  EMS medium. (know Salmaell = lac<sup>-</sup>)  
EMS used in

T2. suppress pH. zero

observed secondary  $\rightarrow$  indirect effect? (feedback).

## Excerpt.

All theory, but...

Mars since 1938. Astronomy + cosmology > most biologists  
1957 - Sputnik + Haldane. (model of nuclear energy for  
under or space).

Sci - scientific nexus

few other scientists would forecast such  
prompt & expansion. Plants < US had  
launched a satellite?

Political threat in that vacuum.

→ quarantine policy. + political planning to control science  
Instrumentation. → rocket

→ computers

theoretical planning for Mars-missions  
microhabitats theory of Mars

Dendral.

computer case fact.  
How explicit is it?

(a) Discovery that molecules  
are graphs  
no developed theory.

?? How apply computer in new way to science. What theory is  
good for.

mol. composition  $\rightarrow$  mol. graphs  
(I'd know of chemistry. How?)  
Heuge + Blau.

Designing algorithms for mol. comp.

Inferences - can I infer a description?

graph theory development?  $\leftarrow$  learn published out  
(computer impl.)

Skepticism about AI.

o can these retrosynthesis models be substantiated?  
Fretwell

## Biography.

Stet learning method. Extra facts  
collecting date.

Discarded as a problem | ~1973 - Reply to Stent, Wright  
re Avery.  
1974 - CASBS  
1975 - Tatum

began to see how my architecture courses  
+ run memory.

Betty.

halfhearted. Pete Farby turned me off.

I didn't want to be swallowed by my own company.

More precision that wit-grit.

and in all of those (and more) sound to this for now report  
in any / and. But that may still be best. may not be  
(as long as) can take the heat.

Repl-pl / Ind. sel.

Methodol need for genuine insights.  
 Introspection of moral models. → use velvet.

→ indirect subtle

→ do it in tubes!

- interest in application of science.
- Science as way of life - religiosity intensity - curiosity
- Method: abstract or generalization? → ~~method~~ → velvet → tubes
- Bring all the changes (E.G. what other styles are possible? → ATK, F. J. G. B.
- The systematic scan. - see Syris of life.
- Go for broke. Start things. Ask what questions are significant? Then feasible?
- Learn everything possible about (a) new fields → agreed for them
- Intuition's convergence. (see style of p 80, p 129, p 60)
- formal proofs
- self-referential effort: applying method to this case
- revelation of method, not use, planned

Ask "what am I doing"

- Use of unexcursions - let problems swim. So many brains at once
- ex tempore delivery. <sup>Discipline</sup> Stimulation of an audience. <sup>can't think of how and how</sup>
- Combination of circumstances → what comes to my attention <sup>planning: (calm)</sup> <sup>ltd.</sup> <sup>distrax</sup>

(Constant foraging) But rarely drop anything

- Introspection on method as method. } not always transparent to values: social
- what am I not implicitly justified for. "Self" as instrument. } ∴

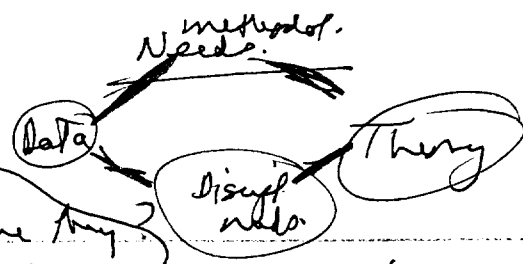
~~What is the value of this?~~

- who else has introspected on method? oo Beridge → all known
- How else could I write this? How would H.A. & Larry Holmes. who else is there?

and communication. E/K



penicillins



1) L-forms - what are they?  
generated by penicillin.

2) Penicillin types growing cells

3) Weitzel - serum stabilizes protoplasts.

Scarf + bested. setting  
Facilities  
breadth - extent of interests

Sp. specificity method.

Model selection method for auxotrophs.  
How do it? ... Recall Biology Hobby.

Are L-forms protoplasts?

(citations to Davis  
implications for  
info. penicillin)

Then methodical study (liquid chemistry).

review what methods

involved much more chemical  
theory than used in lab.

limited managerial/diac (sic!)

Strong theory, argument, broad knowledge  
intuitions about organisms

Very strong theoretical background in biology, chemistry.

Moderate - - - in physics, math.

No radioisotopes & chromatography.

(Expt. rigourity - e.g. penicillin  
V. kind of lab chemistry)

if M, more theory  
most bio +  
chemistry!

F, 2 accidental discoveries  
proust analogy.

→ planned camps.

2 gal. conts? of Morse.

July →.

Field suddenly changed, Became catching + crowded outside  
special collabor. (heavily funded). Step v. limited facilities

Accumulation of knowledge - infinity of questions

Academy of interests: genetics as a mission.

→ serotax cells + microscopy. (thea.)

→ exobiology

→ AI.

→ algebra.

as part of method

→ Stanford. Westalis (?) to organize a dept: large unit rather  
than focus my own lab.

\* I didn't know to demand. Still very young! No role model for  
a lab head past his experience in F&R. and not dominate a group.

2 ✓  
3 ✓  
with HB

# Socio historical circumstances.

Generational. b. 1925

previous autodidact 1935-1941

Columbia College, Med School

V-12

Jew 1st b. son orthodox rabbi

immigrant from Israel. NYC advantages, Ryan

objective valuation of talent → opp'g to usual self-confidence

+ T'l optimism 1925-45. Power of science. Value of science  
Hitler + WW2

- escaped CP; most antisemitism: before reverse discrimination

+ 1948-1960. NIH, expansion of science, (e.g. Starbuck)

+ Genesis of chemical biology: H. W. Wells' education.

① why such a generalist? Science as a "religion" → scientific method. (Whithead? Walls? Russell?)

② curiosity → integration

③ responsibility/guilt ... Jew, survivor. → applix.

④ self-confidence. Early success, parental + teacher esteem

⑤ autodidact. Too "easy". No early trauma. Stress only 1950's; 1961;