

WILLGOOSE

# Environmental Health

commitment for survival



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# Preface

When over a century ago the educator-poet Edwin Markham wrote, "Why build the city glorious if man unbuilt grows . . .," he was mindfully observant of human needs and purposely directing his words to the very core of societal issues now accepted as part of environmental health. In his most widely known poem, "The Man with the Hoe," he made the individual person the symbol of the exploited classes throughout the world and focussed on the social and economic abuses of the day. He did not change much. The abuses to life, limb, and spirit are still part of the scene, as too many people remain unaware of the powerful relationship between their environment and well-being.

This text is concerned chiefly with the alerting activity—a purposeful effort to awaken individuals to the complex association between the environment and human productivity, health, and happiness. Fundamental to the awakening process is the concept that survival and growth are firmly rooted in the ecological perspective, in which the interrelationship of all living things to one another and to their environment is an essential acknowledgement and point of action.

The focus of attention is on these interrelationships and on the stewardship requirements for planet Earth. From a study of the various pollutions, both spectacular and subtle, it is hoped that the reader will become absorbed in the all-encompassing idea that the ecosystem is everyone's affair. Moreover, the coupling of environmental concepts with imaginative health education efforts has the potential to bring about an enlightened citizenry that will become individually involved in the recognition of environmentally induced illness, disease prevention, and rational self-care.

To accomplish the above, the chapters proceed from discussions of a quality life-style and ecological anxieties to the societal factors associated with such items as the economics of environmental health, urban problems, and social pathology. Thereafter follows a look at international health and worldwide nutrition; air and water pollution; industrial and agricultural pollution; epidemiology and disease control; nuclear energy and health; natural resources, energy conservation, and mental well-being; and environmental variables in the aging population, safe living, environmental health services, the law and human welfare, and an education for health.

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CARL E. WILLGOOSE

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# At Stake: The Quality of Life

Today we are plagued with chronic diseases that an increasing number of health experts believe are largely caused by environmental factors — where we work or live, our habits, diets or lifestyles. The more sophisticated and sensitive our monitoring devices become; the more data we accumulate on the health effects of pollutants and other agents in the environment; the worse things look.

The battle against diseases must increasingly be fought, not simply in the hospitals and doctors' offices, but in our streets, homes and workplaces; in our air and water; in our food and products; and in our habits and life-styles. Such a shift in emphasis will require a searching re-examination and radical revision of our popular understanding of, and our public approach to, health care and disease. If environmental disease is becoming "the disease of the century," as it appears to be, then environmental protection must become the most important ingredient in any national health program.

*Russell E. Train  
Former Administrator,  
U.S. Environmental Protection Agency*

Certainly there is no way for a society to avoid acknowledging and meeting the challenge of environmental protection. Indifference to paying for prevention will result in payment in other ways — in higher treatment costs for drinking water; in damage to forests, crops, and buildings; in lost recreational uses of rivers and beaches; and, dramatically, in higher medical bills, time wasted because of illness, premature deaths, and unnecessary human suffering.

As a nation among other well-established nations, we have behaved rather badly for a long time. This is being changed, but it is a slow process, for not enough people have been moved deeply enough to do more than complain about an environmental shortcoming. The admonition of Aldous Huxley in *Brave New World* is relevant: "If you have behaved badly, repent, make what amends you can and address yourself to the task of behaving better next time. On no account brood over your wrongdoing. Rolling in the muck is not the best way of getting clean."

## PROMETHEAN OPTIMISM — PASCAL TO SHELDON

Man is but a reed, the most feeble thing in nature, but he is a thinking reed. The entire universe need not arm itself to crush him. . . . All our dignity, then, consists of thought. By it we must elevate ourselves, and not by space and time which we cannot fill. Let us endeavor to think well: that is the principle of morality. By space the universe encompasses and swallows me up like an atom; by thought I comprehend the world.

*Pascal (1670)*

If environmental protection is indeed to become the most important factor in any national health program, all members of the human family must struggle together, not merely to survive, but to define carefully and advance the quality of life. To do less is to disregard Pascal's concept and the ability to think, to resolve, and to act as a *Homo sapiens* or thinking animal.

Pascal was right, but William Sheldon went even further by introducing the often forgotten yet almost obvious dimension of human aspiration — a search for something better than what has been; a response to a voice somewhere in the deeper strata of human awareness that says, "This is not good enough."

At moments there comes to many people a painful sense of the nearness of richer and broader human fulfillment, and yet a feeling that some relentless, invisible, but not quite insurmountable, barrier bars the way to a vastly better life. The clearness and vividness of this sense of the better possibility varies in different minds. In many it never breaks through at all to full consciousness. But in a few minds it becomes a dominant mood. It has been called the voice of Prometheus.<sup>1</sup>

Responding to the gentle whispers of Prometheus is to learn to live widely in the world with "responsible heart and searching eyes" — to know the imperfections and frustrations of life in a modern society and *feel* them all, with empathy. It is Prometheus and Epimetheus who represent forethought and afterthought, two sides of human consciousness that are fundamental to the ultimate quality of life. The Promethean capacity for forethought is associated with spirit, aspiration, and awareness; and from Epimethean afterthought comes feeling, warmth, and compassion. Only through awareness and feeling can an individual really come to grips with environmental problems in a noble and self-fulfilling manner.

This is the starting place. When there is harmony of both knowing and feeling, there is a good chance that people will develop the essential dimension of social and collaborative responsibility for the future consequences of their present actions. This "binding together" and common devotion to ultimate goals is the essence of what is required to improve human welfare in an increasingly polluted environment. There is simply no other long-term solution to environmental problems.

Once aimed in the "right" direction and moving toward a significant goal, individuals begin to experience one of the components of happiness — a component that is deeper and more satisfying than the desire for

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<sup>1</sup>William H. Sheldon: *Prometheus Revisited*. Cambridge, Mass., Schenkman Publishing Co., 1975, p. 7.

possessions or the yearning for social power. Inspiring men and women to act on their environmental feelings and make decisions is the real task that must be faced by professionals and others committed to advancing environmental health.

Up to now, efforts to solve environmental problems and improve the quality of life have been fragmented, with small groups and dedicated individuals doing their bit: a few concerned women gather to organize a glass-separating detail for a recycling project at the local dump; a few nonsmokers work to acquaint others with the rights of the nonsmoker; a vociferous group concerned with nuclear energy expansion plans demonstrates at a proposed energy plant site; and individuals such as Dubos and Cousteau wearily shake their heads as the technicians and builders of society focus on their infallibility.

## A HEALTH PHILOSOPHY IN A COMPLEX SOCIETY

It is relatively easy to define health comprehensively in World Health Organization terms as "a state of complete physical, mental, and social well-being, and not merely the absence of disease and infirmity." It is much more difficult to rephrase this definition so that it gives meaningful direction to life and living. The WHO statement implies that one's health potential is a continuum, with near death at one end and optimal health at the other. Moreover, the whole of an individual's capacity for expression is involved in this spectrum of health. It is multidimensional — anthropological, biological, psychological, economic, and even political.<sup>2</sup> This supports the concept of an "ecology of health" by which all human relationships between a community and its environment are health related. It also validates the seventeenth-century remark of John Donne that no person is an island; everyone is in reality "... a piece of the continent, a part of the main ... any man's death diminishes me, because I am involved in mankind."

The ultimate implication of a health philosophy is so broad that there are no boundaries. Societal unrest and urban dehumanization are as significant in terms of well-being as a bleeding ulcer, a coronary thrombosis, or advanced paranoia. Even the aspiration and will power to overcome disease and disorder and to live on can be as weighty an element as a powerful antibiotic. Thus, medical and social science go hand in hand.

As far back as 1931, Aldous Huxley predicted Utopia to be six hundred years in the future. Fifteen years later he amended his prediction to a single century — that is, "... if we refrain from blowing ourselves to smithereens in the interval."<sup>3</sup> Clearly, science and scientific know-how aren't sufficient for prudent individuals' survival. What is needed is a concept of health that embraces the way we live, the pattern of living in a science-oriented world. Several decades ago Norman Cousins presented essentially the same view when he detailed how modern man is obsolete. Amazing machines and industrial processes and products are created, but few advances are made in learning how to live with one another in harmony and

<sup>2</sup>The truth of the old English adage is once again appropriate: "Where indeed is illness bred, in the heart or in the head, or in the body politic."

<sup>3</sup>Aldous Huxley: *Brave New World*, New York, Harper and Row, 1946, p. xiii.

personal satisfaction. It is "the whole man" that requires a whole education to think critically and work with others to create a better world.<sup>4</sup> How else can civilization be expected to survive various catastrophes, the expansion of technology, the discovery of new forms of energy, the extension of knowledge, the rise of new nations, and the worldwide rivalry of ideologies? Moreover, the pursuit of a healthful existence is qualitative. The values held by individuals make a social system worthy. For example, how important is the health of a community when it is weighed against the unlimited use of certain pollutants? How much sensitivity do people have to the fragility and the value of life? What connection do they see between a respect for living things and the healthy development of society itself? These are the crucial issues in environmental studies today.

## THE HAZARDOUS ENVIRONMENT

The ills of a society and the hazards of the environment exist in part because a large number of individuals have failed to exercise a reasonable control over their life-styles. It isn't that they believe they must suffer, but they feel "possessed" — possessed by a poor quality life-style. They don't try to attain control over their bodies. They feel that they are victims of what John Burt calls a poor quality life-style *trap*. They lean on this trap, bound by their illnesses and inadequacies, incapable of becoming free agents. They simply avoid making choices and becoming involved in their personal and environmental shortcomings. It is only in making a choice that perception, judgment, discriminative feeling, and even moral preference are exercised.<sup>5</sup>

Therefore, it is imperative to educate people for healthful living. It is no longer possible to stem the tide of human illness and despair by improved medical and surgical techniques, more hospitals and social workers, more sophisticated health care centers, and more U.S. Environmental Protection Agency regulations. A change is required. The call is for prevention. Of course, there is always danger that a number of "trapped" people will simply tolerate their illnesses and the polluted surroundings that undermine the quality of their lives. Dubos warns that people tend to tolerate inadequate circumstances if they have been conditioned to regard those circumstances as normal during their formative years. "Adults do not miss seeing the stars or the Milky Way if they have grown up in cities so polluted that they have never had the opportunity to learn to enjoy the exciting brilliance of a night sky."<sup>6</sup>

The complexities of modern life and the numerous forms of environmental hazards and pollutions combine to make the task of preventing illness and protecting public health a major challenge. Also, the long-delayed onset of diseases caused by pollution makes it difficult to comprehend the full impact of environmental degradation on health.

Pollutants reach people through various means, each taking its toll, but virtually all forms of pollution have a certain negative effect. There are

<sup>4</sup>Norman Cousins: *Modern Man Is Obsolete*. New York, Viking Press, Inc., 1945, p. 14.

<sup>5</sup>See John Stuart Mill. *On Liberty*. New York, Bobbs-Merrill Co., 1956, p. 71.

<sup>6</sup>Réné J. Dubos: The Dangers of Tolerance. *Journal of School Health*, 44:182-185, April, 1974.

individuals who are especially susceptible to attack, notably the very young, the old, and those weakened by disease. Because resistance to pollution is governed by such factors as age, heredity, general well-being, occupation, climate, residence, smoking, and dietary practices, it is difficult to assess precisely the general effects of pollution upon a large population. Despite a number of uncertainties and a limited knowledge of the full extent of the threat to health, decisions and action cannot be suspended while arguments about proof continue.

Cancer is a particularly good example of a major health problem that results from living in a hazardous environment. It affects one in four persons born in the United States. Between 30 and 40 per cent of environmentally caused cancer occurs in European and American industrial societies. Epidemiological data indicate that the most widespread and important carcinogenic stimulus is cigarette smoking, which affects the upper respiratory tract and may affect the bladder and the pancreas.<sup>7</sup>

The most dangerous elements of environmental pollution are carcinogens, which are substances that cause cancer; teratogens, which cause birth defects; and mutagens; which cause hereditary changes that may be passed from one generation to another.<sup>8</sup>

### Carcinogens

The effect of carcinogens on human tissue (if exposure is sufficient) is generally irreversible. Incidences of cancer today may reflect an exposure many years ago. Similarly, carcinogenic contaminants added to the environment today may not reveal their damage until many years from now.

Cancer is not one disease. It is at least one hundred diseases that involve derangement in body cells. Many cancers are self-inflicted by habits such as smoking, overeating, overdrinking, and sun-bathing.

Carcinogens that produce cancer in experimental animals are found in low concentrations in food. Others, such as some air and water pollutants, certain pesticides and food additives, are everywhere. Not only are we ignorant of the carcinogenic potential of many substances repeatedly introduced into the environment, but we also do not know much about the synergistic effects of two or more carcinogens or even a single carcinogen in combination with various promoting agents or other chemicals. It is not widely appreciated that a combination of pollutants can be more damaging than the sum of their separate effects. Many substances, which are not carcinogenic by themselves, interact with other substances to promote the development of cancer.

Cancer has been a major cause of death in the United States since 1900. In this century there has been an absolute increase in cancer deaths which cannot be explained as a result of either the increase or aging of the population. On the average, cancer deaths have increased by about one per cent per year since 1933.

Cancer of the respiratory tract has shown the most rapid increase ever recorded for a non-infectious disease, 1800 per cent during the past 40 years. And the death rate from lung cancer for urban residents is twice the rural rate even after allowing for smoking habits. In the vast majority

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<sup>7</sup>John Higginson: A Hazardous Society? Individual versus Community Responsibility in Cancer Prevention. *American Journal of Public Health*, 66:359-366, April, 1976.

<sup>8</sup>Comments on carcinogens, teratogens, and mutagens have been adapted from U.S. Environmental Protection Agency: *Pollution and Your Health*. Washington, D.C., U.S. Govt. Printing Office, 1976.



of cases, pollution in urban areas exceeds the levels in less populated regions.

### Teratogens

Numerous environmental pollutants are not only carcinogenic but teratogenic and mutagenic as well. Teratogens may cause monstrous deformities. Congenital defects account for 14 per cent of all infant deaths and are the third most common explanation for deaths in the newborn. Many substances induce abnormalities in a fetus at levels below those needed to make the mother ill. Methylmercury, for example, affects prenatal development; children born to mothers who have eaten food contaminated by it frequently exhibit a disorder resembling cerebral palsy. One of the most disquieting aspects of teratogens is that their potential for destruction has rarely been known in advance. X-rays, German measles, mercury, thalidomide — all exacted costly tolls before their teratogenic features were recognized.

### Mutagens

Mutagens result in transmissible changes that affect potential offspring. If a pollutant damages a cell while its capacity for division remains unimpaired, the result may be defects among future generations.

Many chemicals which pollute the environment are mutagenic in large doses. But, it is not known whether these chemicals are mutagenic hazards at the levels they presently appear in the environment.

As succeeding chapters will show, environmental problems stem from numerous negative variables that contribute to a reduction in the quality of life. Consider the following list of health problems (Statistics apply to the U.S. unless otherwise specified.):

1. Heart disease is still the greatest killer (Fig. 1-1). Over 300,000

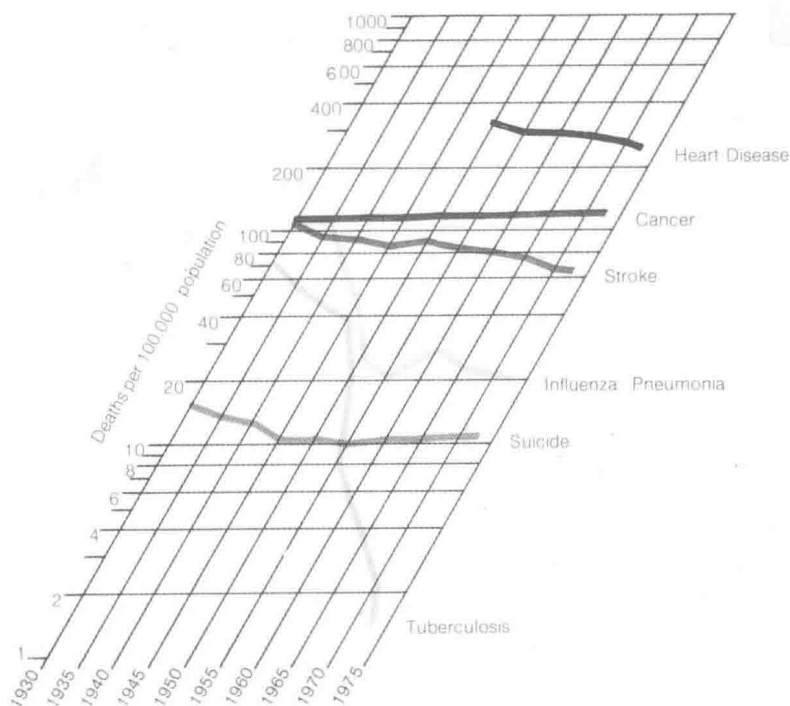


FIGURE 1-1. Age-adjusted death rates, 1930-1975. (From the National Center for Health Statistics.)