Science and Human Affairs[1]

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SCIENCE AND HUMAN AFFAIRS was chosen as the title of this talk because of the importance of the subject and not because of any illusion that the title is novel or of any delusion that I could contribute scientific or philosophic profundities to the elucidation of the subject.

The sciences, scientific methods, and scientific attitudes are of paramount importance in a turbid and turbulent world. In tranquil times ineptitude and error may merely delay the attainment of desired ends, but in critical times they may be disastrous. Science is urgently needed for its contributions to technologies, to wisdom, and to ethics.

The material services of science and technology in times of conflict are so obvious as not to require detailed discussion. They are needed in devising the most effective weapons and defenses. They are needed in the production, processing, and preservation of foods, feeds, fibers, oils, and many other plant and animal products. They are needed in preserving the health and efficiency of human beings, domestic animals, and economic plants. They are needed in efficient industrial production.

Science and technology must be mobilized for national service in times of emergency. Their services are needed in solving immediately pressing problems, in developing materials, processes, machines, and instruments to meet urgent needs. But basic researches are needed also.

There should be no moratorium on basic research, even in times of emergency. Research must provide a reservoir of facts and principles on which procedures can be based when the need arises. Too often we wait until confronted with an emergency, then make an appropriation and demand a miracle. Intensity can be substituted for time only to a limited extent, or not at all, in solving many scientific problems. It is just as wise to provide for "scientific stockpiles" as for stockpiles of critical materials; and the neglect of one can prove just as fatal as the neglect of the other. We need to emancipate ourselves from intellectual naïveté with respect to the miraculous omnipotence of science to repair the wreckage of ignorance by ex post facto application of scientific laws. We need perspective; we need wisdom; we need time.

The continuity of science cannot be interrupted with impunity; we pay a heavy price for interrupting basic research. The continuity of scientists cannot be interrupted with impunity; we pay a heavy price for interrupting the development of our most talented young scientists. We need wisdom and perspective in maintaining our scientific strength.

The spirit of science also is needed in a troubled world. We need a rededication to the ideals of truth and justice. We need to remember that science dedicates itself to the discovery, organization, and humanization of truth. We need intellectual integrity, not mere mental cleverness. We need wisdom—knowledge with the capacity to use it; we need clearer perception of objectives and the best means of attaining them; we need perspective in human affairs. We need to apply the rigid standards of scientific truth to the solution of human problems. We need to try to learn, not only how, but also why, people and peoples think, feel, and act as they do. Then we need to put ourselves in their place and contemplate the meaning of the Golden Rule, of a simple code of ethics. We need the scientific method and the scientific attitude in acquiring knowledge regarding human problems; we need to use that knowledge as a basis for wisdom and ethical conduct.

The contributions and the problems of science still are too vaguely and dimly realized. This is evident from the criticisms made by some thoughtful people and by many who are more vocal than thoughtful.

Scientists are charged with accumulating such huge masses of knowledge that they themselves become so bewildered they lack insight and the power of integration, and therefore remain philosophically inarticulate. They are charged with being so preoccupied with the facts of science that they become sociologically irresponsible isolationists. They are charged with concentrating so much on the material that they impede man's spiritual development. These charges deserve examination.

It is true that much effort in science is devoted to amassing knowledge. It also is true that, as science enlarges the area of the known, it is likely to enlarge the area of the unknown even more. The statement is justified but the implied complaint is not. "The more we learn, the less we know" often is true in a relative sense, but it should be changed to read, "The more we learn, the more we realize how much more we want to know or need to know."

The discovery of America established the fact that there were large land areas previously unknown to Europeans. They might have remained content with that fact. But curiosity and desire impelled further exploration, and further exploration revealed a vast field for study in geography, geology, ethnology, zoology, botany.

[1] Based on the address of the retiring president at Cleveland, Ohio, December 28, 1951.

The explorers of America found corn, potatoes, tomatoes, pumpkins, squash, cacao (chocolate), Hevea rubber, Cinchona (quinine), tobacco—a bewildering array of new and useful plants, some of them comprising many types. And Europeans might have remained content to describe these plants, deposit them in herbaria and museums, call them names like *Zea mays, Solanum tuberosum,* and *Lycopersicum esculentum,* then congratulate themselves that they had not been guilty of disturbing the *status quo* of botany too much. But fortunately some people wanted to study these plants further; and scientists still are studying them, to satisfy curiosity and to satisfy human needs. Certainly there now are bewildering numbers of varieties of many of these plants, and new and better varieties continually are being produced to meet special soil and climatic conditions, to develop resistance to disease, to improve yields and quality. Acre yields of rubber have increased almost threefold during the past three decades; acre yields of corn in the United States have increased about 25 per cent during the past two decades. And the end is not in sight! There is always more to learn, but also more to eat and wear and to use in many other ways.

And so it is with many scientific discoveries: The structure of the atom, the potentialities within a single cell of a microorganism, the phenomenon of antibiosis, and scores of other discoveries disclose vast fields for investigation to satisfy curiosity and to satisfy human wants. It may be more comfortable to be incurious, but the penalty for stifling curiosity is stagnation and eventual retrogression.

Philosophers and scientists may both be impatient because it takes so long to integrate the vast amount of knowledge that must be accumulated before valid principles can be formulated. And they may be critical because hypotheses often are mistaken for principles, because the validity of principles often is limited by insufficient knowledge, and because principles often must be modified as new knowledge is acquired. But there has been integration. The record of the past hundred years is amazing when we consider the integration of knowledge regarding organic evolution, the laws of inheritance in plants and animals, the application of the law of biogenesis to microorganisms, the cause and nature of fermentation, the causes and nature of diseases of animals and plants, the principles of soil fertility, the structure of matter as a basis for modern chemistry and physics. Whatever the motivation, whether personal ambition, sheer curiosity, or desire to render social service, the contributions of many investigators and inventors were integrated into guiding principles for better understanding and for more effective utilization, for satisfying curiosity and for satisfying human needs and wants.

Are scientists philosophically inarticulate? This has been a recurring complaint since man began to accumulate, organize, and record knowledge. Scientific activity is one phase of man's evolution toward intellectual enlightenment; it is dynamic, not static. This is both the despair and the hope of science. The time factor is important; modern science is young, and much of the energy of scientists necessarily has been devoted to the solution of practical problems. The discovery and understanding of many phenomena have necessarily waited on man's inventiveness in devising instruments to aid his senses. Advances in microscopy were prerequisite even to seeing microorganisms, the instruments used in atomic research tax the comprehension of most scientists except specialists in the field. It takes time to incorporate the esoteric into the general fund of scientific knowledge. In the past there have been ever-expanding scientific horizons, and what seemed true today has not always been true tomorrow. The validity of generalizations has been limited by available knowledge. Consequently scientists have tried to develop commendable caution. There probably is more scientific history ahead of us than behind us; how much do we know in relation to what evolving man is capable of learning? What is the significance of science in terms of human values? How wisely will man learn to use science and technology? None of us will ever know. How far can and will man evolve intellectually and spiritually? We can hope, and we can hope that we can help, but can we predict?

Scientists as Citizens

Scientists often are charged with being sociologically irresponsible. They are criticized for giving society new knowledge and tools without guaranteeing that society will use them wisely. The charge is true, but the criticism is unfair. Too often society demands service from scientists, then criticizes them for having complied with the demand. "Food will win the war" was one of the principal slogans in World War I. Science and technology went to work to help meet the demand; the record of achievement was good. But a few years later there was "agricultural overproduction," when millions of people in the United States were hungry and the specter of starvation stalked in many areas of the world. The farmer was "a beggar sitting on a bag of gold"—or wheat. Then scientists were condemned for "having shown how to produce more and more without considering how the increased amount could be consumed." Is it necessary to remind ourselves of a similar experience with atomic energy? Scientists now are being asked to help increase agricultural and industrial production and to improve public health in underdeveloped countries. And already their wisdom is questioned because they are "merely helping to aggravate the evils of overpopulation."

Does society expect too much of science? Are scientists to be investigators, inventors, social pastors, and spiritual guides? They are citizens; they are relatively few in number. Do they accept the morals of the society of which they are a part, or do they set their own standards? Presumably most of them do what is required of citizens in times of national emergency. They may try to contribute wisdom, but they

are neither numerous nor noisy enough to determine social decisions. If they are to be blamed for mistakes, they should be given commensurate authority. It would be an interesting experiment.

The charge often is made that science tends to be dehumanizing rather than humanizing, that it substitutes cold reason for the higher faculties, stifles the imagination, suppresses the esthetic and ethical, emphasizes the material and neglects the spiritual, that it hardens and coarsens the spirit instead of softening and refining it. Does the taint of black magic still cling to science as in the days of Pliny, when men were accused of tempting and taunting the gods by piling linen sail upon linen sail until boats virtually flew across the Mediterranean, at speeds that were sure to incur the displeasure of the gods? How often have men been suspect for knowing too much; how often have they paid the penalty for trying to substitute new truths for old errors: Socrates, Friar Bacon, Galileo! The Faust legend of the Middle Ages! Are we still afraid of the truth because it may be disturbing or upsetting?

How can science be dehumanizing when it seeks to discover and humanize truth? And is not cold reason a better guide than instinct, inspiration, and revelation in solving problems of subsistence, health, and industry? Knowledge and skills are prerequisite to the solution of many human problems; we are confronted with realities; all the idealism and beautiful thoughts in the world are pathetically helpless in increasing the productivity of the soil or in preventing devastating outbreaks of disease. Scientists certainly must have the kind of imagination that enables them to formulate hypotheses, and it is a dull scientist indeed whose imagination is not stimulated by contemplating the evolution and development of plants and animals, the vastness of the universe, the almost infinite potentialities of a single cell. Is a mushroom one of the "children of the Gods," a toadstool, a coprophilous basidiomycete, a mycophagist's delight, or an architectural and functional marvel? It can be either or all, but it is the last that can really stimulate the imagination. And the more one studies the mushroom, the more he wonders, and the farther his imagination expands. Scientists may indeed have their fancies; but, as scientists, they must distinguish between facts and fancies; they may have their dreams, but, as scientists, they must realize when they are dreaming; they may have their ideals, but, as scientists, they must distinguish between ideals and objective realities. And it is difficult to understand why search for truth should suppress the esthetic and the ethical. On the contrary, truth often must be the basis for ethical conduct, just as truth must be the basis for justice in a court of law.

The charges against science often are stated in general terms. "We have developed a marvelous material civilization before we were spiritually ready for it, and science is largely to blame." Again, "Civilization is on trial; science is largely to blame; therefore there should be a moratorium on science until man's spirit can catch up with his intellect and guide it properly."

It would be easy to dismiss the charges against science by asserting that science has emancipated man from the tyranny of ignorance, superstition, and consequent fears of many phenomena; it has emancipated him to a great extent from the tyranny of his physical environment; it has emancipated him from the tyranny of his own physical limitations. Science and technology have enabled man to make his living more easily, to live longer and more comfortably, to make tools, machines, and instruments that enable him to accomplish what he could not otherwise accomplish because of muscular and sensory limitations. And scientists might be justified in asserting, *"Non cum dipteris dorsalibus afflicti sumus."*

But, like other groups, scientists should periodically practice introspection. They should evaluate their contributions, acknowledge their shortcomings, and improve as much as possible. Has science contributed more to the comforts of civilization than to civilization as a whole; have scientists contributed more to science than to society? Is it true that civilization is on trial, is science at least partly to blame, should there be a partial or complete moratorium on science until ethics overtakes intelligence?

Is civilization on trial? Of course it is. It always has been and probably always will be, until mankind reaches Utopia and adapts himself to it. Civilization is not a guided missile powered by wishful thinking, controlled by pious platitudes, and predestined to carry mankind with it to the acropolis of Elysium, there to flower and flourish eternally, free from all tribulations and temptations, and immune from all assaults by the forces of ignorance and evil. Civilization is a stage in the evolution of mankind toward intellectual enlightenment and spiritual refinement. As measured at any given time and place, it is a stage in the evolution of groups of men. It comprises multiple phases and is affected by multiple factors and forces. It is guided by human intelligence, human emotions, and human will. Its goals and guideposts are set by men, and vary in time and place. Its limits are set by man's capacity to evolve intellectually and spiritually; by man's determination and ability to understand and master his environment, and by his ability and determination to master himself; by man's ability and determination to develop and utilize science and ethics; by man's concepts and his philosophy. As long as man continues to evolve there can be no statute of limitations on the trials of civilization.

The trials of civilization are due partly to man's myopia. Too often we see neither the past nor the future clearly. Consequently, we think that civilization is retrogressing because we see the past only dimly. We lack historical objectivity and perspective and, therefore, fail to profit by the lessons of the past. We lack wisdom with respect to the future. Too often we fail to reckon the consequences of acts. The realization of new ambitions is all too often incompatible with the preservation of cherished values. The conse-

quences of acts often are inexorable, and we must bear the consequences. Then we blame civilization, as if it were the culprit, because we have lost what we have thrown away in the attainment of our ambitions. This is a recurring complaint in history. Periodically, thinkers have realized also that there was not parallel development in intelligence and in ethics. The statement of John Fiske that "There has been more progress in intelligence than in kindness" may be true even today. But is it not equally true that there has been too little development in wisdom, as well as in kindness? Civilization is again in a critical period of trial. Is science to blame?

A Moratorium on Science?

Whatever its shortcomings, science alone is not to blame for the trials of civilization. We are neither wise enough nor good enough to live the way we would like to live. All the factors and forces of civilization have not enabled us to reach the goal. Perhaps "There has been more progress in intelligence than in kindness." But would ignorance make us kinder; and would kindness make us wiser? Would it be wise to become more ignorant in the hope of thereby becoming kinder and wiser? Should there be a moratorium on science until the spirit can overtake the intellect?

Before thoughtlessly or flippantly advocating even a partial moratorium on science, we should at least muster enough wisdom to reckon the consequences.

What have been the consequences of moratoria on science? The inhuman results of the classic blackout of science during the Dark Ages are known to every casual student of history. Overconcentration on what were conceived to be spiritual values and almost complete neglect of a naturalistic and rational attitude toward problems of living led to such stagnation and retrogression in science and technology that filth and squalor and disease were considered inevitable. The terrible epidemics of the black death decimated populations and filled life with horror and dread. And the remedy was to burn to death the nonconformists. Surely ignorance did not increase kindness; it aggravated man's inhumanity to man.

But it is not necessary to go so far afield either in time or space to see the consequences of lack of science. There are countries now, in the Western Hemisphere, where agricultural production has been so low that acre yields of corn were 39th of the 45 countries for which data were available; where the yield of wheat was 59th in a list of 62 countries; where meat consumption was 40 pounds per capita, as contrasted with 150 in the United States; and where sugar consumption was 35 pounds as contrasted with 100 in the United States. Respiratory diseases were 8 times as prevalent, enteric diseases 15 times as prevalent, and malaria 45 times as prevalent as in the United States; and the death rate was higher than our birth rate. Science and technology already have begun to alleviate these conditions. Does the solution of such problems merely aggravate the population problem? Do we recognize the reality and the tragedy of hunger and disease, of physical and mental suffering and despair? Is it dehumanizing to alleviate human suffering; are the scientists who help in the alleviation sociologic isolationists, whether they contribute directly or indirectly? Virtue, instinct, inspiration, the so-called higher faculties, cannot solve such human problems. Knowledge, skills and materials, cold reason, are needed. To solve such problems more science and technology, not less, are needed, even though more than science may be needed.

The need of science is greater than ever, because the world is figuratively smaller and actually much more crowded than ever before. Human problems, therefore, are more complex, and more intelligence and ethics are required to solve them.

Science obviously must contribute to improved technologies in an industrial world—better synthetic rubber, better synthetic fibers, more efficient engines. More science is needed in the field of human health. Cancer, arthritis, brucellosis, poliomyelitis, virulent types of influenza, the common cold, still are defiant to medical art. Perhaps something could be done about premature senility and persistent puerility, also. Science is needed in solving problems of human subsistence: when two thirds of the world is poorly fed and part of the remainder is overfed, we need to put science and ethics to work. When we profess the brotherhood of man and cannot act the part and do not know why, we should at least make the attempt to put science to work in studying human relations.

The importance of science and of scientific attitudes in international affairs, as well as in national affairs, is recognized by the United Nations. Whatever its fate as a governmental organization, it is encouraging that such an organization recognizes problems of health, subsistence, and social organization as international problems. Science and technology must contribute to the welfare of peoples, not merely to that of some nations. The mutual contributions of science can help toward international understanding; the recognition of mutual problems can lead to international cooperation; and the mutual benefits derived can help promote international prosperity and peace. The establishment of the World Health Organization, the Food and Agriculture Organization, and the Educational, Scientific, and Cultural Organization of the United Nations is evidence of good intent. But what can really be done? The total annual contribution to Unesco from more than 50 nations is scarcely enough to maintain a regiment of infantry in a modern army! What can be done to improve education, cultural standards, and scientific competence with this pitifully small sum? What impact can these organizations have even if they recognize the problems, analyze them objectively, recognize the inexorability of facts and the stubbornness of situations, and emphasize that permanent solutions of complex human problems are neither quick nor easy? Analysis of the problems and indication of the knowledge and skills required to solve them

are only the first steps. The will to use the knowledge and skills, the implementation, must still be the responsibility of governments. There is need for competence, determination, persistence, faith, tolerance, charity. Can scientists and humanists furnish them, or do they need help? Point Four? What are the problems? Two of the most important are those of human subsistence and of human relations.

The problem of human subsistence is old but important. Ever since Adam and Eve were expelled from the Garden of Eden for being poor pomologists, man has been eating his bread "in the sweat of his face," or, as Virgil expressed it in his Georgics, somewhat more elegantly but less pungently,

> The Sire of gods and men, with stern decrees
> Forbids our plenty to be earned with ease
> But wills that mortal men, inured to toil,
> Should cultivate with pain the grudging soil.

Not only is the problem of subsistence old, but it often has been a determining factor in war or peace. Ever since Malthus formulated his doctrine that population tended to increase faster than food supply, there have been periodic fears that population actually would exceed food supply. It frequently is pointed out that the future of civilization, indeed of man himself, will depend on the amount of energy he can get for food and fuel. Nearly all the energy man now uses is solar energy, some replaceable, some not. The irreplaceable stored energy is in coal, oil, and natural gas. The replaceable energy is made available by plants, but this is less than 30 per cent of the total being used. Plants are basic to human subsistence; and agriculture is the most basic of all industries in a real sense. Soil and water, then, are the most essential basic resources, and the number of people that can live in the world will depend on the intelligence and skill with which man uses them.

Is the world approaching population saturation? Opinions differ. There are roughly 36 billion acres of land, of which 10 billion or less may be suited to some kind of agriculture or forestry. Most of the best lands are, however, already in use; and much that could be cultivated would have to be irrigated, cleared of forests, drained, or fertilized heavily. The population of the world is about 2.25 billion and is increasing at the rate of about 20 million a year. It takes about 2 or 2.5 acres to subsist one individual, depending on the standard of living and efficiency of production. With the amount of good land definitely limited, the population cannot increase indefinitely, as about 500 million acres of additional land are now needed every decade. But how much can productivity of land and water be increased? Will it always require as much as 2 acres to subsist one individual?

How much could an acre of land produce if all the knowledge and skills now available were applied? And how much more can an acre produce 25 years from now if science is put to work on the problem? How much can soil productivity be increased? What is the maximum combination of genes for yield in the principal crop plants? What is the maximum combination of genes for efficiency and total production in domestic animals? What is the maximum combination of genes that nature may combine in pathogens of crop plants and domestic animals? It would be wise to organize and support skyscraper projects to investigate the potentially maximum agricultural productivity. Where is the wisdom; where are the funds?

Since we are so dependent on solar energy, will we always be dependent on plants to utilize it for us? Is artificial photosynthesis possible? Can atomic energy be substituted for some of the stored solar energy that is now being used so inefficiently? Is there a way of using a higher percentage of the energy? Can science emancipate us from present dependence on so few sources of energy?

Whatever the future fate of man in his struggle for subsistence, there are acute and perplexing problems of the present. Land is badly distributed. None of the countries of western Europe has enough land to subsist its population. The amount per capita ranges from about 0.5 in Belgium, about 1 in Italy and prewar Germany, to 1.5 in France. The situation in Asia is even worse. Java has only about 0.5, China about 0.75, Japan only 0.25. The United States has about 3 times as much agricultural land as Germany and Italy, 4 times as much as China, almost 7 times as much as Java, and about 13 times as much as Japan.

What alternatives have countries with too little land? They can reduce their standard of living, increase agricultural efficiency, industrialize and trade, reduce population, live on charity, starve, or swarm and kill or be killed. Some countries still can choose one of the first three alternatives; some, like Japan, are restricted to the last three. It does not solve the problem of overpopulation to say that it never should have come into existence. It does exist, and it must be faced. The problem is basically biological, although its basic nature often is obscured. There is a tendency for biological entities to swarm when they press too heavily on means of subsistence. This is true of potato bugs and grasshoppers, of wolves and human beings. The struggle for existence is not restricted to lower organisms; nor are the uglier aspects of the survival of the strongest restricted to them.

What can science contribute to the solution of problems arising from maldistribution of people and resources? It can insist on objective analysis of the problem; it can help solve the biologic and technologic problems involved, within the limits imposed by nationalism. But it cannot, under present conditions, solve the political problems involved. For nationalism often is epistatic to science, to ethics, and even to religion. Science has solved many problems of man in relation to his physical environment, but it has not succeeded in emancipating man from his baser self, from man's cruelty to man. Can science contribute to better human relations?

Can there be a science of human relations? Is man really capable of understanding and mastering him-

self? Can he be objective regarding himself and the group of which he is a part? And does he want to; do men still thrive on their prejudices? Can the social sciences discover, organize, and apply facts and principles in social affairs? There are obstacles, because the emotions play a far greater role than in the natural sciences. As Bacon wrote, "Numberless in short are the ways, and sometimes imperceptible, in which the affections color and infect the understanding." In social affairs man encounters his presuppositions, preconceptions, prejudices, selfishness, greed, group consciousness, and narrow nationalism. The social scientist has a difficult time: is he to be investigator, advocate, and guide? What penalties does he pay for unorthodoxy? What influence can he exert on courses of action?

The Ultimate Goal

Can insistence on a scientific attitude gradually help substitute facts for fancies; principles for prejudices; education for propaganda; intellectual integrity for mental cleverness; statesmanship for partisan politics; broad humanitarianism for tribalism; the Golden Rule for the law of the jungle? Can science help human beings act the part? Can it contribute both to wisdom and to ethical conduct? This should be the ultimate goal of science.

What does science need if it is to render its maximum service in human affairs; what are the motives: personal ambition, curiosity, social service? Was Mencken right when he wrote, "The prototype of the scientist is not the Good Samaritan but a dog sniffing tremendously at an infinite series of ratholes"? Was Huxley right when he said, "Nothing great in science has ever been done by men, whatever their powers, in whom the divine afflatus of the truth-seeker was wanting"?

Science does or should dedicate itself to the discovery and humanization of truth. There naturally is and must be a division of labor: Discovery, dissemination, application. But there must be coordination also.

Science cannot contribute its full share to progress unless there is increased understanding by society of the complexity of many problems and what it takes to solve them. Nor can it function best unless there is cross-fertilization between pure science and applied science and technology. Some investigators must concentrate on the solution of problems, but many must be free of the restrictions of "assigned research." And there must be freedom from bureaucracy, national authoritarianism, and myopia. Scientists should not claim special privileges for themselves but for science, in order that it may contribute most effectively to social welfare.

Science justly claims certain privileges in order that it may function efficiently. But it has obligations also. Science must continue to satisfy human wants, to contribute to the comforts of civilization. But it can and should contribute to intellectual enlightenment and spiritual refinement, to wisdom, and to ethics. The facts of science, the skills and techniques of science are important, but in education, in human affairs, is the spirit of science not equally important? Science is a humanizing agency but not the only one. Science must not become authoritarian and intolerant. There should be a moratorium, not on science, but on the mutual disrespect that certain groups of scientists still have for each other. Each group contributes in its own way. And, above all, there should be a moratorium on the misunderstandings and conflicts between humanists and scientists. The factors and forces affecting the evolution of man are varied and they vary with individual men and individual groups. *"Es irrt der Mensch so lang er strebt"* is as true now as when Goethe wrote it. But combined effort may reduce the number of mistakes.

A moratorium is needed, but it is a moratorium on the conflict between science and the humanities. For science, religion, music, art, history, literature, have values in the degree to which they make men happier, wiser, and better. The value of each varies with individual men. All are valuable insofar as they illuminate the intellect, refine the spirit, and stimulate useful and ethical conduct. To promote truth, wisdom, and justice is not the prerogative of any one guild. The factors and forces in the evolution of the human intellect and spirit are varied and complex; and it is unscientific and unethical to deny to each its fair share of credit for its contributions.

Humanity needs both the sciences and the humanities; both are humanizing to the extent to which they humanize. There is need for more understanding and tolerance between scientists and humanists; properly motivated, all are humanists and their joint contributions can accelerate man's evolution toward intellectual enlightenment and spiritual refinement.