

## Biotechnology in Finland

a report by

**Academy of Finland**

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Finland has an enviable record in developing knowledge-based industry underpinned by strong public investment in research and training. The most obvious success is the information and communication technology (ICT) sector. The impressive commitment of Finland to scientific and technological development is reflected at the political level in the existence of a top-echelon Science and Technology Policy Council, chaired by the Prime Minister. The Council is responsible for the strategic development and co-ordination of Finnish science and technology policy, as well as the national innovation system as a whole; it advises the government and the ministries related to science and technology.

### Public Sector and Universities

In the public sector, which consists of general government, public Research Institutes and the private, non-profit sector, the volume of biotechnological research in 2000 totalled €24.1 million, or 4.8% of the total public sector research and development (R&D). Among the most important research organisations were the institutes focusing on technical, agricultural and health research. In the higher education sector, the volume of biotechnological research in 2000 was 91.1 million, or 11.5% of the total higher education sector R&D. Ten out of the 20 universities in Finland are active in biotechnology research. Thus, the overall share of biotechnology in all public research (public sector and higher education) was 9.0% in 2000.

In the public sector, the relevant institutions were selected by expert opinion. Statistics Finland investigated the proportion of biotechnology research in the selected units. The Organisation for Economic Co-operation and Development (OECD) definition of biotechnology was used in the instructions. As for the universities, their departments and their activities in biotechnological research were evaluated by the Academy of Finland. Polytechnics and central university hospitals were not included in the enquiry. Thereafter, the volume of biotechnology research was calculated from the R&D survey databases at Statistics Finland.

### Business Enterprises

Due to limitations of the study, only the total volume of R&D of the firms actively engaged in biotechnological research is available, which means that the proportion of biotechnology R&D in the business enterprise sector cannot be estimated. Thus, the figures constitute a kind of upper limit of biotechnological research in enterprises.

Biotechnology firms account for about 7%, or €233 million, of the total R&D expenditure. In all manufacturing firms with 10 or more employees, firms practising biotechnological R&D employ approximately 13,000 persons, or 3.3% of the total employment in manufacturing.

It seems that even if the proportion of biotechnological research could be measured, the chemical industry would dominate. The crucial contribution comes from the major pharmaceutical companies. The figure for the R&D branch probably closely reflects the true volume of biotechnology research, since the firms are rather small and usually oriented towards one field of research. In all, even though we have not been able to measure the exact proportion of biotechnological R&D, its role is small compared with electronics, the dominant industry in Finnish R&D, accounting for 55% of all R&D in business enterprises.

The firms that are active in biotechnological research were identified by Finnish Bioindustries, which is Finland's biotechnology industry association. The R&D figures were produced by Statistics Finland.

### Patents

Applications for biotechnology patents only constitute a minor proportion of all domestic patent applications. During recent years their share has even fallen from 3% to 1.6%. One explanation may be that Finland joined the EPO (European Patent Office) in 1996, which also decreased the overall number of domestic patents.

The dominant field among the few biotechnology patent applications has been the International Patent

Table 2: R&amp;D in Firms Practising Biotechnology by Branch in 2000

Branch	Total R&D	R&D in firms practising biotechnology	
	million	million	%
Food products (SIC 15-16)	€62.7	€37.0	59.0
Chemicals, incl. Pharmaceuticals (SIC 24-25)	€231.0	€117.4	50.8
Research and development (SC 73)	€135.8	€24.8	18.2
Other branches	€2706.5	€43.7	1.6
Business enterprises total	€3,135.9	€222.8	7.1

Table 1: Biotechnology Patent Applications Filed in 1995, 1999 and 2000

Year	Domestic total N	Biotechnology applications	
		N	%
1995	6762	194	2.9
1999	3083	69	2.2
2000	3137	50	1.6

Classification (IPC) category C12N, micro-organisms

or enzymes, under which two-thirds of the annual applications have been classed.

Even by international comparison, Finland has a rather low rate of biotechnology patenting. According to OECD figures for 1997, biotechnology patents accounted for 1.3% of the total number of Finnish patents filed at the European Patent Office (EPO). This is clearly below the OECD average of 3.5%. The Academy of Finland will be releasing new biotechnology data in spring 2006. ■

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