GLASSBLOWING: THEORY AND PRACTICE

by

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CHAPTER I
INTRODUCTION

“... if a man wishes to become a reference point and an element of continuity in this art, he must acknowledge that his only lord and master is Glass.”

- - Seguso Viro, S.r.l.

In 1996, while studying graphic design, I took a class in glassblowing and I have never been the same since. My desire to learn had never been as strong as it was when I started working with glass. The more I worked with glass, the more I wanted to learn, so I started looking into it. I began at the library, getting books with good photographs and spending hours trying to decipher techniques or marveling at the complexities and simplicities of glass throughout history. I also attended a glass conference, where I saw master glass artists at work and viewed glass works from around the world. I have also been lucky enough to work and speak with visiting glass artists at Texas Tech.

In this thesis, I shall look briefly at the history of glass work in Chapter II. In Chapter III, I will explain the art of glassblowing as it has developed and practiced today. In Chapter IV, I recount the progress of my interests and education in glassblowing. Finally, for this “creative-thesis project” for the General Studies degree program, I include a select portfolio of a dozen works that I have created.
CHAPTER II
HISTORICAL INFLUENCES

“... glass could be much more than something to drink out of or something you could easily cut yourself with.” -- Koen Stassijns, poet

Many people do not know that glass has a history reaching back over 5,000 years. Beads and small cast objects finished with stone cutting techniques have been found in Mesopotamia (present day Iraq and Syria) dating back to 2500 B.C. (Tait 8). According to Tait, it was the Egyptians who, around the sixteenth century B.C. until 1,000 B.C., turned glass into an industry (Tait 22). Using a process called core forming, the Egyptians would layer molten glass on a clay rod, the core, and then shape the glass with tools. After cooling, the clay core was removed. These vessels usually imitated the forms of vessels made from different materials, like stone or metal. Glass made in this time period amazes me. People think of glass as a fragile, delicate, transparent material, but these vessels look rugged and have withstood thousands of years. These glass vessels are brightly colored, not clear. The palate of colors used range from turquoise to navy blue, greens, bright yellows and oranges, white and black. Glass, being easier to mold and carve than precious stones, was also used in jewelry such as pendants and ear plugs as well as pieces in pictorial inlays, forming figurative scenes. (Tait 36)

Around 1,200 B.C., Egypt, Cyprus, Crete and other great societies in the Mediterranean came under attack from sea peoples of unknown origins. This caused a decline in culture and resulted in almost no production of glass (Tait 36). By the sixth century B.C., Mediterranean and Syrian glass shops were producing core formed vessels similar in technique to those from Egypt, creating new forms using the same colors (Klein and Lloyd 16).
The next notable glass work was the glass bowls of the Hellenistic Age. These bowls were cast into a mold and then cut and polished on a lathe. To me, the hemispherical bowl holds strength in its simplicity. Its interior and exterior are both seen when viewed from most angles, and it is by far the most versatile vessel. The most noteworthy of the hemispherical bowls were the mosaic bowls produced from 300 B.C. to 400 A.D. (Klein et al 20). To make these bowls, multi-colored canes are first sliced up into tiles, laid next to each other in a circle and then fused. Next, a hot bit of multi-colored glass is twisted and stretched around the mosaic. Finally, this round flat plate is placed over a concave or convex mold and heated and slumped, forming a bowl. Sometimes instead of small tiles, strips of twisted cane were used, resulting in a rainbow-shaped pattern. These techniques were improved by the Romans, and techniques evolving from these would later emerge in Italian Renaissance Glass.

However, before any of what I think of as the most impressive glass was produced, an important discovery had to be made. Blown vessels, considered by many to be the greatest innovation in glass history, started turning up in the Syro-Palestine area sometime in the first century B.C. (Tait 49). Glass makers had discovered that by heating a glass tube at one end then pinching it off, the glass makers could blow into the tube to inflate and form it into a small vessel. Later, when the glass tube was replaced with a metal pipe, the glass blower was able to produce a variety of vessels in many forms and sizes, faster and using less glass than by previous methods. By the first half of the first century A.D., blown glass was the norm. Glassblowing spread across Europe with the Roman Empire, and by the time the Empire fell, established glass makers had evolved into distinct glass traditions. It was in Italy where I believe the most impressive of these traditions would evolve.

In 1380, the Venetian republic emerged victoriously from a war with Genoa, making it one of the five most powerful states in Italy. By 1500, Venice was one of the
greatest cities in Europe. This abundance of wealth created a market for luxury goods, including master works in glass. During this time, Angelo Barovier (d.1460) developed his recipe for *cristallo*, or crystal (Tait 157). This formula was admired across Europe as the clearest, strongest, and lightest glass around. Angelo Barovier also became the first *maestro*, master glassblower, to be recognized by the state (Tait 157). It is at this point that I believe glass moved from an industry to a fine art.

In the second half of the sixteenth century Italian glass blowers developed one of my favorite color patterns, *vetro a filigrana* (Tait 168). *Vetro a filigrana* or *filigree* glass, meaning threads liberally patterned throughout the glass, epitomizes Italian glass to this day. Using the same principle as the mosaic bowl of the Hellenistic Age, this technique involves the use of prepared canes which are applied to a bubble. *Vetro a filigrana* or *filigree* glass can be divided into three different applications, *vetro a fili, vetro a retorti,* and *vetro a reticello* (Tait 168). *Vetro a fili* consists of parallel stripes spiraling around the piece. *Vetro a retorti* involves the use of *latticino* or *zanfricano* canes. *Latticino* and *zanfricano* canes have multiple twisted stripes of color and result in a lace-like pattern. *Vetro a reticello,* by far my favorite pattern, involves two pieces of *vetro a fili* twisted in opposite directions. One of the pieces is placed inside the other, trapping an air bubble between each crossing thread. Of course this is easier said than done. Another style of glass typical of Italian renaissance glass is the *vetro a serpenti* (Tait 174). Maestros would show off their skills by forming canes and spirals of clear and colored glass into wings, coils, and heads of dragons. These dragons would then be used as stems for extravagant wine glasses. Although I prefer simpler designs, I admire these glasses for the technical skill level needed to create them. The Italian glass blowers perfected these techniques and continue to utilize them to this day.

By the 1920's, however, some glass makers had grown tired of these centuries old
traditions. The opening of a new factory in 1921 by Paolo Venini provided a strong stimulus to start a revival of fresh ideas for glass as art (Ricke 12). Venini threw out the complex decorative aspects of glass, including filigree glass, and concentrated on the strength of the Venetian glass blower -- his technical skills at the furnace and his sense of form and proportion (Ricke 13). This produced elegant, thin-walled vessels with simple, classic forms. These vessels were usually one or two colors and transparent. In the early 1930's, young designer/sculptor Nepoleone Martinuzzi, following international tastes in glass, started moving the Venini line in a new direction. Working with thick walls, Martinuzzi focused on the surface texture of the glass (Ricke 17). Still using Venini's simple forms, Martinuzzi would make the surfaces look rough and corroded.

In 1934, Carlo Scarpa, who later became a famous architect, began designing for Venini (Ricke 19). Scarpa was not interested in thick walls. Instead Scarpa focused on clean forms and simple lines and used more opaque color schemes. Like Martinuzzi before him, Scarpa was interested in color and surface value. He is credited with developing many new cutting and grinding techniques as well as other surface texturing processes. My favorite designs of Scarpa's are his murrine plates and vessels (similar to Hellenistic mosaic glass) and the Tessuto series with their soft flowing lines.

After World War II, Italy experienced an economic boom and optimistically looked to the future, an atmosphere that would allow art glass to flourish. Fluvio Bianconi, a graphic artist and illustrator, was introduced to glass through a commission to design some perfume bottles. Surprising everyone with his free nontraditional approach to glass, Bianconi said he was making an "attempt to try out something new in an unfamiliar medium." (Ricke 22) Suddenly Bianconi found himself in a new career as a glass designer. Using multi-colored stripes and patches, Bianconi’s applications of color are similar to Paul Klee’s paintings of the 20’s and 30’s.
During the 1950’s, Archimedes Seguso, combining the skills of a master glassblower and the sense of a draftsman, brought the ancient art of filigree glass to yet another level (Ricke 25). The complexities of Seguso’s merletto or “lace” filigree patterns still puzzle experts today. I really enjoy Seguso’s complex and irregular use of filigrana techniques combined with simple and irregular forms.

Around the same time, Dino Martins, a painter and designer, was pushing the filigrana techniques just as far, if not farther than Seguso (Ricke 26). Martins’ decoration techniques took advantage of all of the traditional Venetian cane techniques in a nontraditional way. Martins would use all these traditions at once -- lace like zanfricano, millifiori flowers, gold adventurine, and crushed colored glass -- to “paint” his exaggerated vessels. I love the way Martins’ designs use so many different applications and colors without losing the form within.

Current art glass production was made possible in 1962-63, when technician Dominick Labino and potter Harvey Littleton developed designs for small furnaces and annealing ovens (Tait 211). These improved designs made it possible for artists to run small glass studios. With this “new” medium available to the artist, the Studio Glass Movement was started. To learn more about glass, American artists traveled to Europe, especially Italy, to learn from the masters and spread the idea of glass as a material available to studio artists. Now that glass has been established as a studio art, many say that glass is the new medium for art -- with a 5,000 year history.
CHAPTER III
TOOLS & TECHNIQUES

“Technical knowledge is not enough. One must transcend techniques so that art becomes an artless art, growing out of the unconscious.” -- Daisetsu Suzuki

For the past 2,000 years, the basic tools and techniques used in glassblowing have remained the same. Because glass is such a responsive material, it allows for different approaches to achieve the same results, and glassblowing styles can be as individual as the artists themselves. The following is a description of the tools and techniques that I use and an explanation of the “moves” that I use.

In glassblowing, heat is the essential tool. When the glass is hot, it moves fast and gradually slows down as it cools, until eventually it “freezes” and ceases to move. If not properly cooled at this stage, it cracks. Observing the styles of glassblowers over the past couple of years, I have decided that there are three basic approaches to working glass, which are related to the experience of the glassblower. The first is to work with the glass relatively cold, when compared to its molten state. This method is usually used by the beginning glassblower because it allows for easier control since the glass is not moving fast. The downfall to this method is that it takes a longer time to complete a piece, the blower uses more energy pushing the glass to move it, and it also leaves unwanted tooling marks. The second method of working involves using more heat and the blower using the responsive behavior of the glass to his advantage. Basically the glassblower gets the piece really hot and lets the glass take on a mind of its own. This usually results in a very free and fluid-looking form, but this approach can sometimes show lack of control. With the third method, the experienced glassblower knows the behavior of the glass and uses heat and tools to shape very deliberate forms. A master glassblower can
do this without even thinking, making it look like one of the easiest things in the world to
the naive, when it is far from that to the trained eye. However, where does this molten
glass come from?

Blown glass starts off at the furnace, a roaring beast, bright like the sun and just as
hot. The glass is melted and contained in the furnace. Running at temperatures over
2,000 degrees Fahrenheit, the furnace is always on to keep the glass, a medium that
rejects heat, hot enough to move. Glass is used up during the day, and raw glass or cullet
(broken glass) is loaded in at the end of the day and melted over night. After the glass is
melted, it has to be taken out in a liquid state to be worked.

- The blowpipe, a metal tube between four to five feet in length, is the most impor-
tant of the arsenal of tools, because it makes the molten glass accessible to the glass-
blower. The blowpipe is preheated and then dipped into the surface of the molten glass at
an angle and rotated. Withdrawing the pipe from the furnace with a small amount of
molten glass, called a gather, my main concern is to keep that glass centered on my pipe
(figure 1). Hot glass is always slumping due to gravity and the constant rotation of the
pipe centers the glass. The next step is to cool and shape the outside surface of the glass
by smoothly rolling the glass on the marver, a low metal table, and then to blow a globu-
lar, even-walled bubble in the glass (figure 2). One important thing I try to remember
about glass is that whenever it is touched, whether by a metal hand tool, wooden tool, the
marver or wet paper, it cools the glass surface down, which slows down the movement of
the glass. So, when I am marvering, it is important to roll the glass evenly and not to stop
it on the marver or the heat will be uneven and the initial bubble will be off center, caus-
ing the entire piece to be off center. During a demonstration, visiting artist Preston
Singletary, told me that consistent gathers and an even, centered bubble were essential to
have a centered and even wall thickness for the glass piece.

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After the first gather is when I consider color applications. If I plan on making a piece to be a color other than clear, I perform a color overlay (figure 3a, 3b, and 3c). An overlay involves melting down a piece of colored glass on a punty, a solid pipe, and letting it drip over a clear bubble. Another method for adding base colors is to roll the piece through colored powdered glass after a fresh gather. After adding color, it is time to gather again, always keeping it centered. This time I go to the bench, a specially designed chair with two arms that allow the glassblower to roll the pipe with one hand, freeing the other to use tools. Using a wet newspaper or soaked wooden blocking tool, I cool, shape and blow the glass into a round form (figure 4). This is all done quickly, to lose the least amount of heat from the glass. Size is determined by the amount of glass and how thin the walls of the piece are blown out. If I want to make something big, I continue to gather, cooling after each gather. Usually I do my other color processes before or after the last gather, depending on the size of the piece and the desired effect I want from the color application.

I feel that color applications in glass can be like brush strokes in painting. Each technique produces a different effect, some very striking and recognizable, others very subtle and requiring close inspection for the viewer to really appreciate. One aspect of colored glass that I enjoy is the serendipitous interaction between the colors. Due to the metallic nature of colored glass, some times the colors will react with each other or with the atmosphere in the furnace and provide some very unique and unexpected results, such as irridescence or color halos. Some of the different color applications that I use are the overlay (mentioned earlier), the spiral wrap, frits and powders and various cane applications.

A spiral wrap resembles threads on a screw. A single stripe of color spirals around the piece from top to bottom. To make this, a small color bit is melted on a punty and shaped into a cone on the marver. After the color bit is reheated, the top of the bit is
touched to the side of the piece (figure 5). Then, while pulling back the color bit, I rotate the piece on the threader, a special track with wheels at either end that rotates the blowpipe forward or backwards at a constant rate (figure 6).

Frits, glass granules of assorted sizes, and powders are laid out on the marver in a pile. A fresh gather or a very hot piece is then rolled through the pile of color. The heat from the piece causes the frit or powder to fuse to the hot glass. Frits result in a spotted effect, while powders can provide either cloudy or solid color fields.

As stated earlier, out of all of the different color techniques, cane applications (vetro a filigrana) are by far my favorite. To use canes involves some preparation before the piece is started. First the canes must be made. To do this, I first melt down a colored bit of glass on a punty and shape it into a cylinder (figure 7a). Multiple gathers of clear or colored glass are layered on and the glass is shaped into a cylinder (figure 7b, 7c & 7d). After reheating, I attach another punty to the end of the glass and the punties are pulled apart, pulling the glass into a long stick sometimes over thirty feet long (figure 8). After this long stick is cooled, the hardened glass is broken into small sticks of equal length, providing materials ready for use in the glassblowing process. After these canes are made, they are lain next to each other or randomly on a hot plate and allowed to heat up while a bubble is prepared on the blowpipe. After I roll the bubble onto the canes and the canes are picked up on the outside of the bubble, making parallel lines running from top to bottom (figure 9a) or random, inconsistent lines, depending on the initial layout. These are pinched and snipped off at the end (bottom) of the piece and can be left straight or allowed to twist (figure 9b). The canes are twisted by turning the pipe while snipping off the end. It helps to blow a small amount of air into the piece while twisting the canes. This prevents the internal bubble from collapsing, allowing the glassblower to continue to work the glass after canes are applied.
An additional process I sometimes use with cane applications is to switch the axis of the piece. After the canes are applied and snipped, the piece is blown into a thick-walled ball and cinched down near the blowpipe using the jacks (figure 10). Then I make a small hole in the side of the piece using a torch or tweezers (figure 11a). While a ring of glass, or collar, is prepared on a second blowpipe, the neck is sealed off on the piece (figure 11b). I then place the collar over the hole in the side (figure 12) and snip the piece off the first pipe. The piece is now attached to the new pipe in a new location (figure 13). Gathering can now be done to this bubble with its newly reoriented pattern.

After the coloring is added, other choices have to be made for the piece. At this point, it is only a patterned bubble ready to be blown out and shaped. My approach to finishing a form, is to work from the pipe end on out to the outer end (bottom). Since the pipe is constantly pulling heat from the piece, this is the first area to get cold and the hardest to reheat. Working with the heat and glass requirements, I feel this area should be blown out and shaped first. Hot spots on a piece blow out faster than the rest of the piece, and the end opposite the pipe (the bottom of the finished piece) tends to be hottest. This causes a tendency for the bottom to become thinner than the neck; to prevent this effect, I lightly marver the bottom half of the piece to cool it and blow until the neck is the desired thickness. After a reheat, I use the jacks, a tool with two 6 to 12 inch blades with a spring in the handle, to put in the neckline (figure 14). The neckline is made by squeezing the jacks on the piece while turning the pipe. The neckline is where the opening will eventually be on the vessel. Then using the jacks, wet paper, wooden paddles and other tools, I finish shaping the piece (figure 15).

At this point the bottom half of the piece is complete and now it is time to transfer the piece to the punty and to work on the neckline. A punty, or pontil, is used like the blowpipe except that it is solid not hollow. To transfer the piece from the blowpipe to the punty requires exact timing and exact temperatures. First, a small amount of glass is
gathered on the punty and cooled and shaped on the marver, while the neckline of the piece is cooled with the jacks (figure 16). Now I attach the punty to the bottom of the piece and center it (figure 17). Then the blowpipe is tapped with the jacks, introducing stress, which causes the neckline to crack and allowing the piece to detach from the blowpipe (figure 18). During this process, the punty must be the perfect temperature: too cold, it will not stick; if too hot, it will fuse to the piece, breaking the piece when the punty is removed. The blown piece must also be at the perfect temperature: the bottom has to be hot enough to stick to the punty, the neck, cold enough to crack when the blowpipe is tapped. If the glassblower is too late and the neck is too cold, it will send cracks through the piece when it is reheated.

Now it is time to work on the neck. After the transfer to the pontil, the piece is reheated and the neck is brought back to the plastic state. Returning to the bench and using the jacks, I open up the lips by rolling the pipe and pushing on the inside of the lips with the blades of the jacks (figure 19). After a quick reheat to even out the temperatures throughout the piece, the punty is lightly tapped and the piece falls off the punty. It is then placed in the annealing oven where it cools over night.

The techniques and processes available to the glass artist are limitless. Most glass artists are always striving to improve their technique. While some artists rely entirely on their technique, others stand by Harvey Littleton’s motto “Technique is cheap” and, instead, concentrate on the communication of ideas rather than on perfect technique. Personally, I believe that a combination of the these two views is needed for a well-rounded glass artist.
Cane Pick-up

Switching the Axis

Necking and Shaping

Punty
CHAPTER IV
ABOUT THE GLASS AND ME

‘What do you like doing best in the world, Pooh?’

‘Well,’ said Pooh, ‘what I like best-’ and then he had to stop and think. Because although Eating Honey was a very good thing to do, there was a moment just before you began to eat it which was better than when you were, but he didn’t know what it was called.” - A. A. Milne (as quoted in Hoff)

While blowing glass, there are many times, just before I start a procedure, when I feel a build-up of excitement and stress. This is released in a rush as I execute the process. This is what I like doing best in the world.

I blow glass because it makes me feel like a little boy playing. When I was a child, my playtime was centered around three things: toys, tools, and fire. Having three younger brothers, there was an overabundance of toys in my house. Among my favorite were the boxes and boxes of Legos and the Star Wars toys. With the Legos, I could build anything I needed. With the Star Wars toys, I could go anywhere in the Universe. I also liked playing with tools when I was younger. The only problem was that I did not know how to build anything, so I just took things apart and usually left them that way.

One of the most exciting things I would do as a young boy was playing with fire. Poking and squeezing little noxious liquid blobs of melted plastic and wax fascinated me. I cannot overlook the excitement generated by performing this forbidden act either. I would check the house to make sure everyone was gone, get out the box of incriminating evidence, and get down to business. The only downfall to this was the horrible smell. As far as fires go, to me, nothing beats the smell of a paper or wood fire, and the blaze of a good warm campfire and the yellow-orange glow of the burning embers will put me in

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a trance every time. As I grew older, my destructive tendencies tapered off and my desire to create intensified.

During high school I wanted to be an engineer and build bridges, so I studied drafting. I loved the whole process of setting up the paper for a drawing and then carefully laying out the lines with every attention to detail. However, I do not really enjoy free-hand sketching and shading: I have to have a ruler in my hand. How else can you make sure the line is straight and the right length?

During this time I started playing guitar as a creative outlet. My favorite part about playing is playing with my friends and the interaction that takes place. During college I continued to play guitar, but decided that building bridges was not for me and switched to graphic design. While studying graphic design, I learned about color, composition and other elements and principles of art. I also studied art history. When I started learning about art, I was interested in the Contemporary and Modern abstract, mainly because I did not understand it. I saw that you did not necessarily need to know how or even need to have a reason to make something. These artists just enjoyed making things. I took a metals and sculpture course because I wanted to make things too. Starting off with balsa wood and then moving on to wood and metal, I tried to create forms with clean and simple lines. What I thought was simple and clean was not simple at all. The finishing of a piece, cleaning up the surface and details, was so time-consuming that I would never finish a piece. Uninterested in finishing the work, I would start a new piece from a fresh idea.

It was about this time I took a glassblowing class. Suddenly everything came together. I was playing and creating. With glass I am able to play with fire, I can easily work with clean simple lines, I can listen to music while I am working, and I can interact with my friends by working in teams. Also the completion of a piece is relatively quick; and once a piece is started, I can not just set it down.
I suppose it was natural for me to develop a space theme in my work because I grew up on Star Wars. After learning how to appreciate color, I realized how beautiful space is. The incomprehensible size of the universe also enters my thoughts and does not make me question my significance, but reassures me that there is always something unknown and therefore new to us. Some of the most inspiring images I have ever seen were those taken by the Hubble telescope. I have tried to incorporate these colors and shapes into such pieces as my Outerspace Vase Series and the M-31 Platter. I see images of deep space and think about the surfaces of these heavenly bodies and the exploration of this last frontier all the while keeping a whimsical view on things with goofy little rockets (The Arrival) and silly looking alien vegetables (Galactic Gourd).

As I was becoming interested in glass and started to become serious about it, I started studying the history of glass. I was deeply impressed by the filigree work of the Italian maestros so naturally I experimented with cane techniques in such pieces as the Cane Plate and the Freak series. I really enjoy the entire process: pulling the canes and lining them up all nice and straight, and then transforming them from a flat sheet of stripes to a round form with lines shooting around it defining the form. I always found myself looking at the bottom of my cane pieces because I thought that the sun burst pattern, caused by the snipping of the cane, was beautiful. I had heard of the technique of switching the axis and reorienting the color pattern, but I had never seen anyone do it. So I took it upon myself to figure it out. After many tries I finally achieved the switch and now I do not have to look at the bottoms of the pieces to enjoy the pattern (as in my Freaks).

Often I find myself daydreaming about glass: getting a fresh gather, doing a perfect cane pick-up, or just marvering a huge bubble. I will even spin a broom in my hands just because it reminds me of a blow pipe. I am constantly brainstorming for new ideas for glasswares, and my sketchbook is filled with drawing of more things than I have
time to make. In time I hope to be working in a professional studio as an artist with a better balance of studio and sketchbook time, making the transition from student to professional glassblower and achieving a new level in my relationship with this magical material.

“Draw bamboos for ten years, become a bamboo, then forget all about bam­boos when you are drawing. In possession of infallible technique, the individual places himself at the mercy of inspiration.” -- Daisetz T. Suzuki
Outer Space Vase (fractured), 1997, 6 1/4" x 3"

Red-violet base with black filigrana. Yellow canes, and blue, red, and green frits applied randomly.

This piece actually broke in half while I was working on it, but I was able to save it and I think I ended up with an interesting form.
Outer Space Vase (final), 1997, 5 7/8" x 3 1/4"

Blue base with black mezza-filigrana. Yellow canes and blue, red and pink frits applied randomly. Clear wrap.

I was working with this color combination on a series of vases when a friend mentioned that the vases looked like they were from outer space.
In 1755 Immanuel Kant proposed a theory of the origins of the solar system. His Nebular Theory describes a process of heating and cooling a spinning cloud of gas, all elements involved in glassblowing (Sagan et al 23).
The Arrival, 1997, 6" x 9 5/8" x 7 3/4"

Sand-cast base and solid punty work (rocket).

Mankind's ability of space travel has always fascinated me and I wonder what it would be like to visit another world: the long journey, the cramped rocket, unmade discoveries, the anticipation of roaming the planets surface.
Detail from The Arrival, 5" x 2 1/2"
Galactic Gourd, 1997, 10 3/4" x 5 7/8"

Black base with pink frit. A second piece with a white base is turned inside out around the first piece.

I was playing around with color applications and ended up with an object that reminded me of a fruit or vegetable... but not quite familiar, something alien.
M-31 Platter, 1997, d. 16 3/4"

Iris yellow base with black mezza-filigra and pink frit.

"... 2.2 million light years away it is similar to the milky way in appearance with its spiral arms swirling out of the ... nucleus." (Sagan et al 185)
**Cane Plate, 1997, d. 12 1/4”**

Blue and white canes, picked up on a collar.

*After watching some master glass blowers do filigree cane pick ups, I really began to concentrate on this technique. The cane plate was a history lesson and an exercise in control all rolled into one.*
Blue and Yellow Freak, 1997, 9 1/8" x 6" x 3 3/4"

Navy blue and yellow canes applied and axis switched. The canes were made by overlaying blue or yellow over white.

This is an early experience with the switching of the axis. I was not concerned with a symmetrical design, I just wanted to see how the lines would accentuate the irregular curves.
Blue and White Freak, 1997, 9 1/2" x 3 1/4"

Navy blue and white canes twisted and axis was then switched.

With this design I was starting to concentrate on symmetrical cone forms and trying to achieve a higher level of control.
Whiteware Freak, 1997, 6 3/8" x 4 1/4" x 3"

Whit powder base with white canes applied and axis switched

The series of freaks were created when I figured out how to reorient the axis, turning the color pattern sideways. In the whiteware series I played with white on white color applications resulting in subtle patterns. This piece is a natural mix of the two ideas.
Freak, 1997, 9 1/4" x 3 7/8"

Light blue canes applied over white frit base. Axis switched.

This is my favorite of the Freak series. I love the soft colors and the clear "window" through the side.
BIBLIOGRAPHY


