

shown rapid advance. This has created new problems but has provided even greater opportunities for undertaking sizable projects which could not have been attempted otherwise and has thereby tended to knit the university into the very warp of industry.

Research conducted in the universities falls into three broad categories: projects undertaken by the student under the guidance of a professor or committee to meet requirements for an advanced degree; research undertaken by the professor, which may be of a more or less continuous nature; and larger research projects undertaken co-operatively on a faculty or interfaculty basis in university laboratories or in such specialized institutions connected with the university as medical research laboratories, institutes of microbiology and hygiene, science service laboratories and faculties of agriculture.

Some idea of the increase in research undertaken by Canadian universities may be obtained from a comparison of the situation in 1919 with that in 1961. In the former year, two universities—Toronto and McGill—offered graduate courses beyond the master's degree and graduated 11 students; in 1961 Ontario had five, Quebec three and six other provinces each had one major university offering graduate courses leading to the Ph.D. degree. They conferred 305 doctorates in course, distributed by fields as follows: biological sciences, including medical and agricultural sciences, 81; engineering and applied science, 19; humanities, 59; physical sciences, 101; and social sciences, 45. Subject matter covered in these courses and other research conducted by university professors and reported in professional journals is encyclopaedic and reflects specialization and variety. Outstanding research in particular fields has become associated with various universities, for example: nuclear research and geophysics in McGill, Queen's, McMaster and Saskatchewan; medical research in such institutions as the Connaught Laboratories and the Montreal Neurological Institute; agricultural research in the western universities; and fisheries research in British Columbia.

Outside financial support for university research comes primarily from four sources: agencies and departments of the Federal Government including the National Research Council and Defence Research Board, which provide grants for approved and contracted government-sponsored research; industry, which supports both basic and applied research; private foundations, which provide grants for approved research, sometimes in selected fields; and provincial governments.

Subsection 5.—Industrial Research

Industrial research in Canada is changing very rapidly. In the past, industry in general was largely unaware of the value of research to its own development and to that of the country, partly because many Canadian companies were subsidiaries of companies in Britain and the United States and partly because small companies found it impossible to finance their own research. The problem was accentuated by the vast size of the country, the absence of concentration of similar industries and the proximity to the relatively large research facilities of the United States.

However, the emergence of Canada as a highly industrialized society, its entrance into multitudinous fields of production, the rapid growth of many large nation-wide industries, the serving of a discriminating domestic market and the meeting of competition from abroad have had the effect of making Canadian manufacturing establishments research conscious and many of the larger ones now possess competent research organizations.

Industrial Research-Development Expenditures.*—The most recent survey of expenditures on industrial research in Canada was conducted during the first half of 1960 and provided figures for the calendar year 1959 and preliminary estimates for the year 1960. The next survey will be conducted in mid-1962 and data for 1961 and 1962 should be available by the end of 1962. The survey in its present form was started in 1958 when figures for the years 1957 and 1958 were collected.

* Summarized from DBS publication *Industrial Research-Development Expenditures in Canada, 1959* (Catalogue No. 13-516).