REPORTS

WORK OF THE NATIONAL RESEARCH COUNCIL OF CANADA

RESEARCH in Canada, in war as in peace, is an "essential" industry. To an increasing extent Canadian industry to-day is looking to the National Research Council for technical guidance and for cooperative assistance in the solution of their plant, engineering and processing problems. Even more important is the fact that in Canada the Departments of National Defense, of Munitions and Supply, of Transport and the numerous technical missions in the Dominion, use the National Research Council much as large industries use their affiliated research and engineering institutions. Facilities in the council's laboratories have been expanded as required to cope with the growing volume of work as the war has progressed. Committees have been appointed to take charge of highly confidential and secret work, in which category a large part of the council's current activities now belong.

The aeronautical laboratories are used to determine the practicability of new designs of aircraft and engines, improvements in technique in construction and flight, studies in engine performance and the effects of modifications in fuels and lubricants, the design and testing of skis and floats, the checking and repair of aircraft instruments. Tests of aviation gasoline, lubricating oil and other petroleum products for the Department of National Defense, have increased by about 250 per cent. as a result of the war.

A committee on aviation medical research has been established. Tests are being investigated for the selection of air crew men and the tests developed have already been found of great value in the selection of pilots, observers and gunners. High altitude flying not only presents problems in equipment but involves conditions which have a pronounced effect on the flying personnel. Another committee, formerly headed by Sir Frederick Banting and including representatives of the medical organizations and medical schools throughout Canada, is working in close cooperation with the British Medical Research Council. Special problems have been assigned to Canadian scientists and the result of their work is being made available to the Empire's Armed Forces. Great progress is being made in the reduction of infection of war wounds which took such a heavy toll in the last war.

Feeding of the troops presents a most important problem. The Division of Biology and Agriculture cooperated in the preparation of the new ration schedule for the troops in Canada. Studies on the improvement and standardization of the food value of canned products are under way. New ways of stacking stored products and improved methods of forcing air through storage room stacks have been developed. Canadian bacon is ordinarily shipped to England in the pale or unsmoked condition. Since smoking prior to shipment would improve the keeping quality during shipment or subsequent storage, an experimental smoke oven has been constructed to study this problem.

Forest tree breeding is carried on in close cooperation with the Dominion Forest Service and the Department of Agriculture. Several hundred hybrid poplars have been produced in a search for improved species for use as pulpwood, match wood and for windbreaks on the Prairies. Many of these hybrids are very fast growing.

In the chemical laboratories work is being carried on in cooperation with similar laboratories and committees in England, on defensive chemical warfare methods. The Division of Chemistry is working almost exclusively in a cooperative way with departments of government on the testing of supplies and the preparation of specifications. Textiles, leather, colloids, paints, laundering, metal spraying and bonding of rubber to metal are among the subjects on which testing techniques have been worked out and advice given on specifications so that the purchasing of supplies may be put on a sound scientific basis. Research on the production of metallic magnesium has taken on new significance, magnesium being an important metal in aircraft construction. Canadian raw materials have been found well suited to the production of this metal.

In the textile laboratory specifications have been prepared for a number of materials such as tarpaulins, camouflage nets, linings for bullet-proof helmets, cotton summer uniforms for the Navy, Army and Air Force and the extent to which cotton or other types of fibers could be substituted for linen, as, for example, in the case of parachute harness webbing, has been investigated.

The paint research laboratory is cooperating with government authorities and with manufacturers to facilitate the supply of the new highly specialized coatings. The rubber laboratory has continued work on the bonding of rubber to metal which has been widening to include the bonding of latex and synthetic rubber.

Work in the plastics laboratory has consisted largely of minor investigations and test work on a variety of plastics and a major investigation dealing with the use of various plastics and synthetic resins in aircraft construction. A program of test work on leather samples from the Department of National Defense has been carried on in cooperation with the Ontario

Research Foundation. Hundreds of samples from shoe factories engaged in military contracts have been examined. Specifications on shoe leathers have been suggested.

Corrosion studies have been extended to corrosion testing of underwater paints, metals and wire screening for radio equipment, corrosion resistance of certain metals used for construction of boat hulls, effect on metals of lubricating oils, and the corrosion of metals by domestic tap waters and by softened laundry waters.

In the Division of Physics and Electrical Engineering equipment has been developed for measuring the vibration characteristics of various aircraft. Useful results have been obtained. Experiments on defrosting aircraft propellors have shown that the method is likely to be applicable to service conditions. Equipment had been developed and constructed for war purposes in the following connections: (a) penetrometers for use in gas warfare (b) a chronograph for measuring muzzle velocities of guns (c) an electrical plotting device for sound ranging. Numerous tests have also been made on the armoring properties of various materials and work is in progress on the improvement of anti-aircraft projectiles. Fifteen new designs of electric meters or metering apparatus were examined and approval recommended. Investigations have proceeded on the use of Adcock aerials for long wave direction finding especially on imperfect sites and also for short wave direction finding. Extensive experiments have been carried out to determine a method of testing vapor barriers in walls. Considerable work has been done on a by-pass method of control on the heat supply in railway refrigerator cars.

In cooperation with the Department of Agriculture and the Division of Biology and Agriculture about two thousand determinations of minor elements in plant and animal material have been made by spectroscopic methods. In the sound laboratory work includes studies on the cause of flutter in gas mask valves, investigations of special telephone receivers for naval use and other new devices.

Extensive investigations of x-ray methods of inspection of castings, forgings, welds and other war materials have been continued and inspection methods and technique suitable for Canadian requirements have been developed. A small optical shop was established to experiment with various methods of producing precise optical devices and to produce certain precise optical parts for the repair of standard instruments and for the development of new equipment. A vast amount of intricate and detailed planning of heavy electrical machinery down to the smallest modern device is being carried on by the electrical engineering staff.

At the outbreak of the war representatives of the National Research Council, the Ontario Research Foundation and the Dominion Arsenal conferred with representatives of the British Purchasing Mission on the subject of munitions gauges. A gauge laboratory was gradually staffed and equipped at Ottawa and equipment was supplied to a similar laboratory set up by the Ontario Research Foundation at Toronto. Canadian manufacturers have shown an aptitude for the production of fine precision parts that bids fair to render Canada independent of outside supplies.

The National Research Council is making a substantial contribution to Canada's war effort.

SPECIAL ARTICLES

DIABETES AND INFLAMMATION[1,2]

THE condition of diabetes mellitus is known to become markedly intensified when complicated by inflammation or infection. No satisfactory explanation has ever been offered to account for the basic mechanism involved. The inflammatory reaction tends to be concomitantly increased in severity and there seems to exist a lowered resistance to infections. There are some observations indicating a diminished capacity for antibody production and a reduction in the bactericidal power of the blood.[3] The present observations attempt to explain both the enhanced degree of diabetes and the associated increased severity of the inflammatory reaction in diabetic dogs having a superimposed acute pleural inflammation.

All observations were made on dogs rendered diabetic by pancreatectomy. It is to be recalled in this connection that although this type of diabetes has many obvious points of similarities with the human form, nevertheless there are several points of differences.[4] Three groups of animals were studied as follows: (1) dogs having a pleural inflammation induced by the introduction of 1.5 cc of turpentine; (2) depancreatized dogs with a pleural inflammation induced by the same irritant, but receiving no insulin immediately preceding and during the period of inflammation; (3)

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[2] The author had the assistance of Mr. M. A. Kadish. In the course of this study aid was also received from Miss Irene Lapouse and from Miss Joan Malkenson.

[3] R. Richardson, *Jour. Clin. Invest.*, 12: 1143, 1933; 19: 239, 1940.

[4] C. N. H. Long, Harvey Lectures, 1936–1937, p. 194, Williams and Wilkins Company, Baltimore.