

Richard Evans Schickel and William C. Sullivan

The Glass Flower at Harvard



Two German artisans, steeped in a family tradition of inspired glassmaking, created the exquisite museum models that have long been admired by visitors

One day in the late 1880s, Harvard professor George Lincoln Goodale set out from his hotel room in Dresden with high hopes. He was to meet with two glass artisans, Leopold Blaschka and his son Rudolf, and he hoped to persuade them to create glass models of plants for Harvard's Botanical Museum. Goodale's meeting was successful. Out of it grew a 50-year collaboration, and nearly 4,000 impeccably crafted, amazingly detailed flower models. This collection, described as "an artistic marvel in the field of science and a scientific marvel in the field of art," has become world-renowned.

The Goodale-Blaschka collaboration began in 1886, but the first steps toward the glass flower project were taken years earlier, with the establishment of various independent natural history museums at Harvard: zoology, geology and mineralogy and a museum of archaeology and ethnology. The emphasis at these was not just on research but on instructing the public as well.

When George Goodale became first director of Harvard's Botanical Museum he sought some way of conveying the beauty and vitality of the plant kingdom, to captivate and instruct a large viewing audience. Dried or preserved plants and plant products would not accomplish this. Neither would the plant replicas of the time, made of wax or papier-mâché. Crudely done, they would not show accurate data. Nor would they stand up well over time.

One day Dr. Goodale saw glass replicas of marine invertebrates by Rudolf and Leopold Blaschka in Harvard's zoology museum. These convinced him that glass was the medium in which to produce a permanent botanical collection.

Goodale's idea took him to Dresden and to the Blaschkas, who listened politely to his

proposal. They were reluctant to take on the glass flower project, however, because they had developed an appreciative market for their models of marine invertebrates, and moreover had encountered business difficulties with the few glass models of plants they had produced. But eventually they agreed to create a few glass models of plants for Harvard's museum.

The first few models the Blaschkas sent were badly damaged while passing through customs in New York. Despite the damage, Bostonians Elizabeth C. Ware and her daughter Mary Lee Ware were sufficiently impressed by the artistry and workmanship to urge Dr. Goodale to secure a contract with the Blaschkas and to offer to finance the project.

The Blaschkas agreed to produce plant models for Harvard on a half-time basis, leaving the remainder of their time to their continuing production of marine invertebrates.

A list of plants was drawn up that represented as many orders, genera and species as possible. The Blaschkas used the list to plan a sequence of production.

Of the plants on the list, some living representatives were sent from America to Germany for the Blaschkas to cultivate in their own garden and use as references. Many exotic plants, particularly tropical species, were in the royal gardens and greenhouses of the castle in nearby Pillnitz; these were made available to the artisans.

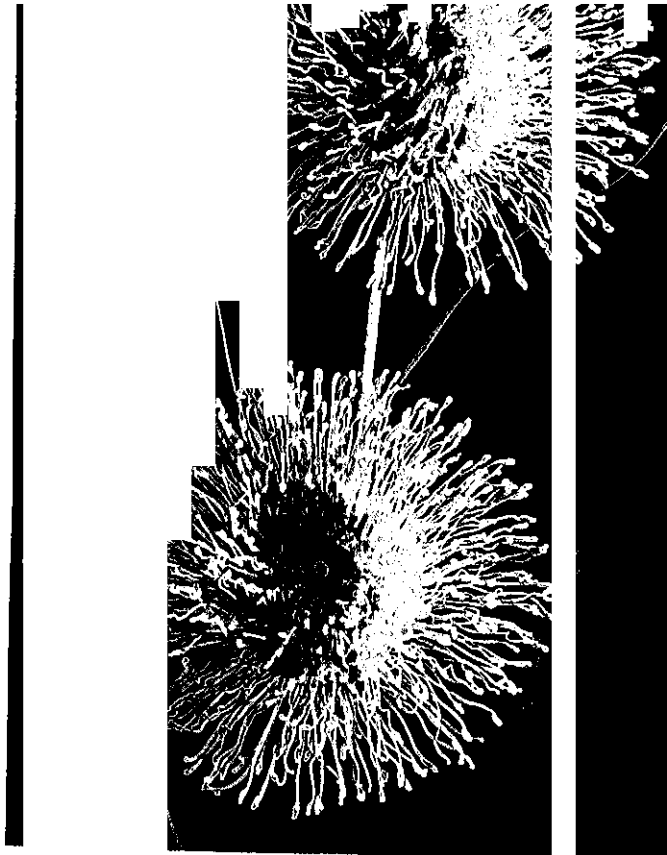
In 1887 the first shipment, 20 models, arrived in New York. By arrangement, it went directly to Cambridge where it was opened carefully by museum personnel in the presence of a customs official.

By 1890 the Blaschkas decided that they wanted to work either with botanical models or with zoological models, but not both. On April 16 of that year they dedicated themselves to botany by signing a ten-year contract

A half-century-long collaboration between the Harvard Botanical Museum and glass artisans Leopold and Rudolf Blaschka resulted in 4,000 extraordinary glass models of plants, including the flowering apple branch (overleaf) and the water lily (this page). Accurate to the smallest detail, they have instructed and delighted generations of visitors. Glass flower photos by Hillel Burger.

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Models of blue gum eucalyptus, E. globulus (left), a vegetable gum gourd, Luffa cylindrica, reveal the great detail of the glass flowers. Ordinary tools—transformed by the Blaschkas' extraordinary skill—were used to create amazingly delicate structures. The Blaschkas experimented with glass of varying position, fitting the working qualities of each to the requirements of the model. Early models were painted for later models Rudolf Blaschka used tinted glass.

with Dr. Goodale. The Wares agreed to sponsor the work.

As work progressed, the Blaschkas found it necessary to examine certain tropical plants under more natural conditions. The younger Blaschka traveled to the Caribbean and to various areas of the U.S. to study the plants, make drawings and color notes and collect and preserve specimens to take back to the workshop in Germany.

The art of melting in stamens

But the creation of these plant models required, not just botanical knowledge, but consummate craftsmanship and an artistic eye as well. Dr. Goodale's description of the Blaschkas' creation of a phlox detailed the painstaking assembly of a single flower:

"They drew first of all a rough sketch of the relations of all the flowers to each other and to the leaves, and then began to mix some glass with colors to get the right tints. The corolla is drawn and formed from a tube of glass. Then the petals are formed and melted to the tube of the corolla. The stamens are melted in next, and then the whole thing is placed in an anneal-



ing oven to remain for a few hours. It took Mr. B just an hour and a half to make the tubes and petals of the three flowers. It required about an hour to put in the stamens and add the calyx. Next, the buds with their twists are made and all are fastened to wires covered with glass. All of these are next fastened to a stem with leaves and the product is then ready for a little paint, which is added with great skill where it is required.

"The molding of the shapes is effected by means of ordinary pincers and tweezers. With these clumsy tools they fashion the flat plates and turn them in any way they please. With little needles fastened in handles, they make the grooves and lines and figurings of the edges. But although you may see him touch a flat piece of glass with his little metallic tools, you know that it is no ordinary touch which suddenly shapes it into a living form."

The Blaschkas relied above all on their knowledge of the glass and its characteristics. The glass they used to make the models varied in composition and therefore in its working qualities. Often, to successfully assemble many parts of a structure (or several structures), it was necessary that glass of varying degrees of fusibility be applied in the proper sequence.

In the later years of the work, Rudolf Blaschka became dissatisfied with the glass available commercially, which had gradually become inferior. As a result, he began to prepare the glass himself, using the basic sand, potash and other materials, and combining them in one of several furnaces he had installed in his studio. He also spent a great deal of time experimenting with various glass formulas to produce his own materials.

Originally the Blaschkas relied on clear glass. To complete such work, color had to be applied to the surface to simulate the appearance of the original plant. All the plant models and their invertebrate models that the Blaschkas and son produced before Leopold's death were painted. Rudolf Blaschka mentioned this aspect of his work in a

letter to Goodale on August 7, 1900:

"This is the provable fact that every model in your museum was painted by myself. I owe the knowledge of painting art to my father, whose eminent gift is proved in the souvenirs I yet possess, the pictures he painted 25-30 years ago. But I got so established and versed in working very rapidly with the brush that, since more than twenty years, all and every painting of models, of the invertebrate animals as well as later of all plants came exclusively on my part."

Undoubtedly, many of the models that Rudolf produced between the time of his father's death in 1895 and 1900 were also finished by what he refers to as "cold painting." A few samples of the coating materials of some of the earlier models have been analyzed: They seem to consist of a gum or glue, or a combination of both, plus mineral pigments.

We do not know just when Rudolf contemplated the possibility of improving the finishing process for the models—turning to colored glass for greater permanence—but it must have been in the late 1890s or early 1900s.

In 1928 Mary Lee Ware wrote in a letter that, "Now he himself (Rudolf) makes a large part of the glass and all the enamels, which he powders to use as paint." She explained how he applied colored glass in powdered form to a glass surface, then heated it in a flame to fuse the two, thereby achieving permanent color.

Although the models were made almost entirely of glass, the Blaschkas used certain other materials also. In some plant models, wire in a variety of weights and compositions was used to strengthen some models. Without it, models with hanging fruits or other heavy structures would have been likely to break.

"We have tact"

Stories about a secret process for making glass flowers have been circulating for as long as the models have been in existence. But as Leopold Blaschka noted:

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"Many people think that we have some secret apparatus by which we can squeeze glass suddenly into these forms, but it is not so. We have tact. My son Rudolf has more than I have, because he is my son, and tact increases in every generation. The only way to become a glass modeler of skill, I have often said to people, is to get a good great-grandfather who loved glass; then he is to have a son with taste; he is to be your grandfather. He in turn will have a son who must, as your father, be passionately fond of glass. You, as his son, can then try your hand, and it is your own fault if you do not succeed." Leopold Blaschka was not speaking theoretically: His grandfather was the most widely known glassmaker in Bohemia.

The truth, then, is that no secret process ever went into the manufacture of the models. The same techniques known to all glassworkers were enhanced by the meticulous skill, unmatched patience, accurate observation and deep love of the subject that the two Blaschkas brought to all their work.

Leopold Blaschka devoted himself to the glass flowers until his death in 1895. Rudolf continued the monumental project alone, until advancing age forced him to retire in 1936. By the time he had stopped work, the collection had grown to 784 life-sized plant models representing some 780 species and varieties in 164 families.

The completed collection also contained over 3,000 detailed models of

enlarged flowers and plant parts, as well as an exhibit of the lower plants, illustrating the complex life histories of ferns, fungi and mosses and liverworts; a group of 64 models showing fungal diseases of apples, pears and other rose-family fruits; and models of plants and insects that demonstrate different methods of pollination.

The miracle of shipping

While the creation of the flowers was a testament to all that skill and love could accomplish, their packing was, as Dr. Goodale put it, "Almost as wonderful as anything about them."

Their previous experience in shipping glass models of marine invertebrates had given the Blaschkas years of practice in the packing of delicate objects. They applied their same highly successful methods to the packing of the glass flowers.

A finished model was mounted on firm cardboard, with strong wire securing it, then placed in a sturdy cardboard box. Tissue paper cushioned it and kept from moving parts that could not readily be wired. Then the cardboard box was covered.

When a number of such boxes were ready, they were placed in a very large, sturdy wooden box with sufficient straw padding to keep the individual boxes from touching one another or the wooden walls. The wooden cover was then screwed on, and the box bale, nearly the height of a person, was transported to America by ship.

At the museum the models were

mounted on specially made plaster bases and placed in exhibition cases. Louis Bierweiler, who came to work for the Botanical Museum in 1901, carried out mounting, dismounting and general care for 63 years.

The ravages of dryness

Many of the glass flowers have endured remarkably well. The coloring of some of the earlier models has undergone change, however, apparently in response to variations in humidity. When the humidity is high the coating remains unaffected, but when the humidity falls, the coating becomes distorted and pulls away from the glass surface. It is possible that this movement of the coating may be due partly to age; we simply do not yet know.

Although the surface of some models appears unchanged, in others the shiny glass under an area of applied material is revealed. In many of the enlarged cross sections especially, the coating material has pulled away from the surface. In some cases as the coating separates it pulls minute fragments of glass from the underlying surface.

As models are regularly subjected to fluctuations in humidity, the separation of this material will continue and in time the material will become completely detached from the underlying glass. Although this condition is not reversible, it can be stabilized by housing the collection in an environment that provides constant temperature and humidity control. An attempt begun in the mid-1970s to raise funds to air-condition the halls where the collection is housed has not yet been successful.

Risky search for a large audience

The glass flowers were made for Harvard and the whole collection is housed at the university. On a number of occasions, however, a few plant models have been exhibited elsewhere. Some were shown in Paris in 1900, a few were put on temporary exhibit at the 1893 World's Columbian Exposition in Chicago, and six models went to the Louisiana Purchase Exposition in St. Louis in 1904. Six glass flowers, on loan to the Corning Glass Museum



Glass artisans Leopold Blaschka (left) and his son Rudolf.

in Corning, New York, during the disastrous 1972 flood, were ruined.

More recently, in 1974, Richard Evans Schultes, director of the Botanical Museum, sent three models to Tokyo as part of a temporary exhibit. They made the whole trip by the side of curator William Davis, with their own first class seat, complete with seat belt and additional web belting.

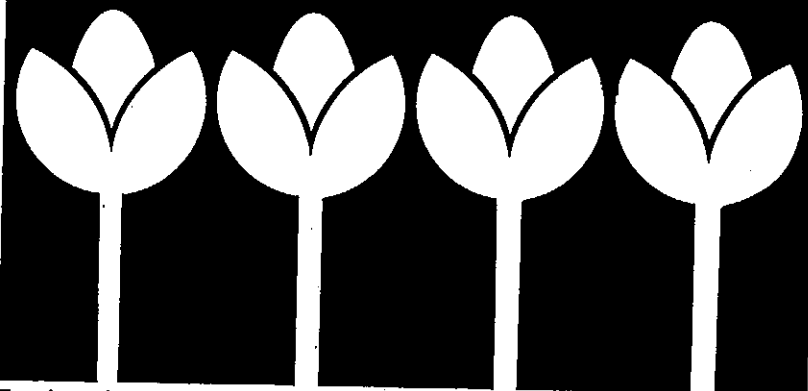
Two years later 25 models made a much shorter, albeit a much more difficult, trip. In early 1976 the Steuben Glass Company arranged for a special month-long exhibit of the glass flowers in Steuben's New York showrooms on Fifth Avenue.

The models, packed in wooden cases similar to those used for the trip to Japan, were to be flown to New York in a small plane. But how could they be safely transported over the icy, potholed streets to and from the airports? Test runs indicated a hearse would give the smoothest ride. The automobiles proved to be so good that, after the well-attended month-long showing, the models were not returned by air but were driven the 200 miles back to Cambridge—in two hearses.

The Blaschka plant models, the earliest now nearly a century old, are used primarily as teaching tools in the plant sciences. The plants are exhibited, by family, in order of evolution, from the simplest to the most advanced; this is the so-called Engler-Gil phylogenetic stem of plant classification. Harvard University does not maintain extensive greenhouses, and even if they did, their value in teaching botany would be limited because real plants flower for only a short period and only one season. The glass flowers, on the other hand, stunningly accurate to the smallest detail, are in flower all year and.

Over the years this collection has attracted tourists, plant lovers and garden club groups. In fact, the glass flowers constitute the largest single public attraction at Harvard, drawing more than 100,000 visitors a year. George Goodale's scheme to instruct the public has succeeded, not just far beyond his wildest dreams.

Bringing home plants from abroad?



Foreign plant pests and diseases can hitchhike undetected on imported plants and plant materials. Whenever you ship or bring home foreign plant materials, protect your own plant collection—and the nation's crops, forests and gardens—by obtaining a plant import permit when required. Send for free pamphlets:

Travelers' Tips Includes a comprehensive list of entry restrictions on agricultural products from most parts of the world.

Moving? Traveling? Trading Plants? How you can avoid spreading plant pests when moving, traveling on vacation, or exchanging plants and bulbs.

For pamphlets to check the entry status of plant materials, or to obtain permits, write: Permit Unit, Plant Protection and Quarantine, Animal and Plant Health Inspection Service, U.S. Department of Agriculture, 638 Federal Building, Hyattsville, MD 20782.

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