

CHEMISTRY IN THE NAVY¹

In the spring of 1917, at meetings of the United States Nitrate Commission, the Navy came into closer touch with the chemists of the country that it had ever had the fortune to do before. This association resulted in much advantage to the navy upon the outbreak of war, the increased production of munitions being to large extent dependent upon the chemical help the Navy could obtain. The Navy, through the American Chemical Society, obtained practically all of its chemical assistance; and it learned to respect and appreciate the services given to the country by this large organization.

The smokeless powder of this country is a nitro-cellulose powder that was made possible by such great chemists as Monsieur Vieille, who, working with Nobel's gun-cotton, placed it in form for Mendeleeff to colloid, and, then, our American chemist, Francis du Pont, introduced the process of dehydrating. The development of this powder to its present form of great stability and ballistic regularity is due to many chemists who have given their entire time to this part of the explosives industry. The problems of the Naval service differ essentially from those of the general military service, in that, with explosives, certain limitations are set by the conditions in which they are stored and used on board ship. Many explosives, prepared for use on shore, are utterly unfit for use in the Navy.

The attempt to avoid excessive erosion was one of the many causes which led to the adoption, in this country, of a pure nitro-cellulose powder as a propellant instead of nitro-glycerine compound used so generally.

There are many new requirements for propellant powders which the Navy hopes to meet with the help of chemists. One is the reduction of flash.

In the field of high explosives, the wet gun-cotton was discarded about 1908, for T.N.T., which is now the accepted high explosive for

mines and torpedoes. During the war, it was necessary to obtain an additional high explosive, one in which toluol was not used, and, for this reason, the Navy adopted a high explosive called T.N.X., which is made by nitrating xylol, one of the lighter oils extracted in the production of toluene. This is not as convenient an explosive to use and handle as T.N.T., but met the situation satisfactorily. This was introduced through the Chemical Research Department of the du Pont Company. Amatol was not used by the Navy to any extent, as it did not stand Naval conditions. Our depth charges, loaded with T.N.T. instead of amatol, which our Allies had been forced to use, were said to be, and apparently were, much stronger than theirs. In fact, German prisoners complained of the exceptional violence of the American depth charges.

In the field of research in connection with automobile underwater torpedoes, there needs to be developed a new source of power. The present source is compressed air and the new source must be of greater potential per unit volume and weight and be nearly as safe to handle and store on board ship. Oxygen has been proposed but is too dangerous to handle.

In the metallurgical line, the Navy demanded a high quality of steel in all gun forgings, and, as a result, there are many more firms now capable of producing such steel than there were before the war, so that the designer is benefited greatly. Special investigations with alloys of steel have been continued and the properties of zirconium for armor plate are still being looked into.

During the war, a large number of pyrotechnic devices, such as smoke-producing apparatus, marker shells, signals, smoke shells, incendiary bombs, and illuminating star shells were worked with and considerable progress had been made along these lines, but it is especially desired to develop this field to much greater efficiency.

The Navy, in gas warfare, was confronted with the fact that whatever gas it developed could occupy a place in a shell so little as not to prevent penetration of the ship's side and

¹ Abstract of an address given at the Philadelphia meeting of the American Chemical Society by Ralph Earle, Rear Admiral, U. S. Navy, chief of Bureau of Ordnance.

subsequent detonation of the shell. Also, the Navy gas mask adopted was of a form such as would make the gun's crew load and handle the guns with the least possible interference, and so this form was considerably different from that adopted by the Armies of the world.

The Navy trusts that the post-war needs will find the chemists and officers of the service much closer together than they were in the pre-war days, and believes that such a condition will take place because we have had the pleasure of meeting so many of your organization and know better to whom to apply to obtain the necessary cooperation and advice.

BUREAU OF ORDNANCE,
NAVY DEPARTMENT

SCIENTIFIC EVENTS

THE WELSH UNIVERSITY AND THE WELSH NATIONAL MEDICAL SCHOOL

IN regard to the plans for the Welsh National Medical School we learn from *The British Medical Journal* that the university deprecates the proposal of the Royal Commission to make the medical school a separate constituent college of the university, thus severing the connection which has hitherto existed between Cardiff College and the school. It is considered that anything which will tend still further to separate the medical students from the general body of students, or to discourage intercourse between the professors in the medical and other faculties, is undesirable from the educational point of view, and it is stated that both the bodies concerned—the university college and the hospital—are opposed to the change. At the same time the university is fully alive to the importance of organizing the medical school as an institution of national and not merely of local concern. It is believed that both these objects can be attained through the revised scheme in which ultimate control is reserved to the university. It is proposed that the college council shall be the chief governing body of the school of medicine, but that it shall delegate to the board of medicine wide administrative and executive functions and powers. Specific proposals have now been put forward with regard to the

remuneration of professors; it is pointed out that the fall in the value of money and the increased scale of salaries now being adopted in England make it clear that unless the University of Wales is to be in a position of permanent inferiority to the modern English universities it will be necessary to fix a scale substantially higher than the minimum figures proposed by the Royal Commission. It is suggested that the figures should be—for professorial chairs £800 to £1,000, for independent lectureships £500, for lectureships £400, and for assistant lectureships £250. Certain special proposals are made with regard to chairs and lectureships in the faculty of medicine. The adoption of the "unit" system is advocated. The medical unit would consist of two full-time teachers, a professor with a salary of £1,500, an assistant professor with £250, and part-time lectures on toxicology and forensic medicine, and on dermatology, £100 each. The surgical unit, it is suggested, should have three full-time teachers, a professor with a salary of £1,500, two assistant professors (one for practical surgery) £1,000; part-time lecturers on orthopedics, genito-urinary surgery, ophthalmology, and diseases of the ear, nose and throat, each to receive £100. The unit of gynecology and obstetrics would have one full-time professor (£1,500) and one full-time assistant professor (£500). There would be also an electrical department with a medical superintendent (£500), and clinics for psychiatry and neurology, pediatrics, dermatology, and dentistry, which it is estimated will together cost £5,000 a year. The salaries of the professors and assistant professors have been fixed on the assumption that having regard to their professorial duties the incumbents would be very largely restricted in private practise.

CONFERENCE ON THE ORGANIZATION OF RESEARCH IN ENGLAND

PART of the scheme devised by the Department of Scientific and Industrial Research for the administration of the funds placed at its disposal by Parliament was the formation of associations among groups of manufac-