

fnrsnews

THE MAGAZINE OF THE FUND FOR SCIENTIFIC RESEARCH • FNRS • QUARTERLY No. 120 • October 2020 • P201210

120
October 2020



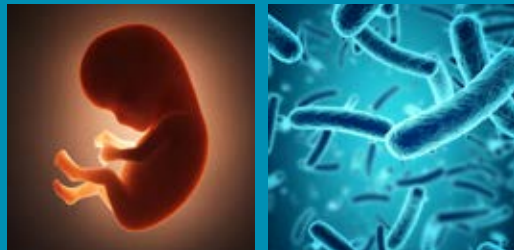
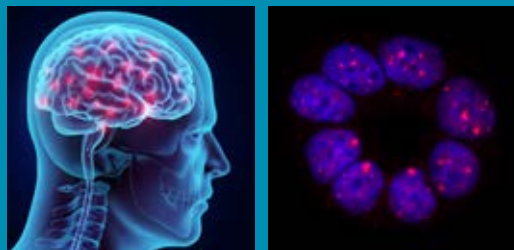
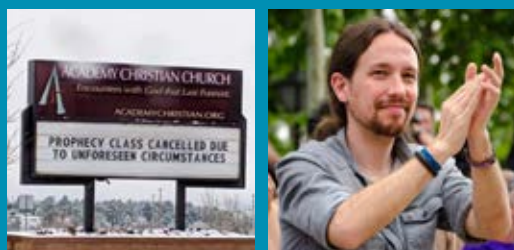
fnrs
FREEDOM TO RESEARCH

**RESEARCH
ASSOCIATES
2020**



EDITORIAL 01 REPORT RESEARCH ASSOCIATES 2

Clément Dessy	4
Quentin Landenne	6
Vasiliki Saripanidi	8
Jean-François Maystadt	10
Stijn Van Petegem	12
Bénédicte Machiels	14
Simon Dellicour	16
Francesca Rapino	18
Olivia Gosseries	20
Giulia Liberati	22
Pascal Gehring	24
Timothée Marquis	26
Thomas Peters	28
Sylvain Quoilin	30
Evgeny Skvortsov	32
OPEN SCIENCE: A REVIEW OF THE ACADEMIES	34
FNRS.AWARDS	36



fnrs
FREEDOM TO RESEARCH

FNRS.news is published by the Fund for Scientific Research-FNRS.

Reproduction of articles published is not permitted without the prior consent of the Fund for Scientific Research-FNRS, stating their origin.

Production: www.chriscom.eu

An electronic version of FNRS.news is available from www.fnrs.news.

Publisher: Véronique Halloin Secretary General, rue d'Egmont 5 - 1000 Brussels.

Editor in Chief: Éric Winnen

Editorial secretary: Céline Husson

fnrs.news@fnrs-fnrs.be

Contributors to this issue:

Madeleine Cense, Marie-Françoise Dispa, Henri Dupuis, Lauranne Garitte, Céline Husson, Julie Luong, Sylvie Paelman, Céline Rase, Luc Ruidant, Frédéric Soumois, Didier Viviers, Laurent Zanella.

Acknowledgments: The editorial team would like to thank all those who contributed to the production of these articles and illustrations.

Confidence(s)

Since the beginning of the COVID-19 pandemic, science everywhere has 'naturally' been centre-stage. Scientists of every hue have been asked to give their analyses, provide clarifications and take part in debates, as well as advise on policy. The main thing to take out from all this is confirmation of the confidence that people place in science as we practise and defend it: rigorously, freely, transparently and in a way that we can all share...


Of course, certain scientific controversies have been given excessive media coverage and numerous questions have been raised about some of the methodological errors made by researchers trying to advance too quickly. But this has also highlighted some of the uncertainties that characterise the routes that science takes, which by their very nature cannot be outlined in advance. All this has made it possible to show that arguments, exchanges and opposition are all essential if science is to progress: Thomas Kuhn demonstrated this well in his analysis of the 'scientific revolutions'.

But no doubt the worrying period we are currently in is even more in need of uncomplicated certainties and straightforward obviousness. If that is the case, then the role of the scientific world should be to make the complexity of things better understood, to show them for what they are, to explain and pass them on. And to maintain a relationship of confidence with the public.

The public's confidence with science is a lively one – which was demonstrated in very practical terms during recent programmes of calls for grants from the FNRS. The first, in the context of research into coronavirus, saw the result contributing to the funding by the FNRS of 21 Urgent Research Loans and 13 Exceptional Research Projects, making a total of 4 million €! Then there was operation Télévie, which through the confidence and incredible generosity and mobilisation of thousands of people (with over 10.5 million € raised), enabled 90 researchers and technicians to be funded, including 6 research projects into cancer.

Confidence is also to the fore with the 15 Research Associates featured in this issue and who have just begun their new open-ended fellowships. These are exciting portraits of enthusiastic people who are well aware of the responsibilities they have taken on.

Nearly 500 years ago, François Rabelais wrote: 'science without awareness is merely the ruin of the soul'. Science without confidence would see just as frightening a menace float above our society.

 **Véronique Halloin,**
Secretary-General
F.R.S.-FNRS

“

Above all, we need confirmation of the confidence that people place in science as we practise and defend it: rigorously, freely, transparently and in a way that we can all share...



Research Associates 2020

Welcome aboard!



It's true – 2020 will be a year like no other...

Just like everyone else, the FNRS has had to adapt and find new ways of 'carrying on as normal', albeit remotely. And to give the resources to researchers to get back on their feet and continue their research work. Some of them have been able to continue, partly or in full, while others have had to adjust their research programme for the time being. Others still have played an active part in the research against coronavirus, as well as in screening projects or other clinical activities.

And in June, as it does every year, the FNRS Board of Directors revealed the list of its new fellows and grantees. 1,173 candidates submitted an application, with 312 of them being awarded funding. Too many applications, judged to be excellent, are still not receiving the funding they deserve.

So the FNRS now has 15 new permanent researchers on board: 5 women and 10 men. That's two more than last year, two more female researchers. It's another step towards gender equality in scientific research, which is one of the fights conducted by the FNRS. 5 in human and social sciences, 4 in life and health sciences and 6 in exact and natural sciences.

This special report from FNRS.news enables the scientists who will be conducting the fundamental research of tomorrow to have their say.

Clément Dessy

Research and translation with art!

With his project into the interaction between translation and French-language literary creation from 1840 to 1914, Clément Dessy will now be able to scratch that itch that has been the central thread of his life and the key to his career as a researcher in the fields of literature and the arts.

"A fellowship as a Research Associate truly opens up the horizon for conducting research to an extent that meets my aspirations." From the outset, through this statement, it is clear just how much Clément Dessy is delighted with having obtained his fellowship. "This position with the FNRS is ideal for me. To make it happen, I am leaving my job as Assistant Professor at the University of Warwick. Some of my colleagues tell me that I have found the Holy Grail, a position that we thought didn't exist anymore, a position where we safeguard research. I will, of course, continue to do some teaching, which is my second passion, and as I have discovered, a rather in-depth communication exercise. But for me, research is the driving force."

Thesis and university: intimidating words

So, Clément Dessy is delighted. He will at last be able to scratch the itch of his curiosity. And to give us a better understanding, he invited us to travel back in time to when he was an adolescent.

"I was already extremely inquisitive... but about history. I often fell asleep late at night because I was reading a great deal. I worked and I researched things that interested me, sometimes forgetting to do my homework. Outside school, I volunteered at a local library – even doing work as a volunteer for classes that weren't even in my syllabus. At the end of secondary school, my history teacher said to me, 'You could maybe do a thesis'. I didn't know what he was talking about. He was thinking about history, not literature, which is what I chose in the end, more as a challenge than anything else."

"The words 'thesis' and 'university' frightened me, because I had a rather fearsome image of the place, no doubt linked to endless work and almost suffering. So when I began my degree in Romance Languages and Literature at ULB, I was very afraid. I didn't feel very cultured alongside my fellow students, who were more systematically cultured in literature than I was."

Writers and the Nabis

In reality, Clément Dessy quickly found his way, achieving his degree (an MA at the time) and then going on to do an MA in History of Art and Archaeology at UCLouvain, prior to gaining a PhD in Languages and Literature at ULB. It was from these two courses that he devised his proposed thesis.

When he began, intense stress appeared again. "I didn't know the codes or how to proceed." But, he adds, "I had the good fortune to work with an attentive supervisor who always gave me confidence without taking my freedom away from me." The subject of his thesis was the relationship and influences between, on the one hand, the Nabi painters (a post-Impressionist movement) and their predecessor, Paul Gauguin and,

on the other, French symbolist writers (Alfred Jarry, André Gide, Jules Renard, etc.) between 1889 and 1905 in terms of writing, the illustration of books, theatre production and so on. This thesis led to a book, *Les écrivains et les Nabis. La littérature au défi de la peinture*, a work illustrated with abundant iconography and extensive annotated, which won the Prix du Musée d'Orsay in Paris in 2012.

The line linking Brussels, London and Paris

Interested mainly in the relationship between text and image, transnational cultural studies and the print culture of literary and artistic periodicals, Clément Dessy specialised in French and Belgian art and literature from the end of the 19th century. He also developed expertise in British and Italian spaces for the same period, as is evidenced by the continuation of his career.

In addition to various research sojourns in Paris and Rome, he went off to the University of Oxford as a postdoctoral researcher in 2012, intending initially to study cultural exchanges between Belgium and the British Isles from 1880 to 1930.

"The aim was to reveal how these exchanges enabled Belgium to play a pivotal cultural role between London and Paris and, in the other direction, to allow Britons to get their art and literature known in Europe. Belgian authors and artists, such as Maurice Maeterlinck and Émile Verhaeren, were able to reach an international audience through this two-way recognition, not only French, but also and particularly British."

“Some of my colleagues tell me that I have found the Holy Grail, a position that we thought didn't exist anymore, a position where we safeguard research.

Managerial logic

Between the end of 2012 and 2015, Clément Dessy returned to Belgium, where he was awarded a fellowship as an FNRS post-doctoral researcher at ULB, delving into the issue of exchanges between Belgium and Britain during the symbolism period. He then went back to Oxford University as a post-doctoral research assistant (2015-2016) in the faculty of English. With the experience he had already acquired, he was able to take part in a project on cosmopolitanism in English literature. The next stage of this fellowship was a little more complicated for him.

"The profession developed with increasingly strong pressure and the introduction of managerial logic into the academic world. In particular, there was sometimes a disproportion between the effort made to obtain a place and the material status that it represented. I was unable to regain that almost obsessional inquisitiveness that has helped me to overcome all that. But in the end it came back anyway."

On 1st September 2017, Clément was appointed Professor at the University of Warwick. And then it was very recently that he was awarded his fellowship as an FNRS Research Associate. "It was at Oxford and then at Warwick that I began thinking about this new project that is called 'Translation with art. A literary history of translation and French-speaking writer-translators, from 1840 to 1914.'"

More soul

"In the second half of the 19th century, the function of translator began to become more specialised and professional," continues Clément Dessy. "But it was only at the end of the century that the issue of copyright was sorted out internationally. So there were a certain number of writers or poets producing translations for literary magazines or avant-garde theatres who were either poorly paid or who received nothing at all. But then if these translations were just potboilers, why did they bother? This poses the question of the aesthetic role that they had for many writers. There was a will to claim a particular and personal way of translating, by adding more soul, compared with more run-of-the-mill translations. What was the relationship between the way they translated and the way they wrote their own poems or novels? At the end of the 19th century, as various

forms of nationalism were on the rise, perhaps these writer-translators developed other ideals, situated somewhere between politics and art, such as the renewal of the language or the emancipation of increasingly rigid frameworks in literature. In this regard, the place of Belgians in relation to the French raises specific questions."

These are the questions that Clément Dessy will be able to delve into in the years ahead. It will be interesting to see the result of his new reflections...

 **Luc Ruidant**



BIO IN BRIEF

Place of birth: Gosselies.

University studies: Romance Languages and Literature (ULB); History of Art and Archaeology (UCLouvain).

Thesis: "Les écrivains devant le défi nabi: Positions, pratiques d'écriture et influences" (ULB).

Grants and fellowships: Doctorate (ULB), Post-doctorate at the University of Oxford (Wiener-Anspach Foundation), FNRS Postdoctoral Researcher (ULB), Post-doctoral research assistant at the University of Oxford, Assistant Professor at the University of Warwick.

Awards and prizes: Prix du Musée d'Orsay (2012).

Passions: Hunting for books, bike-riding and grinding coffee.

Quentin Landenne

From *Bildung* to the learning society

For Quentin Landenne, philosophy has long remained “a secret desire”. “Because of the parameter of professional outlets, which I feared, wrongly, would be few and far between for a philosopher...” But the dual course run at USaint-Louis in Brussels enabled him to combine law and philosophy, reason and passion.

"Some academics share the impression with the general public that philosophers do not have their own field and that by dint of wondering about anything and everything, they get involved in things that do not concern them. But for me, I think that the move to make science ultra-specialised – which is inevitable and necessary – needs to be accompanied by a more transversal outlook and a systematic return to issues of values, common purposes, meaning, etc. At the present time, for example, questions are being asked about the value of health compared with fundamental freedoms and these are typically philosophical questions."

Openness

In his second year at ULB, Quentin Landenne again took two paths by combining philosophy and political science. “I didn’t want to lose the benefit of interdisciplinary input and I was interested in politics – hence my choice. Even though philosophy remains a discipline in its own right, I believe that philosophers always need to remain open to other ways of working, other research communities and other realities.”



FNRS Research Associate, USL-B

“I am very grateful, but there is a feeling of responsibility in addition to this gratitude vis-à-vis the FNRS and the university, as well as to society. Receiving such a wonderful fellowship, which brings such peace of mind, also creates obligations!”

Music for equilibrium

In the same way, he also enjoys meeting people among those close to him “who are not part of the academic world and who don’t have the same reflexes, worries and obsessions as university researchers” and being able to talk to them about topics such as classical music, which is his second passion. “I’ve played the piano for a long time and I still sing in a choir. For me, this is not only relaxation, but also a form of healing and sharing. Music is essential for my overall equilibrium. And it must have common roots with philosophy, because it is music that led me to take an interest in matters of the mind.”

A little serenity

He thought a little about having a university career, but without believing too much in it, “because places are limited! You can, of course, do philosophy in any circles, but at university you benefit from collegial emulation and interdisciplinary stimulation. And you have more time to devote to research...” Which is to say that his fellowship as a Research Associate fell at the right time. “My initial feeling was one of immense relief and then of great joy – the joy of all the projects I was going to be able to do. I am very grateful, but there is a feeling of responsibility in addition to this gratitude vis-à-vis the FNRS and the university, as well as to society. Receiving such a wonderful fellowship, which brings such peace of mind also creates obligations!”

A learning society

Quentin Landenne’s two favourite areas are the history of modern philosophy, from the 16th to the 19th century, and contemporary political philosophy. “And my current research project at the FNRS is midway between these two fields, looking into the idea of a learning society or a society of learning. A society in which learning and training exercises a new and entirely central function that is marked by three major breaks in relation to its traditional function: 1) learning is no longer reserved to a time when a person is preparing for life, the ‘learning years’, but instead relates to all ages – lifelong learning; 2) learning and education are no longer the prerogative of formal education institutions, primary schools, secondary schools, higher learning, but in fact come under all sectors of society – you can learn everywhere;

3) learning is no longer up to individuals, but concerns a whole range of providers, groups, official bodies, institutions, organisations, businesses and so on – society as a whole needs to be learning.”

Ability or duty?

In the 1990s, this concept was taken up by international institutions, such as the European Commission, UNESCO and the OECD, as well as by various national governments, aimed at theorising societal developments and promoting learning in the world of work. “Since then, lifelong learning has been considered as a key feature of the employability of workers and the competitiveness of companies. So we have gone from a humanist project – the learning society contains a promise of personal liberation through culture – to a socioeconomic project and from a promise of cultural emancipation to the imperative of systemic adaptation: not only do we have the ability to learn throughout life, but we have a duty to do so – otherwise we fall into obsolescence.”

Imaging

Quentin Landenne’s aim first of all is to demonstrate the ambivalence between promise of emancipation and imperative of adaptation “and then to compare these contemporary discourses with an older paradigm that placed learning at the centre of society. In German philosophy from the end of the 18th and beginning of the 19th centuries, of Kant, Hegel, Goethe, Schiller and Humboldt, society was based around a cultural concept called ‘Bildung’ in German. In today’s language, Bildung, which literally means imaging, designates education, but in the vocabulary of philosophy, it also covers culture, teaching, training, enlightenment and construction. The idea of Bildung philosophy that one sets oneself free by learning and that social transformations depend on the individual’s ability to self-learn.”

Dual threat

While understanding the change between the time of Bildung and today, the era of the learning society, is first and foremost the work of the philosophy historian, Quentin Landenne has also undertaken to reveal the political philosophy underlying the learning society. “The learning society is a method of governance, but how do you govern by learning? What



BIO IN BRIEF

Place of birth: Woluwé-Saint-Lambert.

University studies: Law and Philosophy (USaint-Louis Brussels), Philosophy and Political Science (ULB).

Thesis: “Le perspectivisme transcendantal et la philosophie appliquée chez J.G. Fichte” (ULB).

Grants and fellowships: FNRS Research Fellow (ULB), FNRS Postdoctoral Researcher (ULB), Alexander von Humboldt Stipendium (TU Berlin).

Awards and prizes: None to date.

Passions: Classical music (piano and choral singing).

does that imply? What are the conditions of learning for all? Who are the new excluded from this society? And what are its social costs and the balance of power it conceals? It is important to unlock the main values put forward by these discourses, as well as to understand the role of classic educational institutions and universities in particular in this continuity of learning between general education and the world of enterprise. Universities are currently under a dual threat: either they allow themselves to be colonised by logics that are foreign to them, or they secede. How will they succeed in retaining their autonomy, their independence in research, without losing sight of the real needs of society? I firmly believe that philosophy can contribute to answering this question.”

 Marie-Françoise Dispa

Vasiliki Saripanidi

Yesterday, today, tomorrow...

Vasiliki Saripanidi, called Vivi, grew up in Drama, a small town in the north of Greece. She studied archaeology at the University of Thessalonica, in the north of the country. And when it came to choosing a specialist subject, she naturally opted for this region and more specifically for the history of the Macedonian kingdom. A dip into the past that lights up the current day.

"As an adolescent, I wanted to study biology, because I was interested in Life," admits Vivi Saripanidi. "And then I met a lady friend of my mother who was studying archaeology and I was smitten! But I stayed consistent because I wasn't only interested in works of art, but also in everyday objects. To discover through them the practices and social relations of a bygone age – in other words, Life."

All in a shard of glass

While studying for her first master's degree, at Aristotle University in Thessalonica, Vivi Saripanidi became a ceramologist. "I was fascinated by what a tiny shard of glass could teach us about the shape, date and origin of an object. And while ceramics may be less impressive than sculpture, for example, we find them with the rich and poor alike, in palaces and in temples." A second master's, at

John Hopkins University in Baltimore (United States), enabled Vivi to extend her education to the study of written sources. And her thesis, which she devoted to the ceramics of the necropolis of Sindos, characterised by an abundance of gold – "men with weapons, buried with gold masks and women literally covered in gold, with gold jewellery and even golden shoes" – made her want to go further.



"It seems that I am not the only one to be convinced that archaeology not only tells about life long ago, but also – and perhaps just as much – about the world today."

Illiterate societies

"The north of Greece remained largely unexplored until the discovery at the end of the 1970s of the great royal tombs of Aigai, the first capital of the Macedonian kingdom, an hour from Thessalonica. It was a multicultural region where the Greeks, when they colonised it, discovered numerous different people: Thracians, Macedonians and so on. But there were no written sources – they were illiterate societies – and so it was impossible to identify them from material culture alone. As for the Macedonian kingdom, which ended up by conquering the Greek world, all we know is that its whole history was a long territorial expansion. There's just a small text from Thucydides, the great Greek historian, that lists the regions conquered by the Macedonians, but without saying in what order or when."



BIO IN BRIEF

Place of birth: Thessalonique.

University studies: Classical archaeology (Aristotle University), Classical studies (John Hopkins University).

Thesis: "Imported and local ceramics in northern Greece. The Sindos case" (Aristotle University).

Grants and Fellowships: Herculitus II doctoral scholarship from the European Social Fund and from the Greek State Ministry of Education and Religions, Post-doctorate (P. Wiener – M. Anspach Foundation, ULB), FNRS Postdoctoral Researcher (ULB), Scientific staffer (ULB).

Awards and prizes: Honorary Award from the Propontis Foundation (2007), Heraclitus II doctoral scholarship from the European Social Fund and from the Greek State Ministry of Education and Religions.

Passions: Literature.

Superpower

Determined to find out more, when she completed her thesis, Vivi Saripanidi launched into a project that she admits herself was 'gigantic'. "In the north of Greece, most of the sites that have been excavated are necropolises: the living quarters of people who lived in the region before the end of the classical period have not been studied very much. So I decided to conduct a comparative study between the various necropolises to try and reconstruct their funeral practices, from a religious point of view, of course, but also to discover the way the different communities in this region were organised from a socio-political point of view."

Having obtained a position as a researcher at ULB, in the archaeology and heritage research centre, as part of a collaborative project with Oxford University into the reconstruction of social identities through ritual practices, she succeeded in reconstituting the various stages in the expansion of the Macedonian kingdom prior to the age of Philip. "In the history books, the superpower that was Macedonia seems to appear suddenly, out of nothing, at the same time as the father of Alexander the Great. This, of course was impossible – no society can be transformed as quickly as that!"

Key questions

Discoveries of this nature gained from information about funeral practices? "In a house or sanctuary it is only very rarely possible to associate objects with specific individuals. In a necropolis on the other hand, objects are there to reveal the social identities of the dead. And today, thanks to the anthropologists who analyse stable isotopes and DNA, we can even gather information about their health and diet. Through my fellowship as a Research Associate, I will be able to complete this project and use archaeological data to reconstruct the social and cultural history of northern Greece and in particular that of the Macedonian kingdom before Philip. This will be done by tackling three key questions: 1) When were Macedonian communities united under a single central political power? 2) What were the structures of the socio-political organisation of this kingdom and how did it evolve over time? And, finally, 3) How were the conditions and socio-political changes influenced by contacts with the Macedonians and other peoples?"

Story of an elite

Vivi Saripanidi has already started writing a book in which she presents the scenario in Macedonia as she understands it today. "On a political level, it is the story of an elite that was gradually formed from a pastoral population, which was originally rather egalitarian. This elite was engaged in the centralisation of political power, experiencing numerous fluctuations until the time of Philip and Alexander. Sometimes it went forwards and sometimes it went back, strengthening its position, then losing part of its power and then trying over and over again. It is this aspect that gives the subject very strong links with the current reality. Which strategies were used by the elite to take power and which ones were used by the people to resist that power? Back then, just as it does today, each crisis – epidemic, natural disaster, war, etc. – gave the politicians the opportunity to set themselves up as protectors of the people and to manipulate them."

A passionate choice

For Vivi Saripanidi, research is not a profession, but a passion. "It's like music: it's impossible to go three days without it! Also, even though I love travelling, laughing, going out and having a meal in a restaurant, I don't have any hobbies as such." Except, perhaps, literature. "I'm more of the type to read Proust or Knausgaard in a café than to walk for hours in the countryside!" She is also aware, without any bitterness, that life as a couple and a family is more difficult for female researchers than for their male counterparts. "In my post-doctoral group, there are male researchers who have found a woman who is prepared to follow them physically and mentally. That is rarely the case for a female researcher." But she has no regrets. "The moment I learnt that I had been awarded the fellowship by the FNRS was the best moment of my life... I know that competition for places is enormous and that choosing priorities between research into cancer and the reconstruction of the Macedonian kingdom is no easy task for the university authorities. Fortunately, it seems that I'm not the only one convinced that archaeology doesn't just tell us about life in the olden days, but also – and perhaps just as much – about the world today."

 Marie-Françoise Dispa

Jean-François Maystadt

Profession? Spouter of clichés about refugees

Forced immigration is a major topic of concern in contemporary societies. Jean-François Maystadt takes dynamic photos that are much more precise. And that shatter many clichés about the phenomenon.

FNRS Research Associate, UCLouvain

While it was somewhat unusual, our meeting with Jean-François Maystadt was at the same time of great thematic continuity. He is attached to the universities of Lancaster and Antwerp, has retained his colleagues from KULeuven, but lives in Charleroi. And here he is, on the point of migrating professionally to Louvain-La-Neuve, to UCLouvain. So the meeting point was set for Brussels South railway station, to talk over a traditional Greek-style meal at an unpretentious street restaurant, where we were able to eat our fill for a few euros. Few of our table companions were likely to have proper papers. So what better place to talk about his research work, which delves into forced migration and in particular the impact and integration of refugees in developing countries?

"The usual images that come to mind when we speak about refugees are boats or trains filled with people from the South, trying to make their way to the North, which they see as a place of asylum and prosperity. This is especially the picture that we have had of Syria for the past ten years or so.

Yet, it's wrong: most of the people displaced in the world find themselves in countries neighbouring their place of origin and with a low income. In Europe, less than one per cent of inhabitants are refugees. In Lebanon, it's a quarter of the population. In a country where stability is already very fragile," explains the researcher, following a visit to Beirut¹. That's because Jean-François Maystadt is no back-room researcher. In particular, he has combined an analysis of individual data with a field survey in the refugee camps of Tanzania, in the Kagera region, which has been virtually 'invaded' by refugees from Burundi (1993) and Rwanda (1994), fleeing war and famine.

From humanitarian aid to development

"Using data from households, government administrations and satellites, as well as statistical and econometric methods, I try and describe the economic consequences of accommodating refugees or displaced persons in a low-income country. In the short term, it's true, violence, environmental

degradation and the spread of disease are major risks for the host populations. But in the long term, infrastructure, trade and employment markets are key factors in determining the impact on host communities. Often, this impact is a positive one, albeit with very strong redistributive effects. My projects consist of weighing up the options available for strengthening resilience in the light of this data. Investments in infrastructure – roads, for example – greater trade with the countries of origin or the local integration of refugees through access to the employment market are all strategies to explore for strengthening resilience and making the move from humanitarian aid to development," explains Jean-François Maystadt.

"Let's go back to the case of the region of Kagera in the north-west of Tanzania. Twice as big as Belgium, it already had a population of a million and a half at the beginning of the 1990s. From the end of 1993 to 1995, more than 800,000 people arrived from Burundi and Rwanda in a matter of a few months. 300,000 of these were housed in a single camp. We often perceive these gigantic camps as unstructured places, with displaced persons receiving assistance and only there on a temporary basis. The reality is very different. First of all, temporary situations are rare. Almost 70% of refugees have

“Using data from households, government administrations and satellites, as well as statistical and econometric methods, I try and describe the economic consequences of accommodating refugees or displaced persons in a low-income country.

temporary status for more than 5 years, leading to what the United Nations High Commission for Refugees calls 'prolonged emergency situations': some refugees have stayed in Tanzania for over 10 years... After that, refugees are far from being passive, taking decisions about consumption and production, interacting with the local population in the form of trading and non-trading exchanges. They may become an integral part of their society and then they may become a resource. These people are consumers, even if they are very poor. And they represent a significant workforce."

Integration: a multiplier of the improvement effects of wellbeing

The conclusion? *"Our results indicate that the presence of refugees considerably increased real consumption per inhabitant between 1991 and 2004. This situation created winners who may have benefited from cheap labour and an increase in demand for agricultural products. It also created losers due to greater competition in the market for jobs and the increase of some consumer prices. The effects of this continued until 2010, even though most of the refugees left between 1996 and 2000. What are the possible channels for passing on such persistence? The main one is a considerable reduction in the cost of transport following the increase in road-building. The results go against the widespread opinion today that says forced migrants systematically become a*

burden. The opposite is true and our results suggest that refugees actually contribute to economic development. In the short term, the priority should certainly be to improve the ability of the local population to deal with changes in prices and competition on the agricultural market. Then, gradually, humanitarian aid needs to give way to efforts in favour of long-term development by capitalising on the investments in roads made by international organisations. In a context similar to our case study in Tanzania, we can assume that the integration of refugees into the local economy may certainly have acted as a multiplier for economic development. This is an option that is overlooked too often for dealing with situations where refugees are involved over extended periods."

Of course, this is only a single case, but similar conclusions about the contribution of refugees in economic development have been drawn in different contexts, for example in Uganda and Kenya, or more recently in Turkey, Jordan and Lebanon.

Innovative data for going beyond the employment market

Over time, the researcher has adopted new tools: data about mobile telephony to understand the mobility of refugees in Turkey, anthropometric data (size and weight of children) to evaluate the impact that massive influxes of refugees have on health in more than 30 African countries, satellite images to gauge the extent of deforestation and the use of land in Africa. Along these same lines, last year, he published as summary that once more goes against the usual refugee cliché. *"Taking a more nuanced view of the way in which refugees are affecting the African landscape, we can see that those areas that accommodate refugees experience a slight increase in the level of vegetation. There is no systematic proof that refugees contribute to deforestation due to their involvement in the extraction of resources. But it is true that there is a greater risk of areas of forest being turned into land for growing crops. Local farmers may respond to incentives to develop agriculture and intensify their production."*

"Emerging literature quantifies the impact of displaced persons on host communities, in particular via the markets for goods and labour. Most analyses have concentrated

on a specific sector or particular channel of impact. However, we need to take a more overall view to better understand that the prolonged presence of refugees can bring about structural changes to host economies," concludes Jean-François Maystadt – not without calling into question those often misleading clichés circulating about refugees...

 **Frédéric Soumois**



BIO IN BRIEF

Place of birth: Charleroi.

University studies: Local Economic Development (London School of Economics).

Thesis: "Conflict and forced migration" (UCLouvain).

Grants and fellowships: FNRS Research Fellow (UCLouvain), ARC fellowship (UCLouvain), Post-doctorate (International Food Policy Research Institute), Post-doctorate (KULeuven), Associate Professor (Lancaster University), Associate Professor (University of Antwerp).

Awards and prizes: LUMS grant; CRP2 Activity 39 "Policy Options for Reducing Poverty and Vulnerability in Conflict-prone countries"; IFAD grant on "Decreasing Vulnerability to Conflict in MENA through Rural Development"; IFPRI Post-Doctoral Strategic Innovation Funds on "Building resilience in refugee-hosting population"; Roger Vanthourmont Award 2003 for B.A. dissertation.

Passion: Sport, reading (including strip cartoons).

1. Cet entretien a été réalisé avant la double explosion d'un dépôt d'engrais au port de Beyrouth, le 4 août 2020.

Stijn Van Petegem

'Helicopter parents'

Stijn Van Petegem was very young when he started looking at adolescence, a period of life he finds fascinating. As part of his new appointment as FNRS Research Associate, he will study overprotective parents to assess whether our society, with so many injunctions of perfect parenthood, has its own share of responsibility in this type of toxic behaviour.

However, he loved Switzerland. Scenery, mountains, hiking, climbing, skiing and so on. But after five years far from those close to him, Stijn Van Petegem and his partner both wanted to come back home. To the Ghent where he was born, "which is only 30 minutes from Brussels". This is an important detail, given that the researcher will be working at ULB, in the psychology of the development of the family department. As a specialist in relations between parents and adolescents, he will be examining what are often called 'helicopter parents'. "Parental overprotection is a topic I have been working on for several years. These types of parents do lots of things instead of their kids and protect them from everything. Scientific literature has established that this is not good for the development of children. My objective will be to seek to understand why certain parents become overprotective. The studies already produced have mainly analysed individual characteristics (parents and children) that lead to overprotection. I will be looking more to see whether broader factors,

linked to the context, have a role to play. Today there are many expectations and injunctions for society to be perfect parents. A culture of anxiety, a fear of danger and economic inequalities, and so on may also be involved. My topic will blend sociology, the study of genders, the economy, etc.," explains the 34-year-old psychologist. Everything is clearly summarised in the title of his FNRS project: "Prevention better than cure? Identifying the determinants of parental overprotectiveness in the context of a changing society".

Psychology, a little pot luck

And what if we tried to identify the determinants of this taste for the behavioural psychology of adolescents? Well, we'd very quickly happen upon this triggering element that has already worked wonders: happenstance! After the hectic pace of his career at school (he skipped a year along the way), Stijn Van Petegem enrolled for psychology at UGent. "It wasn't a choice that I thought about much. I like people and psychology made me curious, although I wasn't dreaming of becoming a psychologist." In the end, though, he held firm and opted for clinical psychology, which got him on the way to becoming a psychologist, and involved a doctorate in development psychology, dealing with the development of autonomy and identity in adolescent. "Human beings are fascinating and adolescence is particularly interesting because it's a period when lots of things change, when we tend to be unbalanced and readjusting. It's a period that is often presented as being difficult, but I also think it is filled with opportunities and a time when existential questions come to the fore. And I find that fascinating."

During his five years doing his doctorate, he was a Research Fellow at the FWO and worked as a clinical psychologist in a centre for children and adolescents attached to his department. "That was where I saw adolescents and/or parents in

difficulty. It enabled me to cover ground and feed my theoretical thinking by putting things into perspective and bringing my feet firmly back on the ground."

Switzerland: a breath of fresh air

While he was attracted by the idea of being a practising clinician, his thesis injected him with the research bug and he elected to remain in the academic world. After a scholarship from the Special Research Fund (BOF) at UGent, he applied again to do a post-doctorate at the FWO. He was travelling in Iran with a friend when the response came in. It was in an Internet café that he took the blow: he hadn't been accepted. He was immensely disappointed, all the more so because there were not too many options in his sector at UGent. So he tried to make up for his disappointment by giving himself a dream: why not go travelling for a year with his girlfriend or both



BIO IN BRIEF

Place of birth: Ghent.

University studies: Psychology (UGent).

Thesis: "The autonomy debate in adolescence revisited" (UGent).

Grants and fellowships: Postdoctoral researcher, Special Research Fund – BOF (UGent), Lead Assistant (UNIL).

Prizes and awards: none to date.

Passion: Climbing

“

One of the big difficulties in the university world is the uncertainty for what comes next. It's like being in a big funnel where only 5 to 10% of the best people are going to get through to the next stage.

go and live in another country? On his return from Iran, he exchanged several e-mails with the team at the Institute of psychology at the University of Lausanne, with which he had a small project to finalise.

When he let them know that he was going to have to leave the academic world, the Swiss let him know that there was a post

of Lead Assistant coming up with them for five years. Stijn Van Petegem arrived at the University of Lausanne (UNIL) in 2015. He worked for the Institute of psychology and the Centre for research into the family and development.

"Everything went very well and it felt very natural to join the team there. Also, in Switzerland, the quality of life is very good and because I love nature and the mountains, I was like a kid in a sweet shop! Being under contract for five years gave me the time to breathe and think about the direction I wanted to take in my research. Having this free space enabled me to bring my ideas to maturity and be much more as part of an in-depth work," he explains.

Happy return home

A precious time that, today, constitutes a foretaste. As with everyone appointed to a permanent researcher post, the first feeling is one of relief. "One of the big difficulties in the university world is the uncertainty for what comes next. It's like being in a big funnel where only 5 to 10% of the best people are going to get through to the next stage. As an FNRS Research Associate, I no longer have that weight on me and the door is finally open to the development of projects. The possibility of doing something in depth, away from the speed of publication and working on what I'm passionate about is brilliant!" All that and also returning to his stamping ground, near his friends. Which is important for this night-owl with a busy social life. Of course, he'll no longer be able to drink his coffee – "at not too early an hour" – while gazing at the mountains. However, even back in the Flat Country, the horizon will still have plenty of peaks: the ones this researcher sees, who not only wants his work to make a contribution to scientific circles, but also to the community. And here's hoping it also has an impact outside the academic world, like the collaborative arrangement that he had with the Ghent police for improving relations between police and citizens.



Madeleine Cense

FNRS Research Associate, ULB

Bénédicte Machiels

The long-term effect of “good and bad viruses” on the immune response.

After her studies in veterinary medicine, Bénédicte Machiels became a researcher in immunology. Her work, which delves into the modulation of the immune response based on the history of viral infections while young, has particular resonance in these times of pandemic.

FNRS Research Associate, ULiège

Bénédicte Machiels is the ‘head in the clouds’ type. She’s the type to leave her keys on the bonnet of her car, miss appointments, lose her way and sometimes to leave the lab without putting her samples in the fridge... It’s something of a joke within her team, so often does this chronically absentminded researcher forget things. But there you are, Bénédicte Machiels is also an ‘ascending persevering’ idealist. Poor at everyday details, but excellent at visualising long-term objectives. “There are careers that particularly select the most obstinate researchers,” she relates. “Because the route taken by the researcher will also involve dealing with numerous setbacks. Yet when you become an FNRS Research Fellow, it’s generally because you have had a good career. Me, I was one of those people who think that with a little good faith, things can always go well. But on

a day-to-day basis, it’s not like that. There are disappointments in terms of handling things and results, as well as setbacks in obtaining very competitive projects and positions.” At the age of 36, Bénédicte Machiels can finally catch her breath, even if that’s not exactly one of the habits of this hyperactive lady, who is skilled at running races, festive in her soul and never against a little trek into the mountains.

From vet to immunologist

It all began by ‘taking a wrong turn’. “I studied veterinary medicine, but very quickly came to realise that I was much more interested in fundamental issues, such as biology, chemistry and virology than in the clinical side. Research was an obvious

choice. Nevertheless, it’s a curriculum that prepares you very well for it. So I have never seen it as a handicap, even if today the purpose of my work is not veterinary, but more human, on a very fundamental level.”

For her thesis, with Laurent Gillet (ULiège) as her supervisor, Bénédicte Machiels turned towards immunology and virology. She then studied the strategies of immunoevasion developed by gamma herpes viruses (the best known of which is the Epstein-Barr virus, responsible for infectious mononucleosis). She is particularly interested in the roles played by certain viral glycoproteins in escaping recognition by host-specific antibodies. Bénédicte Machiels then won an FNRS Research Fellowship, during which she focused on the imprint left by these gamma herpes viruses on the immune system. “Gamma herpes viruses are

responsible for persistent infections, which are asymptomatic most of the time. The aim was to identify the advantages and disadvantages that the host can derive from these infections.”

The researcher also spent a post-doctorate year at the prestigious Marseille Luminy Immunology Centre. There, she looked at the molecular mechanisms that regulate the recruitment of certain innate immune cells – monocytes – and she also gained new technical skills, in particular mastery of the mouse model, which became part of her daily life.

An ERC Starting Grant

Combining her skills in fundamental virology and immunology, Bénédicte Machiels then developed research examining the influence of certain respiratory diseases on the innate immune system and, more particularly, on monocytes. In this context, she was awarded an ERC Starting Grant in 2019 for a project called VIROME (Viral Regulation of Monocyte Education). “In immunology, adaptive immunity has long been studied. This is an immune response that develops vis-à-vis a particular pathogen/antigen and which is based on a specific memory. My own interest is to see how the history of infections at an early age could modulate the innate immune system and influence immune responses at adult age to very different pathogens or stress.”

For example, viral respiratory infections in infancy could have a long-term influence on the activation of monocytes and hence modulate the immune response in the intestines, which is where monocytes are recruited in large numbers. Heterologous protections are also already observed in the context of the tuberculosis vaccine (BCG), which provides protection against pathogens that are unrelated to this vaccine. “Certain innate immunity cells undergo epigenetic modifications depending on the history of infections. This may contribute to the great variability in immunity between individuals, which means that some people develop allergies, autoimmune diseases such as Crohn’s disease or complications with coronavirus.” This, in the medium-term, gives the prospect of educating/redirecting this innate immune system where vaccines aim to stimulate the adaptive immune system.

This idea, according to which the history of infections modulates the immune response, is not new. It underlies the ‘theory of hygiene’, which explains in particular why generations that grew up in more aseptic environments also develop more allergies. But until recently, this theory only concerned bacteria and not viruses, seen as necessarily harmful agents. However, like bacteria, some viruses could turn out to be beneficial. These are what Bénédicte Machiels is interested in. “We have a thousand times more viruses than bacteria in our bodies! Yet it has been shown, in mice, that a respiratory infection with a gamma herpes virus could totally protect against the development of allergic asthma.”

“The route taken by the researcher also involves dealing with numerous setbacks.”

Public health issue

The health crisis has only reinforced the belief of Bénédicte Machiels as to the interest of her research for public health. “With the recent pandemic, more and more scientists are focusing on viral immunopathologies and are investigating our history of infections in the context of ‘trained immunity’. This research topic, very much in vogue, is exciting and so broad that I believe there’s room for everyone.” In any event, for this researcher, it’s totally unthinkable for her to go ‘to the lab bench’ each morning without having the social purpose of her work in mind. “Immunology is a field of research that leaves a lot of room for new discoveries. I always hold my breath when I’m waiting for the results of an experiment.”

Once the laboratory has closed its doors behind her (and trying not to forget anything...), Bénédicte Machiels goes home to her two daughters, aged 9 and 8, not without a twinge of guilty conscience that torments the majority of mothers who are very committed to their career. “It’s still hard to reconcile everything. It’s not unusual for me to start working at 5 in the morning so that I can go and pick them up from school on time.” Then, to shrug off the stress, Bénédicte Machiels goes running. A long-distance run – and something of a passion.

 Julie Luong



BIO IN BRIEF

Place of birth: Liège.

University studies: Veterinary medicine (ULiège).

Thesis: “Study of the bovine herpesvirus 4 Bo10 gene” (ULiège).

Grants and fellowships: FNRS Research Fellow (ULiège), Post-doctorate (Marseille Luminy Immunology Centre), Post-doctorate researcher (ULiège), VIROME ERC Starting Grant.

Prizes and awards: Eugène Yourassowsky Award (2012), Dehay Foundation Prize (2015), Léon Frédéricq Foundation Astrazeneca Prize (2018), D. & M. Jaumain Prize (2018).

Passions: hiking, running.

Simon Dellicour

From a passion for DNA to molecular epidemiology

Fascinated by DNA since he was a child, Simon Dellicour specialises in molecular epidemiology, a discipline in which the genetic analysis of populations of pathogens (particularly viruses) is used to examine epidemiological questions. While COVID-19 has recently propelled his field of research to the fore, this qualified bioengineer tries to keep a cool head and look at the horizon.



FNRS Research Associate, ULB

"Ever since I was very young I have been fascinated by DNA, this molecule that contains all of the genetic information about a living organism. It's a bit of a cliché, but it probably all began with the explanations given by Mr DNA in Jurassic Park," recounts the researcher, born in 1986. Enthralled by science subjects, Simon Dellicour couldn't decide whether to study civil engineering or bioengineering. Still doubting, he took the entrance exams for the former, passed, but in the end went down the bioengineering path. "I wanted to do the most catch-all science studies possible, but focusing on the living. But I am not and I have never aspired to be a naturalist. What fascinates me is what creates the unity of the living, like the DNA cell or molecule."

Developments in methodology

In 2008, while an Erasmus student at Manchester University, Simon Dellicour attended a course in population genetics. It was a revelation. It gave him a glimpse of the myriad questions of demographics, evolution, ecology and conservation making it possible to explore the analysis and comparison of the DNA of living organisms. On his return to UCLouvain, he elected to produce his dissertation on this topic. His subject: 'analysis of the impact of the fragmentation of forest area on populations of red deer, one of the best-known representatives of deer'.

Simon Dellicour then moved to ULB, where he embarked on a thesis in the team of Patrick Mardulyn, funded by FRIA-FNRS. On this occasion, he used an

approach to population genetics to study the impact of the abundance of food resources and past climate changes on species of wild bees. "Alongside the work in the field and the lab and the analysis of data, my thesis also – and particularly – was an opportunity to develop and implement new methods of analysis."

I view the current health crisis as a real marathon.

Developments in methodology, especially through the development of computer programs, remain one of his major concerns. "I never produce a methodological development just for the sake of it, but in response to a basic question. However, I then always try to make these developments accessible and usable by as many researchers as possible in the scientific community."

Towards molecular epidemiology

During his post-doctorate years – the first at Oxford University and the second at KULeuven – Simon Dellicour redirected his main research project to a more applied theme: molecular epidemiology. "Molecular epidemiology consists of using the genetic information contained in the genomes of pathogens to answer epidemiological questions. Over the years, I have had the opportunity to work on various viruses, such as rabies, which is responsible for nearly 60,000 deaths each year, as well as the bird flu virus (H5N1) and the virus that causes AIDS and the Ebola virus."

In 2018, Simon Dellicour began a third post-doctorate stint in the team of Marius Gilbert, FNRS Director of Research, in the Spatial Epidemiology Laboratory at ULB. The aim of the collaboration was to contribute towards bridging the 'gap' between spatial and molecular epidemiology. "Working at the interface of these two disciplines makes it possible to tackle issues that are often beyond the reach of traditional approaches, such as the impact of environmental factors on the history and dynamics of the dispersion of viruses." Via the reconstruction of phylogenetic trees, molecular epidemiology makes it possible to retrace the evolutionary history of an epidemic as is done for the evolution of species. The difference here, though, is that the timescale is sometimes a few months and not several million years. "These phylogenetic trees can then be replaced in time and space, which enables the effectiveness of potential intervention strategies to be tested."

The marathon of COVID-19

It goes without saying that if you are working in this field, 2020 was the year of all challenges. "We quickly had to put our main projects on hold to focus our efforts on the epidemic. Very quickly, my principal task was to conduct a molecular epidemiological study on a countrywide scale. This fast study would not have been possible without the efficient collaboration between a number of research teams, particularly from ULB, KULeuven and ULiège. In addition to its application in Belgium, the analytical approach put in place was applied to Brazil, a study that has just been published in the Science review'."

It was also necessary to deal with the many requests from the media and there was a need to talk about the epidemiological situation and explain what was at stake. "There again, everything went very quickly. It was a fine challenge and I believe that communication is part of service to society, which is one of the missions of the researcher. I have not been given specific training in this area, but I try to remain as factual as possible and avoid saying things about questions that are beyond my area of expertise, or to remind people that there are still a lot of unknowns. I view the current health crisis as a genuine marathon, because we need to keep up with things while keeping a cool head." Simon Dellicour does not like the term 'expert' much, which has crept into our speech and our imaginations. "I think 'researcher' is much better. The fact that we don't know is a given, but we are looking to find out."

Added to this tumultuous everyday routine is the excellent news of his new post as FNRS Research Associate. "This is a huge opportunity that enables me to look ahead to the horizon, but also to take more risks, in some respects. Because while you are in fixed-term research projects, you sometimes remain limited in your ambitions, not only because these projects are limited in time, but also because you are pressed more by the imperative of producing immediate results." This increased stability and freedom comes at a good time in this unprecedented period.

 Julie Luong



BIO IN BRIEF

Place of birth: Uccle.

University studies: Bioengineering (UCLouvain).

Thesis: "Étude de l'histoire évolutive d'insectes phytophages. Approche phylogéographique et développements méthodologiques" (ULB).

Grants and fellowships: Post-doctorate from the Wiener-Anspach Foundation (University of Oxford), Post-doctorate FWO (KULeuven), Scientific staff member at the Rega Institute, (KULeuven), FNRS Research Fellow (ULB).

Prizes and awards: Quetelet Prize, David and Alice Van Buuren Foundation Prize.

Passions: Parallel research projects, trekking, graphic design, music.



His current research in the context of the pandemic.



The "world after", viewed by 5 FNRS researchers. Contribution from Simon Dellicour: from 2'20" to 17'14".

Francesca Rapino

Humility working on behalf of science

Francesca Rapino is passionate about research. Her aim: to discover how cancer adapts and advances... The goal she is seeking to achieve is not only to improve targeted therapies, but also early diagnosis. This is work she intends to complete to thank the good fortune that enabled her to meet the right people at the right time.

The story begins in Italy. After studying molecular biology, first in Pisa, then in Rome. Francesca Rapino began a doctorate in molecular pharmacology in Frankfurt. In 2014, she packed her bags for Liège, a city she hasn't left since.

At the GIGA Institute at ULiège, she met Pierre Close, an FNRS Research Associate. It was a meeting that marked the beginning of a lengthy collaboration that saw the researcher's interest in transfer ribonucleic acid (tRNA) and their role in the proliferation of cancerous cells. *"I'm studying the impact that tRNA has on the development of cancer. The aim is to develop therapies that will target some of these tRNA that are important both for the growth of cancer and for the good health of the surrounding healthy cells. The idea, like any research associated with cancer, is to find markers that will allow for targeted therapy that is less toxic for the patient, but effective in the fight against cancer."*

Classic subject, new perspective

The subject is not a new one. In fact many researchers are working on it. *"What is new is that we are focusing on elements that weren't considered to be important until five years ago."* And with good reason: while the discovery of tRNA dates back to the end of the 1950s, it is only in recent years that its role in the development of cancer has begun to be highlighted. *"We were some of the first researchers to pinpoint the importance of tRNA for therapy. This resulted in us publishing an article in Nature in 2018¹. We showed that these molecules*

could have an impact on the patient's life in the future."

In particular, this discovery highlighted a new opportunity for treatment: new-generation drugs could curb the resistance acquired by melanoma and ensure the efficacy of existing treatments. *"This is an important discovery, because patients become gradually resistant to targeted therapy."*

Francesca Rapino's current research aims to expand the scope of the cancers concerned. *"I'm trying to take a broader approach, mainly on cancerous stem cells, to understand how they produce their protein and what their repertoire of tRNA is so that we can target it and kill the cancerous stem cells."*

In the near future, the researcher wants to develop tools for studying these cancerous stem cells. *"Then the aim will be to identify biomarkers to help improve treatment and, particularly, the early diagnosis of cancer. In an ideal world, a simple blood test with a few biomarkers could make it possible to diagnose a cancer a lot earlier than current standards allow."*

A challenging field

At the age of 15, she already knew that she would head towards molecular biology. *"It's a challenging field. Molecular biology is a very simple way of studying very complex issues. It's an easy way to model ideas, which suits me perfectly because I like to summarise. It is very easy to test a hypothesis inside cells now that we have tools capable of modifying DNA or RNA in order to conduct lab tests. Molecular*



BIO IN BRIEF

Place of birth: Rome.

University studies: Cellular and molecular biology (University of Rome).

Thesis: "Induced transdifferentiation of human Leukemia/lymphoma cell lines and inhibition of leukemogenicity" (J.W. Goethe University Frankfurt).

Grants and fellowships: Project grant from the UCT-Trx programme (Frankfurt), Post-doctorate (ULiège).

Prizes and awards: Rita e Sebastiano Raeli Prize (2011), Braconnier – Lamarche Prize (2015), Bonjean – Oleffe Foundation Prize (2016), Frederic Van Den Brule Prize (2018), King Baudouin Foundation Prize (2019).

biology really does offer flexible tools, which suits me very well."

The fight against cancer very soon became an obvious one for her. *"The idea took root after I finished my master's. So while I was doing my doctorate, I was naturally drawn towards anti-cancer therapies. The world of tRNA appeared to me when I arrived in Liège. I was one of the first doctoral researchers in Professor Close's laboratory. I latched on to the subject, and here I am!"*

Liègeoise by adoption

In reality, Francesca Rapino chose to come to Belgium for personal reasons. *"My husband, who's Italian, also works here at the university. We like Belgium because there are universities everywhere. So it was easier to find a place for us to work and live. Then I met Pierre Close, which prompted me to stay. I like living here. I've bought a house. I have two children who were born in Liège. So Liège has adopted me, perhaps also because there are lots of Italians here!"*

So, behind the researcher there is a mother of two children (aged two and four). *"Having children who are so young is a full-time job."* But she's not complaining. *"I'm lucky to have a fantastic husband. He has really helped me to manage this situation. We share the hassles that young children can cause. That means illnesses, most of the time! He has really helped me*



FNRS Research Associate, ULiège

during the long hours at night that we have to spend in the lab. Then there's the fact that Belgium allows women to have everything. Child-minding facilities are open until 6 in the evening, there's financial assistance when the kids are ill and so on. And Pierre Close has given me plenty of flexibility in my work. Sometimes I go into the lab at 4 in the morning, then go home at 8 to have breakfast with my children before returning to the lab for the day. I also sleep very little, although I don't know if that counts," she adds with a laugh.

With the coronavirus crisis, Francesca and her children have had to give up their passion for travel for the time being. Francesca has been able to make herself useful by being part of the Covid taskforce at ULiège, while also continuing her research when she has been able to. *"I also do Biocomputing, which enables me to take my work home with me."*

A grateful researcher

The fellowship as FNRS Research Associate gives Francesca Rapino the opportunity to stay in her adopted city. *"I am grateful to Belgium and specifically to the GIGA Institute at ULiège, because I have really felt supported in my work. Not just financially, but also personally – especially during my two pregnancies. I have never felt*

devalued because I have a family. Coming from Italy, that is truly precious for me. So I really want to contribute to the success of projects in Liège. At the same time, it also gives me the opportunity to have funding and to put a research team together, which is practically impossible if you don't have a permanent appointment in a university."

It has to be said that this researcher has a genuine passion for her work. *"I am really happy to be able to do my work. It's so complicated doing research over the long term and I am simply grateful for that. I still need to explore my passion more, because there are other people who are just as capable as I am who have not had the good fortune to meet the right people at the right time. I feel lucky. I sometimes even have the impression of being something of an imposter, because Lady Luck has smiled on me – and not on others. So I want to give something back to the community."*

A lesson in humility.

 **Laurent Zanella**

“It's so complicated doing research over the long term and I am simply grateful for that. I still need to explore my passion more and give something back to the community.”

1. Rapino, F., Delaunay, S., Rambow, F. et al., Codon-specific translation reprogramming promotes resistance to targeted therapy. Nature 558, 605–609 (2018). DOI: 10.1038/s41586-018-0243-7.

Olivia Gosseries

Shedding light on comas

FNRS Research Associate, ULiège

Comas and altered states of consciousness have yet to reveal all of their secrets. Ever since she was 14, neuropsychologist Olivia Gosseries has conducted prolific research on the subject. From diagnosis to treatment, the new FNRS Research Associate intends adding her own stone to the overall edifice of science.

"I saw a white light at the end of a tunnel", "My body was detached from my mind", "It's an experience halfway between dream and reality", etc. These are the words of patients who have experienced a coma. But what about our consciousness when we're in a coma? Neuropsychologist, Olivia Gosseries, has been trying to answer that question for over ten years. "It all began during my Erasmus stay at the University of Quebec in Montreal. Every Wednesday I visited patients in a rehabilitation centre. All of them had spent time in a coma. I was intrigued by it." At this time, we know virtually nothing about this medical phenomenon. Thanks to artificial ventilators, some patients who would otherwise have died, were lucky enough to recover. But not all. Why? The many studies conducted by Olivia Gosseries in collaboration with other researchers, lift the veil on these mysteries.

Understanding the mechanisms of the brain

Before beginning her thesis, the neuropsychologist decided to familiarise herself with coma patients and to analyse their progression. So she flew off to the United States, where she spent four months at the Moss Rehabilitation Research Institute (MRR) in Philadelphia. On her return to Belgium, she was able to begin her thesis in the Coma Science Group at ULiège, with Steven Laureys, FNRS Director of Research, who founded the group. "It was decided - I wanted to understand the mechanisms for recovering from a coma in terms of the brain. And to find a treatment for bringing these patients out of this state." This is the beginning of a long story into the research that was guided by integrity and scientific thoroughness and by a strong interest in teamwork.

Measuring consciousness

For around 40% of patients who recover from a coma, there has been an error of diagnosis. "We think they are unconscious, whereas they are actually conscious," reveals Olivia Gosseries. Coming to realise this, she began her thesis with a question: what happens in the brain while a patient is recovering from a coma? To answer that question, the young researcher used a method that is still valuable today: transcranial magnetic stimulation, linked with electroencephalography. "You place a cap fitted with electrodes on to the patient's head to measure the brain's electrical activity (encephalogram). You then stimulate an area every 2-3 seconds for 5 to 10 minutes and watch the resulting electrical activity." The results are astonishing: in an unconscious person, i.e. in a state of non-responsive arousal (see opposite) or in a deep, dreamless sleep, the brain responds simply in a single location. In a conscious person, i.e. someone in a state of minimal consciousness, in the process of dreaming or in locked-in syndrome, the brain responds, but the response is complex. As a result of her thesis, Olivia Gosseries proved that stimulation of the brain was a diagnostic tool, enabling a doctor to know whether a person was conscious or not.

Quantifying this cerebral response

Taking this a step further, the neuropsychologist wondered about how to quantify this consciousness. Working with the team of Professor Marcello Massimi at the University of Milan, Olivia Gosseries developed a 'perturbational complexity index'. "This is a figure between 0 and 1, with a key point of 0.31. If the figure is below 0.31, the person is considered to be unconscious."

From discovery to discovery

Over the years she has been researching, Olivia Gosseries has made many other discoveries. "For me, research is a way of learning every day, which I love. That's when you realise there is still so much that we don't know! For example, a coma only lasts for a few hours or weeks maximum. So it is wrong to say that someone is in a coma for several years. Depending on the diagnosis, after this temporary state of coma, the patient moves on to another state," explains the researcher.



BIO IN BRIEF

Place of birth: Uccle.

University studies: Psychological science and education (ULB).

Thesis: "The assessment of residual cerebral processes in patients in a coma and related states. Studies by electroencephalography and by transcranial magnetic stimulation" (joint supervision ULB/ULiège).

Grants and fellowships: FNRS Research Fellow (ULB/ULiège), FNRS Research Fellow (ULiège), postdoctoral scholarship (University of Wisconsin-Madison), BAEF postdoctoral scholarship, WBI postdoctoral contract (ULiège).

Prizes and awards: Young Investigator Award from the International Brain Injury Association (2014), AstraZeneca award for Rare Disease (2019), BIAL Research Grant (2019-2021), Biology winner and audience favourite of "Dance Your PhD 2019".

Passions: Organising events, yoga, travel, hiking and camping, reading, cooking.

From the laboratory to the field

Our neuropsychologist, who says she is "meticulous, creative and a perfectionist", is not content with just simple theoretical statements. As one who regularly practises yoga and enjoys hiking, she wanted to apply all of this information directly. So, a few months ago, Olivia Gosseries contributed to the publication of guidelines intended for care professionals regarding the diagnosis of patients. For example, it is recommended to use a mirror for assessing the visual tracking of a patient (i.e. their ability for their eyes to follow a moving target). Another tip: a patient who doesn't open their eyes may be conscious, but with locked-in syndrome. Opening a patient's eyes manually may be necessary.

Finding the 'aspirin of comas'

Up until now, the majority of Olivia Gosseries' work has focused on diagnosis. For the years ahead, her maddest dream is to find a remedy which, like aspirin for headaches, would help patients to receive from a coma. Various research projects are underway. "On the one hand, there are pharmacological studies going on into zolpidem (a sleeping tablet that 'wakes up' 5% of patients), apomorphine, which is used to treat Parkinson's disease and is showing promising results for recovery after a coma) and psilocybin (a psychedelic drug that acts on the serotonin receptors and may help certain patients). On the other hand, there is

For me, research is a way of learning every day. That's when you realise there is still so much that we don't know!"

transcranial magnetic stimulation, this time tested as a treatment, as well as stimulation of the vagus nerve."

Towards the discovery of a treatment

Last April, Olivia Gosseries was appointed co-director of the Coma Science Group at ULiège, with Aurore Thibaut. That's where everything began, 14 years ago. This is a great accolade for this enthusiastic researcher, who intends to continue shedding more light on comas. For this woman who originated from Brussels and who travels all over the world, the title of FNRS Research Associate is a real accomplishment. "Given my journey within the FNRS, it's a logical next step, but in particular it is recognition of the work carried out over 14 years. It also provides a good dose of motivation to continue as hard as I can towards discovering a treatment and understanding the cerebral mechanisms of consciousness."

 **Lauranne Garitte**

The stages of consciousness

The research conducted by Olivia Gosseries has made it possible to demonstrate that a patient in a coma does not stay there indefinitely, but in fact goes through various stages of consciousness:

- 1. Coma:** this acute state only lasts from between a few hours and a few weeks (in the case of pharmacological coma). A patient gets to this state for reasons of trauma (car accident, blow to the head, etc.) or non-trauma (cardiac arrest, stroke, etc.). When these lesions are too severe, the patient lapses into a coma, a phase during which he or she is neither awake nor conscious.
- 2. Persistent vegetative state:** this has denoted a vegetative state since 2010. The person is awake, but does not respond. The patient opens their eyes, moves their head and limbs, but there is no sign of consciousness. For example, the person is unable to follow their eyes in a mirror.
- 3. Minimal state of consciousness:** the patient recovers signs of consciousness. For example clenching the hand 3 times out of 4 when asked to do so. The person is therefore 'there', but is unable to communicate functionally.
- 4. Locked-in syndrome:** the patient has a brainstem lesion and so is in a coma, then wakes up and is fully conscious, but paralysed from head to foot. The person's only way of communicating is to blink or move their eyes.

Giulia Liberati

Pain in the twists and turns of the brain

For the past ten years or so, Giulia Liberati has been juggling between applied and fundamental research, between brain-computer interface and understanding the cerebral mechanisms of pain. At the heart of her recent research into the neuropsychology of pain, there is a hypothesis: what if pain emerged from the cerebral oscillations of the individual (or human being)?

“

Today pain, which is essential for survival, is a very common experience of everyday living. However, we still don't know all of the exact mechanisms that pain passes through.

FNRS Research Associate, UCLouvain

The brain has still not given up all of its secrets. What happens when we dream? How do we treat mental illnesses? How does the nervous system come into place during development? Many researchers are working to find a scientific answer to all these questions. One of them is Giulia Liberati, for whom research was written in the stars. “Ever since I was a child, I have always been fascinated by research. I dreamt of working in a laboratory one day.”

Giulia began her journey in Rome, with studies into the memory and attention in humans. She then spent time on a wide variety of subjects related to neuroscience, switching between fundamental and applied research. “The cohorts of patients that interested me were those affected by Alzheimer's Disease, amyotrophic lateral sclerosis (ALS), epilepsy and victims of cerebral vascular accidents (strokes),” she says. Already at that time, her work went beyond frontiers and disciplines. “I have always worked

in international and interdisciplinary environments that include neuroscientists, psychologists, doctors, IT specialists and engineers.”

It's only one step from the brain to the computer

While she was still at Rome's Sapienza University, Giulia Liberati embarked on a doctorate thesis in collaboration with Eberhard Karls University in Tübingen (Germany). She worked on communication between the brain and the computer, better known as brain-computer interfaces (BCI). Classifying the mental state of Alzheimer patients, conducting experiments into brain-computer interaction for rehabilitating the motor functions of stroke patients, she steadily gained experience with neuroimaging techniques: electroencephalography (EEG), functional magnetic resonance imaging (fMRI) and transcranial magnetic stimulation (TMS). Also at this time, she contributed towards the development of a portable BCI machine promoting the communication and individual autonomy of patients affected by ALS. “This project enabled the creation of a tablet that could be accessed both by conventional entry methods (touchscreen, mouse, etc.) and

by BCI. Patients with amyotrophic lateral sclerosis can then communicate and control their environment using this machine,” she explains.

Fighting pain

After completing her doctorate, Giulia Liberati then made a rather radical transition from applied research to fundamental research. Her aim? To better understand the structure and function of the human brain, in particular the perception of pain. One particular study topic occurred to her: pain. “Today pain, which is essential for survival, is a very common experience of everyday living,” she emphasises. “However, we still don't know all of the exact mechanisms that pain passes through.” We know that nociceptive stimuli (which make us perceive the stimuli that cause pain) provoke coherent responses in several areas of the brain. But these areas are not specifically involved in the perception of pain. So why do these stimuli reach these areas? And how? “This lack of knowledge of neural mechanisms is worrying at a time when chronic pain is a major health problem affecting the quality of life of millions of people around the world,” she points out. As the result of fundamental research, Giulia Liberati hopes to better understand how pain emerges from cerebral activity in order to predict more accurately which individuals will develop chronic pain and then improve their quality of life thanks to appropriate treatment.

Neuroimaging working on behalf of pain

As part of her research into the neurophysiology of pain, Giulia Liberati uses intracerebral electroencephalography, which is a method of recording brain activity. The patients studied undergo a pre-surgical assessment for focal epilepsy, which is a type of epilepsy that starts in a specific area of the brain. During the study, electrodes are implanted deeply beneath the neurocranium. “Using this method, I'm looking to identify the biomarkers of transitory pain that humans can bear,” she explains.

Close-up on the waves of our brain

In her search, Giulia Liberati studies the modulations of cerebral neural oscillations. Our brains follow a cerebral rhythm in the form of electromagnetic oscillation resulting from the activity of our neurones. The researcher's hypothesis is that pain may come from the modulations of spontaneous cerebral oscillations. To validate this hypothesis, Giulia Liberati is using a brand-new method of tagging, called Frequency Tagging of Ongoing Oscillations or FT-OO, coupled with neuroimaging techniques. “These specific modulations could be tomorrow's biomarker of pain,” she enthuses. Before drawing any major conclusions, Giulia Liberati plans to better understand how individual and contextual factors modulate the oscillations linked to pain and develop new strategies that will predict chronic pain. She will also consider intervention strategies based on neurostimulation techniques. This work programme has now been made possible by her status as FNRS Research Associate. “Working as a Research Associate is an extraordinary opportunity that will enable me to develop my own team and continue my research in the direction that I think produces the most, without any time limit.” With, at the end of the road, fewer grey areas when it comes to pain.

 Lauranne Garitte



BIO IN BRIEF

Place of birth: Rome.

University studies: Clinical psychology and experimental psychology (Sapienza University).

Thesis: ‘Development of a brain-computer interface to help classify the mental state of patients with Alzheimer's Disease (Sapienza University/Eberhard Karls University).

Grants and post-doc fellowships: FNRS Scientific staffer (UCLouvain), FNRS Research Fellow (UCLouvain), Clinical Research Fund (FSR) (UCLouvain).

Prizes and awards: ‘Premio Giovani’ from the Italian Society of Psychophysiology for the best scientific contribution by a researcher aged under 35 (2017); Annual Award of the Belgian Pain Society (2016).

Passion: Playing tennis with my colleagues and reading.

“Ouch” zone

During her research, Giulia Liberati has made her own contributions in the field of the neuroscience of pain. The main one was to dispute the widely accepted idea that the neural responses recorded from the human insula (an area of the brain that plays a major role in the perception of pain) are specific to the perception of pain. “I have demonstrated that the posterior insula, commonly known as the ‘ouch zone’, is not specifically correlated to pain. In fact, using direct intracerebral recordings, I have discovered that the pain and non-pain stimuli create very similar responses in the entire

human insula.” Which calls into question all of the basic theories of pain. “So it would not be relevant to use insular responses to assess the effects of a pharmacological treatment or to assess the pain of patients who are unable to communicate.” In legal cases, also, this dispute raises the question of using these insular responses to determine unequivocally whether claimants actually feel the pain for which they are claiming compensation. Finally, for neurosurgeons, targeting the posterior insula to relieve pain would not make sense.

Pascal Gehring

How to convert nano-heat into maxi-electricity

By building a microscope unique in the world capable of detecting changes in temperature to the microKelvin, Pascale Gehring aims to map the thermoelectric properties of materials, down to the nano level. And by using the virtues of quantum physics, he may end up making use of ambient heat, such as the warmth emitted by a factory, or the sun, but also the human body, as a specific and ecological source of energy that would be inexhaustible.



Place of birth: Dinkelsbühl (Germany).

University studies: Materials science (University of Stuttgart).

Thesis: 'Magnetotransport properties of topological insulator thin films' (Ecole Polytechnique Fédérale, Lausanne).

Grants and fellowships: Post-doctorate (Max-Planck Institute), Post-doctorate (Oxford University), Marie Curie Research Fellow (Delft University), Post-doctorate (KULeuven).

Prizes and awards: Marie Curie Prize (2017).

When, at the end of our conversation, we promise to see Pascal Gehring again in twenty years' time to continue our dialogue, when he will have changed the world by developing a source of energy capable of replacing all polluting and non-renewable sources of energy whose extraction disrupts the biotope, he simply accepts this rather extravagant proposal without cracking a smile. Because, if he makes it, he will already have the promise of a Nobel Prize within his grasp.

This is because this thirty-something willingly approaches life with a big smile full of light that has not been extinguished by multiple relocations, from Stuttgart where he attended courses at the Max Planck Institute, right through to UCLouvain, where he will begin construction on his nano-microscope in October. In between, there has been Oxford, Delft and KULeuven, always in the most upscale departments of European quantum nanoscience. It has been a flawless journey.

Is there really enough to change the world in a few years' time? It's a definite possibility. The explanation behind it all is the idea of converting particle spin into energy. Either by using this encapsulated energy to produce quantum 'motors'. Or

by pumping the heat from a material to cool it, which is a very useful application in the field of super-calculators, where more advanced miniaturisation is hampered by the amount of energy they emit.

If you remember your physics lessons, spin, in quantum physics, is one of the internal properties of particles, like mass or electrical charge. As with other quantum observables, its measurement gives discrete values (which means that the set of values it can take is finite or infinitely countable, and this measurement is subject to the uncertainty principle. To complete the process of making it exotic to the general public, it is the only observable quantum property that does not have a conventional equivalent, unlike for example the position, momentum or energy of a particle.

Already in our computer hard disks

It is this property and its relationship with heat that Pascal Gehring will focus on, thanks to his new cryogenic microscope, which will be fitted with a local thermal probe and function in a powerful magnetic field. It will also be fitted with a high-precision thermometer. "The field of spin caloritronics studies the relationship between spin and heat transport. It is attracting growing attention, because it would enable the limits of conventional thermoelectric materials to be exceeded and may lead to new strategies for generating power from spin or the manipulation of local magnetisation. Although the first energy harvesting devices have shown

promising results, their efficiency is still low. Efforts to improve this performance are hampered by a lack of understanding of the parameters and the microscopic processes responsible for the conversion of spin-heat and heat-spin. My project involves getting down to the nano level by building the first cryogenic microscope with a local thermal probe operating in a powerful magnetic field. It will be made up of an atomic force microscope tip equipped with a high-precision thermometer that will make it possible to map temperature changes down to the microKelvin level, or 10-6 Kelvin – all with nanometric spatial resolution."

Today, in fact, device-scale thermoelectric measurements, such as measuring the voltage drop over a sample in response to an applied temperature gradient, is unable to reveal local variations of thermoelectric properties in the sample.

But what will this tool be used for, in the end? "It is a multipurpose tool for studying the spin-caloritronic properties of walls for estimating spin coherence lengths and for measuring thermal transport properties such as spin heat valve effects in atomic thickness heterostructures." Of course! But what does that mean in everyday language? We already use these properties on a daily basis: the magnetic hard disks of our computers, for example, are based on ferromagnetic materials where the information is read using giant magnetoresistance, an effect that depends on electronic spin.

Again in everyday life, this fundamental research opens up some astonishing prospects: organic semiconductors (i.e. carbon-based) allow flexible optoelectronic devices with a large area, such as organic light-emitting

diodes, transistors and solar cells. Because of their exceptionally long spin lifecycle, these materials could also have a significant impact in the transmission, processing and storage of information. There are countless applications: capturing the sun's energy (or from other natural, non-polluting sources) on an unprecedented scale, the microminiaturisation of computer tools, living machine integration and so on. "However, to make use of this potential, having a direct method of converting spin information into an electrical signal is essential," explains Pascal Gehring.

The material of choice: graphene


Yet increasing the efficiency of thermoelectric materials is needed to enable these devices that could recover residual heat and convert it into useful electrical energy. This is all the more true because 'bulk' thermoelectric generators at the moment do have the conversion capacity required thus far to be competitive with current thermal motors, such as combustion motors.

"Spin-charge conversion in inorganic semiconductors and metals relies mainly on spin-orbit interaction, a relativistic effect that couples the motion of electrons to their spins. Spin-orbit interaction converts a flow of spins into an electrical field. This field is perpendicular both to the spin polarisation and to the direction of flow of the spin current. I will use my microscope to demonstrate the effects of spin-caloritronics in 2D heterostructures containing ferromagnetic crystals and I will extend the field to insulators that can be

used as an effective spin-heat converter." Pascal Gehring has worked at length on graphene in particular. "We have shown that its thermoelectric properties can be modified by microstructuring it and making it so fine that it becomes a ribbon that enables it to be made into a genuine thermocouple."

This project could result in in-depth understanding of spin-heat conversion on a nanometric scale and open the way to future devices for recovering energy and local cooling, with the sources of spin current activated thermally or thermocouples for the transfer of spin, based on materials structure on an atomic scale. It also considerably broadens the range of materials and structures available to answer certain scientific questions that are currently poorly understood. The German researcher's work opens up opportunities for producing new devices for processing the information based on the spin and for harvesting caloritronic spin energy using the unique properties of organic-inorganic hybrid structures. The main aim of the research proposed is to take spintronics to a level that inorganic spintronics cannot achieve alone. "My project is based on new theoretical and experimental methodologies emerging at the interface between two scientific communities that are currently disjointed: organic semiconductors and inorganic spintronics. It aims to use the synergies between chemistry, physics and theory."

He says all this with a big smile. See you in twenty years, Professor Gehring...

 Frédéric Soumois

FNRS Research Associate, UCLouvain

Timothée Marquis

The tango of maths

Appointed Research Associate at the UCLouvain School of Mathematics, Timothée Marquis never contemplated any career other than in mathematics.

He believes it is a profoundly human science.

FNRS Research Associate, UCLouvain

young man from Brussels wasn't in the classroom. One sentence sums it up: being the class brain at maths is not always easy or an advantage for that matter. Far from it. The young Timothée gave the best of himself when he was among his friends in the Mathematical Olympiad. "I took part from the beginning of secondary school," he recalls. "When you were selected for the finals, you had access to preparation courses. That's where I found other youngsters who were less prejudicial about maths and we were in a stimulating environment. I also took part in two international finals, in Athens and Tokyo, which were very enriching experiences." Now we understand better why this young mathematician likes to quote Francis Su, who was the President of the MMA (Mathematical Association of America), who wrote in an article: "If you ask me 'why mathematics?', I would say maths helps people to fulfil themselves."

Science... human!

So it was maths or nothing. Even though Timothée Marquis acknowledges that there is "a problem" with this discipline. "It's a science, for want of a better word to define it. But it's totally separate from other sciences, particularly with regard to communication. In other fields, you can explain what you're doing in a few sentences. That's not possible in maths." On the usefulness of maths, on the other hand, he is inexhaustible. "The way I see it, mathematics are profoundly human. They have an important place in education, particularly when it comes to developing rational arguing skills, being able to adopt a position in a debate on an objective basis, developing a critical thought process – in other words giving sense to information." These are qualities that Timothée Marquis helps to spread through his concept of his profession as a researcher. "I don't view it as being limited to pure research. Teaching, supervision and communication are also part of it." Which explains his presence in the Maths

Teaching Group (GEM) at UCLouvain, where maths teachers at all levels of study rub shoulders. Their aim is to propose school activities that prompt pupils to think, to give sense to things.

Digging deeper

During his course at ULB, Timothée Marquis met two people who were to become important for him. His favourite classes were options presented by a German professor who was working at ULB at the time, Bernhard Mühlherr. It was thanks to him that Timothée discovered the work of a Brussels researcher, Pierre-Emmanuel Caprace, whose thesis supervisor had been Bernhard Mühlherr. Then, when Pierre-Emmanuel Caprace was appointed to UCLouvain, it was only natural that Timothée Marquis should follow him there to do his doctorate.

But what is research into maths? You might be tempted to say that it's going beyond the proof provided by demonstrating a fact. Because it's not because the truth of a property has been demonstrated that you actually understand that it is true.

A mathematician wants a deeper understanding. Timothée Marquis likes to develop an image of the world with what is on the surface ('our' world, the world of science) and what is buried in the ground (the world of mathematics), a basement filled with roots that subdivide, join up again and intermesh. "The mathematician digs down to untangle these roots and especially to bring to light any links for understanding them in depth. You get away from the surface, develop new concepts and dig for offshoots. And, sometimes, one of them comes back to the surface and an unexpected application emerges!"

Group theory

An illustration of this way of working is provided by the work in which Timothée Marquis became involved from his doctorate onwards. To understand our world, we have never ceased to structure it, to count, to compare and to identify what is repeating itself. The notion of symmetry quickly emerges – which is what allows for certain links to be established between a wheel and a pizza! These objects, which barely have any apparent links, are in fact connected by one common property: the symmetry of rotation. Most of us will stop there, 'on the surface'. But mathematicians will seek to develop increasingly complex concepts, based on this observation. First of all, there is the notion of a group. Because symmetries can be combined, they will group objects with the same symmetries... some of which are specific, such as those with continuous symmetry (such as a sphere). Groups of symmetries such as this are called 'Lie groups', named after the Norwegian mathematician, who introduced them in the 1870s. This is a fine root that came back to the surface world when physicists realised that they had a tool that enabled them to define certain particles, such as quarks. In the meantime, mathematicians continued to dig. If previous groups were the finished dimension, what was stopping them from imagining an indefinite dimension? Hence the appearance of groups called Kac-Moody groups from the 1980s onwards. Timothée Marquis has made these groups the common thread of his research and has also written a reference work on the subject¹. These groups are the subject of growing interest in a variety

of fields of mathematics – and which have already made their way to the surface: theoretical physicists have used them in 'string theory', an attempt to unify all interactions and all forms of matter.

Can you dance the tango?

While he was doing his doctorate, Timothée Marquis stayed in Paris, at Pierre & Marie Curie University. "I was looking for a sports and socialising activity provided by the hall of residence, because I didn't know anyone. There was diving, boxing... and the Argentinean tango. I said to myself, go for the tango!" He fell in love with it so much that by the end of his stay, he was spending 20 hours a week on the dance floor. Back in Brussels, he continued to tango, which is where he met his partner. Hence his second passion: his three-year-old son. During lockdown there must have been lots going on in the Marquis apartment!

 Henri Dupuis



BIO IN BRIEF

Place of birth: Brussels.

University studies: Mathematical science (ULB).

Thesis: "Topological Kac-Moody groups and their subgroups" (UCLouvain).

Grant and fellowships: Humboldt Research Fellow then Marie Curie (IEF) Fellow (Friedrich-Alexander University Erlangen-Nürnberg); FNRS Post-Doctoral Researcher (UCLouvain).

Passion: The Argentinean tango (and his three-year-old son!).

1. MARQUIS Timothée, An introduction to Kac-Moody groups over fields, European Mathematical Society Publishing House, Berlin, 2018 (EMS Textbooks in Mathematics).

“It's a science, for want of a better word to define it. But it's totally separate from other sciences, particularly with regard to communication. In other fields, you can explain what you're doing in a few sentences. That's not possible in maths.”

Thomas Peters

To win the 'Holy Grail' of citizen cryptography

Can a war be won thanks to cryptography? This question doesn't surprise Thomas Peters, Doctor of Science at UCLouvain: "in a world-famous crypto lab". And it's one on a par in Europe with the École normale supérieure in Paris and, of course, the British of Bletchley Park.

Recent history reminds us that cryptography can be a determining factor in the outcome of armed conflicts. During the Second World War, for example, the information obtained thanks to the decoding of the messages from Enigma, a portable electromechanical machine used by the Germans to encrypt information, gave the Allies a definite advantage in fighting the war. It is estimated that the war in Europe was shortened by at least two years as a result of the code-breaking work carried out by the teams at Bletchley Park, where the British secret services had installed their code-breaking capabilities. During the cold war, encryption also took on vital importance. "I don't think that cryptography alone could win a war, but

obviously it can be used as a weapon. Not protecting yourself against cyber-attacks is to put yourself at the mercy of a potential attacker. Unfortunately, recent news has plenty of examples of malicious groups of individuals exploiting security weak points," says Thomas Peters.

Guaranteeing people's security in complex systems

"I am a researcher into cryptography. I work mainly on 'public key' cryptographic primitives that enable any group of individuals who may possibly have never communicated amongst themselves, to join and take part in a secure protocol.



BIO IN BRIEF

Place of birth: Anderlecht.

University studies: Doctorate in Engineering Sciences, Master's in Mathematics.

Thesis: "Privacy Enhancing Cryptographic Mechanisms with Public Verifiability" (UCLouvain).

Grants and fellowships: FNRS Research Fellow (UCLouvain), Post-doctoral fellow (CNRS, École normale supérieure), FNRS Scientific Staffer (UCLouvain).

Prizes and awards: IBM Innovation Award (2015).

Passions: Rugby, family... and research!

If he were a zoologist, Thomas Peters would be feeding animals with strange names each morning. "Homomorphic signatures, calculations on authenticated data, controlled malleability, verifiable threshold encryption." These funny-sounding animals get to work every time you pay for your shopping with a bank card, vote electronically at elections, order a plane ticket and make an online transfer. If they don't work, the plane won't take off, those euros won't be exchanged and even nuclear power stations would end up shutting down for safety's sake.

Cryptographic primitives, the "atoms of secrecy"

"In computing, cryptography enables individuals to have free access to the connected world today without compromising their digital integrity or the confidentiality of their sensitive data. Without cryptography, there is no mathematical assurance that our rights are being preserved in our digital exchanges. At the heart of a provable system lie 'cryptographic primitives'. Like atoms, they can be combined into more complex structures called protocols in the form of molecules," explains the specialist.

The citizen at the centre of the process

"My first aim is to show that it is possible to protect all users, even those who have the fewest calculation resources. To do that, I will develop them based on three criteria: transparency, using new verifiability mechanisms; resilience, to control the spread of failures linked to an abuse of privilege; and expressiveness, to enrich the functionalities of the cryptographic calculations distributed and make their use more flexible."

And to draw up his 'battle plan': "In the years to come, I will concentrate along three main lines: The first will be 'responsibility': the aim is to model solid verifiability and responsibility guarantees regarding the results of the algorithms executed or automated recommendations, so that appropriate primitives can be designed to achieve these properties. I will also pay special attention to the verifiable storage of sensitive data of people."

"The second line is what I call 'controlled calculation'. This involves extending the field of calculation to encrypted and authenticated data by granting finer malleability rights in which verifiability

plays a controlling role. The aim is to make the underlying authorisation mechanism more expressive to the system in such a way that the validity of the final modification will be sufficient to attest to its legitimacy." The whole thing is guaranteed by a verifiability seal.

Finally, Thomas Peters wants to practise 'dual security'. This involves extending security models to balance the privileges and protection against their potential abuse within a dynamic network of users who benefit from certain abilities of signature, encryption or calculation.

"Rethinking verifiable and distributed security at the level of primitives is naturally the best option for managing the overall performance of a system because they can be built to interact easily with each other. In cryptography, I am the right person to research these fundamental aspects of security." Do we detect a lack of modesty? He is simply legitimately proud of the hard work carried out that is to be found regularly in the pages of publications from the International Association for Cryptology Research (IACR), the *nec plus ultra* of the discipline. Would you believe it...?

 **Frédéric Soumois**

FNRS Research Associate, UCLouvain

“
My first aim is to show that it is possible to protect all users, even those who have the fewest calculation resources.”

Sylvain Quoilin

The engineer working on behalf of the planet

In his headquarters at the University of Liège, Sylvain Quoilin is working on the decarbonisation of the thermal sector. As a civil engineer specialising in electromechanics, he does not intend to use prototypes to respond to this challenge, but macroscopic planning models. It's a topic in tune with the times.

"Thermal integration modelling in intelligent energy systems": that's the title of Sylvain Quoilin's research project. He doesn't think the title in French is very sexy, preferring to talk about 'smart energy systems'. To summarise, these are energy systems that are low-carbon, sustainable and safe into which the production, infrastructure and consumption of renewable energy are integrated and coordinated through energy services, active users and various technologies.

Synthesis of past research into complex systems

This research topic is a combination of Sylvain Quoilin's research subject and his post-doctorate at the European Commission. "During my thesis, I was working on some very specific heat systems. We were developing heat pumps, small solar power generators and other thermal systems enabling problems to be solved in a decentralised manner. I was working on some very practical things." In 2014, there was a change of scene. At the European Commission's Joint Research Centre, he found himself having to step back and work on theoretical models on a European scale.

Sylvain Quoilin's idea is to combine these two approaches. "When we talk about decarbonisation, energy-savings, the use of renewable energy, most people think about solar energy or wind power, in other words renewable electricity. Yet, if we look at the energy consumption of Europeans, we can see that more than half of consumption is linked to heat, and not electricity. It's a forgotten area, or at least it doesn't get much media coverage and it's not in people's minds, whereas this is a sector that also needs to be decarbonised."

How? "Some technologies enable it, but we will have to go through urban heating networks in areas of high population density and heat pump systems in more rural areas." The aim is to quantify our consumption of energy and particularly to optimise that consumption by using models. The snag is that there is currently no model that takes account satisfactorily of all decentralised heating units on a macroscopic level. "It's a highly practical problem that is the major issue of my research work."

Social sciences and Europe as the cornerstones

Sylvain Quoilin's project stems from his career as a student. From his adolescence, he knew that he would devote himself to studying renewable energy. "As one thing led to another, I worked on the various technologies. Then I wanted to understand how these technologies fitted into a more overall system."

After five years of studying civil engineering at ULiège, where he specialised in electromechanics, Sylvain produced the thesis for his doctorate and combined it with a master's in population and development. This was the first cornerstone of the researcher's work. "I began this master's because I came to realise, through my career, that social aspects are fundamental for succeeding to integrate renewable energy into a community. This is all the more true in developing countries. This is something that I continue to highlight in my research. The idea is to also integrate these social and environmental aspects into energy planning models."



BIO IN BRIEF

Place of birth: Liège.

University studies: Civil engineering – Electromechanics (ULiège), Population and development (ULiège).

Thesis: "Sustainable energy conversion through the use of small-scale Organic Rankine Cycles for waste heat recovery and solar applications" (ULiège).

Grants and fellowships: FNRS Research Fellow (ULiège), Scientific Research at the European Commission's Joint Research, Lecturer (KULeuven).

Prizes and awards: McKinsey & Company Scientific Prize (2012), Professor Angelino Prize (2013), SAGE Best Paper Award for the Journal of Power and Energy (2013), Prix des Amis de l'ULiège (2013), 10th international Modelica Conference - Best Library Award (2014), Highly cited paper award (2015 & 2016), Web of Science Highly Cited Researcher (2018 & 2019).

Passion: Market gardening (since the Covid crisis), self-building

The second decisive stage in his career was his move to the European Commission. Then an FNRS Research Fellow, Sylvain Quoilin headed for Amsterdam and the European Commission's Joint Research Centre, where he stayed from 2014 to 2017. "During those three years, I touched on various subjects. There were more questions linked to energy policy and planning models on a European scale." What happens if the decision is made to include 50% renewable energy in the system? How will it respond? How much will it cost? These are the sorts of questions facing him.

ULiège as headquarters

After the European Commission, Sylvain Quoilin became a Lecturer at KULeuven, a post he held until obtaining his fellowship as an FNRS Research Associate at ULiège. This is the place that he considers as his real HQ, because he never really left the ship. "I was born in Liège and my family lives there. Also, this fellowship means I have total freedom to do the research I want. For almost 100% of the time, I can conduct my research in the way that I feel is best. I can explore my own research projects. I can create a team as I want it. It's this freedom that I find extremely appealing."

An opportunity to get back to the thing that motivated researchers most: research! "What has motivated me most in my career are the questions of research. Ask

me a question that no one has yet found the answer to – and then allow me to work on it to solve the riddle. Often, when delving into the question, you come to realise that perhaps the question was too simple in relation to the complexity of the answer."

Humanitarian fibre

The aim of returning to Liège was simple: to build a research team at ULiège to work on smart energy systems in a multidisciplinary manner. "I also want to develop aspects of energy planning in developing countries. This is what I have already done in Africa and Bolivia. It's important to me because the growth in demand for energy doesn't come from us, it comes from developing countries," he says. "Right now there is an opportunity that we need to grasp: the aim is for these countries not to follow the path we have gone down (coal, oil, gas), but to go directly to a system that is based more on clean energy. These are often countries with very significant sources of renewable energy. But if we are to get there, we need energy planning and models capable of representing these systems. It's an opportunity – and quite an urgent challenge."

This humanitarian fibre is also to be found in his involvement in the OpenMod Initiative. "It's all about promoting open research: free access to models, to codes and to data. Unfortunately, that is not obvious to everyone. But it is also an incredible opportunity for developing countries that may be able to access completely free models as a result that are of equivalent quality to commercial models. This is one of my hobbyhorses: promoting open research to ensure that it is accessible to the greatest number."

 **Laurent Zanella**

“

One of my hobbyhorses: to promote open research to ensure that it is accessible to the greater number.

FNRS Research Associate, ULiège



Evgeny Skvortsov

He fell in the magic physics potion when he was little

He was born "near Moscow. Well, 'near' in the Russian sense: in a small town 300 km from Moscow..." he says with a wink. His parents are both doctors. His mother is a cardiologist, his father a surgeon. And it was his father who introduced Evgeny very early on to the uplifting joys of physics. "He explained lots of basic things to me about how the world works. Why the sky is blue, for example. That's what triggered my thirst for a deep understanding of the world that surrounds us." When he was an adolescent, the family moved to a village and the young Evgeny landed up in a pleasant little school, where everyone knew everyone else, but where no one shared his Force 10 interest for physics and maths. Until one day, a friend of his father, a graduate of the Moscow Institute of Physics and Technology – the MIT of Russia – gave him nine volumes of the essential 'Feynman Lectures on Physics'. For Evgeny Skvortsov, it was a dual revelation: studying physics is marvellous and there is a 'temple' where you can do it: the MIPT. So he enrolled.

A series of direction changes

Attracted first in particular by maths, programming and the modelling of physical processes, Evgeny discovered theoretical physics in his third year. It was his second bolt from the blue. He elected to study astrophysics, before gradually discovering that it wasn't quite rigorous enough for his taste. So he made a third, crucial, change of direction, immersing himself in the exploration of high energy physics, string theory and quantum field theory. He based his thesis on the study of the main types of particles found in the universe. After that, adventurous and ambitious, Evgeny Skvortsov chose to take a steep pathway. "In Russia, there is no concept of a 'post-doc fellowship'. Either you have a job or you don't," he explains. "I had a permanent contract at the Lebedev Institute of Physics, but after my thesis I decided to see what post-doc life was like. So I applied for and enrolled at the Albert Einstein Institute at Potsdam in Germany, in 2012. I spent virtually all

FNRS Research Associate, UMONS

Initiated by his father, then spending time at leading Russian and German institutes, Evgeny Skvortsov is joining UMONS. There, with his fellowship of FNRS Research Associate, he will attempt to crack some of the quantum gravity codes. At the same time working with his colleagues to make the department he is joining indispensable.

of my post-doc life in that very special place, except for two years at Louis and Maximilien University (LMU), in Munich. I spend some fantastic years there as a young researcher and I hope now that the best of my life as an adult researcher is just about to begin."

The physics of common points

His launch-pad will be UMONS, with Nicolas Boulanger, Lecturer in the department of Physics of the Universe, Fields and Gravitation. Once there, he will of course begin by focusing on the project that he has submitted to the

FNRS, i.e. "High spins in quantum gravity, Chern-Simons theories with Matter and Deformation by Quantification". The experts can skip the next paragraph. For anyone else, here are some easy-to-understand explanations from Dr Skvortsov himself: "Physicists try to understand how the world works and we are able to propose models that describe certain aspects of reality. So, one model may describe the trajectory of satellites, the stars, black holes and galaxies. Another may describe what happens when we boil water or when we play with a magnet. And if we put all of these models together, we can understand just about anything," he says with a smile. "What happens rarely is that a single model or mathematical structure turns out to be capable of describing

things that are completely different. An example is what I will be looking at with my project: it happens that some mathematical structures, which we call high spin symmetries, have a direct relationship with several phenomena that are completely different. These may reveal important things about both water and magnets, as well as, surprisingly, about a very old problem of quantum gravity."

On a cloud

Needless to say, this 38-year-old researcher is on a cloud, happy to be able devote himself serenely and intensively to what has always made him tick: "breaking the code", lifting the veil on the mysteries of physics. But also "making the most of the interactions with students and PhD students, via supervision and teaching," he adds. He is also assured of no longer having the dark cloud of uncertainty hovering over the horizon – which also hung heavily on his wife and two boys (12 and 9 years old). "This appointment as a full-time researcher at the FNRS is the most crucial stage of my career so far. Getting my doctorate was a thousand times simpler," admits the man who actually tends to be optimistic ("a sunny day can't be all bad," he believes). But there you go, no matter hard you study the most impenetrable cogs of reality, it always succeeds in thwarting our plans. However, where the erstwhile student was once delighted that when school was over he'd never have to get up again before 7 in the morning, he now finds himself having to wake up at 6.30 am so that he can wake his own children at 7...

Mons, beer and ambition

Family life and life as a researcher do not leave much time for Evgeny Skvortsov to play the guitar and indulge in the outdoor sports that he loves. To keep himself fit, he resorts to jogging at least once a



Place of birth: Russia.

University studies: Physics, Moscow Institute of Physics and Technology (MIPT).

Thesis: "Study of the main types of particles encountered in the universe" (MIPT).

Grants and fellowships: contract at the Lebedev Institute of Physics (Moscow), Humboldt scholarship (Albert Einstein Institute), Post-doctorate (Louis and Maximilien University).

Prizes and awards: None to date.

Passion: Science, science and science.

week and, since lockdown, he has started cycling to work. But his heart really goes to free-diving, which he did plenty of with his father. Today, this is a pleasure reserved for the summer holidays – when he's not on the beach, reading... scientific articles and books, of course!

His adjustment to Mons should be made easier by his taste of Belgian Trappist beers (note for his future colleagues: he particularly enjoys Chimay, Rochefort, Orval and Westmalle) and his love for discussing things with friends. He views Mons as relatively similar to Potsdam, where he has been based for years – i.e. a pleasant place to live, green and quiet, without the hassle of the big cities. He tells himself that if his children grow up to become fine people who make a success of life and that if, with his colleagues, they turn their department at UMONS into one of the leaders in their field on the international stage, then he will have done a good job.

 Madeleine Cense

“

At the Albert Einstein Institute, I spent some fantastic years as a fledgling researcher – and I now hope that the best of my life as an adult researcher is about to begin.

Open science: a review

with Didier Viviers

This issue of FNRS.news presents a portrait of the new Research Associates recruited to the FNRS for the new academic year 2020-2021. You can't help but be impressed, seduced even and often amazed by the scientific journey and the quality of the record of these young researchers. It is also reassuring to see the extreme variety of the fields of research. Reassuring, because diversity is necessary to nurture scientific circles worthy of the name in the Wallonia-Brussels Federation. But this new generation of researchers made every effort to achieve the Holy Grail of an indefinite appointment, albeit at the risk of having to overcome numerous challenges. Allow me to highlight some of them.

In collaboration with



ACADÉMIE ROYALE
DES SCIENCES, DES LETTRES ET DES BEAUX-ARTS
DE BELGIQUE

First of all, let's talk about the increasingly acute issue of funding research projects. Whether we like it or not, this competitive context involves a race to publish. This is not always an efficient way of doing things, because it is not necessarily synonymous with quality, nor conducive to the smoothing sharing of data along the proposed pathways of research. This context sometimes leads to a restriction of ambition in favour of a greater return on the time spent researching and the number of publications. Because complex and original questioning, as well as specific and reliable verification procedures of the hypotheses requires a lengthy period of time for the process of the

researcher, whereas short-term deadlines increasingly punctuate careers and the task of obtaining grants that are so vital for the exercise of science.

Moreover, while the main missions of the researcher remains to increase knowledge, it seems obvious that it is also the researcher's job to respond to other issues, which current events make more urgent every day. Without trying to make an inventory of them all, it is sufficient to mention open access to data, the dialogue between disciplines and the struggle against pseudo-sciences peddled with increasing intensity on social media and which sometimes lead to undisguised mistrust of scientists. Encouraging researchers to respond themselves to these issues (since they are best placed to provide answers) is no less important than persuading them to publish their results.

However, there is still the question of how the institutions – and in particular the Academies – can play their part in the commitment to limiting excessive and

harmful competition, as well as defending the independence of the researcher in relation to the various lobbies, the need to maintain a wide diversity of topics and the essential 'freedom to research', to use the FNRS's luminous slogan, which guarantees the researcher's right to carry out what is sometimes called 'blue sky' research.

In this regard, lessons can be learned from any period of crisis. Indeed, the health crisis we are currently going through has had a dual effect on science. It has both highlighted the fundamental role of researchers in managing the crisis, as well as opening the way to a form of populist defiance in relation to scientific circles. This has led to a number of reflections that the Academies, nationally and internationally, have been quick to develop. It is true that the role of the Academies, not only in reflecting on how methods of assessing research have evolved, but also in the development of new practices, is a historical one. 'Peer review', which guarantees the validity of research, emanates from the Academies. Because, as we increasingly feel obliged to repeat, science, which is destined to be constantly revised and deepened, is not 'just another belief', but a critical approach that is worthwhile because of the soundness of the reasoning used and the data that supports it, as well as a collective organisation of scientific controversies.

Today, however, we need to go further and several working groups, particularly the Royal Academy of Belgium, are already at work, as are many international networks of Academies (EASAC, Euro-CASE, ALLEA, UAI, etc.) in supporting and developing the concept of 'open science'.

While studies show that competition between universities or research centres (accentuated, among other things and depending on the country, by the lack of financial resources and the terms of public and private funding, not to mention the 'rankings') tends to limit true openness, maybe even open science itself, we need to develop

“

The answer to the major societal challenges can only emerge if there is extensive collaboration between researchers, based on science that is totally 'open'.

places where there is no competition and where collaborative platforms can flourish. The answers to the big societal challenges, whether it be climate change, health, poverty, a reduction in critical thinking (with the effects that that has on democracy and individual freedom), energy transition and many other topics of great concern, can only emerge if there is a high level of collaboration between researchers and between disciplines, based on science that is totally 'open' and that is not merely working on behalf of an institution forced to demonstrate its dynamism and the exceptional character of its output.

One's thoughts turn, just to give one example, to creating 'pre-publication' platforms, some of which are beginning to crop up here and there. These would be places of discussion and exchange, even before the results of the research are submitted for publication, yet at the same time ensuring that the author holds the intellectual property rights to the information submitted. While institutional repositories offer various scientific institutions both a showcase for their scientific output and the guarantee of open access, pre-publication platforms are places for open and collaborative science. They may significantly speed up the dissemination of results (both positive and negative) and through exchange enhance the quality of the final result to be submitted for publication. The Academies should be able to host platforms such as these and hence contribute to boosting research in a perspective of total openness, while also guaranteeing the scientific quality of the tool. It is also a way of responding to the latent obscurantism that seeks to deny the essential contribution of science to our modern societies in



favour of a deleterious relativism. Because this contribution is not solely about the results of the research and a technological development that was more or less expected. Above all, it is based on a method of developing knowledge, which must advocate the rigour of reasoning, but also encourage precision and the sharing of data. Beyond the necessary education in science (which we must continue to insist on), making the process of constructing knowledge transparent and increasingly visible can only contribute to affirming its legitimacy, well beyond mere publications. Tackling the questions, doubts and challenges of any research can only strengthen the value of the final publications, the number of which by the way, could be reduced without too much damage. This may lead to a slight change in the assessment of cases.

Finally, the Covid-19 crisis has highlighted the vital link, albeit a delicate one, between science and politics. Here again, 'open science' needs to be put in place, based on the general principles implemented in the procedure of 'technology assessment'. At the current time, eleven European countries (Austria, France, Denmark, Norway, Germany, Finland, the Netherlands, Switzerland, Greece, the United Kingdom and Sweden), one Region (Catalonia), as well as the European Union itself, have put a 'Technology Assessment Institute' in place via their governments. In Switzerland, this centre of excellence is attached to the four Swiss academies. We need – in total transparency and independence, justifying attachment to a scientific institution – to draw up an inventory of the scientific knowledge in this or that field (well beyond technology alone), as well as to identify various avenues for reflection and draw attention to the various dangers and opportunities that we need to seize. In any event, the final decision is controlled by politics, but they benefit from a consultation mechanism for scientists, which at least provides information that is documented, carefully thought through and critical about which topics to deal with. Here again, the Academies are able to offer very efficient places of legitimacy and dialogue, working on behalf of independent

science, but available to the public services that fund them to a large extent. Without going into detail of how these collaboration platforms operate between politicians and scientists, it should be noted that these systems participate in open science, without maintaining a dangerous confusion of genres.


It would be pretentious to think that there is no need for us to adapt our scientific practices in line with the general evolution of our societies and the place the science occupies in them. Indeed, this is an issue of some significance to which the Academies are anxious to make a contribution.

 **Didier Viviers**

“

The health crisis has highlighted the fundamental role of researchers in managing the crisis and, at the same time, has opened the way to a form of populist defiance in relation to scientific circles.



 **Didier Viviers**, Permanent Secretary to the Royal Academy of Sciences, Letters and Fine Arts of Belgium.

fnrs awards 2020

**These
researchers
who aim for and
achieve
excellence**

Administering Scientific Awards is one of the FNRS's activities that enables researchers of excellence to be showcased, while at the same time making additional financial resources available to research through the support of sponsorship.

Each year, the FNRS, on occasion in collaboration with the FWO, handles some twenty or so sponsored Awards or Scholarships for which a link needs to be managed with the sponsor. It also ensures that information is disseminated to the broader scientific community, that applications for funding are received, that the cases submitted are dealt with and that specialists are recruited to make up the judging panels. Whereas 2020 is not yet over, some twenty award recipients have already been identified. In these short videos, broadcast on the social networks of the FNRS, these grantees thank their sponsors and explain in detail what receiving such a reward for their work changes for them.



Video capsules by the winners fnrs.be/fnrs.awards



Gustave Boël-Sofina Scholarships

The GBS mobility scholarships have been awarded each year in Belgium since 2014 by the Platform for Education and Talent (run by the King Baudouin Foundation). The aim is to offer additional training opportunities to young talents. In 2020, these scholarships will cover the costs of the research stays of 7 PhD students, including 5 scientists from the WBF: Jehan Waeytens (ULB), Antoine Aerts (ULB), François Renaud (FRIA-FNRS/UCLouvain), Pierre Vassiliadis (FRIA-FNRS/UCLouvain) and Emily Claereboudt (FRIA-FNRS/UMONS). "I am honoured to have received this scholarship, especially as a female scientist," stated Emily Claereboudt. "This will be an extraordinary opportunity for me to expand my doctorate training and my scientific network, as well as to establish long-term and productive collaboration with a foreign research group."

Eugène Yourassowsky Award

Camille Goemans, post-doctoral student at the European Molecular Biology Laboratory (Germany), received the Eugène Yourassowsky Award for her thesis, produced courtesy of an FRIA-FNRS scholarship at UCLouvain's Duve Institute. Camille lists the benefits of receiving this award, worth €15,000, in the field of medical microbiology and infectious diseases: outside recognition, money to invest in her career (conferences, courses, laboratory) and visibility.

McKinsey & Company

McKinsey & Company Award

Since 2003, the McKinsey Award has been presented each year in the BWF by McKinsey & Company, via the FNRS. It rewards a doctorate thesis that stands out for its social and economic relevance and its practical applicability. The €5,000 award went to Pierre Jamin, Researcher at ULiège, for his work on the measurement of underground water flows. "An Award such as this is a great joy to receive! Both for the recognition and the support it provides," explains Pierre Jamin, who intends to use it to expand on the technology he developed as part of his doctorate. His ultimate aim? To launch a spin-off.



BiR&D Award

Luis Couto, currently Researcher at Oxford University, received the BiR&D Award for his research into lithium-ion batteries. As part of his doctorate thesis carried out at ULB courtesy of FRIA-FNRS funding, the engineer succeeded in pushing back the boundaries of lithium-ion batteries by developing better control algorithms using electrochemistry. "Everyone knows about batteries. They power our phones and portable computers. But these batteries can also be dangerous sometimes, so we want to have the best," he explains.

Applied Chemistry Prize

The Société de Chimie industrielle Branche Belge (SCIBB) was dissolved in 2014 and transferred its fund to the FNRS, which has continued to award a Prize of €4,000 every two years to reward a PhD thesis dealing with new concepts and/or applications in the field of the chemical industry. Luiza Bonin was the winner in 2020. After completing her doctorate at UMONS, Luiza developed three methods for dispensing the heavy metals in chemical nickel boron baths. There are many applications for this in the automotive and electronics industries.



IBM Innovation Award

The IBM Award, presented each year in the WBF since 1975, is worth €5,000 and rewards a doctorate thesis making an original contribution to Computing Sciences or to one of its applications. This year, the Award went to Sarah Itani for her thesis on the diagnosis of neuropathologies in children, produced at UMONS as an FNRS Aspirant. "Current diagnoses for these disorders are subjective," she explains, "because they are based on descriptive clinical criteria. My thesis aims to supplement this examination through an assessment of the cerebral data."



Wernaers Awards for Scientific Popularisation

The Awards for Scientific Popularisation from the ISDT Wernaers Fund are for €6,500 each. Their aim is to reward individuals who demonstrate creativity, innovation and relevance in passing on their knowledge to teachers, students and pupils, or to the general public. These awards are presented to five individuals or teams.

Julie Allard, Professor, Vincent Lefebvre, Scientific Fellow and Julien Pieret, Lecturer at ULB, were rewarded for their audio podcast, "Les Acteurs du Droit".

Axel Fischer, Lecturer at ULB, received an Award for his exhibition, "Enter the Modern Landscape".

Christine Frison, FNRS Research fellow and Émilie Gobbo, Research Fellow at UCLouvain, received an Award for the animated video "Graines de discorde: six principes pour une gouvernance commune, équitable et durable des semences".

Jan Govaerts, Professor at UCLouvain and Mark Huyse, Emeritus Professor at KULeuven, received an Award for "La Route du Big Bang", an initiative that makes it possible to depart - by bike - in the footsteps of Georges Lemaître, founder of the Big Bang.

Guillaume Lobet, Lecturer at UCLouvain, was rewarded for "BioGo", his web application for organising biological treasure hunts.

Grants to media contributing to the development of interest in scientific culture

The Wernaers Media Grants supported five projects in WBF: "Le Puits", a graphic documentary, strip cartoon style; "Fossiles en Ville", a mobile app; "La Tortue de Zénon", a literary collection; "La Symphonie des Vivants", a documentary film; and "L'agenda du médiéviste", a scientific blog.



Oswald Vander Veken Award

The Oswald Vander Veken Award rewards, over three years, an original contribution about tumours of the musculoskeletal system, their causes, prevention, diagnosis and/or treatment. It was Anabelle Decottignies, FNRS Research Master at UCLouvain, who won this award in 2020. "One of the main aims of our laboratory is to find new targeted treatments that could replace chemotherapy in the treatment of cancer," summarises the researcher, who devotes her research to tumours of the bone and muscle in the case of paediatric cancers.

Lambertine Lacroix Award

The highly prestigious Lambertine Lacroix Award, worth €30,000, rewards research into cancer and research into cardiovascular disorders on an alternating basis. Luc Bertrand, FNRS Research Director at UCLouvain, won the award in 2020, for his cutting-edge research into the metabolism and post-translational modifications of the proteins involved in the development of cardiovascular pathologies. "Our current work is designed to discover new therapeutic means for curing cardiovascular hypertrophy," he explains.