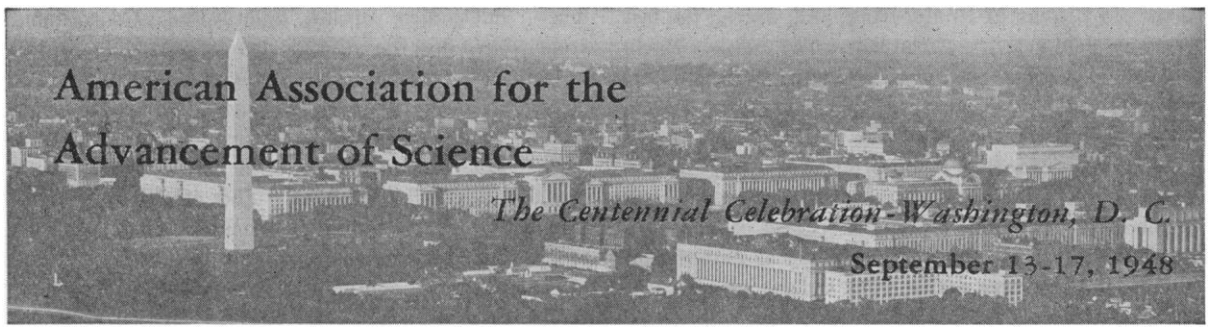

The U. S. Naval Research Laboratory

On the east bank of the Potomac River, just within the southern corner of the District of Columbia and opposite the historic city of Alexandria, Virginia, stands one of the important research establishments of the Navy. Sprung from modest beginnings some 25 years ago, the U. S. Naval Research Laboratory today comprises extensive laboratories, shops, and administrative offices, and its staff includes some 3,000 scientific, technical, managerial, and clerical employees.

The mission of NRL, as originally defined, was "to increase the safety, reliability, and efficiency of the Fleet by the application of scientific and laboratory experimentation to naval problems." NRL has in its history been a field activity of several different Navy Department bureaus and offices, and its program has been modified by each. But, by and large, its staff has devoted its energies to basic research, except during war, when the needs for development, experimentation, and even testing are paramount. Continually growing demands on the part of the Service have necessitated progressive expansion of the Laboratory so that the plant is now well equipped to carry on almost any type of scientific investigation.

The numerous permanent and temporary buildings, all of harmonious external appearance and distributed around a landscaped mall, are specially designed to meet definite requirements. The laboratory buildings, which are in the majority, compare favorably with modern industrial laboratories and are so designed that space may be added to, or subtracted from, individual rooms by means of demountable bulkheads. Included are shop facilities for metal-, plastics-, and wood-working, each consolidated in a separate large building, and at the river end of the mall is located the administration building. Since the Laboratory is conveniently situated on tidewater, a wharf is also provided which accommodates small vessels with drafts up to 18′. A converted patrol craft is assigned permanently for test work in open waters.

Laboratory equipment is, in general, of the very finest and includes some pieces of apparatus and certain facilities unavailable elsewhere. In a number of instances, highly specialized units have been designed and built in the Laboratory itself whenever such units were unobtainable on the open market. Among those of particular interest are the 20-Mev betatron; an RCA electron microscope; and an altitude chamber which simulates changes in pressure, temperature, and humidity experienced by aviators.

That most of the expansion to present size and importance took place during the period 1940–45 provides some measure of the responsibility of NRL in the conduct of World War II. But, as an institution, the Laboratory owes its origin to the foresight and initiative largely of two men. As early as 1910, Thomas A. Edison recognized the need for a research organization dedicated to the interests of the Navy, and by 1915 certain of his public statements on this matter had come to the attention of Josephus Daniels, then Navy Secretary. In July of the latter year, Daniels wrote Mr. Edison, stating his intention to establish a department of invention and development and asking whether he, Edison, as a public service, would be willing to act as chairman of a board of consultants. Acceptance of this post by Mr. Edison led shortly thereafter to the establishment of the Naval Consulting Board, composed of representatives of the 11 largest technical societies in the United States and including a number of distinguished scientists and administrators.

Armed with the recommendations of the Consulting Board, Daniels took the matter before Congress, and in 1916 the House passed an appropriation of $1,000,000 for the construction of the Laboratory and $500,000 for the initial year of operation. Because of the unusual situation arising from World War I, however, formal opening of the new facility was delayed until July 2, 1923, and accordingly the 25th anniversary of NRL has just been celebrated this year.

During its first quarter-century, NRL has operated variously under the Secretary of the Navy, as a part

of the old Bureau of Engineering, and, during the last war, as a field activity of the Bureau of Ships. Early in 1945, in a merger toward an all-Navy scientific organization, NRL was transferred to the Office of Research and Inventions, now the Office of Naval Research. But regardless of these changes in cognizance, the Laboratory has tackled technical problems for all of the naval bureaus. Upon the request of a bureau or office, NRL undertakes either to act as expert consultant or to assume active work on any scientific or technical problem falling within its scope.

Since its inception, the internal organization of NRL has followed the pattern conceived originally by the Consulting Board—that of a laboratory operated by civilian scientists under Navy management and devoted to the scientific interests of the Navy. The higher administrative and liaison posts are filled by naval officers chosen for their engineering or scientific background. Naval personnel serve tours of duty of two to four years, so that outgoing officers carry back to the Fleet a definite experience with the scientific method and its latest naval developments. Similarly, the replacement officers coming directly from the Fleet bring to the Laboratory the immediate problems and operating experience of the Service afloat, under water, and in the air.

The civilian scientific organization, on the other hand, is permanent and is afforded full authority and responsibility for the conduct of its work. Having been considered by the Program Board and accepted, a problem is assigned to the appropriate division of the scientific staff. Thereafter the administration avoids interference with the program and in no case attempts to direct the research. Ten research Divisions, each under a competent scientist as superintendent, have been established—three in radio and one each in chemistry, electricity, mechanics, metallurgy, nucleonics, optics, and sound. Coordinated from above by the division superintendents and a director of research, the Divisions are subdivided below into sections, each of which deals with some definite type of scientific problem.

That this combination of officer and civilian control has functioned harmoniously and effectively is evidenced by NRL's remarkable achievements over the years. For security reasons, details of many of the most important contributions cannot be discussed. Suffice it to say, however, that in the whole broad fields of radio communication, detection and range-finding, and guided missiles, and particularly in the development of radar, the Laboratory has been a pioneer. Many of the important developments in underwater sound gear and in naval applications of physical optics may also be claimed for NRL, as well as highly significant accomplishments in antifouling paints, rain-repellent films, hydraulic fluids, nonpetroleum lubricating oils and greases, fire-fighting foams, and many other products of special application.

Little known is the fact that NRL initiated one of the first methods for separating U-235 from U-238 for the production of atomic energy. On display in the exhibit room (open to visitors) is a model of the original liquid thermal diffusion plant in which the first successful separation by this process was accomplished (Abelson, 1940–41). Also to be seen, together with numerous other examples of the Laboratory's success, is an exhibit of "Window," used during the recent war to clutter enemy radar.

But, as is the case in most active laboratories, the achievements of NRL seem dwarfed by the new problems created by the new knowledge. The end of conflict heralded a return to many fundamental investigations which may be expected ultimately to contribute to the general peacetime welfare of the Nation.

The Naval Research Laboratory is another among the many institutions in and around Washington which will serve as hosts during the forthcoming Centennial Celebration. It is hoped that these brief sketches of host institutions which have appeared in *Science* during past weeks and which will also be published in the two remaining premeeting issues will be useful to those attending the meetings who wish to avail themselves of the opportunity to visit the many laboratories, colleges, and universities at which research is being conducted around the Nation's capital.