

ordination of effort, and for wholehearted democratic application of the results of research. Democratic process demands that all scientists have a responsible voice and part in this movement.

Public welfare demands also that government have a voice and part in this movement. We need a body of responsible public servants with adequate means, both financial and cooperative, to assist the organized scientists in making the most of our national scientific effort. Its role of promoting coordination would apply both to governmental and nongovernmental research agencies, but it would be facilitative rather than managerial.

In such a formula, we have a two-way, cooperative-bargaining arrangement between government and science. It would avoid the evil of the Government trying to dominate science and the equal evil of frittering away our scientific talent through fragmentation and financial inanition. It would preserve scientific freedom, but it would bring a vastly increased energy, order, and responsibility into our total scientific effort. If democracy is to function, it must be efficient; and it can be efficient without regimentation. Disorder is collective frustration. Orderly cooperation augments the power and freedom of the individual. The essence

of freedom is that it can survive only if it is based on order.

Science can become the most important tool for democratic reorganization, but not if it remains halfheartedly used and socially irresponsible, and not if leading scientists sow distrust of government and remain squeamishly aloof from it. The Bush group, in effect, not only deny that government has the responsibility to assist in organizing science for human welfare, but they deny even that the scientists have that responsibility. For they would leave the laissez-faire tradition of science essentially intact and would perpetuate the isolation of science from the swirling current of human life. Above all, by debarring the full implementation of scientific method in democratic government, they would actually hasten what they most fear, namely, ill-considered, makeshift extension of government power.

In the age of the atom bomb, horse-and-buggy government is not merely an anachronism: it is a crime. To deprive government of the powerful tool of scientific method in reorganizing human relations, through law, administration, and cooperative social organization, would indeed condemn human society to remain in an "endless frontier" of force and chaos.

The Science Teacher and Legislative Proposals for the Promotion of Science

Frank E. E. Germann

University of Colorado and Executive Secretary, Southwestern Division, AAAS

THE NOTABLE SUCCESS of the Office of Scientific Research and Development in coordinating and originating scientific studies during our recent crisis has made our entire population conscious of the value of research. The report of the Director, Dr. Vannevar Bush, to President Truman, entitled *Science, the endless frontier*, has served as a framework of a bill (S. 1285) introduced by Senator Magnuson¹ at the first session of the 79th Congress. The purpose of this bill and those of Senators Kilgore, Johnson (Colorado), and Pepper (S. 1298), Senator Fulbright (S. 1248),¹ Senator Byrd (S. 825), and Representative May (H. R. 3440) is to attempt to carry over to peacetime the advantages of a national research program. The National Research Council, organized during World War I, has announced the extension of its activities to the grant-

¹ Since this was written these latter bills have been combined into one S. 1720 (see *Science*, 1946, 103, 10; 39-44), but the cogency of Dr. Germann's comments is in no way weakened by this event. Ed.

ing of Predoctoral Fellowships in the Natural Sciences while continuing its program of Postdoctoral Fellowships. The Research Corporation of New York will devote \$2,500,000 during the next five years to support of research in chemistry, physics, mathematics, and their applications, such as engineering. The grants are to be made to institutions and are to be used to support the research work of persons of proven research ability who are desirous of entering, or re-entering, the faculties of institutions of learning. "Professional salary of the applicant must be borne by the institution as well as responsibility for continuation of the professional opportunity of the applicant beyond the terms of the grant."

Whereas all of the above programs should prove of great value to the stimulation of research, they fail to bring aid to the men under whom research is to be conducted. *No stream can rise higher than its source.* For many years the most competent research

workers and teachers have been enticed away from educational institutions by our large industrial corporations, which have been able to pay salaries commensurate with the abilities of the men. A small number of our highly-endowed educational institutions have been able to hold and attract outstanding scholars because of their higher salary scales, but the average private or state-supported institution has been forced into mediocrity. The success which these have achieved is the result of a number of factors reflecting no credit on the institutions. Among these factors the following may be mentioned:

(1) Because of his own health or that of a member of his family, a teacher may be forced to remain in a given climatic environment, regardless of salary.

(2) Because of a personal fortune, the teacher is free to work where he chooses.

(3) In order to live on the limited salary offered by the institution of his choice, the teacher may refrain from marrying and thus avoid financial obligations.

(4) A married teacher may refrain from, or postpone, having a family because of the low salary received.

(5) The teacher may also follow the European plan of marrying wealth.

(6) The family may scale its standard of living far below that which would seem to be appropriate to the profession.

(7) The wife may also have to be a breadwinner.

No one will deny that the conditions cited above do exist, and that they drag down the very group of society which in the final analysis has produced the vast body of educated and highly skilled scientists used as raw material by the OSRD in the task of winning the scientific aspects of World War II. Universities have the definite obligation of training men to enter the research laboratories of industrial organizations, but they also have an obligation to train men for the teaching profession. If this latter responsibility is not met by making university teaching financially more attractive, the quality of the product will of necessity deteriorate. In the long run, industrial laboratories are bound to suffer. The situation has been serious for many years, but the recent high level of wages paid to boys and girls graduating from high schools has served to bring the matter to a head. When many college and university positions pay only \$1,500 to \$2,000 to persons with doctorate degrees, is there any wonder that competent persons cannot be found to fill them? Even now, when the war is over, we are still able to place women just receiving the baccalaureate

degree in chemistry, in industrial positions at \$200 per month!

What future can we promise young men and women holding pre- and postdoctoral fellowships at \$1,800 to \$3,000 when we still offer \$2,000 for assistant professors and require that they have the doctorate degree? What chance do we have to secure competent teachers in science when a full professor, after thirty years of service, may never reach a salary of \$4,000? Intelligent young men should hesitate to make the sacrifice, knowing they will be better able to provide for their families if they choose the industrial offers which in a few years may bring them salaries of \$10,000 or more. Recently a request was received from a university asking us to recommend someone holding both the M.D. and the Ph.D. degrees. The salary was \$2,000, and the apology was added that this offer was being made in the hope that someone not actuated by financial needs might be willing to accept. What a travesty on justice! How long shall such conditions prevail? Shall universities continue to base salaries on individual needs or the minimum for which men will work, rather than on what they are worth in a competitive labor market? Should not a teacher be judged to be worth as much as his students. If not, why keep the teacher?

It is probably too much to expect to ask American industry to do something in the way of subsidizing professional salaries in our educational institutions so as to make these positions at least as lucrative as equally skilled industrial workers. However, the writer is convinced that such a move would, in the long run, reap handsome dividends for the donors. Such an undertaking, sponsored by the Federal Government, and possibly financed from excess profits taxes, would not seem to be unreasonable, because it would be returning only a small percentage to the teachers who had made corporation profits possible.

Some plan to accomplish the above end should be incorporated in one of the bills now before Congress or in some compromise bill resulting from the recent hearings. No plan yet proposed can hope to raise the level of scholarly achievement as much as can be accomplished by placing college and university teaching on a plane where the teachers will no longer have to apologize for their inability to go to scientific meetings, to take vacations, to care for the health of the family, and to do all those things which are expected of them by society.

Scanning Science—

Dr. David Starr Jordan was elected President of the California Academy of Sciences at its recent annual meeting.