The Rise of Science Understanding

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NONE OF US CAN KNOW FIRSTHAND the happenings of a century or realize with the vividness of recent years the feelings and ideas of days before our time.

Upon my bookshelf there is a leather-bound, fox-leaved little book, *Elements of natural philosophy,* printed in 1808 in Philadelphia. Perhaps I should not have told you the date, so modern-sounding is the preface:

> The great object of science is to ameliorate the condition of man, by adding to those advantages which he naturally possesses. . . . If, then, philosophical knowledge be of such essential advantage in the general pursuits of society, it surely becomes highly expedient to diffuse it in such a manner, as to enable every class to obtain some portion of the whole.

This was two generations before the beginnings of the American Association for the Advancement of Science. And there was then nothing new in the idea that people should understand science. Great discoverers of earlier years, Copernicus, Newton, Franklin, and many others, had to tell what they had learned in words that could be understood by those who did not know what had been discovered. The classic discoveries were, of necessity, in many cases "popularized" in their first telling.

But today *is* different from yesterday.

The popularization or interpretation of science, as it is broadly understood today, is as modern a phenomenon as the newspaper, radio broadcast, television program, movie, or slick picture-magazine articles of today.

Something has happened to the public's attitude toward science and the scientist's attitude toward the public. Those in their 20s may date the change from Hiroshima. But the new approach to science understanding is an older phenomenon that antedates the fission of uranium. It goes back to the intellectual burst of realization that this is a scientific world in which we live—a slow-moving explosion that was touched off by the airplane, the radio, appreciation of sanitation and immunization, snatching of nitrogen from the air, the chemical revolution, and a score of other scientific achievements. It is dated by World War I.

The public is never in the vanguard of scientific progress, just as the body of scientific opinion can never keep pace with the great, creating pioneers. The man in the street cannot be told about the achievements of science until they happen. If we are tempted to criticize the newspapers of 1903 for not putting banner headlines on the first Wright Brothers flight, remember that Orville and Wilbur were not willing to shout the news themselves from the cloudtops.

The public must not be too far behind. Today public knowledge and appreciation often treads on the heels of the researcher. Seldom does science trip for that reason.

The pace in the prewar days—and you can choose your own war, Civil, Spanish-American, World War I, or World War II—was not as swift as it is now. The lag between discovery and effective public knowledge was seemingly longer. This interval between the discovery of new knowledge and its application—presuming it has practical application—is one of the variable, unknown factors, difficult to measure. It is like the development period between the issuing of a patent and its successful commercialization, which most inventors will ruefully claim approximates the 17-year period of patent grant.

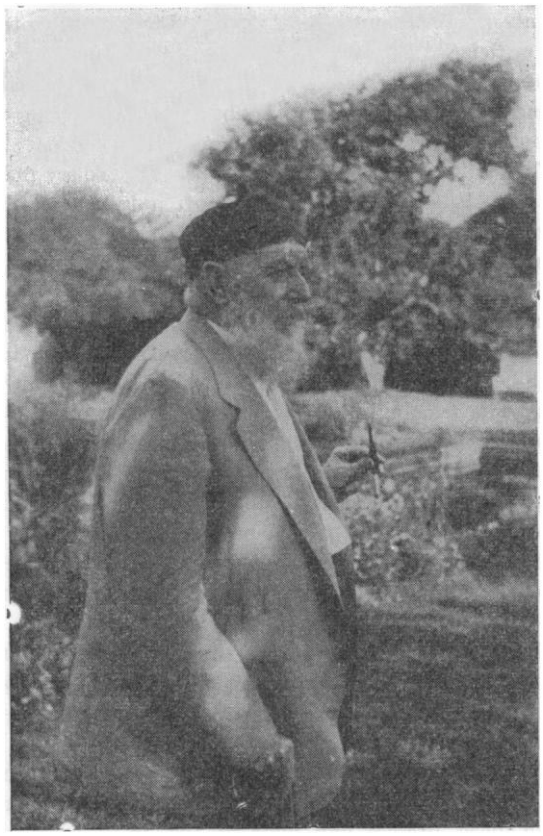
Perhaps we are closing the time gap between discovery and use. Certainly, $2,000,000,000 and several thousand scientists did some gap-closing in the case of uranium fission during the recent war.

We must not be complacent because we can reach 99,000,000 people with sound and bulletin a thousand high-speed presses any hour of the 24. There are millions (in the U.S.A.) who may mouth science and scientific jargon, yet they do not understand the methods of science, much less practice them.

It is a hard, intelligent, and rewarding task to give the people opportunity to understand. Every year there is a new audience, eager and receptive if their inquisitiveness is not rubbed off by dull, didactic teaching. Always the old to some is the new to many. Perhaps it has often been so. We like to believe that there is now more opportunity to understand than ever before.

About a hundred years ago, gold was discovered in California, the Smithsonian Institution got under way, and the AAAS was organized. Social ferment was abroad in the land, to fester a decade or so later into a bloody war. It was, as always, the ending of an era and the beginning of an era.

In the decades that followed, the books and lectures predominated in taking science to the people. Look back over the rows of early AAAS reports, the famous Smithsonian reports that were virtual science yearbooks, and the great books that carried the new formulations to scientist and intelligent gentleman alike. Darwin's *Origin of species* sold out the first day of issue, you remember.



E. W. Scripps

W. E. Ritter

In the mode of the pulpit, the early scientists were also speakers who carried their messages directly to the people from the lecture platform—not all of them, of course, but an impressive number, comparatively. Then, too, there were the professionals, the Chautauqua speakers. Even the pulpit helped, for the well-ballyhooed conflict betwen science and religion was good advertising for science, in the long run, as well as an ever-fresh text for the preachers. One of the last gasps of this controversy, the Scopes trial at Dayton, Tennessee, in 1925, was of educational value to the public.

The newspapers of those days covered science as they did other matters—sometimes well, sometimes badly. There was sensational pseudo-science to fit the ideas of enterprising editors and, in a very real sense, the popular knowledge of the times. There was a running feud between scientist and reporter, in almost all cases. The scientist could not trust the reporter, who did not try to understand. The reporter often used his malicious imagination instead of taking the trouble to understand, and the scientist did not try to persuade the reporter to understand.

There were some creditable reports of scientific gatherings. About the turn of the century, Dr. Charles Edward Munroe, the great explosives chemist (whose "effect" was used in the bazooka), turned out several newspaper columns a day on one important meeting in Boston, if I remember correctly. If the old-timers were alive, they could tell us more such instances.

But there was no sustained effort at taking science to the public.

The modern era of science popularization dates from the end of World War I, when the shock of TNT awoke scientists and public alike to the effectiveness of science. It is a happy fact that an era of good feeling between scientist and newspaperman was

achieved and made effective during the decade that followed that war. And it is significant and appropriate that the hands of good fellowship of science and the press were extended simultaneously in such a way that scientists and editors have been able to work together.

The implications of this pooling of interests by the public and the world of science extends far beyond the mere implanting of scientific facts into the minds of laymen or the replacement of so many newspaper columns of crime, politics, or other news by scientific news. It transcends the securing of adequate support for scientific research, important as that is. Science reporting and interpretation does not accomplish its purpose—the principal purpose of science popularization—if it does not bring about an appreciation and a utilization of the method of science in everyday life.

I have a firm conviction that this cannot be done didactically or even by consciously setting out to do it. I believe the most powerful method of getting across any idea is by example. If the great mass of the people, through accurate and interesting accounts of the successes and failures of science, can glimpse and understand that essence of science, its trying, testing, and trying again, if they build their own convictions that this is a good, sensible, successful, and useful method, then there is hope that they will apply it more widely to everyday life, to our human relations, to running our businesses, to our governments, to everything that we do. So many of the ideals that we cherish, such as liberty, opportunity, the pursuit of happiness, freedom, democracy, are achieved by the utilization of scientific methods. The ways of science and democracy may at times seem roundabout and slow, but they are usually more sure and safer. The mistakes of science and democracy are best corrected by the methods of science and democracy.

It is this philosophy and plan of action that lies, historically and actively, at the roots of Science Service.

Let us turn back to 1919, a year after the Armistice, when the world was sobering up from the debauch of war, realizing that there is something more real and powerful than the rule of might, even in a righteous cause.

Two men, one a great newspaper man, the other a great biologist, were the progenitors of what is now Science Service.

E. W. Scripps had founded and guided to success the great group of newspapers that bears his name; he had created press associations and syndicates to supply them with news and features. Yet he saw the need of something that his enterprises lacked. In planning and materializing the new institution he turned to Dr. W. E. Ritter, University of California biologist, his fellow philosopher and fellow student of nature and man.

What was in these two minds at that time? Dr. Ritter has told me of one of Mr. Scripps' earliest statements of his conception of Science Service. It is useless, E. W. argued, to think of making the world safe for democracy without thinking also of making democracy safe for itself. And both Scripps and Ritter were convinced that the only possible way of making democracy thus safe is to make it more intelligent. Since to be intelligent is utterly impossible without having much of the knowledge, method, and spirit of science, it followed that the only way to make democracy safe is to make it more scientific. And that is what they set out to do.

Mr. Scripps and Dr. Ritter visualized what they at first called the "American Society for the Dissemination of Science," and they set to work to bring it into being. Dr. Ritter became missionary and expositor. He visited the intellectual centers of America to urge the cooperation of scientists in this liaison agency between science and the press. He met with some skeptics and with some who believed science to be above the average man. He was, nevertheless, successful. Science Service was organized two years later, in 1921, with trustees nominated by three scientific groups, the National Academy of Sciences, the National Research Council, and the American Association for the Advancement of Science, and two newspaper groups, the E. W. Scripps Estate and the journalistic profession.

Science had formally backed the ambitious infant organization. Science Service then had a double task: first, selling to the American newspapers the idea that science is news, good news, news that can compete, from a circulation standpoint, with crime, politics, human comedy and pathos, and the conventional array of news and feature; second, it had to sell and distribute the popular science material it produced.

We have the bound record of material sent out to newspapers over the years, of the successful and unsuccessful experiments in tailoring a product that newspapers would want to print and pay for at nominal rates.

One of the first things that Science Service did was to produce a news service that it distributed directly to newspapers under the now-familiar "By Science Service" label. In 1921 it was a mailing once-a-week. Now our leased wire service spans the continent, delivering about 800 words a day, and this is backed up by mail copy, under release date ("wire by mail" we call it), a weekly feature page, and other features. We reach a couple of hundred newspapers and other publications with a readership of about 10,000,000.

The first director of Science Service, until his death in 1929, was Dr. Edwin E. Slosson, chemist, a superlative popularizer by pen and voice, whose great book, *Creative chemistry,* had a predominant influence upon the public appreciation of chemistry and the prestige of that science in those days. Dr. Slosson came to

Edwin E. Slosson

head Science Service from the literary editorship of the old *Independent* magazine. It was a great privilege to work with him in Science Service's beginnings.

Our offices in those days were in the old residence rented by the National Research Council at 1701 Massachusetts Avenue, since replaced by a swanky apartment house. We used to say that Science Service material was conceived in the maid's bedroom and born in the butler's pantry, for those were the locations of the office and the mimeograph. Science Service joined the National Academy of Sciences and the National Research Council when their monumental building on Constitution Avenue was erected. Just at Pearl Harbor time, Science Service occupied its own building at 1719 N Street, N.W., not distant from the present headquarters location of the AAAS.

If one views the extensive and sympathetic play that science gets in press, magazine, and radio today, it is hard to realize that not long ago the scientist to the cartoonist was a funny old man with a beard and the way to report a scientific meeting was to pick out the big words in the program and write a funny story. When Science Service was young, that was the conventional method of handling science in the press.

Even when there was a publisher who understood the news value of science, there were pitfalls. About a year before the organization of Science Service, when I was on the staff of the National Bureau of Standards, after sundown I wrote science news for the old Washington *Herald,* then owned by Julius Barnes and Herbert Hoover. The fact that ragweed, not goldenrod as most people believed, causes hay fever was reported at a local meeting. My story was slugged for page one, much to my delight. Imagine my chagrin the next morning to find that a friendly copyreader had "corrected" the story to read that goldenrod causes hayfever! Frequently even today copyreaders, and others, have to read something new three times or more before they believe it.

"Not interesting *if* true, but interesting *and* true" was one slogan used in the early days of Science Service. Newspaper science is less suspect now. It was a long and arduous struggle to convince scientists, on the one hand, and editors, on the other, that science could be written popularly so as to be accurate in fact and implication and yet be good reading in newspaper columns.

Then, as now, the annual meetings of the AAAS were major occasions for Science Service coverage. The Toronto meeting at Christmastime in 1921 was the first covered by special press telegrams directly to newspapers. For this meeting, too, Science Service devised the familiar "blue sheet" method of asking those on the program to send in their AAAS papers for press use.

Radio was in its infancy then, too, and Science Service got its baptism in this new medium by doing talks over local stations before there were radio networks. One of the early ventures of Science Service was the issuance of directions as to how to build one's own crystal receiver. Most newspapers had their own radio editors at the height of the set construction era, and these specialists were concerned with the building of sets rather than the programs that were heard. A few of them switched from radio to science writing when the radio craze became less of a boom, and thus these specialists are numbered among the early science writers of the present era.

It took about a decade for the specialty of science writing to become recognized by other press associations and the larger newspapers. At about that

time the practice and example of science usage caused the assignment of specialists to the science news and feature field in a number of instances.

The science-writing practitioners banded together later as the National Association of Science Writers, a little "guild" that includes most of the active writers. Today the specialists who write popular science for newspapers and magazines as a full-time occupation number somewhere between 50 and 100.

Without minimizing the continuing operational activities of Science Service, its major contribution might be considered to be that it has made science acceptable to the American press, and that it has made science reporting acceptable and respectable in both newspaper and science circles.

E. W. Scripps, in his first outline of Science Service's purposes, wrote:

> It is only through the press—mainly the daily press—of the country that the vast majority of the people of this country receive any information or education at all. It is, therefore, only through the press that the public can be quickly and well instructed on matters of its greatest interest.

The daily newspaper continues to be a main channel to the public's thought stream. Science is flowing in it with fairly satisfactory volume. Conventional scientific sources, such as meetings, journals, and laboratories, are being covered with regularity. But there is still need for the science reporter and the news editor to view great news events from their science angles, often ignored now because rush of spot news or the urgency of action tends to monopolize the news scene.

Science in its great accomplishments is international news of the first water. But there is plenty of science in local news, valuable to the community and the newspaper itself. The time will come when each newspaper will have a science writer just as it now has a sports editor, a dramatic critic, a political writer, and other specialists. The sphere of this local science editor is the science news of his own home town—what the engineers are doing, what discoveries are made at the college, the activities of the nature hikers, the earnest experiments of the science clubs in the high schools, how a group of amateurs is making a telescope, what the local medical society is doing, the work of the radio club, etc.

As in every task that must be well done in this world, the quality of science reporting is dependent upon the abilities of the person doing it. Preferably, the science writer or editor should be professionally qualified in both science and newspaper work. He should be the type of person who can hold his own in research laboratory or news room.

Although historically young, radio is one of the most lusty of the mass media for taking information to the people. Television is in its early stages, and to join the standard radio services has come FM, with a new spectrum of opportunity. There is much less science on the radio, percentagewise, than in newspapers and magazines. The art of making science understood by voice and sound may be more difficult; the attention of the audience, more evanescent. Nevertheless, science does get its chances at the microphone, in connection with meetings, public events, dedications, and in some dramatic programs. There are some programs of long standing—for instance, Science Service's Adventures in Science each week over the Columbia Broadcasting System network, which in 18 years has presented some 900 scientists as guests.

Early in the work of Science Service individuals desired to obtain direct access to its product. Thus, the *Science News Letter* (weekly) was born as a magazine which now has a circulation of over 50,000. As the weekly summary of current science, it is useful to scientists as well as intelligent laymen, teachers, and others.

Chemistry (monthly) is another Science Service publication available by direct subscription and read by teachers, students, chemists, and others.

Another service to individuals was begun as the result of sending samples of new materials to newspaper editors as a demonstration and reinforcement of articles being sent them. A bit of a new plastic or a piece of other new material created so much interest on the part of the busy editors that it was decided to issue collections of new materials and specimens to individuals, under the title THINGS of science. Each month there are sent to subscribing members 10,000 little blue boxes, each containing a number of specimens, a booklet of explanations, museum legend cards, and directions for a half-dozen to a score of experiments. These experimental kits in a box are widely received in schools, homes, and offices. More elaborate experimental kits have been prepared in a number of instances. With one such outfit, plants may be grown without soil and experiments performed in hydroponics, with plant hormones, etc. With another "Science FUNdamentals" kit, as it is called, the basic experiments in electricity and magnetism may be performed, while still another kit is devoted to phosphorescence and fluorescence.

To about a third of a million young scientists organized in some 15,000 science clubs in the Nation's secondary schools, Science Service, through its Science Clubs of America, furnishes materials and incentive through the sponsors of these clubs. Affiliation of each club with Science Clubs of America is provided without fee, and the basic materials are furnished

upon request. In most of the states there are cooperating junior academies, museums, etc. that give special attention to the science clubs in their states, sponsoring science fairs and congresses.

The Science Talent Search for the Westinghouse Science Scholarships is an educational effort to pick from the senior classes of the Nation's secondary schools the creative scientists of the future. Now in its eighth year, the Science Talent Search has already demonstrated that it is possible to select those who give great promise of being scientists of the next generation. Each year 300 are selected for honors, and,

Watson Davis, present director of Science Service

through cooperation with committees in more than a dozen states, others of ability are selected on a regional basis. This is one of the activities of Science Clubs of America.

The support of the youth interest in science and the efforts of schools and other organizations in science education has become an important part of the national program of science diffusion. In many instances, newspapers cooperate in such activities in their region. No field is richer for future support than that of science for the youth of our land.

One important by-product of popularization is aid to research. Often first news of research results comes to other specialists through a popular channel, particularly if the research happens to be in a different pigeonhole of science. Science Service has lent its aid to research in a number of fields, such as the collection and distribution of cosmic data, the investigation of archeological discoveries, and the location of earthquake epicenters. It has also pioneered in the development of microphotographic duplication and its application to scholarly research materials. Microfilms make available the contents of libraries and allow the publication of research results that otherwise would not be made available.

Because translations of American books are needed in Latin America, Science Service has cooperated with the Department of State since 1943 in administering its book translation program, in part devoted to medical and other scientific books.

In other lands there is a rising appreciation of science information for the layman. UNESCO, through its Natural Sciences Section, is giving special attention this year to the popularization of science, and American experience is being placed at the disposal of that international organization.

Scientific information gathered by American news organizations flows regularly to all parts of the world as part of the regular international services. In some foreign centers, such as Buenos Aires, Mexico City, and Oslo, daily newspapers publish Science Service reports with as much effectiveness as newspapers in the United States.

An increasing amount of research and development is being done in industrial laboratories. Commercial organizations and trade associations are thus an increasing source of scientific information, often of basic importance. In the last quarter-century, the information issued as publicity on behalf of industrial laboratories has grown in volume. Public relations efforts on behalf of scientific institutions, as well, provide welcome raw material for the science writer and popularizer.

One of the most essential factors in our present progress is the differentiation between popularization and propaganda. Proselyting should have no more place in dissemination than in research itself. And research perishes when it is linked to a particular idea of government, religion, economics, race, or philosophy.

In his original expression upon Science Service, E. W. Scripps presented this ideal clearly and forcefully:

> The first aim of this institution should be just the reverse of what is called propaganda. Its objects should never be to furnish argument or facts for the purpose of producing partisans for any particular cause. Its sole object should be to present facts in readable and interesting form—facts on which the reader could and probably would base his opinion on a subject of politics, sociology or concerning his duty with regard to himself and his fellows.

Such words are worth remembering in these troubled times when so many peoples are told what they must and must not believe. Not even science must be allowed to become a dictator. Science must set the example for straight thinking, confident that the processes of democracy guided by scientific method and reason will give the effective result.

Entrance to Science Service

A succession of great personalities in science and journalism have aided the cause of science popularization through service upon the board of trustees of Science Service. Four of them have served as president in the 27 years so far: William E. Ritter, J. McKeen Cattell, Edwin G. Conklin, Harlow Shapley. Those who have been Science Service trustees are: C. G. Abbot (1924–46), Carl W. Ackerman (1937–38), Karl Bickel (1939–41), Otis W. Caldwell* (1944–47), W. W. Campbell* (1924–26), J. McKeen Cattell* (1921–44), E. G. Conklin (1937–), Max B. Cook (1944–48), John H. Finley* (1925–40), Frank R. Ford (1941–), E. F. Gay (1921–25), George E. Hale* (1921–24), Ross G. Harrison (1938–), W. W. Hawkins (1939), Ludvig Hektoen (1935–38), Harrison E. Howe* (1928–42), W. H. Howell* (1931–42), Vernon Kellogg* (1921–35), F. R. Kent (1924–27), A. H. Kirchhofer (1940–), Karl Lark-Horovitz (1948–), Warren H. Lewis (1942–), Burton E. Livingston* (1930–37), D. T. MacDougal (1921–30), Kirtley F. Mather (1948–), John C. Merriam* (1921–31), R. A. Millikan (1921–), George T. Moore* (1921–24), J. Edwin Murphy (1938–39), A. A. Noyes* (1921–27), Raymond Pearl* (1929–35), Marlen E. Pew* (1927–36), M. I. Pupin* (1926–29), O. W. Riegel (1938–), William E. Ritter* (1921–28), Chester H. Rowell* (1921–24), Charles Edward Scripps (1948–), E. W. Scripps* (1921–26), Robert P. Scripps* (1921–38), Harlow Shapley (1935–), Thomas L. Sidlo (1926–36), H. L. Smithton (1928–), Mark Sullivan (1925–38), Neil H. Swanson (1939–), Hugh S. Taylor (1943–), Warren S. Thompson (1936–44), Willard L. Valentine* (1946–47), Victor C. Vaughan* (1925–28), Henry B. Ward* (1935–46), Alexander Wetmore

(1946–), David White* (1927–35), William Allen White* (1921–25), and R. M. Yerkes (1921–25).

* Deceased.

Tomorrow's opportunities in advancing science understanding are constantly increasing, for the horizon moves ever onward, no matter how rapidly we advance. As a dedication of the present and the future, there can be repeated a statement, portions of which have appeared in the fundamental literature of Science Service kept in print since the foundation of the institution in 1921:

In a democracy like ours it is particularly important that people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. The specialist is likewise a layman in every science except his own, and he, too, needs to have new things explained to him in nontechnical language. Scientific progress is so rapid and revolutionary these days that no one can keep up with it without some means of maintaining close contact with its new ideas and discoveries.

Recognizing that science, industry, the public, and the press would benefit alike from increased understanding between the scientist and the layman, the AAAS joined with the Westinghouse Educational Foundation in 1945 to establish the George Westinghouse Science Writing Awards. The purpose of the program is threefold: to encourage more and better science writing in the public press; to attract the attention of able young writers to popular interpretation of science as an important and worthy career; and to help those who train and those who employ science writers. Cash awards of $1,000 are made each year to the newspaper writer and the magazine writer judged best in their respective competitions.

Since the close of the contest year on August 9, a panel of judges representing the press, science, and education has been engaged in reading and evaluating the 180 entries received this year.

The winners of the 1948 awards will be honored at a luncheon scheduled for September 16 during the Centennial Celebration of the AAAS. Following an address by Dr. Edmund W. Sinnott, president of the AAAS, presentation of awards will be made by Dr. Howard A. Meyerhoff, chairman of the Managing Committee.