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Galloping Technology, A New Social Disease

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The outstanding characteristic of our time is the headlong rush of technology and science. Scientists and engineers are prying new secrets out of nature and remaking our lives at a breathtaking and ever accelerating rate. The adverse effects on society of their efforts could be referred to as social diseases, although we have preferred the term social issues. Our galloping technology has created or aggravated problems of unemployment, urbanization, racial and international tensions, war, overpopulation, and many others that have been the constant concern of members of SPSSI.

But "social disease" in my title refers to the other, old-fashioned medical meaning of the term—namely, illness caused by the conditions of social living. My particular training has made me sensitive to the direct effects on life and health of man's reckless conquest of the environment, a topic that has been largely neglected by social scientists. The most obvious reason for this neglect is that the problems present themselves as medical or technological. My thesis is that, although the new menaces to life and health may be caused by new machines and poisons, the remedies lie mainly in the realm of human behavior.

In its medical meaning, the term "social disease" referred to illnesses contracted, directly or indirectly, by misbehavior, and therefore blameworthy. Most commonly, of course, it was a euphemism for venereal disease, but it was also used for illnesses like tuberculosis, presumably contracted by living under unhygienic conditions. These diseases were reprehensible because our forefathers blamed the slum dwellers for the circumstances under which they were forced to live.

Of the social diseases caused by galloping technology, those caused by air pollution might be thought of as analogous to tuberculosis, whereas

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injuries and deaths caused by reckless driving—a voluntary, pleasurable, but disapproved activity—would be analogues of venereal diseases.

Like their medical counterparts, technological social diseases can be acute or chronic. The most virulent and acute form, which fortunately has not yet broken out, would be modern war. The threat to survival posed by modern weapons is receiving so much agonized attention from most of us that there is no need to dwell on it. It may be worthwhile to point out, however, that modern weapons symbolize the reversal of man's relation to his environment, a matter to which I shall return again. For the first time in human history, the chief danger to human survival comes from man himself instead of the forces of nature.

Historians have sufficiently described the horrors or war throughout the ages, but actually weapons were a trivial source of death compared to natural causes until very recently. Even when men tried deliberately to kill each other in war, they succeeded only sporadically and in localized areas. The influenza epidemic in 1918, for example, killed ten million people throughout the world in six months. Endemic diseases like malaria and tuberculosis took their tolls in millions every year, as did famine.

World War II claimed about 65 million lives in eight years, if one starts with the Japanese invasion of Manchuria, but in that war, as in all others, the great majority of deaths were caused by disease and starvation resulting from the dislocations of society caused by the fighting. World War II was the first in which, even among the fighting men, more died of wounds than disease. As a great bacteriologist has observed: "...soldiers have rarely won wars. They more often mop up after the barrage of epidemics. Typhus ... plague, typhoid, cholera and dysentery (have) decided more campaigns than Caesar, Hannibal, Napoleon and all the inspector generals of history" (9).

Now, just as we have learned to master the major epidemic illnesses and to produce food in abundance for everyone, we have suddenly created a new, more powerful form of death-dealing that can destroy tens of millions of people in minutes and, indeed, could put an end to mankind. If one were mystically inclined, one might suspect that there is some law of nature which states that the danger to human life remains constant, so that as one source diminishes another must take its place.

I shall assume, without any really valid grounds, that humans will shackle the self-created monster of modern weapons before it is too late. Otherwise there would be no point in continuing with this address, which deals with the causes and cure of chronic forms of technological social disease. These are the subtle, insidious dangers that are the unwanted and incidental by-products of fabulous achievements in raising the level of human welfare. These dangers are at present more apparent in the United

States because our society is the most technologically advanced, but in due course they are certain to plague all nations.

The dangers can be grouped into three categories: pollution of the living environment, the biosphere; accidents; and drugs. Let me start with the only brand new danger, of small consequence at present but potentially one of the greatest—the pollution of the biosphere by radioactive products of nuclear power plants.

At this time, twenty-seven nuclear power plants are in operation or under construction, and their number will grow very rapidly. In 1962 nuclear power accounted for only one-half of one percent of the total power generated in this country, but it could be as high as fifty percent by the year 2000. And the growth rate is exponential. In absolute figures nuclear power plants produced one-half million kilowatts in 1960, one and one-half million this year, an estimated five million by 1970, and 68 million kilowatts by 1980.

Nuclear power plants present three types of danger. The first is a break in the protective casing that encloses the radioactive elements. Such an accident to the reactor in Windscale in England in 1957 is said to have released more radioactivity into the atmosphere than the explosion of an atomic bomb of the Hiroshima type. Another serious potential hazard lies in the possibility of a leak in the transportation and storage of high level radioactive wastes that cannot be safely released. Already some sixty million gallons are stored in underground tanks and, of course, the storage problem will become increasingly serious with each passing year.

The third source of potential danger lies in low level radioactive isotopes. These are now released into the environment under carefully monitored conditions, to insure that the dilution is sufficient to prevent any predictable human exposure above levels believed to be harmful. The trouble is that very little is known about these isotopes, since they have only existed for a few years. So far, none has approached the presumed maximal permissible concentration in humans. However, they raise uncomfortable questions. Even though traces of radioactive isotopes in our tissues may be harmless in the short run, we do not yet know enough about what long exposure to slight doses of ionizing radiation does to living systems to be sure that we are not suffering slow damage. In this connection, deaths from cancer in survivors of the Japanese atomic bombings have only now, after about twenty years, started to show a sharp rise.

A more serious problem is that some living creatures accumulate certain isotopes which become increasingly concentrated as they move up the food chain. For example, algae concentrate radioactive zinc to about 6,000 times that of the surrounding water. The algae are eaten by bluegill fish, in whose bones the concentration is about 8,700 times that of the

water. Fortunately, humans do not eat bluegill bones, but who knows what edible tissues will be found to store other radioactive substances in the same way?

Dangers of the same type are created by pesticides. In terms of the amount of chemical per unit of body weight, most pesticides are equally toxic to all living creatures, though immunity for some can be built up in time. They kill insects and not men simply because the former receive enormously greater doses in proportion to their weight. The amount found in human tissues to date is far below the concentration that would cause immediate damage. But certain creatures we eat concentrate pesticides to a fantastic degree. The oyster, for example, accumulates DDT to a level some 70,000 times above that of the surrounding water. This happens because water-living creatures lack the enzymes present in adult humans, that metabolize most of these substances into harmless wastes. It turns out—an example of an unanticipated danger–that babies also lack these enzymes, so that they would be damaged by much smaller amounts of pesticide than adults.

Furthermore, some pesticides, like radioactive isotopes, cause cancer in animals on repeated exposure, and some are suspected of damaging the germ plasm, so that their deleterious effects, though long delayed, may eventually be very serious.

A more serious, immediate menace to health is atmospheric pollution from factories and automobiles. It is estimated that 133,000,000 tons of aerial garbage are dumped into the atmosphere of the United States each year—more than the weight of our annual steel production. As to its effects on health, a cautious statement is: "A large fraction of our population is now being exposed to significant concentrations of a variety of toxic chemicals. These levels are often a substantial fraction of those which produce acute effects. There is a possibility that our people may be sustaining cumulative insidious damage. If genetic injury were involved, the results could be especially serious" (1, p. 1527). It is estimated that the chances of a man dying between the ages of 50 and 70 from respiratory disease are twice as great if he lives in an air-polluted area than in a clean-air area.

A particularly subtle form of air pollution, which may have the most inexorable effects, is the slow increase in carbon dioxide in the atmosphere produced by industrial use of fossil fuels. This blocks the radiation of heat energy back to outer space, so that the temperature of the earth is gradually rising. The average temperature today is 8% higher than it was in 1890. This of course, could be due to other causes. In any case, if it keeps up, among other unpleasant consequences, it will melt the polar ice caps, flooding the world's seaboards.

The social diseases considered so far have been analogous to tuberculosis—the individual cannot do anything about the noxious agents to which he is exposed. Now let us turn to those that are more analogous to syphilis—that is, they result from a person's own actions, whether deliberate or heedless. This category includes disability and deaths caused by accidents or by drugs. Accidents have become the leading cause of death from ages 1 to 37 and the fourth cause of death at all ages, being exceeded only by heart disease, cancer and stroke. Their prominence obviously results, in part, from the sharp reduction in natural causes of death, especially in the younger age group, but in absolute figures they claim an impressive toll. In 1964, the last year for which figures are available, they killed 105,000 people and injured 10,200,000. The worst offender, of course, is the automobile—or rather the automobile driver. On United States highways a death or injury occurs every 18 seconds. In 1965, 49,000 people were killed—or almost half of those who were killed in all accidents—and 3,500,000 maimed. I shall return to the question of the causes of this carnage presently, but for the moment wish to pass on to a brief look at the last category of new environmental hazards to be considered. Ironically, these are created by the medical profession or, more broadly, the life sciences.

The worst, fortunately, is only hypothetical so far. Now that biologists have been able to rearrange living molecules, they can create self-reproducing viruses that never before existed. Probably some are doing this in the service of biological warfare, but many are working on such projects purely out of that powerful human urge, scientific curiosity. A Nobel prize winning biologist views such research with profound alarm. He speaks of the good possibility that these tinkerers will create a new poliomyelitis virus, for example, against which humans have built up no immunity. "Any escape into circulation ... could grow into the almost unimaginable catastrophe of a 'virgin soil' epidemic involving all the populous regions of the world" (4, p. 38). He concludes: "there are dangers in knowing what should not be known," (4, p. 39) a feeling shared by many atomic scientists. Apparently, splitting the molecule may have consequences as disastrous as splitting the atom.

To return to more mundane but more immediate hazards arising directly from efforts to prolong life and health, floods of new medications are being put on the market. Despite increasingly stringent laws, some that cause serious damage to health or even death get past the guards. Examples were the contaminated strain of polio vaccine, and, more recently, the malformed babies caused by an apparently harmless sleeping medicine, thalidomide.

Finally, there is the growing menace of drugs that alter states of consciousness, including sedatives, stimulants, mood-lifters and so-called psychotropic drugs such as LSD. Most of these drugs were thought to be harmless when first introduced. Cocaine, barbiturates, dexedrine, and now LSD, to name a handful, were first viewed as great boons to man.

We should have learned by now that no drug powerful enough to cause a change in psychic state is harmless if taken over a long enough period of time or in large enough doses. Barbiturates proved to be superb suicidal agents, dexedrine produces serious psychoses (in one series 83% of those who used this supposedly harmless pep pill for one to five years showed psychotic symptoms), and increasing numbers of sufferers from the acute and chronic ill effects of LSD are appearing in psychiatric emergency rooms.

Hundreds of common drugs, moreover, impair driving ability. One physician found that a group of patients receiving a tranquilizer for 90 days had 10 times more traffic accidents than the population at large. He concludes, glumly, "No matter how strenuously doctors warn patients about drugs and driving, the advice probably wears off faster than the drug" (5).

This reminder that our topic is people, not technology, may serve to conclude this very spotty survey of the new hazards to life and health created by man. I have not even mentioned, for example, water pollution by industrial wastes, the more than 150 poisons that can be found in any household, or the host of new industrial hazards.

The psychological questions I should like to raise concerning this new group of social diseases are, first, why do we not pay more attention to them and, second, why are our countermeasures so ineffective.

The obstacles are both perceptual and motivational. Perceptually, most of the dangers are remarkably unobtrusive. In fact, they are undetectable by the senses. Radioactive isotopes and pesticides in our tissues, and the slowly rising carbon dioxide content of the air cannot be seen, heard, tasted, smelled or felt, so it is easy to forget about them. When they do intrude on consciousness, in the form of eye-burning smog or brown water, in the language of perceptual psychology, they are ground rather than figure. As an authority on air pollution says: "...the private citizen is unaware of the fact that the substance he is inhaling may eventually cause cancer of the lungs. He does not associate a bad cough with atmospheric conditions. It may be only on days of particular wind direction that a housewife will be bothered by fly ash on her clothesline; immediately thereafter, she'll forget it....The offensive odors of some industries, the dust on windowsills, the haze that obscures an otherwise beautiful day—all are taken as features of urban living about which nothing can be done.

And when the air is clear, the facts of the matter might as well not exist" (6, p. 262). One is reminded of the old man in Arkansas whose roof didn't leak when it didn't rain.

Occasionally the dangers do spring into focus, as when at least 4000 people died during a four-day London fog in 1952, or when traffic deaths hit the headlines on a holiday weekend, but these occasions are too brief and infrequent to sustain attention.

A further difficulty in identifying the damage to health caused by noxious environmental agents is that illnesses have multiple causes, so in any given case it is hard to single out what really is to blame. If an elderly man with chronic lung disease dies during a heavy smog, who can say for certain that the smog was the cause of death? In other terms, statistical variations in various environmental and internal factors are so great that the true noxious agent may be hidden by them. The problem is analogous to that of detecting evoked potentials on the electroencephalogram. These are spike waves occurring a fraction of a second after the stimulus. They can only be detected by superimposing hundreds of tracings so the random variations cancel each other out.

Finally, although the damage done by environmental poisons is constantly increasing, the increments are very small compared to the base level. So, in accord with a well known psychophysiological law, they do not rise above the threshold of awareness. Humans may be in the same plight as a frog placed in a pan of cold water, which is very slowly heated. If the rise in temperature is gradual enough, he will be boiled without ever knowing what happened to him.

These perceptual obstacles to appreciating the dangers created by technological advances play into strong motives for not doing much about them. The major source of complacency, I believe, is that the new dangers to life and health are tiny compared to the benefits. For example, American industry, the chief source of pollution of the biosphere, produces half the world's goods in addition to a fabulous arsenal of weapons—a technological triumph that could, in a flash, nullify the gains produced by all the others. And our society could not function at all without that space-annihilator, the automobile. Pesticides are mainly responsible for enabling less than 10% of the American population not only to feed the rest too well, but to produce millions of tons of surplus food.

Medical science has prolonged the average length of life in the United States by about 50% in the last half century and has virtually conquered the major epidemic diseases, although this battle is never permanently won. (Recently new strains of resistant malaria have been reported from Vietnam.) And the lives of millions have been made more tolerable by relatively harmless sedatives and anti-depressants.

Surely, it will be said, these huge gains in human welfare (and I have named only a few) far outweigh the relatively minute increases in illnesses and deaths that accompany them.

True, but in absolute numbers over 100,000 accidental deaths a year and the rising death rates from cancer and lung disease are far from insignificant. And even though the immediate danger to health and life may be small, some types of damage are cumulative and some may be irreversible. For example, no one knows how to restore to the water of Lake Erie the oxygen it has lost through a complex chain of biological and chemical reactions set off by industrial wastes, resulting in destruction of its edible fish.

In any case, the rewards yielded by our galloping technology are large, tangible and immediate, and the penalties are remote and contingent. It does not take a learning theorist to know which will determine behavior. The pleasure of a puff on a cigarette far outweighs the probability that it will shorten the smoker's life by a few years in the distant future. The increased risk of getting killed influences the automobile driver much less than the joy of speeding, especially after a few drinks. And, at the social level, the prospects of increased revenues to a community from a new industry dwarf the hazard to health it might create.

So, everyone is motivated to minimize the dangers, especially when taking them seriously might jeopardize some of the gains. Perhaps this universal underestimation also partly reflects the proverbial American optimism. Even scientists, whose sole task should be to establish the facts, seem to be affected. One is constantly running across new items like: "New tests developed at Pennsylvania State University reveal that pesticide residue in plants is fifty per-cent to a hundred per-cent greater than present tests indicate" (7). Or: "Radioactive caribou and reindeer may pose a health threat to nearly all the residents of Alaska. Scientists previously had believed that only Eskimos living near the Arctic Circle were endangered" (2).

When profits, not merely truth, are at stake, optimism becomes literally blind. One example may suffice. Fluorides discharged into the air by phosphate plants in two Florida counties have damaged citrus crops over a radius of about 50 miles, cut production in some groves by as much as 75%, and have resulted in a 20 million dollar reduction in property values. In the face of these facts a spokesman for the Florida Phosphate Council told local citrus growers: "Gentlemen, there's no problem of air pollution in this area that is affecting citrus groves. All you boys have to do is take better care of your groves and you will have no complaints about air pollution" (6, p. 261).

Since local chambers of commerce wish to attract people to their localities, they join the creators of pollution in minimizing it, so whatever tendency the average citizen has to overlook his slow poisoning is aided by the absence of corrective information. A recent poll of the inhabitants of Nashville, where substantial numbers die every year from heart and respiratory diseases aggravated by heavy air pollution, found that 85% believed it to be a healthy place to live, and less than 3% suggested that measures be taken to reduce air pollution.

Despite these impediments, Americans have at last officially recognized the existence of the problems and taken action to solve them. Congress has appropriated funds for fighting air pollution, water pollution and highway accidents. So, you may ask, what is there to worry about? Unfortunately, in comparison with the size of the dangers, the efforts to combat them are so small as to be pitiable, or laughable, depending on one's point of view. For example, only 130 air pollution control programs are in effect in the nation's 7,000 communities, and most of these are considered inadequate.

The two main sources of air pollution are industry and the automobile. By 1970 there will be 60% more industries pouring pollutants into the air than in 1960, many of them new, so no one knows how toxic they will be. In 1960 74 million automobiles travelled 728 billion passenger miles. In 1980 these figures will be about doubled.

Thus, emission of poisons into the atmosphere would have to be reduced at least fifty percent merely to keep pace with their increased production. To do this would cost an estimated three billion dollars a year. Even this would only be about one-half of one percent of our gross national product. Actually industry and the government today are spending only about 35 million—that is, slightly over one-tenth as much as would be needed to do a minimal job. To quote an expert: "America of the near future will be filthy and foul, and our air will be unfit to breathe. Indeed, this dark, dangerous era ahead of us is inevitable" (6, p. 271).

In short, so far, efforts to halt the diseases created by our galloping technology have been too little and too late. That this state of affairs is a pressing social issue seems self-evident, so it is appropriate to ask why it has aroused so little interest among social psychologists. The basic trouble may be that, in contrast to our other concerns such as war, poverty and racial discrimination, this one has no focus and no villians. Ironically, the ills caused by technology are by-products of benevolent efforts to promote the general welfare. It is hard to get indignant over this, and indignation seems to be the initial goad to becoming concerned about a social issue.

Moreover, if one looks about for a focus, one can find only familiar and universal aspects of human nature—such as failure to appreciate the seriousness of dangers that are not in awareness, unwillingness to forego immediate rewards in order to forestall future disasters, and the general inertia of social organizations. We may be dealing with a new manifestation of the illness that, according to the Spanish philosopher, Ortega Y Gasset, afflicts all civilized societies and eventually kills them—the desire of the citizens to enjoy the fruits of civilization without putting forth the effort or accepting the discipline necessary to maintain it. Perhaps the last word was really said by Descartes over three centuries ago: "Defects are always more tolerable than the change necessary for their removal" (6, p. 221).

Lest we throw up our hands prematurely, however, let me suggest some aspects of the problem to which social psychologists might be able to contribute.

One is the American faith in the quick fix. Our history of incredible inventiveness has fostered the belief that some new technological invention can always be devised to correct the evils created by the last one, without causing anyone too much cost or inconvenience. No doubt, new inventions will be required to help combat new dangers, and all of the diseases created by technology have partial technological antidotes. But right now we have the techniques to sharply reduce such evils as air and water pollution, if only we would apply them, and the most efficient way to relieve many other dangers would be through modifying the behavior of people, not machines.

Traffic fatalities are a case in point. When the disgraceful carnage on our highways finally passed the threshold of awareness, a great cry went up for safer cars, whereas what we need more are safer drivers. Certainly cars could and should be made much safer than they are today, but just consider a few facts. Twenty percent of drivers are involved in 80% of accidents. If they were all kept off the roads, accidents would be sharply reduced at one blow. Many studies have found that in about 50% of fatal accidents one or both of the persons involved had been drinking. And I have mentioned the tenfold increase in accidents found among one group of patients on tranquilizers.

Finally, speeding is involved in nearly 2 out of 5 driving deaths. No amount of tinkering with automobiles will change the fact that the human reaction time is about three-fourths of a second, which means that at 70 miles an hour a car will cover 77 feet or about three car lengths before the driver can even press the brake. So if a driver is tailgating at that speed and the car in front stops suddenly, no safety devices on earth can keep him from crashing, although they could, to be sure, reduce his resulting injuries.

Nor are these considerations merely theoretical. Three New England states have reduced their accident rate to about half the national average simply by enforcing laws against speeding and drunken driving. If to these were added universal driver education courses, and effective measures to keep accident-prone drivers permanently off the roads, traffic fatalities would drop to a negligible level without changing the design of a single car.

Insofar as improved safety features on cars are involved, the human problem has only been pushed one step back to the auto makers. It is much easier to invent safety devices than to get auto manufacturers to install them. No manufacturer can afford the additional cost of making his cars safer unless all his competitors do likewise.

This consideration calls attention to a broad social issue that creates serious impediments to combatting technological sources of damage to health—the competitive orientation of our society. The American social philosophy assumes that competition is the main-spring of social and economic advance. The general welfare is believed to emerge from the interaction of conflicting economic interests. Every American inevitably belongs to several overlapping interest groups, but, by and large, he assigns the highest priority to the one centering on his means of livelihood, whether it be producing or selling goods, working for wages, or selling services. Groups are formed to protect other interests than making money, to be sure, but they do not exert as powerful or pervasive an influence. If an interest does not affect income and offers no dramatic focus for attention, no group will form to protect it, regardless of how vital it may be. It is safer to predict that there will never be a National Association of Air Breathers or an Amalgamated Water Drinkers Union. As a result, efforts to combat the poisoning of the biosphere, are bound to receive a low priority. Everybody's business is nobody's business.

Another social issue implicit in technologically-caused ills arises from the fact that they cannot be effectively combatted by local action. The dangers are seldom confined to political units. When they are, as when fumes from a factory pollute the air of a town, the industry involved is seldom locally owned, and so is relatively immune to local pressures. The characteristics of local administrative agencies also impede effective action. If the job of policing water pollution, for example, is assigned to an established agency like the Health Department, it must take its place at the end of the line behind the department's established duties, and must compete for funds and personnel that are usually already inadequate. If a new department is formed, it must battle established agencies, resistant to encroachments on their terrains.

Nor can local communities meet the financial burdens involved in adequate safety measures. A major reason for the success of the federal

highway program seems to be that the federal government footed 90% of the bill. It will probably have to assume a similar share of the cost of combatting environmental ills, instead of the meagre 40% it now offers.

And so we find ourselves once again facing in a new guise the perennial problem of the place of government regulation and control in a free society—a manifestation of the inevitable and universal tension between freedom of the individual and the welfare of the group.

In other words, it appears that technologically-caused ills of individuals can be successfully combatted only by correcting the ills of society with which they are intertwined. At this point certain new tools that psychologists have helped to develop may come to our aid.

One is computerized systems analysis. The biosphere is a single system, of which human beings are an integral part. So attempts to modify any aspect of it may have repercussions on the rest, sometimes unforeseen. For example, the introduction of methods to control air pollution might affect patterns of mass transportation and employment, which in turn may influence rates of crime, alcoholism and drug addiction. Computerized techniques of systems analysis, that enable rapid gathering of many types of data and analysis of their interactions, for the first time permit solution of such problems. They analyze the relationships of the different aspects, make it possible to anticipate the effects of various remedies before actually implementing them and provide continuous feedback on the success of the measures finally undertaken. California has pioneered in a pilot application of systems analysis to problems of air and water pollution, mass transportation, and crime, with encouraging results.

To combat the ills caused by technology also requires bringing about major changes in the attitudes of the American people. We would have to learn to view our problems in a broader context—to realize that the quick fix will not work and that adequate solutions require consideration of the social and ethical implications of remedial measures. In addition, we shall have to learn how to cope with a constantly changing environment.

The achievement of both these aims would require drastic and large-scale changes in our philosophy and methods of education. There would have to be more emphasis on general principles, and on learning how to solve problems, and less on sheer information and development of technical skills. It would be necessary to introduce these orientations into the school curriculum from the earliest grades. Their implementation would require full use of new methods of teaching that eliminate the enormous waste motion of traditional methods.

A massive program of adult education along similar lines would also be necessary. Electronic communications media could be used very much more effectively for such a purpose than they are today. Many industrially

backward nations are using radio and television to speed the education of their people, as well as for other less worthy aims. Today, educators, political leaders and other molders of the public mind can drop in for a chat, via television, in over 93% of American homes. Attempts to use the educational potentialities of television more fully would run into the same obstacles as any other social innovation. The mere existence of television, however, gives grounds for hope that it will be used to speed the changes in public attitudes required by the changes in the environment.

Lurking behind all the problems I have discussed is a brand new psychological issue, to which I should like to call your attention. It probably concerns philosophers, theologians and poets primarily, but, as psychologists, we cannot be indifferent to it. Let me introduce the topic by taking as a text a comment of a State Conservation Commissioner defending a public utility, one of whose atomic power plants had caused an enormous fish kill by its effluent. He described this mishap as "almost in the vein of an act of God" (8). I do not think he really meant to imply that God is dead and has been replaced by Consolidated Edison. But such a proposition might contain a germ of truth. Our generation is living through the culmination of a struggle between man and nature that began when someone first resolved to sail into the wind, rather than letting currents and breezes carry him where they would. After he learned how to do it, he became able to choose his destination, so he had to develop navigational instruments to tell him where he was and how to reach his goal. From then on, step by step, man has gradually bent the forces of nature to his will, until today, barring only his inability to conquer death, he seems to be nature's master. But let us not become too self-confident. At first the benefits of our assault on the natural environment far exceeded the costs, but now the latter are rapidly mounting. Nature may simply have been biding its time.

The interesting psychological point is that our increasing power over nature has been accompanied by growing despair about ourselves. Playwrights, novelists, poets, philosophers keep hammering away on the related themes that life is meaningless, absurd, a kind of bad joke, and that man is capable only of making himself and his fellows miserable. And these statements find a wide response. Could they spring, in part, from a feeling of terror at our inability to live up to the appalling responsibilities of our new power?

In the past, men could shrug their shoulders in the face of most of the evils of life because they were powerless to prevent them. A misfortune like a fish kill could be blamed on God or Fate. Now there is no one to blame but ourselves. Nothing is any longer inevitable. Since everything can be accomplished, everything must be deliberately chosen.

It is in human power, for the first time, to achieve a level of welfare exceeding our wildest imaginings or to commit race suicide, slowly or rapidly. The choice rests only with us.

Perhaps we are realizing that no degree of control over nature can solve basic problems of social living. Our dazzling material triumphs are, rather, a warning that in the end, all depends on improving the quality of our relationships with each other. Without this, all our scientific and technological triumphs may only hasten our destruction.

Man has been characterized as the only creature with an infinite capacity for making trouble for himself, and we seem to be exercising that capacity fully today. It may be some comfort to recollect, with a student of man's origins, that "man is a bad weather animal, designed for storm and change" (3).

Today man is making his own stormy weather. Perhaps it is not too much to hope that the same qualities which enable him to triumph over the destructive forces of nature will enable him to master those he himself has created.

REFERENCES

1. Abelson, P. H. Air pollution. *Science,* March 26, 1965, *147,* 1527.
2. *AMA News,* January 10, 1966.
3. Ardrey, R. *African Genesis.* New York: Atheneum, 1961.
4. Burnet, F. M. Men or molecules? A tilt at molecular biology. *The Lancet,* January 1, 1966, 7427.
5. Hollister, L. E. *Baltimore Sun,* March 20, 1966.
6. Lewis, H. R. *With Every Breath You Take.* New York: Crown Publishers, 1965.
7. *Medical World News,* October 8, 1965.
8. Wilm, H. G. *New York Times,* May 20, 1965, p. 45, Col. I.
9. Zinsser, Hans, *Rats, Lice and History.* Boston: Little Brown, 1935.