

ROYAL BELGIAN INSTITUTE OF NATURAL SCIENCES

# ANNUAL REPORT 2017



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# FOREWORD

**“An outstanding offer in an outdated shell”:** these words sum up the conclusions of the panel of international experts that came to evaluate our activities in disseminating knowledge.

This conclusion recognises the intense efforts that have gone into renewing what we offer. In recent years, three quarters of our exhibition halls have been completely renovated. Scientific content has been updated, the museographic approach has been modernised and there is a greater focus on inclusion, such as guided visits in sign language. We are delighted to have this acknowledged by our peers as well as by the visitor numbers, as we see again in 2017.

But these experts also underline the extent to which accessing the Museum is uninviting. Despite the warm welcome from our teams and the willingness of our visitors, our spaces are quite simply no longer up to scratch, having been built over 30 years ago and welcomed millions of visitors.

We absolutely must be able to offer services in line with current norms. This will allow us to fully achieve the renown and international reach warranted by our extraordinary Belgian collections and the recognised expertise of the Museum’s teams. A project to renovate and restructure these spaces has therefore been submitted to the Building Authority and inter-cabinet consultation bodies, anticipating a positive response.

The inadequacy of our management practices to address our missions was also highlighted, both by these experts and their predecessors who appraised our research activities. They make several mentions of barriers such as absence of autonomy and lack of financing. Several diagnoses go in the same direction: a recent report from the Court of Auditors mentions that the Federal Scientific Institutions (FSIs), including our Institute, do not have the necessary means to manage the important collections in their care. The governmental declaration also indicated the intention to give more autonomy to the FSIs. We look forward to concrete and effective measures that fully empower us to carry out our missions of collection conservation, research, and knowledge sharing with as many people as possible.

That said, this year has again shown a great deal of activity. Expeditions, exhibitions, publications, forecasts, training, observations: this report tells only part of the story. Still, it gives a sense of the abundance of results in fields as diverse as applied geology, marine forecasting, the mechanisms of evolution and the history of domestication.

In addition, behind the scenes, much time has been devoted to the preparation of new research programmes funded by the federal authority, the FPS Science Policy, which is launched in 2018. During its implementation, the schedule of which is to be announced, we hope, as always, to be able to answer the scientific needs of our time. Our aim is obviously to maintain the high standards achieved in previous programmes: during the Brain.be programme, for example, open to all universities and research institutes in the country, the RBINS took part in a quarter of the selected projects, half of them as coordinator, which is a remarkable result considering our specialisation and size.

Showing the importance of nature to everyone’s lives: this is our ambition. This range of discoveries, expertise and concrete achievements should convince you of it.

I hope you enjoy the read.

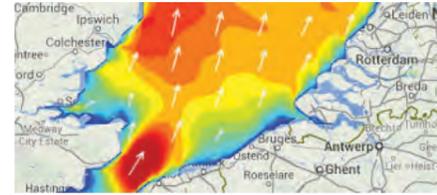


**Camille Pisani,**  
*General Director*

# 2017 AT A GLANCE

11.01

At the start of 2017, Western Europe is bracing for a potentially devastating storm. With precise predictions, the RBINS' Marine Forecasting Centre helps the Flanders Region take adequate precautions.



17.02

The CEBioS lexicon is launched. 'Habitats du Parc National de la Kibira (Burundi)' is a field guide for eco-guards to follow the evolution of forests around the Rwegura lake in Burundi.



09.03

Three international experts visit the Museum as part of the evaluation of the museum and public service activities of the Institute, commissioned by the Belgian Federal Science Policy Office.



11.03

We celebrate the tenth edition of Museum Night Fever! The theme for the evening is 'Animal Rebel Culture' including graffiti, physical theatre and DJs.



05.04

The 2017 Falcons for Everyone season kicks off! This year, the public can watch three nests of peregrine falcons in Brussels live via HD streaming.



30.04

The 59th Phasma Meeting takes place at the RBINS. It brings together stick insect enthusiasts, breeders and taxonomists from all over Europe to share their passion and experiences.



10.05

Scientists from the RBINS and the University of Liege travel to Sweden and bring back ten black grouse. They will help restore the critically endangered black grouse population on the Belgian High Fens.



15.05

The Institute publishes an overview of marine mammals and remarkable fish washed ashore and observed in Belgium in 2016.



15.05

The Museum is buzzing with activity for an inspiration day about bees. Present are organisations in the field, researchers and policy makers – including ministers Willy Borsus and Marie-Christine Marghem.



16.05

Researchers from the Institute make an entomology inventory of the Brussels Town Hall to kick off Insect Week.



18.05

Archaeologists from our Institute find the remains of a dromedary from the 4th century AD in the Belgian city of Tongeren. It is only the second time such a discovery is made in our country.



23.05

Secretary of State for Scientific Policy Zuhair Demir visits our oceanographic research vessel, the Belgica.



23.05

European Journal of Taxonomy, co-founded by our Institute, announces the publication of the journal's 1000th new species, the Bigheaded Rubber Frog.



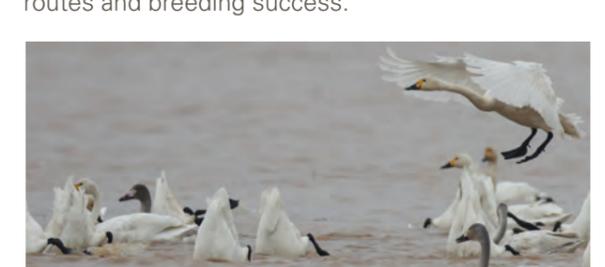
27.06

The young authors of the book 'Basile, the crocodile of Maransart' visit the Institute. They meet Basile's cousins, Martial the gavia and Hector the alligator.



01.07

During an expedition in Arctic Siberia, ornithologists from our Institute equip Bewick's swans and taiga bean geese with GPS tags to track their migration routes and breeding success.



21.07

Researchers from the Institute help discover 13 new land snail species in Nepal. In the poorly known fauna of Nepal, many more species await to be described in the future.



25.09

Researchers from our Institute present climate predictions up to the year 2100 for extreme storm surges in the North Sea at a stakeholders meeting of climate change research project CORDEX.be.



17.10

Our ornithologists band a long-tailed shrike at the Zwin nature reserve in Knokke. It is the first recorded appearance in Belgium and only the fifth time the Asiatic bird has been spotted in Europe.



18.12

Our colleague Maurice Leponce receives the *Wetrem's Award* for a significant contribution to Science from the from the Belgian Royal Academy.



31.07

A free, open-air photo exhibition on entomodiversity opens in the Botanical Garden Jean Massart, presenting some of the 1100 insect species present there.



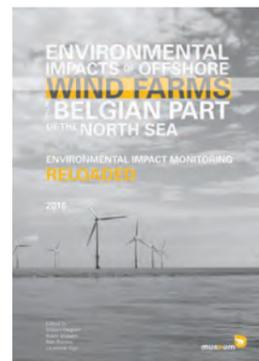
02.10

Matthias Baeye receives the *Richard W. Faas Research Prize* for his 'outstanding work in the field of marine sedimentology'.



01.11

The report '*Environmental impacts of offshore wind farms in the Belgian part of the North Sea*' is published. It presents an overview of findings of the Belgian offshore wind farm monitoring programme.



20.12

Secretary of State for the North Sea Philippe De Backer presents his '*North Sea Vision 2050*' at the marine base in Zeebrugge. This document was developed with the support of RBINS colleagues.



22.08

Researchers of our Institute install the first ever bat recorder at hub-height of wind turbines, an important tool to help reduce the number of bat fatalities at turbines at sea.



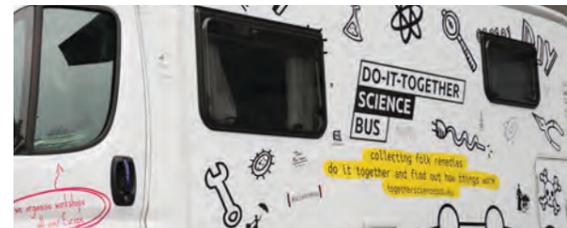
10.10

Our exhibition *MONKEYS* opens. The temporary exhibition immerses the visitor in a tropical forest, where they embark on an expedition to discover an extraordinary variety of primates.



09.11

The DITOs Science Bus stops at our Institute. It is part of a European project that aims to reach out to people that do not usually come to the Museum, through workshops and experiments.



22.12

The Federal Council of Ministers approves the replacement of the oceanographic research vessel *Belgica*, to be designed and built starting in 2018.



02.09

CEBioS staff organise a summer school at the Centre de Surveillance de la Biodiversité in Kisangani, DR Congo. 80 participants attend conference sessions, training courses and workshops.



17.10

Pascal Godefroit receives the *Nairamdal Medal*, the Mongolian State Award, for his contributions to the study of dinosaurs in Mongolia and return of Mongolian fossils that were illegally exported.



17.12

Our *Dinosaur Gallery* celebrates its 10th birthday. At a festive Dino Family Day, the public has a chance to meet our new addition Ben, the plateosaurus.



# RESEARCH

## **JUST FOR THE RECORD: INVENTORYING BIODIVERSITY**

Opening up the 'Atlas of Life'  
Picturing the diversity of land snails in Vietnam

## **WHALE HELLO THERE!**

A small whale in an unexpected place  
Baleen whales with teeth  
Belgian coast welcomes a surprise guest

## **DIGGING UP OLD SECRETS: DINOSAUR DISCOVERIES**

A fossil find ruffles some feathers  
Raptors that swam against the tide  
A cousin of Iguanodon with self-sharpening teeth

## **SNAPSHOTS OF EVOLUTION**

A Belgian bat much older than expected  
Letting the cat out of the bag on feline ancestry  
A living snapshot of beetles' evolutionary history

## **STICKING TO THE FACTS: POLICY SUPPORT AT THE RBINS**

The best route to a low-carbon future for Belgium?  
Our new website supporting management of the North Sea  
Sniffing out air pollution  
Managing spills

## **FROM EXOTIC INTRODUCTIONS TO INVASIVE SPECIES**

From the Mediterranean to the Scheldt?  
Barcoded secrets of a travelling worm  
An official role for the Institute

## **OUTBREAK: VECTORS OF DISEASE**

On the frontline against Ebola  
Keeping an eye on the tiger

## **TREADING LIGHTLY: OUR IMPACT ON OTHER SPECIES**

City life: it's not for everyone  
When the climate changes, what else changes?  
Tracking the planet's most wanted

# 1 RESEARCH



## JUST FOR THE RECORD: INVENTORYING BIODIVERSITY

*To protect our planet's biodiversity, we first need to know what living things there are on Earth, and where to find them. Taxonomists classify these living things into groups of related species and compile catalogues of these species families. These catalogues are great tools to raise awareness of biodiversity, ensuring people know what's at stake when it comes to conservation.*

### Opening up the 'Atlas of Life'

2017 saw the completion of the final chapter of the 'Atlas of Life', the first global review of all vertebrates on our planet. An international team of researchers worked on the catalogue of all reptiles on Earth - an important tool for the conservation of wildlife.

It was long thought that many reptile species were too poorly known to be mapped. But an international team of 39 scientists, including our own, proved it was possible. The reptile chapter contains more than 10,000 species of snake, lizard and turtle.

Reptiles tend to have unusual distributions, preferring hot and dry places that are less studied by biologists. This study, published in *Nature Ecology & Evolution*, has identified locations where reptile diversity is in urgent need of conservation programmes. These include the Arabian Peninsula and the Levant, inland arid southern Africa and the Asian steppes.



The next step is for the International Union for Conservation of Nature to classify all species in the atlas according to their conservation status. This will lead to the creation of an interactive map, accessible for everyone.

### Picturing the diversity of land snails in Vietnam

Vietnam is known for its tropical forests and spectacular mountain scenery. Less visible, but equally impressive, is its biodiversity at every scale, making it a particularly interesting area for our researchers.



Land snails are no exception, and this wealth of species is pictured clearly for the first time in a new illustrated guide.

Our institute teamed up with natural history institutions, universities and societies from Vietnam, Thailand, UK, France and Hungary to produce the very first pictorial guide of the land snails of Vietnam. With this guide it is possible to identify the most common land snails and to assign less well-known taxa to families or genera.

The guide aims to boost research on Vietnamese land snails and to help schools and local societies to have a clear picture of their amazing land snail diversity, in need of protection from threats of deforestation and land use. It's available to download at [bit.ly/vietnamsnails](https://bit.ly/vietnamsnails). And the team thought of every last detail, including several thousand copies printed on waterproof paper that can survive even Vietnam's notorious rainy season...

## WHALE HELLO THERE!

*It's the first thing you see when you walk into the Institute – our glorious humpback whale keeping a watchful eye over the entrance hall. That skeleton was shipped from Greenland to Brussels back in 1880. Over a hundred years later, whales still play a big role in our research, in the form of both fossils and live sightings.*

### A small whale in an unexpected place

The pygmy right whale *Caperea marginata* is the smallest living whale, found only in the southern oceans. Which raises the question: what was it doing in Italy, 1.8 million years ago? Palaeontologists discovered an ancient pygmy right whale fossil in Sicily and another, more recent one, in Japan.

The study, by an international team with researchers from our Institute, shows that *Caperea* first evolved in the south, hemmed in by the warm water of the tropics. Then, the beginning of the ice age allowed *Caperea* and other marine mammals to migrate north across the equator – until temperatures rose again, resealing the tropical gateway. *Caperea* persisted in the south, but the animals that had made it north went extinct. Crucially, such events are not confined to the past. With global warming affecting the tropics now, we could see an even stronger north-south separation affecting more species in the future.



### Baleen whales with teeth

Fossil discoveries can tell us not only about where whales were found, but how they ate. Modern baleen whales don't have teeth but keratin plates and bristles, through which they filter their prey out of the water. Then how come a 36-million-year-old whale fossil was discovered with not baleen but actual teeth?

The specimen was found by researchers in the Pisco Basin in southern Peru as part of a project that included researchers from the Institute. Up to 4 metres long, this late Eocene animal was dubbed *Mystacodon* ("toothed mysticete"). It seems it didn't filter food like modern baleen whales but most likely most likely dove down and sucked prey into their large mouths. As the oldest known cousin of modern baleen whales, *Mystacodon* also revealed some other surprising characteristics that help shed light on whales' early evolutionary history.



## Belgian coast welcomes a surprise guest

On March 31 2017, a bowhead whale was sighted in Belgian waters - a first for the whole of the North Sea. This massive baleen whale - which can be 20 metres long and 100 tonnes in weight - was thousands of kilometres from its home in the Arctic. It was spotted near the coast of Raversijde, and again at Middelkerke. Sadly, it seemed to have had its tail entangled in a fishing net or ropes.

It's not easy to explain how it got here. Although it's too early to describe the bowhead as a climate fugitive, climate change has certainly disrupted the Arctic ecosystem through a dramatic decrease in ice in both winter and summer, which could play a role in this and other similar recent sightings.



## DIGGING UP OLD SECRETS: DINOSAUR DISCOVERIES

*A T-rex's killer jaws; a stegosaurus' defensive spiked tail – some dinosaur adaptations are well-established. But species described in 2017 gave us a more nuanced picture about how some dinosaurs behaved – how they ate, how they got around and how they found a mate. The history of evolution can be a puzzle, and every fossil has the potential to hold a missing piece.*

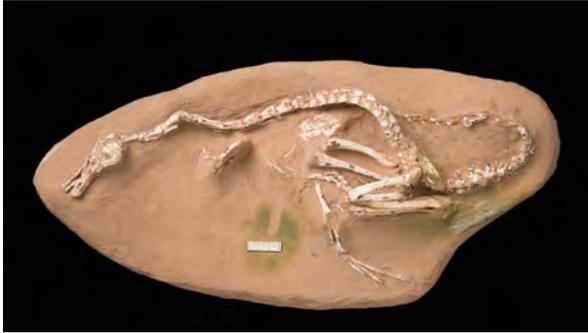
### A fossil find ruffles some feathers

Belgian palaeontologists have described a new, 165 million year old dinosaur species from Northern China. *Serikornis sungei* –nicknamed 'Silky' – is an important fossil in the evolution of feathers in dinosaurs. Silky had feathers on its four limbs, but could not fly. The discovery suggests that ground-dwelling dinosaurs had feathers for other reasons.

'Silky', around 48 cm long and 160 to 165 million years old, was found in the Tiaojishan formation in northern China. The feathers on its limbs may have served to impress mating partners or to warn enemies, long before the modern wing and feather structure developed that allowed them to fly.



## Raptors that swam against the tide



An international team of scientists, along with Belgian palaeontologists, has described a new raptor that could swim. It is the first time this adaptation has been found so clearly in a dinosaur. The 75 million year old and exceptionally well-preserved *Halszkaraptor* fossil from Ukhaa Tolgod in southern Mongolia was poached and circulated in private collections.

*Halszkaraptor escuilliei* had modified forelimbs that likely allowed it to glide through water like a penguin, using its long neck to grab prey in a surprise attack. The predator, almost 80 centimetres long from head to tail, is closely related to the iconic Velociraptor. This new species is described in Nature.



## A cousin of Iguanodon with self-sharpening teeth

A “paleotrip” to France brought up some fascinating finds for palaeontologists from our Institute, including the description of a new dinosaur species that had scissor-like teeth. The fossil remains of *Matheronodon provincialis* – a primitive relative of Iguanodon – were discovered in the South of France, where our team worked with Belgian and French colleagues.

The new species lived around 70 million years ago and grew up to 5 metres long. Its massive teeth operated like self-sharpening serrated scissors. Thick enamel on one side of the teeth would have ground against the other teeth while chewing, keeping them sharp. Its diet probably consisted of palm leaves that would otherwise have been too fibrous and stringy to eat.



## SNAPSHOTS OF EVOLUTION

*Flicking through old photos, we can see clearly how we've changed over time. But the fewer images we have, the harder it is to tell the story. This is the challenge that our scientists face when studying the evolution of the species we see around us now, compared with how they used to be, millions of years ago. And just like looking through old photos, a careful eye can reveal some surprising details.*

### Letting the cat out of the bag on feline ancestry

Picture the lineup: there are five subspecies of the wildcat *Felis silvestris* known today. All skeletons look exactly alike, indistinguishable from that of our domestic cat. So with the naked eye, it's impossible to see which of these subspecies was domesticated in a distant past.

The Institute worked with colleagues from the University of Leuven to dig deeper into the genetic code. Researchers used the DNA from bones, teeth, skin, and hair of over 200 cats found at archaeological sites in the Near East, Africa, and Europe. These remains were between 100 and 9,000 years old. Results were published in *Nature Ecology and Evolution*.



And what did they reveal? The DNA analysis showed that all domesticated cats descend from the African wildcat or *Felis silvestris lybica*, a wildcat subspecies found in North Africa and the Near East. Cats were domesticated some 10,000 years ago by the first farmers in the Near East. They later spread across Europe and other parts of the world via trade hub Egypt. The DNA analysis also revealed that most of these ancient cats had stripes: spotted cats were uncommon until the Middle Ages.



## A Belgian bat much older than expected

In 2017 our palaeontologists described the oldest fossil of the bat genus *Myotis*, or mouse-eared bat. This discovery proves that the widespread genus has existed for over seven million years longer than previously assumed.

Over 120 species of mouse-eared bat are found today all over the world. In 1999, a palaeontologist at our Institute found the remains of a relatively large vesper bat from the Oligocene (33 to 23 million years back) in Boutersem, Flemish Brabant. Recent research concluded that they belong to the *Myotis* genus. This *Myotis belgicus* is 33.5 million years old, at least seven million years older than any other known mouse-eared bat.

The palaeontologists looked at when the first fossils appeared for over a thousand genera of placental mammals still in existence today. They concluded that only 13 of them appeared first in the middle to late Palaeogene (48 to 33 million years ago), among which six are bat genera, including *Myotis*.



Their successful adaptation skills resulted in fast evolutionary diversification, during a period of rapid global warming, 52 to 50 million years ago. This research was published in the journal *PLOS ONE* and makes it clear that bats were among the earliest mammal species.

## A living snapshot of beetles' evolutionary history

Researchers don't always have to dig into the past to see the story of evolution. On the volcanoes of the Galápagos Islands in the Pacific Ocean, *Calosoma* can be found, known as caterpillar hunter beetles. Long-winged and short-winged variations of these beetles coexist, creating a living picture of the molecular machinery behind evolutions in morphology.

Throughout evolutionary history, many insect lineages have become wingless. In this particular area of the Galápagos, long- and short-winged beetles mate and give rise to beetles that have a mixture of both types of characteristics. By carrying out high-resolution genomic scans and comparing the results to the morphology of the beetles, researchers could see which regions of the genome are associated with the *Calosoma* beetles having long or short wings.

Interestingly, the extent to which the two variations overlap changes according to the age of the islands. The Galápagos Islands were formed by volcanoes hundreds of thousands of years apart. So on the oldest islands, there is a much clearer distinction between the short-winged *Calosoma* beetles higher up on the volcano and their long-winged relatives flying around the leafy lowlands. On the younger islands, the two are much more likely to co-exist. As such, the islands paint a clear image of evolutionary mechanisms in action.



## STICKING TO THE FACTS: POLICY SUPPORT AT THE RBINS

*Policymakers rely on research to show the potential impact of their choices. As an Institute for natural sciences, the RBINS has a mandate to ensure that decisionmakers are supplied with scientifically-sound data for a whole range of environmental topics, whether this involves developing new energy sources or curbing pollution at sea.*

### The best route to a low-carbon future for Belgium?

Geothermal power will become a crucial source of energy in the coming years – but it brings with it a range of complex questions for policymakers. The Institute is home to the Belgian Geological Survey and therefore has a great deal of expertise that is vital to inform policy decisions. Through the ALPI project, which wrapped up in 2017, researchers were able to bring their findings to the decisionmakers that may shape the future of geothermal energy in Belgium.

The aim of the project was to compare various policy instruments, providing sound scientific evidence of their impact and how best to implement them. The Institute specifically worked on the implementation of a case study looking at the Belgian side of the Campine Basin, with the University of Hasselt providing the economic analysis. 85 high-level policymakers, researchers and industry professionals came to discuss the results at the final conference at the RBINS in June 2017. Key recommendations included the use of recoverable loans and advantageous insurance conditions for developers of geothermal projects.

### Sniffing out air pollution

Part of the Institute's work on monitoring the North Sea involves checking up on sulphur dioxide emissions. Fuel burnt by vessels in the North Sea should not exceed the limits set by the *International Maritime Organization*. In 2017, researchers from the Institute presented their findings to hundreds of policymakers and industry professionals at events across Europe.

Sulphur dioxide poses serious risks for human and environmental health. The Institute's surveillance aircraft is equipped with a "sniffer" that can detect levels of sulphur dioxide and alert port authorities to better target their checks. As part of the CompMon project, between 2015 and 2017, the sniffer monitored 1800 vessels for sulphur content, of which 140 were over the limit, including records as high as 30 times the legal limit. Since the Institute's work, the number of ships caught red-handed has doubled. The bodies implementing the *Bonn Agreement* and *Helsinki Convention* have taken these results into account, recognising Belgium's role as a significant player in the field.



## Our new website supporting management of the North Sea

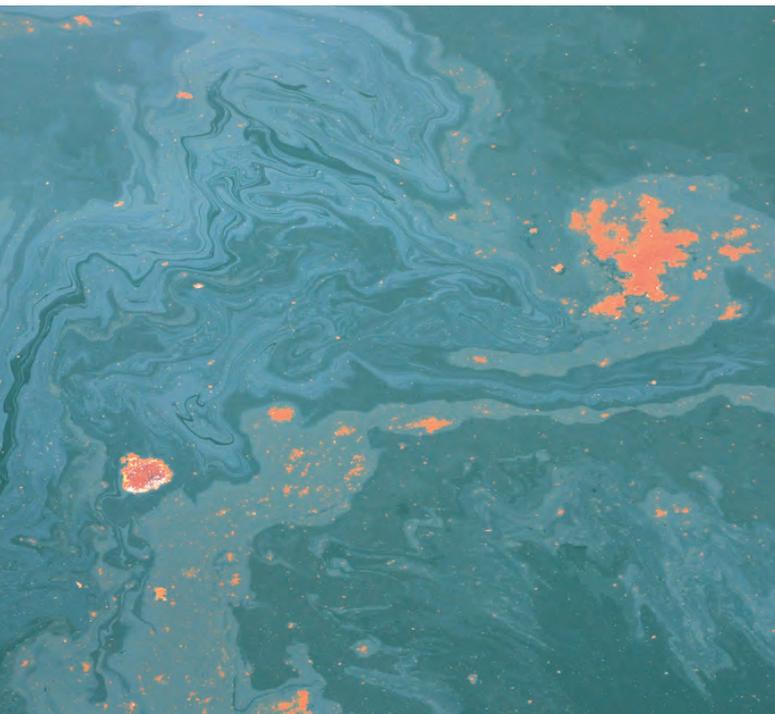
Open data is one of the Institute's aspirations: making more and more research results available online. But when it comes to policy support, it's essential to ensure this data is available in a way that is most useful to the relevant stakeholders. 2017 saw the launch of a new website, particularly well adapted to support policymakers with the latest data on the North Sea ecosystem.

The *Scientific Service Management Unit of the Mathematical Model of the North Sea* is responsible for the follow-up of different legal obligations and rights for the management of the marine environment. The website <http://odnature.naturalsciences.be/mumm> gives a complete overview of the current state of activities at sea. It houses official documents about wind farms at sea, for example. It also paints a very clear picture of how the North Sea is managed and monitored: the missions of our aircraft and the operators, figures on oil pollution and data on legal prosecution, among others. You can also find information there about other human activities at sea, from sand extraction and aquaculture to the jettison areas where WW1 munitions are dumped.



This all helps to increase the impact of our work, whether it is aerial surveillance of the sea, environmental impact assessments or monitoring of the quality of the sea in the framework of the OSPAR Convention and the European Framework Directives.

## Managing spills



To tackle an oil spill, decisionmakers need to move fast. How can they predict the ways the pollution will move and spread, subject to the tides and weather conditions? 2017 saw the finalisation of HNS-MS, a European-funded project coordinated by the RBINS that developed a decision-support tool for national maritime authorities and coastguard stations to be able to forecast the drift, fate and behaviour of marine pollution from spills.

The development of the tool focused on northwest European waters: the area covered by the *Bonn Agreement* and the *Bay of Biscay*. It includes a database of harmful and noxious substances with complete details of how each behaves at sea, as well as a set of vulnerability maps, showing environmental and socioeconomic resources that are sensitive to spills. The final key outcome is a 3-dimensional mathematical model showing the drift and fate of potential spills. All this is hosted in a handy, user-friendly, web-based tool that coastguards can use any time.

## FROM EXOTIC INTRODUCTIONS TO INVASIVE SPECIES

*When it comes to working on exotic and invasive species, it's impossible to work alone. The Institute works closely with networks of experts at local, European and global level so that when an exotic specimen is spotted, the right people can be mobilised.*

### From the Mediterranean to the Scheldt?

*Ferussacia folliculum* is a small yellowish snail, around 8mm long, native to the Western Mediterranean region. One place they are most definitely not native to is Antwerp province. When our researchers stumbled across *Ferussacia folliculum* hiding out in a storage depot, it was the first time the species had ever been reported in Belgium.

For the moment there doesn't seem to be any sign that this little mollusc poses a threat to local ecosystems. It is more likely the result of an unintentional introduction, catching a lift on some imported plants or construction materials. Still, this sort of observation is useful as potential early warning data for future introductions of other species. Plus, the snail was found by a team including volunteers, as part of a project called SPEEDY, looking at the effects of urbanisation. It is an excellent example of what the Institute can achieve when working with citizen scientists.



### Barcoded secrets of a travelling worm

The rivers and stagnant waters of Southeast Asia and Africa are the usual home of water worm *Branchiodrilus hortensis*. But a specimen was reported for the first time by a specialist in Holland in 2005 and since then has been reported several times in France and Slovakia.



How did they get to European waters, where do they come from, and could this become an invasive species?

To find out, a genetic and morphological study of specimens from several countries was undertaken, using a network of specialists around the world. Thanks to the use of a genetic "barcode", the analysis demonstrated that this form of *B. hortensis* is genetically identical to specimens from South Korea and China. It was probably introduced into Europe on aquatic floating plants sold for ornamental ponds. This study shows that DNA can be a powerful tool for tracing the origin of potentially invasive species. When we know how they ended up in European streams, we can take action at the source of the introduction.

## An official role for the Institute

The Institute has been working on biodiversity for years – but in 2017 it was selected to host the *National Scientific Secretariat on Invasive Alien Species*. What does this mean?

A new EU regulation on prevention and management of the introduction and spread of invasive alien species entered into force in 2015. This regulation provides a set of measures to be taken by member states for all species included on the list “*Invasive Alien Species of Union concern*”. The role of the new Secretariat is to facilitate and support competent authorities in the implementation of this new regulation in Belgium. One example of one of the 49 species on the regulation’s list is the Asian hornet *Vespa velutina* that preys on bees, first spotted in Belgium in 2017.



## OUTBREAK: VECTORS OF DISEASE

*It is no exaggeration to say that the Institute’s work on vectors of disease can be a matter of life or death. In 2017, outbreaks of Ebola, dengue and Zika devastated communities. Our researchers’ work to help in the struggle to prevent the spread of these diseases took on grave new relevance.*

### On the frontline against Ebola

In northern Congo, an outbreak of Ebola infected eight people and took four lives in May 2017. Belgian scientists, including from our Institute, were invited to help identify the source.

The researchers found a large colony of bats close to where a fisherman from Kagbono first became ill. The analysis of the blood and the organs of about 300 bats, rodents and bushmeat is currently underway and should reveal whether one or more of the species is host to the virus.

The animals were caught in July 2017 by a team from the Institute with Congolese, Belgian and US colleagues in the remote Congolese province Bas-Uélé. The sampling took place just in time, before the bat colony migrated away a week later. All samples were carefully disinfected and transported to the lab in Kinshasa, where they are currently being tested by researchers. The results should allow the team to draw up risk maps and instructions for how to best manage the area.



## Keeping an eye on the tiger



We have globalisation and climate change to thank for the first appearances of exotic mosquitoes in Western Europe. Our colleagues have started working with researchers from the Institute of Tropical Medicine in Antwerp to look for tiger mosquitoes in places with the greatest chance of entering Belgium. The quicker we detect the mosquito, the easier we can control it and the less chance it has of settling in our country.

*Aedes albopictus*, the tiger mosquito, is a small, black-and-white-striped mosquito that can also transmit viral diseases such as dengue, chikungunya and Zika with its painful sting. It comes from South-East Asia, but soon conquered Europe and America through the worldwide transport of goods and through global warming. It has been spotted in Belgium before, but hasn't yet managed to survive the winter or reproduce.

Where might *Aedes albopictus* turn up? The research focuses on 23 key spots, from ports and airports to tyre centres and garden centres. The presence of the mosquito does not mean the presence of disease, of course, but if the virus is present in a big enough mosquito population, transmission can occur.

Our collections play an important role in mosquito research. By comparing our specimens with what we find today, we can identify the exotic species. *The Barcoding of Organisms and Tissues or Policy Concern* department, BopCo, run by our Institute and the *Royal Museum for Central Africa*, is a key player. Researchers prepare genetic profiles of the mosquitoes to facilitate future identification.

## TREADING LIGHTLY: OUR IMPACT ON OTHER SPECIES

*In this era we call the Anthropocene, human existence on the Earth is one of the biggest factors affecting populations of the species that surround us. Whether our impact is subtle or flagrant, research can give us more insight into how we can minimise the footprints we leave behind.*

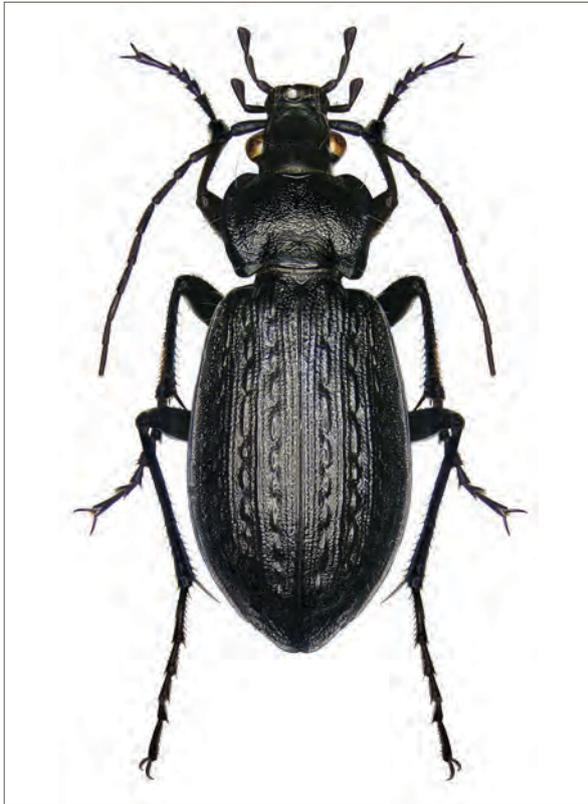
### Tracking the planet's most wanted

Things are not looking good for the most-trafficked mammals on Earth. Pangolins are rapidly heading to extinction, notably due to their value for bushmeat and traditional medicine. Research at the Institute published in 2017 explored the evolutionary relationships among the eight species of these African and Asian scale-bodied anteaters currently in existence.

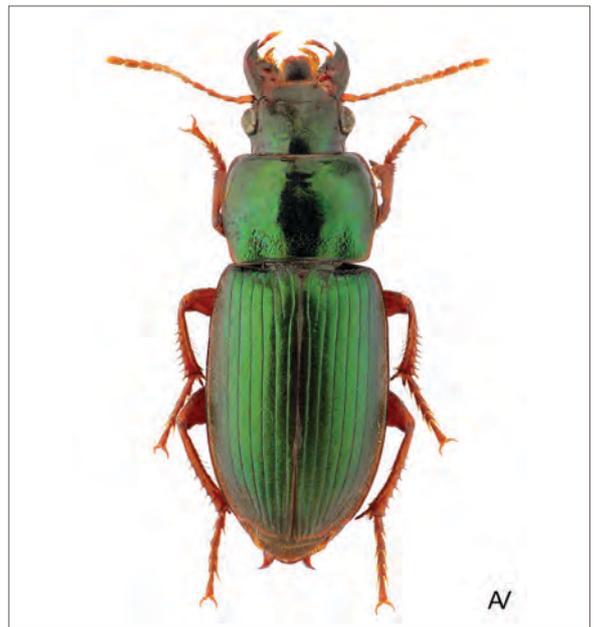
The three genera identified (Asian, large African and small African) first diversified over 10 million years ago. A clearer picture of pangolins' genetic history provides an unprecedented resource for further research and for effectively tracing the worldwide pangolin trade. It is particularly important to have molecular tools for the rather grisly reason that the pangolins are often found as processed body parts: scales, smoked carcasses, chopped meat, paws and embryos, making species more difficult to identify.

## City life: it's not for everyone

Urban life can be a struggle, and research from the Institute has shown that insect biodiversity feels the strain too. But species with certain characteristics are affected differently, according to this study published in *Global Change Biology*.



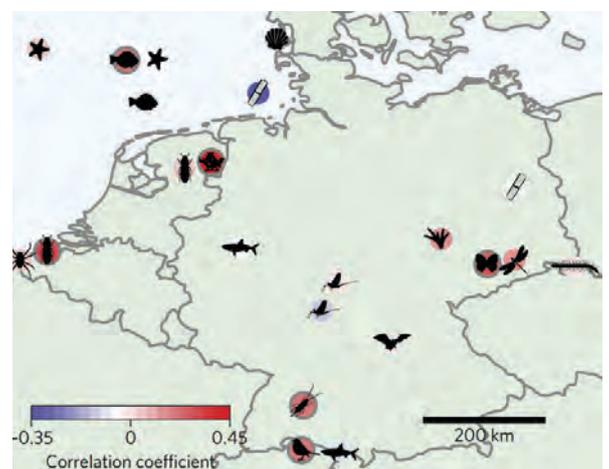
Researchers compared beetle species in rural and urban areas by installing traps at 81 places across Belgium. The result: species with high tolerance of heat were much more common in cities, which contain a lot of heat-absorbing materials like concrete. Cities are not the place for short-winged beetle species, either. They are less mobile and don't always manage to relocate to green areas if their habitat is converted. This type of insight is important for measuring long-term effects for ecosystems and being able to anticipate them.



## When the climate changes, what else changes?

We know that climate change is affecting populations. But which species are affected most? Data on beetles collected at the Belgian coast by researchers from the RBINS over 25 years were a crucial part of a wider study published in *Nature Ecology and Evolution*.

The researchers gathered long-time data from 22 communities, from algae to mammals, in West and Central Europe, where temperatures have increased by 0.3 °C since 1980. The results of their analysis revealed that populations of warm-dwelling species have increased more than those of cold-dwelling species in that time. As for species living in water, the impact of temperature change on their populations was variable.



# COLLECTIONS

## THE STORIES OUR COLLECTION HAS TO TELL

Neanderthal diet tips from Belgium and Spain  
Central African bats revisited  
Seeing stars in South Africa  
Taking on the nightmare taxon

## OPEN DATA, OPEN MINDS

## KEEPING UP APPEARANCES

Dazzling new heights  
A mammoth operation

# 2 COLLECTIONS



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NOMBRE MEMORIALS I.G.  
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## THE STORIES OUR COLLECTION HAS TO TELL

*What visitors see in our Museum galleries is just the tip of the iceberg: from Neanderthals to bats to starfish to bees, research on the Institute's 37 million specimens still provides revealing insights year after year.*

### Neanderthal diet tips from Belgium and Spain

The Spy Neanderthals are perhaps the best-known of the Institute's anthropological collection. Australian scientists analysed the DNA in the hardened dental plaque of two Neanderthal fossils from Spy and compared them with two from El Sidrón in northern Spain, all over 40,000 years old. The results, published in *Nature* in 2017, showed the diet was very different – the Belgian Neanderthals mostly ate meat, like woolly rhinoceros. Their family members in northern Spain, however, were vegetarians, feasting on pine nuts, moss and bark. Mushrooms were found in the diets of both.



### Central African bats revisited



Our expertise in the bats of Central Africa is what led to the Institute being called in to investigate the 2017 Ebola outbreak mentioned on page 19. To be able to identify species in that sort of situation, solid taxonomic work is key. In 2017 our team worked closely with researchers from DR Congo, South Africa and Belgium to document twenty thousand Central African bats in collections across five museums in Belgium, Switzerland, the UK and the US. Since the last time the Chiroptera collections were documented, much has changed: ten of the 136 species recognised in the current study were not known, for example. This inventory is extremely valuable for further research –and can help prepare for future outbreaks of Ebola and rabies.

## Seeing stars in South Africa

Another cooperation with South Africa took our Institute to the KwaZulu-Natal Province to explore diversity in echinoderms – species like sea cucumbers, starfishes and sea urchins. DNA barcoding and morphological identification of 351 specimens, including several from our own collection, showed around 114 species, including some new records and what could be considered new species. The results contribute to build a reference library of DNA barcodes of echinoderms for South Africa.



## Taking on the nightmare taxon

*Halictinae*: the taxon that sends a shiver down the spine of taxonomists! The reason this massive sub-family of bees is known as the “nightmare taxon” is that it contains a great many species that are extremely tough to identify.

Our researchers nonetheless rolled up their sleeves and investigated the evolutionary history of several groups of species, studying gene fragments of 172 bees from across 150 species in the collections across the Institute and our partners at the *Royal Museum for Central Africa*. The results help us classify key species from across Europe and Africa and should allow us to propose an updated classification of the species of the Old World Halictinae.



## OPEN DATA, OPEN MINDS

*With a collection the size of ours, there is always work to be done. Keeping our archives protected and well-preserved is not enough: the Institute also has a mission to make collection items accessible for researchers and the public. That is where the process of digitisation comes in: the perfect way to make a back-up that is open to all. For this important task, we can count on the invaluable help of motivated volunteers.*

And digitisation is no mean feat. For many of the Institute's volunteers it means sorting through piles and piles of pages. For example, related to our famed Bernissart iguanodons, the Institute's collection contains not only scientific documents but all of the correspondence, newspaper articles, drawings, receipts and other documents related to the famous 1878 discovery. Volunteers have to make sense of them in order to scan them into the system, tagging them with the relevant metadata. And the more pages per document, the more complex the task becomes.

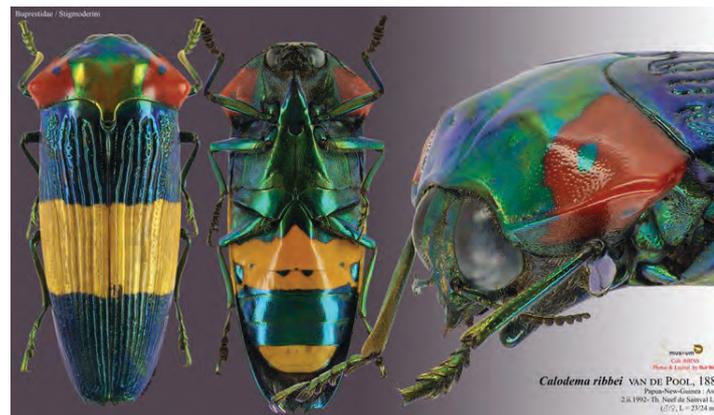
The impetus for digitisation also comes from the federal level in Belgium. Through a funding programme known as DIGIT, the Belgian Federal Science Policy Office has been supporting the digitisation of all of the federal collections and archives. This has helped the Institute to digitise its collection. But much remains to be done including "type specimens", illustrated specimens and the associated archives, complementing earlier work to develop databases for collection inventory and management known as DaRWIn and MARS.

Thanks to the hard work of researchers and volunteers alike, the Institute has managed to scale some pretty impressive digital heights. 200,000 pages are now available in open access, covering all our publications since the second half of the 19th century, 110,000 of which were digitised thanks to the DIGIT programme. The remaining 90,000 were digitalised in-house by the Institute, technicians and our team of expert volunteers. Over 40,000 specimens are now digitised, including almost all the Belgian butterfly collection.

The more of our collection we are able to digitise, the closer we get to a future where all research outcomes are uploaded, with scientists able to access important data for their work in just a few clicks. Crucially, the public, policymakers and other stakeholders are also able to access and scrutinise these outcomes online, supporting a more transparent, accessible and open model of science.



The result is a rich database that holds countless interesting stories, like the expeditions in 1929 and 1932 of the future King Leopold III and Princess Astrid through the archipelago of the Dutch Indies. Prince Leopold collected specimens, including many insects that ended up in the Institute's collection.



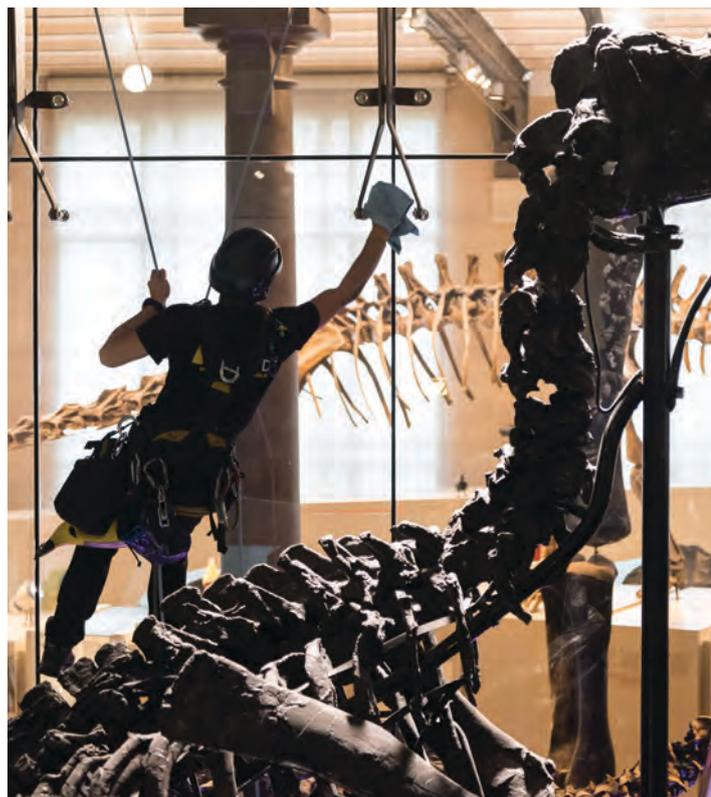
## KEEPING UP APPEARANCES

*The current Instagram generation might think they have a thing or two to teach us about looking camera-ready. Well, they may be slightly older, but our iguanodons and mammoth both got makeovers this year to rival even the most glamorous of social media stars – inside and out.*

### Dazzling new heights

Looking good is one thing. Being seen to look good, as our Bernissart iguanodons can testify, is something else altogether. And when you're surrounded by 7-metre-highspecially provided glass walls, you need those walls to be sparkling clean – not only so those photos come out looking flawless, but also to ensure a minimum of dirt in the cages. Cleaning the outside is not so tricky. But ten years since the *Dinosaur Gallery* reopened, the inside of the glass was starting to really need a scrub. What cleaning company is going to be able to scale three storeys to do the job with iguanodons looking over their shoulders?

Luckily, our team managed to track down just the people for the job – a team of specialised climbers, also responsible for keeping the Atomium shiny and buffing up skyscrapers in Dubai, known as *Vertical Works*. They worked closely with our scientific heritage service, museology, cleaning and maintenance teams for five days, suspended from ropes to ensure the Iguanodons were visible in their full splendour for the tenth anniversary of the Gallery's opening. The technicians took the opportunity to upgrade the lighting for the occasion too, ensuring the beasts of Bernissart were ready for their close-up.



### A mammoth operation

For our Dendermonde mammoth this year, a makeover was required that went a little deeper than surface level. Like many other fossils, the 29,000-year-old treasure was under threat from a silent assassin: pyrite. The shiny mineral known as fool's gold grows in the bones like a tumour. It can expand the bones to a point at which they break or even crumble. Specialists from our Institute, together with volunteers of the *Belgian Palaeontology Association*, were on hand to tackle the enemy within.

The team removed as much pyrite as possible, with scalpels, needles and brushes. After this, the pyrite in the fossil remains had to be stabilised. The bones were rinsed with alcohol and coated with a special air-tight acrylic resin. The finishing touch was to fill up the cracks with paste and apply a little colour. These techniques can slow down the decline caused by pyrite, but never fully stop it – every few years another round of restoration is required.



This restoration project was a great collaboration between a federal research institute, an association and the city of Dendermonde to conserve a unique piece of Belgian heritage and return a striking vision of ice age fauna to the public eye.

# PUBLIC

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## **GOING APE FOR OUR NEW EXHIBITION**

### **SUPPORTING ALL TYPES OF CLASSROOMS**

Science teachers take on a game of survival  
Teaching in Brussels from another angle

### **ACCESS FOR ALL**

A sign of the times  
Celebrating accessibility  
A wish come true

### **INTRODUCING BEN**



# 3 PUBLIC



## GOING APE FOR OUR NEW EXHIBITION

*You find yourself deep inside a dense, humid, tropical forest. The yelps of distant apes echo among the trees. Orang-utans and bush babies lurk around every corner. Let's say that as immersive experiences in Brussels go, this year's exhibition was quite a change from the Ardennes.*

Our spectacular temporary exhibition *MONKEYS!* launched in 2017 to great acclaim from the public. This joint project with National Museums Scotland and Nomad Exhibitions brought some innovative taxidermy to life and invited visitors to meet all kinds of apes and monkeys – from the tiny mouse lemur to the mighty gorilla – in poses taken straight from nature. The exhibition also looks at our impact on the primate world, including the threats of habitat loss and hunting. A series of media partnerships made it possible to reach a wide audience through a whole range of communications activities.

This was accompanied by kids' days, nocturnes, documentaries and debates featuring a series of very special guests. Jane Goodall herself came to present *Five Reasons for Hope*, a conference that set out the possibility for coexistence among the great apes, nature and humankind.



## SUPPORTING ALL TYPES OF CLASSROOMS

*The relationship between schools and museums has come a long way since the days of the simple school trip. At the Museum, our team works closely with teachers to actively bridge the gap between formal and informal education – from primary education through to lifelong learning.*

### Science teachers take on a game of survival

In 2017 the Museum was accredited as a training provider for teachers from the Flemish communities. We held three teacher training days on evolution where 69 teachers participated from organisations at Flemish regional, municipal and community level. Highlights included our natural selection game, where as part of the Museum's educational programme, teachers can play with their students to engage them in the complexities of evolution.



## Teaching in Brussels from another angle

There are a lot of misconceptions about teaching in Brussels – it's seen as being no walk in the park. So what better way to dispel the myths for trainee teachers than with a walk in the city? The Institute participated in *Big City Life*, a project of the Flemish Community Commission, where nursery, primary and secondary trainee teachers were given an app with a series of Brussels-based tasks to fulfil. Students from Erasmus, Odisee and CVO Lethas had the chance to experience the Museum's educational programme differently, as well as taking the essential selfie with Simon, our Iguanodon.



## ACCESS FOR ALL

*When we talk about the Institute's mission of "bringing nature into everyone's lives," we really do mean everyone. For the Museum, that means taking into account the needs of our visitors and setting an example of accessibility in a city that prides itself on its wealth of diversity.*

### A sign of the times

Two years ago, a new project was launched to make the Museum more accessible to deaf people. This came about thanks to a Friend of the Museum that put our education team together with non-profit organisation *Art & Culture*, who organise cultural activities for the deaf and hard of hearing in Belgium. Two deaf guides were trained to give visits within the *Dinosaur Gallery*.

Since September 2017, the Museum now proudly welcomes schools, groups and families for Museum visits in French Belgian Sign Language or in International Sign. A particular highlight was the Brussels Museums Nocturnes where over 70 deaf people joined us for a special signed tour. And our team is still working to broaden this programme further.



## Celebrating accessibility

On the 5th July 2017 the Museum was delighted to welcome a group of special guests – not only Belgian Secretary of State for People with Disabilities and Scientific Policy Zuhair Demir, but also two groups of people with disabilities that joined us to discover the Museum. The visit was thanks to a partnership with Intesa, a service centre that provides care to adults with mental or physical disabilities.

Thanks to some sunny weather, the group enjoyed a picnic in the grounds as well as exploring the Museum via our wheelchair-friendly route. Our guide adapted the tour especially for their interests and abilities. *The Gallery of Humankind* was a hit, with its tablets at wheelchair height, immersive experiences and multilingual subtitled films. Our Secretary of State was particularly impressed with the facilities, later tweeting “a model of accessibility - congratulations!”



## A wish come true

2017 brought us yet another very special guest: five-year-old Milo Van Regenmortel, who had a lot of fun with the inhabitants of our exhibition *POISON*. Milo has neuroblastoma, a cancer that forms in certain types of nerve tissue, and his request to the Make-a-Wish foundation was to come and hang out with dinosaurs and creepy-crawlies for the day.

He got even more than he bargained for when he met our animal keeper and had the chance to see a live tarantula, scorpion and snakes up close. With a visit to our T-rex Stan, his trip was complete. His Facebook page told the story: “I had a great day, and I couldn’t stop smiling. I got to stroke and hold a real snake, giant snails, stick insects, turtles and giant grasshoppers. Not many kids can say that!”



## INTRODUCING BEN

*Ben was a surprising addition to the Museum in more ways than one. Who would have thought that what started out as a way to bring a dinosaur to Brussels could turn into a new means of building a community?*

When our colleagues met Ben for the first time, he was in Switzerland. 6.5 metres in length, primarily vegetarian and dead for 210 million years, Ben is a Plateosaurus - one of the biggest dinosaurs of the Triassic, and one of the first "long necks". The Sauriermuseum in Frick offered him to the Museum on a permanent loan, making him the first authentic dinosaur to join our *Dinosaur Gallery* since the Bernissart iguanodons a century ago. Very welcome support came from the Brussels-Capital Region for the preparation of the skeleton. But the task of getting Ben from the palaeontology lab to the *Dinosaur Gallery* remained costly.

Our team came up with a solution in the shape of a crowdfunding campaign. The Brussels platform Growfunding.be opened up the opportunity to people to help contribute financially, with anyone from enthusiastic adults living their childhood dreams to schoolchildren chipping in their pocket money in exchange for a small reward. The success of the March campaign launch was unprecedented – people were very keen to be a part of Ben's story. A PlateoNight helped to raise funds, with music, street art and auctions, encouraging people to keep the contributions coming. As the comments rolled in on the Growfunding website, we started to understand people's motivations: a chance to acknowledge the role the Museum plays in their lives, out of the principle of bringing science to the public, or simply to give their grandchildren the chance to fall in love with the Museum the way they did.



With the target achieved much earlier than expected, the pressure was on to ensure that the presentation of Ben would do the campaign justice. Meticulous work was required with a pneumatic chisel to reveal the 200 fossilised bones that make up Ben. The fossils were then prepared and arranged along a specially-constructed wire frame, with the missing parts replaced by sculptures. Ben's curved posture is no coincidence – stretched out, he would never have fit the gallery space.

The party to launch Ben's status as a new star of the Museum was, inevitably, a massive success. Under the patronage of the Swiss embassy, it coincided with the 10-year anniversary of the *Dinosaur Gallery*, with crowdfunding, Swiss officials, project partners, YouTubers participating in the T-rex Tuesdays campaign and Belgian guests all coming together to celebrate our new family member. A screen installed next to Ben showed the 700 donors' names and there was even a Ben Lego set made for the occasion. Former colleagues came back to the Institute, excited to use their Growfunding reward to show their families around their old workplace. In the end, Ben was a lot more than an additional dinosaur – he has come to embody this sense of community that we love about the Museum.



# 4 FIGURES



Collectors

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# FINANCES

2017 shows a decline in both income and expenditure. The financial balance shows a slightly positive result of €297,350. This balance is a significant improvement compared to 2016, bearing in mind that the very negative balance of 2016 was due to a number of payments related to 2015. This involved payments for the purchase of two microscanners, expenses for improving the safety of the public spaces of the federal scientific institutions and a delay in the billing of the research vessel Belgica. Taking this into account, the balance for 2016 would have been €134,000 in the black, similar to the balance for 2017.

On the revenue side it can be noted that in 2017 we received no subsidies for the design of the new permanent exhibition *Living Planet*, because of the delay of the renovation of the Convent Wing where the exhibition will be set up. Ticket revenues have not only recovered since the 2016 tax year, but even increased by 12 % compared to 2015, thanks to the success of the temporary exhibitions *MONKEYS* and *POISON*. These exhibitions also had a positive impact on the Museum shop, with revenues up 23 % compared to the previous year. On the other hand, the educational activities bring in an increasingly small share of the income: they remain as low as in 2016.

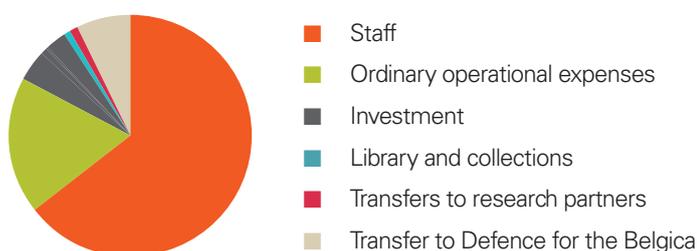
Research activity generates less income than in 2016, in almost all categories. Only the income from international actors outside the EU has increased. The federal government remains the largest source of funding, with Belspo's project subsidies still the largest share. Revenues from the private sector remain relatively stable, with income from monitoring of the impact of human activities in the North Sea, such as sand and gravel extraction and concessions for offshore wind farms.

In addition to income from the Museum and research activities, a number of other income streams can be identified, such as revenue from copyrights and administrative fees charged to third parties.

On the expenditure side, it is striking that human capital accounts for the lion's share of the outgoings. The search for resources to maintain personnel during budget cuts remains a constant challenge. The upshot is that operating and investment expenditures inevitably continue the downward trend.

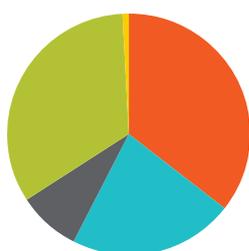
## BREAKDOWN OF EXPENSES (IN €)

	2015	2016	2017
Staff	20 252 000	21 362 000	21 655 864
Ordinary operational expenses	6 837 000	6 820 000	6 138 251
Investment	2 150 000	3 318 000	1 367 352
Scientific	214 000	1 313 000	315 174
Museum	69 000	24 000	69 748
Others	1 867 000	1 981 000	982 430
Library and collections	253 000	278 000	226 189
Transfers to research partners	625 000	595 000	388 745
Transfer to Defence for the Belgica	1 367 000	4 260 000	2 394 075
<b>Total</b>	<b>31 484 000</b>	<b>36 633 000</b>	<b>32 170 476</b>



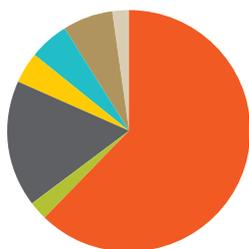
## BREAKDOWN OF INCOME (IN €)

	2015	2016	2017
<b>Staff budget</b>	10,487,000	10,596,000	10,311,692
<b>General grant</b>	10,000,000	9,275,000	6,457,555
<b>Museum: own income</b>	2,651,000	3,865,000	2,417,472
Museum renovation grant	8,000	1,527,000	0
Ticket sales	1,340,000	1,292,000	1,504,235
Exhibition hire and sales	68,000	35,000	63,000
Museumshop	358,000	332,000	408,148
Donations - sponsorship - grants	283,000	86,000	100,228
Education	186,000	166,000	127,730
Events	227,000	166,000	165,311
Dinocafé	48,000	18,000	48,820
<b>Research: own income</b>	10,123,000	10,400,000	9,727,302
Belspo	2,552,000	3,419,000	3,156,077
Federal administrations (excl. Belspo)	2,682,000	1,694,000	1,667,425
European Union	1,601,000	1,313,000	1,030,745
Belgian federated entities	948,000	1,483,000	1,313,615
Private sector	2,091,000	2,392,000	2,337,572
Outside the EU	249,000	99,000	221,868
<b>Various: own income</b>	99,000	121,000	312,805
Belgica Grant	-	-	3,109,000
Public Observatory Grant (all federal museums)	-	-	132,000
<b>Total</b>	<b>33,360,000</b>	<b>34,257,000</b>	<b>32,467,826</b>



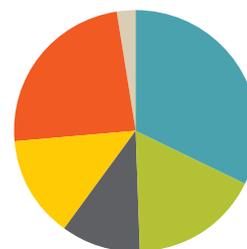
- Staff budget
- General grant
- Museum: own income
- Research: own income
- Various: own income

### BREAKDOWN OF INCOME OF THE MUSEUM



- Ticket sales
- Exhibition hire and sales
- Shop
- Donations - sponsorship - grants
- Education
- Events
- Dinocafé

### BREAKDOWN OF RESEARCH INCOME



- Belspo
- Federal administrations (excl. Belspo)
- European Union
- Belgian federated entities
- Private sector
- Outside the EU

# STAFF

The workforce figures have been in decline for years, in line with the government-imposed cuts on personnel. These cuts are particularly visible in the figures for statutory non-academic staff.

Statutory employees who leave are very rarely replaced. As a result, various (support) services are nearing the critical bare minimum in terms of staffing. Where possible, temporary solutions are sought by recruiting contractual staff.

The number of women within the Institute has remained virtually stable compared to 2016, both for statutory and contractual employees.

The average age of staff has increased slightly and is now 43 for women and 45 for men. Employees aged over 55 make up just over 20 % of the staff. Developing a strategy for knowledge transfer remains a current challenge.

Over the past few years, we have been investing heavily in attracting young people, bringing the number of under-26-year-olds to 4.5 %, whereas the legal requirement is 3 %.

Absenteeism increased slightly (from 4.87 % to 5.67 %), but still remains below the federal government's overall figures. The increase is in line with the figures from the private sector, which can partly be explained by the ageing workforce.

The number of accidents has remained the same as in 2016. However, there is a remarkable shift in the nature of the accidents: the number of accidents in the workplace has halved, whereas the number of accidents during people's commute has doubled.

In 2017 there were 7 accidents in the workplace. Together, these accidents result in a loss of 21 days of labour.

The number of volunteers has increased by 53 % in two years. Given the extensive cuts in personnel, this is welcome support for the various services.

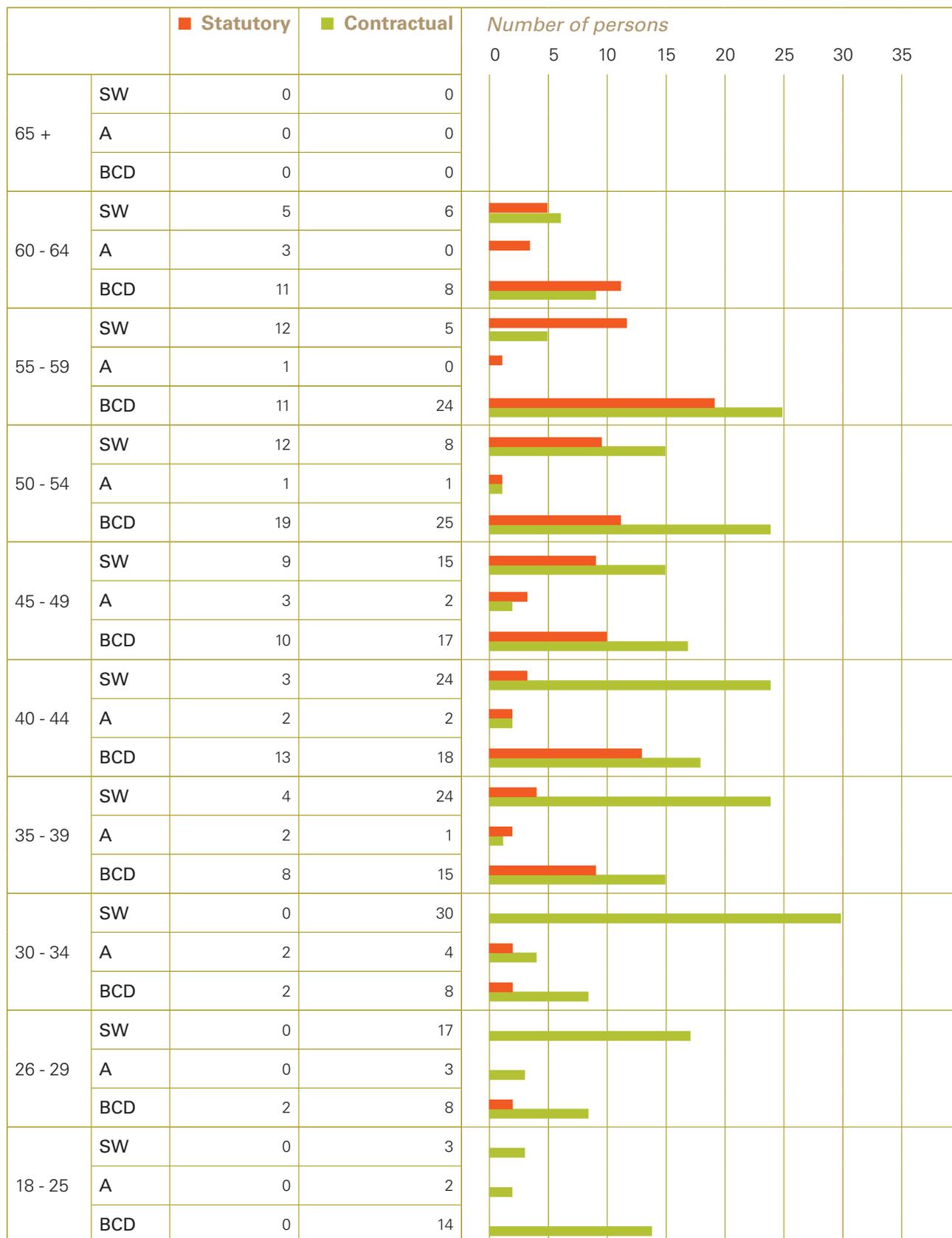
## STAFF BREAKDOWN BY STATUTE (NUMBER OF EMPLOYEES / IN FTE)

	2015	2016	2017
■ Statutory scientists	47 / 44	46 / 44.6	45 / 42.6
■ Statutory administrative and technical staff	102 / 89.46	95 / 83.76	90 / 81.26
■ Contractual scientists	128 / 112.8	130 / 117.75	132 / 121.35
■ Contractual administrative and technical staff	152 / 125.9	153 / 129.8	152 / 130.15
<b>Total</b>	<b>429 / 372.16</b>	<b>424 / 375.91</b>	<b>419 / 375.36</b>



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

## AGE PYRAMID



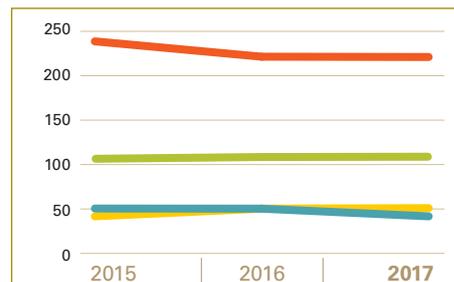
**SW** = Scientists

**A** = Level A (Master)

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

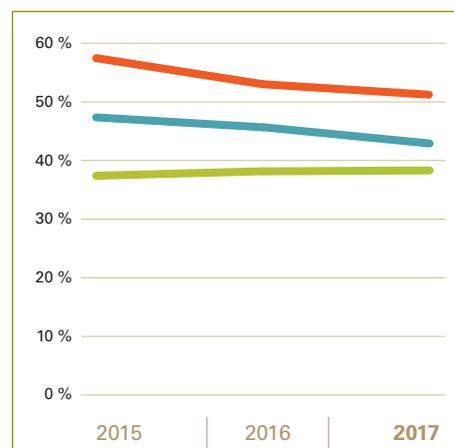
## SOURCES OF FINANCING FOR CONTRACTUAL STAFF

	2015	2016	2017
■ Staff budget	225 / 197.76	209 / 187.56	209 / 190.36
■ General grant	46 / 37.8	54 / 44.1	46 / 41.75
■ Ordinary income	54 / 44.2	54 / 46.3	57 / 47.5
■ External projects	104 / 92.4	107 / 97.95	107 / 97.75
<b>Total</b>	<b>429 / 372.16</b>	<b>424 / 375.91</b>	<b>419 / 377.36</b>



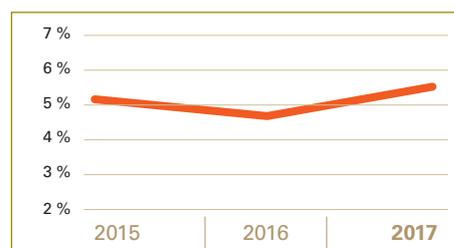
## PERCENTAGE OF FEMALE STAFF (%)

	2015	2016	2017
<b>Statutory staff</b>	34.90	34.04	34.07
■ Scientists	25.53	26.09	26.67
■ Level A	38.89	41.18	35.71
■ Level B, C and D	39.29	37.18	38.16
<b>Contractual staff</b>	52.14	51.59	51.06
■ Scientists	46.09	48.46	46.97
■ Level A	76.92	64.29	66.67
■ Levels B, C and D	55.40	53.24	53.28
<b>Total</b>	<b>46.15</b>	<b>45.75</b>	<b>45.58</b>



## ABSENTEEISM AND WORK ACCIDENTS

	2015	2016	2017
Accidents in the workplace	5	14	7
Accidents on the way to work	15	6	12
■ Absenteeism RBINS	5.20 %	4.87 %	5.67 %
Absenteeism federal level	5.98 %	6.22 %	6.11 %



## VOLUNTEERS

	2015	2016	2017
■ Research volunteers	100	115	131
■ Collections volunteers	2	10	23
■ Museum volunteers	15	22	27
<b>Total</b>	<b>118</b>	<b>147</b>	<b>181</b>



# ENVIRONMENT

To ensure the continuous improvement of our work, in 2014 we decided to implement an integrated Quality-Environmental Safety management system. In December 2015, we achieved our associated certifications (ISO9001, OHSAS18001 and EMAS) for the period 2015-2018.

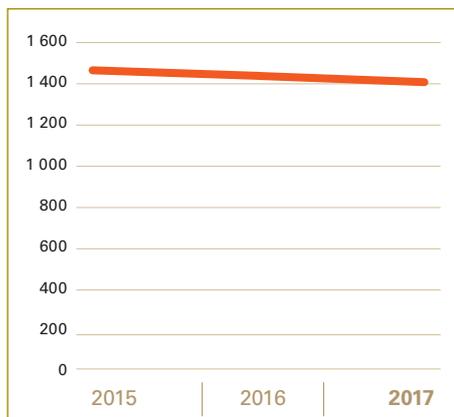
EMAS (Eco-Management and Audit Scheme) is a voluntary environmental management system for organisations that strive to continuously improve their environmental performance. However, for some time we have been working on improving our environmental performance and involving the employees. In 2017 various activities were organised by the members of our Ecoteam, leading the way.

For example, awareness was raised about electricity consumption thanks to a campaign using stickers. Everyone was encouraged to turn off the lights and electrical devices when leaving the room, no matter for how long. An additional focus was placed on mobility. During the mobility week the results of the 2016 survey, realised around this theme, were briefly explained and the use of public transport was promoted during Mobility Week.

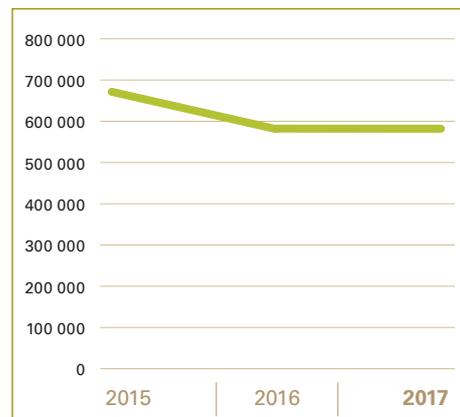
## ENVIRONMENTAL INDICATORS

	2015	2016	2017
■ Electricity consumption in equivalent tonnes of CO2 emissions	490.4	444.1	451.7
■ Gas consumption in equivalent tonnes of CO2 emissions	957.0	982.6	943.4
Energy costs in thousands of euros	453	347	401
■ Pages of paper printed	675,659	589,002	586,056
Percentage of commutes using public transport	Measured every two years (the year before, 2014, was 78.87 %)	83.7	Measured every two years

**ENERGY CONSUMPTION**  
IN EQUIVALENT TONNES OF CO2



**PAGES OF PAPER PRINTED**



# RESEARCH

The number of scientific publications fluctuates but not as much as in previous years. The number of publications in high-quality scientific journals with an impact factor (IF) increases compared to 2016.

In 2017, about 23 % of scientific publications were available in Open Access (and thus freely available to all).

The number of popular science works has been decreasing for a number of years, perhaps due to the growing use of digital media and social networks.

There are slightly fewer publications per scientist than in 2016, but figures over several years show no downward trend.

In 2017 we recorded the number of publications per scientist engaged in fundamental scientific research for the first time. Trends will be visible within a few years.

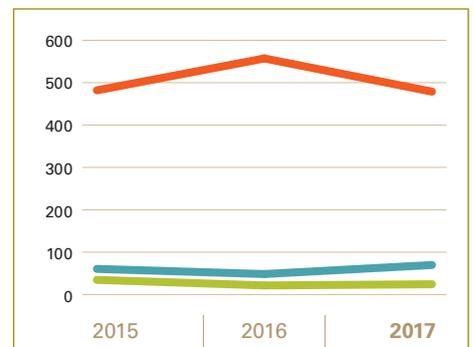
In 2017, the RBINS had 134 ongoing scientific projects: almost the same figure as in the previous year, but still significantly less than in 2015. The Institute coordinates 64 % of the projects in which it participates.

The distribution per source of funding remains relatively stable, with Belspo remaining the main source of funding, both in number and in amount.

The RBINS' scientific research is for the most part financed by the Belgian federal government. In 2017, it provided half our scientific research revenue. Other key sources of funding are the private sector, the Belgian federated entities and the European Union.

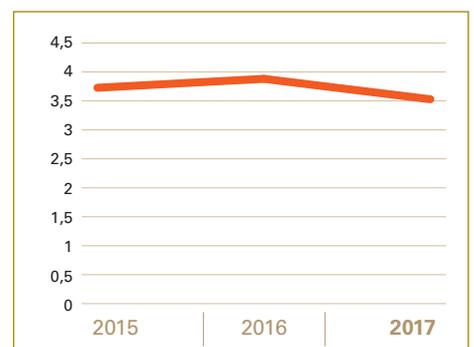
## PUBLICATIONS

	2015	2016	2017
■ Scientific publications	487	567	484
of which Open Access	118	97	115
of which journals with impact factor	204	189	207
■ Popular works	41	22	23
■ Expert reports	62	44	71
<b>Total</b>	<b>590</b>	<b>633</b>	<b>578</b>



## AVERAGE NUMBER OF PUBLICATIONS PER SCIENTIST (IN FTE)

	2015	2016	2017
■ All publications per scientist	3.76	3.90	3.52
All publications with impact factor per researcher	Only available as of 2017		2.69

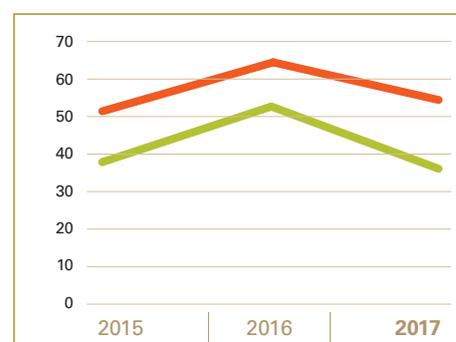


## FUNDING OF CURRENT SCIENTIFIC PROJECTS

	2015	2016	2017	2017
	Number	Number	Number	Amount (in €)
<b>Belpo</b>	65	57	61	
Number of projects coordinated by RBINS	49	42	43	3 156 077
<b>Federal funding from other sources</b>	14	13	12	
Number of projects coordinated by RBINS	14	13	12	1 667 425
<b>European Union</b>	32	23	25	
Number of projects coordinated by RBINS	4	3	3	1 030 745
<b>Federated entities</b>	25	24	21	
Number of projects coordinated by RBINS	16	14	13	1 541 756
<b>Private sector</b>	8	8	6	
Number of projects coordinated by RBINS	8	8	6	2 109 431
<b>Outside the EU</b>	13	10	9	
Number of projects coordinated by RBINS	13	10	9	221 868
<b>Total</b>	<b>157</b>	<b>135</b>	<b>134</b>	
projects coordinated by RBINS	104	90	86	<b>9 727 302</b>

## SUPERVISION OF STUDENTS

	2015	2016	2017
■ PhD	52	64	54
■ Master	37	52	37
<b>Total</b>	<b>89</b>	<b>116</b>	<b>91</b>



The supervision of students, both PhD and master students, remains relatively constant in the long term, but shows a small decrease compared to 2016. The decline is greatest among the master's students.

# LIBRARY AND COLLECTIONS

Our library is one of the biggest Belgian libraries on natural sciences. It is available to both internal and external readers.

The number of works in the catalogue is increasing, as in previous years. After budget cuts, over 200 subscriptions to paper and digital publications were discontinued, but access to the Web of Science was purchased. The works of a number of internal services (the Management Unit of the North Sea Mathematical Models) and external non-profit organisations (the *Royal Belgian Society of Anthropology and Prehistory* and *Natagora Aves*) were integrated into our collection.

The number of paper consultations is steadily decreasing, whereas the number of digital consultations remains stable. This follows the current evolution of the library system.

Our scientific collections include approximately 38 million specimens. No fewer than 300,936 specimens were added in 2017.

The number of collection visitors for scientific research is rising again, but the number of days per visit is decreasing compared to 2016. So there are more visits, but each takes less time.

The number of loans from the collections remains stable: a total of 370 loans were registered, representing 36,788 specimens on loan.

Digitising both the paper and the scientific collections remains a major challenge. A lot of attention and time is spent on this very extensive work.

In 2017, 50,000 pages were digitised, and we began to make the catalogue digitally available. Scanning the 300,000 inventory files will take three years. In 2017, 60,000 were already scanned. In addition, some 25,000 pages of scientific archives were scanned.

The digitisation of the specimens comprises two parts: adding the specimens' metadata and the digitisation of the specimens themselves, with no fewer than seven different techniques. Priority is given to the type specimens, those which describe or help to describe a species. In 2017, the metadata of approximately 24,500 specimens was introduced or completed.

To date, the data of 89,714 type specimens are available, out of a total of about 200,000, or about 44 % of the total number.

For non-type specimens this is 2,675,166 specimens out of a total of about 38 million, or about 7 %.

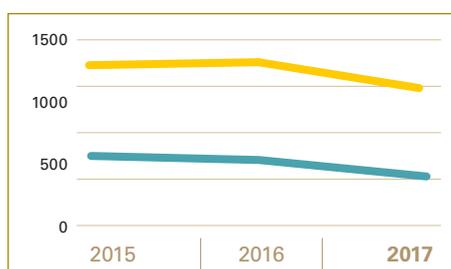
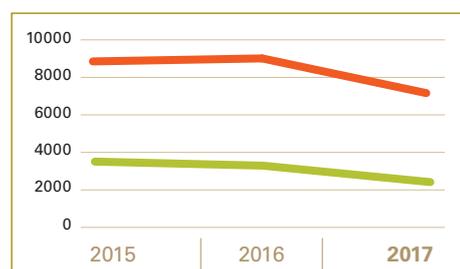
## SIZE

	2015	2016	2017
<b>Library</b>			
Size of the library	399,036 items	405,070 items	410,149 items
Growth of the library	Not available	Not available	Total growth of 1.2 %
<b>Collections</b>			
Number of collections acquisitions	+ 62,854	+209,804	+300,936

\* item = physical unit

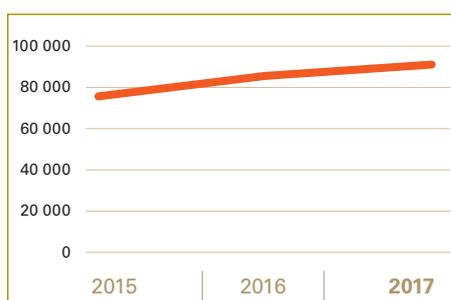
## CONSULTATIONS

	2015	2016	2017
<b>Library</b>			
■ Paper documents	3,701	3,496	2,879
■ Electronic documents	8,747	8,852	6,986
<b>Collections</b>			
■ Number of scientist visits	679	593	648
■ Duration of scientific visits (days)	1 246,5	1 361	1 050
Number of loans from the collections	332	386	370
Number of loaned specimens	-	-	36 788



## DIGITISATION

	2015	2016	2017
<b>Library</b>			
Back-cataloguing	7,148	5,917	5,601
Digitisation of the catalogue of the library	0	0	60,000
Number of digitised pages	0	110,000	50,000
<b>Collections</b>			
Type specimens	4,757	1,986	1,811
Non-type specimens	118	232	195
The new registrations in the databases	21,643*	20,062	24,409
The number of new types	708	2,182	748
■ The total of digitised specimens (metadata)	2,493,816	2,580,717	2,764,880
■ The total of digitised type specimens	77,912	86,901	89,714
The total of digitised species (all specimens)	157,598	58,590	24,943



\* This figure was adjusted since previous annual reports: the number of new registrations is now 31,000 lower since a mass import was removed.

# MUSEUM

The Museum welcomed 327,866 visitors through the doors in 2017. That is an increase of 15 % compared to 2016. This is the third best result since the reopening of the Dinosaur Gallery in October 2007. Only 2008 (the year after the reopening) and 2013 (with the Baby Animals exhibition) did better with 353,843 and 334,190 visitors respectively.

Both the permanent halls (+12 %) and the temporary exhibitions (+19 %) attracted more visitors to the Museum. After the March 2016 attacks and the resulting decline in visitors, a turnaround was seen in the last two months of 2016 that clearly continued throughout 2017. Both Belgian visitors (+15 %) and foreign visitors (+15 %) returned to the Museum. The temporary exhibition can be seen as the driver for the renewed interest. The successful start of the *POISON* exhibition in 2016 continued in 2017: 100,559 visitors in 8 months! The *MONKEYS* exhibition also had a creditable opening period (35,430 visitors in less than three months). In 2015, only a quarter of the number of museum visitors went to the temporary exhibition; in 2017 this figure reached 42 %.

Most Museum visits are in families or by individuals (76 %). Groups, most of which are schools, represent only 23.61 % of the visitor figures. The broadening of the public is therefore largely due to individual and family visits.

The age categories also show that mainly parents with children (and, less often, grandparents with grandchildren) visit the Museum. The relationship between adults and children remains balanced. The size of the share of young children (under 6 years) varies according to the theme of the temporary exhibition.

Participants in the educational services are still typically (school) groups, as opposed to individual visitors, with almost 89 % of the total number of participants in educational activities. This relationship has been the standard for years and is connected to the educational service's offer. In absolute figures, we have a cautious revival in 2017 after the acute decline in 2015 and 2016. However, the peak years 2013-2014 are still out of reach (62,594 and 60,060 participants respectively). The overall average number of participants in the educational activities for 2017 is 21. This shows hardly any difference to previous years.

If 100 people visit the permanent galleries, 42 of them also visit the temporary exhibition. 17 of them take part in an educational activity, 5 a guided tour, 5 a workshop, 3 another activity, and 4 an outdoor activity. 8 of them by something at the Museumshop.

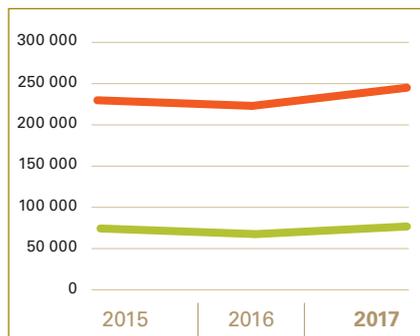
## MUSEUM VISITOR ACTIVITIES

	2015	2016	2017
<b>Total Museum visitors</b>	<b>300,011</b>	<b>284,865</b>	<b>327,866</b>
Permanent galleries	225,853	170,642	191,877
Temporary exhibitions indoor	74,158	114,223	135,989
<b>Temporary exhibitions outdoor</b>	<b>482,272</b>	<b>110,000</b>	<b>105,000</b>
<b>Museumshop customers</b>	<b>23,176</b>	<b>20,556</b>	<b>25,178</b>
Expenses per customer	€ 15.33	€ 16.42	€ 16.21
<b>Participants in educational and cultural activities</b>	<b>56,556</b>	<b>49,885</b>	<b>54,626</b>
Guided tours	17,604	15,264	17,550
Workshops	15,692	13,584	14,435
Other indoor activities	8,599	7,108	8,791
Outdoor activities	14,661	13,929	13,850

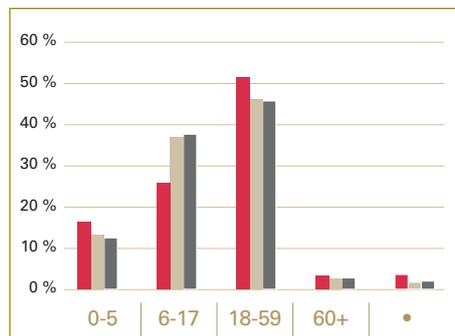
## PROFILE OF THE MUSEUM USER

	■ 2015	■ 2016	■ 2017
<b>By type</b>	<b>300,011</b>	<b>284,865</b>	<b>327,866</b>
■ Visitors in groups	72,529	67,956	77,398
■ Individuals and families	227,482	216,909	250,468
<b>By age</b>	/	/	/
Small children (0-5 years)	16.31 %	13.23 %	12.42 %
Young people (6-17 years)	25.72 %	36.71 %	37.42 %
Adults (18-59 years)	51.05 %	45.78 %	45.46 %
Senior citizens (60+)	3.35 %	2.60 %	2.73 %
Not known •	3.57 %	1.68 %	1.97 %
<b>Participants in educational and cultural activities</b>	<b>56,556</b>	<b>49,885</b>	<b>54,626</b>
■ Visitors in groups	49,473	44,372	48,534
■ Individuals and families	7,083	5,513	6,083
Average participants per activity	21.4	20.7	21

**MUSEUM VISITORS: VISITORS IN GROUPS VERSUS INDIVIDUALS AND FAMILIES**



**MUSEUM VISITORS: AGE**



**PARTICIPANTS IN EDUCATIONAL AND CULTURAL ACTIVITIES**



## PRESS AND INTERNET

In 2017, the RBINS was mentioned 1,510 times in the press: about four times a day. In the first semester of the year the emphasis was even more on scientific subjects and scientific research. In the second semester we got a lot of attention for the Museum, especially around the temporary exhibition *MONKEYS* and the crowdfunding campaign around our plateosaurus Ben. But in the second semester our scientists also made headlines: mainly new paleontological finds, a think tank around the North Sea, stranded marine mammals and ornithology.

An employee of the Institute is quoted in over half the articles or reports; a consequence of the conscious strategy of putting a quote or spokesperson in press releases that we send out ourselves. We see that the media are keen to use this way of quoting someone from the RBINS.

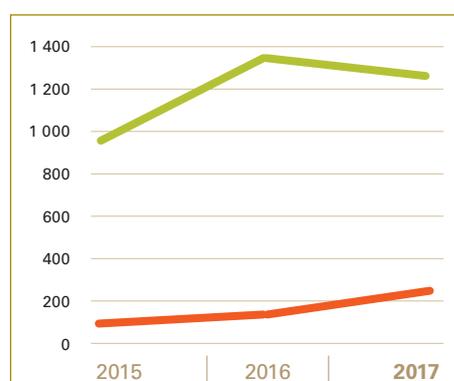
Across all our websites – which total about 50 – we reach around 760,000 visitors. This is the first time that we have counted for all websites, so 2017 is the benchmark for the coming years. Our 'corporate website' (naturalsciences.be) reached 405,000 visitors in 2017 (more than half of all visitors to our websites). From the 'corporate website' we can see the progress since 2015, and it is on the rise.

Our social media figures are also on the up. The number of Facebook followers has grown steadily to around 8,800, and we reached nearly 2 million people on Facebook in 2017; 700,000 more than last year. Twitter has gone up fast: we have doubled our number of followers to 10,000 in one year. For the time being, Instagram does not offer a handy analysis tool to export figures, but the number of followers in 2017 will be over 1,100.

The most discussed topics on Facebook were our plateosaurus Ben and our mammoth. On Twitter we mainly looked at scientific news, such as the discovery and description of new species, and stranding of marine mammals.

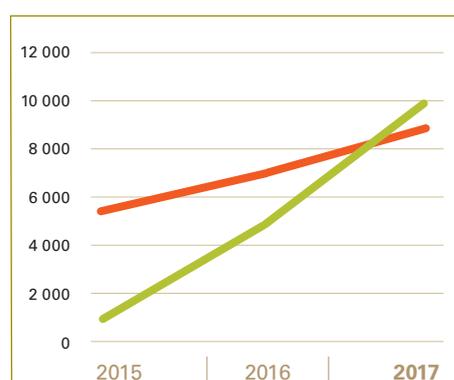
## IN THE MEDIA

	2015	2016	2017
<b>Printed press</b>	933	1,364	1,281
Of which research	401	901	776
Of which Museum	512	463	505
<b>Radio and TV</b>	118	149	229
Of which research			109
Of which Museum		Not available.	120
<b>Total</b>	<b>1,051</b>	<b>1,513</b>	<b>1,510</b>



## ONLINE EN SOCIAL MEDIA

	2015	2016	2017
<b>Websites</b>			
Website visitors			764,829
Website visits		Not available	3,362,919
Visited pages			13,382,669
<b>Social media</b>			
Facebook followers	5,540	7,018	8,861
Twitter followers	1,047	5,000	9,900



# THE RBINS IN BRIEF

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## 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

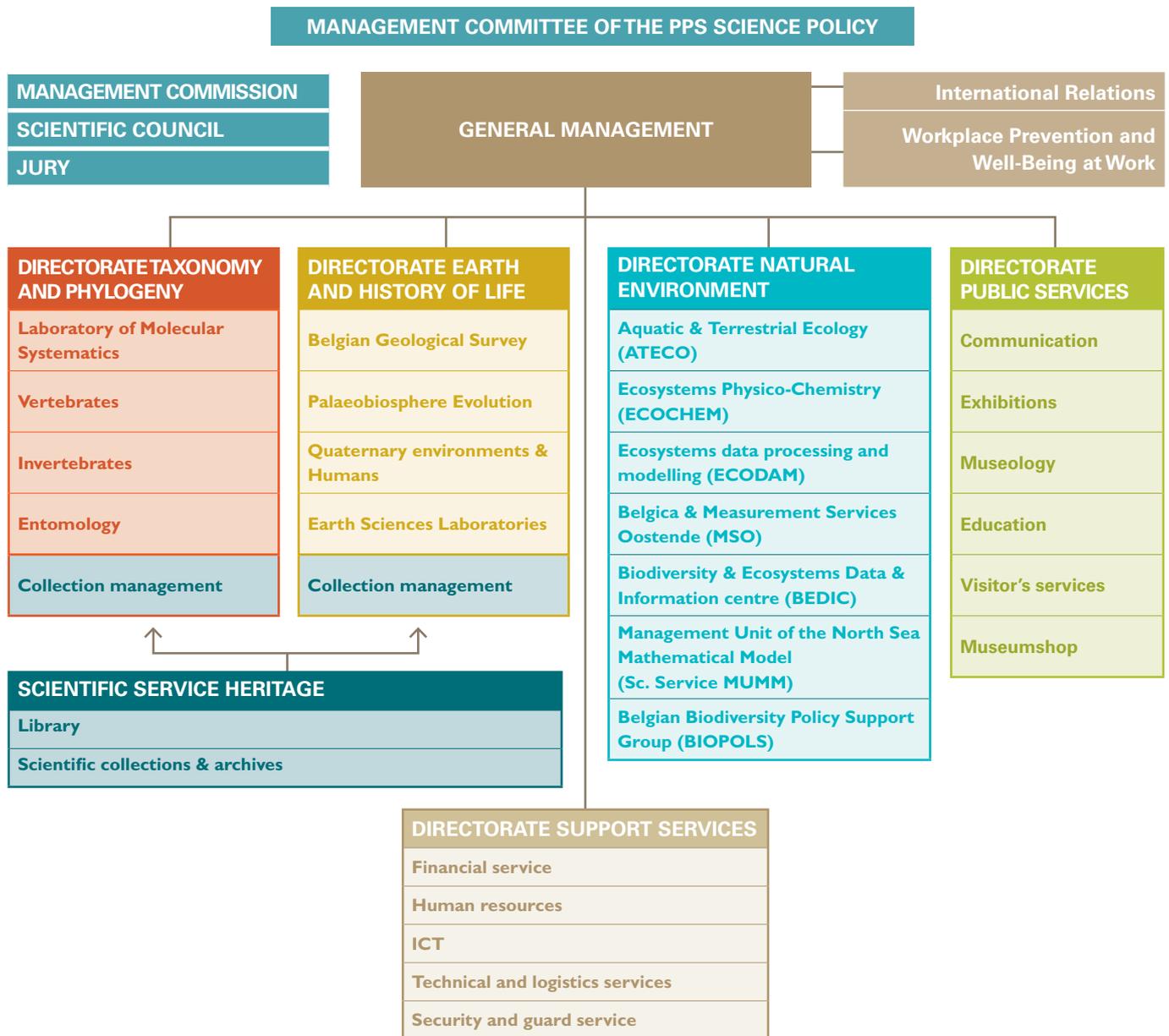
With their 38 million specimens conserved as Belgian heritage of universal significance, the RBINS's collections come just after London and Paris in the European classification, and belong to the top 10 largest collection in the world. They serve above all as reference and research tools and as such 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<sup>2</sup> 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 careers.

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

### **Copywriting - Translation**

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### **Coordination**

Jonas Van Boxel (RBINS)

### **Photos**

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- p. 15 photo 1 (Manuel Ruedi)
- p. 19 photo 1 (Danel Solabarrieta), photo 2 (UAntwerpen)
- p. 21 photo 1 (Udo Schmidt), photo 2 (Andrey Vlasenko)
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- p. 25 photo 2 (A. Pauly)
- p. 27 photo 2 (Anthonie Hellemond)

*All of RBINS activities are described in the 2017 detailed report (FR/NL).  
This report is available and can be obtained on request  
from [direction@naturalsciences.be](mailto:direction@naturalsciences.be)*

