# Unfinished Business and New Forces In Environmental Health Orthodoxy

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ON EXAMINING the table of contents of a forthcoming volume on public health under the editorship of one of the most distinguished workers in that field, I was astonished to find no mention of environmental sanitation or hygiene. The volume comprehensively covers elements in the public health field which are largely medical, dealing with the newer fields such as hospital care and geriatrics. But the book ignores the environment.

This field has been well defined by Winslow as "environmental therapeusis," the term encompassing those controls of the environment and that machinery of the community which go into the preservation of health and the prevention of disease.

Perhaps it might be useful to probe a bit into some of our current assumptions and practices in light of Winslow's farsighted concept. Also, we might attempt a glance forward.

### Orthodox Functions

Begin with a look at what current engineering literature describes as the "orthodox functions" of the sanitary engineer. I want to take issue with this term and to explain why.

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The orthodox functions are so familiar that nobody in a country such as this worries about water supply so long as something that is reasonably liquid and reasonably clear flows out of the spigot. We have become accustomed over a quarter of a century to a status in which that is the expected.

The canvass of the functions of the State, municipal, and county health departments made by the American Public Health Association recently bears out the fact that the so-called orthodox functions—such as water supply, sewerage, refuse disposal, and food sanitation—take a declining portion of sanitary engineering staff time in those agencies.

Yet travel about the country reveals that although those problems are by definition orthodox, they are, in addition, unsolved. They are unsolved technically and unsolved from the more important standpoint of coverage of the population. Many millions of persons living in well-defined communities in this country—the sparsely populated areas not included—have neither a public water supply nor public sewerage facilities. We are confronted with a persisting problem which has been accepted as solved partly because typhoid fever, the earlier measure of the problem, is disappearing.

In appearing yearly before the Maryland Legislature, in my early days, I defended the State health department budget exclusively and simply on the typhoid fever death rate decline. The familiar curve of typhoid fever disappearance was impressive, quantitative, logical, and simple. It was a much happier day than now

Before the regular monthly general staff meeting of the Public Health Service in Washington on May 1, 1953, an internationally known teacher and practitioner of sanitary science informally examined that field of public health endeavor which Dr. Winslow has characterized as "environmental therapeusis." In the following condensation of Dr. Wolman's informal remarks he notes that while many of our currently underemphasized problems are "by definition orthodox, they are in addition, unsolved." In closing, Dr. Wolman remarked that he knew he was speaking dogmatically and that he had "purposely chosen areas of criticism, simply on the assumption that you know what you have done."

when less dramatic and more subtle complexes must be explained in support of a budget.

Typhoid days are gone, and now people ask: "Why should you concern yourself with the extension of water supply? The typhoid fever rate total is quite small throughout most parts of the United States."

The combination of that disappearing index of necessity (or accomplishment) and the fact that we are dealing with orthodox and familiar principles has resulted in an important technologic and administrative gap in the matter of water supply and sewage and refuse disposal.

### Progress in Sewage Disposal?

It required nearly a third of a century to eliminate cesspools and septic tanks in a large part of the congested areas of the United States. Today, we find that accomplishment has become negative. In the last 12 years we have put in more septic tanks and cesspools than we took out in the previous 40. We describe that situation as one which "crept up" on us.

Most health officers and sanitary engineers can recall the struggles to eliminate those early devices from the metropolitan areas. Recently a report came from one State of the installation of thousands of septic tanks and derivatives thereof in the past 5 years—perhaps half of them in areas in which the ground water is 8 inches or so below the surface.

The careful distribution of sewage among the population in certain congested areas has been eminently successful! We could not have done it better by design.

### Community Management Problems

All of us in public health and public administration have fallen down in two areas of effort. We have failed to develop the administrative and fiscal machinery necessary to provide the public amenities of water supply, sewerage, and sewage disposal in areas outside the political boundaries of individual cities. Efficient planning, with very few exceptions, declines as one moves out of the municipality itself into its metropolitan areas, and in turn from the metropolitan areas into the more rural counties. It virtually disappears on an intercounty basis. Here we encounter the absence of either or both a responsible official agent or a militant public interest and knowledge. The two, of course, are inseparable, whether in city, metropolitan area, or county.

In the city, the problem is lifting the sights: first, of municipal officials, a task made more difficult because of historical limits; and second, of individuals, who do not see that city plans and ordinances do not necessarily whittle away their private rights.

As in epidemics, government takes action when the hazard to the many becomes too great. It has been about 18 years since the zoning ordinance of Baltimore was upheld by our court of appeals on the basis that smoke and carbon dioxide and congestion were true public health hazards. Within the city, however, there is still insufficient integration of planning and programs by the department of public works, the department of health, the department of highways, the city planning commission, the housing

authorities, and the redevelopment commissions. And I know of no city which has been able to accomplish this integration satisfactorily.

### Metropolitan and Rural Areas

In the metropolitan area and counties, we are confronted with the problem of ex parte units. As chairman of the Maryland State Planning Commission for 10 years, I called officials together from the various areas frequently but found that a political boundary line on a map is an amazing brick wall.

We are edging into progress in the direction that all would like to see. In many instances, the State sanitary engineer has the opportunity to effect cooperation because he gets around. He has a comprehensive view. His facilities in general transcend political boundaries. He has a potential—one which he has not always used because he is busy with other things and gives integration and cooperative planning a low priority.

Integration ought to have a high priority. Possibly no one would require a sanitary engineer to be also a city planner, but he could be one of the best and sometimes is.

### Suburbia Needs Sewers

The tremendous growth in this country in the past decade will probably continue in the next decade, particularly in the metropolitan areas, and generally there is no organization to assure installation of conventional sanitation features. All down the line our official groups for one reason or another have failed to introduce or develop the planning that would have prevented retrogression in this area.

In some of our States, sanitary district operations are almost at a minimum. Even in one of our greatest metropolitan areas in 1950, there were 50,000 septic tanks and cesspools within the city limits. Most were brand new. Most were bad. Many were recently installed in unsuitable soils. They were the result of a city policy which decreed that sanitary sewers would not be constructed unless storm sewers were first installed. It drove those areas into a medieval system of sewage disposal. I fail to see any logic in this.

The absence of workable administrative and planning machinery in and around our cities is one charge against our past practice and one which I hope will stimulate thought and future action.

### Fiscal Blind Spots

Medical officers and sanitary engineers in their fields of application have a benign disregard for how the money is found. Their objective is to get the orthodox facilities introduced.

It is astonishing to find in no few instances that, when the pressure for installation of a system begins to mount, there is no realization of the amount of money involved. There appears, sometimes, what seems almost a cavalier disregard of whether the system costs $10, $20, or $30 million.

I do not take exception to that too strongly, because if systems are needed and there are sound public health justifications for them, the money should be found. However, increasing attention should be paid to devices for finding such money—and there are devices.

Research in, and transmission of, information concerning methods of finances are as desirable and necessary as is the purely technologic delineation of the system.

### Housing: Gap in the Orthodox

Administration sometimes has taken an easy route which reminds me of King Canute. Since sanitary facilities are not easily available, since the administrative machinery is not easily developed, and since the money does not seem to be in sight, the order goes out that no further construction of housing can take place in a particular area.

We must find some alternative to that negativism.

One of our most distinguished sanitary district engineers has announced that the function of his particular agency is to see to it that houses in subdivisions of 500, 1,000, or more shall not be placed where the agency considers them to be inappropriate on a zoning basis. The agency has no zoning powers, but it can extend water and sewer lines. It simply says, "Out in this

area, we do not think you belong. Therefore, you cannot get our facilities." The courts have yet to speak.

### Technologic Challenges

An important technologic challenge confronts us in the orthodox areas. It is reflected partly in what I have said about money.

We are using, in the fields of water supply, sewage and refuse disposal, and in housing, approximately the same structural devices, the same technologic procedures that were employed a half century ago. We have made adjustments, of course. We have a different filter bottom than the one used in 1829 in London. It is not materially different, but it is a little different. We use a type of rake, with very modest modifications, which was used in 1913.

Is the state of our art so far advanced that there can be no contributions, not only to reducing cost, but—even to a considerable extent—to modifying and improving the processes?

If you look through our sanitation and engineering rules and our designs, you find that we are the victims of uniformity. Uniformity has great administrative advantages, but it also has great administrative danger, particularly if it curbs investigation, inquiry, and critical diagnosis.

Now let's discuss the future—not 1980, but the future of tomorrow morning. There are a few happenings which have encroached upon the environmental control area and to which we are not giving—in research, administration, or finance—the attention we should.

### The Chemical Environment

The first of these happenings is the tremendous advance in the chemical industry. This area of unparalleled expansion is of interest not only because it has increased tenfold in the past 25 years, but also because it deals in a field in which neither the producer, the user, nor the engineer has detailed, accurate knowledge of what is being produced in the way of wastes. It is a strange situation.

Our chemical problems of 25 years ago had elementary simplicity compared with those found in the Kanawha River or the other branches of the Ohio, and even in such streams as the Columbia. The kind of scientific information we need is lacking. We do not even have the instrumentation for identification or measurement.

There is also a tremendous technologic challenge in determining the peripheral effects on those who use this increasingly massive chemical production.

What is the effect of the great array of materials that are placed on the market and sold through radio, television, and newspaper advertisements? What are the products that everybody uses? What is in them? What effects do they have on people? How do we know? Are those effects subtle? Are they long term? Have we any measures for them?

### Ionizing Radiation

A second happening is in the field of radiation. About 6 years ago the field was challenging, but it seemed circumscribed, geographically, in total production and in numbers of facilities. Only a handful of locations and installations had been developed, though it is true that they were big, as we thought of them then.

On a map of the production facilities in the field of nuclear fission today, there is hardly a spot in the United States which has not been used for developmental purposes. An additional characteristic of the nuclear energy industry is that, unlike most others, it has gone into areas which normally we would have said would always be isolated.

Radiation is a subject which many if not most health officers and sanitary engineers have avoided. Partly this avoidance is due to the mystery of the scientific practices, partly to the mystery of the terms, and obviously to the mystery of the effects.

This is another area of environmental problems that puts us back in the period between 1800 and 1880 in this respect: We attempt to control a situation without the guidance of the microbiologist. The heavy chemical industry and the radiation industry lack microbiological and physiological criteria. Even when we can determine the extent of contamination, we cannot predict with certainty the physiological effects. The situation is reminiscent of the days

when we began to filter water without knowing why we filtered it, except that people did not like what they were getting. Today, people do not even know what they are getting or where it is coming from.

There must be in the local, State, and Federal agencies that degree of imagination and foresight that would bring more satisfactory indexes for measurement and control. The engineers are not too patiently sitting around waiting for the answers which have come from bench and field investigations, with epidemiological findings as primary guides.

### The Virus Diseases

Recently, one of the distinguished workers in the field of poliomyelitis chatted about its impact upon our public health problems and controls. He said: "There may come the day—and it may not be very far ahead—when we will have in this country one of the largest poliomyelitis epidemics of a waterborne nature that the world has ever seen. Everything that I know and have done and have found in our laboratories and in the laboratories of others about its probable epidemiology leads me to the feeling that if our guard is down, and down for even a very short interval of time, with our present sensitive population which we did not have a quarter of a century ago, we will get a disaster."

Another investigator commented with respect to infectious hepatitis: "I don't know what the route of this particular virus will be in its impact on the American population. I do know this: It will be one that should be protected by environmental sanitation. Of that I have little doubt."

Most observers are convinced that part of the control of these viruses is an environmental sanitation problem. It is a problem of food and water. It is curious to have these viruses come into the environmental sphere of interest because they are, strangely enough, in water, the field of our orthodoxy. And we have taken our sights off the field of water supply.

We shall be pushed into a revived interest in water control—and I dislike to admit that the only thing that will push us back into that emphasis in every health department is a calamity. If you look over public health history, and particularly environmental sanitation history, there are periodic reminders, by epidemic, of where we fail.

When we thought we had done everything we could do with the control of milk, we had the Montreal epidemic. A modest mistake, an interesting shift in a valve, and there were 4,000 cases of typhoid fever. On the European scene, particularly in the German area, large numbers of typhoid fever cases of a waterborne origin are occurring in populations which apparently for many years had believed that the water controls were supreme, accurate, and, therefore, could be forgotten.

Again we must turn to research. Quite recently a laboratory technique—cultivation of the Brunhilde virus in the brain of mice—has been developed which may make virus studies many times more practicable than they were in 1952. We seem to be mastering identification and growth of the virus on a simpler, cheaper, and more rapid basis. We may have to wait awhile longer. But now that the technique is available, we ought to sail into detailed developmental studies.

What do our orthodox water and sewage treatments do to the viruses? How do they behave? A year ago such exploration would have taken the whole Federal environmental research budget. Chimpanzees alone would have required a large part, but there is indication that with tissue cultures and mice the answers can be searched for with greater skill, economy, and speed.

### Other Environmental Problems

In this country we thought we were rid of the insect and rodent vectors until the 1952 reminder—the human encephalitis outbreak in the Central Valley of California and one of the largest in recent history.

An engineer has to look 30, 40, or 50 years hence in most of his developments, so that I risk the prophesy that we will have repetitions of insect- and rodent-vectored diseases in this country.

Morbidity and mortality statistics reflect conditions which challenge the engineer. I look at the poliomyelitis record, dramatic as it is; I

look at the typhoid record, low as it is; I look even at the respiratory diseases, the sclerotic diseases, and so on, and I find the accident total rate outstrips them all.

Home, highway, and industrial accidents are a leading challenge to public health engineers. And our health departments, not by fiat, not even by conscious agreement, 30 years ago seemed to have ruled accident prevention out of their obligation. I am glad to see that there are evidences that they are going to rule it in again. Why is it all right to kill a child in the house by a defect in structural arrangement or to kill the child on the public street by an engine, but it is not all right to kill it by a virus?

The latter challenge we have accepted in full. About the former, we still have some hesitation. I predict we will have to take it; the public demands we should.

### Water for Washing

In Korea last year, a medical investigator of epidemic hemorrhagic fever said to me: "You know, from the standpoint of environmental sanitation, I would say one of our biggest deficiencies up here, and maybe one that would have reduced our mortality and sickness tremendously, is not what you people are always talking about in the sanitary field, namely, the quality of water. The thing that impresses me most is importance of the minimum quantity of water—quantity per se—which insures the capacity to be clean. One of the great demonstrations to me on the front, with all of our diseases, is that quantity of water as a disease deterrent has been ignored."

This is an interesting point of view which I confess I have never thought of before because we live with an abundance of water—not for drinking only, but for all of its multiple sanitary uses. When you get into periods or areas of shortage and stress, the mere ability to wash has a tremendous public health significance.

"I don't even care," this same investigator said, "If they wash in a polluted stream—if only they can wash."

### Physiological Engineering

Much of what I have described awaits developments in collateral fields. I now wish to note an engineering field which is subtle and remote.

As we become better acquainted with the physiologist, he says: "Why is it that the engineer stays away from the piping system of the human being? Why does he feel that all hydraulics are restricted to cast iron pipe? Why doesn't he interest himself in the mechanisms of viscosity, of deposition, of corrosion, and the like in arteries?"

The physiologist asks for participation. He says: "Why don't you interest yourself in the filtration system of the kidney? We read your material on filtration through sand. We have a system of capillary filtration which outstrips almost anything you know. We would like some light on hydraulics. Why do you deal with pumps if they are made of metal, but you don't interest yourself in the umbilical cord, which is one of the finest and most interesting and baffling pumps that we know of?"

This is jumping, maybe, into 1955 or 1960, but we should be whetting the interest of promising young engineers in the field of physiological mechanisms.