

formed participation in the processes of government. I fear that the central forces of change in today's world—science and technology—are but dimly understood, or not understood at all, by the majority of the electorate.

We cannot hope that now, or perhaps ever, the majority of people will be able to explain the quantum theory or the third law of thermodynamics. Nor is this necessary. But I believe there are minimum levels of understanding that can be conveyed to all citizens and there is more sophisticated knowledge that can be conveyed to a large percentage of our people.

Such understanding can, I believe, help our society to react more intelligently and quickly, and in a democratic way, to challenge and opportunity as we travel farther along the road of the Scientific Revolution.

We may learn, for example, to better adapt to swift social changes like those forced by automation, more readily accept necessary technologies such as automation and nuclear power, and perhaps even support science for the right reasons. . . .

There are certain fundamental ideas that, I believe, virtually every citizen can grasp and that represent minimum attainable levels in public understanding. The minimum level that can be achieved almost universally, I believe, is an understanding of what science is, what technology is, and the difference between the two.

Search for Knowledge

As we all know, science is a search for an understanding of new knowledge about nature. Generally, it does not have an immediately practical goal, although sometimes applications may be easy to foresee. The essence of basic research is freedom of the scientist to pursue his curiosity where it leads him.

New knowledge is hard to acquire; nevertheless, it is necessary in order to synthesize the bits and pieces into general laws representing major progress.

On the other hand, technology, or more correctly engineering development, involves the transformation of the knowledge we gain from basic science into useful things. Our radios, television sets, automobiles, synthetic fibers and plastics, nuclear reactors and moon rockets are all engineering developments rising from towering edifices of basic knowledge erected by chemists and physicists. . . .

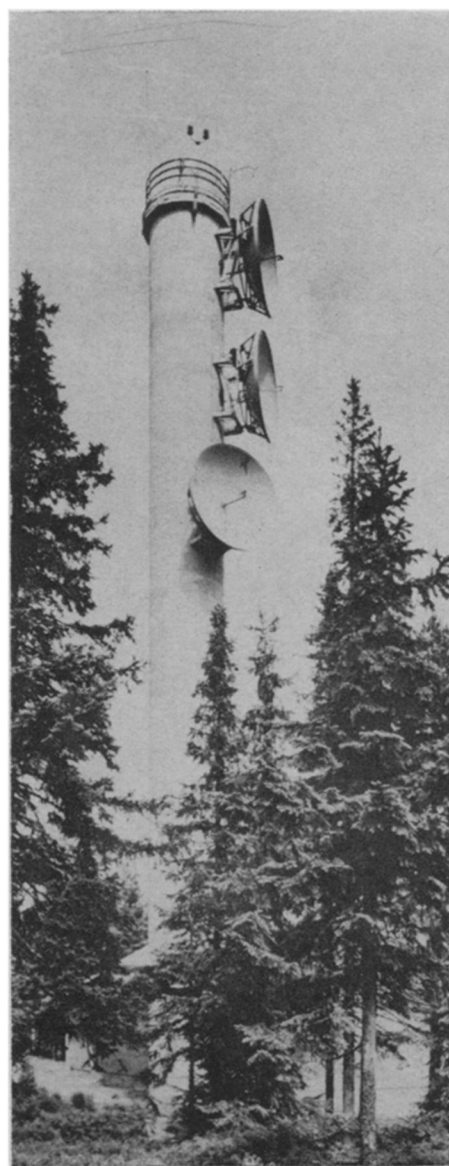
Confusion over what science is and is not can do considerable mischief. Not uncommonly, men are hostile to what they do not understand. Many people, among them some otherwise well informed individuals, are critical of government support of science.

Not infrequently this criticism is based on two mistaken notions: first, that the \$15 billion annual Federal budget for research and development is all for "science", and second, that

"science" may not be "producing" enough "gadgets" to justify the outlay. Actually, only about \$1.5 billion, or about 10 per cent of this sum, is allocated for basic science, with the remainder being allocated for applications of knowledge.

Lack of understanding causes still other mischief. Science receives much credit for its accomplishments, of course, but it also is the whipping boy for those who would like to find a simple explanation for man's destructive weapons.

It is true, for example, that nuclear weapons were an outgrowth of new scientific knowledge. But so is the nuclear reactor, which promises to perpetuate a technological civilization that is dependent upon the production of huge quantities of energy.



PASTORAL SETTING—The tower of Ostersund, Sweden, is part of a 39-station network bringing telephones and television to Sweden's Arctic North. The system is the work of International Telephone and Telegraph Corporation's major British affiliate.

In other words, knowledge is born without moral properties. It is man who applies knowledge, and he applies it according to his acquired patterns of behavior. The point is that misunderstanding on this can mislead us about causality. Man, not knowledge, is the cause of violence. . . .

A great deal of dedicated work toward public understanding of science has been done for many years, and is being expanded. A commendable contribution is being made by newspapers, magazines, television, radio and through educational films to give the public a sense of the significance and scope of scientific discovery.

Considerable credit belongs to the National Association of Science Writers and the Council for the Advancement of Science Writing for improving and increasing the nation's corps of professional writers on science for the mass media.

Private foundations and the Government have supported these and other efforts at popularization. SCIENCE SERVICE, of which I have the honor to be president, has done yeoman's service for over 40 years in popularizing science through its news services and Science News Letter, now Science News.

The scientific societies have also established helpful programs, among them the American Association for the Advancement of Science, the American Institute of Physics and the American Chemical Society. Government agencies, including the National Science Foundation and the Atomic Energy Commission, have made significant efforts to explain science to the public.

Occupying the middle ground is the unique Scientific American, serving highly motivated, intelligent laymen as well as scientists, engineers and other technical people. I had the privilege of being among the company of those who encouraged Gerard Piel and Dennis Flanagan in launching this valuable publication in 1948.

Some Gaps

I wonder if there are not some gaps in the popularization of science in the mass media for communication that might be filled to the profit of media management and the public. For example, some surveys indicate that the public is interested in reading more science than they are getting in the newspapers.

Is there a place, for example, for more regular column or feature material that would make good reading and that, being free of the restriction of the news lead, would provide a larger opportunity for revealing more about the rather interesting processes and personalities of science? Is there a place for a national science newspaper?

Might it not be profitable to publish a high quality popular science magazine that would interest a mass audience? In connection with these