

situation in 1955. In 1955 Ontario had four, Quebec three and six other provinces each had one major university with graduate facilities and conferred 294 doctorates in course, distributed by fields as follows: biological sciences, including medical and agricultural sciences, 83; engineering and applied science, 6; humanities, 50; physical sciences, 115; social sciences, 38; and unclassified, 2. Subject matter covered in these and reports of other research conducted by university professors and reported in professional journals is encyclopaedic and reflects specialization and variety. Outstanding research in different fields has become associated with various universities, for example: nuclear research and geophysics in McGill, Queen's, McMaster and Saskatchewan; medical research in the Connaught Laboratories and in the Montreal Neurological Institute, to mention two; agricultural research in the western universities; and fisheries research in British Columbia.

Outside financial support for university research comes primarily from three sources: Departments of the Federal and Provincial Governments and 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; and private foundations which provide grants for approved research, sometimes in selected fields.

Expansion of facilities and the organization of personnel for research is not haphazard but the result of policy decisions. The present trend is towards the selection of department heads with consideration of expansion of research and the co-ordinating of research within broad fields.

#### 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 the United Kingdom 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. The fields covered by some of these industries are outlined in the 1956 Year Book at pp. 386-389. The research work of the Canadian Pulp and Paper Association, an independent corporation combining efforts of government, university and industry in the expanding field of pulp and paper research, is described in the Forestry Chapter of this volume.

**Industrial Research-Development Expenditures in Canada, 1955.**—A survey was conducted in 1955 of some 2,500 of the larger industrial firms in an attempt to measure the extent of the research program being undertaken and to obtain an indication of its direction. From this survey information was secured on research costs incurred by Canadian companies—both direct expenditures, and cost of purchasing research-development results from affiliates or from other companies located in Canada and in foreign countries. Data were also secured on the principal fields in which the research was carried out and on the number of professionally trained research personnel employed. The magnitude of the research-development costs in 1955 and the increase planned for 1956 give an indication of the size of the program and the direction in which business is searching for new products, for new and more efficient processes and for improvements to existing products and techniques.