

THE FUTURE OF POPULAR SCIENCE

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1. *Meaning of Popular Science.*—I realize that my subject, "Popular Science," has had some unpleasant associations in the recent past, but I am tempted to use it to bring before the State Academy of Science, in the few minutes allotted me, some thoughts on the science situation in this country, especially on the teaching of science in our schools, colleges and universities. If I can suggest to you that this country may have and should have a science which is *popular*, that is, for the masses, as well as one which is *technical*, that is, for the experts, I may not be subject to the sneers of the sober man of science nor will he feel that my suggestions are, of necessity, fit only for the limbo of lost ideas.

2. *Popular Science of the Past Generation.*—The year 1890 may be taken roughly as the beginning of the laboratory period in American high schools, especially in the Central West. As we think of the two preceding decades (1870-1890), years in which men as old as the speaker, or older, probably received their first inspiration to engage in science work or teaching, we remember them as the "wonder years of science." They were "wonder years" because of the wide-mouthed, eager wonder of so many of our people for scientific discoveries. The Philadelphia Exposition, with its early telephone and arc light, the untold, apparently illimitable extent to which discovery might go, the bicycle and the prophecy, as yet so dim, of the automobile and the aeroplane, gave to the professional lecturer a profitable field. Crowds went to hear lectures by "Professor" Blank on the "Wonders of Electricity" or the "Little Devils of Chemistry." Here static machines turned rapidly with gratifying zips of electric discharge, Ruhmkorff coils hissed and buzzed, Crookes tubes fluoresced in endless play of color. Or mysterious rubber bags, with weights upon them, delivered the wonderful gases of the oxy-hydrogen flame, liquids that were red were changed, in a twinkling, to blue, and then turned back to red again by the addition of colorless water. Specks of a white powder swelled up, when ignited, to an enormous bulk, while a great, bulky amalgam shrank to a droplet of liquid mercury. And when

interest lagged there was always an explosion to make everyone start to his feet.

These and multitudes of other "experiments" came as the natural result of the discovery of the new applications of electricity and chemistry. The lectures were spectacular, often inaccurate, but nevertheless of absorbing interest and stimulation. They stirred up the imagination of a non-scientific, but inventive people; who can tell how many of the later, perfected pieces of electrical and chemical apparatus came solely, or came sooner, through their influence!

The seventies and eighties were also the age of the Chautauqua Literary and Scientific Circle. Old as well as young people, denied the advantages of college education, read the classics in English translation and studied science in the form of Professor Steele's "Fourteen Weeks" courses. The more sober went on to Popular Science Monthly and the Scientific American. As we think of that age we must conclude that relatively, if not absolutely, its interest for knowledge, such as it was, was very high; the mind, as well as the mouth, was open to receive the wonderful new ideas that were "put across" the lecture table.

3. *Results of This Interest.*—The thesis I wish to present, and can hardly more than state, is this, that in my belief this interest largely created by popular lectures, text books, magazines, and science study circles, is responsible for the rapid development of laboratories in our high schools and many colleges and for their present magnificent buildings and equipment. We school men are often likely to find fault with the niggardliness and shortsightedness of the public in certain special cases in which we are interested, but we need to remind ourselves again and again that there has been a tremendous loosening up of purse strings in the last twenty or twenty-five years, especially with regard to school outfitting. Here, in the presence of this new chemical laboratory (that of the University of Illinois), is it necessary to suggest that the same is true of the university? We need not be old to remember the days when such things would have been utterly impossible, even if we had had our present great national wealth.

I remember well the case of a new high school building in Chicago, first occupied in 1887, and situated in the center of

one of the most thickly settled portions of the city. The leading newspaper of the city attacked the Board of Education most viciously because the board had expended the enormous sum of, perhaps, \$175,000 on the building. The building had not a single laboratory for the pupils' use, as I recall matters. In contrast with this case is that of a high school I visited the other day, in a city of less than 90,000, in which the science *addition* to the building cost \$180,000. My point is that much of this change of sentiment is due to the popular science courses of a few years ago and to the conviction produced in the minds of people who themselves had no opportunity to study in the laboratory, that laboratory experimentation was worth while.

4. *Relation of the People to Laboratory Science.*—In a country having a strong governing class the people may permit experts to tell them not only *how* they should spend their money, but how much they should spend; not so in this country, if we can judge by the signs. Here the common man will still have something to say regarding the how much, however far he may ultimately defer to the expert with regard to the use of money. For some years, even without any popularization of science, the appropriation for science laboratories will continue from its own inertia. But sooner or later the Philistine will have his day.

The theory of the laboratory as a part of a school's equipment was that all of the people should have an opportunity to experiment for themselves and thus to get the benefit of first-hand acquaintance with nature. Some qualifications of this theory are in vogue today. I have had considerable opportunity, in the past few months, to observe high school science teaching, to say nothing of college and university teaching. In both classes of institutions I have heard teachers state again and again their belief that the benefits of laboratory work were greatly overrated, that pupils work blindly to get results, while to many instructors the laboratory note book seems to be the principal object of the course. These teachers believe what they say is true, and all of us who teach have probably some share in the belief. Now, I wish to suggest that this is the very antithesis of the belief expressed more or

less forcibly by teachers of a generation ago, who held that about all that was needed for the millenium was to let everybody experiment.

If an upsetting of our theory were all that is involved in this new conception of the laboratory, we might dismiss the subject with a smile for the impracticability of our youthful beliefs. But this is not all. When once the man who runs gets hold of this gossip of the science teachers, he will run in another direction. The motive for the most expensive part of school and college buildings—I mean the science laboratory—will be gone and he will act upon his new knowledge to vote no more such expenditures.

5. *The Future of Popular Science.*—For what I have stated, you will see that I believe a future is desirable for popular science. Shall there be one, more significant than anything of the past? Or shall it be, like the traditional apple in the hands of the small boy, without a core? Is it worth while for men of science, such as those of the Academy, to seek by more worthy methods to appeal to the wonder instinct of the people? Or is a people that knows the movies and the cabarets lost to the possibility of wonder? I believe that by giving the people something it can understand in the newer terms of a more sound science we can make, if we will, a better partnership between the investigator and the public. We can use the movies themselves. Each member of such academies as ours can serve as the apostle to his own community. By lectures or by simple courses of study, not too long, the interest of the people may be stimulated and they may be given something worth while. Suppose we were to copy from the schools of agriculture a few lessons and that we were to distribute to the constituents of our schools pamphlets beginning something like this:

“Your children are receiving at school the vocabulary of modern science. This vocabulary is not an end in itself, but the means of further education from science texts, newspapers and government publications. If you desire it, the men of science of Illinois will give you, too, this vocabulary in an understandable form. They believe that by informing yourself more fully you will be able better to judge the needs of

science and will be able to make of your state a better place for yourselves and for your children."

Is there anything in all this that is antagonistic to investigative science? To use an illustration borrowed from the laboratory, if we wish to get the pure crystals of blue vitriol out of the dirty, unpromising lump of bluestone, we dissolve it in water and manipulate the solution so that crystallization begins. But when the beautiful crystal appears, shall it say to the turbid mother liquor, "I have no need of you?" The solution is old-time "popular science"; the beautiful crystals are the fruits of investigation. As I see matters, the scientific progress of our democracy must ever be dependent upon an understanding on the part of the people of what its experts are about and upon the willingness of the people to trust these experts in the fields into which the people as a whole cannot enter. In other words, science and confidence must be the real food of our national life.
