NEWS *and Notes*

Vannevar Bush, chairman of the newly formed Joint Research and Development Board, which now coordinates the support of basic research offered by Army and Navy contracts, addressed a general engineering meeting sponsored by 10 engineering societies in Washington on January 14.

He spoke principally of the physical sciences, saying that "another whole evening could be spent on the amazing implications of present advances in the biological sciences; and the social sciences, too, in so far as they contribute to sound bases for human relationships."

Further, he said, "we have attained full public recognition of the basic relationship between science and civilization." Moreover, with basic research, as with applied research, success depends primarily on the man concerned in any research undertaking. He must be able, and he must be free, to put his ability to use as only he can do.

Right here we run into a possible difficulty. Whatever else we can say about research, basic or applied, we know that it costs money, sometimes a lot of money. The research man must be able, and free to put his ability to use. But he cannot be free—indeed, cannot even be fully able—without long and costly training, without materials, equipment, facilities. This means he must have support. The possible difficulty is clear—if support has strings on it that means control of the researcher, the essential freedom goes. If support is not given with full confidence, there is hence a dilemma. If support *is* given with confidence, however, the dilemma need not exist.

The hazards which any formal system of support might involve are few but great. We may cite as principal ones first, the danger of overemphasis on applied science, especially the applied science of immediate benefit to the supporting agency, because of its possible practical returns; and second, injurious dictation by laymen who might misinterpret the power of the purse as giving them skill to tell the researcher what lines to follow. American experience in the support of research, as for instance in both private and state-supported institutions such as universities, has been highly fortunate in that these hazards have in the main been avoided. As we move toward a broader plan of support, some observers worry about the possibility of these dangers as though they were new things and were created by the broader plan. They have, however, always existed, and will always exist as long as the possible dilemma which I have mentioned confronts the research man. By and large, the broader the source from which he draws his support, the less risk of dictation he runs.

In the years before the war, support for research in this country came from four main sources—universities, industry, philanthropic foundations, and the Government, which in several departments, notably Agriculture, Commerce, and Interior, and the Federal Security Agency, maintained research staffs and carried on research programs. Today, these four sources operate as before, but the Government's role has changed importantly.... During the war, Federal funds were channeled into research in principal measure through OSRD. At present, the principal flow of funds is through the armed service. In time to come, another means will in all likelihood be provided.

Let us look at the financial side of the matter. The total outlay of the United States in research and development now amounts to more than a billion dollars a year. This is about three times as much as we were spending yearly before the war. Before the war—1940, say—the Government provided about 20 per cent of the total of 345 million. Now, the Government's share is 50 per cent. The principal channels through which this Federal money flows are the Departments of Agriculture, Commerce, Interior, the Navy Department, the War Department, and the Atomic Energy Commission. Note that the armed services, which accounted for about 6 per cent of the much smaller prewar total, are disbursing some 40 per cent of the present total of about $1,077,000,000.

Now these are important sums, in anybody's bookkeeping. The present pattern of their expenditure places on the armed services a heavy responsibility in both basic and applied research. Much of their responsibility for applied research the services must continue to carry. When proper opportunity offers, they will presumably be glad to relinquish what they can of it. The responsibility they now have for basic research can be lifted. The contracts which the Army and Navy have written with research organizations—not for the devising or improving of weapons of war, but for basic research—have been effective in giving vitally needed Federal support to the country's scientific effort in the interval since the contraction of OSRD work. The support thus rendered has strengthened the universities during a difficult period. It has gone some distance toward filling the deficit in basic research caused by our having had to focus principally during the war on applied research for immediate purposes. It has indirectly contributed somewhat toward redressing our grievous present and future shortage of trained scientific personnel. It is fortunate that the Congress has had the vision to support the services in their performance of this vital interim task, and that the services in turn have had the wisdom to step in where help is needed. *In the long run, of course, it is to be desired that Federal support of basic research be extended rather through a body that balances civil and military needs and is closer to an understanding of fundamental research as a whole than the services, in the nature of the case, can hope to be.* That the services desire such an outcome is plain in the record of their advocacy before the last Congress of legislation to establish a National Research Foundation.

Let me turn now to consideration of the proposal for such a foundation, what it signifies, and what we have by way of experience and knowledge to combine in it. Federal financing of research is by no means a new thing; it dates well back into our history in the actual research operations carried on in several government departments; in the somewhat newer form of support through contracts it is now going on apace. *But the creation of an agency separately and specifically planned to coordinate and administer this newer form of support will be a new thing.* The task is complex enough and important enough to require such an agency. More than that, the temporary system under which we are now operating cannot per-

form some of the important things that must be done. Notable among these is the job of finding able young potential scientists and seeing to it that, wherever they are and whatever their economic status, they have full opportunity for the education and training that will make their abilities available in the expanding programs which we must undertake....

We have a substantial body of practical knowledge on which to draw. Outside of government, the American people have probably had as much experience in the administration of industrial and university research as any other nation....

The Joint Research and Development Board was established last July by joint action of the Secretary of War and the Secretary of the Navy, to have civilian as well as military members, for the purpose of coordinating the research and development programs of the War and Navy Departments.... I wish to emphasize that the JRDB, concerned with policies, plans, and allocations of responsibility, does not enter into the affairs which are the proper concerns of G-6 and ONR, respectively. These affairs—the actual operation of research and development programs as well, of course, as their initial formulation—are carried on by the departmental agencies. The Board thus is not an operating body; its principal function can properly be described as a judicial one. It resolves differences which may arise between the War and Navy Departments in the broad field of research and development, and in particular resolves the differences arising when the programs of the two services are merged to form an integrated national program. Since it is expected to reach decisions, it works by majority vote. Obviously, if it is to work in the broadest national interest, it must be fully informed. It has a major supporting activity, therefore, in the assembly and analysis of information and the correlation of research objectives with broader military plans. It thus becomes well qualified to formulate opinions and render advice, and in this respect becomes important in determining relative emphasis, filling gaps, and shaping policies. Except in the allocation of responsibility for programs, its actions take the form of recommendations to the Secretaries.

Membership of the Board consists of Gen. J. L. Devers, Gen. Carl Spaatz, Adm. D. C. Ramsey, Assistant Secretary of the Navy W. John Kenney, and myself as chairman. Its Policy Council, on which the chief planning officers of both departments meet regularly with representatives of the Board, is a vitally important part of the setup. It provides for the correlation of research and development with strategic requirements, in an obviously two-directional way, for new developments may have sweeping implications for strategy. There is, of course, a vast amount of work to be done in achieving the goal of a strong, unified, integrated national program. This work is allocated to committees, of which six have thus far been organized, each covering a major field of technical activity.

The Committee on Atomic Energy is headed by J. B. Conant; it will function in close collaboration with the Atomic Energy Commission. Its membership and that of the military liaison committee and the general advisory committee for the Commission overlap somewhat, a condition that will be helpful.

Hartley W. Rowe is chairman of the Aeronautics Committee.

K. T. Compton is chairman of the Guided Missiles Committee.

The Committee on Electronics has as chairman J. A. Stratton.

The Committee on Geophysical Sciences, concerned with such subjects as meteorology, oceanography, and so on, is under the chairmanship of R. F. Beers.

The field of geographical exploration is coordinated by the sixth committee, headed by Charles Behre.

Others will, of course, be organized as the work of the Board requires. Each of these committees can be considered to follow within its defined area the general pattern of the Board itself. Thus, each committee consists of civilian and military members. Usually, the chairman will be a civilian. The Board has delegated great authority to its committees, when they act on the basis of unanimous decisions. Thus, for example, the Committee on Guided Missiles, acting unanimously, will undoubtedly have the final word in determining allocation of responsibility in the national program in the field of guided missiles. A question on which the committee does not reach unanimous decision will, of course, go to the Board for resolution. Otherwise, only two types of decision of the committee will require review by the Board itself: first, matters involving broad policy or strategy concerning which the Board may consider that the committee's knowledge may have been incomplete; and second, matters transcending the interest of a single committee and hence requiring consideration by more than one agency of the Board.

Since both the Board and its committees are made up of individuals serving part-time, much of the important work is carried on by the full-time staff, which is headed by Lloyd Berkner, executive secretary. He is assisted by Maj. Gen. Anthony C. McAuliffe, the Army Secretary, and Capt. J. H. Thach, the Navy Secretary....

From the point of view of military organization, the Board is a good illustration of a staff unit performing a staff function. It is not an executive body. It is not an administrative body. It is a body where qualified minds can secure information, formulate advice, and resolve differences at the level where they occur. It can therefore be regarded as an important step in the formation of a combined staff—which may well be our next logical progression from the concept of the War Department General Staff which we owe to the genius of Elihu Root, the concept of an organization composed of officers free from routine administrative activities and free from responsibilities of command who can spend their full time in the vital staff functions, of which one is planning.

From the point of view of science—that is, particularly of research—this Board ... is essentially a peacetime mechanism, seeking to meet conditions requiring a machinery for coordination differing in major respects from that which was adequate during the war. The dollar is no longer flexible, and in a period of limited or diminishing appropriations the task of adequately apportioning emphasis and adjusting programs becomes more difficult. The lessened feeling of urgency also contributes. During war, the penalties for delay were so obvious that it was relatively simple for men to agree on a course of action involving diverse interests. In peacetime it is inevitably more difficult for any group to subordinate its individual interests, and it is correspondingly more difficult to achieve solutions directed toward the broadest national interest.

This situation holds true not only in the area for which the Board has responsibility but also in many others. A result of it is that agencies seeking to reach solutions need the broadest possible base in the scientific and economic life of the country. Government is necessarily as-

suming responsibility for a larger part of the scientific effort of the Nation. That fact means emphatically that there will be increasingly frequent calls on competent citizens for counsel and cooperation, for service on boards and committees, for arduous meetings, for exacting work. If the task is to be properly met, citizens must respond and give their time and energy, making their special professional acumen available to the Government. It is pleasant to meet and pass a resolution and then go home, but it doesn't accomplish much toward working out specific answers to specific problems....

About People

Wesley C. Cox, Colonel, MC, has been appointed chief of the Army Industrial Hygiene Laboratory, Edgewood Arsenal, Maryland, with offices in the Surgeon General's Office, to succeed Maj. Robert H. Duguid, MC, now conducting an industrial medical and hygienic survey of Army Air Forces bases in Europe. Col. Cox returned recently from seven years in Panama, where he had been Canal Department Surgeon since 1943.

Rebeca Milies, professor of psychopedagogy, on leave of absence from the Institutos Normales, Montevideo, Uruguay, has been appointed to an externship at the Wichita Guidance Center, Wichita, Kansas. Prof. Milies, who was awarded maintenance and travel grants by the State Department through the Institute of Internation Education, to study child research and service centers in the United States, previously held an internship at the Institute for Juvenile Research, Chicago, and a fellowship at the University of Iowa Child Welfare Research Station.

Theodore L. Swenson, since 1938 director of the Western Regional Research Laboratory, USDA Bureau of Agricultural and Industrial Chemistry, Albany, California, has been appointed special assistant to Louis B. Howard, chief of the Bureau, the Department of Agriculture has announced. Michael J. Copley, for seven years with the Eastern Regional Research Laboratory, succeeded Dr. Swenson at Albany. Dr. Swenson's new position was created to improve and expand utilization of farm crops and products in processed foods and get results of such food research into commercial use.

Merrill F. Roff has joined the staff of the Research Division, Air University School of Aviation Medicine, Randolph Field, Texas, as chief, Department of Psychology. He formerly was director, Aviation Psychology Program, Office of the Air Surgeon, AAF.

Awards and Grants

Duane Roller, professor and head of the Department of Physics, Wabash College, Crawfordsville, Indiana, will receive the Oersted Medal of the American Association of Physics Teachers at the Association's meeting January 31 at Columbia University. The medal is awarded annually "for notable contributions to the teaching of physics," and in the case of Dr. Roller is a tribute to his work as editor of the *American Journal of Physics* since its foundation in 1933. In his address of acceptance at the meeting Dr. Roller will discuss physical terminology.

Karl Terzaghi, professor of the practice of civil engineering, Harvard University, was awarded the Norman Medal of the American Society of Civil Engineers for the third time January 15. Dr. Terzaghi, who won the medal in 1930 and 1943, went to the Harvard Graduate School of Engineering in 1938 from the Technische Hochschule, Vienna. He was recently appointed professor of the practice of civil engineering (*Science*, January 3).

The American Society for Horticultural Science has awarded the $500 Leonard H. Vaughan Research Award in Horticulture to both Charles M. Rick, University of California, and G. A. L. Mehlquist, Missouri Botanical Garden, formerly of the University of California at Los Angeles. Dr. Rick's paper, "Field Identification of Genetically Male-Sterile Tomato Plants for Use in Producing F_1 Hybrid Seed," and Dr. Melhquist's, "Inheritance in the Carnation. V. Tetraploid Carnations from Interspecific Hybridization," were published in the Society's *Proceedings* for 1945.

The Ella Sachs Plotz Foundation in 1946 made 18 grants to individuals and two to institutions doing research on problems related to medicine and surgery. Since it was founded 23 years ago the Foundation has made 551 grants to scientists throughout the world. Applications for grants in 1947–48 must be in the hands of Dr. Joseph C. Aub, Massachusetts General Hospital, Fruit Street, Boston 14, Massachusetts, U.S.A., before April 15, 1947. Letters asking for aid, which will usually be grants of less than $500, must include qualifications of the investigator, accurate description of the research, size of grant requested, specific use of money to be expended, other sources of support or expected support, and letters of recommendation.

Henry B. Mann, associate professor of mathematics, Ohio State University, was awarded the Frank Nelson Cole Prize in theory of numbers at a meeting of the American Mathematical Society in Swarthmore, Pennsylvania, December 28. The Cole Prize, established in 1928, is awarded each five years to a member of the Society who in the preceding period has published the most outstanding paper on the theory of numbers.

Colleges and Universities

The University of Leiden, Netherlands, has announced the following changes in science professorships since the liberation: new appointments—C. J. Gorter, physics; E. Havinga, organic chemistry; T. H. van den Honert, plant physiology; E. H. Vogelenzang, pharmacy; retirements—J. J. Blanksma, organic chemistry; W. van der Woude, mathematics; W. H. Keesom, physics; E. Hertzsprung, astronomy; resignations—L. G. M. Baas Becking, plant physiology; dismissed—J. J. Lynst Zwikker, pharmacy.

Harvard University has announced promotion of the following faculty members to the rank of full professorship: Lars V. Ahlfors, Garrett Birkhoff, and Saunders MacLane, mathematics; Paul D. Bartlett and E. Bright Wilson, Jr., chemistry; Marland P. Billings and Francis Birch, geology; Lemuel R. Cleveland and Kenneth V. Thimann, biology; Carleton S. Coon, anthropology; and Jabez C. Street, physics.

At the same time James J. Lingane and Robert B. Woodward, chemistry, were advanced to the rank of associate professor.

Twelve additional full professorships in the Faculty of Arts and Sciences were granted in nonscience fields at the recent meeting of the Board of Overseers, bringing the total to 23. Average age of the new professors is 44, six being under

40 years and 12 between the ages of 40 and 45, the University disclosed.

The University of Michigan Board of Regents on December 27 accepted gifts totaling $61,000 for the following purposes: $10,000 from the estate of Gertrude French, Rockford, Illinois, for the Lt. Francis Brown Lowery scholarship in the College of Engineering; $9,400 from the U. S. Public Health Service, through the National Institute of Health, for gastrointestinal research under H. Marvin Pollard; a grant from E. I. du Pont de Nemours & Company, Wilmington, Delaware, to renew the du Pont fellowships in chemistry, chemical engineering, and mechanical engineering for 1947–48; and $4,000 from the Upjohn Company, Kalamazoo, Michigan, for a fellowship in histology in 1947.

Duke University School of Medicine has announced the appointment on January 1 of Eugene A. Stead as professor of medicine to succeed Frederic M. Hanes, who died last March.

The School of Medicine Fungus Disease Registry announces a month's course in mycology to be offered under Norman F. Conant in the summer of 1947. The registry, financed by a grant from the American Foundation for Tropical Medicine, supplies sets of teaching cultures for medical schools and maintains a diagnostic service that includes culture, histopathologic and serologic investigations.

Meetings

The American Oil Chemists' Society will hold its 38th annual meeting May 20–22 in New Orleans, with H. P. Newton, Southern Regional Research Laboratory, general chairman, and A. M. Altschul of the same laboratory, program chairman. The Society has changed the name of its publication to *Journal of the American Oil Chemists' Society* with the January 1947 issue. The name had been *Oil & Soap* since 1932; before that for eight years it was *Journal of the Oil and Fat Industries*; and prior to that, from 1917 to 1924, Society papers were published as the Chemists' Section in the *Cotton Oil Press*.

Elections

Sigma Delta Epsilon, graduate women's scientific organization, at a Boston meeting in connection with meetings of the AAAS elected the following national officers for 1947: Lela V. Barton, Boyce Thompson Institute for Plant Research, president; Winona Welch, DePauw University, 1st vice-president; Pearl Claus, University of Wisconsin, 2nd vice-president; Frances Lloyd Naylor, University of Washington, secretary; and Beulah Armstrong, University of Illinois, treasurer.

The New Hampshire Academy of Science, meeting at Keene State Teachers College, Keene, New Hampshire, October 25–26, elected these officers for 1946–47: Donald H. Chapman, University of New Hampshire, president; Richard H. Goddard, Dartmouth College, vice-president; Richard C. Jones-University of New Hampshire, secretary treasurer; and Hilbert R. Siegler, Department of Fish & Game, Concord, member of the executive council for four years.

The Committee of Food Sanitarians, organization for accumulation and dissemination of information relating to problems of insect and rodent control within the food processing industry, have elected for 1947, E. M. Searles, chairman; E. L. Holmes, vice-chairman; J. P. Barrett, secretary; and G. S. Doolin, treasurer.

Competitive examinations will be held early this year for 75 positions, with grades of assistant and senior assistant scientist, in the regular corps of the U. S. Public Health Service. Written examinations will be held April 14 and 15, and oral examinations during the period February 13–April 9, in bacteriology, mycology, parasitology, entomology, malacology, biology, chemistry, physiology, physics, statistics, and psychology. Salaries are $3,811 and $4,351 for assistant and senior assistant scientists with dependents. Applications may be obtained from the Surgeon General, U. S. Public Health Service, Washington 25, D. C.

Recent Deaths

Johan Wilhelm Sandström, 72, Swedish meteorologist and oceanographer, died in Stockholm January 12.

Rosa Smith Eigenmann, 88, ichthyologist, died in San Diego January 12. Wife of Carl Eigenmann, former dean of the Graduate School and head of the Zoology Department, Indiana University, who died in 1927, Mrs. Eigenmann was first woman president of Sigma Xi.

Charles O'Rourke, 50, professor of structural engineering, Cornell University, died at the Cornell University infirmary January 10 after a long illness.

David R. Morris, 67, meteorologist in charge of the Weather Bureau's New York observatory in Central Park, died of a heart attack at his home January 9. Mr. Morris wrote on air pollution for technical journals, collaborated on studies of allergies to various pollens in the air, and improved apparatus for measuring and analyzing pollution of air by smoke, dust, and pollen.

George Singer, 41, assistant chief, X-ray Section, Bureau of Standards, died suddenly at the Bureau January 16. Mr. Singer worked on the proximity fuse project, developed a method for X-ray inspection of TNT filling in bombs and shells, and during the war organized a large group of users of high-voltage X-ray equipment and then formulated a safety code now standard for the industry in this country.

James W. Lawrie, 65, technical director and director of research, Joseph Schlitz Brewing Company, died January 14 after a two-week illness. Dr. Lawrie in 1937 isolated vitamin K from alfalfa.

Karl Mannheim, 53, lecturer in sociology, London School of Economics, died in London January 9. Born in Hungary, Dr. Mannheim was removed from the chair of sociology at Frankfort University in 1933, at which time he went to Britain. Illness forced him to refuse chairmanship of the European section of UNESCO as well as an offer to reorganize Canberra University in Australia.

Winford P. Larson, 66, head, Department of Bacteriology and Immunology, University of Minnesota, since 1918, died in Minneapolis January 1.

Harry Plotz, 55, consultant to the Secretary of War after his retirement last year as head, Virus Division, Army Medical Corps, died in Washington January 6. He worked mainly with the typhus bacillus and mass typhus control, receiving the Legion of Merit in the recent war and foreign and U. S. recognitions in the World War I.

Samuel Gargill Milligan, 83, former professor of physiology, West Penn Medical College, died in Pittsburgh January 4.

Harry E. Barnard, 72, Indiana State Food Commissioner for many years and pioneer in pure food laws, died in Indianapolis December 30.