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THE AGE OF CLIMAX

IT is so common, these days, for reflective men to speak of the feeling of crisis now in the air that "proofs" hardly need to be offered. The crisis in international affairs has numerous obvious causes, chief of which are the emergence of new nations from centuries of subjection to colonial status, the rumblings of revolution among vast numbers of men still held in bondage, and the wholly frightening prospect of incalculable destruction from another world war.

"Dilemma" is a word for apparently insoluble problems, and dilemma is the word for nearly all the dangers and threats which beset the modern world. We see the dangers, but we do not know what to do about them. Even the people who think they know what ought to be done are confronted by an insuperable obstacle: they don't know how to get *others* to see what must be done.

It is natural, therefore, to react to the futilities thus made plain by turning one's attention away from particular problems—at least for a time and to examine the general situation: man held captive by dilemma. It is this, surely, which generates the feeling of crisis and justifies the air of desperation found in so much of human expression in our time.

One question is this: Is captivity to dilemma a kind of "accident" of history, or is it an essential part of human experience?

Another way to phrase this question would be: Is the human struggle physical, or is it metaphysical?

For if the enclosing of human life by dilemmas is only a fortuitous conjunction of difficulties, then we have what may be called "technological" problems before us, to which we need only to apply the full resources of our technical "know-how."

But if, on the other hand, the confinement by dilemma is an appropriate and necessary form of human experience—as natural for man as confinement of the chick in the egg, of seed by soil—then an entirely different study of the human situation is called for.

History, for example, is supposed to instruct us in the course of human experience across the centuries. Now either history can be a "science," or it cannot. If history can be a science, when it becomes a science we shall learn from it the *meaning* of history, and thus, in some larger or collective sense, the meaning of man's struggle.

If history is potentially a science, then, in any given cycle of history, certain basic facts about man will be disclosed by historical studies. And those basic facts will gain confirmation from examination of *other* cycles of history. After a time, if we can assure ourselves that we have seen enough of history, or particular cycles of history, to supply all necessary facts and their confirmation, we shall be able to make broad generalizations about human beings which will be true of all history and histories, and those generalizations may be of a sort which can then be considered independent of any particular history.

These facts, it is fair to say, and the resulting "laws" deduced from them, will constitute a metaphysic of history. They will represent the constant processes of general human experience throughout long stretches of time.

Now if this is the case, it seems quite possible that the study of the dilemma-situation will be recognized as more important than the endeavor to get out of particular dilemmas, by hook or by crook. For the dilemma, in this case, may be identified as an essential type of human experience.

We can think of two great discussions of human dilemma. One is Boetius' *Consolations of Philosophy,* penned by this Roman schoolmaster to the Middle Ages in prison while awaiting execution at the hands of Theodoric. The other is the Indian classic, *The Bhagavad-Gita.* Boetius sought to penetrate the mystery of freedom from the

foreordaining will of God, while the *Gita* is concerned with freedom from the bonds or consequences of action. Freedom is always the issue in a dilemma, since once we are free to solve our problems, doing what needs to be done is only a technical affair. It is the apparent loss of freedom which creates the feeling of crisis and despair.

If history has a metaphysic, then the problems of the modern world are not different from the problems of the *Gita* and the problems of Boetius. This is not to say that the solution is "easy." The solution was not easy for Arjuna, in the *Gita*, and Boetius, as we read him, did not really find a solution at all. But the solution, if there is one, certainly lies in an understanding of the nature of man.

Why should an understanding of the nature of man be so terribly difficult? Why can't we just apply "science" or the scientific method to this question?

We can't "just" apply science to man because, as Erich Fromm pointed out in his *Saturday Review* article (March 16), "Man is not a thing." Dr. Fromm wrote:

> Psychology can show us what man is not. It cannot tell us what man, each one of us, is. The soul of man, the unique core of each individual, can never be grasped and described adequately. It can be "known" only inasmuch as it is not misconceived. The legitimate aim of psychology, as far as ultimate knowledge is concerned, is the negative, the removal of distortions and illusions, *not the positive*, full, and complete knowledge of a human being.
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> There is, however, another path to knowing man's secret. This path is not that of thought, but of love. Love is an active penetration of the other person in which my desire to know is stilled by union. In the act of fusion I know you, I know myself, I know everybody—and I "know" nothing. I know in the only way in which knowledge of that which is alive is possible for man—by the experience of *union*, not by any knowledge our thought can give. The only way to full knowledge lies in the act of love; this act transcends thought, it transcends words.

But it does not, alas, transcend the cuss words of the "practical" man who is looking for a formula for success and certainty, when he is confronted by this explanation—of the man, in short, who wants an objective definition of subjective reality. The "practical" man resents being told that he is foolish to want to control the uncontrollable. He calls this a rejection of "progress." He insists that science can conquer every obstacle to certainty.

There is frenzy in the human situation because of *this* dilemma. Arjuna agonizes, squirms, and complains bitterly to Krishna because his teacher will not agree that a submission to the constraints of conventional morality is the "right" thing for Arjuna to do.

Boetius has similar trouble. He wants to believe in an all-knowing and all-determining God, *and* freedom for human beings. He can't have both.

For Arjuna, the rule of his religion is objective and clear. It is wicked to make war on one's relatives, preceptors, and countrymen. For Boetius, the rule of God is plain enough. God, given the qualities that are always given to God, *must* produce the future, instead of it being the work of puny, erring man. God, in this case, has the role of the inexorable laws of nature. How *can* there be freedom for man?

And we, in our time, have dozens of such confinements of our freedom—all the way from the mechanistic and deterministic theories of physicists and biologists to the compulsions of the almighty State. Let go of science and where are you? Renounce the State and what will become of you? There has to be an *order*. We must *belong*.

But if we don't let go of science, we are nothing, anyway, but a wrinkle in the cosmic process, an intersection which lasts a moment or two of forces which move without notice of human hopes or fears. And if we obey convention and the State, if we accept the progressive invasion of our private lives by the mechanisms of industrial, social, and political organization, we shall have no more individuality than a motif in the design of the latest wallpaper. We shall become stamped and lithographed men.

No wonder we talk of crisis. No wonder the Riesmans, the Macdonalds, the Fromms, the Chiaromontes and the Roderick Seidenbergs are writing searching books and articles about the

dilemmas and the crises of our time. We are having nothing but crises, these days.

Here, we should like to take time out for a brief "book review" of Roderick Seidenberg's *Posthistoric Man.* This extremely learned but exhilarating volume is based upon a metaphysic all its own. Seidenberg, a scientist, has a theory of history. The human story, he proposes, begins with the rule of life by instinct. Instinct is pervaded by an automatic conformity to nature. Instinct is never troubled by indecision or debate. It is total in its commands. Man's organic, prehistoric past, Seidenberg says, enjoyed the perfect rule of instinct. Then, by some mysterious awakening, *mind* began to take over from instinct. Mind made man in a sense "independent" of nature. Intelligence enjoys choice, and choice brings creative decision. Man began to replace the guide of instinct with the order of humanly devised institutions. In modern times, the rational order is the order of human organization, patterned after the perfect organization of the machine. The machine principle is invading human life, he says. Some day, the invasion will be complete. Then men will have no more choices than a machine. Intelligence will freeze in some form of mechanically perfected "order" which will bring the advent of the "posthistoric" era. History occurs when human beings act, when they are protagonists in authentic "events." But after intelligence has made the perfect organization, men will be its captives. There will be no more decision, no more action, no more choice, in a word—no more *history.*

This is Seidenberg's version of the dilemma of our time. His book is exquisitely written and his case is brilliantly argued, but the real force of its persuasion is in the symmetry of his metaphysical scheme. The book is a bid to explain the nature of things, and is therefore a rival of other metaphysical systems. No book without a metaphysic ever really captures the attention of mankind. Hegel and Marx have had tremendous influence because of the metaphysical content of their works. Spengler, despite his gloom, still fascinates his readers because his work is schematic and explanatory instead of merely descriptive. Only the metaphysical religions survive the inroads of time.

But Seidenberg's metaphysic is built upon scientific postulates. He starts with the assumption that man is a "thing," subject to mechanistic laws. But although himself delighted with the purity of scientific mechanism—as would be any man who enjoys the elegance of accurate prediction—no more than any other distinguished dilemma-facer of history does Seidenberg like the implications of scientific or historical determinism. He doesn't *want* man to be a "thing." As he writes, he turns against his thesis with objecting footnotes. He resists, as Boetius resisted, and as Arjuna retained Krishna for a teacher, despite his pessimism.

The present article is written only to set the outlines of a problem, to suggest a way of looking at the dilemmas of our time. For an optimistic conclusion, to be enlarged upon in later installments, we offer a passage from Dostoevsky's *Notes from Underground*—a location not entirely unlike our own:

> You Gentlemen have taken your whole register of human advantages from the averages of statistical figures and politico-economic formulas. . . . Shower upon man every earthly blessing, drown him in a sea of happiness, so that nothing but bubbles of bliss can be seen on the surface; give him *economic prosperity* such that he should have nothing else to do but sleep, eat cakes, and busy himself with the continuation of his species; and even then, out of sheer ingratitude, sheer spite, man would play you some nasty trick. He would even risk his cakes and would desire the most fatal rubbish, the most an economical absurdity, simply to introduce into all this positive good sense his final fantastic element . . . simply to prove to himself—as though that were necessary—that men are still men and not the keys of a piano. . . . The whole work of man really seems to consist in nothing but proving to himself that he is a man and not a piano key.

REVIEW
THE ECHO OF GREECE

EDITH HAMILTON'S *Echo of Greece* has been awaited expectantly by those who appreciate her former works, confident that this new volume will be another one to own. Perhaps like some of the ancient Greeks whom she weaves into the fabric of her readers' lives, Miss Hamilton never does anything by halves. *The Echo of Greece* is not a repetition of *The Greek Way,* nor of the comparison between Socrates and Jesus of Nazareth found in *Witness to the Truth.* The present book is of entirely different construction—an unusual history of ancient Greece in which philosophy and literary art achieve what seems to us a perfect blend.

The introduction to the first chapter of *The Echo of Greece* furnished the thoughts for an article in the *Saturday Review* for Jan. 12—noted by MANAS—providing necessary recognition that the history of Greece is the history of *ideas.* Its theme is a definition of the human soul as the Greeks gave it, followed by discussion of what such words as "freedom" and "responsibility" really mean.

In her second chapter, Miss Hamilton examines "Athens' Failure," suggesting that the failure of Athens was the result of "a spiritual change." Elected by the other Greek cities to lead the Delian League, because, as Herodotus said, "the Athenians stood first for wisdom," Athens throve in her power, grew hungry for more, and caused the failure of the league to unite Greece because she failed to live up to her own ideals. As Miss Hamilton puts it: "In a few years she had forgotten the ideals that had saved her from Persia, her devotion to freedom, her spirit of self-restraint. She turned the league of free cities into a league of unwilling subjects to herself." As leader, Athens became a "professional," losing the genius which the other Greeks had honored in her. She began to pay her politicians—over the strong objections of such men as Plato and Aristotle and as soon as politics became closely connected with money and with voting, politics and philosophy parted company. Here, Miss Hamilton enables us to see Plato in a far different light from that of his modern critics, who call him "fascist," and a man who was content to advance his reputation as a writer. For Plato was spurred by the realization that Athens was on the verge of invoking the same Nemesis which had brought the destruction of other governments:

> The whole process was dear to Plato. Athens had reached the point of rejecting independence, and the freedom she now wanted was freedom from responsibility. There could be only one result. "The excess of liberty in states or individuals," he said, "seems to pass into excess of slavery." If men insisted on being free from the burden of a life that was self-dependent and also responsible for the common good, they would cease to be free at all. Responsibility was the price every man must pay for freedom. It was to be had on no other terms.
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> Plato gave up Athens. "A lofty soul born in a mean city," he wrote, knowing that "no politician is honest, nor is there any champion of justice at whose side to fight," and that he can be of no use to the state, "holds his peace and goes his way, content if he can be pure from evil and depart in peace, with bright hopes." He does well, Plato says, and yet his good is second-rate. Only in a state he can work for, only through loyalty and patriotic devotion can a man grow to his full stature. There speaks the true Athenian, always keeping clear in his thoughts that the individual's good was the community's good, and that private life could be no more than a part of the fullness of life open to the man who could serve his country. This is Plato's farewell to the good state on earth. He turned away from freedom. He had seen the excess of it in irresponsible Athens, freedom without any counterbalancing weight of responsibility, and he wanted none of it. But by that time Athens had reached the end of freedom and was never to have it again.

Miss Hamilton's fourth chapter, "The School Teachers," is of great interest. The fourth century was not only an age of great prose writers, but also of great educators. Plato founded and taught in his Academy, Aristotle taught in the Lyceum, and Isocrates, the "Progressive" educator of his time, elaborated another clearly defined theory of

education (he spurned metaphysics and loved the practical). These contrasting views gave focus for animated discussion. Whatever the school of thought or whoever the teacher, all proponents were at one in the unshakable conviction that neither excellence nor beauty could be easily achieved. The "easy way" of later religious orthodoxies was not the Greek way, nor were the teachers and philosophers of the fourth century B. C. ever deluded into thinking that good government could be obtained without the self-discipline and constant striving of individual citizens.

The Stoics, also, taught the examined life, the life of self-mastery, the life of dedication to unswerving ideals. But when Greece began to fail—when her incorporation with the Roman Empire made further political inroads on the ground once held by philosophy—the era of inspiration was over. The Roman Way and the Greek Way were alternative courses for centuries to come—and the Roman Way was taken by the Christian religion. Rome, while admiring of the Greek genius and culture and philosophy, could think only in one fashion. After all, Rome's devotion to "obedience" and "authority" had quite a background: she had been at war for eight hundred years. While the Greeks still valued individuality in Athenian citizens, the Romans "distrusted anyone who was different and wanted citizens who were not given to thinking, but to doing what they were told." And the rising Christian Church followed the way of Rome:

> No more little communities of Christians each led by the Spirit of Truth which Christ had promised them. The Romans with their genius for organization took them over and built up one great institution so superbly planned and developed that it finally was able to step into the place of the Roman Empire. Never could that magnificent position have been reached by following the Greek way. The Roman way led the Church to supreme power, power over heaven and hell as well as the earth.

Miss Hamilton could hardly have failed to wonder about what the course of Christian history might have been if the Greek way instead of the Roman way had been chosen. She writes:

> Another danger too might well have been avoided, less great but yet of major importance, the danger of formalism, of considering the outside more important than the inside, of holding up a form of words, a creed or theology, as a more basic expression of the truth than the way people live. Christ said, "Ye shall know them by their fruits."
>
> That is not the way the Church went. The Inquisition put people to death not for living wickedly, but for making what to the Inquisitors were incorrect statements. The Greeks were not interested in trying to make correct statements about the infinite and the eternal. Plato said, "To find the father and maker of all is hard and having found him it is impossible to utter him," and he speaks of truth coming to him suddenly like a flame blazing up from a spark. That flame shrivels up formalism.

Miss Hamilton's last chapter carries the same theme further. This is not simply dreamy speculation, but a lesson for religionists in the present and in all times to come. For despite Athens' failure, her greatness still lives—the "echo" cannot die away:

> What would it not have meant to the religion of Christ if Christians had been learners as well as teachers of Greece. The basic Greek idea that nothing of value can be easily won would have found a perfect fulfillment in Christ's life. The cruelties practiced in his name might not—almost surely would not—have defaced the religion of love. There would have been, too, another criterion of the truth, not only creeds and *ipse dixits* authoritatively promulgated and obediently accepted, but Plutarch's criterion, If we live here as we ought, we shall see things as they are, the Greek version of, The pure in heart shall see God.
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> "The excellent becomes the permanent." The influence of Greece died, but the truth and the beauty the Greeks discovered finally came to life again and have never passed away. They are still our teachers.

COMMENTARY
AN HOUR OF FREEDOM

CRITICISM in science, of scientific contentions, *by* scientists, is a part of the scientific method and the task of specialists. But criticism of broad, scientific theories to determine where they *lead* and what they *mean* in respect to man, is Philosophy.

Roderick Seidenberg's *Posthistoric Man* (see lead article), therefore, is essentially a work of metaphysics, although there is much weighing of scientific facts in the volume. Further, Mr. Seidenberg's interest in the subject is a metaphysical interest. He fears for the loss of human freedom. But, starting with the methodological premises of science, Mr. Seidenberg becomes their captive—a captive, principally, of the second law of thermodynamics, which asserts the inevitable reversion to random motion of all forms of matter, and the eventual reduction to meaningless chaos of all intelligence and all the works of intelligence.

What Mr. Seidenberg has to work with to counter these gloomy implications is only the empirical fact of the perpetual struggle of life and intelligence to *resist* this reducing process. Accordingly, since the laws of thermodynamics seem to be universal principles, while the resistance of life is a phenomenon which does not endure, *Posthistoric Man* reaches a pessimistic conclusion, livened only by the author's manifest hope of finding some reasonable escape from the "heat death" to which the entire universe seems doomed.

What Mr. Seidenberg needs, and what he does not have, is a fundamental principle expressive of what we might call the *creative*, or forming, integrating and surviving forces in nature. In short, the science from which he draws his facts is well acquainted with the laws which lead to death, but knows nothing, or practically nothing, of the laws which lead to life. The value of his book is in making this lack very clear.

The result of this disclosure, to which others, also, are contributing, is an hour of freedom in human thought. We are able to look at our science with a degree of philosophic objectivity. After a century or two of deep involvement in the drama of physical discovery, we are now able to withdraw from our achievements to a point where we can measure and evaluate them from a *philosophic* point of view. We are asking if science, after all, must of necessity be an enterprise which rationalizes only death and despair. We are led to consider the possibility that the science which discovers the laws of death is the science of matter, and that another sort of science is needed to discover the laws of life—the science, we may hope and believe, of the future.

CHILDREN
. . . and Ourselves

READING SUGGESTIONS FOR CHILDREN

RESPONSE to our occasional comment on children's books indicates that many readers welcome discussions of this nature and are on the lookout for books which contain enough "magic" to resist the onslaught of television. On the whole, MANAS readers seem to agree that the best book for a parent to recommend to his child is one that he (the parent) will enjoy reading himself. But what is it that can make child-fare also palatable for adults?

In the first place, there is the matter of sophistication. Every adult is "sophisticated," at least in comparison with his children. He uses words and concepts beyond the child's ken, and is aware of many more implications in regard to both material and psychological life, which leads him to boredom if he attempts to read uninspired material to his children. His sense of humor, presumably, requires some measure of subtlety if he is to chuckle or laugh. But as A. A. Milne demonstrated many years ago, sophistication need have nothing to do with technicalities or impressive terms. The psychological undertones and overtones of *Winnie The Pooh* allow the most sophisticated adult to laugh at himself, his children, and practically everybody else—and in a warm, kindly fashion. Milne is superlative and, in our opinion, can play a role in our lives from near babyhood till the day we die.

True, a very small child will miss much of the cleverness, save what he derives "by osmosis" from his parent's enjoyment; but it is easy to interpolate simple explanations into the *Pooh* stories, building a place in the minds of children for Milne's characters to emerge later with completeness. Again and again we have noticed that children who had an early *Pooh* period have gained a sense of nuance—or rather, we should say, that often, when an adult's humor strikes us as particularly delightful, we discover that he has known *Pooh* since far back in a childhood past.

All of which leads us to *Charlotte's Web* by E. B. White, which has become a "best-loved"-children's book in the five years since 1952, when it was published by Harper's. A subscriber asked us to read this book, thinking we would want to pass on the suggestion that it is ideal fare for family reading. It is, and we do. A month or so ago, on the radio, Marya Mannes—author and contributor to the *Reporter*—and the indefatigable Clifton Fadiman spent a little time analyzing why everyone likes "Charlotte," and while we have forgotten what they said, the answer seems quite apparent to us now. It is simply that *Charlotte's Web* has everything. No aspect of human existence is left untouched, so that White's "Web" gives one the feeling that he has had a repast, the ingredients of which are so ingeniously and originally put together that he is not conscious of food intake, or that he is doing anything constructive, until he thinks it over.

For very young children, *Charlotte's Web* seems a little easier to follow through most of its chapters than *Winnie The Pooh*—though we should have to say that Milne's priceless atmosphere is by no means duplicated.

Should we "summarize" the story? No, because a short description sounds inane and would not attract the reader, though one might go so far as to say that the heroine, Charlotte, is an ordinary spider with extraordinary ideas. Because she hangs upside down from her web for such a long time every day, her brain is stimulated so greatly that she out-thinks all the other animals of the barnyard. Determined to save little Wilbur, the pig, from an inevitable winter butchering, she undertakes a course in human psychology to see how this sad fate may be averted. Wilbur is too young, still too foolish and uninformed, too naively amiable, to die. Because Charlotte has befriended him she feels a responsibility for his future, and finally evolves The Plan. And when Charlotte, herself, dies, as she must after

accomplishing her mission, and having laid 514 eggs to insure posterity, the reader comes to terms with death in a way impossible if Wilbur had felt the ax.

There are those who protest books in which animals think and talk like human beings—and we are usually among them. The objection is that this sort of anthropomorphizing, and the ensuing over-sentimentalizing about pets, which does neither the pets nor their masters any good, also interferes with a real understanding of the world of creatures. But Mr. White is so manifestly writing about human beings through this medium that we think he stands vindicated as a new maker of fables. Templeton, the rat, for example, is a most objectionable character, and yet he is fitted into the scheme of things by Charlotte, once his psychological *modus operandi* is understood. And so, the reader feels, with objectionable people, of whom there are a good many. So, from four-year-olds on—and perhaps a little bit before—*Charlotte's Web* is not only worth reading but worth thinking about. Discussions of birth and death, respecting either animals or humans, can develop naturally from the background provided.

Of the many little volumes of the Little Golden Book series, something called *The Friendly Book*, listed as No. 199, has our unofficial award of first prize. Complete with fantastic pictures over which even three-year-olds can pore for some time and laugh about, the theme of *The Friendly Book* is the simplest in the world. It just lists, in most cleverly turned rhyme, all the things a tiny child can "like" if he is in the right mood—and *The Friendly Book* helps him get there. Two verses will show how Margaret Brown moves from the sublime to the ridiculous, apropos of stars and bugs:

I like stars
Yellow stars
Green stars
Red stars
Blue stars
I like stars
Far stars
Quiet stars
Bright stars
Light stars
I like stars
A star that is shooting across the dark sky
A star that is shining right straight in your eye
I like stars.

* * *

I like bugs
Black bugs Green bugs
Bad bugs Mean bugs
Any kind of a bug
A bug in a rug
A bug in the grass
A bug on the sidewalk
A bug in a glass
I like bugs
Round bugs Shiny bugs
Fat bugs Buggy bugs
Big bugs Lady bugs
I 1ike bugs

Another recommendation from a reader is Harry W. French's *The Lance of Kanana.* First published in 1892, this book has been issued again and again for children's libraries. It is a story of adventure and heroism, best, perhaps, for those who are ten years old or more. This is no ordinary sort of blood-and-thunder tale, for Kanana, the son of a mighty warrior, refuses to cast his lance against any human being. Regarded as a coward by the Bedouin tribesmen, the despair of his father, Kanana comes to save a kingdom *without* violence. His bravery is the greatest of all, and it is, in the end, his lance which saves Arabia, even though it was not cast to kill. *Kanana* is a powerful story, possessing some of the best Rudyard Kipling overtones and well worth a parent's reading. As with our most often recommended *Call It Courage*—Armstrong Sperry's classic—*Kanana* is the story of a lone child who becomes a brave man, unaided either by circumstances or by "helpers" and who puts all other standards of bravery in the shadow.

FRONTIERS

Answers to Questions about "Fall-Out"

WHILE the recent *(Newsweek,* June 3) report that the Government is likely to discontinue nuclear testing may help to allay the fears of some people, the groundswell of disapproval of the tests now going on in Nevada is well on the way to tidal-wave proportion. Quite possibly, the idea of ending the tests is prompted by growing fear of outraged public opinion.

Meanwhile, scientific analysts of the tests are piling up evidence that even the relatively "small" fall-out from experimental detonation of nuclear bombs has added significantly to the ominous cloud of radioactive materials in the earth's atmosphere. Chief provocative of statements on fall-out from scientists opposing the tests has been the light-hearted way in which official spokesmen have "minimized" the threat to human health and life in the weapons-testing programs of Britain and the United States. Criticism from individual scientists has been directed chiefly at the AEC's Willard F. Libby, the chemist who told Dr. Schweitzer that the tests could continue at the rate of the past five years without producing enough fall-out to cause serious concern. A less "conservative" apologist of nuclear testing, Viscount Cherwell of England's House of Lords (who was Winston Churchill's wartime scientific adviser), insisted that objections to the tests come from "hysterical people" who believe that they threaten (in Cherwell's words) "a negligible part of the human race." This "negligible" group, according to some estimates, may amount to a million or more of people.

Time, unlike *U.S. News & World Report,* gives obvious credence and plenty of space to scientific critics of Lord Cherwell and the U.S. Atomic Energy Commission. *Time's* June 3 round-up story repeats the views of many leading scientists who are demanding that the tests be stopped. For example, citing E. B. Lewis, California Institute of Technology geneticist, *Time* says that he "proves" that leukemia is caused by radiation. *Time* adds that Lewis thinks that if the concentration of Strontium 90 in the U.S. ever rises to only *one tenth* of what the AEC considers the "maximum permissible concentration," leukemia in this country will increase from five to ten per cent.

Early last month (June 7), in Los Angeles, Leon Pape, a member of the American Federation of Scientists, spoke before a crowd of 1800 people on the effects of radiation from nuclear testing. (Mr. Pape is a medical physicist whose specialty is the study of the effects of radioactivity on living organisms.) Mr. Pape's address was intended to bring to the public fundamental information on the subject. He based his remarks very largely on the part of the National Academy of Science report (made to President Eisenhower and published June 13, 1956) prepared by the nation's leading geneticists. He pointed out that the facts presented by these scientists are not subject to dispute; what is at issue is the implication of those facts. Mr. Pape's statement of what is known to geneticists concerning the biological effects of radiation was lucid and simple to grasp. Following, in summary, are the essential points:

There is no disagreement as to the fundamental conclusions of geneticists concerning how radiation affects living organisms. There are five basic conclusions:

1. Radiation causes mutations. (The impact of a subatomic particle on the genes, the bearers of heredity, produces a permanent alteration in the hereditary endowment of the individual affected. Mutations, in other words, are *inheritable* changes in the organism.)

2. Practically *all* induced mutations are harmful. (This means that artificially produced mutations—in laboratory experiment or from direct radiation of nuclear explosion, or from the radioactive particles of fall-out materials—may be assumed to be always destructive to the organism. "Natural" mutations, on the other hand, are not

very well understood, and result in part from the "natural background" of radioactive materials normally present in the human environment, but largely from the organism's chemical environment. These natural mutations are held to be the fundamental cause of evolutionary change.)

3. Any "dose" of radiation, however small, can induce harmful mutations.

4. There is *no* "minimum" dose of radiation which the human body can be said to tolerate without expectation of adverse effects.

5. Any additional radiation will produce additional mutations, directly proportionate to the increase in radiation.

Radiation is measured by roentgen units. The irreducible "dose" of radiation from the "natural background," to which all human beings are subject, is said to be 4.3 roentgen units. Medical procedures such as X-rays result in an additional 3.0 roentgen units of exposure. This makes a total of 7.3 roentgen units as the "normal" dosage of human beings, which will, of course, vary up or down with individuals. (These values all apply to the cumulative effects resulting within a single generation, or thirty years.) The "maximum permissible dose" is held to be 10 roentgen units. Mr. Pape, however, is emphatic in pointing out that this expression is grossly misleading. Exposure to radiation, so long as it is less than 10 roentgen units, is not "all right." There is really *no* "safe" dosage.

To press this point home, Mr. Pape described the statistically possible genetic effects of the additional radiation now being produced by nuclear testing. Weapons testing, he said, results in somewhere between .1 and .5 roentgen units. This amounts to radiation varying from one per cent to five per cent of the so-called "maximum permissible dose." This, he said, after thirty years, could cause from 5,000 to 25,000 tangible physical or mental defects in as many children born in the United States, as the result of mutations directly caused by this additional radiation. The basic equation is this: radiation equals mutations, and mutations equals harmful effects.

Mr. Pape gave considerable attention to Strontium 90. He began by explaining that a nuclear explosion produces great clouds of radioactive fission materials—radioactive dust. There are both inherently radioactive particles, such as Strontium 90, and dust which is made radioactive by exposure to radiation from the explosion. Small particles such as Strontium 90 rise to higher levels in the atmosphere and achieve a wider distribution. Strontium 90 does not occur in nature except as a product of nuclear explosion. It has gained special attention in connection with the menace to health by reason of its long "half-life" of twenty-eight years. This means that the radioactive quality of Strontium 90 is reduced by half in twenty-eight years. After fifty-six years, it will still be 25 per cent active.

Further, Strontium 90 has properties which liken it to calcium. It is, Mr. Pape says, a "bone-seeker." It has an affinity for bone and blood and is thus identifiable as a producer of bone cancer and leukemia. Since children require more calcium than adults, they are peculiarly susceptible to the inroads of Strontium 90, attracting more of this radioactive material by their need to grow. More than four times the adult content of Strontium 90 may be found in children, Mr. Pape said.

How much Strontium 90 can human beings assimilate without serious mishap? No one knows the answer to this question, but a rule has been established for persons who are engaged in work which exposes them to intake of radiations of this material. Such workers are allowed to continue with their tasks so long as their bodies reveal the presence of no more than 1000 micro-micro curies of Strontium 90. The much smaller dose of 100 micro-micro curies is regarded as "safe" for ordinary people.

At present, the average amount of Strontium 90 in human bodies generally is estimated to be .1

micro-micro curies. However, by 1970, when all the Strontium 90 now high in the atmosphere has come down to earth, this fractional amount will grow to 2 micro-micro curies. But children commonly absorb four times the Strontium 90 found in adults. This makes, for children, 8 micro-micro curies of Strontium 90 in children in 1970, But in some children, already, ten times the amount of Strontium 90 usual in children has been found. This means that by 1970, *some* children will have as much as 80 micro-micro curies of Strontium 90 in their systems. And 100 micro-micro curies is regarded as the limit to be tolerated!

Some light is thrown on the "negligible part of the human race" which may suffer from nuclear radiation by a statement by Linus Pauling made last May 2. Discussing the Christmas Island tests of the British, then only contemplated, he said:

> If the British Christmas Island tests are carried out and one super-bomb, with five megatons equivalent of fission, is exploded, I estimate that it will cause the deaths from cancer and other diseases of 100,000 people now in the world and will increase by 20,000 the number of seriously defective children born in the next generation.
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> These effects of the bomb tests are small, in a relative sense. Hundreds of millions of people in each world generation of a thousand million people die of cancer and similar diseases, and an additional one million deaths would escape detection. In each generation there are born about twenty million seriously defective children, two per cent of all births, and an additional 200,000 is only a small relative increase.
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> But the dictates of humanity, of morality, require that we give consideration to individual human beings. In an absolute sense the effect of the bomb tests in causing the deaths of an estimated one million individual human beings and in causing 200,000 seriously defective children to be born in the next generation and in each of a score of succeeding generations is no small matter, no negligible effect. It is instead, a crime, a crime against the human race. It is immoral, a violation of the principles of humanity. . . . The bomb tests must be stopped.

With such voices raised against "experiment" with super-bombs, the world may soon recover a measure of its sanity and abandon the tests. The next step will be to abandon the bombs, and then, as the only possible security against a revival of these tools of annihilation, war itself.