

Reminders of the obscuria: as concerns the problem of the real world —

To the extent that advanced countries already perceive needs for health cooperation, they will have advanced their own initiatives. [I believe that perception is unrealistically shallow (i.e. threats of jet-age dissemination of serious human disease are unduly discounted, even in the face of disasters like corn blight in U.S., or hoof & mouth disease in British cattle.]

For them, and even more for the poor countries we must still deal with these problems in the light of their perceptions, as much as of "objective facts." Who they are is also an issue — diplomats? center of government? ministry of health? press? ^{physicians?} _{elements} influencing communication among those ^{elements} _{judicious} may be the most important (and challenging) task.

or countries } It may be futile, even disastrous to attempt to deal with the "health issue" out of harmony with other aspects of national development — economic growth, social reform, education etc. (Many of these may be beyond the useful reach of outside forces). What use to better child survival without other checks on population growth?

* Further, some of the proposals hereinafter may have political ramifications that outweigh other values; they may still have some preservative value. (E.g. — later — rights in traditional plants.)

However, in many cases (including the U.S.!) the cycle of poverty - disease - education failures may be the central impediment to economic advance. (Thus schistosomiasis is a drag on productivity in Egypt as hookworm once was in U.S., and malaria elsewhere). The disease component may be a crucial target for breaking the vicious cycle.

There are 3 main elements:

1. Nutrition
2. Environmental sanitation (controlling vector insects and routes of contagion through water and food contamination.)
3. Specific therapy and prophylaxis - vaccines, drugs, etc.

1. ~~It~~ is now mostly a question of public administration & finance. It is hard to see how much sophistication can be added with realistic costs. However, it has an important international element - reporting and quarantine procedures. The problem is not the level of US cooperation. Still we might add something here through more research on very early disease - recognition and identification to spot diseases before they have penetrated too far beyond a national boundary. (Imagine an automated breath or saliva test on

debarbing passengers as an extrapolation of some proposed gadgets for BW monitoring. ~~There~~ A useful & fever-spatter at acceptable cost is probably within the state-of-the-art!

But air travel has become so fast that many infections will still be unwise between takeoff and landing.

In areas like much of India with very high water tables - rice paddy country - we may have to investigate and discover very different approaches to sanitary disposal than we are accustomed to. Cheap reliable disinfectants for water supplies are still a research challenge [but few traditional sanitarians will admit this.] How much chlorine do you want in your water!

We have to be very careful about partial solutions. Nothing would be worse than a water supply that was clean 365 days, heavily polluted only once per leap year! For the population would then be deprived of the "natural" chronic insults that lead to low grade disease and immunity to many infections.

The WHO has put clean water supplies very high on its list of (unfilled) priorities.

variable
response

palatable

2. Nutrition may be the most favorable arena for scientific cooperation — as the Intl. Rice Research Institute & Borlaug's work in Mexico will illustrate.

Malnutrition may irreversibly injure the development of a child's brain. It also weakens individual resistance to every other disease, and saps productivity.

Research on ~~the~~ improving the quality, as well as yield of indigenous crops would undoubtedly be the most fruitful investment. There is no reason in principle why plant crops should not be developed that are as nutritious as meat. The techniques of genetic engineering used so far in plant breeding are relatively crude and there has still been a minimum of effective communication between plant breeders and molecular biology research workers within the U.S. How much more distant they are when the field work must be done abroad! Unless positive remedial measures are programmed.

The success of dwarf rice and wheat shows how exportable this kind of advance can be.

As an interim, food crops can also be upgraded

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Heckel
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by synthetic supplements, esp. lysine. Obviously the chemical industry involved should be peripheralized as far as possible. Microbial (single cell) proteins grown on oil and various wastes also plays a role here. I do not believe they will have a long term future in competition with an invigorated agriculture. I.

1970 Pure-bred crops, as we learned with grief from the outbreak of corn blight, are at risk of being wiped out by a specific plant pest; work on anticipating and controlling these must be part of any new efforts.

New approaches to plant-breeding may also enlarge the utilization of semi-acid or lateritic or other under-utilized land areas.

2.

SUMMARY.

A. NUTRITION RESEARCH and

B. Food production

A. Methods for identifying specific deficiencies in different populations.

(You would not believe how badly we understand this in the US!)

(Obviously you can't treat lysine deficiency with vitamin B₁. But different continents must have different core problems.)

Individual variation in nutrient needs - age, occupation, health, pregnancy, etc (FAO standards are crude approximations.)

Role of trace metals (remaining frontier of nutr. need knowledge at qualitative level.)

Is chromium a dietary essential?

Secondary problems. Health implications of imbalance in sugar, fat etc.

B. Modernize plant breeding by convergence with cell- and molecular biology.

MUTATION studies: Engineering seed proteins to upgrade food quality.

Laboratory studies on haploid cell cultures (more readily manipulated) prior to field tests on entire crops. Systematic development of more sophisticated evaluation of new strains.

Wide crosses

Cell fusion (to allow otherwise impossible hybrids).

Engineering ("friendly") viruses to modify plant properties.

Specific mixed crop associations, e.g. different legumes with each other or with other crops (immediately overlooked as too labor-intensive for advanced countries).

• ^{Scientific} Breakthroughs are imminent; in some areas a lead for application to B&E engineering.

③

INFECTIOUS DISEASE

Generally speaking, the main infectious disease problems of the advanced world are acute epidemics — influenza, hepatitis, encephalitis — where mortality is the hazard. High technology still has many tasks here.

The poor countries are not immuneable to these, but they face still more serious problems of chronic disease where the consequence is debilitation (and the poverty cycle), blindness, inertia. These are the problems mutually reinforced by social conditions and nutritional and educational failure.

③. Medical treatment and prophylaxis of infectious disease.

The existing major waste is to

malaria
mollusks
schistosome disease
trachoma
tuberculosis

all the subject of
global eradication
campaigns with varying
success.

and to a lesser extent

cholera and typhoid; amebic dysentery
bacillary dysentery (ubiquitous but less lethal);
and a host of sporadic diseases that flare up periodically
plague, typhus fever;

venereal diseases

and innumerable worms.

Except for VD,

None of these is now a major problem in advanced
countries; but there is a perpetual threat of emergence
of virulent strains or other breakthroughs. There are
also many "exotic diseases", poorly known, like
Lassa fever or Marburg virus that might become
catastrophic threats to the US population (like
10% mortality) at any time. It would be very
much in our interest to develop well-equipped

see
"Excepts"
"Hosts of
Marburg"

field (or mobile) laboratories that could be deployed at indigenous sites (1) to maximize benefits to local populations and (2) minimize the risk of importing a new disease into the U.S. before we understand it? A CSA with built-in disinfecting gear, or deployed from a properly equipped base would of course handle the transport requirements [and offer some variety of tactical training experience to some pilots].

The real job that needs to be done is the painstaking study of all viruses as potential disease agents. Major classes of viruses probably still remain to be uncovered! A great deal of work is, of course, going on and it would be difficult to impose much real structure on basic research. However, the WHO certainly could help to stimulate still wider activities in many countries and help communication with the US + European experts who can help chart the most promising unexplored territories. This is one area where a formal international conference about every 3 years would be most useful.

Such a conference would obsolete my own proposals for areas of research emphasis. However some highlights would surely include:

the
re health
designing

Patterns for answers
(Technical definition of questions is easier than political of answers).

Forms of cooperation and US participation therein.

(A) Share money for WHO.

Internal Taxes → gifts.

Obvious drawbacks.

Levy on intercontinental air travellers (treaty tax)

a) to fund coordinating work of WHO.

b) to acknowledge benefit to the traveller of health improvement at his destination.

Royalties on certain kinds of drugs.

a) those based on folk-medicine. A kind of cooperation for the exploitation of the fruits of another culture. Quinine; [digitalis (English)]; Rauwolfia (Indian) are spectacular examples. There may be many more in the offing.

WHO could accelerate their orderly exploitation.

[i] perhaps a convention against "stealing" valuable indigenous plants or animals.

Cf. Marco Polo and the silk moth eggs.

b) or other indigenous sources. The "bug" that makes chloramphenicol was taken from Venezuelan soil.

[ii] Special case. Mexican jungle again as source of steroids is not a medicinal plant.

It still should be protected by convention from

being taken out of Mexico for propagation elsewhere without a license.

c) "drugs from the sea". Extension of sealed concept.

d) drugs tested on other country populations - this also could be facilitated by WHO. This would be politically delicate where the same condition (say pregnancy) was prevalent enough in a rich country to allow its primary testing there.

Contributions from or on behalf of medically trained migrants

A brain drain tax. US sucks up an enormous number of foreign MD's. Direct part of their income tax or gift payments to WHO in lieu thereof.

All of these items could be reduced to paper calculations and assessed as lump sum contributions from various countries.

③ High technology and its transfer

1. World scientific conferences (BIOGS, GENES, CELLS, LIFE FOR PEACE) in

model of Atoms for Peace.

WHO Assemblies are political.

Specialist conferences are too narrow.

Call Biologists +

Biochemists have never been brought together
with practical medical & agricultural
workers in a context of a world mission

(cf. my proposal to the Nobel Foundation, which has not been adopted, perhaps owing to the generally cool reaction to the Sept. 1969 conference [which was badly out of focus].)

2. World Health Institute. (Back to money)
Grants programs administered by world organization,
analogous to NIH.

Even if geographic factors must dominate country allocations, a central agency can provide the staff competence (like NIH) for efficient and minimally politicized choices of meritorious projects

3. U.S. National Institutes of Health. (Back to money)
Had de facto standing a few years ago, was killed by the gold drain problem. We could still
- a) put higher priority on int. H. oriented research in NIH.
 - b) make further use of country grant funds

4. a Revive the "Fullbright^{*} exchange program", in health
- b. Better variant: designate specific pairs of institutions to manage exchanges, giving them some latitude for ~~for~~ validating surrogates. (E.G. Stanford could coopt a sister's fellow to Berkeley.)
- [We have a very successful program with Pavia under

a US-Italian treaty for science cooperation managed by NSF. Our fellows are well screened and we have ~~fewer~~ fewer brain drain problems when the fellows know they can come back to the US periodically.]

5. Everything costs money. But some of it can be in barter currencies.

Health might be given a preferred standing for "gifts" of unused capacity in transport and communications on a standby basis. What this "costs" is a matter of accounting philosophy.

The free tickets on national airlines for students or patients should be counted as matching funds. Even give the coupons to WHO for distribution and negotiate the subsidy rates domestically. (The ~~are~~ airlines have to be subsidized and taxed many different ways anyhow; they surely get a large subsidy in the net outcome).

Apply to all health-connected transfers: fellows, doctors, consultants, patients for specialized care, students, publications, equipment....

to communications - e.g. in government + intergovernment subsidized satellites, get back part of the investment this way.

Medical
subsidy

Classification - identification - taxonomy of viruses. Their evolutionary relationships to one another and to normal cell constituents.

Sensitive ~~test~~ detection (monitoring) methods

Approaches to chemotherapy. Contra bacterie, viruses are still generally beyond the reach of antibiotics but some holes are emerging. Interferon.

Basic studies on the life cycle of viruses in cells [Next to, and overlapping, "genes", at the center of molecular biology.]

Virus genetics - for understanding bases of virulence of certain strains, and for rational production of vaccines. (Sabri's approach on polio was as empirical as Pasteur's had been on rabies).

~~Use of~~ Validation of a library of cell types on which new viruses can be readily grown. (A critical delay or response to Hong Kong flu was a consequence of its poor growth in the traditional chick embryos.) Our health authorities have been confused for a decade on the utilization of pure tissue cultures

- but we still produce polio virus in monkey tissue known to be risky for contamination by other viruses.

Closely related - The management of wildlife + animal resources for virus ~~research~~ research + production. We are slaughtering monkeys, when for all we know some domestic crop animal or pest might do as well. The real cost of importing monkeys, as with using many other partly renewable resources, is probably underestimated.

Since vaccination is the keystone of prevention for direct-contagious diseases, the process of immunity to viruses must be understood. We still have only a superficial idea of what happens in vaccination: where the virus goes; which elements of the virus particle are crucial for eliciting immunity, + why. How to purify viruses for safety, stability + efficacy. (Most commercial viruses are grossly impure.)

Producing antibodies synthetically or in cell culture for passive immunization, which can be applied for immediate therapy as well as short-term (3-6 month) prophylaxis.

New approaches to vector (insect, flea, mite, ~~tick~~
~~tick~~ tick, snail) control. †

New + safer pesticides adapted, e.g. to tropical
conditions.

Biological control.

Little fleas

Biological tricks on the pests.

Measures with problem of plant pests.

All of above have vital application to veterinarian
as well as human health!

Focussed attacks on major specific diseases (Begin
up what WHO already does perhaps more emphasis on
higher sophistication of approach.)

Priorities:

WORMS

TRACHOMA

Other viruses

bacterial infections

It would, for example, allow us to collaborate
meaningfully with a group in Sweden that
wants to ~~tie~~ tie in with our research on com-
puters by giving them access to our machine!

6. Formal ~~an~~ information centralization? ^{is}
Perhaps at least as far as making National
Library of Medicine services available world wide
as application of (5).

more to follow.

Offer Ft. Detrick (at least as a physical facility) to WHO ~~as~~ for
world health/ infectious disease research on premise that further ar-
rangements will be worked out for cooperative funding of operating
costs. Go as far as deeding title to UN.

Can be nucleus of campus of a World Health
University.