VIRUS infection A.
from an evolutionary
biological perspective

New and Emerging VIRUSES

The mutual relationships
of humans and viruses
as they evolve together
on this planet.

MOST of you are neither B.
physicians
virologists
nor evolutionary
biologists

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② The most important
ecological issue that
we face by far!
Even all the public
anxiety about chemical
pollution. 1968
flu killed as many
people as WW I before
it.

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is protection against
infectious disease

E.G. Kissinger re
its importance in
understanding global
interconnection of
people. C.

So why this topic? D.

① The specialists do
not deal with it
Evolutionists with few
exceptions ignore inf.
disease.

Charles Darwin never
mentions it! Though
he lived in the time that
Pasteur and Koch were
making their pathfinding
discoveries about germs.
& Vice Versa.

Certainly not well E.
understood by
policy makers

How AIDS caught the
world by surprise!

Even public health
specialists tend to
think of viruses and
other disease agents
as fixed entities rather
than dynamically
evolving living
systems.
(special creation)

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1. Surprised by a F.
new virus like
AIDS

2. Give insufficient respect
to its continued
evolution.

Perhaps a bit of <u>hatred</u>
difficult to understand
your adversary.

3. Neglecting future.
contingencies

VIRUSES of other infectious diseases G

malaria } still
TB } probably worse.

But we have tools to cope with those.

and have done in advanced countries.

∴ Can ignore LDC's

obviously not the case for AIDS?

How different?

Go back to what a H. virus is

Compared to a bacterium or protozoan parasite like malaria (a tiny animal.)

life cycle of virus * I.

of free-living

Chemotherapy.

SPECIFIC AGENTS * J.

Consequences. K.
OF LIFE cycle

Immune prophylaxis are best weapon.

Not much use after infection.

Viral chemotherapy are greatest challenge.

a faltering steps.

when immunity L.
doesn't work.

(a) target has a sanctuary
TB, leprosy, AIDS

(b) other tricks.
immune masking.
+ autoimmune disease
rh. arthritis

(c) worst of all collapse of immune system. (AIDS)

(d) rapid evolution of viruses.
flu < recomb. (FLU)

(e) neglect + complacency. N.
always some sideffect.

tradeoff of individual rest vs comm. benefit.

Evolution - some more depth. N.

1. Co-evolution of hosts, parasites + vectors.
2. Ultimate origins of viruses unknown. Probably many paths and cycles.
3. Hosts tend to become more resistant.
species specificity.
e.g.: flu → human, pigs
→ birds
→ rodents.
Can be cross adapted

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species specificity O.

vitally important.
why smallpox can be eradicated. polio? (As far as we know)
vs.
yellow fever. arthropod borne.

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flu in between.

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almost no similarity but new methods

COST OF EVOLUTION
P.

myxo

sickle

placenta distemper.

VIRAL evolution. Q.

Contrary to naive judgment
towards lower lethality easier spread.
(HTLV-1.)

HIV : SIV
in primates

NOT a reliable barrier.

Benign relations of R.
(1) VIRUSES to host cells

Lysogeny - hide!

transduction
host DNA ↷ viruses.
(oncogenes)

95% selfish DNA

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use host enzymes and metabolism

VIRAL VARIATION S.

(2) MUTATION

(3) hyper-mutation
RNA viruses

(4) recombination

(5) illegitimate "

POLICY LESSON T.

why now is different?

Are we better than ever in relation to infectious disease?

We would have thought so until AIDS. Even so, certainly medical care & preventive health far better today than in 1900. But the variance is greater. as well as the mean.

Expectations higher!!! life exp. of 40 not acceptable.

1. paradox of sanitation.
a) We are adapted to many viruses as childhood disease. Mumps. Rubella.
b) cross-reaction — with immunity to mix. antigens and less virulent strains
(c) Poor sanitation may accelerate "equilibrium"
(d) natural selection on hosts

2. Modern World.
Rapid Transport
Large pop. in LDZ's
Sudden ecological change.

U.

Modern transportation V.
(primarily the steamship & jet airplane) have probably caused far more trouble by spread of disease than by accidents or by chemical pollution.

Quarantine breaks down when air trip < incubation time.

TECHNOLOGICAL ANS.

mainly in biomedical science.

Tooling up for rapid response to vaccine needs.

of course research on viruses fundamentals

... AIDS so different

Technological support irresponsible for that

W.

VACCINES the X.
fundamental answer.

But AIDS-like diseases will surely emerge more often.

LARGE SCALE SCREENING ??

privacy issues

Quarantine facility

portable laboratories
in situ

Better to attack the virus at its source platform.
Hi Tech surveillance of disease economics.

Y.

MAIN motive is your interest as a human being
self-interest
° your national survival
world.

Symbolic that Nakajima is DG/WHO

° Japan - a crowded country. economic viability and dependent on world commerce

Z.

POLICY LESSON

1 WORLD.

my view of
Human Science Frontier.

→ Terry
propaedia
Doing Deceiving (Leibniz)
Dict. synonyms
WORK; novel.

OED?

Za.