ANNUAL REPORT

ROYAL BELGIAN INSTITUTE OF NATURAL SCIENCES

museum

ROYAL BELGIAN INSTITUTE OF NATURAL SCIENCES
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175 YEARS
OF CHANGE

On our 175th anniversary, this special supplement to our Annual Report celebrates how our Institute has changed to reflect and adapt to broader shifts in the world around us. We explore how our collections, our research, our Museum, our organisation and our buildings have adjusted, through tumultuous world events, advances in technology and societal shifts in perspective. We begin with a timeline, charting the milestones that have shaped the Institute as we know it today.

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FOREWORD

On 31 March 2021, our Institute celebrated its 175th anniversary. On this day in 1846, the Natural History Collections department of the Museum of Brussels was officially transferred to the young Belgian state and renamed the Royal Natural History Museum of Belgium. This act laid the foundations of an organisation that has developed in parallel with the evolution of Belgian society and has, as such, been partly moulded by it. The development of Belgian industry in the 19th century, characterised by major infrastructural works and intensive mining, the two world wars, the colonial and post-colonial era – these are all milestones in Belgian history that have made a significant mark on the development of our collections, our scientific and public policy activities, and, of course, our Museum.

This year, we have taken time to reflect on this long history, as it reveals a significant part of our identity. But, above all, it provides us with a compelling story which, for this special occasion, we include in a separate section of this report.

A more focused look back at 2021 reveals a second year marked by coronavirus, in which we have regularly had to adapt our activities in response to the evolution of the virus. While the year began with a hopeful light at the end of the pandemic tunnel, this hope faded with every outbreak of another virus variant. Continuously switching between mandatory and recommended work from home, juggling the ever-changing social freedoms and adapting to new Covid measures has placed great demands on the flexibility and morale of our staff.

However, this difficult situation has not impacted on the Institute's results.

In contrast to 2020, our Museum has continued to welcome visitors throughout 2021. After the summer months, the buzz of excited children in our galleries confirmed the very welcome return of school groups. Also, during the Christmas period, while the cultural sector was in turmoil, we had the privilege of being able to remain open.

Our scientific vitality has been reflected in an increase in the number of research projects selected for funding. Additionally, our Science Policy staff have kept the protection of our biodiversity on the political agenda through a number of initiatives.

Looking back at our history, it is notable that marine research quickly became a central component of the Royal Belgian Institute of Natural Sciences research strategy. This is in line with the integration a few decades ago of the MUMM North Sea unit, which gave a great boost to national marine research via the operation of the Belgian research vessel, among other things. The arrival of the new research vessel Belgica in December 2021 forms the next chapter in this story. Protecting marine biodiversity and the role of the sea, both in our national energy provision or as a source of 'Blue Growth', are crucial themes for the decades to come.

Once again, the Institute will be closely involved in a significant social movement. And that's just the way we like it.

Patricia Supply,
General Director a. i.

175 YEARS OF CHANGE

175 years **at a glance**

1780

Death of Prince Charles Alexander of Lorraine, governor of the Austrian Netherlands. He leaves behind his collection of "natural curiosities", housed at the Palace of Nassau in Brussels.

1846

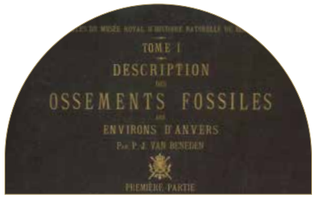
The Royal Museum of Natural History is founded, based on Charles of Lorraine's collection. Ornithologist Bernard du Bus de Gisignies becomes the first director.

1868

A new director for the Museum: geologist Edouard Dupont, known for his work on prehistory and excavations in the Namur region of Belgium.

1869

The Lier mammoth, still visible today at the Museum, is mounted at the Museum by Louis François De Pauw using an innovative mobile assembly system.



1877

The Museum's first publication is launched: the Annals of the Royal Museum of Natural History, communicating the institution's research to the scientific world.

1882

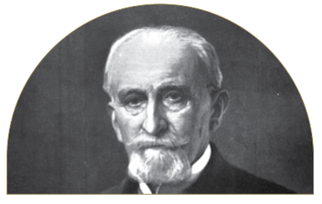
Louis François De Pauw completes the assembly of the first complete skeleton of one of the iguanodons discovered four years earlier by miners in the collieries of Bernissart, Hainault.

1889

Having outgrown the Palace of Nassau, the Museum's first collections are transferred to their new home, a former convent in Park Leopold, where the Institute is still found today.

1905

A new wing of the Museum opens to the public. Designed by art nouveau architect Emile Janlet, the wing hosts Belgian vertebrates including the famous Bernissart iguanodons.



1909

The Museum finds a new director in marine ecology pioneer Gustave Gilson. He promotes a more active role for the institution in exploring the Belgian national territory with a focus on the North Sea.

1914

During WWI the Museum's work continues despite the impact on the country. Fieldwork is of course severely limited.

1925

The Museum initiates Africa's first national park: Albert National Park, now Virunga National Park in DR Congo, helping to protect the mountain gorillas living in the forests of the Virunga Massif.

1928

King Albert calls on the Museum director Victor Van Straelen to accompany Prince Leopold and Princess Astrid on a trip to Indonesia: the institution's first major research expedition abroad.

1929

Belgian malacologist Philippe Dautzenberg bequeaths his enormous collection to the Museum. It contains over 4 million specimens, plus a library of nearly 8,000 documents, still used for research.

1932

The world's largest museum display cases are unveiled. Two huge glass cases protect the Museum's iguanodon collection that had been under threat of humidity and temperature changes.

1936

Architect Lucien de Vestel begins work on the Museum's new buildings, the facade of which would not be completed until 1958, decorated with hundreds of royal crowns for King Leopold III.

1939

Amid the outbreak of WWII, collections are moved to the building's basement. Sandbags, shovels and fire patrols are organised to protect the collections, which suffered little or no damage.

1943

Renowned painter Paul Delvaux completes his watercolour "Au Musée d'Histoire Naturelle", one of many of his artworks inspired by visits to the Museum.

1948

The Royal Belgian Museum of Natural History is no more! The institution's focus on ensuring a scientific approach finally sees it granted its current title of Royal Belgian Institute of Natural Sciences.

1948

The Institute is a founding member and serves as the headquarters of the International Union for Conservation of Nature, the leading global organisation for environmental protection.

1958

Brussels is in the global spotlight thanks to Expo 58, the 1958 Brussels World's Fair. The Museum builds dioramas for the occasion, depicting Belgian wildlife, like this one of a kestrel's nest.

1970

King Baudouin, Prince Albert and his son Prince Philippe open the exhibition "La Pierre de lune" on December 12 1970, revealing a lunar soil sample new to our collection.

1984

In Zeebrugge, the RV Belgica is launched. The Institute is responsible for much of the Belgian national oceanographic vessel's operations.

1988

Daniel Cahen takes on the role of director, bringing with him a new vision for the Institute that significantly raised its profile over the following years.

1990

The Institute's Aerial Surveillance team starts monitoring the North Sea from above. They focus on the marine areas Belgium is responsible for, in accordance with the Bonn Agreement.

1992

Iggy is born! Sculptor Yves Bosquet unveils the lifesize model of a Bernissart iguanodon, carved in cedar around a metal frame, that still today welcomes visitors outside the Museum.

2002

The century-old Geological Survey of Belgium is transferred to the Institute. The GSB continues its geological and mineralogical research, both applied and fundamental, under the RBINS umbrella.

2005

Camille Pisani is announced as the new director general: the first woman and first non-Belgian in the role. She held key positions at museums in Paris before leading our Institute for 14 years.

2007

Europe's biggest dinosaur gallery opens to the public! After its renovation, our beautiful Janlet wing boasts over 3,000 square metres devoted to dinosaur discoveries, their lives and how they evolved.

2010

For the United Nations International Year of Biodiversity the Institute marks the occasion with a wide range of activities. The year ends with the opening of our permanent exhibition BiodiverCITY.

2013

The Institute comes to the end of a significant restructuring process. The result includes three new directorates that coordinate much of the work of our Institute's scientists. A fourth is in charge of the Museum and public outreach.

2015

The federal government commissions a peer review of our work that commends our "strong history", "unique collection", "enthusiastic and dedicated staff" and "excellent collection infrastructure."

2016

The Museum goes virtual on Google's Art and Culture platform. A complete Street View is made available of our entire permanent exhibition on web and app.

2018

The State Secretary for Science Policy announces the construction of a new state-of-the-art oceanographic research vessel to replace our RV Belgica, launched in 2020 and arriving in Zeebrugge in 2021.

2020

After closing our doors in the pandemic, we finally open all galleries of our freshly renovated Museum complete with our new Gallery Living Planet.

175 years of change: our collections

This story starts with a focus at the heart of our mission: our collections. How did our eclectic selection of specimens grow into one of the most important in the world? And in the 175 years of our existence, what were the key societal and scientific shifts that have seen our collections take on new relevance?

On the 31st March 1846, when the statutes of the Royal Museum of Natural History were signed, the world was in a very different shape. Belgium was still a very new country, founded only sixteen years earlier. Across the country, the industrial revolution was only beginning to take hold. Our relatively small natural history collection looked very different too. It was largely based on the curiosity cabinet of Charles of Lorraine, of which few samples have been preserved to this day. Originally, natural history collections served primarily to fascinate the visitor with the beauty of natural diversity. Over the years, our society has gained an understanding of the potential held within those collections: the significance that their study can hold for our knowledge and understanding of the history of the natural world.

A very Belgian collection

In Belgium, industrial growth helped to shape our collections through the discoveries that were made when reshaping our landscapes. Many of the discoveries that joined our collections were found thanks to large scale public works. One early example was the Lier Mammoth, discovered in 1860 while workers were digging to divert the River Nete in the province of Antwerp. The complete skeleton was an incredible addition: only the museum in St. Petersburg had such a piece at that time. The relationship between the Belgian territory and the Institute's collection was further entrenched under the second director of the Museum, geologist Edouard Dupont. He felt strongly that the Royal Museum of Natural History must above all be "a regional museum of exploration".

A global outlook

Belgium's links with the rest of the world also had a huge impact on the collections our Museum acquired. Belgium's complex relationship with the Congo meant that between 1930 and 1960 our scientists collected many biological specimens from Congolese national parks. Our researchers gradually built up reference collections from expeditions across the world: the famous Belgica expeditions to the North and South Poles, the Mercator expedition in 1935 and the 1946 exploration of Lake Tanganyika to name but a few.

More recently, the significance of global cooperation among natural history collections has greatly enriched our work. Across the world, collections contain huge potential for knowledge, for example for the study and analysis of climate change. As part of the DiSSCo initiative, our collection joins this rich European research infrastructure as part of our continent's 1.5 billion specimens across more than 130 institutions.

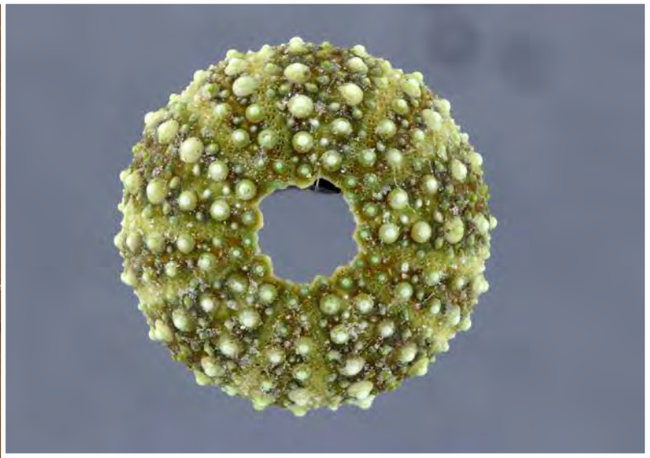
Advancing into a technological era

Changes in technology, too, have revolutionised our collections. Our first collection managers' main role was taxidermy: stuffing and maintaining the specimens and only occasionally mounting skeletons. Our Bernissart iguanodons were originally exposed to the open air. It was only in 1932 that we began to treat the specimens with shellac to prevent the pyrite in the bones from oxidising and protect them in huge glass cases. With contemporary techniques we can maintain our specimens in even better condition.

The way we access our collection has changed thanks to technological advances as well. Over the years, many specimens have been lost or damaged by a variety of calamities. These days, our collection can be preserved thanks to digitisation: the perfect way to make a back-up of our specimens and associated data that is open to all. Tens of thousands of specimens are now digitised and fully accessible online. And our ever-growing collections of databases now span, in some cases, decades of ecological monitoring of natural environments, such as the North Sea, and can either serve to discover trends in ecosystem decline or recovery or be used to detect further natural cyclicities.

New perspectives on ethical questions

While European collections have benefitted massively from links with the global south, our perspective on the ownership of these benefits has shifted. Developing countries have a wealth of genetic resources at risk of being exploited, and in 1992 the Convention of Biological Diversity was drawn up to help ensure that the benefits are shared in a fair and equitable way. Our Institute participated in negotiations of the Nagoya Protocol in Japan in 2010, setting out a legal framework for collecting and using specimens internationally.



Now every specimen entering our collection needs a permit: a time-consuming process, but one which improves access to research results and ensures no country loses out.

Still today, our understanding of ethical questions around our collections continues to grow. Our anthropological collections tell a complex and sometimes disturbing story about the history of humans as part of the natural world which raises a number of moral questions for us as the Belgian institution with the greatest number of specimens of human origin in our collection. The HOME project, launched by our Institute in 2020, aims to discover the historical, scientific and ethical background of the human remains and investigate a legal framework for an eventual repatriation.

Interview: Patrick Grootaert

Patrick Grootaert was Head of the Department of Entomology at the Royal Belgian Institute of Natural Sciences and responsible for the entomological collections until his retirement in 2017.

I arrived at the Institute in 1980. The date was April 1st, but it was no joke to me! It was a lot to get used to, because I was assigned to the entomology section, whereas I was a nematologist, with a background in scientific research on worms.

What struck me early on was that our technicians did not have backgrounds in collection management. My personal technician was a carpenter by training. As collection managers, they were excellent, but it took them years to learn how to prepare insects. Twenty years later, instead of hiring people for their salary level, we were hiring them for their skills. We could recruit collection managers in entomology with specific expertise on insects. Now the Institute is renowned for its excellence in collections management.

We used to pride ourselves on being the third biggest collection in Europe, one of the ten biggest worldwide. But it no longer makes sense to compare ourselves since now all collections cooperate internationally. As a federal institute, we have always shown that by working together, you can achieve fantastic things. And now it is so much easier to work together across national borders. I can email my colleagues in Hawaii and China to exchange photos of specimens - everything goes so quickly now in this digital age.

I grew up in a pre-computer time! It was great fun to experience the gradual digitisation of all our collections. DNA barcoding was another technology that completely changed our work to identify specimens. Before, we had to count on morphological studies. With early barcoding, we could process 96 specimens at a time. And now with next-generation barcoding, we can process two or three thousand specimens in each batch, allowing us to learn a lot about the relationships between specimens and populations which is so important for nature conservation.

One of the collection's great strengths is its international dimension. I will never forget my trips to the Biological Station in Papua New Guinea, on an island one kilometre long and three hundred metres wide. We lived under a canopy that was home to more than ten thousand flying foxes during the day. You can't imagine how fantastic it was out there. And we found a lot of new species, new genera, new families of insects - all very important taxonomic work.

What I have learned in my years at the Institute is that we cannot disconnect our collections from our research and our work with the public. Fundamental research, frontline research, public engagement and policy support: all are essential for each other and we must not lose our focus on any one of them.

175 years of change: our research

From boundless exploration to addressing fundamental societal challenges, the shift in focus of our Institute's research over the years could not be clearer. As a natural history museum, we have always bridged science and society - little wonder that our research has been shaped by changes in the world around us.

The late 1800s were a time of exploring nature and broadening knowledge. Research into the natural sciences had the atmosphere of a voyage into the great unknown: erudite experts making startling new discoveries. And for early director Edouard Dupont, this voyage had to start close to home. He was determined to open up lines of research beyond the study of collections, exploring and documenting the "natural riches of Belgium".

Today, fieldwork is incontestably a crucial aspect of research into the natural sciences. But back then, it was less popular and marked a departure for the Museum. As a geologist, Dupont would no doubt be particularly pleased to know that today, the Institute still hosts the Geological Survey of Belgium. The GSB, which also celebrates its 125th anniversary this year, provides services to a range of stakeholders on an independent and non-commercial basis and represents Belgium in European geoscientific research.

Voyages of discovery

Of course, Dupont's emphasis on exploration did not limit itself to the national territory. In the early 20th century, Belgium's focus turned abroad. In 1928, King Albert invited Museum director Victor Van Straelen to join Prince Leopold and Princess Astrid on a six-month trip to a territory that is now Indonesia: our Institute's first major international fieldwork, discovering 403 new species. Expeditions rapidly picked up pace in the following decades.

The objectives of these expeditions gradually shifted: from open exploration to starting to answer specific questions. And in the past, these questions were inevitably tied to Belgium's colonial history. An example from the early 1950s was the fieldwork in Lakes Kivu, Edward and Albert bordering what was then the Belgian Congo. The research aimed to provide answers for the economy: what was the fishing potential of these lakes? As African countries gained their independence, our research served increasingly to help build capacity for local conservation and sustainable development. These days our fieldwork is done in partnerships with local researchers, such as recent paleontological digs in Mongolia and China.

A similar shift in focus from exploration to conservation can be seen much closer to home: in our work both above and beneath the waves of the North Sea. Our early explorations of the North Sea under the direction of marine biologist Gustave Gilson paved the way for further oceanographic research. A century later, we started to manage the RV Belgica, our federal research vessel, launched in 1984. Today our Management Unit of the North Sea Mathematical Models is a key player in Belgium in Blue Growth and marine management, making us unique in a role that is usually reserved for designated marine research institutes.

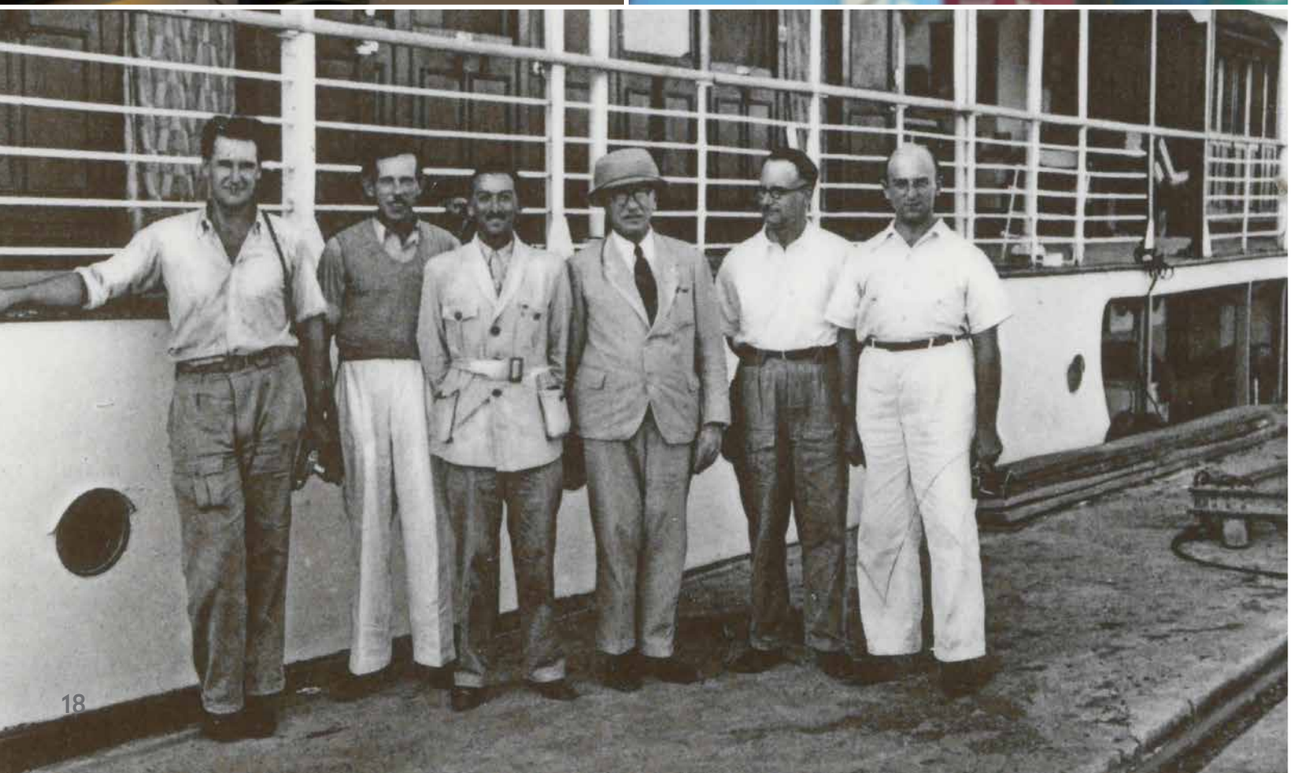
Opening up our research

Publications have always played a key role in communicating our research. But the shape of that role has also been moulded over time. Our original Annals, dating from 1877, were published to inform the scientific community about our research on Belgian collections. Over the years, our journals, bulletins and monographs gained in reputation and significance. In 2015 we set up our scientific publications Unit (SPU) which continues to embrace the recent European push for open access. Meanwhile we both cooperate with and compete with major international research institutions on articles published in prestigious journals like Nature and Science.

In recent years, many of the advances in our research have been technology-driven. With new imaging technology, digitisation of specimens is more useful than ever. Our micro scanners shed new light on our specimens and allow them to be studied in detail from a distance. In addition, the arrival of novel analytical techniques allows re-examination of previously investigated specimens, for example through genomic techniques in the labs of our Joint Experimental Molecular Unit.

Establishing our position

It is thanks to these changes that our Institute has positioned itself as one of Europe's leading research institutions across a wide range of natural sciences. This mission emerged in our early years as the Royal Museum of Natural Sciences and came to fruition in 1952 when we finally received the title of scientific



institute. Since then, as the notions of biodiversity and environmental conservation broke through into the social consciousness, we endeavour to ensure that our research actively supports policy.

Today, science-based biodiversity policy support has become a distinct pillar of our Institute's activities. In 2000, the Belgian Biodiversity Platform was created by Belspo with RBINS as one of three host institutes in Belgium. We host CEBioS (Capacities for Biodiversity and Sustainable Development), assisting developing countries to implement the Convention on Biological Diversity. The Platform also trains scientists from the Global South as part of the Global Taxonomy Initiative. Recently, the National Scientific Secretariat on Invasive Alien Species was also housed at RBINS. The BioPolS group (Belgian Biodiversity Policy Support Group) is easily the most extensive group of people dealing with science-based biodiversity policy support in any European Natural History Institute.

Interview: Jackie Van Goethem

Jackie Van Goethem is the former Executive Head of the Belgian National Focal Point to the Convention on Biological Diversity and former Head of the Department of Invertebrates at the Royal Belgian Institute of Natural Sciences.

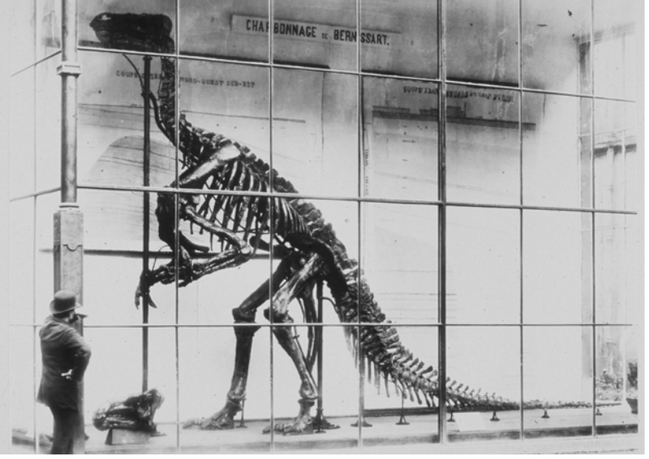
Twice in my career I have put my malacological research on hold. The first was in the mid-80s to work on our Museum's invertebrate galleries. The second was in 1993, to devote my work to the follow-up of the Convention on Biological Diversity (CBD), the first global agreement to cover all aspects of biological diversity, for which our Institute was chosen as the Belgian National Focal Point. I had the privilege to represent Belgium and attended the first Conference of the Parties (COP) for the CBD in Nassau, Bahamas in 1994.

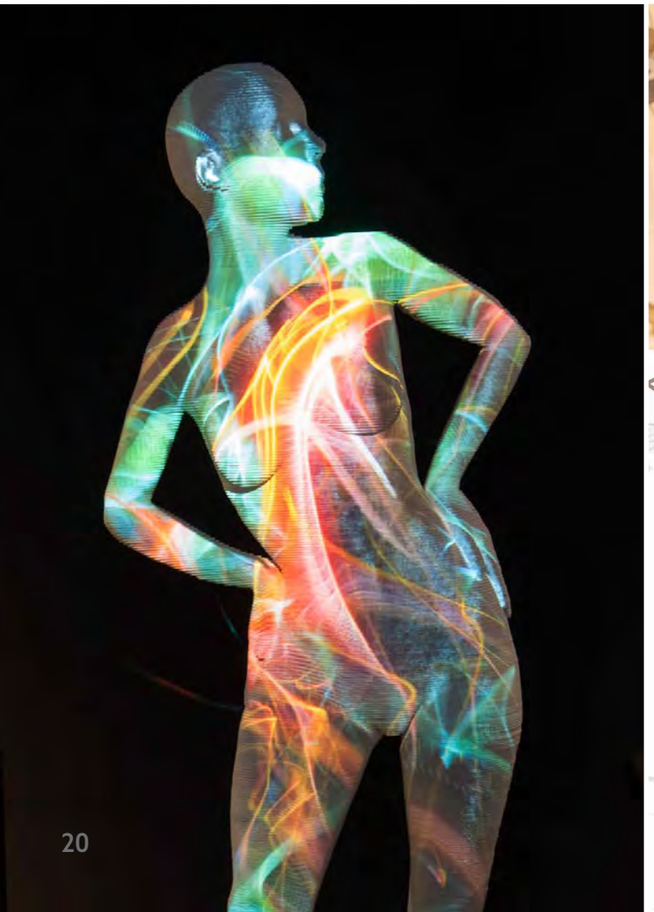
Early on came the launch of the Global Taxonomy Initiative, where it became clear that many countries did not have the capacity to identify their flora and fauna, while there was very much a need to do so. For our Institute, taxonomy has always been a core business. As part of the CBD, countries set up what is known as a Clearing House Mechanism (CHM): a centre for exchange of biodiversity-related information between countries. As the representative of our Institute, I had a good relationship with the German representative who had been one of the first to set up a digital CHM. Watching his presentation I was excited and I asked him, "may I copy your layout?" With the help of the RBINS IT service, we set up such a website.

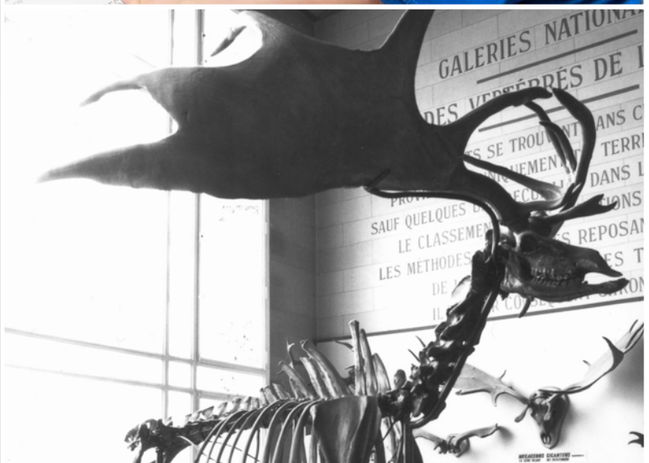
During a second COP, the representative of the DR Congo came up to me and asked "could you help me set up a similar website for my country?" At that time, the political relationship between Belgium and DR Congo was frozen. But for our Institute, there was no barrier to cooperation. Our Institute worked together with the Kinshasa representative on the first Congolese CHM.

The RBINS went on to support similar work for Benin and Niger - eventually, we worked with most French-speaking African countries. The federal agency responsible for development cooperation became very interested and began to finance this work specifically. With this funding, we were able to invite African colleagues to seminars in Brussels, Kinshasa, Ouagadougou and so on. Young African researchers came to work at the Institute - I remember working with young Congolese and Rwandan scientists on the taxonomy of African land slugs, for example.

This was a moment that fundamentally changed our thinking and the scope of our research: when funding organisations began to open up financing for this taxonomic capacity building work. After years of growing international emphasis on the importance of taxonomy and an increasing spotlight on the needs of taxonomists in developing countries, we were finally able to focus on this capacity building work that continues to support the objectives of the CBD to this day. I am very proud of the role the Institute played and the visibility of this shift in the Museum.







175 years of change: our Museum

A museum is nothing without the public. And just as the people coming through our doors today are very different to our first visitors 175 years ago, our Museum, too, has changed immeasurably. Here we take a look back at how our galleries, exhibitions and educational activities have grown.

Our Museum has always left an impression on our audiences. Visitors to the Royal Museum of Natural History in 1846 came to see exotic animals at a time when international travel was the privilege of the rich. They found themselves surrounded by specimens they could only dream of seeing in real life: a stuffed polar bear, a black panther from Java and exotic fish preserved in alcohol. A guidebook from the time informs us that the cabinet was "well supplied in rare and curious objects" that would have intrigued and fascinated visitors.

As the Museum's collection grew, it started to be perceived less as a curiosity cabinet and more as a place to engage with a range of natural sciences. In 1875 the Museum opened two new galleries in the Palace of Nassau to host the vertebrate collections. All sections of the Museum's collection could finally be visited, with all specimens labelled and located on geographical and geological maps. And the public came in great numbers to see them: around 100,000 per year. Not bad, considering the population of Brussels was only around 170,000 people at the time.

Our educational service is born

As the 20th century dawned, expectations around museums were changing. The arrival of Gustave Gilson as director in 1909 marked a turning point for the Museum. Gilson was a zoologist with a vision for how museology could engage the public in science. He planted the seeds for the Museum's education service, pointing out that the public has the right to an explanation of the meaning and value of the displayed specimens and that it was not enough to simply label them.

And so in the early 1930s, the Museum's educational service took shape. It modelled itself on those of the Royal Museums of Art and the Museums of Art and History, focusing initially on guided tours for groups of schoolchildren. Little by little, the service's role grew, ensuring bilingual explanatory notes, guide books and publications aimed at a broad audience. Soon it also offered conferences for primary school teachers, nature walks for adults, radio talks and educational packages for guided visits.

Fresh approaches, fresh opportunities

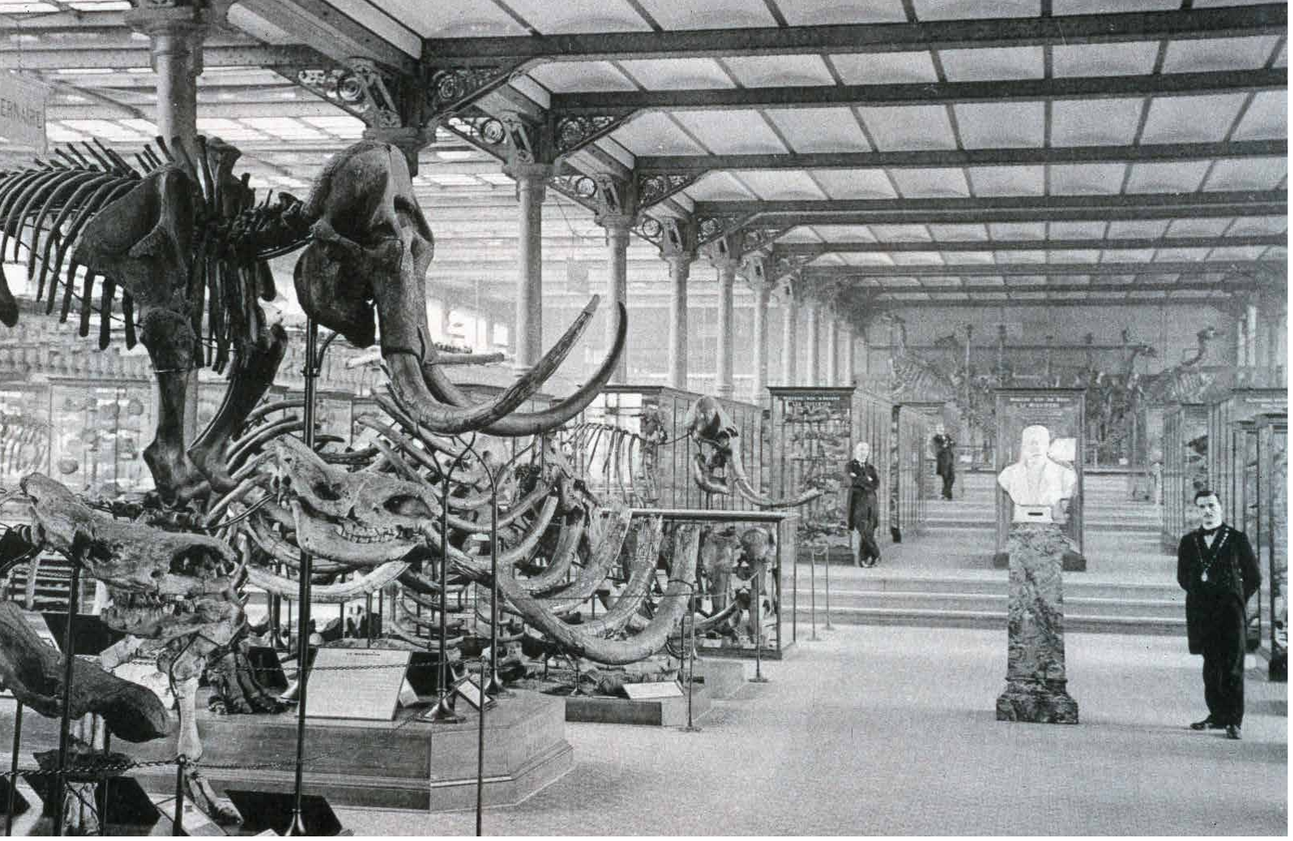
In Belgium in the 1980s, academics were coming up with new ways of engaging people in science. This came during a fresh wave of activity for our Museum's education service. The Museum launched workshops that invited children to discover scientific research and nature through playful methods: games, activities and colourful characters to appeal to young minds keen to learn about science.

In the same period, economic and political shifts were taking their toll on federal finances, and the Museum began to turn to the private sector for new funding opportunities. A partnership in the early 1980s with "Generale Bank" (now BNP Paribas Fortis) opened the door to corporate sponsorship of major exhibitions, bringing significantly greater budgets. This made it possible to bring our exhibits to life: in 1989 our Museum welcomed gigantic moving dinosaurs from US animatronics company Dinamation International. And with them our annual visitors reached 600,000 in total – four years before Jurassic Park even reached cinemas – marking a huge uptick in our numbers.

Working with our European neighbours

And it was not only corporate partnerships that were on the increase: cooperation with other European museums began to flourish too. In 1989, the Institute became a founding partner of Ecsite, the European Network of Science Centres and Museums. All European institutions were facing similar challenges: how could we deliver high quality, innovative, participatory exhibitions in the face of budget cuts, and make the most of our wealth of collections and expertise?

The solution was to work together. Our Museum teamed up with Naturalis in Leiden, Netherlands, and the National Museum of Natural History in Paris, France to develop an exhibition together. In 2004, Fatal Attraction opened its doors: our first co-production exploring courtship in the animal world. Its launch was attended by colleagues from a Canadian museum who then joined the list of institutions that hosted our exhibition as it travelled the globe.



Roaring into the modern age

The rise of multimedia and digital in the 90s and 2000s came at a time of acceleration for the Museum. Our exhibitions and galleries grew rapidly in number and scale but also in interactivity. Touchscreens and mobile technology brought about new ways of engaging with visitors. And at a time when the notion of inclusion came into the spotlight, the Museum continued to adapt its programme, focusing on accessibility for an increasingly diverse range of visitors.

When our Museum had to close due to COVID, we were able to quickly adapt our online offer, featuring a wealth of podcasts, videos and virtual visits and further building our strong social media presence. In 2020, when we finally reopened, the launch of our Living Planet gallery marked another crucial milestone in the Museum's history: the first time all halls were open to the public, almost entirely in four languages, complete with full online ticketing system. And while the profile of our visitors continues to change, we hope to maintain the sense of wonder that people have always felt when entering our galleries for the first time.

Interview: Michèle Antoine

Michèle Antoine is Director of Exhibitions at Universcience, Paris, France. She was Head of Exhibitions at the Royal Belgian Institute of Natural Sciences.

Daniel Cahen had a vision that transformed our Museum. As director, he was determined to implement a radically different approach to museology. I was recruited in the mid-nineties. Up until then, the Museum team had been composed of collection curators, architects, designers, illustrators and exhibition builders. Aside from the dinosaur exhibitions, our halls were primarily designed to display and demonstrate collections.

It was Cahen that brought in the role of exhibition curator: the museographer. As a result, our galleries became much more than just demonstrations of our collections. They began to take into account the sense of space, with a real mise en scène that carries a message. They also became significantly more interactive, bringing the visitors in as participants. In 1998 with Vivre ou Survivre? we created a dialogue with the public where the conversation took place independently of the specimens.

With this new vision came a new wave of activity. I had the feeling nobody ever said no to a project! At the same time, there was a dynamic that seemed to invite everyone on board, including our researchers. It took some adaptation at first for the collection curators, whose role had shifted with the arrival of the museographers. But our cooperation blossomed with the development of the Dinosaur Gallery that opened in 2007, where we worked hand in hand with Pascal Godefroit and his team. Working with our scientists on the 2009 Gallery of Evolution was the greatest intellectual experience of my life: a true scientific and museological dialogue. I learned so much.

The Dinosaur Gallery and Gallery of Evolution also marked a change in terms of the look of our permanent exhibitions. There is a clear visual focus: these halls have a photogenic, iconic quality to them. During the development we had to keep taking a step back and asking ourselves: what will this look like in the space? What message does that express? What image are we projecting?

With these new permanent exhibitions, we gained new visibility. The change was clear in the way tourist guidebooks talked about us. They used to say "Nice museum, a bit dusty, with good exhibitions from time to time." Now they say we are a must-see. Since I left in 2013, it has been beautiful to see the movement that started in the 90s continue to take flight.

175 years of change: our organisation

In 1846, our organisation barely had ten staff. In 2021, we are a team of 400 scientists, administrative and technical staff working together to bring nature into everyone's lives. In 175 years, our team has not only grown, but changed drastically in terms of our profiles, our structure and our partnerships.

Charting the shifts in our organisational structure over the years, we see the extent to which it moves with our collections. In the mid-1800s, we did not need more than a small staff: a director, a collection curator, room supervisors, a secretary and a taxidermist who prepared the specimens to be exhibited. Towards the late 1800s, as our team grew, our staff was structured across just seven sections, all related to our collections. A whole section was devoted to conchology, the study of mollusc shells, reflecting the richness of our mollusc collection at the time. This was the predecessor of our malacology section: one of our 13 sections in the late 20th century, by which time our collection had expanded greatly.

These structural shifts also tell the story of how the role of science has changed. Our early marine and freshwater research, for example, which began as exploration work, gradually shifted to focus on supporting nature conservation and ecosystem management. As a direct consequence of this research, new sections were created within the Institute: Hydrobiology, Oceanography, Ecology and nature conservation. Our institute was a trailblazer in this field in particular, beginning to raise public awareness of ecological problems as early as the mid-1960s.

Our changing structure also highlights the uniqueness of our Institute. Few natural history museums in the world have accumulated such diverse roles, particularly in recent years: managing the state oceanographic research vessel Belgica since 1984; incorporating the Management Unit of the North Sea Mathematical Models in 1997; and hosting the state geological survey since 2002, for example.

A thoroughly Belgian institution

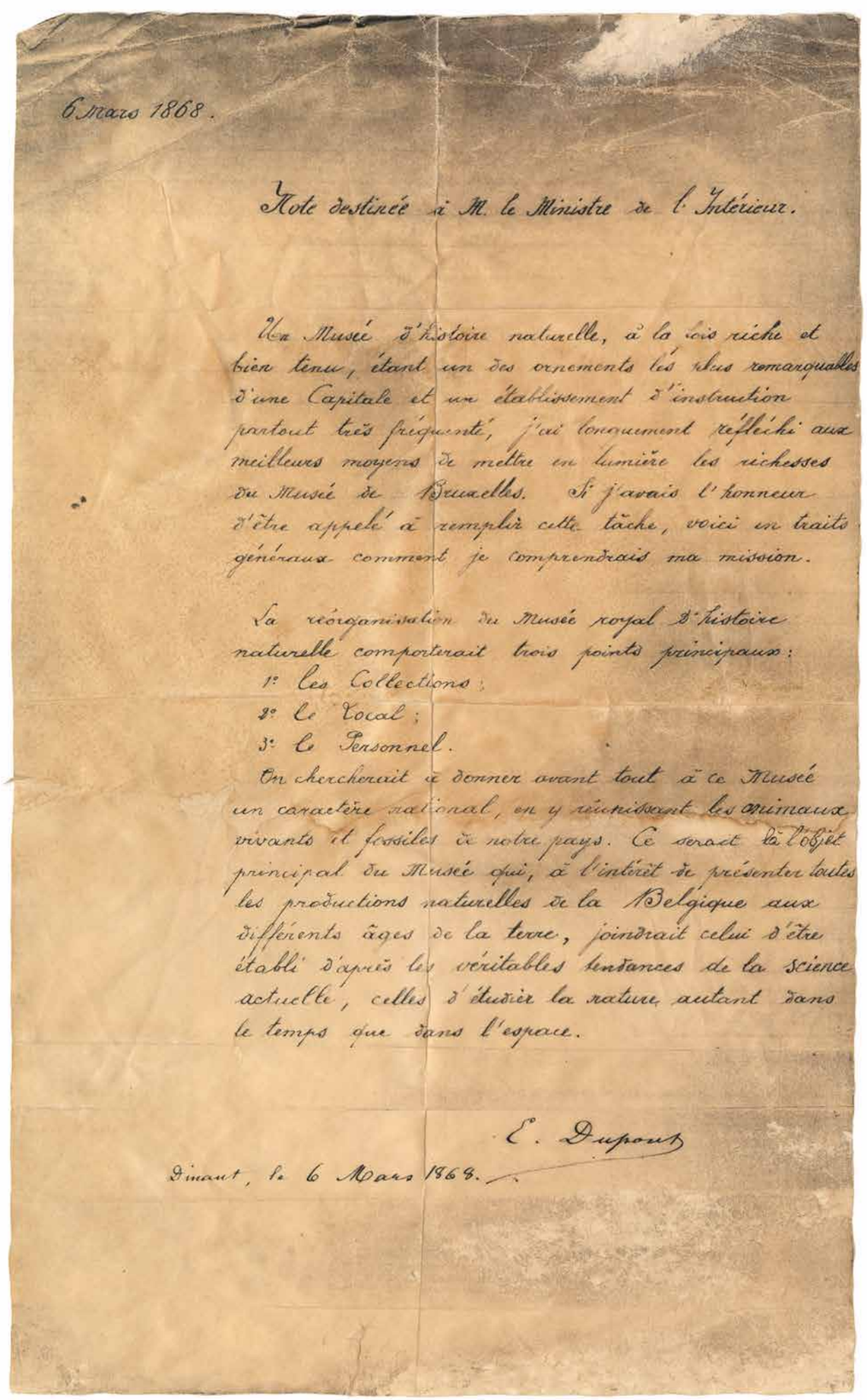
The story of this unique role is embedded in our history as a federal institution, dating from a time when Belgium was a very young country: just a teenager. When the Museum was created in 1846, it was attached to the Ministry of the Interior and supervised by a board of seven members. During reforms to the Belgian state in the 1980s, the Institute clung to its old structure, while other institutions had their research competences transferred to the regions or linguistic communities. Still today, our Institute is one of ten museums and scientific institutes attached to the federal government; currently governed by the Belgian Science Policy Office (Belspo).
As a Royal Museum and later a Royal Institute, we have always had close links with the Belgian royal family. Leopold I made several donations of collections; Leopold II supported the construction of the Janlet wing; while Leopold III had an office in our building. This strong relationship continues today: we still work closely with the Fonds Leopold III, for example, and our Museum participates in the annual exhibition Science and Culture at the Royal Palace of Brussels hosted by the Belgian royals.

Our partnerships with other Belgian institutions have marked our history. It was our former director Gilson that set up the Institute for Maritime Studies in Ostend in 1927: an early predecessor of the VLIZ with which we still work closely to this day. Some of our earliest directors joined us from the same Belgian universities we still regularly cooperate with on research projects. And our regular cooperation over the years with the Royal Museum for Central Africa in Tervuren is exemplified, among others, by the launch of our 2007 Joint Experimental Molecular Unit specialising in DNA barcoding.

Resistance and resilience

When we inevitably closed our doors in 2020 to ensure the safety of our staff and visitors in the COVID-19 pandemic, it was a reminder of how rarely we have had to put our work on hold. On some occasions, however, we have had no choice. In the winters of 1917 and 1941, it was a lack of fuel that forced us to close the Museum to the public so we could at least heat our scientific laboratories. At the end of 2016, we had to close for several days as part of the lockdown after the Paris attacks. And while there were times we also shut down during the two World Wars, our Institute is also notable for its resistance.

During each of the two periods of German occupation, our directors at the time marked their opposition to the policy of the occupier. When Gilson was pressured into collaborating during WWI on a dig to excavate the riches at Bernissart, the staff of the Museum found ways to disrupt the plans, delaying the work until the war was over.



6 mars 1868.

Note destinée à M. le Ministre de l'Intérieur.

Un Musée d'histoire naturelle, à la fois riche et bien tenu, étant un des ornements les plus remarquables d'une Capitale et un établissement d'instruction partout très fréquenté, j'ai longuement réfléchi aux meilleurs moyens de mettre en lumière les richesses du Musée de Bruxelles. Si j'avais l'honneur d'être appelé à remplir cette tâche, voici en traits généraux comment je comprendrais ma mission.

La réorganisation du Musée royal d'histoire naturelle comporterait trois points principaux:
1° Les Collections;
2° Le Local;
3° Le Personnel.
On chercherait à donner avant tout à ce Musée un caractère national, en y réunissant les animaux vivants et fossiles de notre pays. Ce serait là l'objet principal du Musée qui, à l'intérêt de présenter toutes les productions naturelles de la Belgique aux différents âges de la terre, joindrait celui d'être établi d'après les véritables tendances de la science actuelle, celles d'étudier la nature autant dans le temps que dans l'espace.

E. Dupont

Dinant, le 6 Mars 1868.

During WWII, Van Straelen's hostility towards the occupying power went even further. As a member of the resistance movement's Secret Army, he regularly supplied their Head of Engineering and Destruction with glycerine taken from the Museum's endowments. He also negotiated the return of several members of staff who had been taken prisoner at the beginning of the occupation, as well as providing refuge to researchers and students following the closure of the Free University of Brussels. In the end, despite the significant dangers to the Museum, it maintained much of its ongoing work and escaped any major damage during the two world wars.

This resilience is perhaps the most striking common factor throughout the history of our organisation. We have a wide range of strengths: research and policy support, collections management and public engagement. It makes us a complex organisation. But the challenges our global society is facing are themselves multifaceted and interlinked. It perhaps explains why we continue to be well placed to address them.

Interview: Camille Pisani

Camille Pisani was General Director of the Royal Belgian Institute of Natural Sciences from 2005 to 2019.

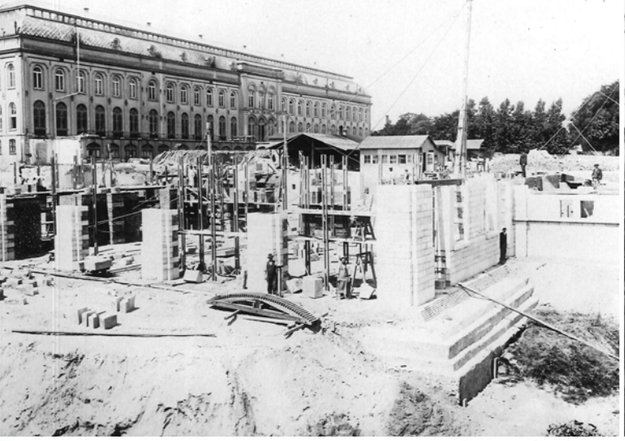
When I arrived at the Institute in 2005, I remember reading the Annual Report by my predecessor Daniel Cahen. In the introduction, he commented that it had been a year of transition - but, as he noted, looking back, every year was a year of transition. The same was very true of my time as director.

At the time, the political will for change was very strong. The Belgian Science Policy Office that manages the Institute had implemented a series of reforms that made it possible to consider a profound internal reorganisation, structuring our institution according to its missions and no longer according to scientific specialisations. This helped to highlight our work on each of our missions. It also acknowledged the professionalisation of roles such as curator, mediator and exhibition designer, which until then had been carried out by scientists. I knew that this would take an immense amount of energy, but I could never have imagined that it would take ten years! We had to completely redraw the Institute's organigram, making it more functional, directorate by directorate.

Defining the directorates devoted to public services and support services was relatively straightforward. But our scientific activity is so vast that it would have been disproportionate to try to make one service to cover it all. We had to introduce several. Some particularly Belgian challenges had to be taken into account - for example, the need for an even number of operational directorates, so that to ensure the heads had a balance of Dutch and French speakers.

What struck me about the ten years of work on this restructuring was people's resilience and willingness to cooperate. The whole team was so engaged in the task of ensuring we work better together. There was also change regarding our demographics: a steady increase in the proportion of women in scientific roles at the Institute. Although women do not yet hold 50% of the roles of statutory scientists, we do now publish our progress in every annual report. As the first woman to lead the Institute, I never felt as though people worked with me any differently to men. Perhaps it made more of a difference that I was the first director from France!

What I am proudest of is how we positioned the Institute as a reference centre for biodiversity knowledge and management during my time there. Biodiversity loss and climate change have become the main challenges of our century and I wish the Institute to engage strongly with citizens and politicians to fight for a sustainable future.



175 years of change: our buildings

In 175 years, it is not only our work that has changed: the walls around us have been transformed too. From the Palace of Nassau to the Convent of the Redemptoristines in Leopold Park, we chart the story of the bricks and mortar that have housed our collections, our researchers and our galleries throughout our history.

Now that the entire Museum has been renovated, visitors can explore not only the diversity of our collections but also a striking variety of architectural styles. Behind the bold modernist facade of our tower, we discover not only the impressive wrought iron features of our eclectic Janlet wing but also a 19th century neo-Romanesque convent. The story of our Institute is written into the buildings it has inhabited over time.

Our palatial beginnings

In 175 years, the home of our collections has travelled two kilometres. The building housing the original Museum was not in Leopold Park but at the top of what is now the Mont des Arts: the Palace of Nassau. The palace was the Brussels residence of Prince Charles Alexander of Lorraine, whose cabinet formed the basis of the original Museum's collection. Today, natural sciences have made way for books: it is now used for the temporary exhibitions of KBR, the Royal Library of Belgium. And it remains a spectacular building, whose first-floor rotunda includes a central rosette made up of 28 types of Belgian marble from the prince's original collection: the only trace still linking the palace to our now vast mineral collection.

Making ourselves at home in Ixelles

The rapid growth of the collections meant the Palace soon became cluttered. But the solution came in the 1880s when the government found a new home for the Museum: the Convent of the Redemptoristines in Park Leopold. Architect Emmanuel Cels had designed a grand convent with a chapel that was to house a sisterhood of nuns. In the end, the chapel was never built and the nuns never occupied the convent, opting to move to Mechelen instead. And even the echoing halls of the convent were not enough to house the Museum's vast collections: a new wing had to be built. In 1891, the same year the Museum opened its new doors in the convent, architect Emile Janlet began work on a new wing.

Scaling up

The turn of the century was a frenzy of construction for Belgium. The rise of industry in the 1800s had brought in great wealth and this was reflected in the architectural style of the time, visible in the extravagant arcades of the Cinquantenaire monument that were still under construction as Janlet's plans were being drawn up. And that sense of opulence is still present in our current Gallery of Dinosaurs thanks to Janlet's eclectic design, rhythmic use of wrought iron and intricate marble mosaics.

Our mid-century identity shift from Royal Museum to Royal Belgian Institute of Natural Sciences was marked by a new expansion project. The continued growth of our research activities meant a tower was needed to house the laboratories of our researchers and a new wing for our geological service. In the 1930s it was modernist architect Lucien De Vestel that was selected for the design, but war and financial struggles dragged the work out across the decades.

In 2020, when the Living Planet gallery was completed in the two upper floors of our historic convent wing, it marked the end of two decades of successive renovation projects. Finally all of the permanent galleries opened to the public. The convent wing is now fully devoted to telling the story of biodiversity on earth, with the windows in the roof letting daylight illuminate the space for the first time. As the need to adapt to current sustainability standards and reduce our ecological footprint becomes ever more urgent, we will eventually need to make new plans for a more sustainable building - no doubt before our 200th anniversary comes around!

ANNUAL REPORT 2021

2021
AT A GLANCE

02.01

It took 13 years of work, 52 scientists and a number of sponsors including the RBINS to publish the impressive box set "Les Insectes du Monde", a compilation of human knowledge on all orders of insects.

13.01

Vincent Van Quickenborne, Minister for the North Sea, helps to monitor ship nitrogen emissions on board our 'sniffer' plane. Belgium was the first country ready to monitor the restrictions that came into force on 1 January.

13.02

The exhibition, "The World of Clovis – Merovingian Itineraries", opens at the Royal Museum of Mariemont, presenting the results of the Archéosciences team's anthropological study of the Ciply collection at the RBINS.

02.03

Hilde Eggermont, coordinator of biodiversity.be, presents the new policy context - the EU Biodiversity Strategy for 2030, the Post-2020 Global Biodiversity Framework, and Belgium's role in the negotiations - to the King of Belgium.

05.03

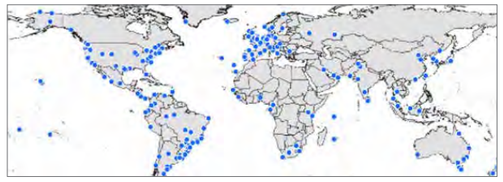
Good news: the rats in Antwerp's historic sewers do not carry coronavirus. Scientists continue to monitor these wild animals to prevent the emergence of any secondary reservoirs of the virus in the immediate vicinity of humans.

09.03

The Belgian Biodiversity Platform launches a video of the findings of the TALE project on the potential conflicts and possible synergies between agricultural services and biodiversity.

26.04

Our Institute represents Belgium at the 2021 Scientific Committee meeting held by the International Whaling Committee for the conservation of whales and the management of whaling.



09.04

'Falcons For Everyone' is back! Tens of thousands of fans tune in to our 24/7 HD live stream to watch two falcon families in Brussels as they raise their young from egg to fledge over the course of two months.

01.05

Our teams participate in an expedition in DR Congo to research mammal reservoirs of the Ebola virus and to study other pathogens. Objective: to control animal-to-human transmission and prevent another potential pandemic.

20.05

Welcome to Pollinator Park, an impressive virtual reality project depicting the bleak future that faces humanity without pollinators, and a lavish green beacon of hope. Our Institute is a partner.

20.05

No curfew for nature! The Brussels Museums Nocturnes return to our galleries to surprise and astound 795 visitors with a variety of scientific, artistic and poetic encounters.

22.05

Announced on the International Day for Biological Diversity, an incredible 64,000m² – the equivalent of 12 football pitches – were returned to biodiversity in less than 3 months of the "Create your m² of biodiversity" campaign.

18.06

Three of our staff take part in the European Archaeology Days, giving three lectures during the urban.brussels webinar on archeozoological, archeobotanical and anthropological research.

01.07

Sea Force, the new two-month interactive digital exhibition at Technopolis in which the RBINS is a partner, offers visitors the opportunity to immerse themselves in the sea and visit the harbour of the future.

08.07

In our garden, string instruments, ouds, flamenco guitars and mysterious soundscapes from the Walden Festival transport 400 visitors on a journey of discovery and break down the barriers between musical genres.

01.08

Successful tests for the new black carbon sensor on our 'sniffer' plane. As with sulphur and nitrogen, we will now be able to find out more about the black carbon emissions of marine vessels.

01.08

The "Abeilles de Belgique et des régions limitrophes (Insecta : Hymenoptera : Apoidea) Famille Halictidae" from the RBINS "Faune de Belgique" series sells out in less than two years, and gets a second, corrected print-run.

03.09

Delicious food, speeches, quizzes, and music: our staff enjoy a Covid-compliant but sun-filled and festive celebration after the long months of restrictions.

04.09

On Leopold Park Day, our activity coordinators head out into the garden to bring the wonders of natural science to life with a range of workshops: giant dinosaur puzzles, crafts, games, and more

04.09

The RBINS video guide for citizen scientists starting out in taxonomy is presented as an example of good practice at the congress of the International Union for the Conservation of Nature.

17.09

The "Down in the river" exhibition in Brussels presents our archeozoological and archeobotani-cal research on items excavated from the old Parking 58 site, and offers a glimpse into some of the city's oldest history.

20.09

Our monitoring plane joins the five-day Co-ordinated Extended Pollution Control Operation (Super CEPCO) organised by Norway, Sweden and Denmark.

24.09

The RBINS hosts Researcher's Night 2021, a two-day event coordinated by the BeWiSE Belgian Women in Science association, among others, with a particular focus on the role of women in science.

25.09

To assess air quality in Brussels, along with 3,000 residents, we join a large-scale citizen science project: Curieuzenair. With test tubes attached to our windows, we measure the amount of nitrogen dioxide in the air for four weeks.

02.10

Koen Stein and Olivier Lambert receive the Paleontologica Belgica Award for their contribution to Belgian palaeontology and their work with citizen scientists. Citizen scientist Mark Bosselaers receives the Louis De Pauw Award.

04.10

65 years after the Bois du Cazier mining disaster, the bodies of 17 still-unidentified miners are exhumed. This marks the start of a large-scale mission to identify the victims, in which two of our anthropologists are taking part.


LE SOIR

LA TRAGÉDIE DE MARCINELLE

Un portrait à retoucher

Plus de 250 mineurs restent bloqués par le feu dans le puits du Cazier

Mercredi soir, les sauveteurs avaient réussi à ramener

07.10

Amid the joyful hubbub of school groups finally returning to the Museum, Thomas Dermine, Secretary of State in charge of Science Policy, welcomes Trix to the Museum and inaugurated *T.rex*, an exhibition all about her.

13.10

Over the course of three days, the RALF21 Archeobotany Congress sees 52 participants from France, Switzerland and Belgium gather at the RBINS for discussions around 28 presentations and a microscopy session.

06.11

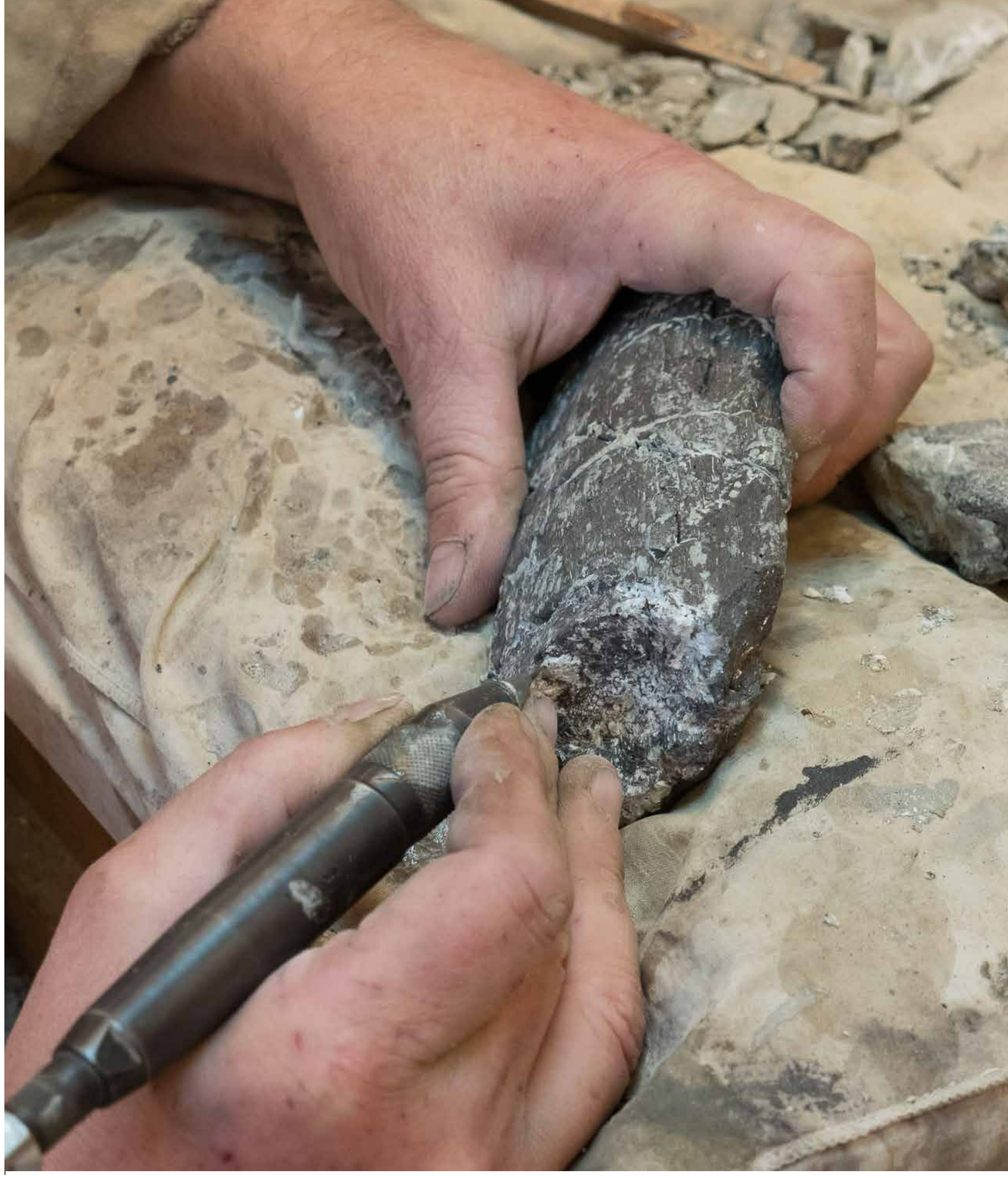
The Bright Brussels light festival comes to an end. Over the course of ten days, our illuminated façade transported thousands of visitors into the fantastic and poetic world of its light show.

12.11

Researchers translate into sound the secretions emitted by insects to defend themselves against predators, allowing them to compare the effect of these secretions on predators with the effect of sounds on humans.

16.12

The Geological Survey of Belgium, part of the RBINS since 2002, celebrates 125 years of service to the community, first in exploring the mineral resources needed for the economy and now in researching sustainable solutions.



1 RESEARCH

BREATHTAKING BIODIVERSITY

The world around us contains an incredible richness and variety of species, over 80% of which has not been described yet. *In 2021 our researchers worked to uncover more biodiversity from across the world and found even more surprises in store.*

A small species with many **secret identities**

How cosmopolitan are microorganisms? Until recently, we would have assumed a tiny microflatworm like *Gyratrix hermaphroditus* could be found anywhere in the world, as long as the environmental conditions were right, with enough humidity. Marine, freshwater or brackish ecosystems: it seemed to be a true "world citizen".

However, as our JEMU team discovered, working with the University of Hasselt, this is not a single species at all. It is in fact a complex of at least 62 well-delimited species defined by DNA data and, in part, morphology.

The findings were published in *Zoologica Scripta*. DNA analysis of specimens from nearly all over the world showed that this is probably a world record of this type of cryptic biodiversity. Some of the new cryptic species detected have very wide, intercontinental distributions though, suggesting they may still be rather cosmopolitan.

The research is a sign to taxonomists that more exploration may be needed into other so-called "cosmopolitan" species like *Gyratrix hermaphroditus* that might also contain a hidden wealth of biodiversity.

Researchers respond to **endangered chimps' cries**

It is 2015 in Eastern Congo, the province of Ituri, near Lake Albert. A biologist is working on infectious diseases, travelling through a mountain forest with a guide. Suddenly she hears an unexpected sound: the cries of a chimpanzee.

A number of research teams, including our Institute, came to discover and document this previously unknown community, catching 42 weaned chimpanzees and 10 infants on camera. They estimated around 4.6 chimps per km^2: that's denser than in comparable forest patches in other regions. The Congolese and Belgian researchers involved in this study published their results in the journal *Conservation Science and Practice*.

The eastern chimpanzee Pan troglodytes schweinfurthii is an endangered subspecies. Its community is under threat as more and more forest is turned into agricultural land – by slash-and-burn – to grow cassava, groundnuts, beans, maize and sorghum and feed the densely populated communities in the area. Our researchers suggest that authorities protect these mountain forests and involve local communities from the start.

WELCOME HOME, BELGICA!

Twenty metres longer, six metres wider and sampling 3500 metres deeper: *2021 was the year our brand new oceanographic research vessel reached the shores of Belgium. We celebrate the arrival of the new RV Belgica.*

On December 13 2021, a new arrival discretely eased its way into her new home: the naval base at the port of Zeebrugge. The new RV Belgica finally made it to Belgium, three and a half years after work began on her design and construction at Freire Shipyard in Vigo, Spain.

RV Belgica plays a key role in Belgian and European marine research, with expeditions to research numerous issues, such as the study of global warming and better protection of the marine environment.
The Belgian State, represented by the Federal Science Policy Office (Belspo), is the owner of the ship. Our Institute manages the vessel in cooperation with the Ministry of Defence and a private operator: Genavir, also selected this year. The French shipping company is a subsidiary of the French Institute of Marine Research, IFREMER, which already manages, operates and maintains the French oceanographic coastal and offshore vessels.

While the RV Belgica is based in Zeebrugge, it was announced in 2021 by the State Secretary for Science Policy, Thomas Dermine, and the mayor of Ghent, Mathias De Clercq that the city of Ghent will be the vessel's official godparent city.

And how is work aboard the new vessel? For our team, going from 100 to 400 square metres of workspace on the RV Belgica is a delight. And its state-of-the-art equipment helps us maintain Belgium's position as world leaders in marine science and exploration.
As for the former RV Belgica: it has found a new identity as RV Borys Aleksandrov, now based in Odessa, Ukraine. The ship was officially renamed in the presence of Ukrainian President Volodymyr Zelensky and it now forms part of the country's new scientific fleet. We all hope for a peaceful future for Ukraine and the RV Borys Aleksandrov.

PROBING PLASTIC POLLUTION

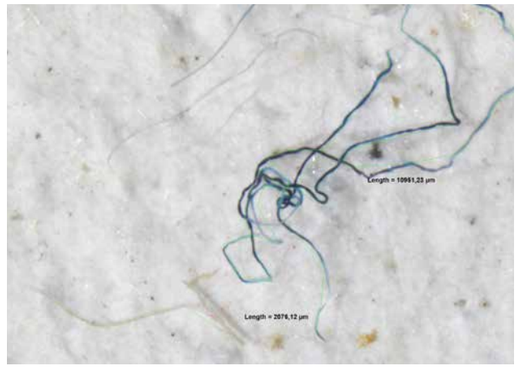
Crates. Bottles. Fibres. Microplastics. *In the Belgian North Sea, plastics are a major source of pollution. Our systematic monitoring study this year revealed some good news, some bad news and several key challenges to be tackled.*

As part of the research project MarinePlastics, our Institute worked with the Flanders Research Institute for Agriculture, Fisheries and Food (ILVO) to map out how much and what types of plastic occur in Belgian fishing grounds. The project also explored the presence of microplastics in the commercial fish and crustaceans from our fishing areas. The project was funded by the European Fund for Maritime Affairs and Fisheries and the Funding Instrument for the Flemish Fisheries.

And the news was not all bad. It appears that microplastics over one-twentieth of a millimetre do not accumulate in the commercial fish and crustaceans sampled in areas where Belgium catches fish. In almost all those samples, the numbers of microplastics were so low that the concentration could not be precisely determined. We can be reassured that, in terms of microplastic contamination, fish and crab from Belgian fisheries are currently safe to eat.

However, concentrations of microplastics in the seabed and in seawater can be high. Our study showed for example that water from the port of Zeebrugge contained 48 times more microplastics than areas further out to sea. And large pieces of waste plastic (macroplastics) constitute up to 88% of all marine waste. Plastic fibres from fishing gear are particularly omnipresent - although more in the Dutch part of the North Sea than in the Belgian part.

This research fulfills our obligation from Europe to collect figures on macroplastics on the seabed. As of 2020, data must also be collected on microplastics in the sediment and in the water. To meet Europe's demands, a national monitoring program for microplastics must therefore be set up.



THE REAL EXTENT OF WIND FARM IMPACT

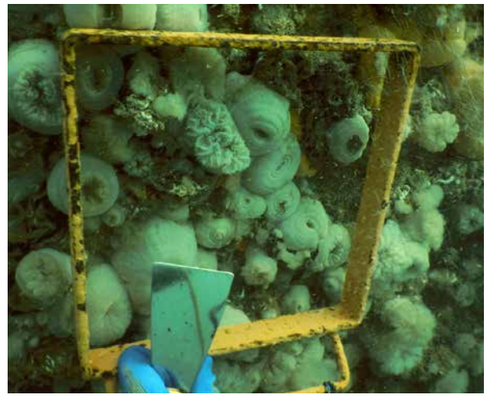
The 399 wind turbines in the Belgian North Sea produce enough to power two million households. *But what effect do they have on the surrounding ecosystem, both above and below the waves? In 2021 our research provided policymakers with some key evidence.*

Wherever offshore wind farms are constructed, monitoring is needed to see the impact they have on local wildlife. But nowhere in the world has such high quality long-term monitoring data as our Institute. Our Marine Ecology and Management team (MARECO) started measuring the environmental effects of offshore wind farms in 2008 and our work this year continues to attract international attention, setting an example for monitoring worldwide.

We typically think of wind farms having a largely positive effect on the seabed, with turbine foundations serving as de facto artificial reefs that are colonised by mussels, anemones and small crustaceans, and attracting fish like cod and plaice.

Thanks to our long-term data, we can help to tell even more of the story. The FaCE-It project investigated the effects of offshore wind farms in several countries. Our model simulations show how over time, these ecosystems produce high concentrations of organic material on seabeds in and around the wind farms. This suggests that carbon is increasingly stored in the seabeds, helping to protect both our climate and the fauna at the bottom of the sea, which is currently investigated in the OUTFLOW project. The results were published in two papers in *Frontiers in Marine Science*.

MARECO, together with the North Sea modeling unit (MUMM), provides crucial policy advice to the federal government on environment-friendly offshore wind farms. In 2021 our team launched a comprehensive new report based on data collected as part of our monitoring programme WinMon.BE. Our leading role globally was also further strengthened this year as a representative of our Institute was appointed as chair of the International Council for the Exploration of the Sea's Working Group on Offshore Renewable Energy.



FOLLOW THAT BIRD: NOW ONLINE

Our Institute has long been a source of expertise on bird migration, as host of BeBirds, the Belgian Bird Ringing Centre. *This year even more of this data was opened up online for all to access, helping us to understand changes in migration patterns.*

Tracing the Bewick's Swan in real time

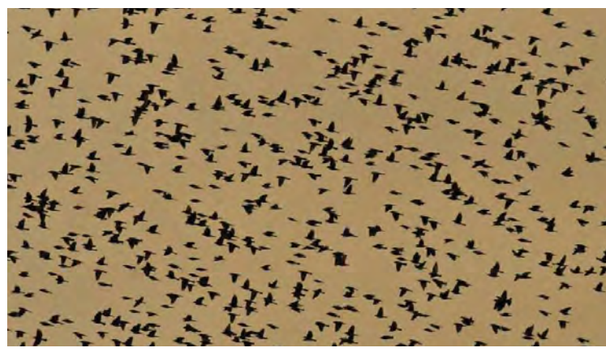
The world's smallest swan takes to the skies every year, migrating from the icy Russian tundra to the shores of Europe. But recently, fewer Bewick's Swans have been reaching our region. Over the last 15 years, the numbers wintering in North Sea countries fell by a third. Meanwhile, in the Evros Delta between Greece and Turkey, the swan has colonised a new area, with a surge in numbers. Are these shifts connected? And could we be seeing signs of illegal hunting, or human impact on the swans' sources of food?

To help answer these questions, our Institute's international research programme The Odyssey of the Bewick's Swan is now sharing the swans' routes online in real time. As part of this programme, since 2015, Bewick's Swans have been ringed and equipped with GPS and GSM transmitters, both in the Russian breeding areas and in the European wintering areas. Now anyone can access the data thanks to the new geographical application. The programme is a particularly international cooperation across Russia, China, Belgium and Greece. A total of 23 Bewick's Swans ringed in Belgium can now be followed and the data are updated weekly.

Migrating birds on the meteorologists' radar

It's not only rain and snow that weather radars can detect in our skies. Every spring and autumn, millions of migrating birds are visible as well. And now, information about their numbers is being shared live online from ten weather radars located in Belgium, the Netherlands, France and Germany, thanks to CROW, a BELSPO project between the Royal Meteorological Institute (RMI), the Flemish Research Institute for Nature and Forest (INBO) and our Institute.

What we see on the web application is the estimated number of birds that pass an area close to each radar at a given moment. The vertical distribution of the birds is also visible: the bird density in areas higher or lower in the atmosphere. The data showed for example that in 2021, bird migration started exceptionally early, thanks to unusually warm weather in the second half of February. This tool provides invaluable insights into the dynamics and evolution of bird migration on a large scale that cannot be gained in any other way. It is also important for aviation, helping us to avoid fatal collisions between aircraft and groups of birds.



NEW PERSPECTIVES ON ANTARCTICA

The Antarctic has always had a special place in our Institute's heart *- our research vessel Belgica is named after the boat that took the Belgian Expedition there in 1898. Over 120 years later, we are still learning about the biodiversity and geology of the coldest continent.*

Extra-terrestrial clues about an **ancient meteoritic impact**

A research team of international scientists, including our Institute, has found new evidence of a low-altitude meteoritic touchdown event reaching the Antarctic ice sheet 430,000 years ago. In 2017 and 2018, extraterrestrial particles were found in the Sør Rondane Mountains during the Belgian Antarctic Meteorites expedition, based at the Belgian Princess Elisabeth Antarctic station and funded by Belspo in the AMUNDSEN project. The new research indicates that they are the result of an unusual event: an asteroid at least 100 metres in size entering the Earth's atmosphere. This caused a jet of melted and vapourised meteoritic material to shoot forth, hitting the Antarctic ice sheets at high speed.

The study, published by *Science Advances*, is particularly important for the geological record where evidence of such events is scarce. This is primarily due to the difficulty in identifying and characterising impact particles. It also highlights the importance of reassessing the threat of medium-sized asteroids in the future. Over a densely-populated area, such an impact would result in severe damage across hundreds of kilometres.

How microbes thrive in the harshest of conditions

Not all of Antarctica is covered in ice. Along the coastlines there is land that remains exposed. And at some points in the ice sheet we find protrusions of land known as nunataks. But these few ice-free areas are among the most extreme land environments on Earth. Life in these places is dominated by microbes - a very particular ecosystem. But with climate change and other environmental shifts, how is microbial diversity affected?

As part of the MICROBIAN project funded by Belspo through BRAIN-be, our remote sensing team combined satellite data on Antarctica with measurements of ground temperature and elevation. They were able to show that there are two key factors: the temperature and the orientation of the site. These affect soil moisture and thus have a direct effect on microbial biodiversity. The results were published in *Remote Sensing Applications: Society and Environment*. The more we understand what shapes the biodiversity of these microbiomes, the better we can provide a scientific basis for conservation strategies, long-term monitoring efforts and predicting their possible response to future environmental changes.

Coordinating biodiversity observation in our fifth Ocean

In 2021, National Geographic announced its cartographers would now recognise the existence of a fifth ocean alongside the Atlantic, Pacific, Indian and Arctic: the Southern Ocean, around the Antarctic continent. The more we know about this ocean's biodiversity, the better we can help to address the challenges it faces. This same year saw the launch of a key agreement to reinforce our capacity to observe ocean biodiversity.

Our Institute hosts the Antarctic Biodiversity Portal of the SCAR: the Scientific Committee on Antarctic Research, a key interdisciplinary body that coordinates international research about Antarctica and advises policymakers such as the UN and IPCC. Together with the Marine Biodiversity Observation Network (MBON), a Memorandum of Understanding was signed with a vision to build and coordinate a global observation system on ocean biodiversity. This work will help to systematically assess the state of the ocean's biodiversity, past trends and how it will change in the future. It is essential to safeguarding the environment and protecting the integrity of the Southern Ocean's ecosystem.

How to untangle the **genomics of Antarctic wildlife**

The marine fauna in the Southern Ocean is unique in the world. It is increasingly under threat from global warming, pollution and overexploitation of its resources. To understand how to best manage and conserve this biodiversity, we need to understand the genomics behind the Antarctic fauna. How are the species there genetically structured and connected? This year the project published a pilot testing streamlined techniques for population genomics across a range of Antarctic species, from starfish to snow petrels.

The paper, published in *BMC Genomics*, is one of the outcomes of the RECTO project (Refugia and Ecosystem Tolerance in the Southern Ocean), led by our Institute and funded by Belspo. RECTO explores how past climatic events drove diversification and adaptation in different animal groups in the Southern Ocean. The study showed that the methods tested can be an excellent way to acquire population genomic data for several classes of animals: ostracods, bivalves, sea stars and fish. These methods can then be used to help to reconstruct population histories of model species, shedding light on the complexities of the fauna there.

LEADING ON GLOBAL BIODIVERSITY POLICY

How can biodiversity research make a real difference to policy decisions at international level? *Our Institute is home to the Belgian Biodiversity Policy Support Group (BIOPOLS), a group of entities working to ensure policy is always grounded in the latest science.*

Key roles for our Belgian Biodiversity Platform

The IUCN World Conservation Congress is a unique chance for biodiversity stakeholders to come together to shape global priorities. This year it was held in Marseille, France, where speakers included Federal Environment Minister Zakia Khattabi. Our Institute hosts the Belgian Biodiversity Platform (BBP) which, as national IUCN Focal Point, led the Belgian delegation, chairing several talks. Our representatives were successfully selected for key positions representing West Europe on the Council - IUCN's main governing body - and on the newly formed Interregional Committee for Europe, North and Central Asia.

Another key highlight of 2021 was the publication of the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services) & IPCC (Intergovernmental Panel on Climate Change) Biodiversity and Climate Change Workshop Report: the outcome of a four-day workshop that showed that biodiversity loss and climate change are both driven by human economic activities and mutually reinforce each other. The BBP again had a key part to play: it is the Belgian IPBES Focal Point, ensuring our country's experts and stakeholders are directly involved.

100 countries speaking with **one voice on biodiversity**

To continue to benefit from the services biodiversity delivers, we need to change the way our society views biodiversity. An important step towards this was achieved in October 2021 when the Kunming Declaration was adopted by over 100 countries, as part of the virtual 15th meeting of the Conference of the Parties (COP 15) to the United Nations Convention on Biological Diversity (CBD). The Declaration calls upon the parties to mainstream biodiversity protection in decision-making and recognise the importance of conservation in protecting human health.

Our Institute hosts the National Focal Point to the CBD which coordinates Belgium's contribution to the COP 15 and works closely with European partners to develop a common position. Roundtables at the Conference included the participation of Federal Environment Minister Zakia Khattabi, Walloon Minister for Environment Céline Tellier and EU Environment Commissioner Virginijus Sinkevičius.

COOPERATING FOR CAPACITY

Another key part of our Policy Support Group is the CEBioS programme*, which works with the partner countries of Belgium's development cooperation activities. This year two of its highlights involved CEBioS' ongoing work with the Global Taxonomy Initiative.*

Explaining an **unexpected *Tilapia* population**

CEBioS stands for Capacities for Biodiversity and Sustainable Development, and its Global Taxonomy Initiative (GTI) sub-programme supports researchers from partner countries for scholarships to do research on taxonomical topics with a mentor in Belgium or in their country. One such grant brought a Beninese researcher to the Institute who this year published the results of his research in the journal *Diversity*.

Nile tilapia is the world's number one farmed fish, and a key economic driver in Africa. In the Atchakpa reservoir in Central Benin, the Nile tilapia population has gradually been replaced by a less marketable relative: the black-chinned tilapia *Sarotherodon melanotheron*. But the black-chinned tilapia is native to coastal habitats - how did it come to dominate so far inland? The study looked at genetic markers to show that the black-chinned tilapia from the reservoir were genetically indistinguishable from their counterparts on the coast and therefore likely colonised the reservoir naturally, rather than being introduced by people.

Identifying ants in one of Africa's oldest rainforests

Rwanda, like most countries of eastern and central Africa, has megadiverse populations of ants. This extremely rich, unique and taxonomically important fauna is also particularly sensitive to global changes such as deforestation and climate change.

In the framework of the GTI, our Institute worked together with Rwandan researchers to deliver a taxonomy training course that focused on the local ant fauna. 11 young scientists from across Rwanda, Kenya and the Democratic Republic of the Congo came together in the Nyungwe National Park to discuss how ants can be one of the most informative groups for biodiversity evaluation and monitoring.

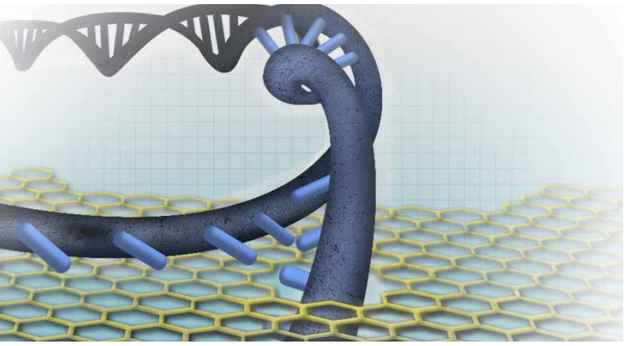
This type of training course is particularly valuable to local researchers in enabling them to carry out further research in the framework of conservation projects. It supports the broader aims of CEBioS by strengthening local capacity to provide the evidence base for policy in the future that can protect our planet's biodiversity.

CRACKING THE CODES: OUR DNA ANALYSIS

JEMU is our Institute's expertise centre for molecular biology, *exploring the secrets held in the DNA of our natural history collections. This year it unveiled a new technique to reconstruct genomes and helped to answer questions about a mysterious chess piece.*

A nano-scale hole to solve our sequencing challenges

Our molecular lab hosts a range of technologies that help to sequence DNA, deciphering genetic codes of all types of species from across our collections, in partnership with the Royal Museum for Central Africa. Until this year, our sequencing technologies focused on analysing short stretches of DNA. But when assembling genomes, one challenge our researchers often face is that the genome turns out to be much more complex than first thought, with lots of repetitive sequences, deletions or duplicated genes. To sequence these complex regions, we have to work on long stretches of DNA. A new tool was needed.



The solution arrived this year for our DNA lab in the shape of Nanopore technology. This state-of-the-art technique takes single strands of DNA through nano-scale holes, embedded in high-tech electronics, to be analysed. It means we can sequence longer DNA molecules than ever before, telling the stories of these complex regions and provide much more information about the genetics that underpin the biodiversity around us. Nanopore is already helping us to detect invasive species and explain the morphological diversity of species like beetles and spiders.

Ancient DNA retrieved from a medieval chess piece

Ancient DNA is a real challenge to analyse. It has usually degraded over the years and been contaminated with genetic material from other species. In addition, the techniques we use to sequence ancient DNA tend to be destructive processes that badly damage specimens. In the case of a recently excavated medieval chess piece, though, the damage was already done: the ivory was shattered during the dig, providing an ideal opportunity to explore its genetic material.

The chess piece, identified as a knight, was found in a medieval settlement in the Jambes district of Namur, Belgium. Our lab team was able to sequence two short fragments of DNA still present in the ivory and compare it to existing DNA records. They found evidence that the ivory likely comes from savannah elephants from an eastern or southern African country. It was therefore probably transported along the African trade route passing through the Swahili Corridor. In this way, luxury products like ivory help to tell the story of international trade over the centuries. The results were published in the *International Journal of Osteoarchaeology*.

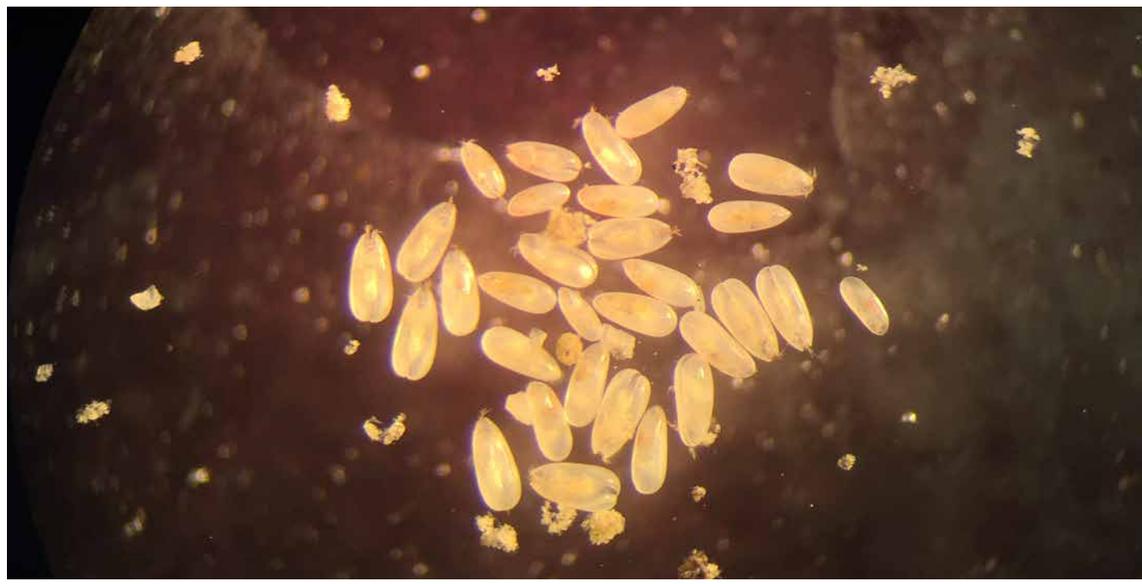
LET'S TALK ABOUT SEX

There's no avoiding it: species reproduce. *The work of our Institute this year shed light on sexual characteristics in species from spiders to land snails, as well as the genes of others whose reproduction is not always sexual.*

In the sheet-weaving spider *Oedothorax gibbosus*, every male is one of two types: one much flatter and more feminine; the other hunched, with extra glands and hair. But why do we only see these two extremes, and no males that fall somewhere between the two? In the journal *Nature Ecology and Evolution*, our Institute published a study that shows how genes can be grouped together and form a 'supergene', neatly inherited in a single bundle. It is the presence of a 'supergene' that makes the difference between the flatter and hunched *Oedothorax gibbosus* males - either they have the supergene, or they don't.

While studying snail fauna in Cuba, our researchers found some particularly surprising features in the rare endemic genus *Jeanneretia*, published in *Archiv für Molluskenkunde*. These snails are hermaphrodites, with both male and female sexual characteristics, and shells just 2.5 cm in diameter. But in one species, the genitals were found to have structures up to a massive 30 cm long - quite possibly a record among land snails. Probably such exaggerated genital structures evolved as a result of sexual selection: in this case, to help to make extra large packages of sperm.

Ostracods are tiny crustaceans, mostly less than a millimetre long. Non-marine ostracods are also a group with a lot of asexuality. While some species reproduce sexually, others clone themselves. In sexual reproduction, natural selection takes care of the negative effect of any mutations that may occur. But to deal with mutations in asexual species, species have to develop unusual genetic mechanisms like hybridisation or transfer DNA material horizontally. This year, our Institute published the first ostracod genomes in the journal *Genes/Genomes/Genetics* that are the first step in better understanding how asexuality can persist in these tiny organisms.



THE WAY WE WERE: HUMANS IN TIMES GONE BY

Our research into the history of the natural world has much to tell us about how our own species used to live: *the horses we rode; the illnesses we suffered from; how we buried our dead. Our work this year was no exception.*

A vast necropolis uncovered in Virelles

Our Institute's Archaeosciences unit works on plant, animal, human remains and sediments from archaeological sites across Belgium. Often, that means that when builders start to dig out a construction site, we can expect a phone call. This year brought our team to Virelles, near Chimay, where human remains had been discovered during the construction of a private house.

The Archaeoscience team worked in partnership with the Walloon Heritage Agency to help implement an excavation methodology, contributing to collect sediment and other samples. This work aims to reconstruct the social composition of the group, so we learn about the burial rites, health and diet of people that lived there. And the site appears to have great potential, possibly containing as many as 800 burials. An initial diagnosis led to the conclusion that it was a necropolis dating from the Early Middle Ages, a period from which remains are rare. This therefore represents an excellent opportunity for further archaeological study.

Snapshots of **medieval abbey life**

In the city of Mons, the tower of the Val des Ecoliers is a singular landmark - the last trace of a medieval abbey that dates back to 1252. This year, when a nearby construction site uncovered the walls and floors of the old monastery, our Archaeosciences team was again called in to contribute to the excavation, as part of our partnership with the Wallonia Heritage Agency. And there proved to be a lot of discoveries to be made, in the short time before the dig was over and construction began on offices and underground car parks.

Around sixty skeletons were uncovered in coffins in the cloister galleries, exceptionally well preserved. By reconstructing the initial position of the burial, we can learn about the funerary practices of the time. Analyses of the bodies will tell us about the age, sex and health of the individuals who lived in this privileged place. Latrines contain the remains of animal and plant material that hold information about the abbey's food supply. Now work can begin on this research to bring these findings forth.

Unearthing the complex history of the hepatitis B virus

Today, 300 million people worldwide live with chronic hepatitis B - a viral infection that attacks the liver. We know from recent studies that the virus has been infecting humans for millennia, but the details of its evolutionary history remained unknown. A new study published in *Science* by a large team of researchers from across the world examined the virus' genomes from ancient Eurasians and Native Americans from as long as 10,000 years ago.

A researcher at our institute provided background information and helped to provide access to samples from a body excavated in St. Rombout's churchyard in Mechelen: a young adult who had hepatitis B when he died, before being buried in a multiple burial in the 15-17th century AD. Researchers used DNA-enrichment techniques to reconstruct large proportions of ancient hepatitis B genomes in tissues from this skeleton, along with 136 others. They were able to show these ancient viruses may have had a common ancestor between 12,000 and 20,000 years ago, present in European and South American hunter-gatherers during the early Holocene, before the beginning of farming.

Origin of domestic horses finally established

How were modern horses first domesticated? Our Institute was part of a team of 162 international scientists that published a study in *Nature* with answers to questions that have been puzzling researchers for years. The scientific team analysed the genomes of 273 horses that lived across Eurasia between 50,000 and 200 years BC. And it was our Institute's collection that provided one of the horse bones: a specimen approximately 36,000 years old from the Goyet Cave near Namur.

The DNA of all horse remains was sequenced by two French research centres. It showed that horses were first domesticated in the Western Eurasian steppes, especially the lower Volga-Don region, before conquering the rest of Eurasia within a few centuries, between 2000 and 2200 BC. The genome of this domesticated population indicated signs that its behaviour was more docile than the populations it replaced, and its backbone stronger. These characteristics were no doubt crucial to their success at a time when horse travel was at the forefront.

ANCIENT RELATIVES UNCOVERED

***Our palaeontological research regularly stretches back tens or hundreds of millions of years**, tracing the origins of species to some of their earliest family. Looking this far back tells us not only about the history of fauna and flora but about the history of the Earth itself.*

Brachiopods from a long way back

When it comes to Belgian marine fauna from around 480 million years ago, fossil evidence is unsurprisingly rare. But a few years ago, an amateur palaeontologist collected numerous tiny fossils of brachiopods near the ruins of the famous Villers-la-Ville Abbey, in the Brabant Massif. These specimens, complemented with ones from the Stavelot–Venn Massif from the same period, represent the oldest shelly fauna ever found in Belgium after the even scarcer brachiopods from the latter massif, dating from the Cambrian, around 505 million years ago. They shed light on how their geographic distribution at the time was controlled, as an international research team concluded in the *Rivista Italiana di Paleontologia e Stratigrafia*.

Among the 150 specimens from Villers-la-Ville, all managed at our Institute, three genera were identified. These brachiopod taxa are widely distributed later in the Ordovician, but in the early part of the Ordovician known as the Tremadocian, they are restricted to Avalonia, the microcontinent where Belgium was located back then. One of the three genera in particular, named *Thysanotos*, was found only in Belgium at that time.

The oldest plant fossils on the African continent

The greening of the continents - or terrestrialisation - is without doubt one of the most important processes that our planet has undergone. And plant fossils that document how land was conquered are very rare. In 2015, during the expansion of the Mpofu Dam in South Africa, researchers discovered numerous plant fossils in geological strata dated to the Lower Devonian, 420 to 410 million years ago, making this an exceptional discovery. A remarkable number of the fossil specimens were relatively complete: small plants, no larger than 10cm tall.

The study, published in the journal *Scientific Reports*, analyses fifteen species, three of which are new to science. The conquest of land by plants was a very long process during which plants gradually acquired the ability to stand upright, breathe in the air or disperse their spores. These early plants, simple as they are, form the basis of the long history of life on Earth.

Shark jaw found in the Belgian Ardennes

A team of researchers, including from our Institute, described a 360 million-year-old shark jaw found in the Belgian Ardennes, in the *Journal of Vertebrate Paleontology*. It is an exceptional find because cartilage almost never fossilises. The *Ctenacanthidae* shark jaw, found in a quarry in Comblain-au-Pont near Liège, is the oldest shark cartilage remains ever found on the European continent. For the first time, paleontologists were able to examine a piece of fossil shark jaw, instead of the usual isolated teeth, spines or scales.

A group of Dutch amateur paleontologists and geologists got the fossil from a quarry worker more than 20 years ago and donated it to our Institute in 2016. From the geology of the quarry in the Ourthe Valley our research was able to ascertain that the fossil is from the Late Famennian, back when the region was a deep sea. The piece of lower jaw, 22.5 cm long and 8.5 cm high, suggests that the individual must have been about 1.8 metres long. It most likely fed on small fish and molluscs.

Two primitive mammals that scurried alongside dinosaurs

Researchers from our Institute this year described two primitive mammals from the Upper Cretaceous that lived about 70 million years ago, albeit from very different locations: one was excavated in the Gobi desert of Inner Mongolia, the other at the foot of the Carpathian mountains in Romania. Both belong to the multituberculates, a highly successful mammalian group that survived several mass extinctions before finally disappearing 35 million years ago. The two studies were published in *Cretaceous Research* and *Journal of Mammalian Evolution* respectively.

Kryptobataar and *Kogaionon* belong to the multituberculates, a name that refers to the many tubercles or cusps on the teeth. This group originated in the Jurassic era and has existed for no less than 120 million years. Multituberculates crawled around among the dinosaurs for about 90 million years. At the site in Inner Mongolia, for example, our palaeontologists found Protoceratops, Pinacosaurus and Velociraptor. On the excavation site in Romania, they found Paludititan and Zalmoxes.

2 COLLECTIONS

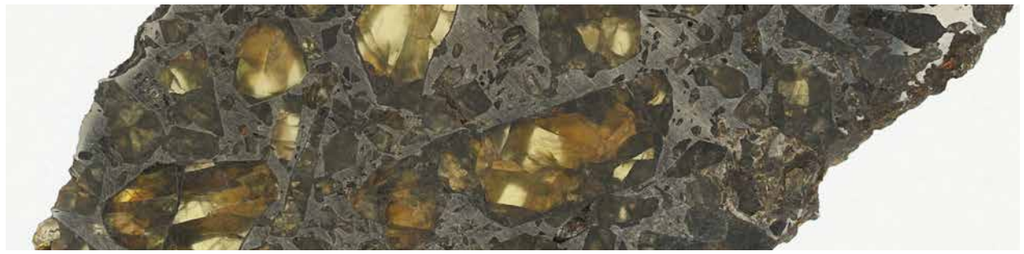
THIS JUST IN: MAJOR ACQUISITIONS

The numbers of specimens in our collections are constantly growing, *and they come from all kinds of sources. This year we look at acquisitions remarkable both in quality and size.*

Twenty new meteorite specimens land in our collections

One quiet evening in 2019 in the village of Aguas Zarcas, Costa Rica, a flash of orange and green streaked across the sky. Moments later there were loud crashes as fragments of black rock smashed through roofs of houses, still warm to the touch. A meteorite the size of a washing machine had broken up in the skies over the village.

Two years later, a specimen of the Aguas Zarcas meteorite is one of 22 meteorite specimens joining our collections, gathered from across the world by a familiar face for our mineralogists: the collector is a longtime collaborator of the Institute. And we still have a lot to learn from specimens across this collection: the inky black Aguas Zarcas fragments, for example, could prove to contain amino acids, sugars, or even proteins, which have long been suspected to be present but never confirmed in a meteorite. Plus, thanks to new additions from Belgium, this acquisition also means we now proudly hold large specimens of all six recognised meteorites ever discovered in our country.



An unexpected catch brings a **new giant** to our galleries

The crew of a Dutch shrimp trawler had a surprise in their nets while fishing in Belgian waters in July 2020: an elephant tusk. The 60 kg, 2.3m long fossil was identified as belonging to Palaeoloxodon antiquus. This is a forest elephant that inhabited the area in between ice ages and was bigger than today's elephants. The tusk belongs to an adult male about 3.5 metres tall. The fossil is estimated to be 115,000 to 130,000 years old and it is the first time that such an intact specimen has been found in Belgium.

The Dutch fishermen sold the tusk to a private dealer in the Netherlands. Afterwards, it was studied by researchers associated with the Rotterdam Museum of Natural History. Finally, thanks to the joint efforts of Deputy Prime Minister and Minister of Justice and the North Sea, Vincent Van Quickenborne, and State Secretary for Recovery and Strategic Investments in charge of Science Policy, Thomas Dermine, the Royal Belgian Institute of Natural Sciences was able to add the tusk to its collections and it now takes pride of place alongside our Lier Mammoth.

REVISITING OUR COLLECTIONS

The specimens in our collections have no shortage of potential discoveries. *Through further study of what we collected sometimes much earlier, our researchers continue to publish crucial findings that shed new light on what we thought we knew.*

When did **Neanderthals** really disappear from Belgium?

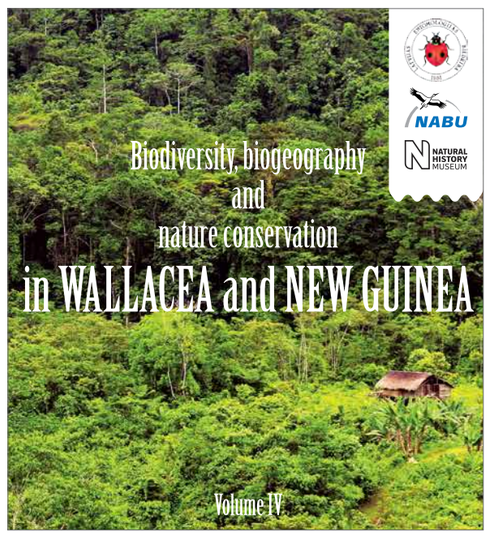
Neanderthals dominated Europe and Asia until about 50,000 years ago, when modern humans replaced them. And the Neanderthals of Spy, in our collections, were thought to be some of the youngest in Europe at 37,000 years old. But thanks to a new technique, researchers have been able to show that the Belgian specimens in fact date back significantly further. The study was published in the journal *PNAS*.

An international, multidisciplinary team of archaeologists, geologists, geneticists, and anthropologists re-dated Neanderthal fossils from the Spy cave and two other Belgian sites, Fonds-de-Forêt (including a femur preserved at our Institute) and Engis. They used a new dating method in which only the amino acid hydroxyproline is dated. This method limits the risk of contamination by, for example, glue. The results show that the remains are older than previously thought: in some cases even 10,000 years older. This means that Belgium's Neanderthals are no longer the most recent known in Europe - for now. Of course, young Neanderthal fossils from Gibraltar, Catalonia and south-west France are next to be reanalysed using the new technique.

A new publication exploring a **biodiversity hotspot**

Situated between Southeast Asia and Australia, the islands of Wallacea and New Guinea are known to have an extremely rich and unique biodiversity, but are still largely unstudied. This year zoologists from our Institute are working with the Latvian Entomological Society in Riga and the Natural History Museum in London to fill in the gaps in our biological knowledge with a series of books that explore the exceptional flora and fauna of the region.

The fourth volume of *Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea* studies specimens from our Institute's collections and beyond, with authors from 16 countries, describing no fewer than 64 new genera and species. Newly discovered invertebrates include a predatory aquatic bug from the Cyclops Mountains and a new snail from Waigeo Island, a giant of its kind. This series of books has already made more than 250 new taxa known, underlining the need for better knowledge and protection of the incredible biodiversity of this region.



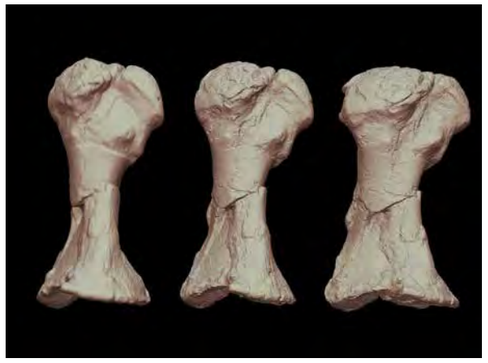
IMMORTALISING OUR IGUANODONS IN 3D

The imposing Bernissart iguanodons are incontestably the stars of our Dinosaur Gallery. *Their discovery was one of the greatest in palaeontological history. This year we embarked on a new project to help preserve them, digitally, forever.*

As well as their incredible value in terms of heritage, the 20 Belgian specimens of Iguanodon bernissartensis remain important subjects of scientific research. They are one of the key reference collections for palaeontologists, who regularly contact the Institute to request a research visit so they can access the original specimens for their studies. Every time a visitor steps inside the Iguanodons' cage represents some level of risk to the security and preservation of the fragile skeletons.

One way of helping to preserve our collections is through digitisation. If we can take a high-resolution 3D image of each specimen, scientists can study the images without ever needing to handle the specimens directly, or even needing to travel to Brussels. And our Institute is one of the country's pioneers in 3D digitisation of museum collections. Today, our researchers use several 3D digitisation techniques on a daily basis: micro-computed tomography, structured light scanning, photogrammetry and multispectral photogrammetry. But most of these techniques are currently used for small specimens. How can they be applied to our iguanodons that measure up to 7 metres long?

In 2021, our Institute embarked on a project known as Iguanodon 2.0, supported by Belspo through the programme BRAIN-be 2.0, with the mission of digitalising our Bernissart giants. The first stage was a comparative study to evaluate a range of different scanning techniques, identifying those which would be most successful for large fossil specimens. This study has now allowed our digitisation team to set up a protocol that will eventually ensure the holotype of our iguanodons can be immortalised in 3D.



ONE FOR THE BOOKS: OUR LIBRARY IN FOCUS

When we think about natural sciences collections, we tend to picture specimens: *carefully preserved fossils or rows of labelled insects. But a huge part of our collections are publications housed in our library: over 18km of shelves managed by our team of archivists.*

When it came to researching the 175 years of the history of our Institute, the starting point was clear: our Institute's library. It is the central point of access for all researchers consulting and borrowing publications, both in-house and external. Open Monday to Friday, this modern facility is complete with a reading room, three meeting rooms, housed in a bright and peaceful space just off our Dinosaur Gallery. It combines traditional library functions with digital services like databases and e-journal consultations.

Our vast collection of books, periodicals, maps, photographs and archives dates back to the 17th century, and is still growing. Our main library recently incorporated the collections of the biodiversity library and the geological service. Nature associations like Naturalistes Belges have also donated their collections of publications. One collection brought to us from the non-profit Natagora included over 200 periodicals, completing significant gaps in our archives.

The Institute's team of librarians works to track down articles and make them available for researchers, both in our collection and borrowing from libraries across Europe. The team also hosts interns studying to work in libraries and archives. This year, the intern from the IESSID campus of the Haute École Bruxelles-Brabant was writing her thesis on the Institute's Philippe Vandermaelen collection consisting of over 500 publications, maps and plans, acquired in 1879.

3 PUBLIC

SO, HOW'S TRIX?

The star of this year's temporary exhibition was a big one: *at 4 metres tall and over 12 metres long, this Tyrannosaurus rex couldn't help but make a big impact on our visitors.*

After a difficult year, families in Belgium were ready for an exhibition that they could enjoy all together, as thrilling for dino hunters aged 5 as for those aged 85. *T. rex* did not disappoint. Almost twenty years since our last temporary exhibition on dinosaurs, our visitors were more than ready to become "T. rexperts".

Centre of attention was Trix, a lifesize 3D reproduction of one of the most complete *T. rex* skeletons ever discovered, presented in a position poised to attack. It meant visitors could get up close and personal with this awe-inspiring specimen. The original was excavated in 2013 in a geological formation known as Hell Creek in Montana, US, by a team of palaeontologists from Naturalis in the Netherlands: our partners for this exhibition. She is also the oldest *T. rex* at time of death that has been found to date, at over 30 years old.

Accompanying Trix were twelve interactive activities that aimed to inspire. They used dancing, bike riding and interactive graffiti as opportunities to discover how *T. rex* once lived. Videos explored the research of palaeontologists from our Institute and beyond, giving a real sense of how scientists can draw conclusions by analysing the fossilised remains of these prehistoric beasts. By including English translations alongside the Dutch and French we ensured the exhibition was accessible for visitors from a wide range of backgrounds. And the numbers tell a positive story: we were delighted to see most visitors taking the opportunity to meet Trix.

NEW LINES OF COMMUNICATION

2021 was the first full year that visitors could access every gallery in the freshly-renovated Museum, *complete with fully signposted routes. Our communications team were keen to innovate to ensure the message got across.*

One rising star on our social media in 2021 was a lot older than your average influencer. Arkhane, our very own allosaurus was featured in one of our most popular Instagram posts with over 600 likes. In 2021 we also launched a series of short films on Instagram TV, Facebook and YouTube featuring the team from the Institute exploring how Arkhane lived 155 million years ago, how he died and how he put on 100kg per year! The series received a total of over 20,000 views.

Our latest addition, Living Planet, was also the centre of attention this year. As well as the usual posters, leaflets and ads in the press, we opted for some new ways of reaching our audiences about the 2000m² new permanent gallery. A photobooth appeared in the forum at the entrance of the Museum for visitors to send images of their experiences to friends and family. A series of fun videos also appeared on social media, featuring a number of the Living Planet specimens coming to life and rocking out to selected soundtracks.

Two famous voices brought some star power to our communications work, in the shape of Dutch-speaking actor Tine Embrechts and French-speaking comedian Kody. Thanks to a cooperation with Het Geluidshuis, Visit Brussels and the Brussels Capital Region as well as staff from across the Institute, we produced an entertaining new audioguide that also proved a big hit as a podcast, with 8700 total downloads and streams. With special versions for kids and adults, Be My Guide takes you through everything you need to know about the residents of our Dinosaur Gallery.

MAINTENANCE AT THE MUSEUM

Our Exhibitions Service is passionate about making sure our visitors find our permanent galleries in perfect condition. *And this is not just about keeping up appearances!*

Visitors in September this year might have been surprised to find our entrance hall's famous humpback whale skeleton surrounded by scaffolding. Fear not: the whale is going nowhere! This was just part of our standard cleaning and maintenance that all our specimens have to regularly undergo to ensure they are in good condition and secure.

For large skeletons like the whale, this is no easy task: it took 8 hours to set up the tailor-made scaffolding and then four weeks of meticulous cleaning with a paintbrush and a vacuum cleaner. The security of the ceiling fixtures was shown to still be in excellent shape. To mark the occasion, one of our palaeontologists joined a Museum guide for our Institute's first ever Facebook Live broadcast, reaching over 2500 viewers.

The whale is just one of hundreds of specimens in our Museum's halls that is included in the Institute's maintenance plan. Since the opening of Living Planet last year, this task has become even more challenging, now that every gallery in our building is currently open to the public for the first time.

And the more interactive the Museum gets, the more opportunities there are for damage to our exhibits. This is particularly true of the hands-on interactive exhibits. When our touchscreens are confronted with the hands of 350,000 visitors per year, there can be consequences! Maintenance is made all the more complex by the fact that our exhibitions are all custom-made, with no IKEA catalogue to turn to when replacement parts are needed. But though our maintenance crew may be a small team, their dedication to the task is huge.

TAILORING OUR EDUCATIONAL ACTIVITIES FOR ALL

For our Museum, there is no "average visitor". *Our audiences are diverse with a real mix of needs and interests. For our Educational Service, this is a chance to rise to the occasion, adapting what we can offer for a whole range of requirements.*

Children who are deaf or hard of hearing can experience our Museum differently. In July we offered a special, inclusive two-day summer school activity where one in three children joining were deaf or hard of hearing. Our Educational Service worked closely with the Brussels non-profit Centre "Comprendre et Parler" not only to ensure that the activities met the needs of the participating children, but also to train our team on how they could better support deaf children in their daily practice.

For our team, COVID-19 restrictions were an opportunity to rethink the types of guided visits we offer non-school groups. And so, the VIP Bubbles were born: a new package at an attractive price where any small group of visitors has their own Museum guide. The format was perfect for social bubble requirements: families could visit comfortably, keeping safe distances. And when schools returned to the Museum, we still offered our VIP Allosaurus on Wednesday afternoons, with exclusive hands-on access to a real allosaurus excavation in the palaeontology lab.

How can teachers make the most of their class trips to the Museum? Our Educational Service is always looking for new ways for teachers to make the most of this exciting chance to engage differently with their students. This year we launched a free teacher's guide with a thematic set of routes around our exhibition that gives them extra autonomy in their visits, covering topics linked to school curricula from reproduction to evolution. They are available to download from our online toolkit.

4 FIGURES

FINANCES

The 2021 budget remains marked by a working environment linked to COVID-19. In a manner comparable to the situation experienced in 2019, the RBINS ended the year with a positive result, largely due to the slowdown of activities linked to the health crisis.

In 2021, the positive result is principally attributable to the under-utilisation of staff credits, delays in putting the new oceanographic research vessel Belgica into operation, and progress made in the context of new Belspo and DGD research contracts.

As in 2020, the RBINS benefited from the support of interdepartmental provisions compensating for the loss of earnings from Museum admissions following the pandemic (247,000 euros), a contribution to the launch of Belgica (953,000 euros) and a contribution (200,000 euros) towards a scientific pre-study in connection with a new wind turbine park in the Princess Elisabeth zone in the North Sea (part of the federal recovery plan).

The Museum has not yet returned to 2019 visitor admission levels (-10%) but has recovered well compared to 2020 (+58%).

The income recorded by the Educational Service returned to 2019 levels, highlighting the interest of the public (and schools in particular) in the support for science offered by the dynamic OD Public teams.

2021 sees a new way of presenting the income that finances our activities, by differentiating between grants for research purposes and scientific service contracts in the true sense of the term. Of 12.8 million euros, 9.3 million was to subsidise fundamental and applied research and 3.5 million for the supply of scientific services to Belgian and foreign public bodies and to private organisations. In all cases, the RBINS maintained resources destined for the development of scientific research at a relatively constant level of +/- 10 million euros.

The specific identification of scientific services highlights the importance (1.3 million euros) of services to Belgian public bodies, whether federal, regional or local. Income from services to the private sector remains at around 2 million euros and is mostly related to monitoring the wind turbine parks and following up the exploitation of North Sea sand and gravel.

Staff costs remain the weightiest item on the expenditure side (65%). In years to come, monitoring the development of the staff plan will receive our full attention.

In 2021, the method of operating the new Belgica changed. The result is that we no longer observed operating expenses attributable to the Ministry of Defence.

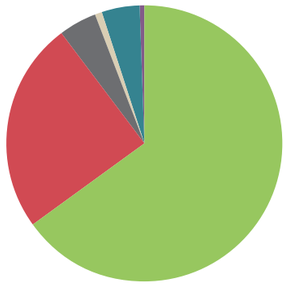
The level of investment was relatively low compared to 2019, when renovations to the Living Planet rooms were in full swing before work was completed at the end of 2020.

There was, however, a notable increase in investments in scientific equipment as part of our global investment plan.

Despite the delays in investments due to the COVID-19 crisis, the RBINS remains very dynamic in the field of research, and in welcoming visitors to the Museum and the collections.

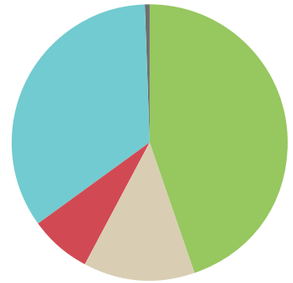
BREAKDOWN OF EXPENSES (IN €)

	2019	2020	2021
Staff	**22,476,880**	**21,397,830**	**21,668,610**
Ordinary operational expenses	**5,851,529**	**5,592,824**	**8,253,932**
Investment	**2,122,178**	**1,013,198**	**1,483,314**
Scientific	455,530	309,589	698,664
Museum	1,043,964	141,328	460,027
Others	622,684	562,281	324,623
Library and collections	**176,388**	**269,486**	**249,846**
Transfers to research partners	**814,963**	**403,489**	**1,545,156**
Transfer to Defence for the Belgica	**2,434,422**	**2,580,951**	**–**
Other transfer	**156,323**	**113,469**	**101,883**
Total	**34,032,683**	**31,371,247**	**33,302,741**



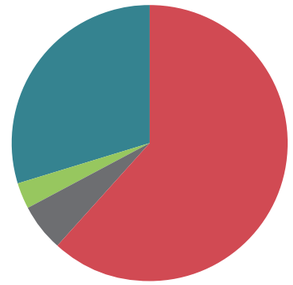
SOURCES OF INCOME (IN €)

	2019	2020	2021
General grant	**16,580,000**	**16,681,872**	**16,764,000**
Specific Grant	**3,542,000**	**4,327,436**	**4,859,323**
Museum: own income	**4,194,040**	**1,665,010**	**2,665,665**
Research: own income	**9,890,284**	**10,301,587**	**12,793,633**
Various: own income	**197,340**	**140,820**	**182,166**
Total	**34,403,664**	**33,116,725**	**37,264,787**



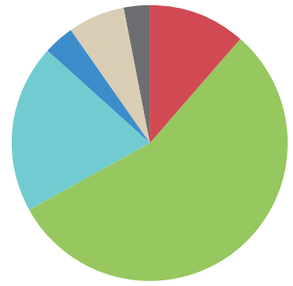
BREAKDOWN OF SPECIFIC GRANTS (IN €)

	2019	2020	2021
Belgica	3,134,000	3,177,876	2,998,000
JEMU	274,000	279,252	279,252
Public Observatory (all federal Museums)	134,000	137,000	138,748
Interdepartmental provision	0	733,308	1,443,323
Total	**3,542,000**	**4,327,436**	**4,859,323**



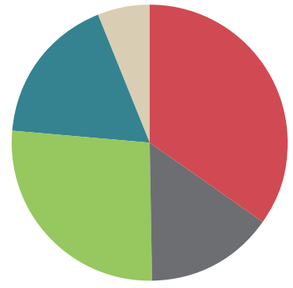
BREAKDOWN OF INCOME OF THE MUSEUM (IN €)

	2019	2020	2021
Museum renovation grant	1,027,492	0	304,678
Ticket sales	1,660,993	943,012	1,486,772
Exhibition hire and sales	77,000	205,043	–
Museumshop	502,847	334,345	522,393
Donations - sponsorship - grants	483,510	65,869	95,462
Education	178,535	49,741	177,133
Events	218,063	54,106	79,227
Dinocafé	45,600	12,894	–
Total	**4,194,040**	**1,665,010**	**2,665,665**



BREAKDOWN OF RESEARCH INCOME (IN €)

	2019	2020	2021
Belspo	1,669,539	2,125,139	3,258,427
Federal administrations (excl. Belspo)	1,313,552	2,070,856	1,391,668
European Union	2,305,683	1,279,106	2,500,467
Belgian federated entities	2,051,345	1,822,422	1,625,160
Private sector	2,156,868	2,418,989	–
Outside the EU	393,297	585,075	557,362
Services			
Public sector	–	–	1,332,163
Private sector	–	–	1,988,121
Outside the EU	–	–	140,265
Total	**9,890,284**	**10,301,587**	**12,793,633**



STAFF

Staff numbers remained relatively stable in 2021. There was a slight fall in the number of statutory administrative and technical employees. A number of staff selection procedures failed to produce any candidates, while relaunching such a procedure is time-consuming as for certain positions there are no reserves.

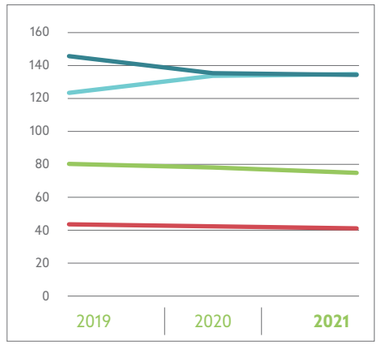
In 2021 we saw absenteeism figures increase slightly at the RBINS, drawing close to 2019 levels. There was a small increase from 4.20% in the previous year to 4.84% in 2021, while remaining below the average for the federal government as a whole. 2021 saw a sharp fall in workplace accidents compared to 2020, but this is attributable solely to a single incident in 2020 involving several employees. As regards accidents when commuting to and from the workplace, we note an increase compared to 2020 but a figure equal to that of 2019. One explanation for this is the more flexible COVID measures, resulting in a reduction of remote working at certain times.

In 2021, 46.89% of staff were female. This marks a further increase compared to the previous two years, albeit a slight one. We are seeing a particular increase in the number of female employees in scientific and administrative level A positions. This must be seen as a positive development.

Also in 2021, our voluntary staff were unable to provide the level of support they did in the past. Due to COVID restrictions and compulsory home working, they at times had limited or no access to our buildings.

STAFF BREAKDOWN BY STATUTE

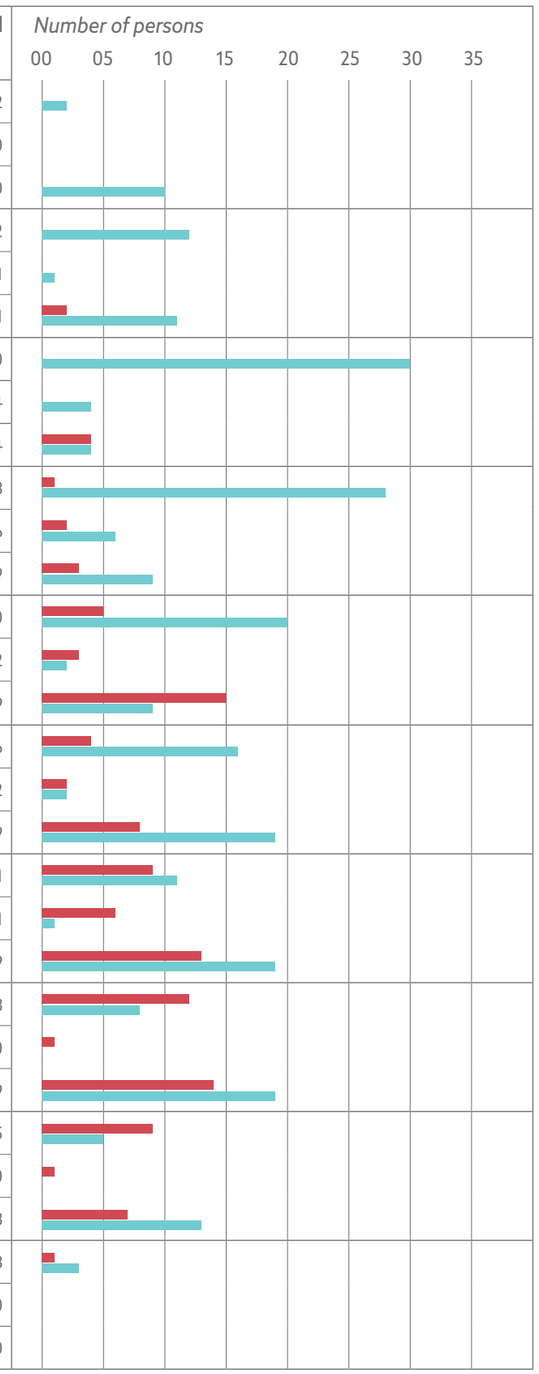
	2019	2020	2021
Statutory scientists	43 / 41.4	42 / 39.2	41 / 39.5
Statutory administrative and technical staff	80 / 72	78 / 70.86	75 / 71.6
Contractual scientists	124 / 113.1	134 / 123.95	135 / 120.25
Contractual administrative and technical staff	146 / 129.35	136 / 121.1	135 / 122.4
Total	**393 / 355.85**	**390 / 355.11**	**386 / 353.75**



The first number refers to the number of employees, the second to the number of full-time equivalents (FTE).

AGE DISTRIBUTION

		Statutory	Contractual
18 - 25	SW	0	2
	A	0	0
	BCD	0	10
26 - 29	SW	0	12
	A	0	1
	BCD	2	11
30 - 34	SW	0	30
	A	0	4
	BCD	4	4
35 - 39	SW	1	28
	A	2	6
	BCD	3	9
40 - 44	SW	5	20
	A	3	2
	BCD	15	9
45 - 49	SW	4	16
	A	2	2
	BCD	8	19
50 - 54	SW	9	11
	A	6	1
	BCD	13	19
55 - 59	SW	12	8
	A	1	0
	BCD	14	19
60 - 64	SW	9	5
	A	1	0
	BCD	7	13
65 +	SW	1	3
	A	0	0
	BCD	0	0



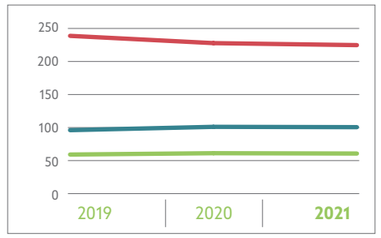
SW = Scientists

A = Level A (Master)

BCD = Levels B (Bachelor), C (secondary education) and D (no degree)

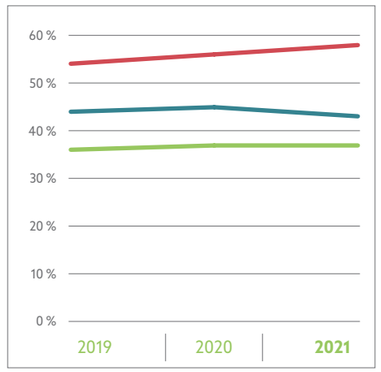
SOURCES OF **STAFF FINANCING** (NUMBER OF PERSONS / IN FTE)

	2019	2020	**2021**
General grant	239 / 217.60	228 / 207.36	225 / 210.70
Ordinary income	59 / 52.65	61 / 54.90	60.5 / 54.40
External projects	96 / 85.60	101 / 92.85	100.5 / 88.65
Total	**394 / 355.85**	**390 / 355.11**	**386/353.75**



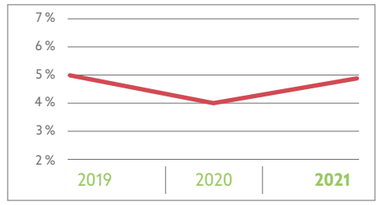
PERCENTAGE OF **FEMALE STAFF** (%)

	2019	2020	**2021**
Statutory staff	**30.08**	**30.83**	**31.03**
Scientists	25.58	26.19	26.83
Level A	41.67	50.00	53.33
Levels B, C and D	30.88	32.20	28.33
Contractual staff	**52.96**	**53.33**	**53.70**
Scientists	46.77	48.51	48.15
Level A	66.67	62.50	62.50
Levels B, C and D	57.25	57.50	57.14
Total	**45.80**	**46.41**	**46.89**



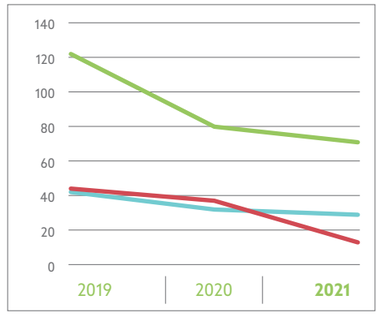
ABSENTEEISM AND **WORK ACCIDENTS**

	2019	2020	**2021**
Work accidents	5	16	3
Accidents on the way to work	7	2	8
Absenteeism RBINS	5.30%	4.20%	4.84%
Absenteeism federal level	6.52%	6.23%	5.93%



VOLUNTEERS

	2019	2020	**2021**
Research volunteers	122	80	71
Collections volunteers	44	37	13
Museum volunteers	42	32	29
Total	**208**	**149**	**113**



ENVIRONMENT

Like 2020, 2021 was marked by the ongoing COVID crisis with a strong impact on our organisation's functioning. Although the Museum was open, only Museum staff and technical staff were present in full. For many of us, telework was still the general rule and days at the office were an exception. This meant a lot of hours less on the road and a reduction of our ecological footprint. Furthermore, travel restrictions resulted in a booming of online events. With the additional benefit of ease of access and the possibility of reaching more people, this seems to be a valuable alternative. In all, let us hope we can retain some positive elements of our ways of working during this crisis.

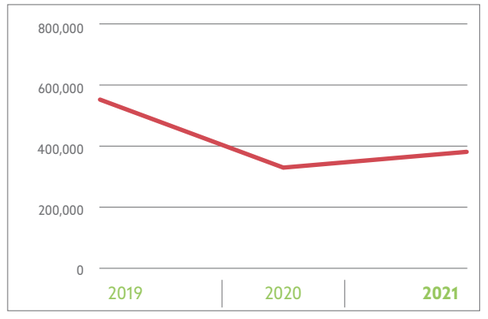
Looking into the environmental indicators we can see an increase in electricity and paper use compared to 2020, but a reduction compared to 2019. This is in line with expectations as more people occasionally went to the office, but fewer than before the COVID crisis. For our gas consumption we can see a similar pattern, but as the temperature in the building is less dependent on the number of people present, a different explanation is necessary. In fact, we encountered several problems with our gas combustion installation, resulting in some increases and some decreases in consumption, depending on the problem.

Finally, a mobility survey was executed during and after the week of mobility. Unfortunately, the response rate was low and data from the HR service was used to complement the survey. From this we can see a slight decrease in the use of public transport, offset by an increase in use of bicycles. Currently a permit application is in treatment for the construction of a bicycle park to meet this rising demand and to encourage others to use the bicycle as well.

ENVIRONMENTAL INDICATORS

	2019	2020	**2021**
Electricity consumption in equivalent tonnes of CO_2 emissions	464.3	382.4	420.4
Electricity consumption in kWh	2,054,497	1,692,023	1,860,318
Gas consumption in equivalent tonnes of CO_2 emissions	Currently not available	827.6	1,020.8
Pages of paper printed	551,937	328,734	380,459
Percentage of commutes using public transport	65%	Survey posponed to 2021 due to COVID-19-crisis	63%

PAGES OF PAPER PRINTED



RESEARCH

The total number of publications has stabilised after the sharp drop in 2020 compared to 2019. The COVID effect remains clearly visible. Although the number of abstracts (resulting from presentations at scientific meetings – not shown in the table) in 2021 has increased since 2020, from 53 to 86, it is still much lower than the figure of 189 in 2019, before COVID. Also in 2021, many meetings were postponed or cancelled, resulting in fewer abstracts published.

The number of A1 papers (papers in journals with a Journal Impact Factor and an important metric of scientific excellence) is still very high. However, the number of A1 papers published in 2021 has decreased by around 10% compared to the previous year. This means that the increased output of A1 papers, which was expected because of increased teleworking, has not happened. The reason for this might be that 2021 was a busy year regarding open calls for project applications. Scientists are in such cases always confronted by a tough choice: while writing time-consuming project applications, paper-writing has to be postponed, because project applications always have a strict deadline. Plus, several scientists have been impacted personally by COVID, sometimes for an extended period of time.

The drop in A1 papers is also visible in the second table: the average number of A1 papers per FTE Type I researcher has decreased from 2.9 in 2020 to 2.5 in 2021. On the other hand, the average of total number of papers (all types, not only A1 papers) per scientist (all scientists active in research) has increased from 3.5 in 2020 to 4.0 in 2021.

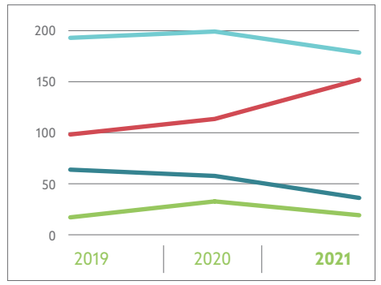
FUNDING OF CURRENT SCIENTIFIC PROJECTS

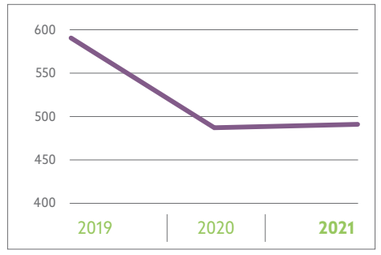
	2019	2020	2021	2021
	Number	Number	Number	Amount (in €)
Belspo	**46**	**58**	**44**	**3,258,427**
Number of projects coordinated by RBINS	33	42	28	2,305,835
Federal funding from other sources	**9**	**11**	**3**	**1,391,668**
Number of projects coordinated by RBINS	9	11	0	–
European Union	**30**	**34**	**30**	**2,500,467**
Number of projects coordinated by RBINS	2	1	1	1,351,881
Federated entities	**23**	**25**	**20**	**1,625,160**
Number of projects coordinated by RBINS	8	15	10	769,334
Private sector	**5**	**9**	**0**	**–**
Number of projects coordinated by RBINS	5	9	0	–
Outside the EU	**9**	**8**	**8**	**557,361**
Number of projects coordinated by RBINS	9	8	8	397,120
Total	**122**	**145**	**105**	**9,333,083**
projects coordinated by RBINS	66	86	47	4,824,170

PUBLICATIONS

	2019	2020	2021
Scientific publications in Open Access	99	114	152
Scientific publications in journals with Impact factor	193	199	179
Popular works	18	33	20
Expert reports	64	58	37
Total Publications	**592**	**486**	**490**

As the Biblio4Plone database, where all RBINS publications are collected, is a living database, people can add papers at any time, also after the publication of the annual reports. Therefore, numbers of publications for 2019 and 2020 might differ from those in previous annual reports.
"Total" (last row) is not the sum of the previous four rows, as rows 1 and 2 have some overlap (some papers in journals with Impact Factor can also be in Open Access), while several other types of papers (abstracts,...) are not listed here.

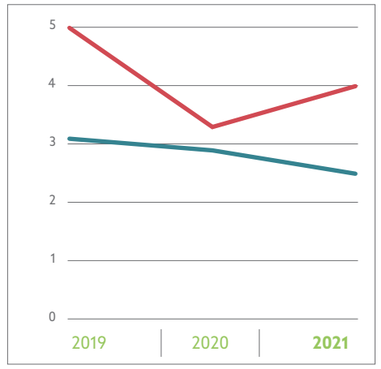




AVERAGE NUMBER OF PUBLICATIONS PER SCIENTIST (IN FTE)

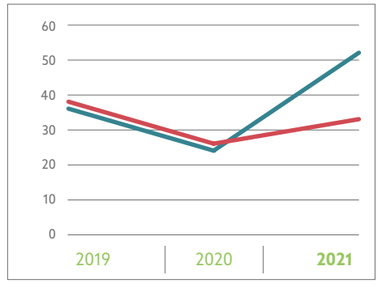
	2019	2020	2021
All publications per scientist	4.6	3.5	4.0
All publications with impact factor per researcher	3.2	2.9	2.5

Average number of publications per FTE scientists: using all types of publications, and FTE of all RBINS scientists, both those actively publishing primary research (Type I) and those working for scientific services (Type II). Average number of A1 papers per FTE researchers: using only A1 type papers (=published in journals with Impact Factor) and FTE of RBINS researchers who are actively publishing primary research (Type I). Individual scientists can be, for example, 70% of Type I and 30% of Type II, which is why we use cumulative FTE.



SUPERVISION OF STUDENTS

	2019	2020	2021
PhD	38	26	33
Master	36	24	52
Total	**74**	**50**	**85**



LIBRARY AND COLLECTIONS

As in 2020, the library continued to offer remote services (inter-library loans, loans/returns via the lockers at reception, etc.). Subscriptions to ScienceDirect (Elsevier e-pack) resulted in more than 3,000 articles being consulted.

A basic service was provided on site for certain tasks and to welcome external readers by appointment. Remote working permitted a notable increase in the digitisation of the collection.

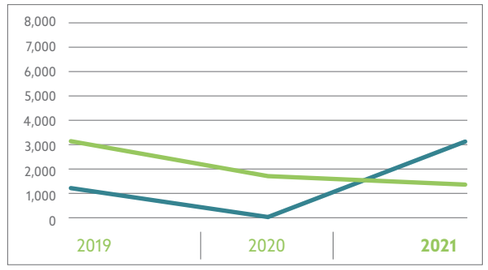
On-site activities for the collections were limited whenever possible, as in 2020. There were significantly fewer visitors and visit days than during the pre-COVID years. Other activity indicators, such as the number of scientific loans (files and specimens) or the growth of collections, are up compared to 2020 but still significantly down on 2019 levels.

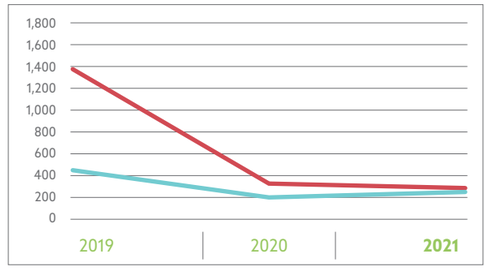
The digitisation objectives were not greatly affected. The DIGIT-4 programme and DiSSCo-Fed project made it possible to continue the digitisation of the collections and archives. Certain activities such as micro-CT were adapted to limit the number of operators and other activities were reorganised to permit remote working. A return to regular on-site working is nevertheless desirable as the number of tasks that can be done remotely remains limited compared to the work possible on physical collections.

CONSULTATIONS

	2019	2020	**2021**
Library			
Paper documents	3,154	1,687	1,332
Electronic documents	1,203*	–	3,139
Collections			
Number of scientist visits	448	193	244
Duration of scientific visits (days)	1,375	320	279
Number of loans from the collections	406	229	291
Number of loaned specimens	100,955	15,885	32,764

* Only the figures from Web of Sciences and Zoological Record are available for 2019.
As we no longer use a paid tool such as AtoZ, an overview of the use of the e-journals in OA and/or free with the print edition is not consultable.





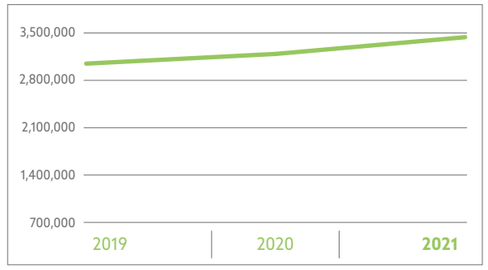
SIZE

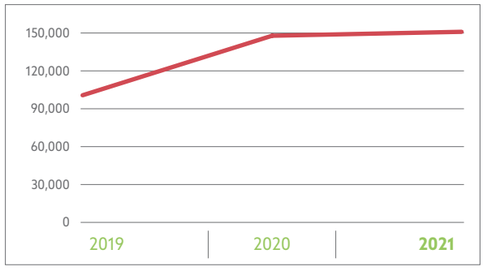
	2019	2020	**2021**
Library			
Size of the library	419,839 items*	430,222 items*	446,743 items*
Growth of the library	Total growth of 1.3 %	Total growth of 2.4 %	Total growth of 3.6%
Collections			
Number of acquisitions	+ 162,035	+ 46,408	+ 98,063

* **item** = physical unit

DIGITISATION

	2019	2020	**2021**
Library			
Back-cataloguing	6,960	9,005	18,237
New inventory entries	–	–	1,507
Digitisation of the catalogue of the library	47,859	0	0
Number of digitised pages	6,414	32,010	8,325
Collections			
Type specimens	2,602	4,332	4,202
Non-type specimens	1,191	800	797
Boxes & Drawers	264 + 5,133	251 + 980	2,889 + 1,660
The new registrations in the databases	20,556 (DaRWIN) 55,152 (Import DaRWIN) 6,669 (Pal Access)	47,889	54,697
The number of new types	3,609 records 9,478 specimens (DarWIN) 3,421 (Pal Access)	5,633	5,313
The total of digitised specimens (metadata)	3,050,211	3,194,226	3,442,585
The total of digitised type specimens	100,944	148,122	151,246
The total of digitised species (all specimens)	85,289	112,189	131,400
Scientific archives	51,878	72,061	48,961
Pictures	11,853	21,747	57,397





MUSEUM

With increased global admissions (+40%), the Museum experienced a progressive return to normal (300,000 visitors a year) in 2021. The Living Planet gallery and the *T. rex* temporary exhibition both attracted large visitor numbers. However, the introduction of the "Museum + exhibition" combined admission means it is no longer possible to put a figure on the number of visitors to each.

2021 was nevertheless marked by one major absence: school groups. The restrictions and uncertainties regarding school outings caused many teachers to be "overly cautious". School activities struggled to reach even 30% of the level for a normal year (2018-2019)! Our efforts to encourage this target audience to switch to online activities (Studio SEED) have not yet borne fruit. Another victim of this instability was the Reservations service, whose work was made extremely complicated due to the many cancellations.

In contrast, family activities attracted large numbers of visitors, almost up to pre-pandemic levels. Guided visits for families (VIP Bubbles) proved particularly successful. Is this perhaps symptomatic of a post-pandemic desire to take more advantage of activities close to home? Individual visitors therefore compensated for the drop in school groups in the total admission figures. It should be noted that the new rates - with admission prices up 25%-30% - did not discourage this group (no complaints received).

During this very turbulent year, the efficiency and flexibility of the first and second line services should be stressed. For Reception in particular, COVID measures had a major impact on their day-to-day activities (checking the CST at the entrance) and they also had to manage some disgruntled visitors. Special mention should also be made of the Communications and Exhibitions team for their flexibility in adapting to successive COVID measures!

Unsurprisingly, the pandemic had a major impact on the hire of spaces for commercial events (-66% compared to 2019 but slightly up on 2020). The Dino Café was closed for half of the year and its clientele limited by restrictions imposed on catering. The Museum Shop was alone in bucking the trend as it recorded a record turnover, easily exceeding half a million euros. Was this perhaps due to families switching their leisure budgets as they were unable to visit zoos, amusement parks, cinemas and theatres? 2022 revenue will no doubt tell us whether or not this is the case.

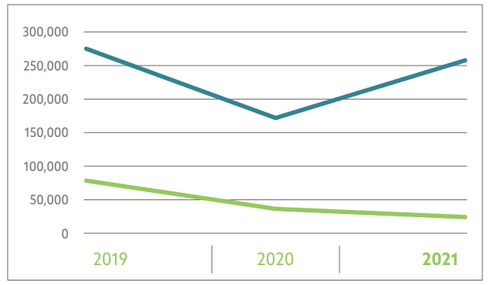
MUSEUM VISITOR ACTIVITIES

	2019	2020	**2021**
Total Museum visitors	**353,054**	**206,657**	**280,730**
Permanent galleries	234,161	47,951	1 single ticket
Temporary exhibitions indoor	118,893	158,706	
Museumshop customers	30,462	17,533	25,918
Expenses per customer	€ 16.26	€ 18.90	€ 20.16
Participants in educational and cultural activities	**50,341**	**20,562**	**28,208**
Participant per activity (global)	20.4	21.8	24.7
Guided tours	11,934	4,068	4,392
Workshops	13,908	4.870	5,165
Other indoor activities	9,917	3,232	3,672
Outdoor activities	14,582	8,392	8,896

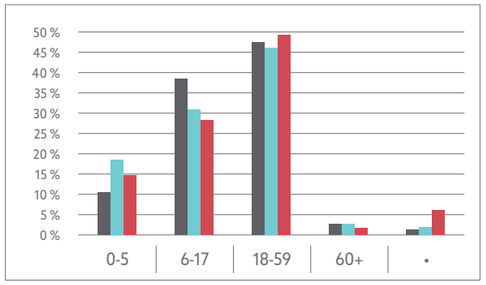
PROFILE OF THE MUSEUM USER

	2019	2020	**2021**	
By type	**353,054**	**206,657**	**280,730**	
Visitors in groups	77,915	35,445	23,071	
Individuals and families	275,139	171,212	257,659	
By age			*from 1/10/2021*	
Small children (0-5 years)	10.42%	18.53%	*0-4*	14.76%
Young people (6-17 years)	38.36%	30.88%	*5-17*	28.29%
Adults (18-59 years)	47.33%	46.04%	*18-64*	49.25%
Senior citizens (60+)	2,62%	2.73%	*65+*	1.6%
Not known •	1,27%	1.82%		6.11%
Participants in educational and cultural activities	**50,341**	**20,562**		**28,208**
Visitors in groups	42,524	17,849		20,946
Individuals and families	7,817	2,713		7,262
Average participants per activity	20.4	21.8		24.7

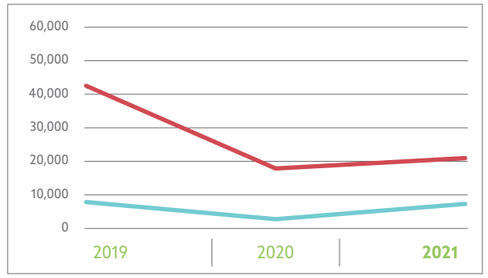
MUSEUM VISITORS: VISITORS IN GROUPS VERSUS INDIVIDUALS AND FAMILIES



MUSEUM VISITORS: AGE



PARTICIPANTS IN EDUCATIONAL AND CULTURAL ACTIVITIES



PRESS AND INTERNET

In 2021, as in previous years, we appeared in the media on average four times a day, whether in the regional, national or international press. Within the total figure of 1488, there were more publications on scientific subjects than on the Museum activities.

At a national level, subjects linked to the marine world received particular attention (beached animals, wind turbine parks, sniffer plane, former and new Belgica vessel). Ornithology was regularly featured (ringing, migration and Falcons for Everyone). The new *T. rex* exhibition also received considerable radio and television coverage.

At an international level, research on the impact of offshore wind turbine parks on marine biodiversity attracted widespread media attention in neighbouring countries. The auctioning of dinosaurs and studies revealing the age of Neanderthals and on the odours emitted by insects all received extensive coverage in the international press.

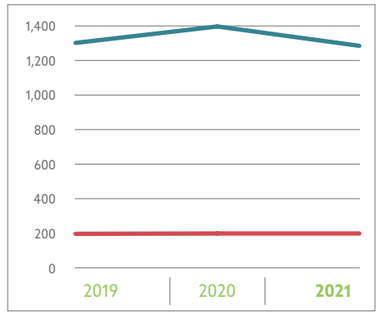
RBINS staff were cited in half of the radio and television reports and in a quarter of the articles in the written press. Journalists are increasingly seeking their scientific expertise and asking to consult them on specific subjects.

After a significant increase in the number of Facebook followers in 2020 due to lockdown and our #NaturalsciencesAtHome initiatives, in 2021 the increase (+ 2,024) returned to normal levels to reach 18,724 followers.

Our Facebook page reached 1.8 million people this year. The fall in the number of tweets (100 fewer) also stifled the increase in the number of followers (+333 / total 13,616) on Twitter. On Instagram we saw a bigger increase than during the past two years (+1,175) to reach 4,856 followers. Instagram and TikTok (recently launched) represent huge potential for growth in reaching adolescents and young adults.

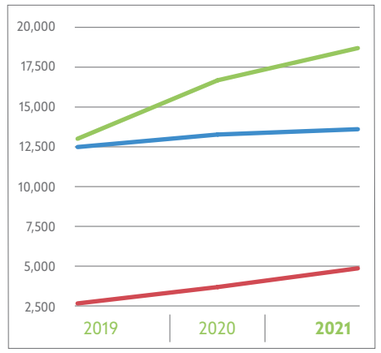
IN THE MEDIA

	2019	2020	**2021**
Printed press	**1,305**	**1,401**	**1,288**
Of which research	906	903	1,046
Of which Museum	399	498	259
Radio and TV	**197**	**200**	**200**
Of which research	138	104	127
Of which Museum	59	96	73
Total	**1,502**	**1,601**	**1,488**



ONLINE AND SOCIAL MEDIA

	2019	2020	**2021**
Websites			
Website visitors	736,401	749,304	865,883
Website visits	1,223,801	1,324,252	1,493,720
Visited pages	3,442,154	3,394,558	3,898,989
Social media			
Facebook followers	13,021	16,700	18,724
Twitter followers	12,500	13,283	13,616
Instagram followers	2,652	3,681	4,856



These are the website figures without the streaming of Falcons for Everyone, because the streaming numbers appeared to be difficult to compare over de last few years. Just to give an idea: the streaming normally accounts for a million to several millions of visited pages.

THE RBINS IN BRIEF

Missions

RBINS has been entrusted with four major missions:

- Scientific research into natural sciences;
- Scientific expertise at the service of the public authorities;
- Conservation and management of scientific and heritage collections;
- Dissemination of scientific knowledge in society.

Research & expertise

One out of every three people at the RBINS is a scientist. The scientific personnel includes mainly biologists, palaeontologists and geologists, but also oceanographers, anthropologists, prehistorians and archaeologists, as well as geographers, physicists, bio-engineers and mathematicians, which enables it to conduct multidisciplinary research.

Lines of Research;

- Biodiversity and geodiversity;
- Biological evolution and the history of life;
- Marine and freshwater ecosystems' management;
- History of the human/environment relationship;
- Applied geology.

Service Provision

- The RBINS provides scientific expertise under Belgium's international commitments in relation to environmental protection.
- It develops tools and methods for monitoring natural land or marine environments.
- It also offers useful advice for the development of national and European policies for the protection and conservation of biotopes and biodiversity and the use of natural resources.

Collections

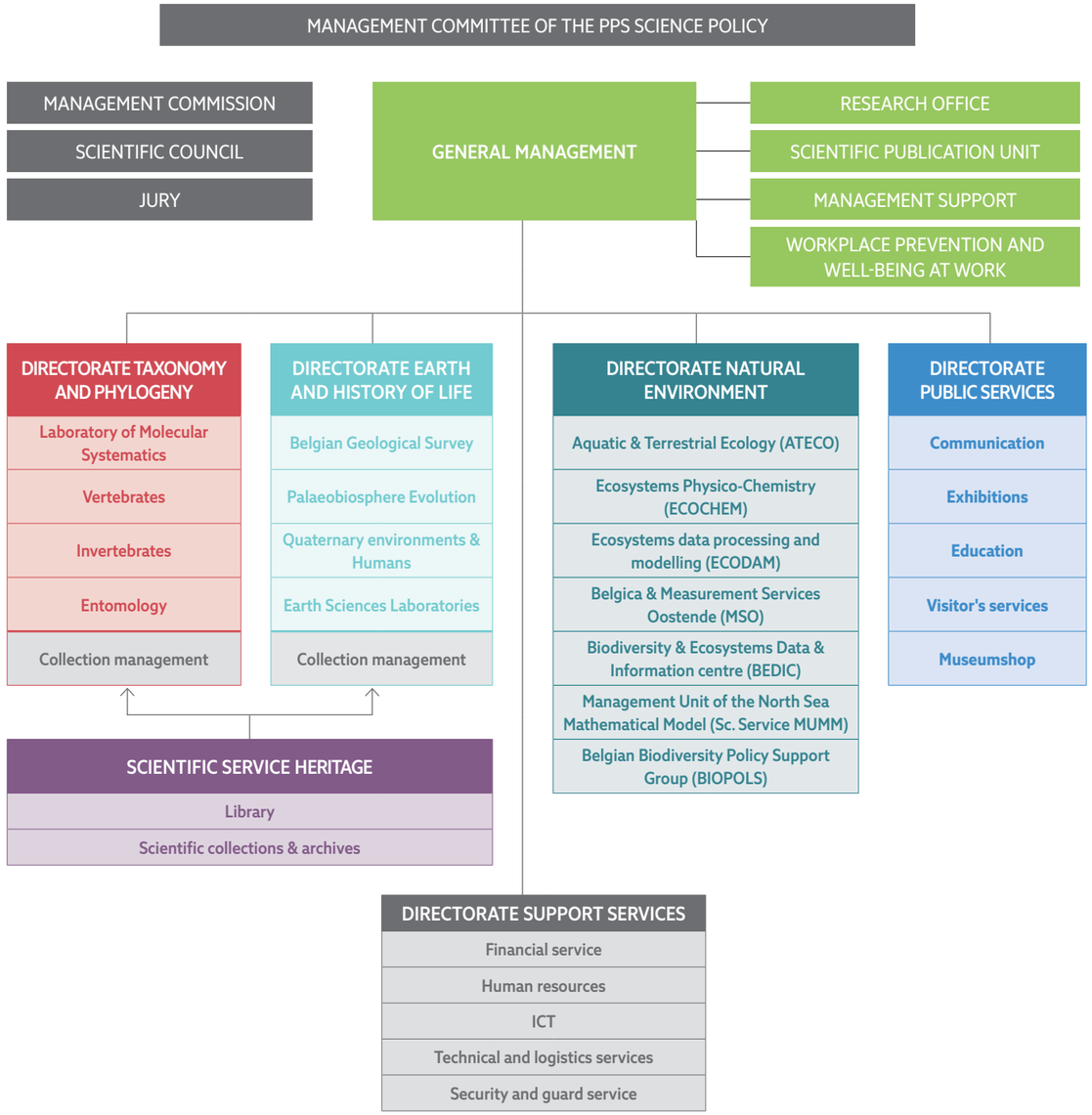
With their 38 million specimens conserved as Belgian heritage of universal significance, the RBINS's collections come just after London and Paris in the European classification, and belong to the top 10 largest collection in the world. They serve above all as reference and research tools and as such belong to the European 'major research infrastructure'. In this respect they are constantly being visited and studied by researchers from around the world. For several years now, the RBINS has been committed to an ambitious programme to digitise its collections and to do so has developed an open-source software, DaRWIN, which has made it possible to encode all the data on any collection of specimens, whatever their taxonomic group.

Museum

For the general public, the Natural Science Museum is the visible part of the RBINS. It has 16,000 m^2 of permanent galleries, temporary exhibition rooms and educational workshops, public spaces of all kind, enabling it to welcome more or less 300,000 visitors each year, approximately 25 % of whom are school groups. Its *Dinosaur Gallery* is world famous and the largest in Europe.

It plays a leading role in the promotion and dissemination of scientific culture, both within and beyond its walls, notably through travelling exhibitions and events. The RBINS is pursuing ambitious efforts to gradually renovate the premises, to make the Museum more convivial and better adapted to people's expectations. The Museum also takes a resolute position promoting a more respectful approach to nature.

ORGANISATION



The Royal Belgian Institute of Natural Sciences is one of the ten federal scientific institutions that are governed by the Belgian Science Policy Office (Belspo).

The RBINS is a State service.
It is managed by **three independent entities:**

- The **Scientific Council** offers advice on issues of a scientific nature that have an impact on the accomplishment of the tasks of the Institute.
- The **Management Commission** is responsible for the financial and practical management of the RBINS. It is the same body for the RBINS and the Royal Museum for Central Africa.
- The **General Director** is responsible for the day-to-day Institute's management. She is assisted by the **Management Board.**

Moreover the **Jury for recruitment and promotion** is responsible for recruiting the permanent scientific employees and monitoring their carreers.

The Institute's General Director is also a full member of the Management Committee of the Belgian Science Policy Office.

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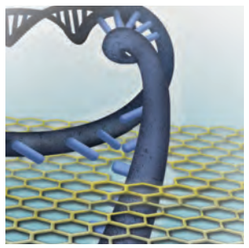

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