Does the Greater Understanding of Man and Nature Increase the Scientist's Social Responsibility?[1]

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THE UNDERSTANDING OF MAN and of nature achieved by science is very recent. During the hundreds of thousands of years of man's past his social behavior was largely determined by direct experience, ignorance, and traditions based partly on ignorance. We have now some indications that the voluntary behavior of all sane citizens can be directed toward the best interest of mankind through the understanding and acceptance of the nature of man and the universe, as revealed by modern science. The special social responsibility of scientists is to promote this understanding on the part of all people in all nations. We must promote:

Education through understanding versus education by dictation.[2] We must have continuous adult education in all lands. Factual, that is, scientific education on the nature of man seems necessary for the best future of man. Such education includes the scientific evidence of *the unity of the human race.* Despite so-called racial differences in such minor details as skin color, language, and religions, science has proved that *the people now living on our earth are one species.* This fact, understood and accepted by all sane citizens, should gradually eliminate racial prejudice, fear and hate. It should promote cooperation in place of violence. Basic to the achievement of freedom from fear, want, and violence is the freedom to know.[3]

If the goal of education today and tomorrow is the *understanding of man and nature and action on the basis of such understanding,* it is obvious at least to me that the traditional "3 R's" and the "hundred great books" will not meet our educational needs, nor are these needs met adequately by *science alone.* But the understanding of man obviously involves man's environment and man's past, that is, history, sociology, economics, politics, literature, and even religion. The "grass roots" as well as the "clouds" are parts of man's environments, past and present. It also means that our education is not completed at the end of the sophomore year in college or even at the end of the senior year. There must be *continued adult education* other than that provided by the modern soap operas, by propaganda, by amusement, and by artistic lying. As to so-called education or technical training, it is perfectly clear to me that we can learn by working with our hands just as well as we can by using our eyes and our ears, listening to lectures, and reading books.

I have been an investigator and a teacher of science, that is, I have tried to teach for fifty years. I think that we teachers underestimate the mental capacity of our average youths and fellow citizens. They can learn, they can understand, they can even reason, if we the teachers can really teach by word, by demonstration, by example. But we must rekindle the suppressed *natural curiosity* in our student, a curiosity largely supported by education through dictation, in the home, in the church, in the public schools, and sometimes even in our colleges and universities. Education by dictation depends on memory, faith, and tradition rather than on understanding of man and nature. The student, the teacher in every field of education should ask for the *evidence,* should examine the evidence. We cannot defeat ideas with guns or bombs or mere say so. Bad ideas can be defeated with better ideas based on better *evidence.* That is, we should apply the scientific method to our education at all levels; the scientific integrity, the scientific courage to face all the proven facts, but keep our mouths shut and our pens dry till we know the facts.

One of the difficulties in our path toward our educational goal of *the understanding of man and nature and behavior based on that understanding,* one of the obstacles, is the evident fact that the human forebrain, in which man surpasses all other species of animals, has not yet acquired complete control of the part of the brain which man has in common with the snake, the hyena, the tiger, and the goat. The second difficulty in our drive toward a better educational goal for all men in all lands is *our reluctance to think and plan for the days to come as well as for today and tomorrow.* I do not know how you stand on this issue, but to me it seems clear that we should think and act for days ahead as long as the days of our past, that is,

[1] Presented at the meeting of American Association for the Advancement of Science, Hotel Jefferson, St. Louis, Mo., December 30, 1952, as part of a symposium arranged by the Society for Social Responsibility in Science.

[2] Our British colleague A. V. Hill, said recently: "The popularizing of genuine science is an important public service; we should all be ready to take our part in it according to our powers."

[3] "As things now stand (science teaching in high schools and colleges) the student-citizen has a good chance of learning certain biological and physical 'facts of life' about the world in which he lives. But his chances of understanding the impact these sciences have on our society, and what he as an individual can do to control and/or modify the effects of that impact, are too often practically nil" (*1*).

at least a million years. It is no credit to us, it is in fact a serious reflection both on our intelligence and our integrity, to render our soil, our other resources, our social and political environment less favorable to our descendants than as inherited by our generation. It seems evident to me that a democracy cannot survive and flourish unless all citizens secure adequate understanding of man and nature through education, better factual education at all levels and throughout life; and even then we have yet to demonstrate that we are fit to survive. War in the future will come close to racial suicide.

Cooperation versus violence and war.[4] Human history, science, and reason appear to prove that it is injurious, and hence stupid, for the individual to rob, injure, or kill his fellow men. Does such behavior become beneficial to the individual and to the human race when carried out by a nation? The evidence today says *no,* for everybody appears to lose by violence and war. According to the German General Von Benhardi (*Germany and the Next War,* 1911) "War is a biological necessity. War is a Universal Law of Nature." The British anthropologist, Sir Arthur Keith says (*The Place of Prejudice in Modern Civilization,* 1931): "Race prejudice, I believe, works for the ultimate good of Mankind and must be given a recognized place in all our efforts to obtain natural justice for the world. Without competition Mankind can never progress; the price of progress is competition. Nay, race-prejudice and, what is the same thing, national antagonism, have to be purchased, not with gold, but with life. Nature throughout the past has demanded that a people who seeks independence as well as peace can obtain these privileges only in one way—by being prepared to sacrifice their blood to secure them. Nature keeps her orchard healthy by pruning; war is her pruning-hook. We cannot dispense with her services." But M. F. A. Montagu (The Nature of War and the Myth of Nature. SCIENTIFIC MONTHLY, 1942, LIV, p. 342) speaks more wisely: "The tradition of thought which renders possible such glib talk of war and its supposed natural causes represents the bequest to us from the remote past of obsolete modes of thought which are conspicuous for their profound irrationality. So powerful is this traditional detritus that it has not failed to influence many of the most respected minds of our day, to the extent of making mathe-magicians of our mathematicians, casuists of our philosophers, and an apologist for war of the gentlest and among the wisest of our anthropologists. This tradition constitutes a Gordian knot that is so tied that to escape its bondage one must sever the knot completely—since it resists being untied. If man is to be saved from himself before it is too late this tyranny must be broken, and this can only be achieved by the unequivocal action that must follow upon the reasoned dissolution of such errors of belief and thought as form so great a part of our traditional social heritage today."

Conservation instead of waste of our natural resources. Our future depends on our food.[5] Through better control of infectious diseases, more efficient repair of accidental injuries, and better knowledge of food requirements for health, modern medicine, where applied, has provided a longer and healthier life span for man. In fact, where modern preventive and curative medicine is applied and adequate food is available the human life span has more than doubled in the last 100 years. The marked decrease in infant mortality is a significant factor in the prolongation of our average life span. This influence of modern medicine can also render human life more difficult by increasing the world population beyond available food resources, thus contributing to starvation, misery, violence, and war, which are some of the consequences of starvation in all animal species.

In all species of vertebrates in the past three main factors determined the population of a species: *food supply, disease, violence, or war.* These three factors controlled also the human population practically until yesterday. By effectively diminishing disease modern medicine has significantly added to human happiness. But modern medicine also contributes to this serious world problem: *the increase of the population faster than the food production required for adequate nutrition.* What is the answer to this serious situation? Shall it be less of modern biology and medicine? more starvation? more violence and war? or more intelligence? We can, no doubt, for a while at least, get a little more food from the soil and the sea. But there is fairly good evidence that we must practically double the present world food production even to feed adequately the present world population. So far as can be judged, this cannot be done. *I think that we, in biology and medicine, must acquaint our fellow citizens with this serious world problem and aid them in working out a wise solution.*

The survival of the most fit in our age of science. Modern biology and medicine have not yet created sufficient factual understanding of the hereditary factors of importance in human physical and mental impairment at every age, so that intelligence rather than violence and ignorance may be applied to decrease the population increase by the significantly less fit of our species. But we know enough of some of these factors to try to establish more humane behavior than that prevailing under the biologic ignorance of the past. Life is difficult enough for people with normal physical and mental capacities. For people with less, life is largely a tragedy. And when these defects are hereditary the impaired individual is not responsible. Again *we in biology and medicine must guide our fellow citizens on this issue.*

[4] "We may be a fixed biological species unable to change our ways, but one of the achievements of our species is that we have learned to talk things over and exchange views with one another" (*2*).

[5] "If they (representatives of religions) now claim that the facts and trends of overpopulation are not what we say, we can argue about that as a scientific question: but if they insist that its consequences should be left to God, they must allow us as citizens to take the opposite view" (*3*).

It seems obvious that as a citizen the scientist's social responsibility is at least as great as his understanding of man and nature. What he can contribute to a saner and happier life for man is not little, but unless we tackle this difficult task at once, it may be too late, considering current hysteria, artistic lying, fear, hate, and preparations for more destructive wars. Our age is not yet an age of science, even in our intellectually and scientifically most advanced nations. Largely through ignorance, and traditions based on ignorance as to the nature of man, we are still nourishing the malignant cancers of race prejudice, hate, fear and war. To do justice to our superior forebrain we should go forward with our eyes open. *We should replace violence with intelligence.* That would mean a healthier, happier future for our race. We would then be a credit to our name: *Homo Sapiens*, "Wise Men." So let us step down from our proverbial ivory tower and carry on!

When the shadows beckon men of my years, we still have our children, we still have our dreams. I dream of a day when our leaders will actually put the principles of science and democracy to work in our land, in politics, in industry, in trade, in education; when understanding will more than hold its own against superstition, guile, and greed, when force and violence is replaced by conference, compromise, and approximate justice in all our domestic and foreign relations. When that day is at hand in our own land, our example will be a greater impetus to the path of peace and justice in other lands, than are our present speeches, and our lend and lease of the implements of war to all democracies, and would-be democracies of the world. It is a matter of forgetting the hypothetical universe created out of ignorance and motivated by our undisciplined emotions, and a reconditioning to the actual universe as gradually understood through *controlled experience and experiment.* I think we can say, even in the face of current fears and pessimism, that during the ups and downs of the past million years man has gradually acquired more understanding, more freedom from fear, more dignity, greater kindness, and a clearer conception of justice. Even though for the moment "the bird of sorrow" is not only flying over our heads, but is actually nesting in our hair—to borrow a Chinese proverb—that bird will not nest in our hair forever, unless a blackout on science be decreed in every land. For, slowly but surely, the understanding of man provided by science will help to make our life more intelligent, toil more cheerful, fear and hatred, pain and tears less prevalent in our life.

References

1. McGrath, E. J. *Sci. Monthly*, **71**, 119 (1950).
2. Adrian, E. D. *Roy. Soc. London, News Rept.*, **2**, No. 4 (1952).
3. Hill, A. V. *Bull. Atomic Scientists*, **8**, 265 (1952).

Edwin Grant Conklin: 1863—1952

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WITH THE DEATH of Edwin Grant Conklin just before his eighty-ninth birthday, on November 21, 1952, there passed away one of the great interpreters of biology in the United States. Professor Conklin was born on November 24, 1863. He was a great admirer of Lincoln and proud of the fact that the year of his birth was the year the Emancipation Proclamation became effective, and proud that he had traveled in a covered wagon from one part of Ohio to another, attended a country school of one room and one teacher, and worked on a farm. Later he became the teacher in a similar country school, where he was janitor and disciplinarian as well as instructor, at a salary of $35 a month.

One of Professor Conklin's most valuable attributes was a prodigious memory of detail, perhaps fostered by his thesis study of cell lineage. Even during the later years of his life, the date of almost any event was recalled with precision, and those of us who knew him well were entertained by many an amusing anecdote of early life in the Middle West and of his later educational period.

After graduating from high school at Delaware, Ohio, he attended Ohio Wesleyan, obtaining a B.S. degree in 1885 and a B.A. in 1886. There he first became interested in science. This interest was fostered by trips for collecting shells and fossils under the guidance of his professor of biology and geology, Edward T. Nelson. Professor Nelson turned him toward biology, and the experience of the next three years as a teacher of Latin, Greek, and science at Rust University, a missionary college in Mississippi, matured the decision to make biology his lifework.

He entered the Johns Hopkins University Graduate School in 1888 and started work with Professor William K. Brooks. His first problem was the identification and morphology of a siphonophore collected by Alexander Agassiz in the Pacific. For continuation of these studies, he was sent to the U. S. Fish Commission Laboratory at Woods Hole, Mass. Perhaps it is fortunate that no siphonophores were obtainable there.