

**Q: Dean Henderson,** would you say public health is invisible medicine?

**A:** Almost. If you have a child in convulsions, the doctor gives an injection and the convulsions stop. The doctor feels good and the mother is grateful. But who's grateful to public health people? Are you grateful that you didn't get smallpox? That your children haven't died of smallpox?



*From 1957—when the first of his more than 60 scientific articles appeared—to 1967, Donald Henderson's professional interests ran the gamut of the public health field, from measles and polio to hepatitis, food poisoning, and cholera. Then, in 1967, Henderson's scientific papers abruptly locked onto a single subject. Whether the papers were in the International Journal of Epidemiology or the Proceedings of the Royal Society, the same word cropped up in every title, paper after paper, year after year: Smallpox.*

*For it was in 1967 that Donald Ainslie Henderson became chief medical officer of the World Health Organization's war on smallpox; and it was under his aegis that one of humanity's most loathesome diseases has become virtually extinct.*

*In its most virulent form, smallpox coated its victims with pus-filled abscesses; when it failed to kill, it often disfigured for life. It could blind. Highly contagious, it was smallpox that in the early 16th century, soon after its introduction to the New World, took the lives of 3.5 million Mexican natives; in 1707 it wiped out almost a third of the population of Iceland; and even as late as 1967, it afflicted more than ten million people each year, worldwide.*

*Yet just ten years later, as of August 6, 1977, the worldwide count of reported smallpox cases stood at 46, all of them in Somalia. All 46 patients were in isolation, and their possible contacts*

had been vaccinated. WHO workers had set up their traditional pool, betting on the exact date of the last case—and in other countries, says Henderson, the pool appeared only weeks before what was indeed the last case. Sometime in the next few years, smallpox will likely be declared eradicated, the first such achievement in medical history.

Last winter, assuming his first post after leaving the World Health Organization, Henderson took over as dean of the Johns Hopkins School of Hygiene and Public Health, where he'd earned his Master of Public Health degree 16 years before. He sees the school as "one of the foremost, if not the foremost such school in the world. Whatever we do here is watched by everyone else."

By long-distance phone, Henderson is still very much involved in the winding-down smallpox campaign, and whether he's talking about that or the School of Hygiene, his hands dart with equal enthusiasm. He's a tall man with an eager manner and a ready laugh. He seems relaxed, unimpressed by his honors, and wholly engrossed in public health.

Henderson received his bachelor's degree from Oberlin in 1950, his MD from the University of Rochester in 1954. He entered public health in 1955—"by accident," he says—with a stint as assistant chief (then chief) of the Epidemic Intelligence Service of HEW's Center for Disease Control. After a residency in medicine and pathology and earning his Hopkins degree, he returned to CDC in 1960. There he served in a variety of key positions until he was tapped as WHO's chief smallpox fighter.

Henderson, married and the father of three children, has been honored for his smallpox work by governments and professional societies on three continents. In 1976 he received the Special Albert Lasker Public Health Service Award.

He is interviewed here by Elise Hancock.

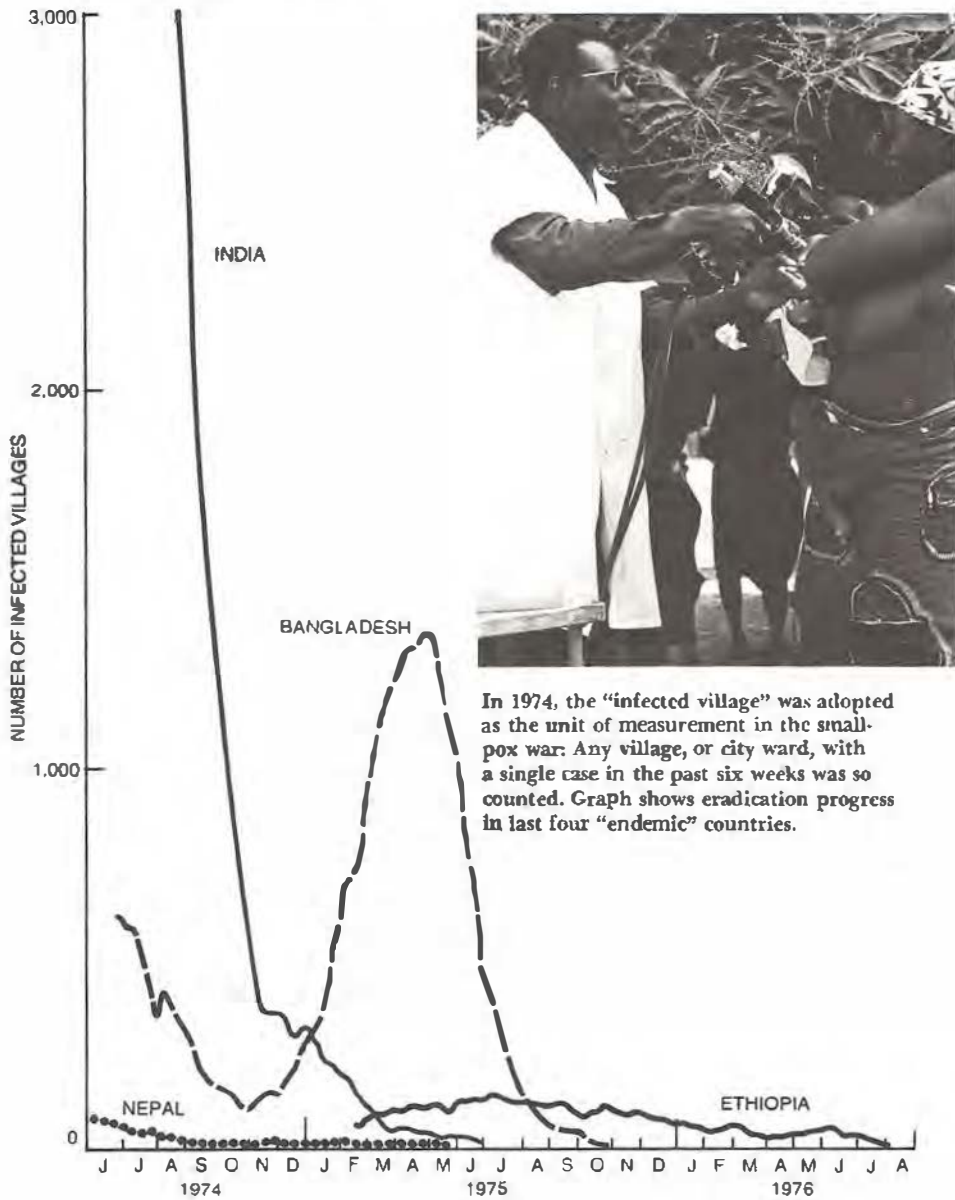


**D**EAN HENDERSON, how did you get involved in the war on smallpox? Rather by accident. I was working at the Center for Disease Control in Atlanta, when in 1965 it was decided the US would undertake a program for smallpox eradication and measles control in 18 countries of West Africa—subsequently extended to 20—and that I would head it up.

Well, we were engaged in setting up the program, trying to decide on equipment, recruit people, train people, get agreements with the governments, and so forth. Then all of a sudden, in May of 1966 the World Health Organization [WHO] decided to intensify its own dormant smallpox eradication

program, a global one. And it was virtually dormant—the program existed on paper, as a resolution, but what was being done was minimal. So I was told I was to take over this global program. Um. Well, I refused. We had a nice house in Atlanta, and more than enough to do. And I had no desire to get involved with the World Health Organization, where I was told there were a lot of political considerations, a lot of constraints in administering anything. But finally I was ordered to go, by the Public Health Service, so I went—with the understanding we could return after setting up the program, after nine or 18 months. We decided to put the children in an English-

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speaking school because obviously we wouldn't be there very long. And there seemed no point in taking over all our household goods, so we put half of them in storage. . . . We arrived back from Geneva 11 years later.

What was your approach to the smallpox campaign? One fundamental was management by objective—the idea that if you can define what you should achieve, everything else follows. Now, up 'til this time, progress against smallpox was charted by how many vaccina-

tions had been done. But our real objective, obviously, was not vaccinations per se; it was reaching zero cases of smallpox. So our real output indicator—if you'll pardon the jargon—was, How many cases of smallpox are there? From the beginning, then, we tried to set up mechanisms to measure the number of cases, and we looked at each case or group of cases as, in a sense, a failure of the program.

Building this measurement system took a long time and made trouble with the press, and a great deal of

trouble with the governing body of WHO, because they were used to receiving reports in terms of millions of vaccinations, not numbers of cases. And at first, as it turned out, only about one per cent of cases were reported. So as the program improved, reported cases skyrocketed in the various countries—for the first couple of years, we found it hard to convince people that cases were actually going down, even though they appeared to be going up.

What we learned by trying to implement the program in the field could fill a book, and involved a great deal of research. We needed to know, for example, how long smallpox vaccine actually protects people. Surprisingly, very little was known. The books speak, rather authoritatively, of a vaccination lasting three years. It turned out, though, that protection lasts virtually forever—which was great. It meant we didn't need to mount a big campaign of re-vaccinations.

There was also the question of how the disease spread within the community. Up 'til then, most people thought smallpox could be airborne, over long distances, especially from smallpox hospitals. And indeed many cases did spread from hospitals into local communities. But was it by the airborne route?

It turned out, I suppose, that it wasn't? That's right. We did document one single extraordinary case, in Germany, but only that one time was it airborne. Most transmission occurred within a closed space in a house or building, rather uncommonly in the market or in the open air. Obviously, this had major implications because, knowing or guessing how the disease spread, we could then focus on likely ways to stop it.

To do that, we had a dual strategy: We would run a vaccination program, systematically, to reach at least 80 per cent of the people. At the same time, we would develop a reporting network so that each local health center sent up a report each week on any cases in its area. This was difficult, because they weren't used to sending reports each week. Many of them more or less lived by themselves, without direction, without drugs—yet they were called health centers. Well, our teams would visit them, and the first time we'd come

around to discuss the program and ask them to report every week. The health unit would say "yes, sir" and no report would come. Then we'd go back, and it was after the second visit that we began to get reports, because the unit suddenly realized somebody was going to be on their backs: These people were coming back again! So reporting improved; and it revealed—this insight came very early, in Nigeria—that smallpox was not distributed as we'd expected. We thought cases would be widely dispersed around the country. But actually, they were occurring in clusters of villages in particular districts and particular parts of town. Smallpox mostly spreads through close contact, we learned, and everything followed from that: Find the case, quarantine the case, vaccinate the neighbors.

The teams turned out to be very effective, very quickly, in stopping the spread of smallpox. One of our first such experiences was in Biafra, immediately before the civil war. Our advisor there, Bill Foege, worked out a network of communication through the missionaries and stopped the spread of smallpox within a matter of *months*—and long before they'd even *started* the systematic vaccination. They started to vaccinate and the civil war broke out—which made it very difficult to work, of course. But we never did find another case in Biafra.

The trouble was, in many countries, vaccination took so much in terms of logistics and planning that the surveillance, the reporting, was neglected. So, as time went on, we started saying routine vaccination was no longer necessary, that all you needed was surveillance. This was a deliberate oversell, because we knew they would continue to vaccinate no matter what we said—which is what happened. So we continued to have real, broad-scale immunization. For final elimination of the disease in any area, though, we had to find each outbreak, find the chain of transmission, and stop it; for that surveillance was essential. And in every country we continued to search for cases for two years after the last reported case.

**I suppose the problems were different in every country?** Oh yes. In India, for example, there are 150,000 health workers. There's even a surplus of

doctors in some areas. So we trained this little army to go from house to house with a picture of a smallpox patient. They'd hold up the picture and say, Do you know what this is? It's smallpox. Do you know anyone with a disease like this? If you saw a case, where would you report it? And so forth. Eventually, in some areas we actually used the old Fuller Brush technique and had the questions printed on the back of the photograph, so we could be sure each worker would run through the whole spiel—which concluded, Do you know there is an award for reporting a case? And the award went up, as cases got rarer, from 50 to 1,000 rupees—half a year's earnings for a laborer.

Then later we had assessment teams do sample surveys to find out how many people knew there was a reward, knew where to report cases, and so forth. By going back again and again,

the health workers educated the people. Once that was done we could locate an outbreak immediately, then move in to isolate the patients and vaccinate intensively.

**Did you isolate them at home, or in hospitals?** Oh, at home. In many of these countries, we found, smallpox spread much more if the patients were in the hospital. In any case, there is absolutely no good treatment for smallpox; patients could just as well be cared for at home. So we tried to keep them in their houses.

As soon as we thought we knew what was happening, though, we'd find a new twist. For example, in many of these societies, particularly in Muslim societies, there is a tradition of visiting sick people. People came visiting from enormous distances, and many of them came in the middle of the night, because it was common folklore that you

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couldn’t catch smallpox at night. We didn’t realize this at first, and we had our control measures set up for the daytime—but the visits were occurring at night, so the smallpox spread on and on. We kept learning.

So we worked out a system whereby we had four watchguards, who took turns sleeping across the front door of the house—and we nailed up the back door. Now, we paid the guards *after* the patient was fully recovered, and we had supervisors making spot checks. If at any time there was no guard there, all four were dismissed without pay. So the guards policed each other, and they always made sure that somebody stayed laid across the front door.

The normal spread was from neighbor to neighbor, but all sorts of strange things happened. We had a couple of outbreaks in brothels, and those gave us real trouble because the whorehouse often sat near the railway station. People coming in by train would stop off, then walk ten or twelve miles here, there, and somewhere else, to their house. When we got an outbreak in a brothel, puff! We’d get a mysterious explosion of cases in young men all

over the area. But after a while, we began to recognize the pattern.

Your local contacts must have been essential. Yes, we found that when we worked closely with the village people, a great deal of help was forthcoming. The systems evolved differently in each country, but fundamentally, where we were doing systematic vaccination, we had an “advance man.” He was the head of the vaccination team, and he would sit down with the village leaders and talk with them about what was to be done. He’d get their advice as to where and when vaccination should be performed, get their help in mobilizing the people. In fact, we trained quite a number of villagers to actually vaccinate, and they did a very good job. It was not necessary to have health workers to vaccinate—nor physicians to supervise.

Training the local health workers was central to the program. In most countries, we used a sort of questioning-arguing process. We’d go back every single month for another discussion of the program, reviewing what had gone on, what went right, what went wrong,

what new thing will we do this month to make it better? In time, the local people developed quite an esprit de corps, a feeling that they were really participating and offering ideas—which they were. It was an Indonesian health worker, for example, who suggested using pictures to explain smallpox. “If only I had something I could show them,” the health worker said—and the idea worked beautifully and was used across the world.

In ways like that, training feeds into service and research. Really—and I feel this applies to the whole field of public health—we had a three-legged stool, the legs being training, service, and research. No leg is much use without the other two; the three work *together*.

You didn’t depend on physicians, then? Not entirely. Back at the Center for Disease Control in Atlanta, we’d had many people who were not MDs, but were college graduates interested in health. Given periodic training, these people gradually moved up into *very* responsible positions. So right from the beginning of the smallpox program, we recruited people of this type, whom we called “Operations Officers.” They worked with physicians, and in theory were responsible only for the *operational* side of the program. But in fact we had about three times as many of them as we did physicians, for a couple of reasons. We got a wider selection of people than if we’d tried to recruit only physicians. Secondly, we became convinced that they were better oriented toward management than were physicians. Medical training is almost counter-productive in organizing and managing a program—the whole of medical training centers on one-on-one kinds of relationships, not working with groups. So when the WHO program began, we likewise managed to bring in a number of these non-MDs. They had some problems, because advanced degrees are very much respected in developing countries, and local medical people were often reluctant to work with non-physicians—at first. But our non-MDs did an excellent job.

Also, we’d found at CDC that capable younger people, people with fairly limited experience, often actually did better than more mature people. Older people would rely on their past experience in operating something, a

hospital or a health department or what-have-you—perhaps all of us are victims of our past. But young people didn't have that experience, and consequently were able to look at new situations and devise new methods—and the new methods were often better.

I understand you were able to run the whole world-wide, 12-year smallpox program for a total of only 96 million dollars. In a way, I think we were fortunate to have so little money. Take Ethiopia, for example, where most of our work was done with Ethiopian staff, Peace Corps volunteers, whatever we could muster. At the beginning we could only afford 50 staff people, in an enormous country of 25 million people. Obviously, we were grossly understaffed. But that forced us to devise new ways to use the local people, the local resources. In Ethiopia as elsewhere, this gave us a better, more innovative program, better tailored to the problems of each individual country. Not only that, it strengthened the health organizations in many countries, and the success of the program increased their prestige. And it was good politically, because the developing nations are increasingly sensitive about technical assistance and foreign research workers. They want cooperation, not paternalism. They're saying, "Don't come in and do your research and go home again. If you're going to do research, do something we need done. Ask questions we need answered." And indeed, having worked in many countries, I agree the problem is real. There is definitely an element of what you'd call exploitative research.

Such as? It's an individual coming in to do, let's say, fundamental work on the physiology of a particular parasite—which makes a lovely thesis project. Then he writes it up with no thought as to whether there is any application, and often doesn't even send a copy to his hosts. Such things have happened so many times that the developing countries are upset and discouraged by it. Now they're looking toward more cooperative development between our universities and their universities, our health centers and their health centers. They want to link research with service and training—which has obvious implications for the School of Hygiene



use up 50 to 80 per cent of their whole health budget—while only 10 per cent of the people live in the cities. Now, these countries are not small. Look at Ethiopia again. If you take every state on the eastern seaboard and throw in Pennsylvania, West Virginia, and a couple more, that's the size of Ethiopia. It's huge, and it's not the only one that big.

So you may have a country the size of Alaska served with one or two big hospitals? Right. These countries tend to put up a magnificent white elephant in the capital, which serves very few people. It's a sickness care philosophy. They've bought the idea that once a person gets sick, then you do something for him at the hospital—if he can get there. But the distances are so

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and Public Health, both abroad and here.

That's not to say the basic biomedical research person, for example, is going to be in the field doing service and training. But he should be in close association with those who are, and in fact it wouldn't be a bad idea if he did go into the field occasionally—the field being broadly defined as the community, the factory, the local health center, a lot of things—and get acquainted with the problems they're facing out there, to know what questions they have. This approach has been a component of the philosophy of the School of Hygiene all along, but I think we can do more, and I think it makes for a very interesting ferment, having research, training, and service going on simultaneously.

What else did you learn from the smallpox program? As one works in the developing countries, one realizes that they're not constrained so much by finances as by management. Money isn't really the limiting factor at all. Many of them are spending enormous sums of money on very elaborate hospitals in the major cities, which may

great, and transport so poor, that few can. So is a hospital the best way to spend their money?

Take the analogy with smallpox: How many hospital beds could we have built for \$96 million? Not enough to treat all the cases—there used to be 10 to 15 million cases of smallpox each year, with two million people dying. Yet for \$96 million, we have essentially eradicated the disease. But no end of hospital beds are being built right now for communicable diseases which are totally preventable, very inexpensively.

No, the problem is management. For example, in 1967 we studied how much they were spending to vaccinate one person in India against smallpox; we calculated this for various districts. Well, it was costing anywhere from 25 cents to a dollar and a quarter per person. In Africa, it was costing us somewhere between 7 and 11 cents. Why the difference? In Africa we had structure; we had a certain output expected of individuals; we had supervisors; we had independent assessment teams verifying what was really being done. We had management.

There are two lessons here. One, we should be looking at prevention—

certainly in the developing countries—as a far less expensive mechanism than treatment. Number two, the system really needs to be rationalized so it will work efficiently, will work even at 50 per cent efficiency. Even if it worked at 20 per cent efficiency, a great deal more could be accomplished in these countries.

Are there any lessons here for the United States? Sure, because we also have a sickness care system more than a health care system. We're much more concerned with treating sick people than with preventing people from getting sick.

Vaccinations, I suppose, would be the obvious example of health care. Exactly. We have effective vaccines against diphtheria, against whooping cough, against tetanus, polio, and measles—and all these diseases can have serious consequences. There is no reason why there should be even one case of any of these diseases in the United States. Yet there are. Look at our priorities: We worry about spending five or ten million dollars for immunization against rubella, a known cause of serious birth defects. Yet we are now on our way to spending two billion dollars a year to treat end-stage renal disease! Not to prevent it—not at all. Not in any way to cure it; it's incurable. Only to treat 70,000 people with end-stage renal disease.

To me this use of resources might be all right—if we were wealthy enough. But we're not; so we now have to make some tough decisions. We just cannot continue to spend whatever we wish on health care—actually on sickness care. We cannot at this time guarantee that everybody who needs a heart transplant, for example, is going to get one. And that means we've got to apply our resources to groups of people, to situations where money can be used more effectively.

Preventive medicine, you mean? In part, and in a more efficient sickness care system. Ten years from now, no doubt about it, we're going to have some sort of national health insurance. The political pressures are there and something's going to happen. Now, what kind of health care can we provide without bankrupting the country?

The system has to change, or else we'll be spending 20 or 30 per cent of our gross national product on sickness, and we as a nation have decided we cannot afford that—look at the fuss already over Medicaid.

Therefore, we're going to have to look at systems whereby not every patient is seen by this highly-trained, highly-specialized, highly-paid individual called the physician for each and every illness. That is really a waste of manpower. We've got to rationalize, then, a system that uses health assistants, nurse practitioners, and various other non-MDs. This change has been slow, but it's coming. At the same time, we've got to look at incentive, and I think that means financial incentive—which is what the market responds to in this country—financial incentives to keep people out of hospitals, out of contact with physicians.

At another level, we also have to look at ways by which the individual *himself* can do something to stay out of the health system. Like staying thin. And I think we'll need to educate people, to reassure people that not every sniffle or fever requires a full workup by a physician. Perhaps a health associate or nurse practitioner can take care of it. These changes are coming.

And we need to figure out where the biggest problems are. We need to ask: What specific changes would best prevent illness?—which is often pretty hard to quantify. You really can't quantitate cause and effect in certain of these areas. But we have to try, then act upon our best information.

What would be your own guess as to the single factor that would improve health the most? I think one very major problem is obesity, which is associated with all sorts of problems, from arthritis to heart disease and diabetes. In returning to this country, I was really struck by the obesity in this country. There's a lot of it.

Obesity being more than 20 pounds overweight? Well, that's one arbitrary definition. But the fact is that every extra pound increases the risk of many diseases that are disabling, crippling, and chronic, and which require hospitalization, physician care, and so forth.

Living in Switzerland, one can't help but be impressed with the tremendous emphasis the Swiss put on physical activity, and on easy access to exercise. Throughout most of Switzerland, Thursday is a school holiday, and the children and teachers bus up to the ski resorts and ski. The children go to school on Monday, Tuesday, Wednesday, Friday, and Saturday morning. But Thursday is activity day. The kids learn to ski, they like it, and they do it in later life. And if you go up into the Swiss mountains you see people hiking and mountain climbing, and the Swiss also do a lot of boating and swimming. People use all sorts of athletic facilities—and many of these people are 70 and 80 years old, but healthy and hale. The athletic facilities are there, and their use is encouraged. In Geneva, there are very few stadia of any size—because there aren't very many people who go to watch athletic events. But there are many clubs that play football, play soccer, play rugby.

Well, so I think we could do a lot more in this country to promote exercise. If you like to jog; that's nice, go jog! But I find it dull. I think a lot of people find it dull. It's no fun. If you make exercise fun, however, more people will participate. So I think here is one major area which could be dealt with without spending a lot of money, and yet it would have considerable effect on health.

Are you saying we should go after the problems that affect the greatest number of people? No, not necessarily. I suppose that would mean attacking the common cold, which in practical terms is hardly a major public health threat. Besides, it's caused by so many different viruses that the potential for some sort of multi-vaccine against colds does not look very good. Is it worth putting a lot of energy into this? I don't happen to think it is. But there are other problems that involve fewer people, but which do have tremendous implications.

For example? Well, let's take Down's Syndrome. A considerable number of children with this syndrome are born each year, and they used to die very young, usually before the age of 10. Now, however, they're living into their twenties and thirties and forties,

**"We have to start looking at ways by which the individual himself can do something to stay out of the health system. Like staying thin."**



and the cost of training these children so they can at least feed and dress themselves, the amount of time spent on this kind of exercise, is just phenomenal. When you look at the absolute number of cases it's not so large; but the costs involved for each case are enormous.

But how much are we doing in prevention? How much research are we doing to determine ways we could prevent mongolism? Not very much, compared to the amount we put into taking care of these people.

In general, just *look* at the number of people we've saved from death but who have little potential to lead a productive life—the number is rising

rapidly. Antibiotics have contributed, of course.

**Success creates its own problems.** Yes, a huge family of them, especially in the geriatric area. So we really should be looking harder at prevention. That's what's so exciting about the School of Hygiene and Public Health. Really, if you look at health in the community, there is very little going on that we're not involved with, trying to find ways to prevent problems. In some ways, ours is not a very *glamorous* approach, though. In medical school, we're trained to have a one-on-one kind of relationship, patient-doctor, which is very rewarding, in a personal sense.

You have a mother whose child is in convulsions, the doctor gives an injection and the convulsions stop. The doctor feels good and the mother is grateful. Well, who's grateful to *us*? Are you grateful that you didn't have smallpox? That your children haven't died of smallpox? No. You don't even think about it. So public health, I think, requires an especially mature person, one who is willing to forego the direct gratification of curing individuals.

**How do you handle that in training public health people?** Well, the people we're training are people who've already decided on this field. It's interesting that there are more and more people like Edyth Schoenrich—who is now a dean at the School. She is a well-trained clinician who began working with the aging and chronically ill, then suddenly realized not only that the problem out there was *enormous*, but also how little she could affect it by treating individuals. So she came into public health.

**Are you accepting the traditional Hopkins mission of training the trainers?** I think we're doing more than just training trainers. We are doing that, but we hope we're also training the policy-makers, and the researchers whose work will be the basis for policy changes. There won't be legions marching out of the School of Hygiene—we don't train that many people. But the few we do train, I think, can have an impact that eddies out very broadly.

You know, here in Baltimore, and even at Hopkins, I doubt that the School of Hygiene and Public Health is perceived quite the way it's perceived around the world. Many people were anxious for me to stay on at WHO. Yet when I indicated I was leaving to come to Hopkins, they actively encouraged me to go—because they felt there could be no job within the World Health Organization more important than the deanship at Hopkins. I don't think many people here see the School in this light. But it's a fact: In countries all around the world, they look to *us* for training and new ideas. This institution is just pre-eminent. There is nothing quite like it in the world.

I find it exciting to be at Hopkins for a number of reasons, but especially because we're just at the beginning of



a tidal wave of concern about better delivery of the sickness care system, about cost control, about other personnel participating in health care, about prevention, and the whole gamut of environmental problems. All these areas are very specifically what the School of Hygiene and Public Health is about—rational health care, not sickness care.

What, specifically, does the school teach? What does a Master or Doctor of Public Health go out and do? We have a diverse group involved in diverse activities—far more than I have time to discuss. For one, there is environmental health, which deals with everything in the environment which causes illness, or potentially causes illness. This work takes on occupational hazards, air and water quality, problems with new chemicals and so forth. What is a given substance doing? How and why is it doing it? What could we do to prevent that effect? What are the risks? How can we screen chemicals more cheaply?—That in itself is a huge area, because with more chemicals being marketed every day, 15 thousand a year or so, inevitably some are going to cause trouble we never anticipated. In environmental health sciences as a whole, we're training people who will be working in government, in industry, in other universities, doing teaching and research, trouble-shooting, running water works, setting standards, monitoring the environment—you name it. These professionals trained in environmental science are very much sought after, more and more so each year.

Epidemiology. Here we study the behavior of diseases in populations, trying to decide—as with smallpox—how diseases spread. What can we do about them? Who's vulnerable? What are they doing that makes them vulnerable? What sort of action could we take, and after we take it what's the effect? Really, epidemiology is at the core of everything we do in prevention.

And we train people who will be delivering health services and researching the best ways to deliver those services. Our training emphasizes the need for ways of knowing what services really make a difference. Say you have a marvelous feeding program for mothers. Are the mothers healthier? Are the infants healthier? How can we

measure the effect?—So far, by the way, there doesn't seem to be a hell of a lot of evidence that most feeding programs make much difference. We should either abandon them or find ways to make them work.

We also have a group working in population dynamics. Among other things, they are concerned with teenage pregnancies and the risks these cause. We're looking at patterns of contraceptive use, of sexual experience at various ages and so forth. These areas have major implications for the health of children, for population size and growth, for the interaction of populations, a whole variety of things. None of these problems occurs in isolation. With teenage mothers, you get smaller, frailer, sicker babies. Not only that, young *mothers* have more medical problems. And they are not always particularly mature, so they often have trouble raising the children, who are then in difficulty later. Where can one intervene? In all these health areas there is a very important *series* of problems.

I really don't know where to stop—I've not said anything about health education, nutrition, tropical medicine, biochemistry, biostatistics, maternal and child health, behavioral sciences, mental hygiene, or pathobiology—in all of which we are training students both at the masters and the doctoral level. In general, though, I'd simply say we are training both generalists and specialists in just about every conceivable area that involves health. Our research and teaching extends from the submolecular level up to the organ, the individual, and society. We have a mix of competence and fields of interest that is absolutely unique—and I find the ferment that results just incredibly exciting.

You sound very much involved, both emotionally and practically. Oh, I am. It's like my reaction to the smallpox eradication program, where I spent a lot of time in the field. I like to get out into the field to talk with the people who are personally involved, because the reports will tell you one thing, but in direct discussion you get a different picture. So, at Hopkins, I like to maintain contact with many different people, at all different levels, to hear what they think, what their problems

are, what ideas they have. It's amazing, but in the smallpox program I can think of exactly one good idea that came out of our headquarters in Geneva—one. All the other ideas—the development of the program, the changes, the modifications—all came from the field. You get out there and find somebody working with an idea. You study it a bit, make a few suggestions, improve it, try it someplace else. Then somebody else will pick it up, modify it some more, and so it goes.

Good programs consist of good people. The buildings, the administration, are all peripheral. If you have good people, you have a good program. If you have mediocre people, you can never have more than a mediocre program.

"Men not buildings," Gilman said. That's right, that is exactly right. In the smallpox program, those of us who worked out of Geneva felt, as a philosophy, that if we were to disappear some sort of program would continue. But if the people in the field disappeared, then we were of no value at all. So our job was very simply to get the very best people into the field, then figure out how best to help them get the job done.

If someone in the field had a problem, it might sound minor at a regional office or at headquarters, but because it surfaced from the field it *mattered*. It might be they couldn't transfer money from here to there, or they'd lost a piece of equipment. Well, we'd try to *do* something about it, that's for sure, within 24 hours—or tell them we couldn't do anything, or at least tell them we'd get an answer back in a week. But we tried to get *something* back to them, so they'd know somebody was supporting them. And as a result, I think, we built up within the program a considerable esprit de corps. When I encounter one of our consultants now, I always hear news about consultants all over the world. They keep in touch with each other. There is a feeling that we were in it together, we worked together. And I think that developed because we as administrators were only *administratively* superior—we were just doing a different job. That concept we worked very hard to *promote*. And I don't think my job at the School of Hygiene is basically any different.