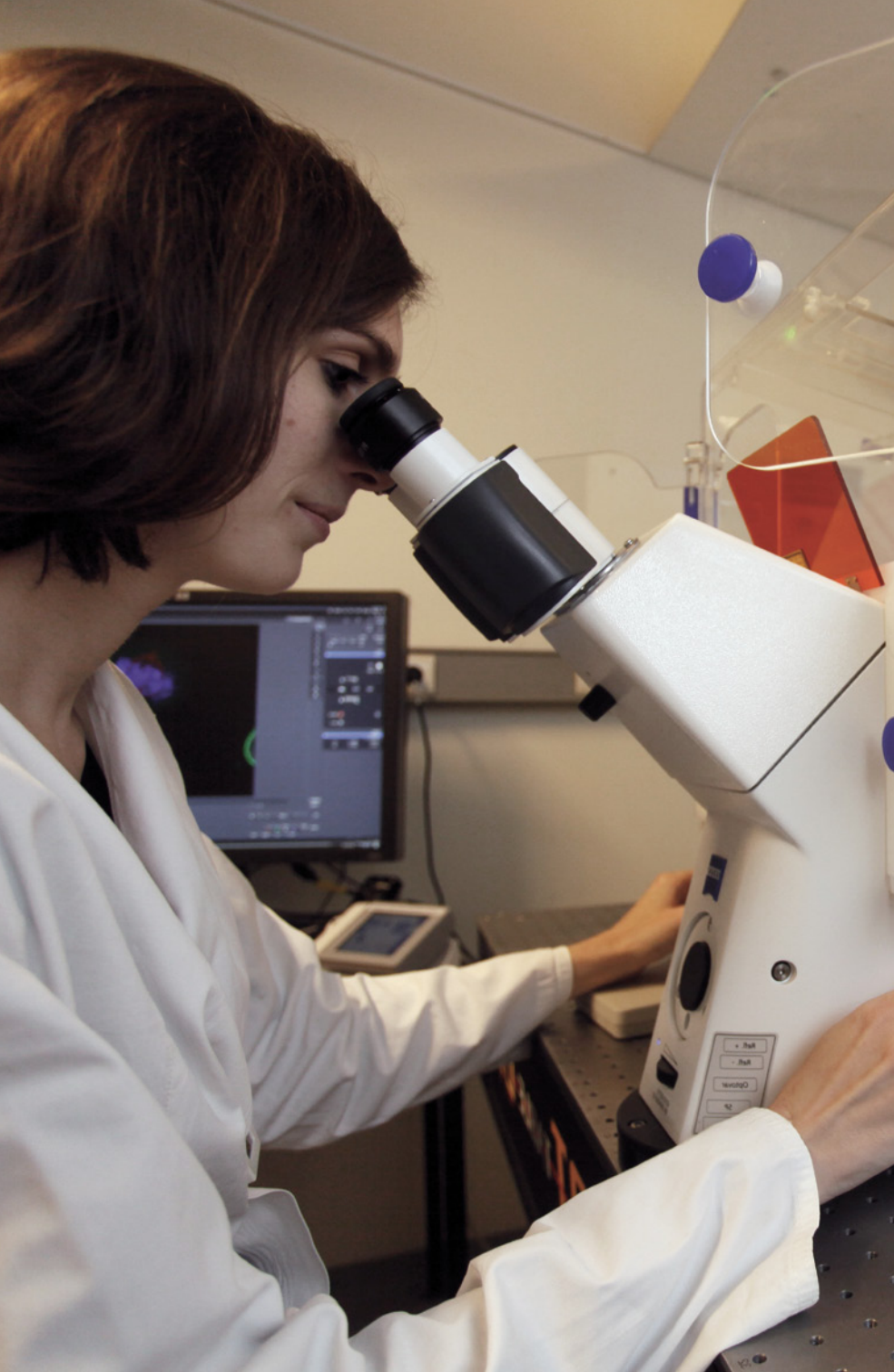




BIOPARK

CHARLEROI BRUSSELS SOUTH

news

The Biopark Charleroi Brussels South Newsletter

n°19 — fall 2013

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ULB

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Mood

EUROPEAN STRUCTURAL FUNDS: THE ADVENTURE CONTINUES!

Ever since the IBMM opened its doors, support from European structural funds has played a pivotal role in developing the Biopark Charleroi Brussels South.

Today, this investment and the work of local stakeholders have made the Biopark an internationally renowned hub for excellence in biotechnology, based at the Aérople science and technology park alongside other major training and research institutes.

The total investment made by the EU and Wallonia together stands at no less than €215m dedicated to the development of the Aérople and the various projects that call it home. This shows just how effective these mechanisms are, which have also developed structures to help businesses obtain funding.

This dynamic will be pushed even further, with Charleroi set to announce more major projects for the 2014-2020 period. The Biopark, with its international reach and the planned inter-university immunology research centre, will be one of the flagship projects with pride of place among these exciting new developments!

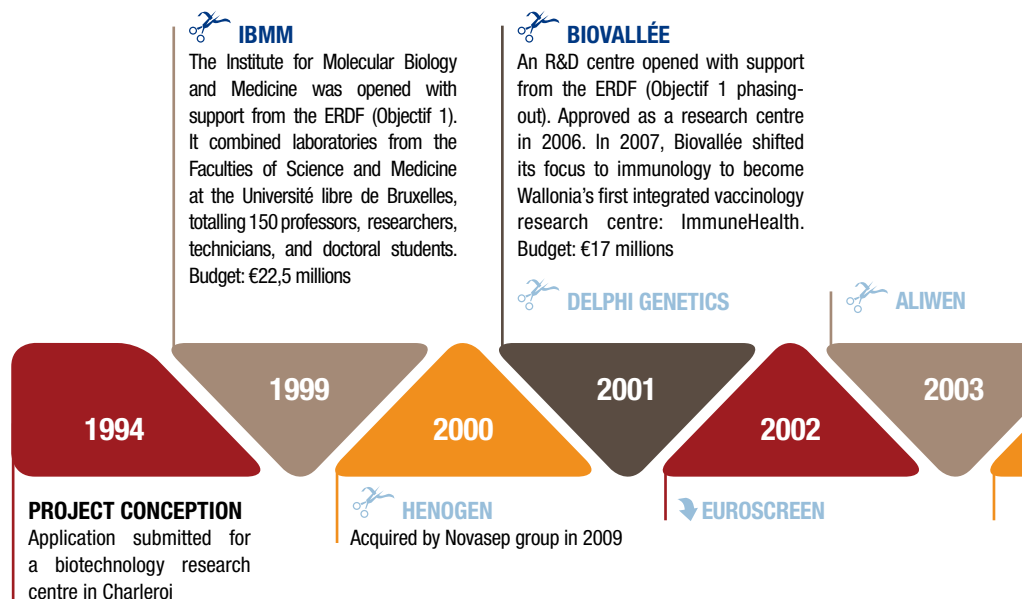
*Paul Magnette,
Mayor of Charleroi*



Mission: Innovation



Charleroi, 1999. The Université libre de Bruxelles opens a research centre dedicated to a promising sector: biotechnology. This bold move received support from structural funds and rapidly paid off: research centres grew, businesses were opened, patents



EUROPEAN FUNDING



EXTERNAL COMPANIES



ULB RESEARCH AND SPIN-OFFS

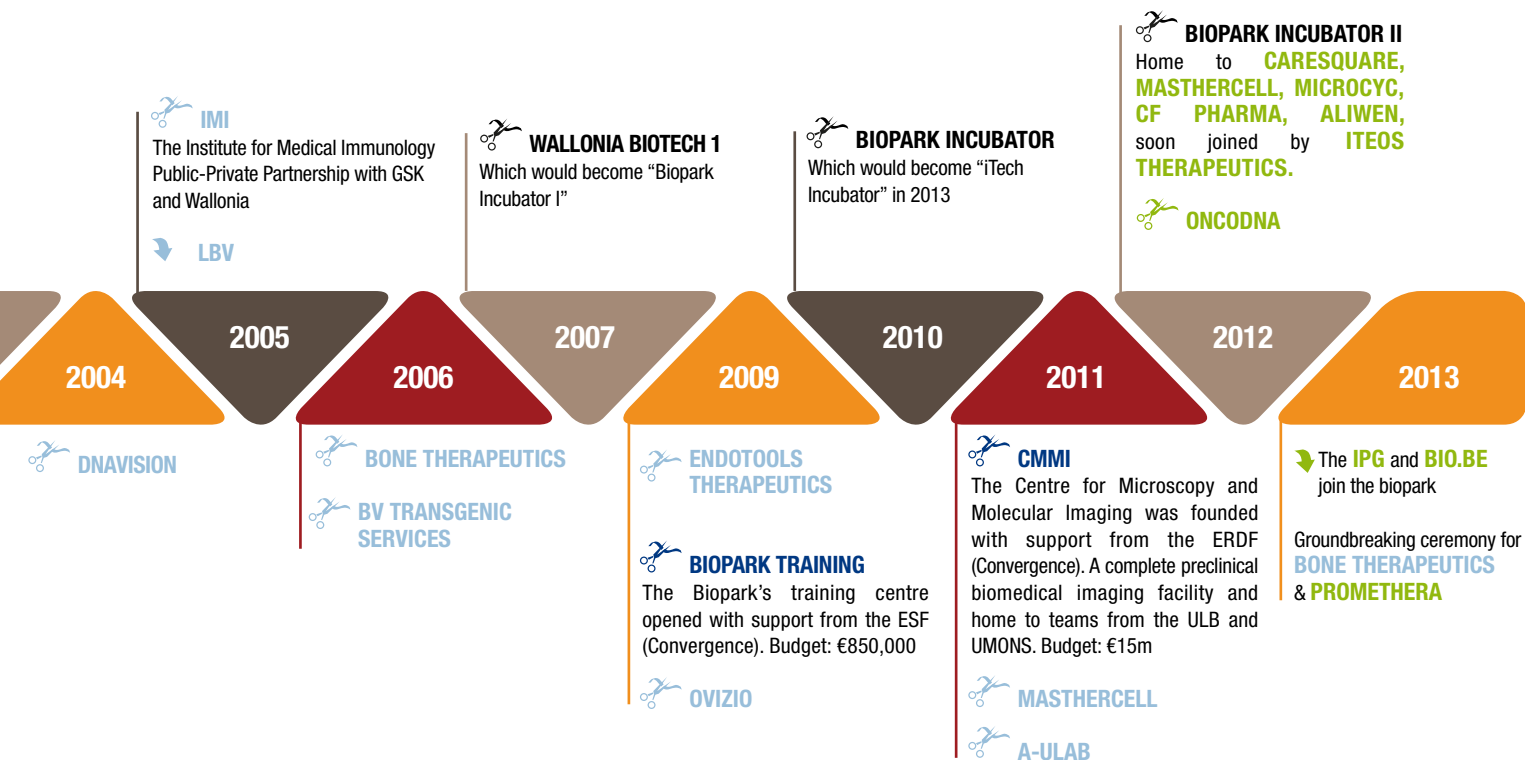


INAUGURATION/OPENING



MOVED TO BIOPARK

obtained, hundreds of jobs were created, a training centre was launched, private capital flooded in on top of public funds, and flagship sectors – immunology, imaging, cell therapy – emerged at Biopark Charleroi Brussels South... The following European programmes will bolster this dynamic as innovation gives birth to growth. To discover in this issue.





Synergies: the credo of tomorrow's research

5 research institutes, 250 researchers, participation in a number of research programmes, and technology transfer resulting in patents and spin-offs: such are the fruits of 14 years of research at the Biopark marked by the emergence of two flagship sectors: immunology and imaging.



The Institute of Biology and Molecular Medicine (IBMM) opened on 13 October 1999, becoming the ULB's first biotechnology facility in Wallonia. The grey building, constructed with support from the European Regional Development Fund and the Walloon government ("Objectif 1"), rose from the all but empty plain and opened its doors to researchers from the university's Faculties of Science and Medicine.

14 years later, and the fields are now populated with buildings and IBMM researchers have been joined by those from other academic and private research centres: the Institute for Medical Immunology (IMI), the Laboratoire de biotechnologie végétale (LBV), ImmuneHealth,

and the Centre for Microscopy and Molecular Imaging (CMMI). Over 200 researchers work as part of 14 research teams, travelling to the Biopark every day to understand the molecular mechanisms behind AIDS, cancer, and embryonic development.

BRIDGING COMMON INTERESTS

But that is not all: a number of researchers also study vaccinology, transplanting, innate immunity, parasitic infections, and inflammation, with immunology having become a major sector for the Biopark. Almost 150 researchers are dedicated to this field at the IMI, IBMM, and ImmuneHealth, and the teams working at these three institutes now work together on a daily basis: "We quickly became aware of similar interests", explains Oberdan Leo, Director of the IMI, "We are currently working on joint research projects with the IBMM, and we can pool equipment and skills to work more effectively, and we are also working with ImmuneHealth on clinical research. These partnerships enable us to approach immunology from a molecular standpoint, as well as *in vivo* in living humans and animals, providing us with the opportunity to take a mechanical look at several clinical and fundamental immunology projects." And the research teams would like to take this cooperation even further: "We have reached

a pivotal moment", Leo Oberdan continues, "The logical next step would be to officially join together in a single group, a single immunology institute, which would be a great boon in terms of competing with other major international institutes".

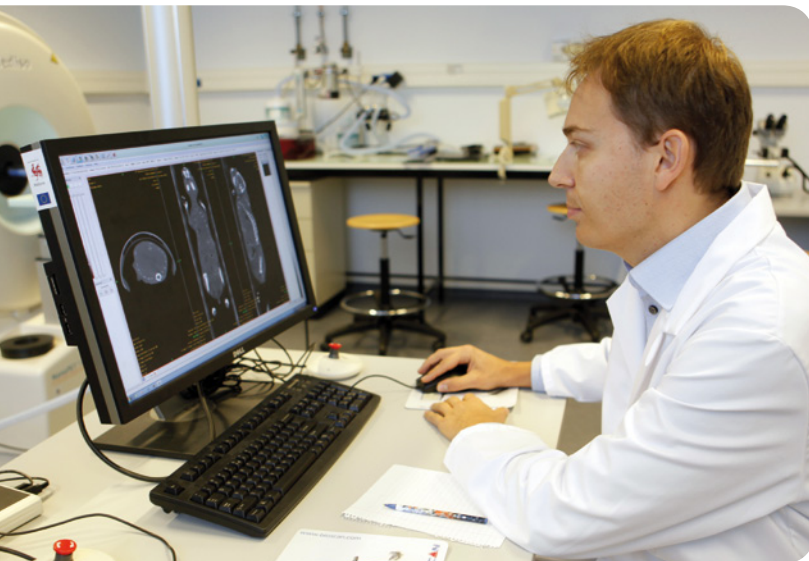
COMPREHENSIVE EXPERTISE UNDER A SINGLE ROOF

Researchers in immunology can also call upon the expertise of the CMMI, with both institutes frequently releasing joint publications. In 2011, the ULB and UMONS opened a joint preclinical imaging facility which has become an important part of the Biopark, for both academic and industrial researchers. "It was part of the initial proposal that we submitted to the EU: we wanted to offer as wide a range of research methods as possible, open to both universities and business", reports Robert Muller, Director of the CMMI. Today, the centre is currently occupied with over 160 joint projects and 25 industrial contracts that cover a broad range of needs. "This volume of joint projects clearly demonstrates the effectiveness of our work and justifies our presence here", he continues. And this effectiveness is based primarily on the rich scope of imaging methods available at the CMMI that range from the molecular level to cells to the entire animal organism. "We are

a *one-stop imaging centre*, a comprehensive centre that groups all of our equipment together on a single site”, Robert Muller explains, “Our setup means that researchers can use different methods to work on a single study all under one roof, possibly even with the same animal”. The centre provides services in microscopy, *in vivo* imaging, histology, services which will soon be complemented by processing. “The aim is to improve the techniques used to collect, process, and store the data generated by our analyses”, explains the scientific director, “This enables us to combine information from different sources for an enhanced view of the results”. The CMMI plans to bid on the next European Regional Development Fund (ERDF) tender to secure further support for its development, as well as to bolster staff and equipment for greater continuity. In coming years, the centre also plans to continue its work with academic and industrial teams, all while boosting its international profile.

It is plain to see for the Biopark, the future will mean working together to grow together. A new credo for the future of Walloon research.

Natacha Jordens



FROM THE LAB TO THE PATENT OFFICE

Research also encompasses the technology transfer of the results obtained in the laboratory, and the Biopark is no slouch with no less than 56 patent families secured by teams working on the site. Detecting multiple sclerosis, new antibodies, or HIV inhibitors: these patents protect an enormously varied range of potential applications. Sometimes, these patents grow into new companies: the spin-offs Delphi Genetics, DNA Vision, and Novasep-Henogen descend directly from Biopark laboratories.

In addition to this, the Biopark is an attractive environment for other university spin-offs and external companies, with 13 biomedical companies currently working on the site.

N.J.

A RESEARCH NETWORK

Biopark researchers regularly take part in local, regional, and national research programmes that bring different research teams, and sometimes businesses, together. Current projects include:

- 2 Interuniversity Attraction Poles (IAP)
- 3 Actions de Recherche Concertée (ARC)
- 2 WELBIO projects
- 3 Public-Private Partnerships (PPP)
- A project for the Queen Elisabeth Medical Foundation (QEMF)
- 6 projects with Biowin, the Wallonia health and competitiveness cluster

Learn more about all Biopark research projects at www.biopark.be/programmes.html

N.J.

The age of cell therapy



In 2000, the spin-off Henogen was launched next to the IBMM. Thirteen years later, and 25 companies do business on the Biopark, several of which are dedicated to cell therapy, including MaSTherCell.

Occupying over 800m² of the iTech Incubator, MaSTherCell has gone from strength to strength: in just a few weeks, the company will create a subsidiary in the USA, made possible by its partnership with AWEX. “In the cell therapy sector, like in so many others, there is a real need for a global presence. We

need to be able to carry out clinical trials on behalf of our customers, or produce batches of products, on both continents. This means that a simultaneous presence in Europe, the USA, and Asia (by late 2014) is not just advantageous, it's a necessity. By March 2014, MaSTherCell

Convergences programme of investment grants, MaSTherCell was able to equip its GMP laboratories within a single year, thanks to Igretec, and the lab space should receive certification from the Belgian Federal Agency for Medicines and Health products (AFMPS)



François Lesage, Chief Strategy & Finance Officer de MaSTherCell.

“Today, the Biopark promotes the creation of spin-offs as well as attracting businesses and investors from Belgium and beyond. We are currently working with our partners at iTech Incubator, Igretec, AWEX, and Sambrinvest to welcome new teams on the Biopark. The proximity to academic laboratories and the public funding available from the Walloon government certainly help to attract businesses to the Biopark, and it's a profitable experience for us, too.”

Dominique Demonté, Biopark Director

will be able to support third party projects in Europe and the USA”, François Lesage, MaSTherCell's Chief Strategy and Finance Officer enthusiastically recounts.

To date, MaSTherCell has invested over €5.5 million (from Theodorus, the ULB's investment fund, Sofipôle/SRIW, Sambrinvest, and a range of private investors). Further investment is planned to fund MaSTherCell's international development.

The young SME likes to move fast: founded in November 2011 with support from the

by the end of September. “Without boasting, I am able to say we have one of Europe's best white rooms, exceeding the requirements of the *European Medicines Agency* and the *American Food and Drug Administration*”, highlights François Lesage. “In addition to this, we are without a doubt one of the only white rooms in Europe where our staff can look out of the window and see the countryside and breathe in perfectly humidified air... This is very important for well-being at work and therefore a bonus for recruitment.”

PROPER STAKEHOLDER COORDINATION

In parallel to the physical make-up of the company, MaSTherCell has also invested heavily in its knowledge of a market that, while still emerging, is expected to undergo significant growth in coming years. Preclinical trials currently represent 60% of the market, compared to 20% in phase 1 and 2, with the final 20% covering phase 3 and commercial production.

Primarily from Belgium and France, MaSTherCell's first customers also came from the USA and Israel, and several of them are considering launching a subsidiary in Charleroi. "The region has grown in appeal, and of course this is in relation to the sources of funding available in Wallonia, but the know-how developed by the different teams on site also plays a role, as does the level of coordination that makes it easy to do business in Wallonia. To use AWEX as an example, they held an information session that was attended by Biolog Europe, WBC, iTech Incubator, UCM, social secretariats, and investors. The half-day event enabled the company to obtain all the information it needed to start doing business in Wallonia. The company is currently finalising its move", observes Marie Bouillez, the Director of iTech Incubator.

MaSTherCell currently employs over 20 staff, mostly in the scientific field, "Our aim is to triple this number in the next two years in Europe, and to duplicate this model in the USA and Asia", specifies François Lesage. Two years is also the timescale that Bone Therapeutics and Promethera Biosciences have set to move into their new premises on the Biopark.



Marie Bouillez, Director of i-Tech Incubator

The result of a public-private partnership involving the Wallonia and Sambrinvest and worth €20m, the platform will enable Bone Therapeutics (a ULB spin-off specialising in using cell therapy to treat bone disease) and Promethera Biosciences (a UCL spin-off that develops innovative treatments for liver disease) to manufacture their own medicines. Both SMEs plan to create 100 new jobs over the next two years.

By 2015, the Biopark should be home to Europe's largest cell therapy production capacity. This dynamic is only set to continue, driven by research. "MaSTherCell is always on the lookout for new technologies that can keep us one step ahead of the competition. And of course, Biopark and the University facilitate this innovation", states François Lesage, "Ovizio, for example, is a ULB spin-off dedicated to holographic microscopy. Its technology could be adapted to the needs of cell therapy and enable testing that is less costly, without compromising performance. This will of course require an R&D phase, and this is something that we are currently looking in to with ImmuneHealth and the ULB laboratories".

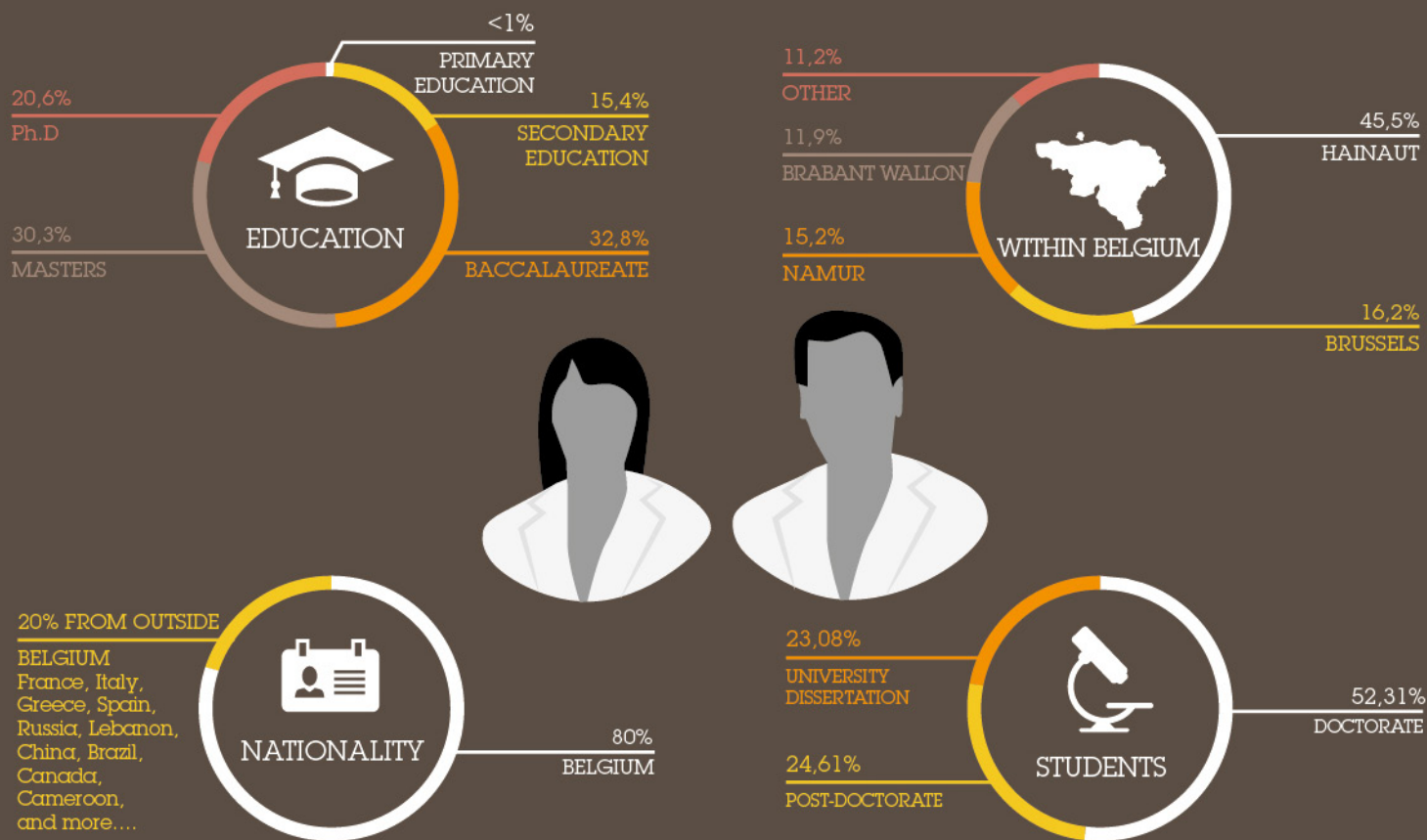
Nathalie Gobbe



Biopark's workers profile

“ Today, 45% of those working on the Biopark live in Hainaut province. Over the years, the Biopark has become a major creator of employment in the region, and it is not just for academics: 50% of the workforce comes from outside the university.

Dominique Demonté, Biopark Director



Data collected from members of Biopark between March and August 2013

Disseminating knowledge



Biopark Training was created with support from the European Social Fund (ESF) and serves the community by promoting innovation through the transfer of knowledge. Every year, 800 trainees attend 25,000 hours of training.

The life sciences sector is in a state of constant evolution and the stream of revolutionary new techniques and strategies means that skills need to be brought up to date on a regular basis. “Lifelong learning plays a crucial role”, explains Arnaud Termonia, the Director of Biopark Training. “It provides a prompt, flexible answer to the highly specialised demands of the sector”. Founded in 2009 with ESF support, Biopark Training is aimed at three types of audience: those working in the sector (technicians, project managers, doctoral students, doctors, etc.), jobseekers, and higher education teaching staff.

“Biopark Training fosters discussion between those involved in the sector, building bridges and sharing cutting edge skills (developed in the most prestigious laboratories) to serve the community”, he continues, “It plays a structural role: disseminating knowledge, skills, competences, and a professional philosophy to every target audience, building upon the expertise in biomedical science and the technological platforms found on the Biopark.”

Today, the Biopark Training prospectus is filled with around 60 modules for courses short and long. What makes it stand out? The attention it pays to industry demand and the regular development of new projects. New developments at Biopark Training in

the second quarter of 2013 include a flow cytometry teaching pack for higher education professors that is made up of three learning tools, including an online module. Designed to be projected to the class before the practical introduction or to revise before exams, exercises at the end of each chapter will enable students to test their knowledge.

Modules on *Stem cells and regenerative medicine* and *Quality? A selection of research tools*, are also included. All of this places training at the heart of innovation on the Biopark.

Damiano Di Stazio



BIOPARK TRAINING, FROM THE DAY IT OPENED:

- An R&D centre within a vibrant network or partners
- 5 full-time trainers, all specialists in Life Sciences
- Around 800 trainees every year attend 60 training modules
- An average of 25,000 hours of training every year



Ambitious challenges!

Interview with Pierre Marage, *Vice-Recteur* for research and regional development at the ULB.

WHEN IBMM CAME TO GOSSELIES, MANY THOUGHT THE MOVE A BIT OF A GAMBLE. ALMOST 15 YEARS LATER, HAS THE GAMBLE PAID OFF?

Pierre Marage : Spectacularly so! It's true that at the time it was a gamble – moving to *the middle of nowhere* to create both a cutting edge institute and a hub of economic development – and yet we have achieved both: the IBMM has maintained and developed its excellence in research, and a genuine scientific and industrial complex has sprung up around us. The project backers, at the ULB and regionally, were visionaries. And what is more they were right!

WHAT CHALLENGES LIE AHEAD FOR THE BIOPARK?

Pierre Marage : Firstly, we need to consolidate our academic excellence, which is what drives the whole Biopark dynamic. We then need to develop the industrial fabric of the Biopark and create more jobs, strengthen links with the hospital network, and continue to attract more new companies by providing the technical facilities and human resources that they need. The campus also has to boost its international identity, in particular by building upon its immunology and imaging resources. That said, government support remains crucial, especially through new European programmes.

BIOPARK REPRESENTS THE ULB IN CHARLEROI, BUT IT IS NOT ALONE...

Pierre Marage : Quite! The ULB intends to become further involved in Charleroi in two other research fields: sustainable development, particularly in the energy sector, and the humanities. If all goes according to plan, the ULB will soon be present in the *Charleroi Ville-Haute* where, in partnership with UMONS, the ULB is set to open research centres in the humanities, higher education facilities, and the Centre for Scientific Culture, currently located in Parentville. These facilities will play an important role in regenerating the area, and form yet another ambitious challenge where, as was the case for the Biopark 15 years ago, the will, enthusiasm, and trust placed in Charleroi's potential know no bounds!

Nathalie Gobbe



The Aéropole in the early 90s (left) and today (right)



A NEW MOLECULE USED TO TREAT TUBERCULOSIS

In recent years, there has been a fresh outbreak of tuberculosis in Belgium and other industrial nations. The primary causes include an increased emergence of multiresistant strains that are able to withstand existing medicine.

In an article published in *Nature Medicine* in early August, researchers from Institute Pasteur Korea and the Novartis Institute for Tropical Diseases reveal the discovery of a new anti-tuberculosis molecule, counting amongst the most powerful compounds ever discovered.

A team headed by **Dr Wintjens (Faculty of Pharmacy and IBMM)** was involved in this research: the laboratory was responsible for interpreting the data and analysing the new molecule's mechanism. They discovered that this new molecule targets the cytochrome bc1 complex that is involved in the bacterium's respiratory pathways. This is a mechanism that is not as yet targeted by any other treatment, and may explain its effectiveness against multiresistant germs.

N. J.

SLEEPING SICKNESS: HOW THE TRYPANOSOME INFECTS HUMAN

Sleeping sickness is caused by a parasite: trypanosoma. In a new research published in *Nature* in late August, the **Molecular Parasitology lab' (IBMM)** sets out a breakthrough discovery about the mechanism allowing some parasites to infect humans.

In 2003, **Pr Etienne Pays'** team already discovered that humans are naturally protected against this type of pathogens owing to a serum protein called apolipoprotein L1 (apoL1), which efficiently kills the parasite by generating ionic pores in membranes of its digestive system. However, through evolution, two variant trypanosomes acquired the ability to resist apoL1. These variant trypanosomes, named *Trypanosoma rhodesiense* and *Trypanosoma gambiense*, can therefore grow in human blood. It's the mechanism which allows those parasites to resist to apoL-1 and infect humans that the researchers demonstrate today.

N. J.

A BETTER UNDERSTANDING OF THE INFLAMMATION PROCESS

Stanislas Goriely's team at the IMI have just identified a new factor in the inflammatory response. Known as IRF3, science was already aware of the anti-viral action of this transcription factor. In a paper published in *PNAS* in early August, the researchers told how the absence of IRF3 is accompanied by increased lymphocyte IL17 production, a cytokine involved in the development of many chronic inflammatory diseases such as psoriasis, multiple sclerosis, or Crohn's disease. IRF3 therefore acts as a "natural barrier" to lymphocyte activation and inflammation.

In another article published in the *Journal of Experimental Medicine*, the team took a closer look at interleukin-23, an inflammatory cytokine with a substantial role in human diseases like psoriasis, inflammatory diseases of the digestive tract, or arthritis. In partnership with the **IBMM** and **CMMI**, the laboratory was able to show that this cytokine's messenger RNA was controlled by a destabilising protein, known as *tristetraprolin*. Without this protein, immune cells produce a large quantity of interleukin-23 which leads to the spontaneous development of severe inflammatory disease in mice.

Proper understanding of how the inflammation process is controlled is important in treating a number of diseases: inflammation is one of our body's natural defence mechanisms to combat external threats (injury, infection, etc.), but if left uncontrolled it can harm tissue. The discovery of the unexpected role of IRF3 and the novel insights into the mechanisms controlling IL-23 expression, help us to better understand inflammatory diseases and to develop new treatments.

N.J.



In brief

DISCOVERY OF NEW RIBOSOME ASSEMBLY FACTORS

Ribosomes are the cell's *workers*: these sophisticated molecular machines *read* the genetic information encoded on RNA, and puts amino acids together to build functional proteins. Because ribosomes are absolutely essential for gene expression, disruption of their synthesis irreparably leads to severe diseases. In fact, a new class of human diseases has recently been discovered and designated as *ribosome diseases* or *ribosomopathies*.

In a recent issue of *Molecular Cell*, the **RNA Metabolism Laboratory (IBMM)** has tested directly in human cells the involvement in ribosome biogenesis of 625 nucleolar proteins. The team led by **Prof Denis Lafontaine** also identifies 286 novel ribosome assembly factors, including 74 without yeast counterparts, yeast being the historical model used in ribosome biogenesis studies. The study also reveals that 38% of the ribosome assembly factors identified have been connected to severe human diseases, mainly cancer and genetic disorders. The study also showed that nearly one third of the human factors identified perform additional or even entirely different functions than their yeast homologs.

This conclusion is very important as it poses fundamental implications for understanding ribosomopathies at the molecular level and for developing effective therapeutic agents. This work provides a key reference dataset and fundamental resource to the scientific community and is available on the website www.ribogenesis.com.

N. J.

IMPROVED UNDERSTANDING OF CARDIAC HYPERTROPHY THANKS TO HIV

Understanding how latent reservoirs of the HIV-1 virus which causes AIDS are reactivated is a major step in improving how the virus is treated. Teams under **Carine Van Lint (IBMM)** and Olivier Rohr (*Université de Strasbourg*) have already shown that the cell factor CTIP2 played a role in forming these reservoirs. Studies have also shed light on the essential role played by another factor, the transcription elongation factor P-TEFb, in reactivating HIV from latent reservoirs. When its activity is inhibited, P-TEFb also contributes to cardiac hypertrophy.

In a paper recently published in *PNAS*, both teams have revealed a link between these factors: CTIP2 inhibits the activity of the P-TEFb complex by recruiting it, via the cell RNA (7SKsnRNA), to P-TEFb dependent gene promoters. A look at how these genes are expressed in the hypertrophied hearts of mice revealed how CTIP2 controls deregulated genes in the wake of disrupted P-TEFb activity.

This discovery unveiled a new mechanism for controlling this factor's activity. A better understanding of P-TEFb regulation is essential to developing new treatment strategies targeting diseases like AIDS and cardiac hypertrophy.

N. J.



FEDER – FSE



L'UNION EUROPEENNE



Wallonie

L'UNION EUROPEENNE ET LA WALLONIE
INVESTISSENT DANS VOTRE AVENIR



Quartely publication

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