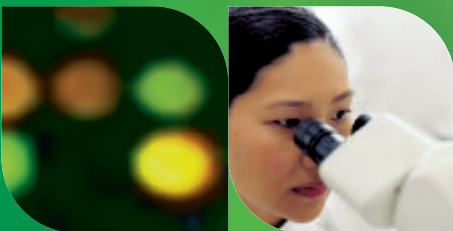




Annual Report

VIB activities in 2001

2002



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Technology transfer and job creation

VIB's core activity is without a doubt strategic basic research. Nevertheless, VIB is also expected to be a driving force for increasing employment in the biotechnology sector and in Flanders. The best approach is through professional development of technology transfer activities.

The question is, is focusing on technology transfer in conflict with VIB's core activity - generating knowledge and increasing basic research quality? On the contrary, there are many indications that successful technology transfer is directly dependant on the amount and quality of basic research. There should therefore be continuous and sufficient investment in Flanders in high quality basic research and modernisation.

Yet top-level research is in itself not enough for initiating economic activity. It is essential that academic inventors are convinced of the importance and necessity of technology transfer and are surrounded by experts. The government must ensure that start-up companies find the right environment, regulations and incentives. Rights of ownership of research results obtained with government funding, realising the importance of a proactive policy with regard to industrial rights of ownership, stimulating bio-incubator facilities and services, facilitating very early and inevitably high risk investment in pre-commercial R&D projects, are all elements that are crucial for the success of technology transfer efforts.

This is, of course, the challenge - as the distance between the concept and making technology attractive enough for investors is on the increase due to the growing success of the sector. For this reason, a proactive technology transfer policy will become increasingly important over the next few years. Technology transfer is much more than licensing or spinning out university research results. Many other tasks such as encouragement and making money available, expanding incubation laboratories, providing a variety of services (financial, administrative, legal, etc.), interacting with a network of business opportunities, providers of risk capital,

patent authorities (such as town and country planning bodies, environmental permits), university administrations, pharmaceutical companies, etc., are essential links in the process of technology transfer.

Bringing all these competences together and harmonising them is a challenge in itself. In this matter, VIB can be an important catalyst and driving force. It is obvious that it is a serious challenge to find, recruit and keep the high quality staff needed for these demanding jobs. In this case, it is also necessary to involve staff in the success of their efforts to establish new and successful start-up companies. Due to earlier government investment and for the creation of many new jobs, it is important that the technology transfer group operates effectively. We should therefore ensure that the technology transfer activities of VIB and of Flanders are allowed to develop their full potential.



Hugo Van Heuverswyn
Chairman Board of Directors

VIB: a research environment full of challenges and opportunities

When VIB was set up in 1996, we faced an enormous challenge: will we succeed in generating enough high-level scientific renewal to place VIB and Flanders on the world map and convert our knowledge into industrial and social added value for Flanders?

Now, six years later, we can look back with a certain amount of pride and satisfaction. For example, the scientific articles in mainly high-ranking and top journals have more than doubled since VIB was set up. The limited number of patent requests

dating from the pre-VIB period has risen to approximately 25 annual priority requests. Dozens of industrial cooperation agreements and three biotech start-up companies (together employing 175 people in Flanders) are the direct result of scientific focus and the group's structural technology transfer.

These and many other results were highly appreciated by the international evaluation teams that investigated VIB. The cost-benefit analysis that was made has meanwhile resulted

in a new five-year management agreement between VIB and the government of Flanders worth 140 million euro (for five years). VIB is very grateful to the government of Flanders for this recognition and continuous financial support.

Naturally the government of Flanders has high expectations regarding this investment. In the new management agreements, they are translated into qualitative and quantitative performance criteria. These criteria confront VIB with a new task: to change into a mature, high performance research institute, aimed at the scientific, industrial and social challenges of the post-genome era.

These challenges are tough but stimulating at the same time. If we want to continue to present Flanders as one of the prominent biotech regions in Europe, we are obliged to constantly enrich the field of knowledge with innovations. New scientific and technological breakthroughs are VIB's foundation and also its main objective. What it comes down to is (i) stressing the correct programmes and focusing attention on highly relevant scientific questions for every operational VIB unit, (ii) ensuring that the various departmental and institutional research groups join forces so that they produce significant added value.

The key to all of this is attracting, training, selecting, stimulating and keeping talented people at all levels in the organisation. In the future management period, special attention will be paid to increasing the responsibility of group leaders, training young talent in Flanders to give them a basis for an academic or industrial career and generating an international and challenging mix of talented scientists and technicians in the VIB laboratories where stimulating discussion and interaction form a natural progression to front-line innovations. Together with a prominent institutional scientific advisory board, a programme of integral quality care and renewal will be worked out which will stimulate future opportunities in Flanders.

To be able to cope with this challenge, VIB must create an environment that stimulates talent. The major ingredients are stable financing, a modern infrastructure and access to advanced technology. The new management agreement provides an important financial backbone and stability. This investment can only fully pay off if researchers have access to an area that is adapted to the needs of future-oriented research in life sciences. For this reason, a structural solution to the current accommodation problem of the VIB research teams is being worked out for the coming management period.

Facing the challenges of the post-genome era and the pursuit of front-line breakthroughs require adapted technology and focused research strategies. Over the next few years, VIB will pay extra attention to developing and attracting advanced (post-genome) technology. This must not only be integrated in VIB research laboratories but should immediately represent an asset for Flanders. For this reason, the institute intends to distribute institutional knowledge and nuclear technology throughout the entire academic and industrial community of Flanders.

The economic and social objective of innovation is to create prosperity and well-being. Building a bridge between innovation and economic or social value requires active technology transfer. VIB wants to apply itself to this completely. In its first life cycle, VIB built up a detailed patent portfolio, which will be actively extended over the next few years and will be the basis for interaction with the Flemish and international bio-industry. As part of the new framework agreement, VIB has strengthened interaction and cooperation with its university partners. This should offer Flanders the chance to combine its technologies and to maximise its chances for new industrial opportunities and added value.

Creating new start-up companies and their expansion in Flanders is now more than ever a priority. Over the past five years, the amount of purely bio, high-tech companies based in Flanders has increased fivefold. These companies deserve an environment that allows them to develop into stable international players while being based here in Flanders. One of the challenges for VIB and for Flanders is to identify the needs and solve them in good time or even to anticipate them. This requires sensitivity and unanimity at various policy levels in Belgium and in Flanders. Only then Flanders can continue to develop as a bio and high-tech region of excellence in Europe.

The VIB community has put its shoulder to the wheel and is actively ready to face the challenges of its second life cycle.



Jo Bury & Rudy Dekeyser
General Management VIB

A Flanders research institute with international ambitions

VIB, the Flanders Interuniversity Institute for Biotechnology, is an entrepreneurial research institute where 750 scientists and technicians conduct gene technology research in various domains of life sciences such as human health care and plant genetics. Through a close joint venture with four universities of Flanders (the UA in Antwerp, the VUB in Brussels, the RUG in Ghent and the K.U. Leuven in Leuven), VIB combines the force of nine university research teams in one institute. As part of this joint venture, both partners (VIB and the universities involved) invest equally and long term in a limited number of carefully selected research groups. Both partners share the profits from the investment. This cooperation in one institute also yields immediate added value for the various partners and their academic, industrial and social surroundings.

Together with its partners, VIB wants to create a basis for a better standard of living and has developed three complementary core activities for this purpose.

1. VIB supports and continues to expand strategic basic research. VIB guarantees scientists stability and quality in their research assignment and offers them a stimulating work environment.

Working in the front line of science requires the effort of state-of-the-art technology. VIB invests, centrally as well as locally, in an extensive highly technological platform. In 2001, the Micro Array Core Facility became operational and preparations were made for the establishment of the Proteomics Core Facility which can identify hundreds of proteins a day. In addition, in cooperation with the RUG, a new building was started for the two largest VIB research departments.

2. VIB pursues an active patent and licensing policy. New technology and inventions that come from strategic basic research are valued in both industrial and social terms.

In 2001, VIB submitted patent requests for 29 new inventions. In addition, VIB entered into 22 cooperation agreements that year with the business world exceeding the 100 ceiling. VIB's camel anti-body technology platform formed the basis of setting up a new company - Ablynx. To increase the start-up chances of young biotech companies, the VIB bio-incubator was extended with four new suites.

3. VIB supplies public information based on scientific data to support an objective and scientifically based social debate on biotechnology.

In 2001, VIB organised an exhibition called 'Eet es genetisch' about biotechnology in farming and food. This interactive exhibition was visited by over 16 000 people. Two debate evenings were organised in the course of the exhibition. After these evenings, panels of layman wrote down their conclusions in a text that was handed over to the chairman of the Parliament of Flanders. In addition, the school project 'farmers@work' was launched in which pupils and teachers work together on projects concerned with farming and food.

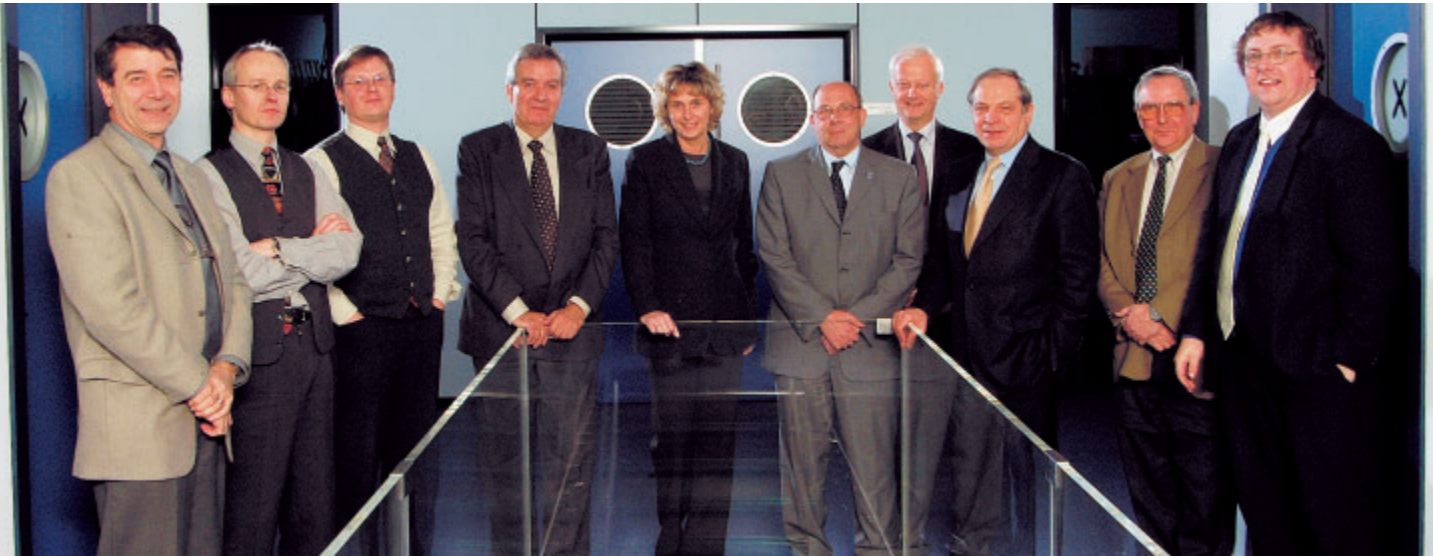
An autonomous structure

VIB is a non-profit organisation managed by a general meeting and a Board of Directors. The general meeting consists of 33 members. The Board of Directors consists of 13 members - six delegates from the Flemish universities, four company delegates and three authorised representatives from the government of Flanders. VIB is an autonomous institute that makes its own decisions. The general management, run by Jo Bury and Rudy

Dekeyser, assures the daily management of the institute. Scientific directors who head the nine VIB research departments are responsible for the scientific management.

The Flanders government investment in VIB is governed by a long-term management agreement. The first management agreement ran from 1996 to 2001. Through this management agreement, the government of Flanders imposes a number of objectives on VIB. To achieve them, the government of Flanders gives VIB an annual donation that came to 26 million euro

Board of Directors, government administrators and general management (from left): Albert Van Loo, Jo Bury, Rudy Dekeyser, Freddy Adams, Michèle Oleo, André De Leenheer, Roger Bouillon, Gustaaf Van Reet, Jacques Lemonne, Bart De Moor



in 2001. Two government officials who closely follow up government investment in VIB activities attend the meeting of the Board of Directors.

Cost-benefit analysis

In 2001, VIB's results were subject to a cost-benefit analysis. To do this, the government of Flanders invited two international audit teams who thoroughly investigated management, policy, structure, and VIB's processes and achievements. The audit's results formed the basis of the new management agreement between VIB and the government of Flanders for the 2002-2006 period. The annual donation provided in this case is 27.8 million euro. The underlying audit of the scientific competence of the nine VIB research departments led to a thorough rearrangement of the research budgets for the various departments. One of the nine departments will be replaced by a new department in 2002 which will be selected as a result of an open tender organised by the IWT (Institute for the Encouragement of Innovation through Science and Technology in Flanders).

Centre for bio technological expertise

With its 750 scientists and technicians, VIB is a leading centre in the field of life sciences in Europe. The institute was able to occupy this position due to the sizeable structural basic funding it gets through Flanders government donations. This donation finances approximately 40% of VIB's research in the nine VIB departments. This research is regularly subject to the critical

analysis of specialised and international scientific advisory boards.

VIB is thus able to guarantee world-class research. In 2001, VIB researchers produced 126 articles in high-ranking journals, of which 42 in top journals.

A network of contacts

Biotechnological research goes beyond VIB's virtual walls. VIB researchers closely cooperate with top Flemish and foreign scientists in a competitive, international environment. The past few years they have succeeded in strengthening their world-wide reputation.

In just a few year's time, VIB has developed an interesting network of Flemish and international contacts in the biotech industry. The network in Flanders is clustered around VIB through the 'VIB industrial network' association. Currently, it has around 50 members from the world of industry in Flanders. The network offers the Flemish bio-industry privileged access to VIB research. In addition, VIB network's afternoon meetings are responsible for the promotion of industrial interaction in Flanders.

Interprofessional cooperation and contacts with academics from many fields and various social players form a strong basis for providing the general public with scientific facts.

“The human genome underlies the fundamental unity of all members of the human family, as well as the recognition of their inherent dignity and diversity. In a symbolic sense, it is the heritage of humanity.”

Universal Declaration of the Human Gene and Human Rights, 1997.

Health

For a **FASTER DIAGNOSIS** and **BETTER TREATMENT**

The unravelling of the human genome sequence is a fundamental step towards knowing ourselves. In the long term, applying this knowledge will benefit everyone in the world. We have more understanding of how we become ill, how we can determine it sooner and how we can efficiently develop drugs.

VIB researchers are also at the front line of biomedical research. Based on the genome, they expose molecular processes in the human cell and gather knowledge from it leading to better medical science.

HERE ARE SOME OF THE HIGHLIGHTS FROM VIB'S RESEARCH IN 2001.
MORE DETAILS CAN BE FOUND IN VIB'S SCIENTIFIC REPORT 2002.

Side effects of cancer drugs reduced

Tumour necrosis factor (TNF), a signal protein that activates the immune system, is an excellent cancer drug. Under influence of TNF, tumours shrink significantly. Unfortunately, the drug has very serious side effects including a drop in blood pressure level and inflammations of the liver. For this reason, TNF is rarely found in an oncologist's medicine cabinet.

Claude Libert and his team at the VIB department for Molecular Biomedical Research (RUG) discovered that a well-known drug, Batimastat, suppresses the disastrous side effects on the liver of TNF. Administering a combination of TNF and Batimastat to mice with cancer resulted in the tumours completely shrivelling up. The mice stayed healthy without a trace of TNF's known side effects. Mice that were only given TNF succumbed to the side effects. Libert and his team believe TNF will soon be starting a new career as a potent cancer drug.

Wielockx *et al.*, *Nature Medicine*, 7, 1202-1208 (2001).

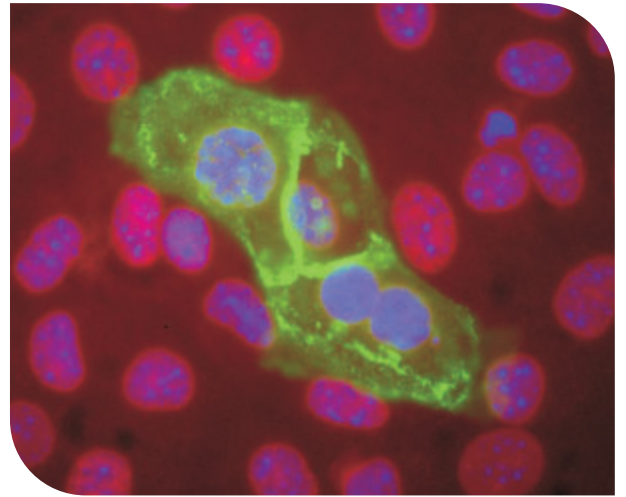
Metastasised cancer and rivets

Cancer cells that break free from a tumour spread via the lymphatic vessels and the bloodstream to other parts of the body. They grow into new tumours that are responsible for 90% of all cancer-related deaths.

Metastasis, or the spreading of the cancer, is only possible if the normal adhesive strength between the cells is lost. Researchers of the VIB department for Molecular Biomedical Research (RUG) managed by Frans Van Roy, have previously demonstrated that the E-cadherin protein plays a crucial part in adhesive strength. E-cadherin forms 'rivets' that link neighbouring cells to each other. In the case of cells that break loose or spreading tumour cells, the amount of rivets is much lower than normal.

Up until now, it was not clear why tumour cells produce less E-cadherin than other cells. Researchers from the VIB department of Developmental Biology (K.U.Leuven), managed by Danny Huylebroeck, found a molecular answer. They had been examining the SIP1 protein for some time. This protein connects itself to the DNA and switches genes on or off. In the case of aggressive tumour cells, the E-cadherin gene is purposefully eliminated by SIP1. The Ghent and Leuven researchers decided to cooperate to find out if one fact had to do with the other. During collective experiments, they discovered a clear connection between the increasing concentrations of the SIP1 protein in the tumour cells, a decrease of E-cadherin rivets and a weakening of adhesive strength between the cells. There is now a clear lead for unravelling the process of cancer metastasis.

Comijn *et al.*, *Molecular Cell*, 7, 1267-1278 (2001).



A dye makes SIP1 (red) and E-cadherin (green) visible.

Preventing thrombosis

Thrombosis is caused by blood cells clotting in a blood vessel. It can be fatal. Most patients experience thrombosis in the leg veins. The danger is the clot being released and ending up in the narrow vessels of the lungs which leads to pulmonary embolism. The disadvantage of drugs that fight unwanted coagulation like this is that they also curb normal coagulation.

Research undertaken by Peter Carmeliet and his team at the VIB department of Transgene Technology and Gene Therapy (K.U.Leuven) isolated the 'growth arrest specific 6' protein (Gas6) in the case of the formation of unwanted blood clots. Carmeliet created knock-out mice in which both copies of the Gas6 gene were eliminated. These mice form hardly any blood clots in their blood vessels. However, their coagulation was normal. From the numerous physiological experiments carried out by researchers in Leuven, it can be concluded that the Gas6 protein does not in fact crank up the coagulation process but strengthens it. This can cause unwanted coagulation, which can result in thrombosis and embolism.

Carmeliet's research may well offer new possibilities for the development of drugs. These drugs must tackle the problem of thrombosis head on without interfering with normal coagulation.

Angelillo-Scherrer *et al.*, *Nature Medicine*, 7, 215-221 (2001).

Reduction in blood supply possible cause of muscular disease

The cause of amyotrophic lateral sclerosis (ALS), a muscular disease that British astrophysicist Stephen Hawking suffers from, was a mystery up until recently. It is known that in the case of ALS, the nerve endings that run to the muscles deteriorate, which results in the patient losing control over his muscles and becoming motor disabled. ALS affects five out of one hundred thousand people and almost half the patients die within three years. Some survive ten years or longer.

Even though it is a serious disease with a high impact, its origin remains obscure. However, research undertaken by Peter Carmeliet and his team at the VIB department of Transgene Technology and Gene Therapy (K.U.Leuven) offers new and surprising insights. Carmeliet examined mice whose gene promoter for the vascular endothelial growth factor (VEGF) had been changed. This protein is an important signal substance that controls the growth and permeability of the blood vessels. If a tissue has a lack of oxygen, the protein is produced in large quantities, which results in the growth of new blood vessels allowing oxygen to increase. In the case of these Leuven knock-out mice, the VEGF gene is no longer connected if the cells lack oxygen.

To his great surprise, Carmeliet found that the mice showed all the external symptoms of a motor nerve disease after about five months. On closer examination, the mice had ALS: the nerve endings in the spinal cord and in the brainstem that run to the muscles had died which caused the muscle cells to weaken and eventually disappear. The lack of VEGF must be linked to this.

For Carmeliet and his research team, it is not yet completely clear how a lack of VEGF gets in the way of the survival of motor nerve cells. There is probably a reduction of blood supply to the nerve cells in the case of the altered mice. There is also a possibility that VEGF directly attaches itself to the receptors on the nerve cells as a signal substance that protects against cell death. In the altered mice, the amount of VEGF needed for these protective signals is probably too low. Up until now, no one made the connection between proteins that are responsible for blood supply and ALS. The new insights of the Leuven team will thus cause a revolution in ALS research.

Oosthuyse *et al.*, *Nature Genetics*, 28, 131-138 (2001).

The hunt for the cause of hereditary neuralgia

Hereditary Neuralgic Amyotrophy (HNA) is a disease in which the nerve endings in the upper arms deteriorate. Patients suffer a lot of pain and eventually the muscles of the upper arms weaken and even die. In some families, this disease is hereditary.

Vincent Timmerman and Peter De Jonghe of the VIB department of Molecular Genetics (UA) are investigating the genes responsible for this disease. First, they looked at a small area of chromosome 17. According to the researchers, a mistake (mutation) in a gene in that area causes the disease, at least in some families. In reality it was more complicated than that. The researchers found patients with a very similar disease pattern where the defective gene is not on chromosome 17 but elsewhere in the genome. This does not make the search any easier. With their contribution, the Antwerp researchers have put anyone hunting for the HNA genes on the right track.

Kuhlenbäumer *et al.*, *Journal of Neurology*, 248, 861865 (2001); Meuleman *et al.*, *Neurogenetics*, 3, 115-118 (2001); Meuleman *et al.*, *Human Genetics*, 108, 390-393 (2001).

Alzheimer protein as guide dog

Alzheimer is a tragic disease. Millions of people suffer from it. They slowly lose their mental abilities. They suffer from memory loss and their thinking and learning abilities are impaired. The patients gradually lose their personality and mentally waste away completely.

During the past few years, the molecular mechanism of Alzheimer has been increasingly unravelled. This is partly because of the work done by Wim Annaert and Bart De Strooper of the VIB department of Human Genetics (K.U.Leuven). The thread of both researchers' work is the presenilin-1 (PS1) protein. PS1 is involved in cutting up and disposing of the amyloid precursor protein (APP). However, this sometimes goes wrong and a poisonous amyloid peptide is created which precipitates in the brain and causes Alzheimer disease.

PS1 has, however, many other functions. According to the researchers in Leuven, PS1 accompanies the telencephaline protein to the cell membrane of the nerve cells. Without PS1, telencephaline would lose its way in the cell. Whether there is a connection between this new function of PS1 and Alzheimer is less clear. In any case, telencephaline is very important for the mutual anchoring of the nerve cells in the frontal lobe. It is this brain area that is very important for our cognitive functions which go wrong with Alzheimer patients.

According to the researchers, it seems increasingly likely that the presenilin proteins form important links in various development and communication channels of the nerve cells.

Annaert *et al.*, *Neuron*, 32, 579-589 (2001).

Defective RNA transporter

Most genes are converted into proteins. Proteins are the biomolecules that not only ensure cell structure but also accompany all reactions necessary for the survival, growth, division and functioning of the cell. The conversion of DNA into proteins takes place in two steps. First the gene in the nucleus is copied to a more mobile molecule, the messenger RNA, and then this RNA is converted into a protein. Both steps take place in two completely different compartments of the cell. Conversion to RNA takes place in the nucleus; conversion to the protein in the cytoplasm. Because the messenger RNA is much smaller than DNA, it can easily make the journey from the nucleus to the cytoplasm. However, the messenger RNA cannot find its way by itself. Proteins that know the way, such as the NXF5 protein, must guide it.

Guy Froyen and Peter Marynen of the VIB department of Human Genetics (K.U.Leuven) discovered that the NXF5 gene was interrupted in a patient with a mental disability. NXF5 is probably not a universal transporter that accompanies all messenger RNAs during their journey. It seems that NXF5 is only used in the brain and probably only in a certain phase of development. If NXF5 is missing during this phase in its life, the brain does not develop as it should and a mental handicap develops.

Jun *et al.*, *Current Biology*, 11, 1381-1391 (2001)

Thanks to the camel

Antibodies are complex proteins of the immune system. They protect the body against intruders such as bacteria and viruses. Each antibody is geared towards one specific intruder. Antibodies consist of a complex structure of four sub-units. The variability between antibodies is almost endless. The commercial use of antibodies is on the increase. They are used in diagnostic tests but also as a cancer drug and for treating rheumatoid arthritis or Crohn's disease. However, the production of antibodies is not easy and is still very expensive.

Camels and llamas have extremely simplified antibodies in their blood, yet they are as efficient as ours. The research team led by Serge Muyldermans of the VIB department of Immunology, Parasitology and Ultrastructure (VUB) examined how camel antibodies developed during evolution. The researchers also discovered how a camel antibody connects to its target molecule and managed to produce camel antibodies in bacteria. Using this method, antibodies can be made much cheaper than with the usual method. This technology was the basis for setting up a new Flemish company (cf. p 17 of this annual report).

Conrath *et al.*, *Journal of Biological Chemistry*, 276, 7346-7350 (2001);
Desmyter *et al.*, *Journal of Biological Chemistry*, 276, 26285-26290 (2001);
Muyldermans *et al.*, *TRENDS in Biochemical Sciences*, 26, 230-235 (2001).

“With the plant genome in hand, the goal of plant research today is to understand its biology completely. In particular, this means being able to explain in detail how all aspects of plant growth and development occur, how plants react to change in their environment, the molecular basis of variation between species and how plants respond in complex communities.”

National Science Foundation

Plant research

MORE INSIGHT with NEW POSSIBILITIES

Farmers sow and harvest crops that originated from wild plants in nature. However, present-day crops all went through a long process of refinement and selective cross-breeding. Only plants with a beneficial combination of positive traits were selected. The explosive growth of knowledge of plant cells over the last 100 years, the unravelling of the plant genome and the availability of gene technology all contribute to the unravelling of the plant genome and the availability of gene technology.

VIB researchers also play a prominent role in the search for the deeper secrets of plants, plant cells and genomes. They mostly concentrate on growth and development mechanisms and on the interactions between plants and the outside world. Furthermore, they are developing new technologies to switch genes in the plant cell on and off at appropriate times so they can gain a better understanding of the function of these genes.

HERE ARE SOME OF THE HIGHLIGHTS FROM VIB'S RESEARCH IN 2001.
MORE DETAILS CAN BE FOUND IN VIB'S SCIENTIFIC REPORT 2002.

Growing with the handbrakes on

Cells of multicellular organisms form a very complex cooperating community. They constantly communicate with one another and check whether their growth and development keep pace with each other. When individual cells follow their own agenda and grow unrestrained, the survival of the organism starts to suffer. Cancer cells are examples of this unrestrained growth.

This pattern not only occurs in humans and animals but also in plants. It is therefore not surprising that basic molecular mechanisms (to control cell growth) are very similar in animals and plants.

In fact, a very limited group of proteins control cell growth and division. These are called cyclin dependant kinases (CDK). These proteins connect phosphate groups to another series of proteins. This activates other proteins which leads to the beginning of cell division. Bonding with cyclin, a protein with a varied concentration, activates the CDKs themselves, depending on which phase of division it is in.

Apart from this relatively simple system, the plant cell also has various other molecular handbrakes to stop cell division and prevent unrestrained growth. Dirk Inzé and his team of the VIB department of Plant Systems Biology (RUG) recently discovered seven similar genes in the genome of the *Arabidopsis*. These genes all make codes for proteins that, acting like a molecular handbrake, can stop the action of CDKs. These proteins actually have some similarity with certain proteins that have the same function in humans.

It is still a mystery why a minuscule plant like *Arabidopsis* has seven similar handbrakes. Each molecular handbrake probably has its own function in a specific area of the plant. Leaves have to react differently to an external stimulus than the stem or root. Together, the handbrakes can form a very highly tuned linking mechanism enabling plants to react to a whole variety of stimuli.

De Veylder *et al.*, Plant Cell, 13, 1653-1667 (2001).

Pale dwarf with an iron deficiency

Arabidopsis plants with a defect in the STARIK gene do not really live happily ever after. They are pale and tiny and their leaves and even their nuclei have an abnormal shape. Sergei Kushnir and his team of the VIB department of Plant Systems Biology (RUG) examined why STARIK mutants look so miserable.

The intention of this research was to determine the exact function of the STARIK protein.

The protein that STARIK encodes is part of an important group of transport proteins. These are proteins that are located in the cell membrane which actively transport molecules through

the membrane. These can be small ions but some transporters manage to move entire proteins.

The Ghent researchers discovered that the transport protein which STARIK encodes seems to have an iron transport function. Plants with a defective gene seem to store much more iron in their mitochondria than normal plants.

Humans have a similar gene which can also be defective. This leads to a rare but serious iron storage disease which is characterized by anaemia and ataxia (uncontrolled movement of the muscles). Even yeasts have a type of STARIK gene. If their gene is defective, they store up to 30 times more iron in their mitochondria than normal yeast cells.

In this case too, the strong molecular resemblance between animals and plants and even yeasts becomes apparent. The pale dwarf plant is the vegetable equal of the anaemia patient.

Kushnir *et al.*, Plant Cell, 13, 89-100 (2001).

“Sound scientific research and technological development is crucial for a country's economic growth. [...] The competitiveness of nations and companies and the employment they can provide depend, to a great extent, on research and technological development activities”

European Union, Policy on Research and Technology

General research

FOUNDATIONS to BUILD ON

Western man has become a *homo scientificus*. He lives with the Greek heritage, the ideas of the Enlightenment and the method of experimental science. The *homo scientificus* wants to know, he thirsts for knowledge and continually asks himself why things are the way they are. There are no limitations to knowledge for this type of human being except limitations imposed by his own physical and intellectual capabilities.

The VIB researcher is also a *homo scientificus*. He wants to understand the molecular basis of his own life and of life around him. He digs deeper and deeper into the secrets of the cell, the basic unit of all life on earth.

Lego blocks and proteins

A child can build a train, a plane or a house with the same Lego blocks. All it needs is skill and a healthy amount of creativity. Nature also likes playing with Lego blocks particularly in the way it creates proteins. After all, each protein is built up out of a series of functional blocks. Put the same units in another order and a protein develops with an entirely different function.

A good example is the arsenate reductase (ArsC) protein of the *Staphylococcus aureus* bacterium. This protein is involved in the bacterium's ability to resist heavy metals and in the transformation of arsenate to arsenite. Ingrid Zegers and Lode Wyns of the VIB department of Immunology, Parasitology and Ultrastructure (VUB) examined the structure of ArsC. Part of the protein is a structure that was previously only known in tyrosin phosphatase proteins.

The researchers concluded that the ArsC gene must have originally split off from a tyrosin phosphatase gene and that it acquired an additional functional unit during its evolution. To continue in Lego terms, the ArsC protein was originally meant to be a train but it was given wings and became a plane.

Zegers *et al.*, Nature Structural Biology, 8, 843-847 (2001).

HERE ARE SOME OF THE HIGHLIGHTS FROM VIB'S RESEARCH IN 2001.
MORE DETAILS CAN BE FOUND IN VIB'S SCIENTIFIC REPORT 2002.

After the genome, the proteome

Researchers are increasingly concentrating on the proteome, all the proteins present in a cell. This is a logical continuation on genome research as proteins are responsible for the cell's functions. The genome, all the DNA of an organism, is in fact not much more than a static inventory. It contains information on which proteins the cell can produce. In kitchen terminology, you could compare the genome with the recipe, the genes with the ingredients and the proteome with the dish.

Kris Gevaert and Joël Vandekerckhove of the VIB department of Medical Protein Research (RUG) examined the proteome of the *Chlamydia pneumoniae* bacterium. This bacterium, which infects the bronchial tubes, does not divide by itself. It must enter into the cell of its host before it can reproduce. To accomplish this, it transforms into a small, quite inactive cell - the elementary body. The Ghent researchers wanted to know about the proteins made by the elementary body. Aided by 2D gel electrophoresis and MALDI-TOF mass spectrometry, they were able to map all 167 marked genes. The genes represent approximately 15% of the bacterium's entire genome.

Research done by the Ghent scientists has indicated that elementary bodies are not 'cells at rest', as previously believed. The metabolism is much more complicated than earlier thought.

Vandahl *et al.*, *Electrophoresis*, 22, 1204-1223 (2001).

Hunting for prey

Functional analysis of proteins has also been given a boost due to the avalanche of genomic information. Scientists have to find new techniques and methods of predicting the function of large protein groups and determining their mutual connections and functional cooperation. In short, the scientist must examine the function of the protein in the context of tens of thousands of other proteins in the cell.

A first step is to examine which proteins connect. To do this, Jan Tavernier and his team of the VIB department of Medical Protein Research (RUG) developed an ingenious detection system: the protein trap.

To put it simply, the trap itself consists of a protein complex that acts as an 'informer'. Part of a known protein is located on one side of the trap. This is the bait. If another protein connects to the bait, the alarm is sounded by switching on the informer. For the researchers, this activated informer is a sign that the prey has 'bitten' the bait or that both proteins are connecting. Although similar search machines were previously developed in yeast cells, this is the first system that can work on human cells.

The protein trap makes identifying the connecting partners of

a protein possible. It is a first step towards ascertaining the function of a protein in its cellular context.

Eykerman *et al.*, *Nature Cell Biology*, 3 december 2001, electronic publication.

Stable mini-chromosome

Transgenic laboratory animals are indispensable in current biomedical research. These are animals in which foreign genes are artificially inserted. They are an important link in *in vivo* functional research.

However, it is not always easy to make transgenic animals. The foreign gene can settle itself in its host in any area of the genome which can have an enormous influence on the expression of the gene. Peter Marynen and his team of the VIB department of Human Genetics (K.U.Leuven) have designed a mini-chromosome that, once inserted in the cell of a mammal, behaves just like other chromosomes. The researchers even managed to insert the chromosome in the embryos of mice. The extra chromosome was passed on to the offspring through the egg and sperm cells.

Creating laboratory animals with such a mini-chromosome has tremendous advantages. The mini-chromosome can incorporate any given gene and the expression of the gene can be refined by promoter and regulatory sequences before and after introducing the gene. This mini-chromosome offers a variety of possibilities in basic research as well as in the production of protein drugs.

Voet *et al.*, *Genome Research*, 11, 124-136 (2001).

Syntenin, Jack-of-all-trades

Research in development and neurobiology increasingly concentrates on mutual communication between cells. One of the most important proteins in these communication mechanisms are the syndecans and glypicans. These are proteins that protrude from the cell membrane and can connect with numerous signal molecules and growth factors on the outside. Guido David's team of the VIB department of Human Genetics (K.U.Leuven) discovered the syntenin protein which makes contact with syndecan on the inside of the membrane. Moreover, additional research indicated that syntenin not only connects to syndecan, it also plays a part in cell adhesion, cell-cell contact and even has a function in the nucleus. How it operates in all these places is not yet entirely clear but syntenin seems to be a Jack-of-all-trades.

Zimmerman *et al.*, *Molecular Biology of the Cell*, 13, 339-350 (2001).

“Chip technology is already revolutionizing the way scientists think about life and is beginning to have impact on other fields such as medicine.”

European Molecular Biology Laboratory (EMBL)

Core facilities

HIGH TECHNOLOGY for GROWTH

Researchers want more information for less money. The amount of experiments needs to increase yet the scale on which these experiments can be done is decreasing. Scientists solve this by using chips, also known as micro arrays. Using micro arrays, a laboratory assistant can carry out more tests in one day than used to be done in a laboratory in one year.

VIB also places scale increases and miniaturisation at the centre of its activities. In 2000, VIB set up its first central laboratory - the VIB Micro Array Core facility. After this technology was set up, implemented and validated, VIB researchers were able to start the first high transit expression experiments in 2001.

HERE ARE SOME OF THE HIGHLIGHTS FROM VIB'S RESEARCH IN 2001.
MORE DETAILS CAN BE FOUND IN VIB'S SCIENTIFIC REPORT 2002.

Micro arrays, glass biochips

It is an everyday small glass plate, 2.5 cm wide, 7.5 cm long and only 2 mm thick. Those who have visited laboratories instantly recognise it - the plain and simple piece of glass researchers slide under their microscope. You can see dozens lying around in every lab. However hard to believe, this piece of glass actually represents one of the most important microbiological discoveries of the last few years.

This glass is different. When you take a closer look, you see thousands of minuscule spots, as if someone has left his fingerprint on it. If you look even more closely, you see that the spots are carefully arranged in rows and columns. This glass plate is in fact the biochip laboratory assistants use for post genomic research.

The chip, often referred to as the micro array, enables scientists to examine which genes are switched on or off in the cell. The spots on the glass plate are minuscule dried-up drops of one nano litre (one billionth of a litre) that contain DNA of one gene. A robot carefully places the nano drops and the computer that controls the robot remembers exactly which drop corresponds to which gene and where it can be found on the micro array.

One plate consists of many thousands of nano drops so a few micro arrays are enough to contain the entire genome of man, animal, plant or microorganism.

Using micro arrays the researcher can examine which genes are activated in a cell. To do this he uses the presence or absence of a corresponding messenger RNA. If the cell converts a gene into

a protein, it first forms an intermediate product - the messenger RNA. If one finds the corresponding RNA of a gene in a cell, then it is very likely that the protein is also in the cell.

If the researcher brings the contents of a cell in contact with a micro array, the RNA molecule recognises the corresponding DNA sequence in the spots of the micro array.

The corresponding RNA and DNA molecules then connect. If this RNA is marked with a fluorescent dye beforehand, the spots with the corresponding DNA sequences also immediately turn fluorescent. A sensitive laser scanner then scans the glass plate and measures to which gene drop the fluorescent messenger RNA has connected.

The VIB team led by Paul van Hummelen succeeded in setting up and validating this advanced technology in VIB's Micro Array Core Facility in a very short space of time. The laboratory developed chips with the genomes of humans, mice and plants. Moreover, the laboratory is run by a state-of-the-art computerised laboratory management system which carefully keeps track of huge amounts of data produced in a high transit laboratory like this one. VIB's Micro Array Core Facility has been carrying out these expression experiments for its 750 researchers since 2001.

Website VIB Micro Array Core Facility: www.microarray.be

Mature

Jubilant news about successful micro array experiments is often found in specialised scientific magazines. However, most information on such experiments is still not reported in a standardised way. This hinders the comparison and reproducibility of these experiments in various laboratories.

VIB's Micro Array Core Facility was part of the leading group in calibrating and standardising micro array data. In cooperation with researchers from various centres in Europe and the Lawrence Livermore National Laboratories in America, VIB scientists undertook several experiments and updated procedures that should lead to general rules for analysing, interpreting, validating and reporting micro array information.

These developments show that the entire technology fits in with the daily practice of bio-medical and plant biotechnological research. Micro array analysis has clearly come through the 'proof-of-principle' phase and researchers feel the need for validation, quality control and reproducibility. In short, micro array research has matured over the years.

Brazma *et al.*, *Nature Genetics*, 29, 365-371 (2001); Kegelmeyer *et al.*, in *From Microarrays: Optical Technologies and Informatics*, Proc. SPIE, 4266, 35-45 (2001).



Research at the VIB Micro Array Core Facility

“Technology transfer is the lever that helps translate inventions into economic growth, new jobs and, in the long run, new products for patients and consumers.”

Technology transfer

DISCOVERING for DEVELOPMENT

In the long run, the inventions of VIB researchers will constitute the basis for new diagnoses, innovative drugs or crops with new agricultural characteristics. However, VIB is a research institute and therefore will not market these products itself. VIB enters into agreements with companies that want to develop and market VIB inventions to provide the general public with the successful results of its experiments.

This process, which lays a bridge between academic research and the business world, is called technology transfer. Broadly speaking, the process is based on three successive steps:

1. Tracking down inventions that are not only scientific breakthroughs but can also form the basis for new industrial applications.
2. Protecting rights of ownership on these inventions through patent requests, etc.
3. Entering into agreements with companies that will transform these inventions into marketable products.

Inventions

The basic ingredients of technology transfer activities are the knowledge and expertise of our researchers and more importantly, their inventions. These inventions can vary from new medical applications using a specific protein and methods to enhance the growth of crops, to technology for comparing proteins in healthy and sick tissues. In 2001, VIB scientists came up with 40 inventions bringing the total amount of reported inventions since VIB was set up to 248. A little over 40% of these inventions is translated into a patent request.

The patent portfolio

29 patent requests were submitted in 2001. This, as in 2000, is the best result since VIB was set up. Today, VIB's patent portfolio includes 94 active patent families, an increase of around 20% compared to 2000. Nearly one third of patent requests are in a national phase, one third in a PCT phase and one third in a priority year. At least one or more patents of the seven patent families have been granted to VIB. For the majority of patent requests in a national phase, licences have already been granted to companies. This is also the case for more recent patent requests. VIB is actively looking for additional licensees. We are currently talking to over 60 companies about 20% of which are situated in Flanders.

Agreements with companies

In 2001, 22 R&D and licence agreements were concluded. The total number since VIB was set up is 105. About one fifth of agreements concluded in 2001 were with companies based in Flanders. The total R&D investments in VIB, laid down in new company contracts, is around 3 million euro. This amount is higher than in 1999 but about a third lower than in 2000 which was the most successful year for industrial R&D financing up to now.

Start-up companies

One of VIB's aims is to set up new bio-technological companies. In close consultation with researchers, technology platforms are being built that can form the basis of a new company. After a design phase, a business plan is worked out within VIB. Then the search begins for experienced managers to run the company and for national or international investors willing to invest in the start-up company.

In 2001, Ablynx NV, a bio-pharmaceutical company, was set up in close cooperation with the VUB and the Investment Company for Flanders (GIMV). Ablynx focuses on development of a unique class of antibodies. Antibodies are proteins made by our body that protect us from intruders such as viruses and bacteria. They start up the immune system when they come into contact with the recognition points or epitopes of these intruders. Antibodies also play an important part in diseases like cancer, rheumatism and asthma. Known antibodies have a complex structure. However, Ablynx concentrates on a much more simple type of antibody. Ablynx antibodies are very stable and can be produced easily and in large quantities. They recognise many types of epitopes, also those that conventional antibodies find difficult to recognise. They actively connect with these epitopes. This way they can, for example, prevent the activation of certain enzymes. Ablynx will continue to develop and market these antibodies through new diagnostics, therapeutics and applications in proteomics and affinity purification.

Two previous start-up companies of VIB, Devgen NV (set up in 1997) and CropDesign NV (set up in 1998), continued to develop in 2001. Together they employ over 170 people.

VIB's bio-incubator

The development of new industrial activities in the biotechnology branch depends on the presence of a technology platform, the necessary capital and the correct infrastructure. To meet with the latter requirement, VIB built a multifunctional building of 2500 m² in the heart of the Flemish biotech valley. This bio-incubator is available to biotechnology companies that invest heavily in R&D and have obvious growth potential.

After noticing the success of the bio-incubator, a request for building a second 1,250 m² floor was submitted in the autumn of 2000. At the end of 2001, the construction was finished and put at the disposal of its new residents. Currently, the bio-incubator accommodates seven bio-technology companies: Phase-1 BioResearch NV, Methexis Genomics NV, Algonomics NV, Devgen NV, Biotechnology Investment Partners NV (BIP NV), BioMaric NV and VIB's new start-up company, Ablynx NV. This shows that VIB's bio-incubator has eliminated an obstacle to give Flemish bio-high-tech companies a new lease of life.

“The important thing is not to stop questioning.”
Albert Einstein

Society

PASSING ON KNOWLEDGE is a TWO-WAY TRAFFIC

‘There is genetically modified cotton in the new euro note, the first cloned human embryo divides to a six-cell stage, the Icelandic discovery of the Methuselah gene predicts a healthy old age, etc.’



Promising or frightening applications of gene technology? Probably both. Society looks on critically while scientists closely study these new applications. VIB applies itself to offer sophisticated and scientifically based information about gene technology and its applications.

Information wanted

VIB is now more than ever the place to find sound and scientifically based information on biotechnology. On average, 30 informative questions are asked a week: students, interested and concerned consumers, the press, politicians and others who are interested find their way to VIB. Existing publications are mainly requested while specific questions are dealt with in a more personal and intensive way. Table one gives an overview of, among others, existing VIB publications.

In 2001, requests for participation in workshops, panel discussions, theme evenings, seminars and special study days increased. These can be small local activities for just a small group of people or regional events attended by hundreds of people. A team of VIB employees tours Flanders to actively inform people about the background and applications of biotechnology. 56 talks were given in 2001.

VIB is also an active participant in trade fairs and information days such as ‘Het Wetenschapsfeest’, a science fair for the general public, the Flemish congress for science teachers and the CST fair (Computers and Multimedia at School and at Home).

'Eet es genetisch'

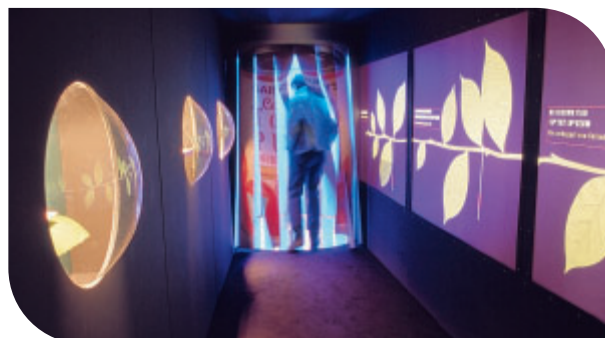
Gene technology in the laboratory is all very well and good but what about on your plate? That's another matter. And yet you have without doubt already eaten genetically modified organisms (GMOs). This is not a matter of blue bananas tasting of pea soup but very small changes that are invisible to the naked eye.

What does 'genetically modified' mean exactly? What possibilities and risks are connected with it? And last but not least, what evolution did our food undergo before we arrived at GMOs?

VIB wants to give a clear and unambiguous answer to all these questions via the 'Eet es genetisch' exhibition so that you will not only know what you eat but also what you talk about.

An exhibition dealing with the subject of the future should also have a modern setting. In other words, there is certainly something to see and experience. Interactive exhibits, CD ROMs and cartoons will ensure that visitors are kept constantly fascinated. There is a real laboratory on display where visitors can carry out scientific experiments under the supervision of an expert.

The above is an announcement for VIB's interactive 'Eet es genetisch' exhibition on biotechnology in agriculture and food, which was held from 3 February to 17 June 2001 in Kunsthal, Sint Pietersabdij (Saint Peter's Abbey), Ghent.



'Eet es genetisch'

Many subjects were dealt with spread out over approximately 600m² including the history of agriculture and food, various crop growing methods in Europe, a biology lesson in cells, proteins and DNA, the basic principles of gene technology, current and possible future applications in agriculture and a number of social aspects such as food safety, legislation, environmental impact and the use of gene technology for the Third World. All this was presented in a modern guise so that a walk through the exhibition could be both educational and surprising. For those who wanted a guide tour of this new world of biotechnology, 42 experienced and enthusiastic guides were on hand including many VIB scientists working. Altogether, they gave 471 guided tours.

TYPE	SUBJECT	PURPOSE	TARGET GROUP
Computer presentation	Farming and food	Information on the techniques used, its applications, environmental impact and social implications	General public
Computer presentation	Medical science	Information on the techniques used, applications, social and ethical implications	General public
Computer presentation	Cloning	Information on the techniques used, applications, social and ethical implications	General public
Computer presentation	Heredity	Information on the genetic background of heredity	General public
Brochure	What is biotechnology?	Basic information on gene technology	General public, schools
Brochure	Food and farming	Information on the techniques used and applications	General public, schools
Brochure	Medical science	Information on the techniques used and applications	General public, schools
Brochure	Cloning	Information on the techniques used, applications and ethical implications	General public, schools
Pamphlet	'Aan genen zijde'	Information on human heredity	General public, schools
Book	Biotech guide 'Eet es genetisch'	Information on the techniques used and applications in farming and food	General public, schools
Book	'Genen en gezondheid'	Popular scientific book, with interesting case studies and applications of gene technology in medical science, with attention to its ethical and social implications	Interested audience
Lesson packet with CD-rom	Many aspects of biotechnology	Detailed information on the technology, regulations, applications and social, economic and environmental influences. Tips for practical tests in the classroom	Schools
School kit	DNA electrophoresis	Practical test: visualisation of DNA	Schools
www.farmersatwork.be	Farming and food	Information on the three most important cultivation procedures in farming (conventional, organic and biotechnological)	Schools
www.vib.be	The many aspects of biotechnology	Information on VIB, general information on the technology used, regulations, applications and social, economic, ethical and environmental influences	General public, schools
Information messages	Important biotechnological events	Reporting important biotechnological events or decisions, often in relation to regulations	Press, interested audience
Files	Many aspects of biotechnology	Articles or files in existing publications on the technology, its applications, regulations, biotechnology in Flanders, etc	General public
Press reports	Scientific breakthroughs	Reporting new scientific breakthroughs of researchers, resulting in articles in newspapers and magazines	Press
Exhibition 'Eet es genetisch'	Farming and food	Information on the techniques used, applications and social implications	General public, schools

Table 1: an overview of the various information systems made by VIB

A large number of visitors enthusiastically went to work at the laboratory. For many, this was a unique experience to isolate DNA from a kiwi or to separate and visualise DNA on an agarose gel. 13 VIB scientists ensured that everything went smoothly and answered hundreds of questions. The laboratory experience made the concept of DNA a lot clearer and the gap between the general public and scientists smaller.

The handy 'Biotech guide' contained all the texts, figures and cartoons shown at the exhibition.

In less than three months, more than 15,000 visitors saw 'Eet es genetisch' in Ghent. Among the visitors were many young people either with their class or visiting as individuals, scientists with their families, interested and concerned consumers, etc. The reactions of young and old in the visitors' book about the exhibition were on the whole positive.

"A very interesting exhibition and beautifully presented. Highly recommended for everyone."

"Also educational for children, great exhibits – very educational."

"Lots of variety, really interesting displays."

"Extremely clear explanations by enthusiastic guides."

"It is very interesting to get to know the details. However, I still maintain that Nature should be allowed to do its own work."

"I'll be back. Cleverly put together."

In 2002, the exhibition will be housed for at least a year and a half in Hortus Michel Thiery, part of the School Museum in Ghent. In the meantime, the interactive elements of the exhibition were on loan to trade fairs and events.

'Eet es genetisch' goes international

25 June 2001 was the date that the great "Eten en Genen" debate on biotechnology and food got underway in the Netherlands. Parts of the VIB exhibition were integrated in the opening event held in Bussum.

On the occasion of the informal EU conference on agriculture, which took place in Alden Biesen during which new technologies in agriculture were examined, a large part of 'Eet es genetisch' was put on display in Oud-Rekem, Lanaken. On 17 September 2001, the European Ministers of Agriculture visited the exhibition together with their delegations. Nearly every delegation was assisted by a VIB guide in their own language. For this occasion, the 'Biotech guide' was translated into English.

This limited version of the 'Eet es genetisch' exhibition stayed open for the general public for another two months. In spite of minimum publicity, the unavailability of guides and the limited opening times (open only on weekdays), around 1,000 people, including many Dutch people, visited the exhibition.

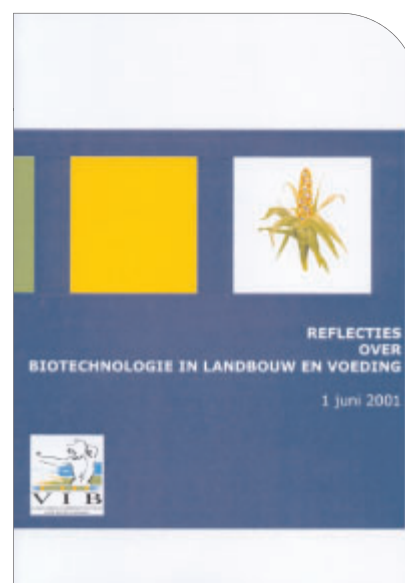
To discuss is to learn

In connection with the exhibition, VIB organised a debate about biotechnology in agriculture and food. A group of school children and citizens learnt about biotechnology in agriculture and food during an intensive period of preparation.

In this informative round, there was room for discussion, a public debate and people were encouraged to write down their discoveries. This was held between March to June 2001. The two discussion evenings (17 April and 15 May 2001) were open to the general public. They were attended by many hundreds of interested people.

The debate about biotechnology in agriculture and food represents a milestone in the discussion on biotechnology in Flanders. For the very first time, students and laymen were given a central role. They were thoroughly informed interactively and were then able to express their concerns. Based on the answers they received during the discussion evenings, the citizens and students wrote down their conclusions on paper. VIB gave these results, known as the reflection text, to the President of the Flemish Parliament on 1 June 2001. Afterwards this text was widely distributed.

VIB hopes that it was able to give a new direction to the debate on biotechnology and has in turn encouraged as many people as possible to look deeper into the whole issue. During these discussion evenings, VIB only played a neutral, organising role while students and citizens determined which subjects to discuss. Experts from a wide range of domains answered their questions. The students and citizens wrote down their reflections themselves. The reflection text resulted in the setting up of an ad



Reflection text of the debate

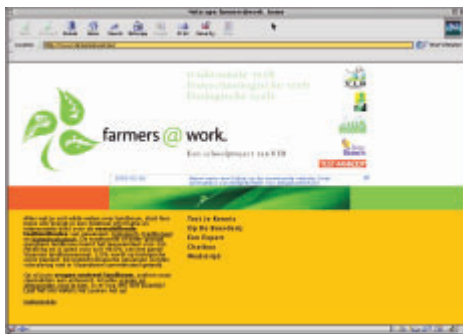
hoc GMO working party in the Flemish Parliament.

In order to get as much as possible out of the debate, VIB carried out an external evaluation of the debate from the beginning. This evaluation, which is freely available, certainly provided food for thought for anyone wishing to organise a public debate.

'farmers@work'

'Eet es genetisch' was the inspiration for a more specific school project - 'farmers@work'. This multidisciplinary project is aimed at secondary school students in second and third grade. It encourages both teachers and pupils to get to know the various aspects of agriculture and food. In addition to gene technology, organic agriculture and conventional agriculture are dealt with in this project. The pupils work out a project in which they examine the various cultivation methods and see whether they can be integrated. 27 project proposals were submitted which involved 430 pupils. In 2002, the ten winning projects will be presented in a playful context at a final event.

'farmers@work' is a pilot project in which pupils can discover for themselves the importance and value of new technologies and how to critically examine their applications. The project runs via the Internet. www.farmersatwork.be provides an extensive package of information that came about in collaboration with the VILT (Flemish Information Centre for Agriculture and Market Gardening), BLIVO (Expertise Centre for biological agriculture), BelgoBiotech and Testaankoop (a consumer organisation). At the same time, the children got the chance to visit a farm, to chat to farmers involved in growing genetically modified crops and to have contact with an expert of their choice. A wide range of teachers and educational specialists put together the aim of 'farmers@work'.

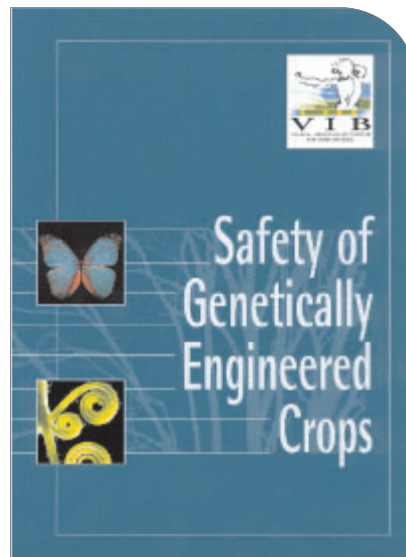


Website of 'farmers@work'

GMO safety

The safety of genetically modified crops and food remains controversial. VIB asked a number of prominent European scientists to summarise the most recent data on five main themes as a contribution to the international discussion on this subject. All these data were included in the English-language report "Safety of Genetically Engineered Crops". The five subjects investigated were:

- A. Food
 - (1) toxicity
 - (2) allergic reactions
 - (3) horizontal gene transfer
- B. Environment:
 - (4) vertical gene transfer (cross-fertilisation)
 - (5) effects on non-target organisms.



Possible risks linked to genetically modified crops (GMCs) were analysed in detail in the report. In addition, an applied risk analysis strategy was discussed and scientific data evaluated which serve as a basis for how to get permission to put GMCs on the market.

The most important conclusion is that in the case of permitted GMCs, there are still differences in the type of data submitted by companies to the authorities. In the report, the experts concluded that GMCs were just as safe as comparable commercial varieties. It is expected that in the future gene modification will be more complex. For this reason, the experts gave a number of recommendations for a more structured risk analysis.

The report was widely distributed and reactions to it were positive. Examples were requested from all over the world. In 2002, a Dutch summary will be produced for distribution to the general public.

"The brain develops better in concert with others..."

Eric Jensen

Personnel

UNITED in BIOTECHNOLOGY

VIB occupies an important position in the very competitive world of biotechnological research. This position can only be maintained and strengthened thanks to the work, commitment and motivation of a highly qualified research team. In order to stimulate and develop this commitment and involvement, VIB gears the career structure to the needs of its researchers.

Career structure

Firstly, the career structure must be adapted to the multitude of tasks and responsibilities within the various research groups. At the same time, it must be geared to the skills, experience, background and expectations of all members of staff. In addition, the career structure must offer an insight into the possibilities for growth within VIB and must be absolutely clear about what expectations VIB has vis-à-vis its staff.

In order for VIB staff to be correctly ranked, evaluated, trained and guided, a simple and transparent career structure has been created based on four functional groups.

- Supervisory scientific personnel (L, group leaders)
- Scientific personnel (W, post doctorates and undergraduates)
- Technical personnel (T)
- Support personnel in the areas of administration, accounting and ICT (O).

(Figure 1)

There are various function levels within each functional group, which indicate the desired level for skills and knowledge of every staff member. The more a staff member grows professionally, the more opportunity he or she is given to climb up the professional ladder to reach senior positions.



Staff policy

A well-constructed career structure is the cornerstone of staff policy. Such a structure is meaningful and has an impact if handled properly within the various departments. The present career structure has been in existence for five years and is now fully accepted. The introduction of a career council in the departments has had a positive influence on this process. The main task of these career councils is to closely follow the professional development of all staff and to rank, judge and guide them in respect of career structure and staff policy planning.

The evaluation and judgement of the company's staff is done via an annual functional analysis, which in the course of 2001 was applied for the first time more systematically. This analysis enables an evaluation of development in the short and long term and to determine possible focus points.

Enough chances for life-long learning, contact with the outside world and teamwork are the means to enable scientists and technicians to grow and develop. Daily intensive guidance is important for young scientists. A life-long learning programme was developed for technicians, a second cycle of which started in 2001. This programme for life-long learning teaches technicians in an active and practical way about the major developments in



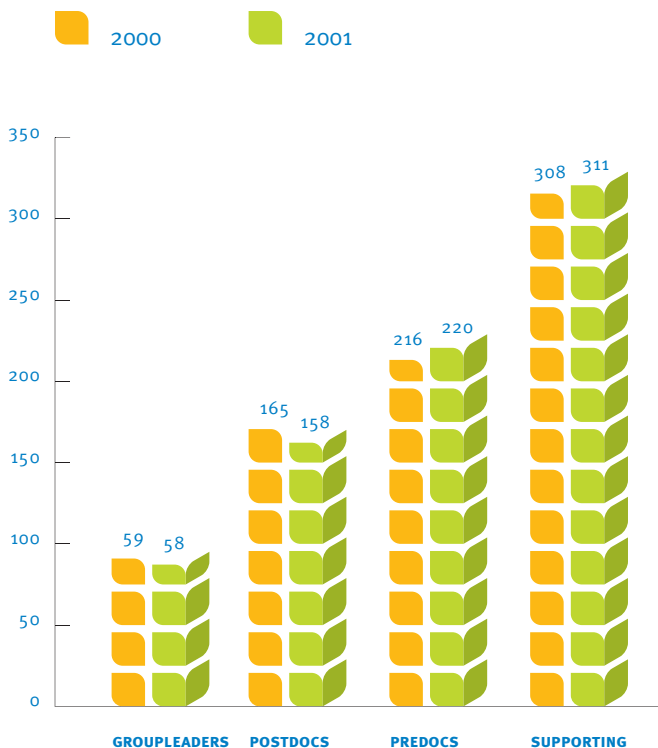
VIB seminar 2002, Blankenberge

technologies that are of interest to VIB. This training will keep technicians informed about the developments in the fringe areas of their own specialisation.

Young scientists also get the chance to follow one or several modules to fine-tune their practical knowledge. Moreover, they are able, just like the senior scientists, to take part in international conferences and workshops. During the annual VIB seminar, young scientists are offered the chance to present their work to colleagues and to network in VIB's international scientific community, which in 2001 covered 40 nationalities.

The world of research is characterised by the continued intake of new talent. In 2001, VIB had an intake level of 16.75%. This is mainly due to young researchers who, after gaining their degree, are encouraged to work for foreign or national scientific institutions or companies. We increasingly see young scientists leaving for jobs abroad to gain experience essential for building up a highly scientific career.

Figure 1: number of staff members per functional domain (as of 31/12/2001)



Financing

Characteristic for VIB as a scientific institution is the complex financing of our staff. Around half of personnel is paid directly via the VIB payment system (= VIB personnel). This is covered either via donations or via external sources mainly contract research for industry or international credit institutions such as the European Union. Via our many joint ventures with universities, salaries of the other half of VIB staff is covered by the FWO [Flanders Scientific Research Fund] or the IWT [Flemish Institute for the Promotion of Scientific Technical Research]. In total, 747 staff were employed in VIB research in 2001.

Financial review

Income statement ('000 Euro)	2001	2000	1999
I. OPERATING INCOME	32,894	32,134	30,208
- Turnover	4,768	4,915	5,249
- Grants and subsidies	27,627	26,900	24,832
- Other income	499	318	127
II. OPERATING EXPENSES	32,330	31,743	30,606
- Raw materials and consumables	3,905	4,207	4,142
- Services and other goods	7,411	6,798	6,706
- Remuneration, social security costs and pensions	17,954	17,842	17,317
- Depreciation	2,367	2,162	1,823
- Increase (+), decrease (-), in provision for liabilities and charges	0	0	-180
- Other operating expenditure	693	734	798
III. OPERATING RESULT	564	391	-398
IV. FINANCIAL INCOME	998	749	667
- Income from current assets	964	729	450
- Other financial income	34	20	217
V. FINANCIAL CHARGES	46	47	272
- Interest and other debt charges	3	3	8
- Other financial charges	43	44	264
VI. RESULT ON ORDINARY ACTIVITIES	1,516	1,093	-3
VII. EXTRAORDINARY INCOME	1,506	0	2,645
VIII. EXTRAORDINARY EXPENDITURE	1,485	5	0
IX. RESULT FOR THE PERIOD BEFORE TAXES	1,537	1,088	2,642
X. INCOME TAXES	0	0	0
XI. RESULT FOR THE PERIOD	1,537	1,088	2,642
XII. RESULT FOR THE PERIOD AVAILABLE FOR APPROPRIATION	1,537	1,088	2,642

Appropriation account ('000 Euro)	2001	2000	1999
A. RESULT TO BE APPROPRIATED			
- Result for the period available for appropriation	1,537	1,088	2,642
- Result brought forward	0	0	0
C. APPROPRIATION TO RESERVES	1,537	1,088	2,642
D. RESULT TO BE CARRIED FORWARD	0	0	0
- Profit to be carried forward	0	0	0
- Loss to be carried forward	0	0	0



Balance ('000 Euro)	31.12.'01	31.12.'00	31.12.'99
A S S E T S			
FIXED ASSETS	10,482	8,191	8,175
II. Intangible fixed assets	399	259	276
III. Tangible fixed assets	8,963	6,856	6,856
- Land and building	4,549	3,506	3,605
- Plant, machinery and equipment	3,590	2,935	2,776
- Furniture and vehicles	83	114	139
- Leasing and other similar rights	14	0	146
- Assets under construction and advance payments	727	301	189
IV. Financial assets	1,120	1,076	1,043
- Other enterprises - participating interests	1,111	1,072	1,039
- Other financial assets	9	4	4
CURRENT ASSETS	30,538	28,073	26,883
VII. Amounts receivable within one year	9,220	11,028	12,485
- Trade debtors	2,526	2,994	3,030
- Other amounts receivable	6,694	8,034	9,455
VIII. Investments	19,083	15,545	12,965
- Other investments and deposits	19,083	15,545	12,965
IX. Cash at bank and in hand	614	349	112
X. Deferred charges and accrued income	1,621	1,151	1,321
TOTAL ASSETS	41,020	36,264	35,058
L I A B I L I T I E S			
CAPITAL AND RESERVES	18,423	15,244	14,287
IV. Reserves			
- Reserves not available for distribution	10,661	9,124	8,036
V. Accumulated results	0	0	0
VI. Investment grants	7,762	6,120	6,251
PROVISIONS AND DEFERRED TAXES			
VII. Provisions for liabilities and expenditures	372	372	372
- Other liabilities and expenditures	372	372	372
CREDITORS	22,225	20,648	20,399
VIII. Amount payable after one year	11	0	0
- Leasing and other similar obligations	11	0	0
IX. Amounts payable within one year	10,866	9,155	9,970
- Current portion of amounts payable after one year	4	0	77
- Trade debts - suppliers	5,399	4,598	5,860
- Taxes,			
remuneration and social security	3,599	2,860	2,881
• Taxes	779	730	711
• Remuneration and social security	2,820	2,130	2,170
- Advances received on contract research	1,579	1,302	798
- Other amounts payable	285	395	354
X. Accrued charges and deferred income	11,348	11,493	10,429
TOTAL LIABILITIES	41,020	36,264	35,058

In 2001, VIB realised an operational income of € 32.9 million. Operational costs amounted to € 32.3 million. Taking into account the financial and extraordinary results, the surplus for the accounting year is K€ 1.537. The organisation's balance sheet total at the end of 2001 amounted to € 41.0 million.

INCOME STATEMENT

Turnover

In 2001, a turnover of K€ 4,768 was realised. This turnover resulted from work performed with regard to contracts with domestic and foreign industrial partners, amounting to a total of K€ 2,913, and contracts with the European Commission, amounting to K€ 1,659. Supplying space and services to newly established bio-high-tech companies in the VIB bio-incubator, provided for a turnover amounting to K€ 196 in 2001.

Income from subsidies

Net income from subsidies during 2001 amounted to K€ 27,627. Gross subsidy income was K€ 28,289, made up of the basic grant from the government of Flanders of K€ 26,034 and K€ 2,255 of other grants and subsidies, including a K€ 1,902 exemption from employer's social security contributions for the year 2001⁽¹⁾.

The difference between gross subsidies and net subsidies can be explained by the movements on the captions 'investment grants' and 'deferred income' on the liabilities side of the balance sheet. The large amount of investments in tangible and intangible fixed assets (+90% compared to 2000), financed by subsidy income, resulted in an increase of 'investment grants' on the balance sheet, by an amount of K€ 1,642, with a corresponding decrease of 'grants and subsidies' on the income statement. The use of funds out of subsidy income from previous years which had been deferred to the deferred income account, resulted in a decrease of the deferred income by K€ 980, while an increase by the same amount was recorded in the item 'subsidies' on the income statement.

Staff costs

Staff costs amounted to a total of K€ 17,954. An amount of K€ 13,336 was expended in salaries and direct social benefits, K€ 3,783 in employer's social security contributions, K€ 482 in employer's contributions for extra-legal pension insurance and a further K€ 353 in other personnel costs.

Other operating charges

The other operating charges, amounted to K€ 693. These mainly related to the amounts paid by VIB to other institutions which are participating in VIB's project research programme and in VIB's societal research programme, in total K€ 303.

Furthermore, K€ 144 was paid or accrued for taxes and K€ 246 was posted as deferred charges. (see pie-chart p.27)

Extraordinary income and costs

A total of K€ 1,506 in extraordinary income was accounted for in 2001. This principally related to the revaluation surplus posted, following the contribution in kind of the camel antibody technology platform to the new start-up company Ablynx NV. In line with the valuation principles for investments in bio-high-tech companies, an amount of K€ 952 was immediately written off from the investment in Ablynx NV. Furthermore, an amount of K€ 533 was written off from financial fixed assets to adjust the value of the investments in the other VIB start-up companies, in accordance with the altered valuation principles. As a consequence, the extraordinary costs for 2001 added up to K€ 1,485.

BALANCE SHEET: ASSETS

Intangible fixed assets

Purchases of intangible fixed assets amounted to a total of K€ 293, while depreciation amounted to K€ 152. The net book value at the end of the accounting year amounted to K€ 399. The main investments during 2001 were linked to the acquisition and implementation of a human resources management system, the conversion of the financial and logistics system to the euro and the acquisition of additional clones for the "micro array" core facility.

Tangible fixed assets

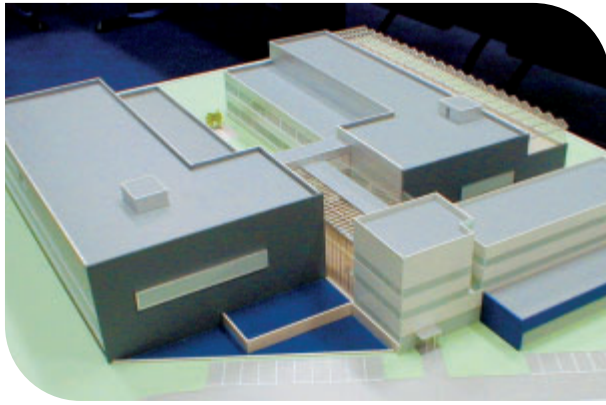
Purchases of tangible fixed assets amounted to a total of K€ 3,487, including K€ 1,275 for land and buildings (phase 2 of the VIB bio-incubator), K€ 2,529 for installations, machinery and equipment with major investments in strategic basic research and in technology transfer projects, K€ 25 for furniture and vehicles, and K€ 18 for leased equipment. The caption 'fixed assets under construction' increased by K€ 606. This mainly related to the investments made for the new RUG-VIB research building in Ghent-Zwijnaarde and the acquisition of large equipment for the "proteomics" core facility. Furthermore an amount of K€ 180, in fixed assets under construction, was transferred to other items. This related to VAT paid on earlier investments in buildings, which was reclaimed from the administration in 2001 after obtaining a ruling with the VAT administration.

Depreciation amounted to K€ 232 on buildings, K€ 1,874 on installations, machinery and equipment, K€ 56 on furniture and vehicles and K€ 4 on leased equipment.

During 2001, equipment, which had been fully depreciated, was disposed off, with a total acquisition value of K€ 19.

The net book value of the tangible fixed assets at year-end amounted to K€ 8,963. This represents an increase of K€ 2,107, or 30.7% in relation to the previous tax year.

⁽¹⁾ In accordance with the Law of 29 April 1996 providing for exemption from social security contributions for additionally employed research personnel.



Scalemodel of the RUG-VIB research building

Tangible fixed assets - rights and commitments not reflected on the balance sheet

Long-term ground lease and building rights

VIB can exercise rights relating to the use of land on which it has erected, or is erecting, new buildings.

This relates to a first lot on the Ghent-Zwijnaarde Technology Park on which the VIB bio-incubator is built. A long-term ground lease agreement will be signed by the University of Ghent and VIB at market conditions.

VIB is currently also constructing a research building - together with the University of Ghent - on the Ghent-Zwijnaarde Technology Park for its Department of Plant Systems Biology and its Department for Molecular Biomedical Research.

This building is being erected on the basis of a co-property agreement, under which VIB and the University of Ghent will own shares of 49% and 51% respectively. For this purpose VIB will conclude a building right agreement with the University of Ghent.

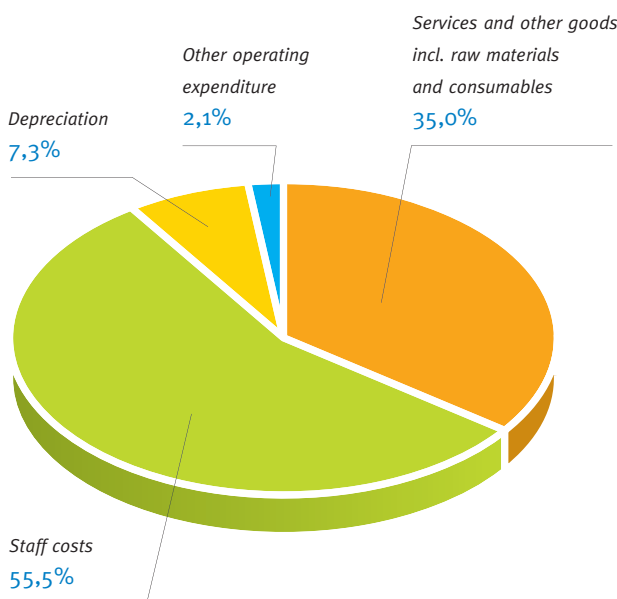
Important obligations for the purchase of fixed assets

As mentioned above, VIB is currently working together with the University of Ghent for the joint construction of a research building to house the Ghent-based VIB departments for Plant Systems Biology and Molecular Biomedical Research.

The building has a total estimated cost of € 20.8 million. The total expenditure up to now is amounting to K€ 581, of which 49% is borne by VIB. The total remaining obligation resting on VIB in the context of this project amounts therefore to K€ 9,919 (49%). This expenditure will be spread over the year 2002 and the first quarter of 2003. VIB will take out a loan from a financial institution for its share of this building.

Operating expenses (k€)

Services and other goods incl. raw materials and consumables	11,316
Staff costs	17,954
Depreciation	2,367
Other operating expenditure	693



Financial fixed assets

The book value of the financial fixed assets amounts to K€ 1.120. This represents the investments VIB owns in the start-up companies DevGen NV and CropDesign NV, as well as in the start-up company Ablynx NV, which was established in 2001. The minor increase in book value, in relation to the last tax year, taking into account the new investment in Ablynx NV, is the result of the application of new valuation principles for investments in bio-high-tech companies on the historical balances for these investments as well as on the investment in Ablynx NV.

Other amounts receivable within one year

The other receivables within one year at the end of the tax year amounted to K€ 6,694. Among these are the subsidies assigned to VIB by the government of Flanders but not yet paid out. The unpaid amount of the 2001 subsidy amounts to K€ 5,498. Besides this, there are also K€ 404 in subsidies which are mainly to be paid in the context of other projects which VIB is carrying out under contract for the government of Flanders. Furthermore, there is a receivable on the National Office for Social Security (RSZ) in the context of the Law of 29 April 1996 (see above). This receivable amounts to K€ 585 and is related to the fourth quarter of 2001. During the course of 2002, a reimbursement of employer's contributions is expected in

the same context for the period October 1998 to June 2000 inclusive. No receivable on the administration has yet been recorded for this.

The balance, amounting to K€ 207, relates mainly to VAT recoverable.

Current investments

Available funds were invested in short-term investment products. In total K€ 19,083 was invested at the end of the year of which K€ 17,127 in fixed-income securities issued by financial institutions and K€ 1,950 in fixed-term accounts.

Deferred charges and accrued income

Deferred charges and accrued income total K€ 1,621. This relates to income accrued relating to research contracted by the European Commission amounting to K€ 1,516.

The remaining balance of K€ 105 represents various deferred charges.

BALANCE SHEET: LIABILITIES

Equity

Equity, after the appropriation of the result of the accounting year, has grown to K€ 18,423. This now consists on the one hand of “reserves not available for distribution” amounting to K€ 10,661, these being the accumulated results of the previous and current financial years, and on the other hand of “investment grants” amounting to K€ 7,762. The operational result as well as the financial result and the extra ordinary result have made positive contributions to the growth in reserves over 2001 of K€ 564, K€ 952 and K€ 21 respectively.

Provisions

The caption “provisions for other liabilities and charges” remained unchanged in relation to the previous year and amounts to K€ 372. The planned renovation works on university research laboratories will not be carried out until 2002.

Other amounts payable within one year

The other amounts payable within one year amount to K€ 285 and mainly relate to projects within VIB’s project research programme and VIB’s societal research programme.

Accrued charges and deferred income

Accrued charges and deferred income accounts are used to neutralise time differences between posted income on the basis of the valuation principles relating to income recognition - and the spending of these sums. This takes place within the time boundaries of the related contracts. The total of K€ 11,348 can be divided up as follows:

- K€ 2,045 for commitments into which VIB entered in the framework of the VIB’s project-based research programme;
- K€ 2,992 for the realisation of technology transfer projects;
- K€ 628 for the funding of projects within the societal research

programme;

- K€ 1,815 for departmental strategic basic research to complete current projects financed by the 2001 grant from the government of Flanders;
- K€ 3,455 for the completion of research work within the research departments for third parties;
- K€ 413 of invoiced income for projects which will only start up in 2002.

CHANGES IN THE VALUATION PRINCIPLES

The valuation principles relating to *financial fixed assets* state that a write off is required after a real and sustained reduction in the value of investments in other enterprises.

The following is added:

“When acquiring investments in bio-high-tech companies, an immediate write off will be posted, in order to take into account the division rules which apply when an exit out of these investments takes place, as catered for in the agreements between VIB and the universities, in which provision is made for dividing the income between VIB, the universities and the inventors.” The historical balances of investment in bio-high-tech companies were adjusted for a total amount of K€ 533.

OTHER INFORMATION

- Since the end of the accounting year 2001, no events have occurred which have a major impact on the annual accounts for this accounting year.
- Nor are there any circumstances, which at present could affect the development of the organisation in any substantial way.
- For full information on the research activities of VIB, please consult the “Scientific Annual Report 2002”.

Notes to the management accounts

CONTEXT

In the management accounts (see table p 29), income and expenditure is presented analytically on the basis of the various income streams. The result of the management accounts equals the result provided in the annual accounts. Nevertheless, the principles used for the management accounts are not always the same as those used for the annual accounts. There are differences in the area of income recognition, the way investment costs are taken in account instead of depreciation charges and the entering into the accounts of commitments for budgets allocated but not yet spent. For a full commentary on these differences, please refer to past annual reports.

In the management accounts, distinction is made between three financing streams, namely (i) the basic grant VIB receives from the government of Flanders, (ii) the external funding VIB receives on a competitive basis through calls for tender in international research programmes and through industrial cooperation, and (iii) other income which can be operational, financial or extraordinary in nature.

DIRECT FUNDING FROM THE GOVERNMENT OF FLANDERS 2001

The management agreement between the government of Flanders and VIB provided for a gross grant of K€ 26,034 in 2001.

Expenditure in 2001, excluding commitments, amounted to K€ 28,240. The overspending therefore amounts to K€ 2,206. This is partly financed by previous commitments and partly by the use of reserves.

The commitments show a net decrease of K€ 801. To achieve the expansion of the VIB bio-incubator (construction of a third floor) at the Technology Park at Ghent-Zwijnaarde, K€ 1,038 was taken from previous commitments on the technology transfer budget. For the organisation of the exhibition "Eet es genetisch" (first half of 2001) extra resources were also made available from previous commitments on the budget for the societal programme, for an amount of K€ 253. For project-based research and strategic basic research, amounts of K€ 103 and K€ 387 respectively were added to the commitments to finance current obligations at the start of 2002.

Management accounts 2001 ('000 Euro)

	DIRECT FUNDING GOVERNMENT OF FLANDERS		EXTERNAL FUNDING		OTHER INCOME & EXPENDITURE		TOTAL BY OPERATING YEAR	
	2001	2000	2001	2000	2001	2000	2001	2000
INCOME								
TURNOVER	0.0	0.0	5,627.8	5,412.5	0.0	0.0	5,627.8	5,412.5
GRANTS	26,033.8	25,669.4	352.8	415.4	1,902.1	1,074.8	28,288.7	27,159.6
FINANCIAL INCOME	0.0	0.0	0.0	0.0	998.4	747.8	998.4	747.8
EXTRAORDINARY INCOME	0.0	0.0	0.0	0.0	1,500.0	0.0	1,500.0	0.0
TOTAL INCOME	26,033.8	25,669.4	5,980.6	5,827.9	4,400.5	1,822.6	36,414.9	33,319.9
EXPENDITURE								
STAFF COSTS	15,473.6	14,611.2	2,721.5	3,333.3	0.0	0.0	18,195.1	17,944.5
OPERATIONAL COSTS	8,874.5	9,032.0	2,365.4	2,274.2	0.0	0.0	11,239.9	11,306.2
INVESTMENTS	3,675.7	1,763.6	1.0	34.4	0.0	0.0	3,676.7	1,798.0
DEPRECIATION	215.8	163.4	136.3	84.0	0.0	0.0	352.1	247.4
FINANCIAL COSTS	0.0	0.0	0.0	0.0	49.0	48.3	49.0	48.3
EXTRAORDINARY COSTS	0.0	0.0	0.0	0.0	1,485.3	0.0	1,485.3	0.0
COMMITMENTS	-800.7	819.2	680.4	68.2	0.0	0.0	-120.3	887.4
TOTAL EXPENDITURE	27,438.9	26,389.4	5,904.6	5,794.1	1,534.3	48.3	34,877.8	32,231.8
BALANCE	-1,405.1	-720.0	76.0	33.8	2,866.2	1,774.3	1,537.1	1,088.1

The remaining shortfall, amounting to K€ 1,405 was financed by using credit balances from the past, more specifically from financial income and extraordinary income generated in previous years. In particular, K€ 281 was invested in departmental strategic basic research, K€ 652 in the “micro array” core facility, K€ 35 in the “proteomics” core facility and K€ 437 for the general management and administration of the institution.

EXTERNAL FUNDING

In 2001 VIB obtained K€ 5,628 through external funding, of which K€ 5,432 came from contract research with industry and the European Commission and K€ 196 from income out of the VIB bio-incubator activities. Turnover has risen slightly by K€ 215, or 4%. Granting bodies provided other subsidy income for a total amount of K€ 353.

Expenditure, excluding commitments, amounted to a total of K€ 5,225, as compared to K€ 5,726 the previous year. To better match income and expenditure with the way work is progressing on these projects, an amount of K€ 680 was charged to commitments. Total expenditure therefore amounted to K€ 5,905.

The balance on external funding amounts to K€ 76, and relates to projects which have been fully completed.

OTHER INCOME AND EXPENDITURE

Operational

Other operational income - an amount of K€ 1,902 - was generated by the recovery of employer's social security contributions on additionally-employed scientific staff within the framework of the Law of 29 April 1996 on the promotion of scientific research. Only recovery for contributions, paid for in 2001, were taken into account..

Financial

Financial income amounted to K€ 998, of which K€ 964 were interests on investments and K€ 34 were positive exchange-rate results. Financial expenses amounted to a total of K€ 49, of which K€ 32 were negative exchange-rate results, K€ 3 costs for leasing debts and K€ 14 costs for investments and taxes on investments. The financial balance was therefore K€ 949.

Extraordinary

Extraordinary income amounted to K€ 1,500. The extraordinary costs were K€ 1,485. All transactions relate to investments acquired or maintained in VIB start-up companies. For a complete commentary on extraordinary income and expenditure, please refer to the “Notes to the annual accounts” (see above).

OPERATIONAL BALANCE

The credit balance for the year 2001 amounts to a total of K€ 1,537.

Statutory auditor's report for the year ended 31 december 2001



In accordance with regulatory requirements, we are pleased to report on the performance of the audit mandate, which you have entrusted to us.

We have audited the financial statements for the year ended 31 December 2001, which is the responsibility of the board of directors and show a balance sheet total of € 41,020,245.01 and a surplus for the year of € 1,537,146.14.

Unqualified audit opinion on the financial statements

We conducted our audit in accordance with the Belgian auditing standards as issued by the “Institut des Réviseurs d’Entreprises/Instituut der Bedrijfsrevisoren”. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, taking into account the Belgian Royal Decree of 8 October 1976 in respect of annual accounts.

In accordance with those standards, we considered the administrative and accounting organisation of VIB VZW, as well as its internal control procedures. Adequate information and explanations have been received from the officials of the organisation.

We examined, on a test basis, evidence supporting the amounts in the financial statements. We assessed the accounting principles used and significant estimates made by the organisation, as well as the overall presentation of the financial statements.

We believe that our audit provides a reasonable basis for our opinion.

In our opinion, taking into account the Royal Decree of 8 October 1976 in respect of annual accounts, the financial statements fairly present the organisation's net worth and financial position as at 31 December 2001 and the results of its operations for the year then ended, and the information given in the notes to the financial statements is adequate.

Additional certifications

We supplement our report with the following certifications which do not have any impact on our audit opinion on the financial statements:

- The directors' report is consistent with the financial statements;
- Without prejudice to certain formal aspects of minor importance, the accounting records are maintained and the financial statements have been prepared in accordance with the Belgian Royal Decree of 8 October 1976 in respect of annual accounts;
- There are no transactions undertaken or decisions taken in violation of the organisation's memorandum of association or the law regarding non-profit organisations in Belgium.

Brussels, 18 April 2002
Statutory auditor

PricewaterhouseCoopers
Reviseurs d'Entreprises
Represented by Raf Vander Stichele

Organisation

Board of Directors

Dr. Hugo Van Heuverswyn
Prof. dr. Freddy Adams

chairman
vice-chairman

Prof. dr. Roger Bouillon
Dr. Christine Claus
Prof. dr. Marc De Clercq
Prof. dr. André De Leenheer
Prof. dr. ir. Bart De Moor
Dr. Jan Leemans
Prof. dr. Jacques Lemonne
Prof. dr. Guy Mannaerts
Dr. Michèle Oleo
Prof. dr. ir. André Oosterlinck
Dr. Rudi Pauwels
De heer Gerard Van Acker
Dr. Albert Van Loo
Dr. ir. Staf Van Reet
Prof. dr. ir. Jacques Willems

non-executive director (from 06/07/01)
non-executive director (till 05/07/01)
non-executive director (from 06/07/01)
non-executive director
non-executive director
non-executive director (till 05/07/01)
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non-executive director
non-executive director
non-executive director
non-executive director (from 06/07/01)
non-executive director
non-executive director (till 05/07/01)

Dr. Marc Luwel
Mr. Toon Tessier

government commissioner
government commissioner

Management Committee

Dr. Jo Bury
Dr. Rudy Dekeyser
Prof. dr. Frans Van Roy
Prof. dr. Marc Zabeau
Prof. dr. Désiré Collen
Prof. dr. Guido David
Prof. dr. Nicolas Glansdorff
Prof. dr. Lode Wyns
Prof. dr. Danny Huylebroeck
Prof. dr. Christine Van Broekhoven
Prof. dr. Joël Vandekerckhove
Mr. Wim Goemare

general director
vice-general director
scientific director of the departement for molecular biomedical research
scientific director of the departement of plant systems biology
scientific director of the departement of transgene technology and gene therapy
scientific director of the departement of human genetics
scientific director of the departement of microbiology
scientific director of the departement of immunology, parasitology en ultrastructure
scientific director of the departement of cell growth, differentiation and development
scientific director of the departement of molecular genetics
scientific director of the departement of medical protein research
financial director

Senior Staff (headquarters)

Dr. Torik Ayoubi
Ir. René Custers
Dr. Chris De Jonghe
Dr. Jan Demolder
Dr. Dirk Iserentant
Dr. Philippe Jacobs
Ms. Marijke Lein
Dr. Gaston Matthysens
Dr. Lieve Ongena
Mr. Emil Pot
Dr. Ann Van Gysel
Ms. Lieve Van kerckhoven

science advisor
regulatory affairs and technology assessment manager
licensing manager
invention analyst
invention analyst
technology protection manager
personnel manager (from 01/08/01)
business development manager
science advisor
licensing manager
communications manager
personnel manager (till 31/07/01)

VIB is an entrepreneurial research institute based in Flanders, Belgium. VIB performs strategic basic research in a number of life science disciplines. Through its joint venture with the universities of Ghent, Leuven, Brussels and Antwerp, VIB gathers 750 scientists in one institute. Our mission is to significantly push the frontiers of the life sciences by frequent scientific breakthroughs and highly significant contributions. The VIB departments are housed on the university campuses, while VIB headquarters – which coordinates and supports the various departments – are located in Zwijnaarde, just outside Ghent. VIB operates an active technology transfer office. The communications office develops educational material and provides information about life science to the public.



VIB

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FOR BIOTECHNOLOGY

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