SCIENTIFIC AND INDUSTRIAL RESEARCH IN CANADA

THE twenty-fourth report of the National Research Council of Canada, 1940–41, includes the report of the president together with the reports of the directors of the various divisions (National Research Council of Canada. N.R.C. No. 1002: Twenty-fourth Annual Report of the National Research Council of Canada, 1940–41. Pp. 28. Ottawa: National Research Council of Canada, 1941). The former well indicates the extent to which Canada's scientific resources are being mobilized in support of the war effort. In addition to its former role the Council is functioning as a research station for the three fighting services of the Department of National Defence and also for the Departments of Munitions and Supply, and the president's report refers to the way in which the National Research Council has been able to turn its peace-time programme almost overnight into one of service in war. For example, the Section on Metrology of the Division of Physics and Electrical Engineering has been expanded to provide the organization required for gauge-testing, and to date there has been no delay whatever in dealing with this aspect of production. Similarly, the Radio Section was immediately turned to the development of secret radio communication and has made important contributions in the development of prototypes. The Section on Optics has dealt with the problem of optical glass and the manufacture of fire-control instruments, with the result that a well-equipped factory is already operating in Canada for the manufacture of optical glass and a wide range of fire-control instruments. The Section on Radiology immediately turned its attention to industrial radiology and has organized laboratories and trained personnel for inspecting castings at the various industrial plants. The Section on Electrical Engineering has been engaged on the design and production of secret gear and equipment in connexion with naval protective devices, while the Section on Acoustics has been devoting its entire attention to acoustic problems for the navy and the Section on General Physics has done much valuable work on the design of instruments, ballistics, etc.

In the Division of Chemistry the laboratories devoted to textiles, leather and rubber have been engaged in testing war materials, developing substitutes and the preparation of specifications for war materials. Research on the manufacture of ethylene glycol by direct oxidation has been continued with special reference to the stability of the catalysts. All research on methods of defence against chemical attack excepting training phases is directed by a special committee of which a member of the National Research Council is chairman and technical officers of the Department of National Defence and of the laboratories are members. This Committee has organized and directed more than twenty research projects with the various university laboratories and in the Chemistry Division at Ottawa, as well as supervised the manufacture of all the gas masks in Canada. In the Mechanical Engineering Division the wind tunnels have been engaged on many miscellaneous projects in aerodynamics, and extensive co-operative investigations on lubricating oils and fuels have been undertaken. The model-testing basin is engaged in studies in connexion with boats and floats, and considerable fundamental work has been done by the Division in the use of moulding plastic plywood construction. The Division of Biology and Agriculture has been concerned with many problems in the storage and transport of food which have become of prime importance owing to the difficulty of transport across the Atlantic. Medical research work has been carried out in close co-operation with technical officers of the Royal Canadian Army Medical Corps, and leading medical research men of Canada are working vigorously on important phases of war medicine. The National Research Council was also largely responsible for the organization of Research Enterprises Ltd., a Government-owned company formed for manufacturing certain special secret equipment from prototypes developed by the National Research Council. The report also refers to the intimate liaison established with the British Government and with research workers in Great Britain, and to the work of the Division of Physics and Electrical Engineering in selecting Canadian university men for special war service in the British Navy.

NEW SPECTROGRAPHIC OBSERVATIONS OF PECULIAR STARS

NEW spectrographic observations of peculiar stars were discussed by O. Struve and P. Swings, of the McDonald and Yerkes Observatories, at the Autumn Meeting of the U.S. National Academy of Sciences held during October 13–15. The McDonald Observatory of the University of Texas (which is operated jointly by the University of Chicago and the University of Texas) is equipped with a powerful ultra-violet spectrograph. Two large crystal quartz prisms and lenses of quartz or of ultra-violet glass transmit stellar radiations to the limit imposed by the ozone bands in the atmosphere of the earth. During the past two and a half years this instrument has been used to record the spectra of a number of peculiar stars which had heretofore been investigated only in the ordinary photographic region of the spectrum. The ultra-violet region of the spectrum contains many important features: the limit of the Balmer series falls in the near ultra-violet where the lines crowd together and where photo-electric ionizations produce a marked discontinuity in the distribution of the continuous spectrum.

Among the results obtained are several remarkable cases of changes in the spectra. Perhaps the most spectacular case is that of γ-Cassiopeiæ, which a few years ago was a normal emission line *B* star, and which in 1940 had an almost pure absorption spectrum with very sharp lines, while at the present time the absorption lines are broad and very diffuse. We know that the emission lines come from a tenuous shell around the star. For some, as yet, obscure reason the shell began to change a few years ago. The authors suspect that it started closing in towards the star, producing an intermediate stage spectrum of sharp lines. Finally, early in 1940, the shell must have largely fallen into the reversing layer of the star.

The opposite series of events has taken place in several other stars (*Z* Andromeda, *AG* Pegasi), where a new shell recently formed has expanded and has, in the case of *Z* Andromedæ, progressed from the sharp-line absorption spectrum to an almost pure emission spectrum.