

SCIENCE and MOBILIZATION

The following statement was issued by the Science Advisory Committee of the Office of Defense Mobilization on September 12th of this year. The Committee, composed of eleven of the nation's top scientists, advises the President and Mobilization Director Charles E. Wilson in matters relating to scientific research and development for defense. Chairman of the group is Oliver E. Buckley, chairman of the board of Bell Telephone Laboratories. Other members are Detlev W. Bronk, president of Johns Hopkins University and of the National Academy of Sciences; Walter Whitman, chairman of the Research and Development Board; Alan Waterman, director of the National Science Foundation; Hugh Dryden, of the Interdepartmental Committee on Scientific Research and Development; James B. Conant, president of Harvard University; Lee DuBridge, president of the California Institute of Technology; James R. Killian, president of the Massachusetts Institute of Technology; Robert F. Loeb, of the College of Physicians and Surgeons of Columbia University; J. Robert Oppenheimer, director of the Institute of Advanced Study, and Charles A. Thomas, president of the Monsanto Chemical Company.

As this nation faces for the second time in ten years a grave national emergency, the scientists of the country and the educational institutions are now facing the question of how they can best be of service to the nation in a critical period. The Science Advisory Committee has been appointed by the President to advise the government and recognizes an obligation to assist the scientists in meeting these problems.

Advice in such a complex situation as we now face must, of course, take individual circumstances into account and must be subject to changing conditions, but one thing is clear. The contribution of science to mobilization must take into account both the acuteness of the present emergency and the prospect of its long duration.

In its endeavor to meet immediate needs, the Department of Defense has expanded its research and development effort to more than double that of the level of the later '40's, and has made increased demands on its own laboratories, on industry and on universities that tax the supply of competent scientists and engineers. The greater part of this expanded effort is in industry and government laboratories where it is directed principally at practical embodiments of advances made during the late war years and the intervening post war period. Only about 10 per cent of it represents work done on contract with universities. The part played by university research is, however, important in degree disproportionate to its cost, for from it comes new

knowledge with which further advance will be made. From it also will come ideas of venturesome thinkers working in the forefront of science. It has an impact, too, on training young scientists on whom we must rely for our future strength. Thus, it is essential that the power of academic scientists in defense research be deployed in the most effective way possible.

Effective deployment means that those who engage in military projects should do so in the most effective way possible with regard not only to solving immediate problems, but also to increasing their ability to participate effectively in whatever situation may arise in the future. It does not mean in this case that all academic scientists should promptly engage in defense research and development projects, for it is essential in the long run that our strength in teaching and fundamental research be maintained and increased. It does mean that we should have a balance, appropriate to the times, between the normal functions of academic science and the abnormal and immediate demands of military problems.

It is our view that under present circumstances the major part of our academic research effort should continue to be devoted to fundamental research but that a substantial portion of the effort, and particularly that of those best qualified by experience and abilities, should be applied to defense research in a way to meet present urgent defense needs and at the same time build up throughout the academic community a wide-

spread knowledge of the scientific problems of defense and a reserve of scientists to meet extreme emergencies should they arise.

We attach great importance and value to systems-research projects of which the Department of Defense has already instituted a few and is in the process of initiating others. The purpose of these systems-research projects is to analyze military systems objectives in a broad area of technology and possible means of achieving them. Such an area, for example, is that of defense against an air attack. These are full-time study projects. They do not generally involve experimental work, but serve to indicate where and how experimental effort can best be directed. Such projects involve very close cooperation with the military establishment and team work of military officers and high grade imaginative scientists with a diversity of skills and knowledge. Generally these projects are of short duration and culminate in a report which defines areas for specific research and development and suggests definite action. There should not be many such projects for there are not many broad areas to be covered this way, and not many available workers with the particular abilities needed. To man such systems projects effectively calls for the highest grade of leadership and an understanding of techniques and personal qualities required.

Out of systems studies and from other sources come major research and development projects directed at providing instrumentalities and weapons of new or improved design and taking full advantage of existing scientific knowledge. Such projects also call for full-time team work but can use a great variety of skills. We believe that generally speaking it is much more effective to employ a relatively large group on a number of related items than a number of small groups on separate single items. We believe too that when such projects are appropriately handled by university groups it is better to carry the development only to the laboratory model stage.

There are of course numerous smaller applied research projects that single institutions can handle with their own forces, and problems of practical application occasionally arise which are readily handled by those engaged in fundamental work in related fields. Support of fundamental research thus provides standby forces for applied defense research. Important contributions will also come from free-lance individual inventors who come up with original ideas that are likely to be missed in the more formal group approach. Nevertheless, experience has shown that the group approach which calls for a major concentration of forces at a limited number of locations is an essential part of effective mobilization of university scientists, and deserves the whole-hearted support of all who can contribute.

Questions then arise as to what are the particular steps that may be taken by universities or individuals seeking more direct participation in defense research. Each situation must, of course, be judged on its own merits, and institutions and individual scientists must arrive at their own decisions, but as a general guide the

Science Advisory Committee has the following suggestions:

1. Outstanding men should be made available to systems projects of the type referred to above and to other defense activities where, in performing their function as a part of a group, they can learn the research needs by participating in determining them.
2. Specially qualified leaders should be given leaves to take positions in the Department of Defense and other government agencies which will familiarize them with the problems most needing attention.
3. Universities and colleges should welcome opportunities for joint projects of special importance where the scientists who participate can give full-time attention to the problems they undertake.
4. Individuals should themselves seek opportunities where they can serve best. To a considerable extent the best place for an individual scientist may depend on whether his own interest and aptitude are for fundamental research and teaching or for applied research or administrative work in defense projects.
5. Periods of leave for such defense work should be of specified duration so that individuals will not be too long separated from their normal activities. This will result in participation by a greater number of individuals and more widespread benefits.
6. In determining actions in this connection, the importance to the nation of research and teaching is a major consideration. In this we concur with the view already expressed by the Chairman of the Atomic Energy Commission and the Secretary of the Navy that "The scientist in his laboratory and the research professor with his graduate students are performing a service which may make a critical difference to our country in the difficult years ahead."

Strengthening our defense effort by these means will do more than help meet the present emergency. It will also strengthen our long-range position. As those who have participated in group projects of the type described, or have taken part in the administration or conduct of research in the military establishment, return after a period of leave, they will be prepared for making their own institutions more effective in defense research and thus broaden the base of experience from which we can draw to meet future emergencies should they arise. With reasonably short periods of separation from normal research and teaching activities there will frequently be net benefit in these areas as well. This is most important, for free research and inspired educational leadership in all our institutions of higher learning are the sources of new knowledge and of the trained minds to apply it in improving the condition of our lives and protecting all we hold most dear.

Advice in particular situations may often be had from the leaders in research activities of the Department of Defense or from others in close contact with defense research activities. The members of this Committee are also ready and glad to assist in situations with which they are personally familiar and will often be willing and able to investigate others.