Avenues of Service

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ONE OF THE PRIMARY PURPOSES of the American Institute of Chemists is to enhance the prestige of the profession and to extend its influence and usefulness. In this it has eminently justified its existence. An outstanding service has also been rendered by the Chicago Section of the American Chemical Society to individual chemists and to the community. It is patent that these two organizations, at least, are keenly aware of their responsibilities. In addition to direct benefits to their members, there is a tacit acceptance of duty beyond the purely professional.

That is as it should be. For example, we are all aware of one item—that chemists and all others who have been privileged to get a professional or academic education were subsidized by their alma maters, whether state-supported or privately endowed, to the extent of the greater part of the cost of their training, despite the current high tuition fees. Some are content to accept this gift and let it go at that; others feel that they must do something in return, over and above good performance in the occupation for which their training fitted them. Salaries in most of the technical professions being what they are, only the exceptional few can repay in kind, that is, contribute financially to the support of their favorite institutions. All, however, can show appreciation by some sort of public or community service.

One can travel along many avenues. Regardless of the ones that are chosen, this type of work is its own reward. One gives and receives at the same time. Orchids may be few, but there is real compensation in the personal satisfaction that comes from engaging in this type of activity. Most of the former Honor Scroll recipients have been outstanding in this respect in addition to their technical achievements.

The first and most easily accessible path is the professional society to which one belongs. Here numerous jobs and committees are perennially open to all who choose to enter. The obligation is primarily to the profession—to do some of the things that will keep the society functioning, that will strengthen it and broaden its usefulness, but that will also make it a constructive force in the community. Our professional societies are in existence because they have been kept alive and useful by the work of others who preceded us. We can do no less for those who will follow. We are merely temporary custodians, links in the chain of continuity.

[1] The Chicago Chapter of the American Institute of Chemists awarded its 1952 Honor Scroll to Mr. Schaar in recognition of his services to the chemical profession and to the community at large. This paper is based on Mr. Schaar's address at the testimonial Award Dinner on Oct. 10, 1952.

Occasionally the long-range results and the satisfaction far outweigh the immediate substantiality of the service, as those know who serve on employment committees, particularly when no jobs are available. I know several chemists, now in important positions, who would have left the profession had it not been for the friendly counseling of some member of an employment committee, even though at that time, no help could be given to place them.

Some societies have well-organized public relations committees, with registers of talks that can be given by their members. The radio is used increasingly to publicize topics related to science. The A.C.S. News Service is preeminent in publicizing chemists and chemistry. Walter Murphy has had a number of excellent editorials on public relations in *Chemical and Engineering News*. Then there are the papers presented at the last A.I.C. annual meeting on "Public Relations for the Chemist," some of which were published in *The Chemist*. The Engineering Joint Council, a cooperative venture of the five principal engineering societies, has public relations as one of its most important activities. It is currently planning to take in twelve more societies. THE SCIENTIFIC MONTHLY of the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE sponsors a series of radio broadcasts of scientific material and invites participation by universities and individuals. Science News Service and popular science magazines also are factors in public relations.

The most extensive program to publicize science that I know was the series of broadcasts during intermissions of the Sunday Concerts of the New York Philharmonic Symphony, sponsored by the United States Rubber Company. Starting in 1943, there were about eighty talks by top-notch scientists, including many Nobel Prize winners. Subjects ranged from the structure of atoms to the exploration of space, and there were also a few talks by social scientists. The whole series is available in book form under the title *The Scientists Speak*.

Much more is being done along this line, but enough has been mentioned to indicate the inexhaustible opportunities for service. Public relations work of this nature unquestionably is of great value in informing the public about the accomplishments of scientists and engineers. It will increase their prestige, and therefore, their usefulness. In the main the substance of radio talks, public lectures, or popular science articles is factual and pertains to a single topic on which the speaker or writer is expert. Although informative, they usually are not designed to coordinate the particular subject with a more basic consideration of sci-

entific method or of the impact of science on society.

Another type of publicity for science, dinning the ears of listeners daily, is a disservice to science and scientists. The "science proves" theme and pseudo-scientific statements conjured up by inspired ad writers to sell everything imaginable tend to give people a totally false impression of scientists and their work. It is unconstructive exploitation of the word "science." If chemists could be instrumental in putting this type of advertising on a higher plane, I am sure the profession of chemistry would reap some benefit, to say nothing about relief to a long-suffering public.

The technical society councils that have been organized in all parts of the country offer many opportunities for public relations work. The potentiality for serving their communities and their constituent societies is great. Performance has lagged in some areas, principally because funds for most effective operation have not been available. Councils are designed so that the societies can cooperate in pursuing objectives beyond the scope or means of the individual societies. The combined memberships of the societies is a much greater force for community activity than any one society can command. Councils can become the overall agencies in spanning the gap between the technical programs of the societies and their relation to the community. As a medium for informing the public on technical matters and in creating opportunities for greater participation of technical men in public affairs, they offer a broad avenue for service.

Outside his professional organizations, in the community at large, precisely the same opportunities for public service exist for the scientist and engineer as for any other citizen. Every "cause" under the sun has one or more organizations to further its aims. It is not difficult to be active in these, to serve on their boards or committees. The respect paid the scientist for creditable service in this area in a measure is extended by his associates to his whole profession, and elevates its status.

There is increasing awareness that the changes in our mode of life and in our international relations, resulting from scientific discoveries and their practical applications, demand a greater measure of participation in public affairs than scientists and engineers formerly considered to be within their province. The lack of authentic information on scientific and technological developments and their social concomitants that mold our life and continually change it makes it imperative that people be better informed. Information is necessary not only that their judgments may be more soundly grounded, but also that the continued support of fundamental research by the public, through taxation and private endowments—without which our technological advances will wither—may be assured. Without such information, it is understandable why scientists find it necessary to be on the defensive with respect to their place in the civilized world.

World War I found our chemists feverishly developing poison gases and block busters, and our engineers, bombing planes. World War II saw the development of bacterial warfare and the birth of the atomic bomb. Hydrogen bombs and other weapons of destruction too horrible to contemplate are on the way. True, the Germans in World War I, after their first attempts, were deterred from using poison gases by the threat of retaliation in kind. Bacteria have never been broadcast and only two atomic bombs were dropped as weapons. But these things are associated in the minds of people with scientists and engineers and have engendered a sense of fear for what may be in the offing and a mistrust of the professions that produce such things.

Regardless of how much we point with pride to the good things that flow, without end, from scientific and technological developments, the fear and mistrust, and the deliberate antagonism and opposition to verified scientific findings, remain. Evidences of this are to be found in such things as the opposition to the use of chemicals in foods revealed in the hearings of a Congressional Committee; the propaganda against the use of fertilizers by certain groups of plant cultists; the opposition to fluoridation of water; the restrictions on the free publication of scientific research which in some cases go far beyond security requirements; the irresponsible character assassinations; the loyalty oaths and guilt by association verdicts; the refusal of passports and visas to certain scientists;[2] the horoscopes in daily newspapers; the many monthly magazines on astrology; the misplaced love and tenderness of those who oppose animal experimentation; the opposition to flood control; the deliberate falsification of the aims of those who want adequate medical care for everybody; antisemitism, Jim Crow laws, discrimination in employment opportunities and other denials of civil liberties—to mention only a few things. I know this sounds like a Jeremiad, but, if you will bear with me, I think you will find that I am not a dispenser of gloom.

There is nothing particularly new about this, except the nature of the things that are singled out for attack or claim the support of the misinformed. You will permit me to refer to an editorial of mine in the *Chemical Bulletin* in 1925, "The Significance of Dayton," which was written during the Scopes trial in Dayton, Tennessee: "Anti-evolution laws are but one phase of a narrow, illiberal, reactionary spirit pervading the country, which has already evidenced itself in the Eighteenth Amendment, the Ku Klux Klan, the censorship of literature and other movements of similar character. This spirit is perhaps the expression of a well-organized minority rather than the carefully thought out will of the country as a whole. The only solution is a wider distribution of knowledge."

It is extremely encouraging to note that the bitter controversy between science and religion over the theory of evolution has largely abated; the Eighteenth

[2] Our visa and passport policy is of such importance that the *Bulletin of the Atomic Scientists* devoted the entire October 1952 issue to it.

Amendment has been nullified; the Ku Klux Klan, except for occasional flare-ups, is not the sinister menace it once was. True, other movements, organizations, and restrictive laws have succeeded them. Many hold a far greater threat to our liberties. But we can take heart in the thought that since these once powerful forces have been curbed, it should be possible to counteract, and eventually replace with more constructive movements, the current unscientific or anti-scientific, and in some cases, undemocratic and un-American trends that are rampant today.

For the most part these things have had consideration by scientists in one field or another. Most of them are rooted in ignorance, misinformation, or prejudice. Some are in the realm of politics; others in the attitudes, opinions, and practices of individuals in their daily lives. Some are deliberately fostered by amoral persons with their own axes to grind, regardless of the resulting harm; others, by well-intentioned people motivated by irrational fears.

These seemingly unrelated items are evidences of the failure of our educational system to prepare people so that they will not become the ready followers of equally misinformed or misguided people. It is also evidence of the failure of scientists to put their case across so that non-scientists can have some insight into what they have discovered, what they are doing now, and how they do it, and what the ultimate goals are.

It is obvious that the groundwork for more rational thinking must be laid long before the individual reaches adulthood. For most people the die of intelligent citizenship is cast in the public school, and all are adversely affected by the shortcomings of our educational system.

As Hutchins and others indicate, an important factor is to be found in the emphasis placed on the acquisition of factual or practical knowledge throughout our primary and secondary educational system. It even extends into the college and university. In some cases it results in the almost total exclusion of cultural instruction, including the sciences, physical as well as social. Greater familiarity with such subjects unquestionably would prepare adults for clearer thinking. This condition is closely linked with the great shortage of teachers, particularly those with adequate training in the sciences. In turn, this shortage reflects the current unattractiveness of the teaching profession as compared with opportunities in industry. Consideration of means to turn the tide is well within the province of all technically trained persons.

The present lapse is anachronistic. At a time when scientific findings and technological developments are high and constantly rising; when they have made a standard of living in this country undreamed of a half century ago and give promise of a better order everywhere, we find in many quarters, in and out of government, acts and movements which will hinder or even prevent further advance. It is more in keeping with the restrictions and taboos of centuries past that throttled thinkers like Roger Bacon and nearly succeeded with Galileo; or with the verdict, during the French Revolution, that France had no need for men of science that resulted in the guillotining of Lavoisier, the father of modern chemistry. The tendency is in the direction of stifling independent ideas, of forcing uniformity of thought, of stamping out opposition. Unrestrained, it could lead to authoritarian dicta with respect to scientific investigation such as we are witnessing in Russia at this time. A free and informed public there would not countenance such dogmatism.

It would be well to keep in mind that progress in any endeavor does not proceed along a straight line, rising smoothly upward until the goal is reached. There are ups and downs, peaks and troughs, with each succeeding peak usually a little higher than the preceding. At present we seem to be in the trough of one of those recurring cycles of intellectual retrogression that have periodically afflicted the world. Depressing as it is, this trough does not seem to be as deep as the last one with its Klans, its Palmer raids, or its Hitlers. And there is every reason to believe, that, when we pull out of it, the peak of the upswing will exceed the previous one.

In the 1951 Arthur Dehon Little Memorial Lecture at the Massachusetts Institute of Technology on "Science and Democracy," Sir Henry Tizard had this to say: "The trouble is that people who hate are much more articulate than people who love, and so make more noise in the world; and unfortunately, they are often infected in the highest degree with the desire to dominate their fellowmen. If the democratic countries combine firmness and strength with patience and tolerance, I see no reason for being pessimistic about the future."

Our democracy does have the inherent vitality to recover from these sieges of intellectual atavism, whether the attack is from the extreme left or the extreme right. Hope springs eternal. But hope alone is sterile and unproductive of change. Dynamic action must take the place of wishful thinking or scornful despair. We need more scientists like Pauling, Condon, Shapley, and Mather, who have the courage to speak out, even under attack.

Here are many avenues of service to his country, to his profession, and to himself, that can be followed by chemists and other technical men. They are fertile fields for those qualified to cultivate them.

Early in my career I ran squarely into a case of contempt for scientific procedures. A building was being erected by the company that employed me. I was instructed to sample and test each car of cement as it arrived and report the result to the foreman on the job before he used it. When I made my first report, I found the cement was being used without waiting for the test. The foreman explained that he had run out of tested cement and had to use it untested to keep his men busy. Since the test was all right, no harm was done, so I merely admonished him against using subsequent shipments until I reported. The next

day the same thing happened. When I arrived on the third day, the foreman became somewhat exasperated and rather heatedly expounded his infallible method of testing cement. He said—"I don't have to wait for your report to find out if a cement is good. I can tell just by feeling it. Why, I don't even have to feel it. I can kick the outside of a bag and tell whether it is good or bad!" Although foremen since those days have traveled far in their faith in laboratory tests, on other levels of acceptance of scientific findings we seem still to be "kicking the bag."

The outstanding example of awareness of an obligation to society by scientists was the successful campaign of the atomic scientists to educate Congress and the public on the dire implications of the atomic bomb. The result, as you know, was the Atomic Energy Commission and our proposal to the United Nations for an international body to control fissionable materials. It was a remarkable achievement that cannot be recalled too frequently. It reveals clearly what can be done when scientists leave their laboratories to perform, as scientists, a public service.

Articles on the social obligations of scientists are appearing in scientific journals with increasing frequency. The titles of some of these are in themselves quite illuminating. A recent symposium in the *Bulletin of the Atomic Scientists* will serve to illustrate the tenor of the thinking. It is called "The Duty of the Scientist in Society" and consists of the following articles: "Scientists are Quite Ordinary Folks" by A. V. Hill, 1922 Nobel Prize recipient in physiology, and who, to back up his thesis, was a member of the House of Commons for five years; "Science is Essentially Social" by Phillip Morrison, professor of physics at Cornell; "Working For a Society Where Science Can Thrive" by N. F. Mott, professor of physics, University of Bristol; "Scientists Have a Duty In Society" by Murray S. Levine of Oak Ridge; and "The Responsibilities of Scientists" by Lord Boyd Orr, a British authority on food and agriculture. A recent article in SCIENCE by Kirtley Mather is titled "The Problem of Antiscientific Trends Today." A great many more could be cited. I feel more at home today among these titles than I did 20 years ago when, as retiring chairman of the Chicago Section, the subject of my address was "Scientific Method and Human Relations."

Articles such as these are stimulating and might be provocative of action by other scientists who happen to read them, but they fall far short of maximum effectiveness because of the small and specialized audiences that they reach.

I should like to say a word along a somewhat different line of service which though seemingly of limited application, actually is of substantial benefit to chemists as individuals and to the chemical profession. As a prelude, I am reminded of the story of three hod carriers working on a building, each filling his hod and carrying it to the bricklayers or masons. When asked what they were doing, the first one replied: "I am carrying mortar;" the second one answered, "I am carrying bricks;" but the third proudly said, "I am building a cathedral."

Young chemists just starting their careers also are faced with the necessity of evaluating their work. Those who have been imbued with the importance of their profession, first by their professors and later by their superiors in industry, will view their immediate tasks in a manner comparable to the third hod-carrier. They will know that, even though the things they are doing are relatively simple, they none-the-less are contributing, with others, to the perfection of something that is building our civilization. All are not geniuses, but all can and should have just such an appreciation of the importance of their work and their profession. It may or may not make them better chemists. It certainly will increase their self-respect, make them better citizens, and make it possible for them to live with themselves with greater satisfaction and dignity. In proportion as the public is impressed with the worth of an individual chemist and with what he is able to transmit about the role of his profession in our civilization, so will our professional status rise. The same goes for young engineers.

Chemistry touches life at every point whether one knows any chemistry or not. Essentially all life is chemistry, plus a little physics and a bewildering amount of organization and cooperation on the microscopic level of the living cell. The well-being of every one is dependent upon chemistry. I think it is more important for non-chemists to appreciate this than it is for them to know the gas laws, the ionic theory, or how to balance equations. Not that it will do them any harm to know these things. They even might be a source of considerable interest and pleasure. However, it seems to me that in courses intended for non-chemists, if less emphasis were placed on the technicalities of chemistry and more on its social meanings, its universality, and its scientific method of discovering new facts, there would be more general understanding of the humanizing role of chemistry, and less antagonism to scientists.

Such a course would justify itself, I think, if it served no other purpose than to enable one to get a glimpse of the hidden beauty of the natural world in which we live, or to view with greater humility the mightiest works of men. Even those who intend to become chemists might well profit from this type of presentation. To those of us who love chemistry as a science and as a culture, the revulsion of feeling that so many have toward it, is, ipso facto, indicative that something was missing in the way it was presented to them.

I think we can go even farther. In addition to other reasons given for the current shortage of chemists and chemical engineers, we might find that introductory chemistry courses in high school and college actually kill the desire of most students to select chemistry as a career, instead of whetting their appetites for more. I know much thought is being given to the content of

such courses. Some unquestionably do make incipient chemists, but not enough, otherwise the shortage would not be so acute. Only the most dedicated survive. This is an avenue of service that can be followed best by those in the business of teaching, but chemists in industry also might have some thoughts on the subject that could be helpful.

The satisfaction one derives from serving along any avenue has been mentioned. Unfortunately, there is another side to the picture. Serving is not all beer and skittles. Disappointments and frustrations are also part of the game. One's motives and good intentions even may be questioned occasionally. All of this must be taken in stride. One must continue to work for the realization of the ends which were thought good, so long as there is some measure of progress toward their attainment. Differences of opinion with respect to procedures constantly arise. One cannot always be right. Others equally sincere and with comparable ability may have the better solutions. Frequently organizations which gave great promise at their inception fail to function or to grow as planned. Where they fail, others with similar programs, profiting from earlier errors, might succeed. Discouragement has no place in the curricula of those whose sights are set high. But there can be no compromise with principles. When the issues in a particular organization demand their sacrifice, get out and go on to something else.

The avenues for service are legion. It is only necessary to make a choice, to select those which our inclinations and ability permit us to follow. A whole gamut of organizations is spread before us, offering an endless variety of challenging, of rewarding paths to follow.

Science does not have the answer to all human problems. Neither are scientists necessarily the best qualified to attack them. In a world increasingly dependent upon scientific findings for many, although not all of the good things of life, the special competence of scientists lies in helping people to acquire their ability, and their will, to unshackle their minds when attacking new problems in their field. The all-important issue today, the one that overshadows everything of a political or economic nature is the elimination of war. In this, scientists have no ready answer. In this atomic age, the attainment of peace is a new and different problem from what it was in the past. Each of us, in his way, had better give thought to the possibility of helping to achieve it. That it is receiving such consideration by some scientists is indicated by a document prepared by the National Research Council Committee on Unesco and the Engineering Joint Council for the Third National Conference of the U. S. National Commission for Unesco. Its assigned topic was "The Opportunities for Scientists and Engineers to Contribute to Peace through the United Nations System."

I would like to close with a quotation from the article by Hill previously mentioned. It expresses more tersely and in clearer language than I can command, the gist of what I have been trying to say. Hill wrote: "Science is in the best sense, I believe, key to the whole culture of our modern world, that general culture which exists in its different and presently contesting forms along the Potomac, the Volga, and the Yangtze. But scientists are only the special professional exponents of their way. What will count in the end is not their acts alone nor their understanding of their duties, however deep, but the degree to which the general ends of science gain adherence among the people as a whole."

In the final analysis that is the goal toward which all avenues of service by scientists and engineers should lead.

News and Notes

Harvard and the Fifth Amendment

THE appeal to the Fifth Amendment by witnesses before Congressional committees of investigation, in order to escape answering questions regarding either their own past relations with the Communist Party or those of associates, has raised grave issues of academic freedom and responsibility and of professional conduct. Some professors have been dismissed or suspended outright; in other cases the administration and trustees have acted contrary to the recommendations of the faculty. In contrast, other institutions have adhered to some measure of due process (see the case of Byron T. Darling, Associate Professor of Physics at Ohio State University, in SCIENCE, April 24, 1953, p. 445). The latest chapter in this history has been written by Harvard University, whose stout defense in times past of intellectual freedom and the principle of personal responsibility makes its handling of this problem of particular note.

The following is a verbatim transcription of a Harvard press release on the matter:

> The Harvard Corporation has completed its study of the activities of three officers of instruction.
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> Here is a summary of its findings:
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> 1. Associate Professor Wendell H. Furry's actions during membership in the Communist Party included "grave misconduct."
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> Dr. Furry will not be dismissed, because the "grave misconduct" took place nine years ago "in a very different climate of political opinion."
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> The finding of "grave misconduct" will remain in full effect for three years. If at any time during that period, either because of Dr. Furry's future conduct or because of new evidence as to his past conduct, the Corporation should deem it to be for the best interests of the University to remove him, he will be removed.