naturhistorisches museum wien

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Vienna, 10 October 2023

Press conference
Cooperation between NHM Vienna and Schönbrunn Zoo
Presentation of a new polar bear exhibit

Founded in 1752 by Emperor Francis I, Duke of Lorraine, **Schönbrunn Zoo** is the world's oldest zoo and a UNESCO World Heritage Site. It ranks among the most renowned zoological gardens globally.
The **Natural History Museum Vienna** is a research museum that emerged from the Imperial collections and looks back on a history of more than 270 years. Dedicated to "the realm of nature and its exploration", the museum is a total work of art with a unique atmosphere. It is committed to conserving and expanding its extensive scientific collections as the basis of research and presentations to the public. Both world-renowned institutions are not only inspiring venues, but engaged in learning and exploration by their very nature. They showcase natural diversity and are important research partners for nature and wildlife conservation projects.

10 October 2023, 10:30 a.m.
Natural History Museum Vienna and Schönbrunn Zoo

Experts report on current and future cooperation, highlighting the areas where cooperation will be enhanced.

Venue: Natural History Museum Vienna, Maria-Theresien-Platz, 1010 Vienna, lecture hall on the mezzanine floor, and behind the scenes in the Zoological Preparation Unit
Admission: from 10:00 a.m.
Start: at 10:30 a.m.

Programme

Welcome and introduction:
Dr. Katrin Vohland, Director General and Scientific Director, NHM Vienna

Cooperation update:
Dr. Folko Balfanz, zoological curator and former veterinarian, Schönbrunn Zoo

Short film: "A second life. The making of a polar bear exhibit" by **BA Christina Rittmansperger**

On the craftsmanship of the Zoological Preparation Unit:
Dr. Ernst Mikschi, head of the 1st Zoological Department of NHM Vienna

Followed by: A visit to the new polar bear exhibit and the new beluga whale model with
Zoological Preparation Unit staff members Natalie Wallner, Robert Illek, Mag. Iris Rubin

Cooperation between NHM Vienna and Schönbrunn Zoo

For NHM Vienna's new special exhibition **"ARCTIC. The Changing Polar World"** (shown from 8 November 2023 until 22 September 2024 in the special exhibition halls), Schönbrunn Zoo has provided the carcass of a deceased female polar bear, which has been turned into a lifelike exhibit thanks to the great artistic skills and craftsmanship of the taxidermists in the Zoological Preparation Unit.
The polar bear was born on 24 November 2013 in a zoo in Tallinn, Estonia. She was transferred to Schönbrunn Zoo on 4 December 2017. On 9 November 2019, she gave birth to one young as part of the zoo's breeding programme. On 9 October 2022, the effects of an acute colic she suffered left the team of veterinarians and attendants who had provided her with extensive and continuous care no choice but to euthanise her. As an adult female polar bear, she weighed around 270kg.

The polar bears at Schönbrunn Zoo are part of the Ex situ Programme for conservation of the species coordinated by the European Association of Zoos and Aquaria (EAZA). Recommendations for future breeding pairs are made by the competent breeding book coordinator in order to ensure the genetic health of the reserve population under human care.

As a modern, scientifically managed zoo, Schönbrunn Zoo considers knowledge sharing, research, and the protection of species to be of paramount importance. Data on individual animals are therefore compiled in an extensive international database and made available to scientific institutions such as museums for research purposes.
Since 2014, Schönbrunn Zoo has been working with the non-governmental organisation **Polar Bears International (PBI)**, conducting research and funding projects in the wild. PBI is the only initiative globally that focuses exclusively on protecting polar bears, and a prime example of how different organisations can join forces to protect a species. This is essential because the habitat of polar bears is disappearing ever more rapidly due to climate change. To hunt seals, their main food source, polar bears need unbroken stretches of pack ice where they can wait near breathing holes for seals to surface. Due to global warming, sea ice now freezes only later in the year, and its thickness has also decreased, which makes it more difficult for polar bears to hunt and to find mating partners.
Schönbrunn Zoo advocates for the cause of polar bear conservation to its millions of visitors. The polar bears at Schönbrunn Zoo have thus become ambassadors for their relatives in the wild. And even after they die, the zoo's animals sometimes continue to serve as ambassadors and bearers of knowledge – in the case of this polar bear, as a centrepiece of the special exhibition **"ARCTIC. The Changing Polar World"**.

The thematic focus of the new exhibition is the Arctic's unique natural environment, its fascination and fragility, as well as the rapid changes affecting Arctic regions. The visible and measurable effects of climate change, as well as the geopolitical shifts these have triggered, have placed the Arctic at the centre of global attention. *"The exhibition explores the many facets and roles of this unique ecosystem from different perspectives. It highlights that through its crucial global role, the Arctic is now more closely connected to all our lives than ever before,"* says NHM Vienna's Director General and Scientific Director, **Dr. Katrin Vohland**, about the mission of the exhibition.

A presentation in the workshops of the Zoological Preparation Unit gives insight into the making of this special polar bear exhibit and of a new model of a beluga whale.

The Zoological Preparation Unit of NHM Vienna

Their work involves chiselling and grinding, skinning and painting, carving artificial skeletons and dissecting organic structures. Their workshops are full of dust and often carry the smell of decay and solvents. Masters of their craft, taxidermists like the staff of the Zoological Preparation Unit are the backbone of any museum of natural history.
Scientific taxidermy has a long tradition in Vienna. The "Viennese School" was considered at the forefront of taxidermy until the end of the Habsburg Monarchy. As a testament to this, works by the famous Viennese anatomist and taxidermist Josef Hyrtl (1810–1894) can still be found in all major taxidermy collections around the world. Today, Austria is the only country in the EU where young people can train to become taxidermists under the dual system combining schooling and apprenticeship. The taxidermists at NHM Vienna currently include an apprentice, Gal Shalev. In recent years, the Zoological Preparation Unit of NHM Vienna has seen dynamic change. In terms of technical standards and staff qualifications, NHM Vienna easily holds its own in international comparison.
Preserving beings long after their death is an ancient desire. Consider, for instance, the mummification of humans and animals in Ancient Egypt. From the 19th century onwards, demand for impressive hunting trophies grew steadily, leading to the invention of new preservation and taxidermy techniques. While the specimens created during that period are of great historical value today, they do not meet modern standards of presentation. In the 21st century, "stuffing" dead animals is no longer the standard. Workshops abound in new materials and techniques: polyurethane foam and epoxy resins, cryogenic freezing and vacuum treatment, airbrushing and all sorts of precision instruments are modern tools to achieve the same goal, which is to preserve as much as possible of the original, or to use model making to create a replica that is as lifelike as possible. In addition, taxidermists are responsible for the conservation, restoration and preservation of various artefacts in the museum's collections. Their work is an important aspect of documenting nature and its transformations over time for scientific purposes, and of preserving historical artefacts for diverse future uses.

Polar bear exhibit
A demonstration shows how the taxidermists and model makers at NHM Vienna mastered the challenge of preserving and breathing new life into the animal's carcass. A main challenge in the taxidermy of animals is restoring their typical stance and shape. A taxidermist's work covers everything from creating animal and plant exhibits to making models and dioramas, as well as imparting artistic and technical methods or knowledge about natural history.
In the case of the polar bear from Schönbrunn Zoo, the team first had to make a body from polyurethane foam with precisely the right measurements to serve as a frame for the animal's taxidermied hide and fur. After drying, the fur was patched where it had been shaved when the animal had been under extensive veterinary care, using scraps from a polar bear pelt in the mammal research collection, and then the exhibit was touched up with paint. The entire process took around four weeks, half of which were spent solely on making the precisely dimensioned mould of the body.

Creation of a beluga whale model
In the spirit of modern ecological awareness, the aim was to use non-toxic materials to the greatest extent possible to make a model of a beluga whale with a length of nearly four metres. Small-scale tests pointed to *papier mâché* as a potential avenue. However, research in old taxidermy manuals led to the discovery of an even better way: Ter Meer's technique, using a mixture peat, flour paste and gypsum, but replacing the peat with paper. Similarly inspired by historical models, the substructure was built from wood and covered with a wire frame and paper; then Ter Meer's mixture was layered on to model the muscles and skin, sanded smooth and painted white with slaked lime paint.

Team of the Zoological Preparation Unit

Robert Illek I Head of the Zoological Preparation Unit, taxidermist
Nathalie Wallner I Administrative manager of the Zoological Preparation Unit, taxidermist
Gerhard Hofmann I Taxidermist
Mag. Iris Rubin I Taxidermist, model and diorama maker
Mirjana Pavlovic I Taxidermist
Melina Haring I Taxidermist
Gal Shalev I Taxidermy apprentice

Technical equipment of the Preparation Unit of NHM Vienna

Maceration unit and osmosis unit
Maceration of pre-treated carcasses by adding maceration enzymes is used to preserve large skeletons. The use of osmosis water prevents the formation of calcium deposits on the bones.

Bone degreasing unit
This machine is used to reduce the fat content of bones. Fat is extracted from bones by means of pressurized application of a solvent (DCM). This enhances the bones' state of conservation and also makes them considerably easier to work with for scientific research.

Skin beetles
Skin beetle larvae are used to strip the tissue from the carcasses of small vertebrates. The process leaves ligaments and tendons mostly intact and attached to the skeleton. The Preparation Unit has bred skin beetles *(Dermestes ater)* for this purpose continuously since 1980.

Freeze-drying
The Preparation Unit has a freeze-dryer with two chambers, a small one measuring about 0.03m³ and a large one measuring about 1.1m³. They are used to make high-quality, extremely detailed preserved specimens, especially of delicate, small vertebrates such as fish, amphibians and small mammals, which would be very difficult to preserve with conventional taxidermy methods. The machine dries out specimens through a process involving extremely low temperatures and the application of a vacuum.

Nitrogen preservation
Nitrogen is used in the preservation of specimens to prevent or fight infestation by harmful insects. Measuring around 12m³, the chamber is big enough to accommodate large specimens. This technique involves withdrawing oxygen from the chamber, leaving a mostly pure nitrogen atmosphere in which insects cannot survive.

Cold storage
The Preparation Unit has a cold storage facility to store newly arrived specimens, where they can be kept cool at 5°C or frozen at temperatures as low as -18°C. The facility measures 40m³ and usually contains around 4000 specimens.

History of taxidermy
Around 1900, there was a veritable boom in impressive hunting trophies. Large workshops emerged, applying specific techniques pioneered by their famous founders. One of these was Philipp Leopold Martin (1815–1885), the inventor of dermoplasty (from Greek: derma = skin, plastein = to shape). Other famous practitioners of this technique were Friedrich Kerz (1842–1915), Hermanus H. ter Meer (1871–1934) and Carl E. Akeley (1864–1926). The animal hides used in dermoplasty were preserved by tanning or curing.
No history of taxidermy would be complete without mentioning the great Austrian anatomist Josef Hyrtl (1810–1894), whose anatomical specimens were renowned for their beauty and sold around the world. Hyrtl is credited with inventing the modern corrosion technique, in which taxidermic compounds are injected into the vessels and cavities of organs, and once they have cured, the surrounding tissue is removed.
Quality expectations in taxidermy are markedly higher today than they were 200 years ago. Today's wide availability of photos and videos in particular makes it easy to critically compare imitations with the real

thing, spurring constant improvements in taxidermy techniques. Not only do modern exhibits hold their own in comparison with images of live animals; they actually show greater detail and are not mere copies, but originals in their own right. The most significant change over time has been in the materials used. Straw, hay and peat have been replaced by wood wool, polyurethane foam and epoxy resins. New techniques such as freeze-drying have been developed, while poisons commonly used in the past, such as arsenic, have been eliminated from taxidermy processes as far as possible. However, the underlying principle remains the same: the long-term preservation of the original specimen.

Taxidermy in the natural sciences
Different groups of animals pose vastly different challenges to those wishing to preserve them. While seashells and snail shells require almost no treatment for preservation, and insects need only be dried in most cases, the preservation of vertebrates involves highly complex procedures. This holds especially true if the preserved specimens are intended for display.

Preservation in alcohol
The simplest method of preservation is to place the entire specimen in a preservative fluid. Alcohol (70% denatured ethanol) is most commonly used. Before preservation in ethanol, specimens are often pre-treated with formaldehyde, a fixative that prevents autolysis and decay of tissue. In fact, formaldehyde fixation is essential when preserving molluscs and fragile organisms such as jellyfish. However, formaldehyde is toxic, which is why it should be replaced with ethanol after a few days. The advantage of preservation in alcohol is that the entire organism is conserved. Though birds and mammals are also sometimes preserved in alcohol (especially small specimens), the technique is mostly used for fish, amphibians and reptiles. Alcohol does cause colours to fade, but the carcasses of these animals lose their natural colouring within a few hours after death anyway.
A further advantage of preservation in alcohol is that genetic (DNA) studies can be conducted on preserved tissue long after. That is why nowadays, tissue samples are often taken from newly delivered specimens and separately preserved in alcohol. While specimens preserved in alcohol are often considered to lack attraction for display, they are absolutely essential for research collections.

Pelts
The skinned and tanned hide of an animal is called a pelt. The pelts of mammals and birds are preserved because the fur and feathers on the pelts are an important source of information.
Pelts form a key part of ornithological and mammalian research collections. As the pelts of birds and mammals retain their colouring, they also make attractive exhibits for display. A further advantage is that they take up less space than taxidermied specimens and are easier to make than dermoplastic exhibits.

Skeletons
To preserve both full and partial skeletons, all other tissue must first be completely removed from the bones. The bones are stripped mechanically at first, often after the specimen has been placed in a maceration fluid (enzyme solution).
The final step in the preservation process involves animals: skin beetles are set to feed on the skeleton or bones. These insects, normally feared for the damage they can do to a museum’s collections, strip the bones clean in a few weeks.
Skeletons are important sources of morphological information. If used for research, the skeletal parts are simply stored in suitable containers, while skeletons intended for display are mounted, meaning that the bones are put back together with the aid of supports.

Dermoplasty
A dermoplastic exhibit is a three-dimensional reconstruction of an entire animal. The starting point is always the preserved hide, the pelt, sometimes supplemented by other parts of the animal (such as antlers, hooves or teeth). While it was common practice until a few decades ago to stuff pelts with various materials like straw, moss, hemp or peat (hence the term “stuffed specimens”), with less than lifelike results at times, nowadays, synthetic cores precisely tailored to the specimen’s species and size serve as the basis of the body’s reconstruction. Cotton wool and wood wool are used to fine-tune the body shape.
In the past, dermoplastic exhibits were treated with arsenic to prevent insect infestation. Nowadays, they are no longer treated with this poison, but with Eulan, a mixture of two pesticides used in the textile industry.
Without a doubt, making a modern dermoplastic exhibit is the pinnacle of zoological taxidermy. Creating an exhibit that is as lifelike as possible requires not only great craftsmanship, but also detailed knowledge

about the animal in question. Accordingly, it often involves in-depth research in collaboration with expert scientists. Photos and videos are frequently essential to study details such as an animal's movements in order to recreate them in an exhibit. Such exhibits make for compelling displays, but require enormous effort. They are therefore primarily made for exhibitions and presentations.

Model making
Like other natural history museums, NHM Vienna also makes its own scientific models. The aim is to make three-dimensional reproductions that are as faithful to nature as possible, though scale models may also be larger or smaller. As NHM Vienna prides itself in the originality of its exhibits, model making plays a key role whenever larger-than-life scale models are needed as educational tools for specimens that are simply too small for their complexity or functional structures to be easily discernible. Models also come into play when specimens are not suitable for preservation regardless of their size, for instance jellyfish and molluscs such as snails, mussels and squids. The work of model makers is therefore extremely varied.
Photos, microscopic images, taxidermied specimens and direct observation of live animals serve as the starting point for scientific model making. Nowadays, most models are made from synthetic materials, including a range of modelling compounds, PU foams, artificial resin laminates, etc. However, creative model makers will basically resort to almost any material. Whether it is glass, wood or metal: whatever helps give the model a lifelike appearance will be used.
Like taxidermists, model makers combine biological expertise with artistic and technical skills. It often takes months to complete a model, and each one is unique and therefore of high value. Experience is key to this task.
Reconstructing extinct species is a particular challenge in model making. There are no images of them, and observation in the wild is limited to related species, if any still exist. A case in point is the terror bird *(Paraphysornis brasiliensis)* exhibited in Hall VII, a predatory flightless bird measuring about two metres that died out more than 20 million years ago. The starting point for the making of this model, a collaboration with the palaeontologists at NHM Vienna, was a mould of a fossilised skull that had been found with a largely intact skeleton in Brazil in the 1980s. Together with photos and measurements of the skeleton, the mould served as the basis for a metal skeleton covered with a PU foam core that was trimmed into shape. The resulting body was covered with bird pelts (farmed turkey and ostrich), and individual feather details were added. The glass eyes were painted by hand, modelled on the eyes of seriemas, a bird species found in central and eastern South America and believed to be the closest living relative of terror birds.
From reconstructing extinct species to creating educational models and designing dioramas, every project thus poses new challenges to model makers, making their work extremely varied and fascinating.

Facts you may not know about taxidermy:

- The German word for taxidermy, "Präparation", comes from the Latin "preparare", meaning to prepare. Which was the original task of taxidermists in a range of fields: preparing finds and specimens for scientific study, whether in medicine, zoology or palaeontology. This also included the preservation of specimens. Indeed, the German term "Präparation" is still used today in surgery to describe the dissection of anatomical structures.

- Mummies from Ancient Egypt are among the oldest examples of preparation and preservation. Over 3000 years ago, not only humans, but also animals such as ibises, crocodiles and gazelles were mummified. Mummification was widely used for religious reasons, but as the centuries passed, the art of embalming was largely lost.

- In Europe, the emergence of modern science and medicine led to a surge in demand for preserved specimens. From the 19th century onwards, there was also great demand for hunting trophies, leading to the invention of new techniques and the refinement of existing ones such as tanning and curing.

- The aim of zoological taxidermy has always been to preserve organic structures, initially for purely scientific purposes. However, the preservation of animal specimens requires a wide variety of techniques.

- The simplest way to make a preserved specimen is to preserve the entire animal in alcohol. Making pelts by skinning and tanning animal hides is a more complex process. Essential structures remain intact and can be studied.

- Skeletons provide even more information. Tissue is stripped from the bones first mechanically, then with the help of chemical solutions. As a final step, skin beetles are set to feed on the skeleton. These insects remove all tissue residues from the bones. If used for research, the resulting skeletal parts are stored in pieces. If a skeleton is intended for display, its parts are put back together and mounted.

- Preservation is used not only in zoology. Other scientific disciplines also use techniques to preserve organic structures. Botanists preserve dried and pressed plants or fragments in herbaria. In anthropology and medicine, dry and wet preserved specimens are made of bones and soft body parts. And in geology, excavated fossils and prepared sediment samples are preserved.

Press materials:
https://www.nhm-wien.ac.at/presse/pressemitteilungen2023/pkeisbaer

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