

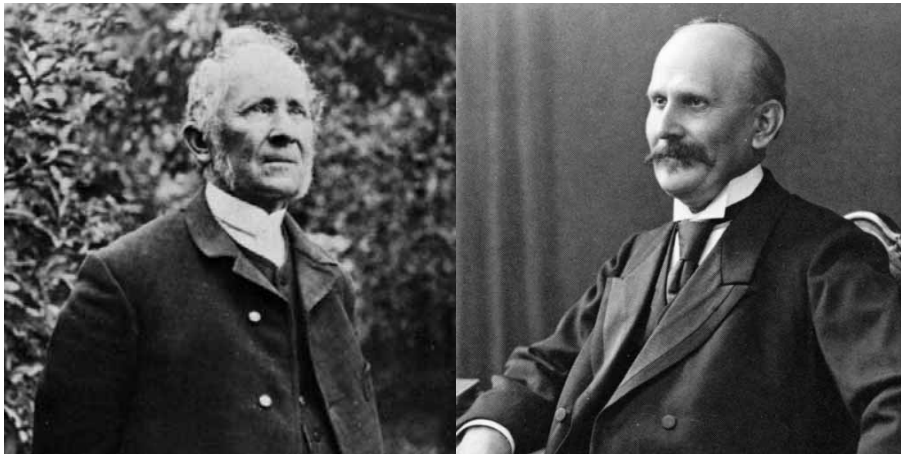
Nature in glass

The models of Leopold and Rudolf Blaschka

The second half of the nineteenth century was a time of great scientific discovery. Throughout the world, new museums were being built and many private museums were opened to the public. New galleries were designed to display the range of known living plants and animals. For many groups of animals this was easily done. Birds, mammals, reptiles and even fish could be skinned and mounted to produce reasonably accurate and lifelike representations. Insects, with their hard exoskeletons, were dried and pinned to boards for study or display. But what about soft-bodied animals, such as jellyfish and sea anemones, which were preserved in spirit? Their colours quickly faded and their shapes became distorted as the tissues shrank. The German glass-worker and naturalist Leopold Blaschka devised a solution to this problem. Together with his son, Rudolf, he established a successful business supplying glass models, mostly of marine animals, to museums worldwide during the latter half of the nineteenth century.

Leopold Blaschka was born in 1822 at Aicha,

in Northern Bohemia, now the Czech Republic. The Blaschka family, originally from Venice, were skilled workers in decorative glass, and Leopold showed artistic skill from an early age. When he left school he spent some time apprenticed as a goldsmith and gemcutter, before joining his father's business crafting ornaments from metal and glass. For many years Leopold continued to produce decorative items and jewellery. Alongside the business, Leopold maintained an interest in natural history. His son Rudolf was born on 17 June 1857, and it was around this time that Leopold began experimenting with making artificial glass flowers. He was introduced to Prince Camille de Rohan, a wealthy amateur naturalist, who arranged to supply Leopold with specimens of orchids from his greenhouses for study. Between 1860 and 1862 Leopold constructed about one hundred models, representing about fifty species of orchids. In the summer of 1863, the models were displayed in the pavilion of the Botanical Garden in Dresden. They attracted a lot of attention for their beauty and craftsmanship, but, although much



Left: Leopold and Rudolf Blaschka at their home near Dresden, about 1895 (Image courtesy of the Botanical Museum, Harvard University, Cambridge, MA)

Right: an intricate model of a Portuguese Man-of-war (*Physalia arethusa*)



admired, no commercial interest was shown in them.

In the same year, an Englishman living in Dresden, whose name was never recorded, asked Leopold to make models of sea-anemones. He provided a copy of a recently published book, *Actinologia Britannica* by P. H. Gosse, for reference. Leopold produced a set of models, which were purchased by Professor Reichenbach for the Dresden Museum. These models, exhibited in artificial aquaria, attracted the attention of curators of the new natural history museums and Leopold began supplying sets of anemones to museums and private collectors across Europe. Inspired by his success with the anemones, he recalled a voyage to America in 1853 when he had spent time observing jellyfish. He remembered being very taken by their glass-like appearance, and soon he had added models of these animals to his repertoire.

In 1870 Rudolf, then a young teenager, began to learn the traditional family skills by assisting in his father's workshop. From 1866 onwards the business only received modest orders for models each year, so they supplemented their income by making decorative items of jewellery, medical glassware and glass eyes, mostly for cosmetic use by blind people but also for taxidermists. In 1876 they received an order for two complete collections of models for the South Kensington Museum in London, now the Natural History Museum. Rudolf was then further inspired to study zoology and anatomy, and made much use of the great natural history library of the Imperial Academy Leopoldina in Dresden. Here the Blaschkas studied illustrated books and copied many of the drawings as sources of reference for the glass animals.

In later years they increasingly based models on observations of real animals, either specimens

collected during field trips or animals kept alive in aquaria in their house in Dresden. In 1879 Rudolf visited Northern Italy and the Adriatic coast to study marine biology and at about the same time an entire room in their house in Dresden was given over to aquaria, in which they kept specimens sent from various marine stations. They also visited several German Universities, and in particular they valued the assistance and friendship of Professor Ernst Haeckel of Jena. By 1880 Rudolf had become an active member of Isis, the Dresden Natural History Society, to whom he subsequently delivered two papers.

Comparison between early and later models made in the 1880s shows a distinct tendency towards increased scientific accuracy and away from a more showy early style. The emphasis had originally been on 'decoration for elegant rooms' and the models were described as such in the early catalogues. The Blaschkas were keen to accommodate customer demand and continued to increase their range accordingly. An early catalogue dating from 1871 listed nearly three hundred models. By 1888 the catalogue published by Henry Ward, their American agent, listed seven hundred!

The models varied greatly in complexity and in their method of construction. Component parts were formed from both clear and coloured glass, using a combination of glass blowing and lamp working techniques. The parts were then either directly fused together or assembled with adhesives, probably animal glues. Where necessary, other materials were used in the construction. Fine copper wires were often added to reinforce or attach delicate tentacles and gills and painted paper was cleverly incorporated to represent internal structures. They also made use of the actual shells of terrestrial, freshwater and

A source picture for the Paper Nautilus (*Argonata argo*) model

marine snails to which the modelled glass bodies of the animals were attached. These included a series of anatomical preparations that were almost certainly based on their own dissections of actual specimens.

Many of the Blaschkas' models came to be displayed at the Museum of Comparative Zoology at Harvard in the United States, where they were seen by Professor George Lincoln Goodale. He was planning new galleries in the adjacent Botanical Museum, and, in 1886, he visited the Blaschkas and persuaded them to make some sample flower models. He subsequently commissioned them to produce models of plants for his galleries, and in 1890 the Blaschkas were offered an exclusive ten-year contract with Harvard. Work on the animal models then ceased.

Leopold died in 1895, at the age of seventy-three, after which Rudolf continued working single-handedly until he retired in 1936. He died three years later at the age of eighty-two. By that time the collection consisted of 847 life-sized model plants and over 3,000 enlarged flowers and anatomical sections. Formally presented to the Botanical Museum of Harvard University in 1893, the entire collection had been privately financed as a memorial to the late Dr Charles Eliot Ware, a former Harvard graduate, by his widow and daughter. The plant models are displayed there to this day, attracting over 100,000 visitors annually.

Sadly, the same cannot be said of the collections of glass animals. Many have been lost over the years or, perhaps because of changing fashions, are no longer displayed.

Conserving the models

Our collection of Blaschka glass models has around 200 items. These represent a whole range of marine



animals such as sea anemones, squid and jellyfish. The models have had a hard working life, and continue to be used in displays today. However, this has had an impact on the collection. Years of open display and poor storage conditions have caused damage to a large percentage of the collection. In addition, previous attempts to repair the specimens have caused further problems through the use of unsuitable repair materials

Conserving the Blaschka models is fraught with difficulties. Their age and complexity require an

A broken Paper Nautilus model

understanding of both how they were made and what they represent. Recent research work has looked closely at the Blaschkas' original notebooks and at the construction of the models themselves. Past practice was to do as little as possible; however, with a renewed interest in the models emerging, the opportunity was taken to develop new displays demonstrating the fine workmanship of the Blaschkas. This in turn resulted in an active need to conserve parts of the collection.

The opportunity to conserve the models was both exciting and nerve-racking. These beautiful glass representations of marine animals were originally developed as educational models. Now they are increasingly considered to be works of art, with a value that makes them irreplaceable. The first important stage of any conservation project is to understand fully what the specimen or object represents, and then to understand the nature of the materials forming it. The Blaschka models are an intricate blend of glass, paint and textured coatings that have been put together to show the textures and colours of the animal in life. Amongst all this is the damage from past repairs and the accumulation of decades of dirt, which the conservator must rectify without damaging or altering the original model.

The conservation of the models involved a number of distinct processes. The first was to assess the most appropriate means of cleaning the models. Suitable methods then had to be developed for removing previous repairs. Finally, where required, the models needed to be repaired.

The models proved to be very difficult to clean. Surface finishes of paint and resin type materials had been applied to the outside of many of the specimens to add texture and colour. These had attracted surface dirt over the years, which was very



A detail of the damage to the Paper Nautilus model

hard to remove. A range of solvents and cleaning solutions was carefully tested. The outcome was that whilst water (with a non-ionic detergent) proved effective for removing the dirt, the surface coatings were also soluble in this solution. Other solvents, such as acetone (propanol) were not effective. Only one of the solvents tested, white spirit, shifted any dirt without damaging the surface coatings. The cleaning that could be carried out was therefore very limited; only those specimens without a coloured or textured coating could be adequately cleaned.

Many of the specimens, especially the cephalopods, had become repeatedly broken and repaired over time. Many of these repairs were now discoloured or failing and some of them were also misplaced, for example tentacles had been re-attached in the wrong place. The older repairs tended to use animal glue that could easily be softened in water, but this required care where the surface coatings were present. The newer repairs appear to have used some general purpose adhesive which was found to be soluble in acetone. This adhesive was easy to soften and ultimately to remove. Once the old glues had been removed, consideration could then be given to reassembling the models.

The glass used to manufacture most of the models was found to be very thin and brittle. Some of the collection had been broken into numerous pieces, and, in the past, mistakes could have been made in the way the detached pieces were fitted together. Careful consideration had to be given to the adhesive to be used because the new repairs needed to be reversible. Epoxy resin based adhesives were quickly ruled out due to their strength of bond, lack of reversibility and long-term stability problems. The consolidant Paraloid B-72™ was chosen because it is a stable material that remains reversible and can



The reattached tentacle
on the Paper Nautilus
model



be removed if required. It also forms a weak repair that will fail before the glass, reducing the chances of damaging the models further.

The refractive index of Paraloid B-72™ is not ideal for working with glass, but it does result in the repair remaining slightly visible, allowing future curators of the collection to identify previous conservation work. Paraloid B-72™ was used in two ways. The first method was as a contact adhesive: thin coatings were applied to the broken surfaces, which were joined when almost dry. The other

method was as a film support. Films of Paraloid B-72™ were cast on acetate sheeting; these required several days' drying before they could be removed. The films remain reasonably flexible for a couple of weeks, and they were used to reinforce the edges of thin glass, or to form splints. The films were also used to fill gaps in some models where a section of tentacle or other process was missing.

The overall aim of this conservation project was to prepare the specimens for use in an exhibition on the Blaschka collection. The conservation work was



The model after conservation

developed to improve the visual appearance and integrity of the models, without further altering the original structure. Since completion of the work, many of the models have been part of a touring exhibition on the work of the Blaschkas, and have survived the experience very well!

The Blaschkas' glass models are an important collection, which is still used today. The recent work carried out on the collection will help ensure its continued survival for future generations to enjoy.

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