VIB TIMES

QUARTERLY
NEWSLETTER
OF VIB.
DECEMBER 2018

VIB

TALENT POOL
FOR YOUNG RESEARCHERS

Marijke Lein

LOOKING FOR FERTILE GROUND TO MAKE TALENT GROW? VIB IS THE PLACE TO BE!

When visiting the VIB labs, I am always struck by the energy, the enthusiasm and the passion of young and not-so-young people from all around the world pursuing their dream of helping to cure widespread and severe diseases and finding new methods of sustainable food production for the ever-growing world population.

I think that we can say that in its 22 years, VIB has become an attractive place for many scientists, and there are many reasons why. From the beginning, we have always strived to offer a stimulating environment in which people can shape their expertise in science and technology. Through proper guidance of world renowned group leaders and experts, as well as access to cutting-edge facilities and training, people can grow and become independent scientists. Besides the scientific training, VIB is quite unique in offering training in skill development and career guidance.

This combination enhances the employability of the PhD students and postdocs in particular, as they only stay with VIB for a restricted number of years. When looking at career prospects, more and more people come to realize that there is a broad spectrum of possibilities in the Flanders region through the strong network between VIB, academia and the biotech and pharma industries. So, it is not only VIB, but the whole collaborative network around it that makes VIB attractive.

Over the years we have seen that the face of science is changing. Scientific output, measured by the number of publications in high impact journals remains important, of course, but more and more emphasis is being put on other aspects of a stimulating environment, namely the well-being of all people working in the institute. So far, initiatives have been taken to make people feel welcome, to increase diversity, pay attention to the home-work balance, health, and to help people when times get rough. I hereby wish to thank the VIB-wide task force on well-being for their efforts in making this happen. Being a scientist is a career choice with many challenges and therefore we want people to feel supported and encouraged in what they do.

Together with the entire VIB community, we at headquarters wish to continue making VIB a great place, where talent can flourish, and successes can be shared, and with the advancement of science with ample benefit and relevance for society as the ultimate goal.

Enjoy the holiday season together with your loved ones and see you all back in 2019.

Marijke Lein, HR Director

TALENT POOL FOR YOUNG RESEARCHERS

SCIENCE MEETS SCIENCE

SCIENCE MEETS TECHNOLOGY

SCIENCE MEETS BUSINESS

SCIENCE MEETS PEOPLE

EVENTS

Joke Baute

Excellent science requires ever more diverse skillsets and collaboration between a variety of competencies. To maintain our position on the cutting edge of life sciences research, VIB offers diverse training programs to scientists and technicians. Joke Baute, learning & development specialist at VIB: "We want to actively contribute to the growth of our scientists and the life sciences ecosystem as a whole."

GROWTH AT VIB PROFESSIONAL DEVELOPMENT OPPORTUNITIES ABOUND

What does VIB's training offering look like?
Joke: "Our training initiatives fall into four main categories: science, bioinformatics, skills and coaching. By participating in these courses and coaching sessions, scientists have the opportunity to gain insights into new fields and technologies, grow their skillsets in a wide range of areas, and develop as well-rounded professionals."

Why does VIB invest so much in training, and who chooses training topics and domains?
Joke: "Providing plenty of training opportunities is a key strategic goal. It doesn't just help people develop their careers and grow as scientists in the context of their work at VIB, but it also increases their employability. Another great side effect: our investment in training attracts fantastic scientists to our institute."

"We believe that it's no longer sufficient for scientists to stick to their narrow disciplines. It's important to become a well-rounded researcher by combining wet lab activities with professional training in additional scientific and parascientific disciplines. As such, we ensure that our training courses and events meet the specific needs of our scientists through feedback surveys and by involving the postdoc and group leader communities in choosing the year's science topics."

How do you ensure that training creates value for researchers – and for VIB as a whole?
Joke: "We carefully curate the content of our training program to make sure that it is well-balanced, flexible and personalized. With the four components that I just described, each PhD student, postdoc and everybody else at VIB has the opportunity to assemble a tailored personal training program that meets their learning needs, career functions and development goals.

"Even more, we expect VIB group leaders to guide our scientists in designing their personal training packages – the yearly feedback meeting is an ideal moment for them to sit down with their researchers and engage with them on the many training opportunities available."

"It's a fact that attending training events and courses stimulates interaction and networking. We invite a range of outside experts from academia and industry to speak, and external participants are allowed to attend a subset of the courses we offer – creating a networking forum that's especially fruitful for young scientists. We also collaborate with doctoral schools on training initiatives, some of which students even receive academic credits for."

OMICS@VIB: 6 DYNAMIC, INTERNATIONAL YEARS OF BREAKTHROUGHS

Kicked off in 2011 to foster diversity and development of 'omics' expertise at VIB, the omics@VIB program has been a resounding success. To date, 81 publications in high-impact academic journals, 5 patent applications, plenty of enthusiasm and an institute-wide VIB postdoc community are products of this forward-thinking initiative. More than reason enough to have a chat with Lieve Ongena, program manager of omics@vib.

Valuable additions to our community
"The omics@vib program was created to attract 20 fellows to VIB over a period of 6 years. The program brought in fellows representing 12 different nationalities with a 3-year fellowship ahead of them. The fellows were quick to dive in at VIB, enthusiastically embracing training opportunities and integrating smoothly into their research groups and the wider VIB community – including every single one of our science, tech and core facilities."

Fostering two-way development
In addition to dedicating their specialized skillsets to enriching VIB research, omics@vib fellows were invited to come up with their own ideas on how to make VIB an even richer institution – and the VIB Postdoc Commitee (PDC) was born. Several omics@vib fellows were inspired by VIB's research environment and took the opportunity to join the PDC steering committee, gaining additional science policy skills in the process.

"The fruits of their efforts have been very valuable for VIB, and include community meetings on postdoc career opportunities and key science & tech topics and company visits. These activities extended to the VIB postdoc population of 300+ people, and to the VIB Alumni Committee, with special attention paid to non-academic career options", Lieve explains.

VIB also took special steps to maximize the fellows' future career opportunities. During omics@vib program evaluations, the review board composed detailed invidual feedback reports – an effort that was greatly appreciated.

Enriching the global life sciences ecosystem
With the program coming to a close last year, most omics@vib fellows have left VIB to pursue other opportunities in industry, academia and science policy. A few have stayed on to finish up important papers, further impacting their career options beyond VIB.

Lieve: "We're proud of the excellent work they have done at VIB, which actively contributes to the growth of the global life sciences ecosystem. And, of course, we sincerely wish them every success in the future."

ALL VIB ALUMNI ARE INVITED TO JOIN THE VIB ALUMNI GROUP ON LINKEDIN.

ALUMNUS IN THE PICTURE: "VIB OPENED MY EYES" DORIANE LORENDEAU RECALLS HER OMICS@VIB EXPERIENCE

Doriane Lorendeau started in the lab of Sarah-Maria Fendt in January 2014 as an 'omics@vib' postdoc fellow. At that time, she was convinced that the next three years would be a very enriching experience. "I thought a stint at the VIB-KU Leuven Center for Cancer Biology would offer a considerable advantage when applying for future academic positions," she says. In retrospect, she got much more out of her fellowship than expected. Being at VIB opened her eyes. "A life-changing experience," she calls it.

Why did you apply for an omics@vib Marie Curie Fellowship?
"When doing preclinical drug discovery work at the University Claude Bernard in Lyon, I realized that the effectiveness of the molecules we tested was highly dependent on the nutrient composition of the media, i.e. the metabolic environment they were analyzed in. That triggered my interest in metabolomics."

"When the omics@vib fellowship allowed me to relocate to the group of Sarah-Maria Fendt in Leuven, I did not hesitate for a moment. At that time, metabolomics, particularly stable-isotope tracing-based technology, was booming in the cancer field, and began revealing its potential to drive biomedical breakthroughs. Investigating the changes in the metabolome and epigenome caused by gene mutations related to cancer resulted in a completely new field of study, but only a few labs worldwide had fully mastered the technology."

"The VIB-KU Leuven environment shaped my expertise in metabolomics and allowed me, within a short period of time, to obtain results that we could publish in high-ranking journals. However, there was much more."

What do you mean?
"The training opportunities at VIB also played an important role throughout my postdoc training, not only in my technological and scientific development. Their focus on soft skill development has been crucial for me. I was able to sharpen my communication and presentation skills, learned to conduct research projects in an interactive and integrated manner and acquired managerial experiences. But, maybe most importantly, I realized that there were other opportunities in science than performing a traditional academic research career. I was amazed by the intense collaboration between academia, biotech and pharma companies here in Belgium. The existence of such collaborative networks was an absolute eye-opener."

Is there room for a social life when you work as a postdoc in a competitive environment such as the VIB lab in Leuven?
"Marijke Lein, Lieve Ongena and Marleen Vanstraelen from VIB HQ sparked the creation of the Postdoc Committee at VIB around a core of motivated omics@VIB fellows. The objective was to launch events organized by postdocs for postdocs. It started mostly as informal get-togethers between a few omics@VIB program fellows."

"Although we were working at different universities, we had lively discussions about our research. We shared our vision on science policy and the issues related to career opportunities for postdocs in academia. And of course, we had a lot of fun together. As time passed, these meetings became more structured, piloted by a more professional committee that attracted the membership of other VIB postdocs inspired by the initiative."

You've worked for Janssen, part of Johnson & Johnson, since last summer. Moving to big pharma is not the most obvious step for an academic postdoc.
I joined VIB with the intention of gaining experience and returning to France to become a scientist or PI in an academic lab. But gradually, I realized that my heart was actually closer to drug development and the bench-to-bedside philosophy. The reason I went to big pharma is that metabolomics is still a young technology, and in industry, it's mainly used in bigger companies.

"At Janssen, we are, among other things, interested in improving patients' response to immunotherapy and the substantial braking effect that the immune system has on chronic disease progression, but also on limiting the damage caused by inflammation in auto-immune diseases, for example. Importantly, these functions, particularly the cytolytic and anti- or pro-inflammatory activities of immune cells, are sustained and modulated by their metabolism and microenvironment. This is exactly where metabolomics can help us understand the fine-tuning that occurs between metabolism and immune cell function. In the end, we aim to identify specific metabolic biomarkers of immune cell exhaustion or inflammation outbreak and druggable metabolic targets to activate or inactivate specific immune cell subpopulations."

What is your ambition in the longer run?
"Putting metabolomics on the map in a company like Janssen and in the pharma industry as a whole. Achieving widespread recognition of metabolomics as a useful tool, just like genomics, transcriptomics and proteomics, which have become routine instruments in drug discovery in many therapeutic areas."

Was there a specific reason you stayed in Belgium?
"Nowhere else in Europe can one find such a dense interaction between academic research centers, biotech firms and pharma companies, except maybe in Switzerland and the UK. This makes Belgium 'heaven on earth' for researchers in life science and drug discovery. Belgium has become a hotspot for scientists from everywhere in the world. Perhaps Belgians aren't fully aware of the value of the rich culture that they have created for life sciences."

ENSURING A FUTURE-PROOF BLEND OF TECHNOLOGY AND EXPERTISE AT VIB

"We can all agree that science and technology are interconnected," asserts Geert Van Minnebruggen, head of the Science & Technology Unit, including the Core Facilities program, at VIB. "It's impossible to arrive at ground-breaking discoveries without access to the cutting edge." That's exactly what the Core Facility, Tech Watch and Innovation Lab programs aim to facilitate.

How does VIB ensure access to key tech, and does 'tech turnover' impact scientists?
Geert: "VIB prioritizes the availability of high-performing, cutting-edge infrastructure that covers all life sciences disciplines, from disease pathways to genome insights. The Core Facilities program has stable, highly developed, performant tech that it offers for a fee to internal PIs as well as external research groups and companies.

"In addition, we've been running Tech Watch since 2008 – a vehicle used to scout for new technologies and bring them into the VIB environment. This has been extremely successful. However, learning how to use and apply brand-new, undeveloped, pre-commercial tech can indeed pose challenges for scientists."

On that note, how does VIB promote 'technological literacy'?
Geert: "That's where the Technology Innovation Lab comes in: it links the VIB Core Facilities and Tech Watch innovations, and ensures that the tech and the literacy are refined as effectively as possible. Since 2017, the Technology Innovation Lab employs dedicated, creative scientists to de-risk new technologies being tested under the Tech Watch program and develop them to the point where other VIB groups can be trained in their use. The successful implementation of 10xGenomics, used for single-cell sequencing, is a great example of the Innovation Lab in action."

There's also Core for Life – how does this special Core facility alliance help bring new tech to VIB?
Geert: "This concept was born back in 2012 when I saw how expensive and knowledge-intensive it is to train and retrain staff to keep up with tech turnover. It's difficult – and infeasible – to take care of all of this training within the walls of a single institute. Competitors can be powerful collaborators – and plenty of other life sciences institutes in the EU have core facility programs centered around different technologies."

"Through Core for Life, VIB scientists can team up with other core facilities in Europe. In addition to the VIB Cores we have here at VIB, our PIs have 8 external core partners that they can work with cutting-edge cores of 8 European top institutes to share samples, discuss new technologies, exchange services and receive training. We can send our staff to environments where new platforms are already operational, accelerating the learning curve – and it happens in both directions."

What's your vision on the future of technology training at VIB?
Geert: "The Core Facilities we have today don't cover the same disciplines as they did a few years ago – we might switch disciplines if, for example, it's cheaper to outsource a service, or if a vital new tech emerges. In light of this, we're currently developing a format where, under the umbrella of Core for Life, core Facility heads can receive in-depth training in new disciplines."

"Even more, a user-based, open-access model for core facilities will become more important, as will innovation. We need to get heavily involved in the innovative development of the scientific technologies of tomorrow to stay at the forefront of our field."

AN ODE TO OUR VIB SUMMER SCHOOL INITIATOR

Eight years ago, microscopist and training coordinator Chris Guérin (VIB-UGent Center for Inflammation Research) set up the VIB Summer School. The founding father's impending retirement makes it the right time to both put him in the spotlight and celebrate the birthday of his brainchild.

Our heads of the VIB Bioimaging Cores in Ghent and Leuven Saskia Lippens (VIB-UGent Bioimaging Core) and Sebastian Munck (VIB-KU Leuven Bioimaging Core) are Chris's 'partners in crime' since the first edition of the VIB Summer School. In honor of their companion and his hard work, they look back on the history and give us a forward glance on the future of this highly regarded international training program.

What was the trigger for the first edition of the VIB Summer School?
Sebastian: "Back in 2010, very few training courses in microscopy had found their way to the European continent. However, as Chris had already co-organized courses like this in the UK – and, as such, was aware of their added value – he decided to expand the offer into Flanders and Europe by initiating the VIB Summer School."

Saskia: "In doing so, Chris tackled a common problem within institutions and universities. During their studies, young scientists gain plenty of theoretical knowledge, but they sometimes remain lacking when it comes to hands-on, foundational research skills. This is also true for microscopy, which is essential to modern science."

Why the choice of one full week of training instead of one-day courses or workshops?
Saskia: "In attending a 5-day course, participants gain an in-depth understanding of the subjects we address, and acquire the profound microscopy skills they need to conduct their research. A shorter training event wouldn't be enough to achieve a similar result."

Sebastian: "Besides, the goal of our audience is to push the limits of research, which they won't attain by watching 2-minute YouTube videos. We start at the very base level of microscopy, and over the course of the week, guide them all the way to high-level, cutting-edge use."

For whom is the Summer School aimed for?
Sebastian: "Even though we welcome participants from various backgrounds, we target scientists just starting their careers. PhD students, for example, usually lack training opportunities. In offering them expertise, mentoring and consulting, we provide them with a tailor-made solution. Our ultimate aim is to facilitate and improve their research."

Saskia: "Also noteworthy is the fact that our audience consists of both VIB colleagues and members of other – sometimes international – institutions. This is also true for the teachers in the Summer School."

What does the program look like?
Saskia: "On the first days, we explore the theoretical side of the subject we'll be working on and they already begin to do some exercises. In the middle of the week, we divide them into groups of four, moving from one microscope to another and they get hands-on expertise during practical workshops. As such, they attend a different microscopy training course every two hours. Data analysis is reserved for the last day. You can probably tell that the Summer School really focuses on experimental research."

Chris Guérin

How did the Summer School develop over the years?
Sebastian: "We started with a one-year framework, but due to the heavy workload involved, we gradually moved towards a bi-annual program: ever since the Summer School began attracting international participants, organizing it has required a lot more effort. However, the first edition, involved VIB members only."

What is the importance of the Summer School for VIB?
Sebastian: "We've managed to generate international visibility for VIB in organizing the Summer School. We entered into competition with globally established training events and ended up being one of them."

Saskia: "The Summer School enables us both to demonstrate the expertise VIB has acquired in the field of microscopy and to network with members of other expert institutes."

Can you give us a sneak peek at the future of the VIB Summer School?
Sebastian: "Since data analysis is becoming ever more crucial for research, we will definitely focus more on it in the future. We already incorporate it into the program, but a one-day course proves insufficient. Moreover, new technologies come with new topics, so innovation is always on our agenda – a mission Chris often emphasized and for which he deserves a shout-out."

Saskia: "No matter how the program evolves in the coming years, I'm sure Chris will always be involved in the Summer School. Next year, for example, he will be the main lecturer. Moreover, at every edition thereafter, he will be our guest of honor."

See you around, Chris Guérin!

5 EDITIONS

162 PARTICIPANTS FROM **8** DIFFERENT COUNTRIES

29 COACHES
13 WITHIN VIB
16 EXTERNAL

MORE THAN **200** HOURS OF TRAINING

640 HOURS SPENT ON CONFOCAL MICROSCOPY

VIB SCIENTISTS ARE THE CREAM OF THE CROP FOR THE FLEMISH BIOTECH CLUSTER

Since it was kicked off in 2004, flanders.bio has been a biotech tour de force to be reckoned with. Willem Dhooge, co-managing director of flanders.bio, has helped shape the independent cluster organization into the successful alliance it is today. "The superior research done by VIB – one of the world's top life sciences institutes – is a key enabler of our success," he asserts.

Flanders' vibrant biotech ecosystem didn't just spring up out of the nowhere. The richness of the sector comes down to the presence of all the ingredients for success – and the skills and dedication needed to nurture their growth. Willem: "Continuing the momentum will be a large-scale group effort."

How did Flanders emerge on the global biotech map?
Willem: "The initial catalyst came in the early 80s when Plant Genetic Systems was established by UGent professors. Shortly after that, other big names in biotech from Flanders – think Tibotec and Innogenetics – successfully translated high-quality fundamental research into life-changing technologies. TiGenix followed in 2000 and became the first company in the world to offer an EU-approved cell-based product."

"Flanders has a track record of innovation that starts with basic science and moves through start-up, R&D, funding, production and acquisition phases to achieve international business success. "Other important factors include the willingness of venture capitalists to support young companies in Flanders, as well as the government's historical support of the sector. The creation of VIB in 1996 was the government's hallmark life sciences achievement."

What characteristics of VIB make it such a powerful achievement?
Willem: "The sector thrives on fundamental research. VIB is one of the top biotech institutes in the world – a quality stamp that attracts major attention from fellow institutes, scientists from around the world and potential business partners. VIB covers university departments across Flanders and has a proactive collaboration strategy with other key research institutes in Europe. As a result, Flanders and all players active in its biotech ecosystem benefit from VIB's reputation for excellent research."

"VIB researchers strive to translate world-class fundamental scientific research into concrete applications. At Janssen, we are happy to make full use of this expertise." -

Tom Aelbrecht, Campus Office head at Janssen Pharmaceutica

How successful are VIB alumni at finding new jobs outside of academia?
Willem: "We don't specifically keep track of VIB or other researchers as they find their way in the biotech industry. However, I do know that if your CV mentions experience in a VIB lab, companies will be more interested in you. Working at VIB is tough and requires discipline and skill. If you can function in a VIB lab, companies know that you're a focused person. You're trained to meet deadlines, protect your research and track results in a structured manner. These are significant assets in the job market."

"Companies are also aware that VIB offers plenty of training opportunities to their employees – not just in fundamental research, but on topics related to business development and intellectual property."

Does flanders.bio help bring new career opportunities to scientists and young graduates in Flanders?
Willem: "There are several flanders.bio initiatives that help connect companies with biotech talent, from recent graduates and postdocs to experienced scientists taking the next steps in their careers.

"We like to recruit VIB employees because of their excellent scientific training in domains that are closely related to our business, in an environment involving close collaborations with industrial partners. Indeed, VIB focuses on new developments and technologies, enabling VIB scientists to delegate people with experience in areas where growth and demand for training is greatest – such as in computational/digital sciences. VIB employees' experience in multidisciplinary teams, the fact that they have learned to work together in an international environment and their personal motivation to translate science into industry successes are also decisive elements of our preference to recruit them."

Benjamin Laga, managing director at BASF Agricultural Solutions Belgium

Through our collaboration with jobat.be we offer a rich online vacancy platform – in fact, it's the most frequently visited page on our website. flanders.bio partner companies and institutions can post job opportunities there, and scientists and other personnel can upload their CVs to our database.

"Every year, we organize Knowledge for Growth, one of the largest life sciences conferences in Europe, where we also offer Belgian biotech companies and service providers the opportunity to connect with students and job-seekers in the region. There are also our BioBizz Cafes and, of course, the OPINNO program."

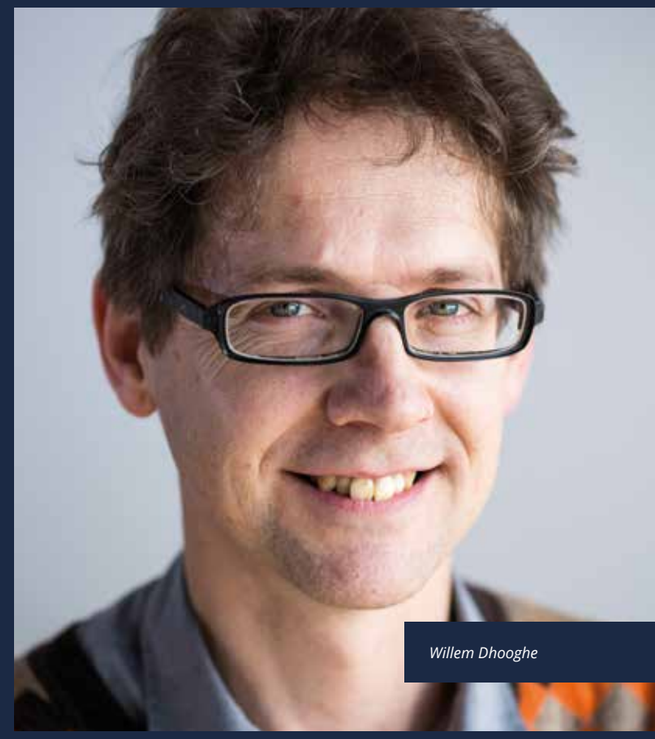
Can you tell us more about OPINNO?
Willem: "OPINNO is one of the manifestations of our new 'human talent' strategic track, run by Pascale Engelen, my colleague and fellow co-general manager at flanders.bio. Through this initiative, flanders.bio aims to support the development and attraction of new talent to Flanders."

"The ultimate goal of OPINNO is to show master's and bachelor's students that there is more to life sciences than pursuing a PhD. There are diverse possibilities outside of academia for biotech and biomed engineers, pharmacists, etc. Service providers and private companies are also in search of high-level competencies, and we provide students with a comprehensive overview of their options. BioBizz Cafes are smaller events where companies have in-depth conversations with students."

Are there any big collaborations between VIB and flanders.bio on the horizon?
Willem: "Alongside 10 private and academic partners in Flanders and the Netherlands including VIB, we are now developing the Interreg Helis Academy. The objective is to grow competencies in new technologies that are increasingly needed in the biotech sector – young graduates don't usually have them when they leave university."

"To make students more industry-ready, we're designing modules on topics including good manufacturing processes, evidence-based clinical testing, business development and market access, bioinformatics and new tech like AI, big data, medical devices and more. It's a great, forward-thinking initiative with a bright future, and we're proud to have VIB on our side."

Are you interested in getting involved in Helis Academy and shaping the future of the European biotech industry? Get in touch with Pascale Engelen, co-general manager of flanders.bio for more information.

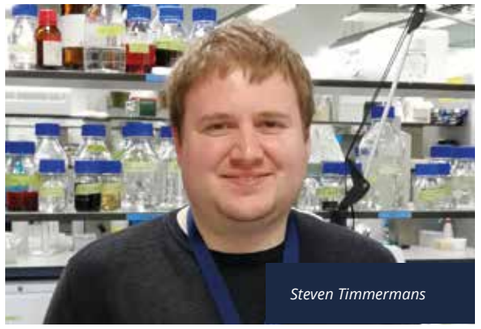


Willem Dhooghe

KEY YOUNG TALENT AT VIB

VIB-UGENT CENTER FOR INFLAMMATION RESEARCH

Claude Libert (VIB-UGent Center for Inflammation Research): "Steven Timmermans is a bioinformatician in my lab. During his PhD, he has combined two key tasks: providing services to other people in the group (analyzing CHIPSeq, RNASeq and other complex datasets), and building a new research line under the guidance of Yvan Saeys and myself. He has constructed a searchable database (mousepost.be), which collects all key protein polymorphisms in all sequenced mouse strains. This groundbreaking database was recently promoted by Trends in Genetics. What I admire most in Steven is his flexibility in dealing with many different datasets and his perseverance in problem-solving. Bioinformatics expertise is crucial, but to see its daily impact on our projects is amazing. As a PhD student, Steven is first author of publications in PNAS, JCI Insight, Trends in Genetics, Mammalian Genome (twice) and shares first authorship on a PNAS paper."



Steven Timmermans

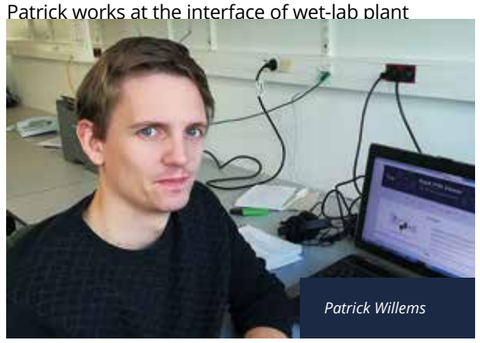
Steven Timmermans (PhD Student at the VIB-UGent Center for Inflammation Research): "The VIB environment is fantastic. Lots of data is generated, there is always room for wet science confirmations, and there is sufficient bioinformatics expertise with Yvan Saeys to help me in my work. On top of that, I have opportunities to attend conferences and courses at VIB. I also want to credit Ghent University for great programs in biochemistry and biotechnology."

Katrien Van Der Borght

Katrien Van Der Borght (postdoc at the VIB-UGent Center for Inflammation Research):
"I learned about interesting career paths and was taught valuable skills to be successful in finding new challenges outside academia."

VIB-UGENT CENTER FOR MEDICAL BIOTECHNOLOGY AND VIB-UGENT CENTER FOR PLANT SYSTEMS BIOLOGY

Patrick Willems and Lam Dai Vu are PhD students shared between the lab of Kris Gevaert (VIB-UGent Center for Medical Biotechnology) and the labs of Frank Van Breusegem and Ive De Smet (VIB-UGent Center for Plants Systems Biology), respectively. Patrick works at the interface of wet-lab plant



Patrick Willems

work and dry-lab bioinformatics to explore the possibilities of various big data sets in addressing specific research questions and making new biological discoveries. He has already co-authored 13 publications. With the help of the VIB Bioinformatics core, he recently developed the Plant PTM Viewer (http://www.psb.ugent.be/PlantPTMViewer/), an online web tool providing a central resource for 20 post-translational plant protein modifications.

Dai combines proteomics and functional characterization of selected proteins to investigate temperature signaling in plants. This combined expertise already resulted in his co-authorship of 12 publications, including several international collaborations.

VIB-UGENT CENTER FOR PLANT SYSTEMS BIOLOGY

In early 2014, Anaxi Houbaert started his PhD in the lab of Jenny Russinova (VIB-UGent Center for Plants Systems Biology). By combining proteomics, genetics, biochemical and microscopy techniques, Anaxi discovered that the substrate specificity of the GSK3s is controlled via scaffolding and localization changes, resulting in the promotion of either stomatal formation or epidermal cell differentiation. These findings led to a prestigious publication in Nature (2018), in addition to a collaborative publication in Plant Physiology (2017) on stomatal development that Anaxi also co-authored.

NERF (VIB-KU LEUVEN-IMEC)

Cagatay Aydin, postdoc working with Sebastian Haesler: "My PhD supervisor was Vincent Bonin (NERF). I have been working at NERF since 2012. This institute helped me develop into an independent scientist by providing an energetic and inspiring environment. In using state-of-the-art techniques and having access to cutting-edge facilities, I was able to conduct experiments that I'd only dreamed of before. This institute stimulated my creativity, and this has resulted in beautiful papers and fruitful collaborations. I strongly recommend NERF to every young, ambitious scientist interested in pushing their limits."

Rodrigo Gallardo

VIB-KU LEUVEN CENTER FOR BRAIN & DISEASE RESEARCH

Rodrigo Gallardo (postdoc at the VIB-KU Leuven Center for Brain & Disease Research):
"VIB is such a powerful environment for basic and applied research that good ideas and solid science can become start-ups. There are few things more rewarding than seeing your work take on a life of its own."

VIB-UGENT CENTER FOR MEDICAL BIOTECHNOLOGY

Lien Van Hoecke is a PhD student in the lab of Xavier Saelens (VIB-UGent Center for Medical Biotechnology). The main aim of Lien's PhD research is to develop and apply new mRNA-based immunotherapies to combat cancer and viral infections. Thanks to collaborations with labs from different VIB centers, her research has generated exciting new findings in the field of anti-cancer immunotherapy (Van Hoecke *et al.*, Nature Communication, 2018). Furthermore, VIB's innovation and business team has been instrumental in securing intellectual property rights based on Lien's findings and in attracting the interest of a private partner that plans to bring this immunotherapy closer to the patient.

Lien Van Hoecke

Researchers of Infopunt Proefdierenonderzoek at Biotech Day on October 21, 2018 in Antwerp

VIB has numerous initiatives supporting scientists in their communications efforts. One of them is 'The Communication Lab': a brand-new page on the VIB Intranet that gathers all sorts of information to help scientists: best practices, tips, examples, etc. It's a one-stop shop for all things communication. The digital Lab is a platform to share resources and experiences, so everyone can pitch in. In creating the Lab, we want to foster proactive communication and stimulate all VIB scientists to learn from each other.

HOW TO COMMUNICATE ON SENSITIVE TOPICS WITHOUT MAKING A MESS

Communicating about your research can be quite challenging, especially when that research touches on controversial topics like animal testing or genetic modification. Nonetheless, some of VIB's scientists are fearlessly embarking on this mission. We would like to share some best practices with you in communicating about CRISPR and animal testing.

CRISPR-CAS: EXPLAINING IT BLOCK BY BLOCK

For Nick Vangheluwe and Gwen Swinnen (both VIB-UGent Center for Plant Systems Biology) CRISPR-Cas technology is a vital part of their research. Nick: "It's a shame that the debate is clouded by ill-informed ideas. Don't get me wrong: I don't expect everyone to be on board with the technology – everyone's entitled to their opinions. But I do believe it's our job as scientists to give the people correct, relevant information to empower citizens to develop truly informed opinions."

"The secret is keeping it simple," Gwen explains. "On the Biotech Day, we illustrated how CRISPR-Cas works using Lego Duplo blocks. Our approach allowed visitors to understand genetic coding – which suddenly becomes less complex when visualized with colorful blocks. Our story was very straightforward: what is the technology, where does it come from, and how can it help us? Even though scientists may feel that this approach overlooks important scientific details, it gives the public just enough information to understand the fundamentals."

"Terminology also plays its part," Nick continues. "For instance, at our stand on Biotech Day, we never used the word 'mutation'. The negative connotation with the term would only hinder our main goal: sharing knowledge."

ANIMAL TESTING: UNDERSTANDING THROUGH DIALOGUE

When it comes to animal testing, Liesbeth Aerts (VIB-KU Leuven Center for Brain & Disease Research) believes proactive communication is key. "Scientists often conceal the fact that they use mice or rats to avoid conflict. But in reality, that's exactly what keeps the conflict alive."

"In my experience, talking about controversial topics usually brings opposing sides closer together. Moreover, informing the public in an understandable, transparent way is an essential part of being a scientist. It's our responsibility to make sure people get why we do research the way we do, not theirs to 'look it up'."

"We recently won the KVAB Academic Award in Science Communication for Infopunt Proefdierenonderzoek (Information Point Animal Research). The platform, voluntarily created by a group of committed researchers, facilitates a well-informed, open discussion by offering as much information as possible in an objective way. Although the prize is a great recognition, our work is never done. All researchers must take it upon themselves to keep the debate going. So: participate in Biotech Day, comment on newspaper articles, or simply discuss sensitive topics with friends and relatives. Seize opportunities to use your voice and help tear down the walls around controversial topics, to change the image of scientific research for the better."

THREE NEW VIB STUDIES REVEAL KEY ROLE OF METABOLISM IN BLOOD VESSEL HEALTH

The lab of Peter Carmeliet (VIB-KU Leuven Center for Cancer Biology) zooms in on the growth of blood vessels in both healthy and pathological contexts, regularly making new discoveries that advance the field.

Recent pioneering studies include those spearheaded by Joanna Kalucka, Ulrike Brüning and Guy Eelen, which were published in *Cell Metabolism* and *Nature*. They focus on unraveling the role and function of the metabolism of endothelial cells - the individual building blocks of blood vessels. These new findings provide us more insights on how metabolism determines blood vessel growth and behavior, and how they can be translated to new therapeutic targets in blood vessel related disorders, such as cancer and diabetes.

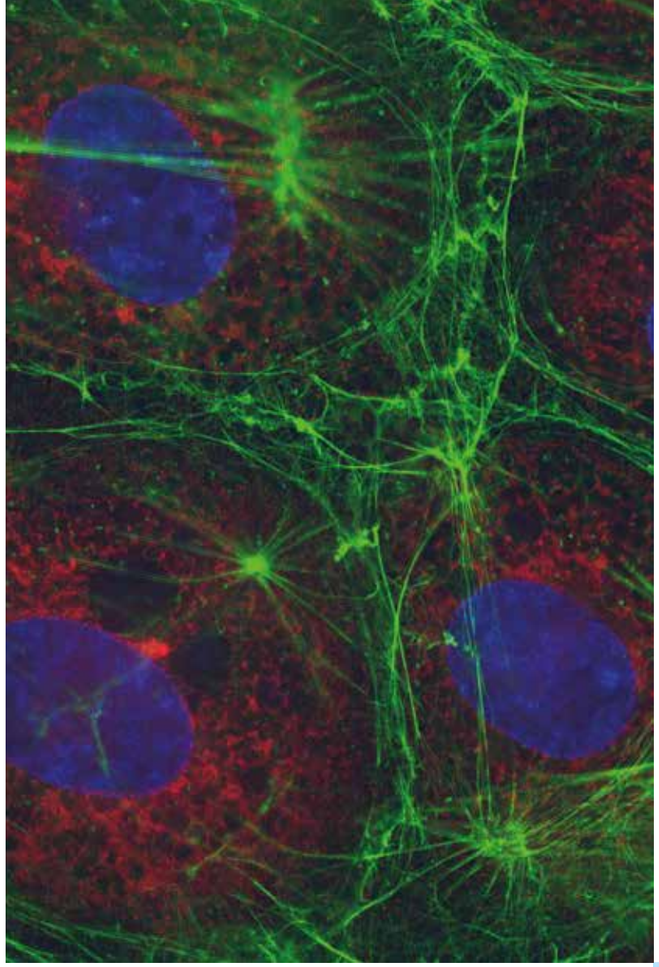
Together with Joanna, we talked about her paper describing the need of endothelial cells to burn fatty acids in order to stay healthy and withstand stress insults.

Joanna, what is it about endothelial cells (ECs) that fascinates you?
Joanna: "To tell the truth, before this study, my cell metabolism knowledge and experience to work with ECs was very limited – I have a background in immunology and tissue regeneration. However, I have always been fascinated by the great impact that these cells have on our body. After all, our organs rely on blood vessels for the continuous supply of nutrients and oxygen. Moreover, dysfunction of endothelial cells contributes to multiple diseases. Therefore, I was really eager to get the opportunity to study these cells in the lab of Peter Carmeliet, who is pioneering studies on vascular endothelial cells and focuses on the development of treatments for vascular disorders based on his research findings.

Did you rely on technologies or approaches that were new to you?
Joanna: (laughs) "Basically everything! I knew cell culture techniques and had a strong background in wet lab work, but I'd never worked with ECs before in my life – never isolated one, never performed any measurement of metabolic fluxes. What really came in handy during the learning process was my knowledge of immunology and immune cell isolation. Therefore, it felt as a 'natural' next step to participate in the set-up of new protocols for the isolation and culture of endothelial cells from tumors. In addition, at that time the lab had just recently purchased a FACS sorter, and my experience with this technology was definitely an asset when it came to freshly isolate and analyze ECs from mice.

"Because our study focuses on understanding the metabolism of ECs, metabolomics naturally played a key role. As a result, we had a vivid collaboration and interaction with Sarah-Maria Fendt and her group, as well as with Bart Ghesquière, head of the VIB Metabolomics Core in Leuven. In addition, thanks to a fruitful collaboration with Diether Lambrechts' group, we were able to perform transcriptomics analysis of ECs in a timely manner. Without any doubts, the presence of these experts in our center was indispensable to obtain better insight, critical advice and to achieve high quality results."

Any important lessons learned?
Joanna: "During this 3-year project, I was simultaneously involved in several other research studies in the lab. While it was sometimes challenging to be the leading person of my own study and also be part of many other projects, I acquired key knowledge of approaches and technologies that were vital to my own project. I also would like to underscore the fact that I had the privilege to work on this research project with extremely smart and talented PhD students. Laura Bierhansl, Nadine Vasconcelos Conchinha and Rindert Missiaen were fully devoted to our study and without their constant help, engagement and determination we would not have been able to achieve these results. I truly enjoyed our team-effort, all small meetings and data discussions, and I believe we learned a lot from each other and grew stronger together.



Eelen *et al.*, Nature 2018

Kalucka, Bierhansl, Conchinha, Missiaen *et al.*, Cell Metabolism 2018

Brüning, Morales Rodriguez *et al.*, Cell Metabolism 2018

"We helped Joanna, Ulrike and Guy in their metabolomics experiments by providing expertise in the set-up, analysis and data interpretation and vizualisation. This required different levels of expertise present within our facility. I helped deciding which of the technologies should be applied to address the outstanding biological questions. Wesley Vermaelen took care of the subsequent mass spectrometry and the data analyses were performed by Mehdi Rifaad and Kristien Tirez. The tailored software tools for the flux analyses (tracer metabolomics) developed by Dries Verdegem ensured the delivered data met the requirements of the researchers."
Bart Ghesquière, head of the VIB Metabolomics Core in Leuven

METABOLOMICS CORE

Joanna Kalucka

UNRAVELING THE MOLECULAR MYSTERIES OF THE BRAIN: JORIS DE WIT'S LAB WALKS THE CUTTING EDGE OF NEUROSCIENCE

Brains are complex – but new technologies and bright minds at VIB are making important advances in our understanding of this convoluted organ. Anna Schroeder and Giuseppe Condomitti, both researchers in the lab of Joris de Wit (vice director of the VIB-KU Leuven Center for Brain & Disease Research), are first authors on papers recently published in Neuron that shed new light on the brain's molecular mysteries

The studies of both Anna and Giuseppe examine the connections between neurons, called synapses. However, each investigation focused on very different molecular interactions occurring within synapses – the very frontier of neuroscientific research. But wait – why not get all the details from the neuroscientists themselves?

Giuseppe and Anna, can you each briefly describe your research studies?
Giuseppe: "We studied so-called 'mossy fiber' synapses between granule cells and pyramidal neurons in the hippocampus – a part of the brain essential for learning and memory. We already knew that GPC4, a specific protein linked to intellectual disabilities, is found at these synapses. We discovered a new receptor for GPC4, a protein called GPR158, and demonstrated that removing this receptor had a major negative impact on how well mossy fiber synapses functioned, potentially contributing to brain disease."

Anna: "For my paper we also focused on synapses in the hippocampus, but we zoomed in on a specific family of 'adhesion molecules', which are proteins that physically connect neurons. We studied how three adhesion molecules associated with neurological disorders regulate how neurons recognize and interact with each other. We found that, in combination, these three molecules contribute to defining the way synapses look and function. This expands our understanding of how mutations in the genes that encode adhesion molecules impact how the brain functions."

Did you use any new technologies?
Giuseppe: "Both electrophysiology and electron microscopy were new to me and fundamental to this research. With the help of Keimpe Weirda and Natalia Gounko, the center's electrophysiology and electron microscopy experts respectively, we investigated the function and structure of specific synapses using multiple approaches to both technologies."

Anna: "The approach most central to my study was 'whole-cell patch-clamp acute slice electrophysiology', which allowed us to study the electrical properties of neurons by creating a tight contact between a tiny micropipette and the cell membrane. As a master's student, I'd spent most of my time using a different technique to collect recordings from frog eggs, so electrophysiology wasn't entirely unfamiliar to me when I started this project. However, performing recordings from much smaller cells in rodent brain slices was an exciting new challenge."

What were the biggest challenges you faced – and how did you overcome them?
Giuseppe: "Visualizing neuronal spines – tiny structures found on the surface of pyramidal neurons – so I could count them in vivo was challenging and required fine technical optimization. I consulted with several VIB colleagues as well as scientists from other research centers who are familiar with the technique I used, in utero electroporation. As a result, I received some fantastic technical insights that led to a successful experiment and fascinating results!"

Anna: "My co-authors would definitely agree with me that our biggest challenge was optimizing correlative-light electron microscopy, or CLEM, to visualize the structure of individual synapses. This was a technical tour de force – and our center's electron microscopy experts Natalia Gounko and Katlijn Vints were crucial sources of expertise during this two-year process. Benjamin Pavie from the Bioimaging Core assisted us in analyzing the resulting images, enabling us to draw important conclusions about the functions of the synaptic proteins we were studying."

Speaking of conclusions, did any of your findings surprise you?
Giuseppe: "What struck me most was the fact that every time we manipulated the expression of GPR158, structural problems only came up at hippocampal mossy fiber synapses – while all other synapses on the same neuron were unaffected. It was quite a compelling finding."

Anna: "One big surprise was that one of the three proteins we studied functioned completely differently at two distinct types of hippocampal synapses. These proteins don't just influence the organization of synapses – their functions are different depending on which synapse they localize to."

Schröder *et al.*, Neuron 2018
Condomitti *et al.*, Neuron 2018

BIO IMAGING CORE

"The contribution of Natalia Gunko and Katlijn Vints from the VIB Bioimaging Core Leuven was invaluable for this research."

Joris, as of September 2018, you've been vice director of the VIB-KU Leuven Center for Brain & Disease Research, alongside Patrik Verstreken. What is your shared vision for the center?
Joris: "We seek a deeper understanding of normal brain development and function with the objective to apply this knowledge to uncover disease mechanisms. Our end goal is to arrive at targeted treatments for neuronal and neurodegenerative disorders. Even though the brain and its disorders remain intensely challenging research subjects, Patrik and I are optimistic that with the talented researchers, deep expertise and state-of-the-art technology in our center, we'll successfully drive these breakthroughs.

'The VIB-KU Leuven Center for Brain & Disease Research is an exciting place to work, and it will only get better. Our group leaders are extremely engaged: Rose Goodchild is chair of the VIB Group Leader Committee, and Bart De Strooper heads the UK Dementia Research Institute. We're a collaborative bunch, and building on this, I'd like to see our center recognized as one of the top institutes in Europe and the world for basic research and translational initiatives in neuroscience."

Which ambition will you tackle first in your new role?
Joris: "We recently launched the VIB-CBD training overview, a roadmap for the technicians, PhD students and postdocs in our center that helps them identify the most relevant courses, workshops and events. With this overview, we seek to increase transparency about training opportunities offered by VIB, KU Leuven and others, boost the profiles of our center and alumni and motivate our people to maximize their skillsets.

"As for upcoming initiatives, we aim to further stimulate transformative collaborative research in concrete ways. At the end of 2017, Patrik held a series of brainstorming sessions where PIs came up with groundbreaking new ideas for collaborative research projects that take advantage of the broad expertise and technology in our center. We'd like to evolve these exciting ideas, which were well-received by our board, and transform them into real interactive, impactful, collaborative projects that span the entire center."

Giuseppe Condomitti, Joris de Wit and Anna Schröder

HOW YOUR MOVING BRAIN SEES THE WORLD

Vincent Bonin

What we see is not only determined by what is really there, but also depends on whether we are paying attention, whether we are moving, excited or interested. We have all seen video's on social media where, focusing on one aspect (e.g. counting passes), we discover we are blind for obvious changes in the scenery (such as a panda or gorilla running past). This 'inattentional blindness' demonstrates how our perception is markedly affected by our state of mind. From attention to reward, arousal or even movement, our behavioral neuronal circuits seem to control how we process sensory information in the brain. The question is: how?

A team of researchers led by Vincent Bonin (NERF - imec, KU Leuven and VIB) set out to explore just that. "Animals navigate the world by processing visual contrasts, and the brain needs this information to guide the body's movements and its trajectory in space," explains Bonin. "We know that in mammals, sensitivity to visual stimuli is altered during movement, but we don't know if this affects detection of simple features like visual contrast and motion."

To address these questions, the researchers at NERF used micrometer-sized silicon devices, called Neuropixels, developed and produced in the clean rooms at imec. These new probes allow to record the electrical activity of hundreds of neurons simultaneously instead of the handful that is customary in most neuroscience laboratories.

"The visual system is composed of different cell types that encode distinct aspects of the visual scene," explains Çağatay Aydın, a PhD student involved in the study. "We looked at two visual areas: the visual cortex, which we already know shows rich motor modulations, and the visual thalamus, which relays inputs from the eye to the cortex."

The researchers investigated how neuronal responses in both brain areas change during movement, in the presence of different stimuli, e.g. fast or slow moving, with varying degrees of detail.

"We found that neurons in the thalamus are just as strongly affected by movement as those in the cortex, suggesting that locomotor modulations are much more widespread than previously appreciated," says Joao Couto, co-author of the study.

Interestingly, the researchers also found that some neurons were more strongly affected by movement than others. "Thanks to the Neuropixels probe, we could measure the activity from lots of neurons all at once, and we could group them according to the specific features of the visual scene they encode. We found for example that more deeply located neurons showed a selective increase in response to rapidly varying stimuli when the animal was moving," says Vincent.

"A consequence of these visual cell-type specific changes is that the overall sensitivity to fast-moving stimuli is enhanced. This may improve the processing of the fast-changing visual scene during exploration and navigation."

"The next step is now of course to gain a mechanistic understanding of this highly specific modulation at the level of receptors and connectivity between the neurons."

Aydin, Couto *et al.*, Nature Communications 2018

DISCOVERY OF A NOVEL METHOD TO BLOCK IMMUNO-SUPPRESSION IN CANCER

Research groups from the UCLouvain and WELBIO, VIB and Ghent University, and the biotech company argenx elucidated the three-dimensional structure of an assembly of proteins operating on cells that dampen immune responses. They also discovered how an antibody can block this assembly and the immunosuppression it induces downstream. Such an antibody could serve to stimulate immunity against tumor cells in cancer patients, triggering the destruction of their tumors by immune cells.

Savvas Savvides and Romain Merceron

Tregs (regulatory T lymphocytes) are immunosuppressive cells that normally counterbalance excessive immune reactions to prevent autoimmune diseases. But in cancer patients, they play deleterious roles by tempering immune reactions against tumor cells. Tregs induce their effects by producing a protein messenger called TGF-beta. This messenger transmits inhibitory signals to immune cells in the immediate vicinity, notably those that are supposed to destroy tumors in cancer patients.

The way Tregs produce TGF-beta is complex and finely regulated, because TGF-beta is very potent and must be kept under tight control. Three years ago, Sophie Lucas and her team at the de Duve Institute of the UCLouvain discovered that TGF-beta is released by Tregs from a protein called GARP, present on the Treg surface. In collaboration with argenx, her team also discovered that it was possible to block the release of TGF-beta from GARP with specific antibodies, which were rare and difficult to obtain. The next thing to find out was how GARP regulates the production of the TGF-beta messenger and how antibodies actually block its release.

To address these questions, Sophie Lucas and argenx initiated a collaboration with the team of Savvas Savvides at the VIB-UGent Center for Inflammation Research, to resolve the three-dimensional structure of the protein assembly made of GARP and TGF-beta. The researchers used X-ray crystallography, a method that has been used to study the structure of molecules for more than a century and that is still being developed for the study of biological macromolecules at atomic resolution. However, they were confronted with the practical problem that they could not readily obtain crystals of the GARP and TGF-beta complex. Via a highly collaborative effort spearheaded by Stéphanie Lienart (UCLouvain) and Romain Merceron (VIB-UGent Center for Inflammation Research), the two teams decided to use a blocking antibody to stabilize the structure - a successful approach that not only helped to generate suitable crystals for structure determination, but also provided details about how a therapeutic antibody might function.

Savvas: “We discovered that GARP resembles a horseshoe that is straddled by TGF-beta. The two molecules are so intricately assembled that TGF-beta itself contributes to the structure of the GARP horseshoe. The antibody fragment sticks to both GARP and TGF-beta in the assembly. It appears to glue the two molecules to one another, ensuring that when other molecules pull on one part of the assembly, the small, active part of TGF-beta is not released, and is thus prevented from conveying its inhibitory message.”

Sophie: “Visualization of this large molecular assembly illustrates the feasibility of blocking TGF-beta activity emanating from a precisely defined and restricted cellular source, such as the surface of Tregs. This can lead to the design of exquisitely specific approaches to treat various diseases associated with altered TGF-beta or Treg activity, most notably for the immunotherapy of cancer.”

Liénart, Merceron *et al.*, Science 2018

OUR IMMUNE SYSTEMS ARE INCREDIBLY DIVERSE. HOW MUCH OF THAT DIVERSITY IS DUE TO OUR GENES?

Each of our immune systems acts a little bit differently. Environmental factors have an impact, but so do our genes. A team of scientists led by An Goris (KU Leuven) and Adrian Liston (VIB-KU Leuven Center for Brain & Disease Research) went looking for links between more than 10 million genetic variations and more than 50 immunological traits. Their findings help to explain why some people have a higher risk for immune diseases than others.

Our immune systems are molded by our unique genetic make-up. Add to that a complex mix of environmental drivers, and you get an enormous functional diversity. From an evolutionary point of view, this diversity is essential to minimize the chance that a pathogen could wipe out an entire population.

But the flip-side is that we're also greatly diverse when it comes to susceptibility or resistance to a broad range of diseases – not only those with an obvious immunological component, such as autoimmunity, allergy, inflammation and cancer, but also those with a more indirect link to immune-deregulation, such as cardiovascular, metabolic and neurological diseases.

A GENOME-WIDE SURVEY

While scientists have studied the links between genetic variations and a whole range of different diseases, the characterization of this "genotype-phenotype relationship" for the immune system itself has received far less attention.

That is why a the Leuven scientists undertook a large genetic study with almost 500 participants. In a so-called genome-wide association study, or GWAS, they probed more than 10 million genetic variations, spread out across the genome, for links to 54 different traits relevant to adaptive immunity. This allowed the researchers to determine which genetic variants were, for example, typical for people with high or low levels of different pro- or anti-inflammatory cytokines.

Adrian Liston

"We found eight previously unknown associations," says An Goris. "The strongest connection was for a genetic variant present in only 2% of the study participants." All of the identified genetic associations provide important biological insights into what drives variation in our immune systems.

This is only the tip of the iceberg, according to Goris: "What we know now, explains about 10% of the variation, but we are still in the initial discovery phase. There might be many more genetic variants—including relatively rare ones—that affect our immune response and thus our susceptibility to certain diseases."

HELPING TO MAP DISEASE RISK AND REFINE TREATMENT

Mapping how genetic variants affect immune function will not only help us understand disease mechanism better, it should also help to refine treatment options.

"The clearest example is the clinical implication offered by genetic variation in the RICTOR gene," explains Adrian Liston. "We now know that RICTOR changes the production of a cytokine called IL-4, providing a new therapeutic target for treatment of autoimmune diseases and asthma."

In many cases, the effects are more subtle and indirect, adds Liston: "Most people will carry dozens of genetic variants that may skew the immune system in a particular direction. This accounts for part of the reason why different people have different risks for immune diseases, but we are much more than the sum of our genes."

Lagou *et al.*, Cell Reports 2018

An Goris

EUROPEAN SCIENTISTS UNITE TO SAFEGUARD PRECISION BREEDING FOR SUSTAINABLE AGRICULTURE

Leading scientists representing more than 85 European plant and life sciences research centers and institutes have endorsed a position paper that urgently calls upon European policy makers to safeguard innovation in plant science and agriculture. The scientists are deeply concerned about a recent European Court of Justice ruling around modern genome editing techniques that could lead to a de facto ban of innovative crop breeding. As a result, European farmers might be deprived of a new generation of more climate resilient and more nutritious crop varieties that are urgently needed to respond to current ecological and societal challenges. Together with the countless statements of European research institutes that appeared online over the last months, this statement is proof of a solid consensus among the academic life science research community in Europe on the negative consequences of this ruling.

Crop improvement has been done for centuries by means of conventional plant breeding techniques, all leading to genetic changes in the plant. Today, innovative techniques represent a next step in plant breeding and allow to make the desired genetic changes with very high efficiency and precision.

INNOVATIVE PLANT BREEDING METHODS NECESSARY TO MEET THE CHALLENGES OF CLIMATE CHANGE

Agriculture feeds the world. On that account, the breakdown of food systems is one of the biggest risks of climate change. Crops that are more tolerant to rapidly changing and harsher environments, such as the recent period of extreme drought in parts of Europe, will be crucial for the success of tomorrow's food production approaches. One of the latest breakthroughs in this field is precision breeding, an innovative crop breeding method based on genome editing. Precision breeding can contribute to tailoring crops to a specific area, considering the environmental factors of a certain region. Precision breeding is also used to generate crops with improved nutritional composition, improved digestibility, lower content of anti-nutritional components, reduced allergenicity or requiring less input, which has a direct benefit for our environment.

EUROPEAN PLANT RESEARCH INSTITUTES JOINTLY CALL FOR ACTION

The implications of a very restrictive regulation of innovative plant breeding methods are far-reaching. European agricultural innovation based on precision breeding will come to a halt because of the high threshold that this EU legislation presents. This will hinder progress in sustainable agriculture and will give a competitive disadvantage to plant breeding industries in Europe. The impacts on our society and economy will be enormous.

To safeguard innovation in agriculture in Europe, the signatories of the position paper ask for a new regulatory framework that evaluates new crop varieties based on science.

Dirk Inzé, Scientific Director of VIB-UGent Center for Plant Systems Biology and one of the initiators of the position paper: "The support we received for this initiative from plant scientists all over Europe has been overwhelming from the start. To me, it clearly illustrates the current dichotomy in Europe: as European leaders in the field of plant sciences we are committed to bringing innovative and sustainable solutions to agriculture, but we are hindered by an outdated regulatory framework that is not in line with recent scientific evidence. With this mission statement we hope to promote evidence-informed policymaking in the EU, which is of crucial importance to us all."

Anna Sablina, Mikhail Steklov and Francesca Baietti

IDENTIFICATION OF LZTRI LEADS TO NOVEL INSIGHTS INTO RAS-DRIVEN DISEASES

Mutations in RAS proteins initiate many of the most aggressive tumors, and the search for pharmacological inhibitors of these proteins has become a priority in the battle against cancer. Mikhail Steklov, Francesca Baietti, and colleagues from the Anna Sablina lab (VIB-KU Leuven Center for Cancer Biology) identified LZTR1 as an evolutionarily conserved component of the RAS pathway.

Multiple genetic studies overwhelmingly point out for the role of LZTR1 in a wide range of human disorders, such as Noonan Syndrome (a genetic disease), liver cancer, childhood cancer, and Schwannoma, a benign tumor that affects nerves. The researchers found that LZTR1 contributes to human diseases by acting as a part of the ubiquitin ligase complex that mediates conjugation of ubiquitin to RAS proteins. This conjugation reduces RAS recruitment to the membrane and thus its activation and downstream signalling.

Anna: "Despite of constant and exhaustive efforts to characterize RAS proteins, LZTR1 is the first novel RAS regulator, implicated in human diseases, that has been identified since years. Of course, this will be not possible without a help of our collaborators from UZ Leuven, VIB-UGent Center for Medical Biotechnology, the National Cancer Institute at Frederick, and the University of Alabama. We hope that the discovery of this alternative mechanism of RAS regulation will lead toward novel therapeutic approaches for RAS-driven diseases."

Steklov *et al.*, Science 2018

QUICKSCAN

3

#AD&FTD Mutation Database #Data mining #Progranulin

The online AD&FTD Mutation Database was conceived by the Christine Van Broeckhoven lab (VIB–UAntwerp Center for Molecular Neurology) and currently provides curated, referenced information of 764 genetic variants associated with monogenic forms of Alzheimer's disease (AD) and frontotemporal dementia (FTD). In addition, the database stores demographic and clinicogenetic data of 1,646 dementia families associated with these mutations. In FTD, the granulin gene (GRN) has the highest number of different mutations (34%) and the second-highest number of associated FTD families after C9orf72.

Cruts & Van Broeckhoven,
Methods in Molecular Biology 2018

2

#Endoreplication #Root development #Computational biology

Many plants undergo endoreplication, an alternative cell cycle resulting in polyploidy. In a joint effort the labs of Lieven De Veylder and Steven Maere (VIB-UGent Center for Plant Systems Biology) computationally predicted and experimentally verified the DNA ploidy level of all cells in the complete Arabidopsis root tip, revealing that endoreplication is spatiotemporally regulated, stress responsive, and likely important in coordinating cell expansion with structural stability.

Bhosale *et al.*, Plant Cell 2018

#Mutations #Mouse #C57BL/6J

The lab of Claude Libert (VIB-UGent Center for Inflammation Research) has generated a searchable database (mousepost.be) unlocking all sequence polymorphisms of all protein-coding genes of all 36 sequenced mouse inbred lines, as compared to the reference genome of C57BL/6J (Timmermans *et al.*, PNAS 2017). But the reference genome is not perfect. They have now provided an overview of 'errors' and their impact on protein function in the reference genome itself. Important defects were found, some explaining typical C57BL/6J phenotypes. These errors could be of importance for scientists using C57BL/6J mice, and people could consider correcting some of them.

Timmermans & Libert, JCI Insight 2018
Timmermans & Libert, Trends Genetics 2018

4

#Mumps #Outbreaks #Vaccine failure

Recently, new mumps outbreaks have occurred in highly vaccinated populations, including in Belgium in 2012. A possible explanation could be an antigenic mismatch between the vaccine and wild-type mumps virus. Tessa Vermeire of the Lennart Martens Lab (VIB-UGent Center for Medical Biotechnology) studied the surface HN and F proteins of the mumps virus. Scop3D was used for visualization and to map amino acid changes and important functional regions on the protein structures. Differences were mainly found in HN, with eight differences in five B-cell epitopes between vaccine and wild type virus. This could lead to a decreased recognition of the wild type virus by vaccine-induced antibodies.

Vermeire *et al.* Scientific Reports 2018

5

#Candida albicans #Protein-protein interaction

The group of Patrick Van Dijck (VIB-KU Leuven Center for Microbioloy) is involved in the transfer of a complete ORFeome collection of Candida albicans genes in specific two hybrid vectors for C. albicans. They already provided a proof of concept. C. albicans translates CUG mostly in serine instead of leucine which means the classical yeast two-hybrid cannot be used. The team then performed a genome-wide mating based protein-protein interaction (PPI) which may later on result in a complete PPI map of all proteins, but more interestingly, they can screen for small compound inhibitors of PPIs that are important for the virulence of this human fungal pathogen.

Schoeters *et al.*, mSphere 2018

6

#Monocyte #Inflammation #Single cell sequencing

Novel experimental approaches such as fate-mapping and single-cell sequencing have thoroughly redefined the monocyte field. Monocytes are now known to consist of multiple subsets generated through distinct developmental pathways with diverse functional specializations in healthy and inflamed tissues. Martin Guilliams (VIB-UGent Center for Inflammation Research), Simon Yona (University College London) and Alexander Mildner (Max Delbrück Center for Molecular Medicine, Berlin) highlight how novel concepts in monocyte heterogeneity, emergency monopoiesis and trained immunity are bringing exciting new perspectives to monocyte research in a review article published in Immunity.

Guilliams, Mildner, Yona *et al.*, Immunity 2018

7

#Plant-specialized metabolism #Transcriptional regulation #Anti-cancer compounds

The medicinal plant *Catharanthus roseus* produces specialized metabolites of the monoterpenoid indole alkaloid class, including the anti-cancer compounds vinblastine and vincristine. The Alain Goossens Lab (VIB-UGent Center for Plant Systems Biology) recently discovered a combinatorial module of transcription factors that boosts the production of these bioactive compounds. The findings pave the way towards metabolic engineering programs for the production of these anti-cancer compounds in *C. roseus* plants.

Schweizer *et al.*, Metabolic Engineering 2018

8

#CR4-NOT #Tumor #Eye cancer

CNOT3 is a protein involved in mRNA degradation and recurrently mutated in T-cell acute lymphoblastic leukemia (T-ALL). The lab of Jan Cools (VIB-KU Leuven Center for Cancer Biology) has now shown that CNOT3 and the entire CCR4-NOT complex act as a tumor suppressor in a fruit fly eye cancer model. Mechanistically, this could be linked to regulation of the stability of transcripts involved in DNA replication and ribosome biogenesis.

Vicente *et al.*, Journal of Hematology & Oncology 2018

9

#Metastasis #Metabolic #Cancer cells

Metastasis to distant organs is a predictor of poor prognosis. Therefore, it is of paramount importance to understand the mechanisms that impinge on the different steps of the metastatic cascade. Recent work of Elia Lacchini and Ginevra Doglioni of the Sarah-Maria Fendt Lab (VIB-KU Leuven Center for Cancer Biology) has revealed that metabolic rewiring is a hallmark of cancer cells that transition through the metastatic cascade. Their results provide mechanistic concepts concerning how metabolic rewiring supports the ability of cancer cells to undergo metastasis formation.

Elia *et al.*, Trends Cell Biology 2018

10

#Early-onset dementia #Genetic testing #Clinical diagnosis

Patients suffering from early-onset dementia (EOD) are often excluded from genetic research studies because they lack a clear clinical diagnosis of a specific dementia subtype. The lab of Christine Van Broeckhoven (VIB–UAntwerp Center for Molecular Neurology) has investigated a group of EOD patients from a larger prospective study of dementia in Flanders by screening the known causal genes of dementia. Multiple known pathogenic mutations have been found in this patient group. These findings suggest that genetic screening of patients with an unclear phenotype can both improve our understanding of disease etiology and help in formulating a genetically based diagnosis.

Perrone *et al.*, Neurobiology of Aging 2018

11

#Immunotherapy #mRNA coding #Tumor #Metastases

It is now clear that successful treatment of cancer will require the induction of anti-tumor immunity in addition to killing tumor cells. By inducing immunogenic cell death in tumor cells, the dying tumor cells can be recognized by antigen-presenting cells and become their own vaccine. The Xavier Saelens lab (VIB-UGent Center for Medical Biotechnology) found that direct intra-tumor delivery of mRNA encoding the mixed lineage kinase domain-like (MLKL) protein, an executioner of necroptosis, results in a systemic cellular anti-tumor immune response that can eliminate the treated tumor as well as distal non-treated tumors.

Van Hoecke *et al.*, Nature Communications 2018

12

#Flavor production #Yeast

Flavor compounds are important for the pleasant taste of alcoholic beverages. The yeast *Saccharomyces cerevisiae* is a major producer of flavor compounds in alcoholic fermentations. In beer, yeast contributes to more than 80% of the flavor. The genetic basis of yeast flavor production is only partially understood. Research by Sylvester Holt in the group of Johan Thevelein (VIB-KU Leuven Center for Microbiology), on polygenic analysis of ethyl acetate production, a compound with a solvent-like flavor, using a strain lacking already-known enzymes, revealed a new enzyme in ethyl acetate biosynthesis. Mutant alleles identified in this way can be used for cisgenic genome editing of production yeast strains.

Holt *et al.*, MBio. 2018

13

#Melanoma #Sammson

Roberto Vendramin, Jean-Christophe Marine (VIB-KU Leuven Center for Cancer Biology) and Eleonora Leucci (KU Leuven) uncovered a key vulnerability of melanoma. While studying the role of the melanoma-specific long non-coding RNA SAMMSON in tumor initiation, the researchers found that it boosts protein synthesis in different cellular compartments. Normal cells are alerted by modification in protein synthesis and react to this threat, but only if this process is altered in one compartment at the time. However, by altering the protein production in two different compartments, SAMMSON prevents the normal cells from recognizing the oncogenic threat resulting in unrestrained cell growth. The scientists suggest that any substance that destroys the equilibrium carefully created by SAMMSON is expected to deliver highly effective anti-melanoma responses.

Vendramin *et al.*, Nature Structural and Molecular Biology 2018

14

#Falcon #Real-time decoding

Researchers from the lab of Fabian Kloosterman (NERF, VIB-KU Leuven-imec) have developed a new software framework to measure and interpret the replay activity of hippocampal neurons in real time. The brain-computer interface—aptly named Falcon, after the fastest moving creature on earth—was validated in an experimental setup with freely moving rats, analyzing the activity of spatial neuronal firing patterns. Because Falcon measures in real time, the system allows for the selective manipulation of specific neuronal firing sequences at a millisecond timescale, a game-changer for studies on memory and other complex brain processes.

Ciliberti *et al.*, eLife 2018

THE BEST OF THE BEST: HIGHLY CITED RESEARCHERS AT VIB

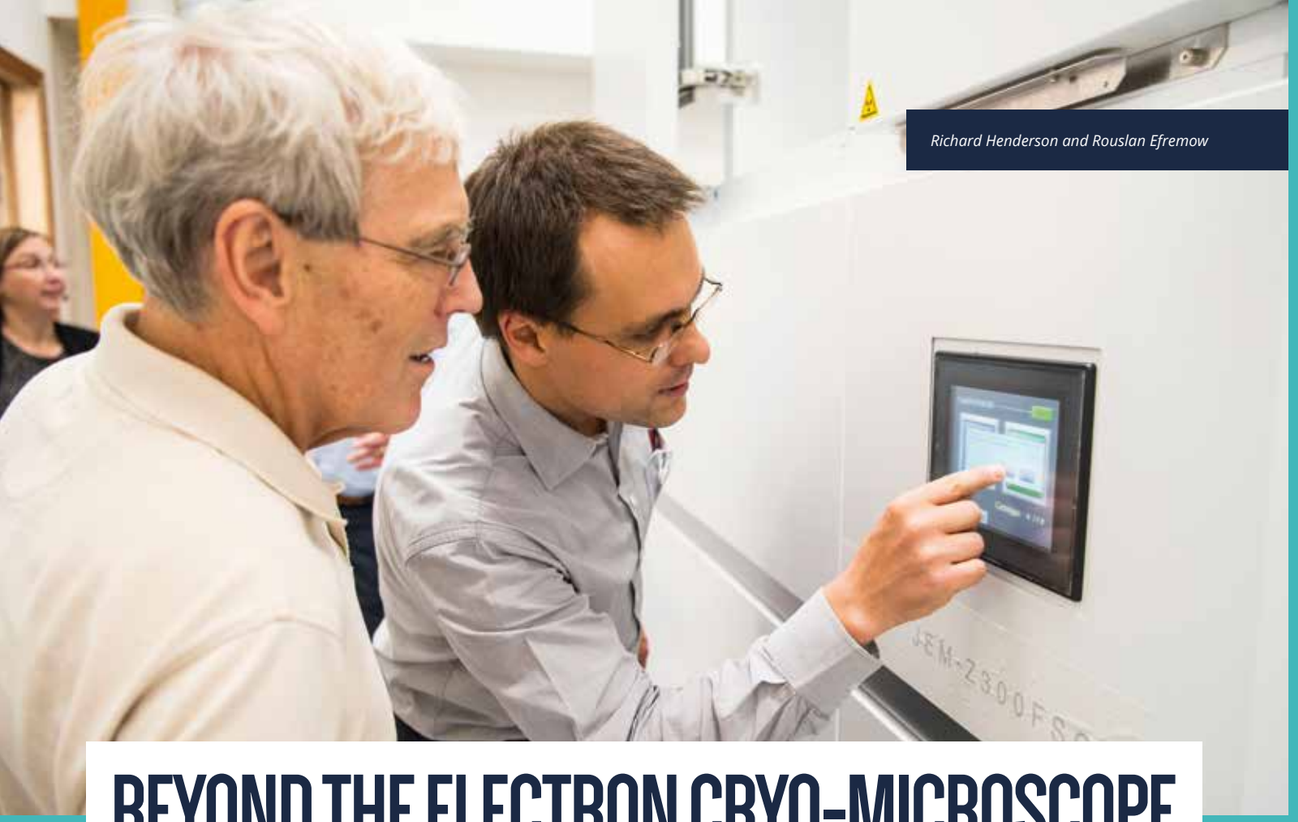
We are very proud of the fact that the number of 'highly cited researchers' from VIB increases every year, with a total of 18 VIB scientists currently listed by Clarivate Analytics – formerly the IP and science business of Thomson Reuters.

Every year in autumn, Clarivate Analytics publishes a list of highly cited researchers within 21 fields of science. The 2018 list is now available and covers 11 years of research output (2006-2016). For every category, highly cited scientists are identified as those publishing works with citation counts ranking within the top 1% in their fields during the period under consideration. For the first time this year, Clarivate Analytics has improved its algorithm, which now identifies highly cited scientists who actively publish in several fields (listed under the 'cross field' category in the table).

Congratulations to all our scientists listed and their teams!

HIGHLY CITED RESEARCHERS

Full name	Category	Affiliation
Tom Beeckman	Plant & Animal Science	VIB-Ghent University, Belgium
Wout Boerjan	Plant & Animal Science	VIB-Ghent University, Belgium
Peter Carmeliet	Cross Fields	VIB-KU Leuven, Belgium
Samuel Chaffron	Immunology	VIB-KU Leuven, Belgium
Bart De Strooper	Cross Fields	VIB-KU Leuven, Belgium
Alain Goossens	Plant & Animal Science	VIB-Ghent University, Belgium
Martin Guilliams	Immunology	VIB-Ghent University, Belgium
Hamida Hammad	Immunology	VIB-Ghent University, Belgium
Dirk Inzé	Plant & Animal Science	VIB-Ghent University, Belgium
Bart N Lambrecht	Immunology	VIB-Ghent University, Belgium
Mohamed Lamkanfi	Immunology	VIB-Ghent University, Belgium
Kris Morreel	Plant & Animal Science	VIB-Ghent University, Belgium
Jeroen Raes	Biology & Biochemistry	VIB-KU Leuven, Belgium
Frank Van Breusegem	Plant & Animal Science	VIB-Ghent University, Belgium
Christine Van Broeckhoven	Cross Fields	VIB-UAntwerp, Belgium
Peter Vandenabeele	Cross Fields	VIB-Ghent University, Belgium
Yves Van de Peer	Plant & Animal Science	VIB-Ghent University, Belgium
Klaas Vandepoele	Cross Fields	VIB-Ghent University, Belgium



Richard Henderson and Rouslan Efremow

BEYOND THE ELECTRON CRYO-MICROSCOPE

NOBEL PRIZE WINNER RICHARD HENDERSON ON STRUCTURAL BIOLOGY AND SCIENTIFIC COLLABORATION

Our recently opened 'VIB-VUB facility for Bio Electron Cryogenic Microscopy' (BECM) hosts the newest kind of JEOL electron cryogenic microscope, one of just three in the world. The guest of honor at the inauguration was none other than one of the brains behind this technology: Richard Henderson, from the Medical Research Council Laboratory of Molecular Biology in Cambridge (UK).

In 2017, structural biologists Richard Henderson, Jacques Dubochet and Joachim Frank were awarded the Nobel Prize in Chemistry. Their contributions enabled the development of electron cryogenic microscopy (cryo-EM) for the high-resolution structural determination of biomolecules in solution: a breakthrough in the field of structural biology.

Universities as well as biotech companies are lining up to make use of this new microscope. What is so groundbreaking about the device?
Richard: "For about 50 years, scientists have been trying to determine the structures of proteins in the human body. Knowing exactly where each atom is located enables us to better understand diseases and develop drugs to treat them. However, our knowledge of human protein structures currently extends to a fraction of these.

Since 1995, we've mainly made use of X-ray crystallography to determine the atomic structure of proteins. But the problem with crystallography is that it can only be applied to proteins that have been crystallized. This is not always possible and often takes years, whereas cryo-EM leads to results quickly and can be used to examine any protein. In principle, there are no conditions and no limits to the type of specimen the technique can analyze."

What triggered you to explore the field of cryo-EM?
Richard: "In 1993, I was personally invited to attend a meeting in the French city of Grenoble. The European Synchrotron Radiation Facility (ESRF) was just about to open, and some researchers were planning to build an X-ray microscope at the site. Since I was already aware of the disadvantages of X-rays and the benefits of electrons for microscopy at that time, I was determined to convince all 50 other attendees that their plans were flawed. However, I didn't succeed.

That's when I decided to bring clarity to everyone who was lacking profound knowledge on the two methods. I started writing a review, and while I was doing so, I got more and more into the subject. Finally, my calculations proved that electron microscopy works a thousand times better than X-ray microscopy when analyzed in terms of the amount of information that can be obtained for a fixed amount of radiation damage to the specimen. From then on, I couldn't have been more optimistic about further investigating the opportunities of cryo-EM."

How did the relationship between X-ray and cryo-EM researchers develop from then on?
Richard: "X-ray researchers used to think of us in a derogatory way, and vice versa. However, they've now all switched to electron microscopy. Five years ago, only 1/100th of all known protein structures were being detected via electron microscopy. By joining forces, that ratio has now been reduced to 1/10th, and has even reached parity for membrane proteins."

How important are collaborations like this within the scientific community?
Richard: "They're becoming ever more important. Take, for example, the history of authorship of scientific articles. For years, they would have had one or two authors, max. Contributions from 20 authors aren't exceptional today. The reason for this is that science has become more technically demanding. In structural biology, we need researchers with expertise in molecular biology, genetic manipulation, protein purification, sample preparation, electron microscopy and computing. So, it should come as no surprise that the most successful institutions are those in which people are encouraged to have a chat. That could be in the restaurant or canteen, during lunch or over tea time. By analyzing and reflecting on a topic in group setting, researchers may discover that a certain experiment isn't worth their time. Chance meetings can really work wonders."

There's still plenty of competition in the scientific world. How does this affect possible collaborations?
Richard: "Sometimes it affects collaborations in a negative way, but competition can be a good thing, too. It makes people work harder. Patents were even invented to encourage scientists and investors to put all their energy and money into research – without worrying about someone observing from a distance and waiting to steal their idea."

Installing the electron cryo-microscope required an investment of 4 million euros. Will the device remain as expensive and exclusive as it is today?
Richard: "We desperately want to 'democratize' the microscope in the future. This means we'll try to render it as simple and accessible as possible. It might develop in the same way as DNA sequencing, which emerged in 1975 and was really unique back then. Today, we can simply send DNA via mail and receive the sequence by email the next day. I hope the same will happen to protein structures in the future."

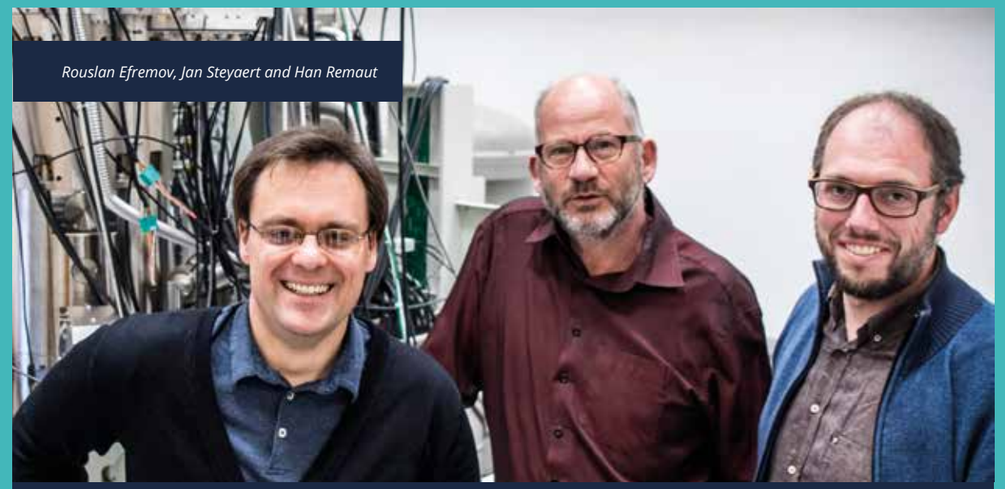
So, is improving cryo-EM next on your scientific bucket list?
Richard: "Yes, definitely. We knew cryo-EM was going to be good, but there's still a lot of work to be done in the field. Once the cryo-EM field is fully established, I might – considering my background in physics – become an enthusiastic follower of other novel research directions. I especially admire the recent spectacular progress in gravitational wave observations. So, I won't be idle!"

"The most successful institutions are those in which people are encouraged to have a chat. Chance meetings can really work wonders."
Richard Henderson

RICHARD HENDERSON

(°1945, Edinburgh, Scotland), was the first to successfully produce a three-dimensional image of a biological molecule at atomic resolution using electron cryo-microscopy. Henderson's refinement of imaging methods for cryo-electron microscopy, in which biomolecules are frozen in such a way that allows them to retain their natural shape and are then visualized with a high-resolution microscope, enabled researchers to capture images of numerous biomolecular structures that previously could not be imaged by other means. He was awarded the 2017 Nobel Prize in Chemistry (shared with biophysicists Jacques Dubochet and Joachim Frank) for his work.

Richard Henderson has worked at the Medical Research Council Laboratory of Molecular Biology (MRC LMB) in Cambridge since 1973, and was its director between 1996 and 2006. He was also a visiting professor at the Miller Institute of the University of California, Berkeley in Spring 1993. He is currently a mentor for the Academy of Medical Sciences Mentoring Scheme and leads his own group at MRC.



Rouslan Efremov, Jan Steyaert and Han Remaut

OPENING A NEW RESEARCH ERA

The microscope in the 'VIB-VUB facility for Bio Electron Cryogenic Microscopy' (BECM) is unique in Europe and was installed thanks to a four-million-euro grant from Research Foundation - Flanders (FWO). It allows images of the building blocks of the human body to be produced with atomic precision. The device is so unique that other universities as well as biotech companies are lining up to use it for measurement purposes. The new microscope will be run as a multi-user facility under the expert supervision of Rouslan Efremov (VIB-VUB Center for Structural Biology).

Rouslan: "The JEOL cryoARM300 is the tool that allows three dimensional structures of proteins to be solved without need of crystallizing them. This microscope will significantly facilitate and accelerate many biological projects that require knowledge of the structures of proteins, protein-protein and protein-ligand complexes with atomic-resolution precision. We believe that it will have a significant impact on the biological research performed at VIB in Flanders and beyond."

The 4 meter high microscope is housed in the former student housing complex, at a central location on the VUB Campus in Etterbeek. The modernist concrete modules were built in the nineteen-seventies by architect Willy Van Der Meeren.

INNOVATION AT THE HEART OF VIB CORE FACILITY DAY

Since 2008, VIB Core facilities have provided countless VIB PIs, external research groups and private companies with cutting-edge life sciences technologies, services and hard-to-find expertise. Roughly every year, the 75 dedicated scientists that power our 10 Core Facilities assemble for a day of connection, reflection and anticipation of the program's next steps. The take-home message of this year's meeting on October 8, 2018: "becoming innovation-driven".

CORE FACILITY DAY: INVESTING IN HUMAN CAPITAL

"Our human talent is extremely important and the key to the success of our Core Facilities," explains Geert Van Minnebruggen, head of Core Facilities at VIB. "It is with this in mind that we invite all staff members from the Core facility program to a one-day meeting each year."

Geert is certain that dedicating time to build communities and foster team spirit is an important part of the program's growth strategy – "which involves working ever more closely together to offer even better services, since all Cores deal with the same types of stakeholders and challenges," he adds. "Tackling these challenges together with like-minded colleagues leads to better results."

CORE DISCIPLINES ARE BEGINNING TO CONVERGE

The day kicked off with a review of past achievements, followed by the most up-to-date Core service portfolio. The services of the Core facility program are different in 2018 from what they were only a year ago. The recent changes were presented by all Core facility heads, including introductions of new applications, new staff hired and new collaborations between Core facilities.

Alex Botzki, Saskia Lippens and Christof De Bo (the organizing committee) observe that VIB Core disciplines are beginning to converge. The community must come together to drive new insights at the very edge of VIB's disciplines, which means building trust before tackling common projects. This convergence is a key trend of our present and future.

CAREER DEVELOPMENT, DATA MANAGEMENT AND TECHNOLOGY MANAGEMENT IN THE SPOTLIGHT

After a group-based team activity in which Core researchers learned more about each other's nationalities and interests, breakout sessions were held to tackle key issues brought up by Core staff, such as talent development, research data handling, and technology development. The insights from these discussions will be very valuable to prepare for the future. Especially embedded technology development will be at the heart of each facility and will set the stage to an innovation-driven service portfolio.

Don't miss out on the March 2019 edition of VIBtimes with focus on the Core Facility program

Laurent Galibert, Sam D'Haeyer, Maarten Dewilde, Isabelle Cambré, Irina Neyens, Ruben Theuns, Annick Lauwers, Robin Doms, Bruno Dombrecht, Jérôme Van Biervliet, Tobias Langenberg, Anne Helfer, Ana Rita Santos, Hui Qi Lu, Michele Curcio

MEET THE EXPANDING TEAM BEHIND VIB DISCOVERY SCIENCES

RECENT AND MORE ESTABLISHED MEMBERS ON THE IMPORTANCE OF TRANSLATIONAL RESEARCH

Well-positioned between industrial companies and university campuses, VIB Discovery Sciences bridges the gap between academic research and product development. As this strategic initiative proves ever more successful, the number of scientists employed by Discovery Sciences continues to increase. This makes it the perfect time to pass the mic to the current team.

As the Head of Business Development at VIB, Jérôme Van Biervliet founded the VIB Discovery Sciences team in 2015, which now consists of approximately 15 members. Bruno Dombrecht, who held a senior position in Nanobody® discovery and engineering before joining the team in January 2018, specializes in therapeutic biologics. The newest member is Laurent Galibert, who's been part of Discovery Sciences since October this year. He has rich experience in drug discovery and multiple therapeutic modalities.

What was the spark that initiated the founding of Discovery Sciences?
Jérôme: "We realized that there was a great opportunity to match VIB scientific expertise with industrial drug and agro-discovery know-how. In doing so, we would be able to translate novel targets emerging from research into promising projects leading to societal benefits for patients and consumers in the long term. This realization inspired us to think about an initiative enabling us to recruit experts in drug development and execute these translational projects in collaboration with VIB groups."

Bruno: "In concrete terms, we take initial steps needed to develop medicines. Since VIB is a nonprofit organization, we also have the opportunity to work on indications with high medical need that have been neglected by industry, usually due to insufficient commercial attractiveness."

What impact does your work have on the probability of further drug development?
Laurent: "We offer industrial know-how and business expertise that enable the transformation of good ideas into products that are promising enough to attract the attention of investors and industrial partners. We understand how, when and to whom to formulate each proposition. As such, we have an established track record of successful projects. Even more, we tend to operate in fields with high societal impact that would have little chance of success without our involvement."

Bruno: "From a statistical perspective, the success rate of new medicines is extremely low. As our team translates scientific discoveries into drug candidates, we help reduce scientific and financial risks that usually come with drug development funding. In doing so, we earn the trust of potential partners and investors and provide them with attractive investment opportunities."

Does translational science require other skills or experience than basic science?
Laurent: "Basic science aims at advancing knowledge and building an understanding of the world. The goal of translational science, on the other hand, is to imagine, develop and optimize a product. Most of us have industry experience, so we're operating according to a 'product-centric' paradigm. We master a number of biotechnological modalities – both biological and chemical – and our technical staff offers hands-on expertise."

"Scientists show ever more interest in translating their scientific discoveries into drug candidates. In expanding our facilities and team, VIB Discovery Sciences responds to their demand"

Bruno Dombrecht

Jérôme: "Besides that, we regularly hire postdocs as project leaders. While employed at Discovery Sciences, they get their first shot to move beyond academic research. By gaining experience in the field of drug- or agro-discovery, their CVs become more attractive to industry recruiters. We also have students doing internships here. As an integral part of the team, they learn a lot in only a few months."

Could you elaborate on how you work as a team?
Jérôme: "In every project, someone takes the lead. However, this manager makes decisions only in agreement with his colleagues. For example, postdocs manage projects in close collaboration with the research group and members of the Discovery Sciences team. It's a great opportunity for them. Once the experimental work begins, they use our lab in Leuven. However, where practicable, we also conduct experiments using the services of an external contract research organization (CRO)."

Bruno and Laurent, you only started working at Discovery Sciences this year. How did you end up being part of the team?
Bruno: "I specialize in biological drug development. What I particularly like about this job is exactly what I was missing while working at a company: being this close to the source of scientific breakthroughs that we can immediately translate into drug candidates. Collaborating with researchers with deep knowledge of target biology is very complementary to our expertise."

Laurent: "Joining VIB was an obvious choice after considering the impact of the organization on the local entrepreneurial ecosystem and experiencing the fundamental values and positive energy that emanate from the Discovery Sciences team. When it comes to scientific expertise, I think Bruno and I complement each other. I've been working as an immunologist for quite a long time, gaining experience in drug discovery and development and using different therapeutic modalities, including small molecules."

Are you expecting any other expansions in the near future?
Jérôme: "In Leuven, we have a fully equipped lab facility of our own, located in the Bio-Incubator. Next year, we'll open a similar site at the Ghent Technology Campus in Zwijnaarde. This project will create new job opportunities."

Which factors underlie the growth potential of Discovery Sciences?
Bruno: "After collaborating with us, academic research groups generally show more interest in translating their scientific findings into products. We have competencies that they don't have: we spot business potential, develop drugs and attract investors. The demand for our activities is higher than ever, so there is great opportunity to expand our team and facilities."

WAVING HELLO AND GOODBYE: ENTRANCES AND EXITS AT VIB

In the course of 2018 we saw the following 7 colleagues taking up their new role as VIB Group leader or Expert Technologist. We asked them about their goal and future challenges:

VIB-UGENT CENTER FOR INFLAMMATION RESEARCH

Sophie Janssens
Group leader since March 1, 2018

"We aim to understand the role of the unfolded protein response (UPR) in immune cells. By studying these pathways in an in vivo context, we uncovered hitherto unknown functions of these pathways, beyond their traditional role in folding. We therefore believe that this could be another example of how ancient metabolic stress pathways are hijacked by our immune system." Sophie received an ERC consolidator grant to make these ambitions come true.

Roosmarijn Vandenbroucke
Group leader since March 1, 2018

"The 'Barriers in Inflammation' research group studies pathological mechanisms at the gut and brain barriers in neuroinflammatory disorders such as sepsis-associated delirium, inflammatory bowel disease (IBD) associated fatigue, Alzheimer's and Parkinson's disease. Our aim is not only to identify novel therapeutic strategies targeting peripheral or central detrimental signaling pathways, but also to develop novel delivery systems to deliver therapeutic molecules across the brain barriers."

Gert Van Isterdael
Head of the VIB Flow Core since June 1, 2018

"My goal is to maintain and further leverage the quality of all the performed flow cytometry and single cell experiments at our state-of-the-art facility. The ambition of our new team is to create an open, dynamic and user-friendly work environment where researchers are inspired to work together and to perform top level science. To achieve this we will offer a high quality service to our customers by sharing our expertise, helping with assay development and data analysis, training of users, and of course using a stringent performance control system on all the instrumentation. Keeping abreast of new emerging technologies in the field will be done in close collaboration with the VIB Tech Watch team and the Technology Innovation Lab."

VIB-UGENT CENTER FOR PLANT SYSTEMS BIOLOGY

Klaas Vandepoele
Group leader since January 1, 2018

"Plants have genomes with high plasticity, meaning that gene copy number and species-specific genes are highly variable, even between species within the same plant family. Within the Comparative Network Biology group, we study gene function and regulation by investigating how genes are connected and organized in networks. Biological networks provide a functional context and co-regulated genes that are conserved between different species offer new opportunities to translate biological information from model to crop."

Geert Goeminne
Head of the VIB Metabolomics Core Ghent since June 1, 2018

"To meet the growing need for untargeted metabolomics, we developed a high throughput Metabolic Profiling Pipeline at the Metabolomics Core Ghent (MCG). The main goal of the core is to make High Resolution Mass Spectrometry based metabolomics accessible to research groups within and beyond VIB, including industry, and this on a national and international level. To bridge the gap between complex technology and useful data interpretation we also provide a basic training in software for processing metabolomics data, if requested. Furthermore we continuously invest in applied method development and integration of the latest high-end technology to ensure the best data quality, and to provide solutions for new scientific challenges."

VIB-KU LEUVEN CENTER FOR BRAIN & DISEASE RESEARCH

Pierre Vanderhaeghen
Group leader since January 1, 2018

"We want to decipher what makes us human, at the level of neurons, the cellular blocks of the brain. Human-specific neuronal development and function will be key to understand the many diseases that affect only the human brain."

VIB-VUB CENTER FOR STRUCTURAL BIOLOGY

Marcus Fislage
Head of the Facility for Bio Electron Cryogenic Microscopy since February 2, 2018

"Cryo electron microscopy is more and more becoming the method of choice to obtain high resolution protein structures. In Brussels we are setting up the new VIB-VUB facility for cryo electron microscopy (BECM). We aim to provide every VIB research group, as well as other academics and industrial partners not only access to the latest high-end instrumentation, but also training for data collection and analysis."

WISHING ALL THE BEST TO OUR OUTGOING GROUP LEADERS

After many years as group leader at VIB Ann Depicker and Mieke Van Lijsebettens both from the VIB-UGent Center for Plant Systems Biology, Peter De Jonghe (VIB-UAntwerp Center for Molecular Neurology) and Chris Guerin (VIB Bioimaging Core Ghent) have retired in the course of 2018. We wish to thank them for all their enormous contributions to VIB and science in general and wish them a good life after VIB!

Stuart Maudsley (VIB-UAntwerp Center for molecular Neurology) will continue his career at the University of Antwerp as from January 2019.

Eleanor Dodson, Bert De Rybel, Christine Van Broeckhoven, Alan Urban, Elisabeth Stes, Anne Corcoran and Rose Goodchild

VIB POSTDOC DAY: "WORK-LIFE BALANCE AND SUCCESS SHOULD GO HAND IN HAND"

Many aspects of scientific life require a delicate balancing act – between work and life, research and teaching, gender representation and more. To explore and tackle these challenges, VIB postdocs gathered at the beautiful Horta Cafe in Antwerp on October 11, 2018 for the 4th annual VIB Postdoc Day organized around the theme of "Finding the right balance". National and international speakers were invited to give their views on the topics, generating a lively interactive discussion.

THE STATE OF SCIENCE IN BELGIUM

The day kicked off with a discussion between VUB Rector Caroline Pauwels and KU Leuven General Manager Koenraad Debackere on the problems and opportunities facing universities in Belgium. Topics included the future growth of universities, quotas for female professors and the tension between basic and applied research. It was heartening to hear that they both agreed on the importance of supporting basic research – "there is no such thing as strategic research without basic research".

Noemi Debacker and Anneleen Mortier from ECOOM (Expertise Center in Research and Development Monitoring) presented compelling data on the breakdown of the academic population in Belgium in terms of gender, nationality, etc. They also discussed survey results showing the career trajectories of people with PhD training in Belgium and their impressions of their chosen areas of work. It was interesting to note that, of those surveyed, academic employees felt intellectually challenged and most free to pursue their interests.

DIVERSE SOURCES OF INSIGHT AND INSPIRATION

Anne Corcoran, scientist at the independent biomedical research-focused Babraham Institute (UK), discussed the diverse efforts of her organization to encourage employee work-life balance. One initiative was to only allow official institute events and meetings during the core working hours of 10am-3pm. Eleanor Dodson of the University of York (UK) spoke about her long career in science, and lessons learned working with Nobel prize winners Dorothy Hodgkin and Max Perutz. Finally, Mo Lamkanfi, former group leader at VIB and the current leader of inflammation research at Janssen Pharmaceutica, spoke about factors that motivated him to make the switch from academia to industry. He also reflected on the differences between doing research in academia versus industry.

WORK-LIFE BALANCE SHOULD BE THE NORM, NOT THE EXCEPTION

The day ended with a lively panel debate featuring Christine Van Broeckhoven (VIB-UAntwerp Center for Molecular Neurology), Rose Goodchild (VIB-KU Leuven Center for Brain & Disease Research), Bert De Rybel (VIB-UGent Center for Plant Systems Biology) and Alan Urban (NERF, imec-KU Leuven-VIB), all group leaders at VIB, as well as Eleanor Dodson (University of York) and Anne Corcoran (Babraham Institute). The panelists agreed that a healthy work-life balance including regular working hours, family time and holidays is possible for successful PIs. Postdocs were encouraged to take control of their careers, seek out mentors and grab opportunities. A happy and balanced life inside or outside academia should be possible for everyone.

The Postdoc Committee would like to thank VIB for its generous support, the speakers who contributed their time and ideas, Elisabeth Stes for being an excellent moderator, and all postdocs who helped make it an informative and interactive day.

AWARDS

JEAN-CHRISTOPHE MARINE

(VIB-KU Leuven Center for Cancer Biology) is the winner of the Dr. Karel-Lodewijk Verleysen 2017 Award for clinical medical research work in the European Union. His winning research study is titled 'From new insights in melanoma biology towards improved early detection and increased therapy efficiency'. During a ceremony organized by the Royal Academy of Medicine of Belgium on December 8, 2018, Jean-Christophe gave a short presentation about the study, he signed the prestigious Golden Book on stage, and then received the award from t he president of the Royal Academy.

INFOPUNT PROEFDIERONDERZOEK

(Information Point Animal Research) was selected as one of the winners of the Academic Award in Scientific Communication. Every year, the Royal Flemish Academy of Belgium and the Young Academy nominate 20 winners of this award, which aims to support and improve the perception of communication in science. On November 27, 2018 the award ceremony took place in Brussels.

REPORTER ON THE ROAD:
A ROADMAP FOR COLLABORATION

Talking to others about my time at VIB, there is one thing that always comes back: The open and collaborative atmosphere. I believe that this allowed me to succeed in getting my PhD, and to make useful connections that would guide me in my career path. But could it be proven in a scientific way? In biology, we often use graph theory to highlight the relationships between biological entities. Could we apply this to labs as well?

MATERIALS & METHODS

I made a list of all authors of the papers I co-authored during my time at VIB. Every lab was counted, and for each lab, I identified the number of co-authors. Labs now could serve as nodes in a network and their relationships would be co-authorships.

RESULTS

The left panel of Figure 1 shows what my collaborative network looks like. Node size in this graph is a function of the number of collaborators I had in that specific lab. Obviously, I have more collaborators in my PhD lab (B) than my MSc lab (A) and what would later become my postdoc lab (C). Because I only took my own papers into account, my PhD lab has the highest degree, a measure of connectedness.

However, some other labs also have darker blue colors and thicker lines running back to my PhD lab. Line thickness in this plot corresponds to the number of papers (that I co-authored) shared between two labs. As you can see in the middle panel, node 3 and 6, which are both darker blue than the rest and have thicker links with my PhD lab, are the SWITCH and Tompa labs, respectively. Indeed, during my PhD, we started collaborations with these two groups, which resulted in a few joint publications and ongoing projects.

DISCUSSION

Besides giving us a pretty network visualizing scientific collaborations, does this type of analysis provide us with any relevant information? It would be useful to extend the analysis to labs, centers or even the entire institute. Which labs cluster together in collaborative networks and have the strongest connections? We could also figure out which labs connect two distant networks, and try to encourage these ties to promote integration of those networks (e.g., collaborative grant opportunities).

Additionally, we can start using such collaborative networks as roadmaps to study not only the flow of information (i.e., shared papers), but also people.

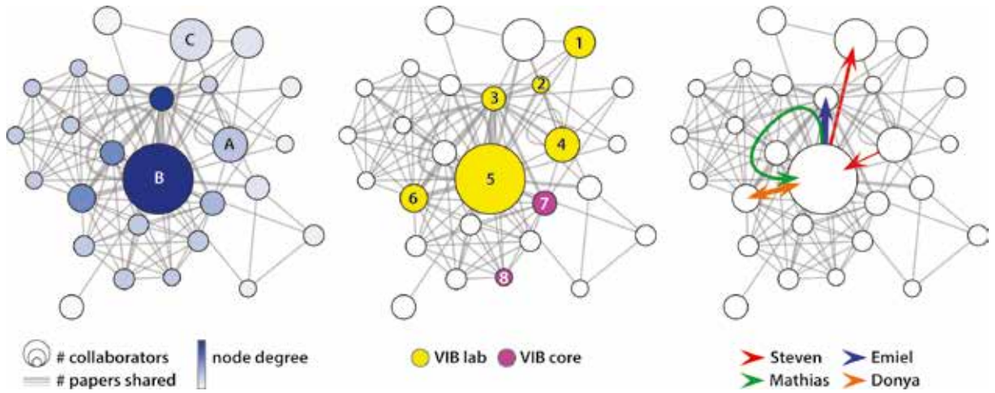


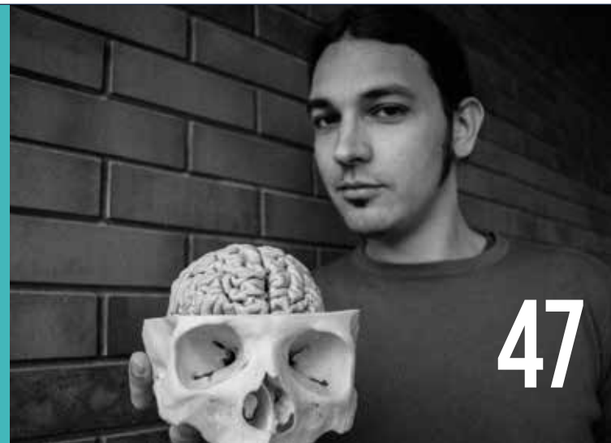
Figure 1: Network analysis of co-authorship reveals collaboration hubs and career trajectories. *(Left) Network of Steven's co-authors. Nodes represent labs, with size corresponding to the number of collaborators. Lines represent shared papers, with the thickness corresponding to the number of papers. Node color represents the number of connections a node has with other nodes. A – MSc, B – PhD, C – Postdoc. (Middle) Position of VIB labs and core facilities in the network: 1 – Van Broeckhoven, 2 – Callaerts, 3 – SWITCH, 4 – Verstrepen, 5 – Van Den Bosch, 6 – Tompa, 7 – Proteomics core Ghent, 8 – EM core Leuven. (Right) Career trajectories of different early career scientists.*

The right panel indicates that the parameters we discussed above may even predict the flow of people. My own career path is in red: I started in the Verstrepen lab, went to the Van Den Bosch lab and ended up leaving VIB for a postdoc abroad. I mentored two bright MSc students, Emiel Michiels and Mathias De Decker. They completed their theses in the Van Den Bosch lab with Kevin Verstrepen as a co-promoter. Emiel joined the SWITCH lab, our strongest collaborator, while Mathias stayed in the lab but started working for the group of Philip Van Damme. Young talent flows through the VIB ecosystem from one hub to the other. On the other hand, the Van Den Bosch and Tompa lab strengthened their collaborative efforts by recruiting new talent from outside the VIB pool: Donya Pakravan is now pursuing a PhD at VIB co-supervised by both the Tompa and Van Den Bosch labs.

This very limited case study shows that the connections identified via this methodology do carry important information and highlight opportunities to foster and strengthen the exchange of knowledge and talent within the VIB pool.

Steven Boeynaems is a VIB alumnus who worked at the Kevin Verstrepen Lab (VIB-KU Leuven Center for Microbiology) and the Ludo Van Den Bosch Lab (VIB-KU Leuven Center for Brain & Disease Research). Recently he traded Belgium for the Californian sun. At Stanford University he keeps pursuing his passion for science and science communication.

@steven.boeynaems | @BoeynaemsSteven



DID YOU KNOW?

THERE'S ALWAYS BREAKING NEWS AT VIB – OUR SCIENTISTS ARE CONSTANTLY CHURNING OUT SUCCESSFUL NEW RESEARCH PROJECTS, RECEIVING RENOWNED AWARDS AND EVEN CREATING BOLD NEW ARTISTIC WORKS. HERE'S A QUICK LOOK AT WHAT'S GOING ON IN OUR WORLD.

Did you know that...

- **Bart De Strooper** (group leader at the VIB-KU Leuven Center for Brain & Disease Research) will once again hold the Arthur Bax and Anna Vanluffelen chair for Alzheimer's research in 2019.

- Several different works of art by **Keimpe Weirda, Luuk van Boekholdt, Nuno Apostolo** and **Melina Figueiredo** (VIB-KU Leuven Center for Brain & Disease Research), **Micheline Grillet** (NERF, VIB-KU Leuven-imec) and **Jeroen Aerts** (VIB Headquarters) were selected to feature in the Brain' Art Challenge organized by Belgian Brain Council (https://braincouncil.be/). The works were displayed in the Europa 50 area at the Liège-Guillemins train station.

- **Johan Cardoen** (Managing Director of VIB) is featured in a podcast produced by Better Science, Better Health on the impact and importance of IP on European biotech and innovation. Listen to it at http://bit.ly/2OUADOh.

- **Aelin Therapeutics** won the Life Stars award for Best EU start-up in the <30M£ category at the Jefferies 2018 London Healthcare Conference. Congratulations to Frederic Rousseau and Joost Schymkowitz (VIB-KU Leuven Center for Brain & Disease Researc), Els Beirnaert (CEO of Aelin Therapeutics), and their entire team! Words of the jury: "Because of the exciting new technology and the impact it may have on an important disease area."

- In March 2018, the reporters of Ketnet and OufTV visited the lab of **Damya Laoui** at the VIB Center for Inflammation Research at VUB. The result was broadcasted on VRT-Ketnet in November.

- **Daniel Peralta** (VIB-UGent Center for Inflammation Research) received a research award from the BBVA Foundation Award and the Spanish Computer Science Society. He received this recognition for developing an app capable of identifying fingerprints in early stages of new drug development.

- KU Leuven will erect new buildings of approximately 27.000 m² for VIB and for the Department of Biology at campus Arenberg III in Heverlee. The new area will be identified as Leuven Bioscience. **Leuven Bioscience** will reshape the Leuven sky line, as it will be the second tallest building in Leuven. The constructions will begin early next year and the new building will host research groups from the VIB-KU Leuven Center for Microbiology. These new premises will feature an auditorium, a cafeteria and roof terrace for the people who work there.

- VIB has gathered the overwhelming support of almost 100 research centers from all over Europe for its call to safeguard the future of genome editing for sustainable agriculture and food production. Science truly forms a united front.

- The interactive VIB **'brain table'** has reached lots of interested people at the Supernova festival (Antwerp), the Biotech Day (at Antwerp University) and 'Dag van de wetenschap' (at KU Leuven). Following these exciting events it has been moved to the Test Zone of Technopolis, the Flemish Center of Science Communication in Mechelen, for a more permanent stay.

THE 'AGROBACTERIUM 2018' SYMPOSIUM

COMMEMORATING 45 YEARS OF A KEY BREAKTHROUGH IN PLANT BIOLOGY RESEARCH

Agrobacterium science has its origins in Ghent, when in 1973, the groups of Jeff Schell and Marc van Montagu discovered that the Ti plasmid contains the transforming principle that is transferred from *Agrobacterium* to the plant cell, resulting in non-controlled plant cell growth.

Although scientists zoomed in on the molecular and genetic characterization of *Agrobacterium* as a pathogen for the next 15 years, the focus shifted in 1983 to the transformed plant cell. From then on, *Agrobacterium* has been used as a tool in most plant biotech labs to transfer DNA into the plant in order to insert extra genes. It was clear from the beginning that genetic modification through *Agrobacterium*-mediated plant transformation could be used as a research tool in the lab and as a new breeding technique to obtain crops with specific new traits.

The '*Agrobacterium* 2018' symposium (12-13 September, VIB-UGent Center for Plant Systems Biology) presented timely perspectives on the cell biology of *Agrobacterium*, *Agrobacterium* as a pathogen (ecology, diversity, treatment), horizontal gene transfer between bacteria and eukaryotic cells, plant responses to *Agrobacterium* infection, and the use of *Agrobacterium* as an essential tool in plant biological sciences.

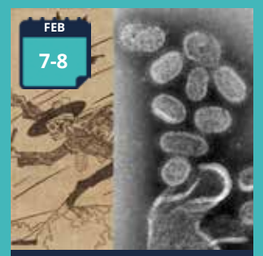
On a personal note, Ann Depicker celebrated her retirement with the organization of this meeting after a 45-year career, which she kicked off by studying the Ti plasmid of *Agrobacterium* for her undergraduate thesis in 1973.

MORE THAN 3,000 HAPPY FACES AT BIOTECH DAY IN ANTWERP

On Sunday October 21, 2018, the Campus Drie Eiken in Antwerp was bustling with activity and about 200 collaborators made Biotech Day a day to remember. Young and old could discover more about Personalized Medicine. In addition, participants had the opportunity to visit the labs of VIB-UAntwerp.

Mark your calendar for the next Biotech Day on October 20, 2019 in Leuven.

Upcoming VIB Conferences & Science Events in 2019



The 1918 influenza pandemic: Historical and biomedical reflections
#Flu1918Ypres
Ypres

Type 2 Immunity in Homeostasis and Disease
In cooperation with Cell Press
#Type2Immunity19
Bruges

Revolutionizing Next-Generation Sequencing (3rd edition)
#RNGS19
Antwerp

Regulatory Oxylipins
#Oxylipins19
Ghent

Emerging Applications of Microbes
#Microbes19
Leuven

International Conference on Polyploidy
#Polyploidy19
Ghent

The Brain Mosaic: Cellular heterogeneity in the CNS (2nd edition)
#BrainMosaic19
Leuven

Next-Generation Antibodies and Protein Analysis (3rd edition)
#NGAPA19
Ghent

For more info go to www.vibconferences.be

MARK YOUR CALENDAR

The 1918 influenza pandemic: Historical and biomedical reflections
February 7-8, 2019 – Ypres

Type 2 Immunity in Homeostasis and Disease
February 21-22, 2019 – Bruges

Revolutionizing Next-Generation Sequencing
March 25-26, 2019 – Antwerp

Regulatory Oxylipins
April 1-4, 2019 – Ghent

COLOPHON

Responsible Publisher

Jo Bury

VIB vzw

Rijvisschestraat 120

9052 GHENT

BELGIUM

Chief Editor

Sooike Stoops

Coordinator

Tiny Sterck

Photography

Ine Dehandschutter

All Enquiries

VIB HQ

Rijvisschestraat 120

9052 GHENT

BELGIUM

Tiny Sterck

E-mail: tiny.sterck@vib.be

Tel.: +32 9 244 66 11

Fax: +32 9 244 66 10

www.vib.be