Handbuilt functional forms

Virginia Cartwright

Follow this and additional works at: http://scholarworks.rit.edu/theses

Recommended Citation
HANDBUILT FUNCTIONAL FORMS

by

Virginia Cartwright

Candidate for the Master of Fine and Applied Arts
in the College of Fine and Applied Arts
of the Rochester Institute of Technology

May 31, 1966
Professor Frans Wildenhain
Professor Hobart Cowles
I dedicate my work to


Professor Wildenhain
The Butterfly Blossom

and

The Myth of the Unicorn Zebra

I give special thanks to Professor Cowles for his knowledge and assistance on my project, and am grateful to Dean Brennan and the School for American Craftsmen for the fellowship which I have held these past two years.
# Table of Contents

**Handbuilt Functional Forms** p. 1-18

**Supplementary Material**
- Miscellaneous Information p. 19-20
- Local Clays p. 21-23
- Raku Ware p. 24-26
- Glazes p. 27-28

**Index of Photographs** p. 30
**Photographs** p. 31-45
HANDBUILT FUNCTIONAL FORMS

Working on the potter's wheel establishes a frame of reference by determining to a large extent the characteristics of the pot. The majority of my undergraduate work in ceramics had been concerned with the disciplines, techniques and infinite variations of wheel thrown forms. However, I found that there were many appealing qualities of clay that were never revealed when working on the wheel, but that with the use of handbuilding techniques, clay could be gouged, squeezed, coiled and cut into lively forms which need not even be symmetrical.

This discovery was certainly nothing new in the field of ceramics but was a personal realization that greatly affected how I felt about my own work. I began to see that although my pots were competently made, they lacked warmth and conviction and were tremendously conservative and academic. Realizing this problem was one thing but solving it was quite another. I found that I had to train not my fingers or my mind, but my imagination.

My two year graduate program at the School for American Craftsmen has provided me with the time, facilities, and most important the instruction necessary to work out a great many of these problems. I purposely stated my thesis to include handbuilt forms because I knew that this was my area of weakness, and therefore would be the most
challenging. I further clarified my proposal by limiting it to predominately functional forms.

My first projects proved to be a conglomeration of varied ideas and techniques. I experimented a great deal and the results were usually not very monumental in scale. One of my earliest projects concerned my involvement with clay impressions. Clay easily picks up surface decoration. I hoped to make use of this technique so that it would become more than an amusing trick. I was excited about the cracks that are often formed in cement driveways, sidewalks and streets. I had made a few small pots from clay crack impressions and wanted to make more on a larger scale. At first I made the impressions by stamping out a ball of clay. However, I found that to make large impressions that would be lighter in weight one could easily use large slabs that have been previously rolled out and left slightly heavier than the desired finished thickness. It is best to clear away debris and small stones that have fallen into the crevices and sometimes it helps to dust the area with dry clay if the cracks are especially deep or moist. Iron oxide can also be dusted into the surface and picked up by the clay to accentuate the impressed markings.

I used these slabs to make covered containers. Since the surface embellishment was the important feature, I wanted to make the total forms as simple as possible. I let the slabs stiffen over a large cardboard cylinder, then joined two rounded slabs together. A bottom and rounded top were added, sealing the cylinder completely. The cylindrical form was sliced about one third from the top. The upper portion became the lid for the covered container. A flange made
from a wide strip of clay was added to the inside of the upper edge of the body of the pot.

Another of my first projects was to make human figures. I originally planned to make the heads, arms and legs of clay and attach them to leather bodies. I was dissatisfied with the attempts that I made, feeling that the features were too doll-like, unsophisticated and cute. I decided to make them on a larger scale. Since it would be difficult for these figures to sit or stand if constructed in the manner mentioned above, I decided to make the bodies of a solid form, the heads being the only moveable part. I formed the heads by joining two circular slabs and attached a tubular neck opening. This neck would fit over a corresponding tube attached to the body allowing the head to turn freely. I found that it was difficult to avoid making these figures appear cartoon-like. I felt that the body of my first figure was too realistic so I simplified the next body even further. I made the arms separately in an ourstretched position and attached them to the body after they were fired by running a wooden dowel through the arm holes of the body and gluing the arms on either end.

Large serving platters were my next project. I began by distorting and adding on to wheel thrown plates. However whatever I tried only seemed to destroy the strength of the form and looked too accidental. I decided that I would be more successful if I constructed them by hand. I pressed overlapping balls of clay into a plaster mould. When it set enough to hold its shape I removed the clay shell and added a rim made from a clay strip and a small foot. This form was an improvement over the previous ones but were still not very "gutsy".
My next attempt was to make free form, hand carved platters. I began with a large, very thick slab of clay and scooped out the platter surface. I worked entirely on the top surface, adding on hunks and strips of clay, squeezing impressions and using a wooden paddle to refine lines. I completely disregarded the outside curve of the platter or the weight. Working on a solid mass enabled me to work boldly without collapsing the form. Since these platters were rather large I had trouble finding a good way to smooth the inner surface. For the first several platters I used a large carving tool with teeth, criss crossing my strokes to level any irregularities. I also used large smooth stones to stamp out curves, but it was difficult to find an object which would conform to the surface desired. I later found that a more successful solution was to use a piece of firm clay wrapped tightly in cloth to tamp out a regular concave surface. This will only work if the clay surface to be worked on is still quite malleable.

When the top surface was established I undercut the edge as deeply as possible and allowed the platter to dry until nearly leather hard. Then I turned it upside down over a bowl or similar form which had been covered with a large coil of soft clay. This supported the platter so that the outside could be worked on without marring the inner surface. I formed the foot of the platter and carved away the excess clay until the platter was of the desired thickness.

I was quite excited about the results of this method of forming and made several variations including a fish platter. I wanted to see if dinner plates could be made in a similar way but hoped to devise a more efficient method. I decided to shorten the process somewhat by
starting with thick square slabs of uniform size and thickness made on canvas covered boards. When the slabs had stiffened slightly I put them on the potter's wheel and turned out the inner surface. This surface then was modified by scraping or tamping it. The rim was paddled, added to or cut away so that each plate had individual characteristics but remained uniform enough to be stackable. It was still a tedious, time consuming job to carve the back of each plate. I also found that my original slabs had not been thick enough to allow for a foot and a deep enough curve for the inner surface of the plate. When thicker slabs were used there was even more carving to be done. I made a few more dinner plates this time correcting the errors made on the first ones. They were more successful, but the results did not seem worth the time involved. I put the problem aside intending to return to it later and hoping to find a better solution.

I often begin my projects by thinking of various functional objects that could possibly be made of clay. It was in this way that I began a series of candleholders. This appealed to me especially because I enjoy candles and knew that candleholders would offer a wide variety of possibilities. I began with the simple assumption that the candles should be elevated in some way from the table and that this supporting structure could be sculptural and very ornate. I decided to make places for several candles on one base but found that this was more difficult than I had anticipated. The candles must be separated far enough apart that they don't melt one another as they burn at different lengths, yet near enough to relate to each other. As I worked upward my structures tended to get smaller rather than larger and I found that I had some
difficulty finding enough room to place the candles. Since these forms were not working well I chose to explore the possibilities of holders for large, single candles.

I began by making column like forms with strata of different decorative elements. I worked on two or three holders at a time so that one could be stiffening while I was working on another. One of these columns had a base of three small feet cut from clay slabs. I decided to try other forms in which the feet played a more dominate part. With each successive attempt the legs became more important until in some cases they provided up to two-thirds of the total height. The legs were very hard edged and two-dimensional. I had several constructive criticisms made concerning them but felt that they worked well to provide a strong contrast for the ornate decoration which they supported.

Much later I returned to the theme of candleholders and made structures that held more than one candle. I also constructed a floor candlestick which was five feet tall. It was made similar to my earlier ones but was divided into two parts to fit into the kiln.

When working on the potter's wheel every movement made on the inside of the pot is readily visible on the outside and likewise each change to the exterior surface directly affects the interior space. One is not free to gouge into the pot or build up areas without carefully considering how it will effect the total form structurally as well as visually. This factor makes it difficult to work in a spontaneous or impulsive manner. I wanted to work large and boldly without these inhibiting factors. The best solution I saw was to work on
a solid mass of clay, building up and cutting away to obtain the desired form. The shape could then be hollowed out to the desired thickness. Large covered containers would be well-suited to this kind of construction.

As I began to amass my clay I found that it would take nearly a hundred and fifty pounds of clay to make a hump the size I wanted, and that approximately three-fourths of this would have to be removed when hollowing the form. I figured that when working on a hump of clay this size, there would be an inner area that would be unaffected even by violent motions on the exterior. Walls six inches thick or even three inches thick would be sufficient to provide the freedom that I wanted. Therefore, the clay could be formed over or around a removable core. I used a large metal cylinder about two feet tall and one foot in diameter and wrapped it loosely with newspaper. I rolled out a thick slab to serve as the base of the pot, set the wrapped cylinder on it and built up the sides around the cylinder in a thickness of about three or four inches. I let the forms of fallen clay help develop the form. Instead of attempting to create one smooth surface, I let some areas pile up and others form hollow areas. I worked on the form with large metal loop tools and wooden paddles to refine, simplify and clarify the form. I added clay on some areas and gouged it away from others. This forming process was done quite quickly, and was the most enjoyable and important part of the pot construction. I removed the metal cylinder when the clay was relatively soft. The form was left to stiffen overnight and was hollowed on the following day.

The top opening was left quite large. It was necessary to be
very cautious when carving the inside to prevent breaking through to
the outside surface. This was especially true in the very sculptured
areas where there were bulges next to hollows. I worked the clay in
a state at which it was stiff enough to support itself but pliable
enough to repair. The upper edge was kept covered. I finished the
form by closing in the top, forming an irregular opening and rim. In
order to make a lid to fit this opening I put a large coil of clay a-
round inside the rim using a mixture of fine grog and dry clay to sep-
state them. I continued adding coils until the lid was closed in. I
had trouble making a knob which worked well with the pot. My solution
was to make a simple clay loop which later would have a forged metal
ring through it. After it was fired and glazed I found that a metal
ring was not needed and that the small clay knob worked fine.

I liked the possibilities of using the method which is mentioned
above but wanted to find a method that would give a similar sculptural
effect with less hollowing out. I began the next pot with four thick
slabs forming them around a square wooden form. These slabs were stiff
enough to handle but pliable enough to slump softly and manipulate
easily. I contrasted this rather simple clay shape with several or-
ganic globular forms on top. The strength of the heavy slabs plus the
support of the wooden frame, allowed me to slap on clay quite roughly.
This upper section was done much like the previous pot and would later
be carved from the inside to thin the walls. I removed the wooden sup-
port and refined and thinned the top portion with the use of a wooden
paddle and loop tool. The lid of this pot was formed from a slab stif-
fened slightly over a rounded form and fitted to the pot, overhanging
the rim slightly. A one-inch strip of clay was added to the underside of the lid to function as a flange and fitted inside of the rim of the pot. Most people fail to notice that this pot is highly erotic. Sometimes it is a relief when the viewers are so unobservant.

The third pot in this series was done nearly a year later. This time the body of the pot was formed from four slabs which were made of overlapping strips of clay. These slabs were supported by a wooden box structure when being joined together. However, these walls were too thin to allow the pressure of slabbing clay on top of them. I solved this problem by lumping clay in masses on a table to get the desired effect then lifted it off the table and applied it on top of the pot. The three pots done in this series have several things in common yet each is quite different.

At the beginning of the fall quarter of 1965, I decided to experiment with a technique that I had seen several times but never tried; the idea of scratching into plaster and taking a clay print from it resulting in a texture of raised or embossed lines. When I began my plaster etching I had no end product in mind. The drawing looked festive and patriotic. I decided to make a monument but did not know for whom or what. Having great respect for my elder brother, I made the monument to "Brother Roy." I used the plaster block to impress four square slabs which would be used as sides for a box. To avoid repetition I smeared out different parts of the design on each slab so that no two sides of the box would look alike. Since the slabs were large and thin and hard to manipulate, I constructed a plywood box to be used as an inner support.

Getting a good clear impression from the plaster block was more
difficult than I had anticipated. After several attempts, I found that
it was necessary to enlarge and deepen my original lines. I also recom-
mend that the plaster block be bone dry and that the clay be nearly leath-
er hard at the time of impression. The clay should be pounded gently and
evenly on the back with a wooden mallet. Allow extra clay on the edges
so that the sides, which are beginning to harden, can be trimmed before
they are joined. If several impressions are to be made, it is a good
idea to dust the plaster block with powdered clay in between each impres-
sion to prevent the next one from sticking.

What does one do with a monument? I thought about this several
times but was not concerned about the problem. Use it to store potatoes
or peanuts, it doesn't really matter. However, it was about this time that
I needed a small filing box or cabinet at home. The next time I looked
at my monument I decided it could work well for this purpose. I adapted
the box for this purpose by adding a row of decorative loops to the top
dge. Two metal rods would later be inserted through four of these open-
ings to support a dozen or more hanging folders.

The lid of the box was made as simply as possible. I began with
a large clay slab. In order to make a flange to fit inside of the box
(which was not perfectly square) I devised the following procedure;
I moistened the rim of the box, placed a piece of paper over it and ran
my finger along the rim. I removed the paper and turned it over on the
clay slab which I had made. I used the marking which the moistened pot
made on the paper as the guide line for attaching the flange. I finish-
ed the slab lid by beveling the edges and adding a small clay coil of
moulding.
At the leatherhard stage the pot was fun to look at, but after the glaze firing the pot looked awful. The primary problem was that the glaze, although it was a good glaze, was not well suited for the form. Also the walls of the monument had buckled slightly inward and the unglazed areas of clay were reduced too heavily. I made the monument again correcting the shortcoming of the first one. Being made of a lighter clay body with the sides bulged outward slightly, and decorated with red, white and black slip with the stars glazed bright blue, the finished "Brother Roy Monument" was an improvement. I decided to make a later edition of my box changing the place of honor to "Birth." Smaller versions of a more practical nature were made, labelled "Cookies" or "Goodie Box." I felt that I had exhausted the possibilities of this particular project and was quite ready to go on to something new.

My attraction for investigating abandoned houses provided a stimulus for my next project. One fall weekend I had found four large turned wooden legs in an old country house. I decided to use them to make a table. The table top would be made of large, raku fired tiles. I made nine tiles, each one a foot square. I trimmed the tiles again when they were leather-hard and turned them over often to prevent excessive warpage. I carved the backs by cutting shallow strips the length of the tile about every inch. This allowed the tiles to dry more evenly and provided a good mounting surface.

The tiles were bisqued fired, then glazed and raku fired at approximately 1700°. I had a high incidence of breakage because of the drastic temperature change necessary in this firing method and because of the size of the tiles. I feel that the cracks add to the total
effect and are evidence of the method by which they were fired rather than an inference of carelessness or poor craftsmanship. The tiles will be set with "Luminite" into a wooden frame and attached to the turned wooden legs.

While working on this table I considered the possibility of making a table entirely of clay. I made a sketch of my plan which consisted of a square top made of tiles and a column-like base. I discussed the drawings with Professor Wildenhain. He indicated in a subtle manner that it wasn't very imaginative. We discussed other table possibilities and various ways to solve the top without the use of tiles. I made a small clay model for a table with an angular sculptured base which was divided into three parts and supported three large clay slabs. I was satisfied with the base but could not come to any decision concerning the top. I considered having the three slabs on different levels but could not establish their exact form or relationship to one another. Unable to find a satisfactory solution, I put the project aside temporarily.

It was nearly a month later before I reconsidered the problem. I simplified the base from three to two parts but still had no convictions concerning the table top. I decided to begin the construction of the base on full scale. I piled up huge pillars of solid clay and began carving away and adding on clay to simplify and sharpen the angular forms so that they would show an upward, twisting motion. The upper portion of the base was not made solid but was pinched up as thick walls. I ended the form with a wide flat rim. Holes were pierced in this rim about every three inches. These holes would later be used for the bolts.
or screws needed to mount the slab tops. Two cuts were made through the base dividing it into three large sections. These pieces were hollowed out, flanges were attached and the parts were reassembled and allowed to dry slowly.

After two days of working with various cardboard and paper patterns, I still could not decide upon satisfactory shapes for the table top. In order to terminate my state of indecision I formed a large clay slab and cut out two fairly simple but related forms. The following day I turned them over and hollowed the backs forming an area to recess a backing of three-quarter inch plywood. The base was fired to cone 9 in a reduction kiln but left unglazed. The tops were glazed thinly with a slip-like glaze and also fired to cone 9.

The period of transition from one project to the next is the most difficult for me. Working on handbuilt, experimental forms makes these intervals only more trying. It is one thing to work on traditional, wheel thrown forms and to be given the problem to throw a well-made tea pot, but it is quite a different situation when one must provide one's own motivation and find some sort of strong commitment to create a form which exists only in one's imagination. When making a wheel-thrown tea pot one at least knows that it will be round and will have a body, handle, spout and lid. But what happens when all such requisites are lacking? I have found no easy solution to this problem. On occasion I do retreat to the security and orderliness of the potter's wheel but find that I cannot ignore the challenges presented by handbuilt forms.

I found that the best way to bridge the gaps between projects is to set almost an arbitrary problem for oneself, no matter how insignificant
or simple it may seem. Although my commitment to these problems may not have been strong, they provided a means to reanimate the working process. As work begins, problems arise and decisions must be made. One idea follows another, one form suggests another. Many of my projects evolved in this manner.

Having completed the sculptured table I had no specific direction to follow. I decided to construct some very simple shapes made of rows of different kinds of textures and ornamentation. These pots could be used as planters. I was not very enthused about this problem but began the work. I cut an elliptical base and attached a clay strip around it. I rolled out two more strips and attached them continuing the wall upward. I overlapped the strips slightly and pressed them together. I found that if the clay is the right consistancy this can be done without the use of slip and that a wall can be raised in this manner much more quickly than with the use of the coil or pinch methods. Having three rows of strips attached, I planned to begin a new layer of ornamentation. However, I felt a strength and simplicity and upward movement in the form that I had begun and did not want to interrupt it with unnecessary decoration. I continued upward, joining slab after slab. I was excited about the possibilities which this technique offered. I used a wooden paddle on the outside contour when pressing the strips together and could easily control the silhouette of the pot. The happiest realization was that one could make very large, light-weight pots in this manner. I found that it is best to add three strips at a time and let them set up slightly keeping the top edge moist. I continued upward thinking that each strip would be the last. It was nearly two
feet later before I felt the form had satisfied itself.

It was a tremendously simple shape, a far cry from the decorative idea with which I had begun. I made other pots to explore the possibilities of this technique. I found that by curving the strips slightly it could broaden or narrow the pot. In other words, if the bottom of the strip was longer than the top of the strip, the pot would go inward and conversely if the top was bigger than the bottom of the strip, the form would begin to move outward. Later I tried varying the width of the strips, then began tapering the strips so that they would form interesting intersections when joined together. Later I let some of the strips continue freely down the pot, twisting and turning rather than being bound into a side seam or onto another continuous strip.

The last pot of this series was constructed of two separate forms which intersect each other at mid-point and continue in opposite directions. This was structurally more difficult than I had anticipated especially on a large scale. Having explored this technique of strip construction I was ready to pursue some new direction.

I reconsidered the problems that I had encountered in making the handbuilt dinner plates. One way to minimize the amount of carving to be done would be to make a plaster mold to form the bottom surface of the plates. The plaster form could be filled with clay and the top surface of each plate could be carved individually so that each plate would be unique yet rather standard in size and stackable. However, I found that it was difficult to estimate how deep one could carve without removing the plate from the mould. If the plate was firm enough to be removed from the form the clay was too stiff to carve easily. I
decided to form the plates by tamping a thin slab into the plaster mould. The slab was allowed to stiffen, removed from the form and the edge of the plate was reworked with a wooden paddle.

For my next project I decided to use the strip technique in combination with some other method of construction. I felt that the surface of broad, rough textured slabs would work well to contrast the refinement of the strips. I textured the surface of my slabs by scraping them with coarse grog and used them to form a box. I cut away the upper corners of the box and replaced them with organic bulging shapes made from strips of clay. The transition from the hard-edged square to the rounded forms worked well but the forms themselves were too droopy and too symbolic as breast-like appendages. Not knowing how to remedy the problem, I discussed it with Professor Wildenhain. He suggested that perhaps it would help if I turned the whole thing upside down. It was true that when the pot was inverted the forms no longer looked droopy but sprouted upwards in a lively manner from the base. When I turned the pot upside down the form settled slightly from the shift of weight. I attached a new bottom and cut a large hole in the top. I finished the upper edge by adding strips of clay and forming them with a wooden paddle. The completed pot could be used as a planter.

The following week I began a variation of the pot above. I started with a five sided slab form and budded strip forms from each of the five corners. I was careful to avoid the problems which I had previously encountered. Since this pot would function as a covered container I had to find some solution for the lid. I closed the top over
completely with a rounded slab and cut through the pot at mid-point using the entire upper half as the lid. I attached a flange inside the bottom portion of the pot to insure a good fit.

Later I made a third pot on this same theme. This pot was also five sided but was much larger than the previous one. My original intention was to turn this one upside down as I had done to the first, but when I did this I found that it looked much too bottom heavy. I kept it in an upright position and closed the top in slightly. I again faced the problem of designing a suitable lid. I added a coil of soft clay to the rim, placed the pot on the potter's wheel and threw a rim and later threw the lid. I paddled the outside of the rim slightly and added grog and scraped the lid to relate them more closely to the handbuilt body. The crispness of the circular opening provided a good contrast for the freeness of the rest of the pot. I made a knob of two or three interlocking strips as a repetition of the five globular strip forms.

When I began my graduate work I wanted a chance to experiment and to make forms which were bolder and stronger than the work which I had done previously. My objective was not so much to establish a style of my own, but was more concerned with finding forms and methods of construction which appealed to me. I began with the distortion of wheel-thrown forms, then construction of solid forms, box-like structures and thin slab strip forms. Knowing when to cover the clay to prevent it from drying too quickly, what glazes to use and how much decoration to apply, developed by a combination of intuition and experimentation.
Although my projects were quite varied (platters, candle holders, covered containers, tables, etc.) the information learned by working on one was utilized on the next. The way I feel about handling the clay becomes apparent in all of the forms and contributes to them a sense of unity.
Miscellaneous Information

The clay body which I used during the year was a variation on the school's stoneware body. The original batch is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentucky Special</td>
<td>100</td>
</tr>
<tr>
<td>XX Sagger</td>
<td>100</td>
</tr>
<tr>
<td>Dalton</td>
<td>25</td>
</tr>
<tr>
<td>Redart</td>
<td>25</td>
</tr>
<tr>
<td>N. Amer. Fire Clay</td>
<td>25</td>
</tr>
<tr>
<td>Bentonite</td>
<td>3 (1%)</td>
</tr>
<tr>
<td>Red Iron Ox.</td>
<td>8 (5%)</td>
</tr>
<tr>
<td>Optional</td>
<td></td>
</tr>
</tbody>
</table>

I disliked the dark metallic brown color of this body when it was fired in reduction. I also found that it slumped and warped slightly, especially when it was used to make plates. The variation of this body which I used was this:

<table>
<thead>
<tr>
<th>Component</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentucky Special</td>
<td>100</td>
</tr>
<tr>
<td>XX Sagger</td>
<td>100</td>
</tr>
<tr>
<td>N. Amer. Fire Clay</td>
<td>25</td>
</tr>
<tr>
<td>Goldart</td>
<td>25</td>
</tr>
<tr>
<td>Bentonite</td>
<td>3</td>
</tr>
</tbody>
</table>

This clay body fired at cone nine reduction is a warm buff color. I had no trouble with slumping. Sometimes I used a mixture of one half of the above batch and one half wet scrap clay. I seldom used grog unless the pieces were especially heavy, such as the stoneware table. In this case I used about ten to fifteen percent grog which was mostly fine grog with some medium coarse grog. I generally dislike using grog especially on glazed pieces because I found that it often burns out as fine granules on the surface of the ware. I had several plates ruined by grog when scrap clay was used. I did not use grog when I made the large slab-stripe pots.

When glazing my large sculptural pieces, I did not want to hide
the clay texture nor dominate the form with glaze. For this reason I fired several of my pieces unglazed in a cone nine reduction kiln. These pieces were fired in the Alpine kiln from their green state to cone nine in one firing. I did not have any breakage when it was done in this manner, but the kiln was fired more slowly than if the pieces had been bisque fired.

When drying the two large slabs for my stoneware table I placed them upside down on the tables in the graduate workroom and covered them so that they would dry slowly. The masonite table top on which they were resting began to warp from the moisture of the clay. I would suggest that in the future sheets of plastic be laid down on the table if moist clay is to be left on it.

"Lumnite" was mentioned earlier in the text and was to be used to set the tiles for the table top. Lumnite is the trade name for a cement like material which is mixed with sand and water, and sets up quickly. It is a dense, black material and may be purchased dry at most building supply companies. Since the tiles were to be set into a frame I decided to use Lumnite rather than a plaster of paris and glue mixture because the latter expands slightly when it hardens and would separate the corner joints of the wooden frame. Because the tiles have large areas of black, I felt that the Lumnite would also look well with the tiles.
Local Clays

Professor Wildenhain showed me a pot which he had made several years ago from clay which was dug on the shore of Lake Ontario. The pot had been fired to cone five and was a self-glazing body. He gave me a bag of this dried clay to experiment with. I soaked some pieces in water and tried using it as a slip glaze. I found that at cone nine it produces a very interesting glaze which accentuates clay textures and varied from a transparent yellowish-brown when thin to an opaque, pea-soup green when it is applied heavily. I wanted to dig more of this clay and experiment with it further. I was directed to a location at Sodus Point called Chimney Bluff. The cliffs there were quite steep and contained clay like material. It was late winter and the shores were covered with a muddy clay. I dug several buckets of this and returned to Rochester. My tests on this were unsuccessful and produced results which had nothing in common to the previous clay sample. I felt that perhaps within the last five years, the strata or composition of the clay had changed. However, Professor Wildenhain said that what I had brought back was not the same clay which he had dug. The original clay body had a distinct slate-grey color whereas the clay which I brought back was more buff colored and contained more loam than the previous sample. We returned to Chimney Bluff and did find several veins of the slate-grey clay. It was quite exciting to find clay at its natural source. It was like coming upon a whole bed of pure Plasticine but better. We carried several bags of it back to the car but our supply was limited as it was some distance to the road and the clay was heavy.
The lake clay could be wedged and thrown just as it was found. The body threw well. I fired one pot at cone five in the electric kiln and it came out as a green colored body but was not really self-glazing. I refired this pot to cone five in the downdraft kiln and it came out a shiny chocolate brown and was self-glazed but had developed cracks from the rim downward. Professor Cowles suggested that the body was too dense or tight and that perhaps some grog should be added. Another possibility could be that the cracks were caused by tensions in the clay which occurred when the pot was thrown on the wheel. I made other pots from this clay which were handbuilt. When these pots were dried they also cracked from the edges downward. I fired these pieces in the Alpine kiln to cone five. The pots slumped into a pea-soup colored mass which was vitrified and self glazed. With such varied results at cone five I could draw no logical conclusion but did know that some sort of filler would have to be added to this clay body. I added a mixture of fine grog and calcined fire clay. I would estimate that this was about a fifty-fifty mixture and was added to the lake clay at about twenty to thirty percent. I made both handbuilt and wheel thrown pots from this mixture. At cone 01 (fired in the electric test kiln) the body was a warm buff color but was not completely vitrified. At cone three the clay is pea-green in color and is vitrified enough to hold water and has traces of beginning to be self-glazing but is still rough clay texture in most areas. The addition of the filler eliminated any tendency to crack but made it more difficult to throw.

I looked for other local clays with which I could experiment. I made tests on clay which I found at Mendon Ponds. At cone nine the
results were very dry and uninteresting as a glaze. Professor Cowles suggested that I do further tests trying the addition of various fluxes. He helped me set up the following experiments to see how the different fluxes would react with the Mendon clay. I used fifty mm. of slip to equal twenty-five grams of dry weight.

<table>
<thead>
<tr>
<th>#1</th>
<th>40% calcium</th>
<th>#6</th>
<th>40% borax</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2</td>
<td>40% lepidalite</td>
<td>#7</td>
<td>40% gerstley borate</td>
</tr>
<tr>
<td>#3</td>
<td>40% nepheline syneite</td>
<td>#8</td>
<td>40% lithospar</td>
</tr>
<tr>
<td>#4</td>
<td>40% albany slip</td>
<td>#9</td>
<td>40% barium carbonate</td>
</tr>
<tr>
<td>#5</td>
<td>50% lake slip</td>
<td>#10</td>
<td>Straight Mendon slip</td>
</tr>
</tbody>
</table>

These tests were fired to cone nine reduction but none of these combinations tended to improve the quality of the glaze. Perhaps a more complex combinations of materials would have resulted in a satisfactory glaze but I felt that if more than one or two secondary materials needed to be added it would no longer be a very honest natural slip glaze.

I did other tests on clay which I found on the property of the Gratwick Farm in Pavilion which is nearby. This clay was very similar in color to the lake clay but was not quite as clean and needed to be dried, made into slip and then screened. I found that this clay turns from slate-grey to a moss-green color when it is allowed to age a few weeks. At cone nine this clay made a fluid glaze but was an uninteresting flat chocolate brown in color. It threw very well but was dense like the lake clay. I added the same type of grog-fireclay filler and made a thrown as well as a handbuilt pot from this body. Fired at cone 01 in the electric test kiln it was porous and light brick-red in color. At cone three it was a deeper brick red in color and was vitrified enough to hold water.
Raku Ware

Raku ware is an Oriental form of pottery which was originated by Japanese potters over fourteen generations ago. The highly developed tradition of raku is sometimes used in connection with the tea ceremony and is characterized by a strong regard for one's material, respect for the asymmetrical, acceptance of the accidental and appreciation of the spontaneous.

The use of raku techniques in the United States is relatively recent and was introduced to us by Bernard Leach and others. Paul Soldner has played an important part in making this technique well-known and popular among American potters. However, I feel that raku as we know and practice it today has little relation to the original Oriental process.

I learned about raku in California through discussions with Paul Soldner and his students. I built a very crude raku kiln and did some experimentation with raku ware. Basically the process as I know it is this: The pot is made of a very porous and shock resistant clay body and is bisque fired and glazed with a low-fire glaze. The pot with the raw glaze is placed in a red hot kiln with the use of tongs. When the glaze is mature the pot is removed from the kiln and placed in saw dust or any combustable material and left covered for about ten minutes. When the pot is removed from the saw dust it may be quenched in water or air cooled. The unglazed portions of the pot will be black or smoke grey. The glaze will have interesting markings due to the sawdust and irregular reduction and will often appear metallic or
opalescent in areas, especially where copper oxide or carbonate is used as a colorant.

Making raku pots has some limitations. For example one cannot make a pot larger or heavier than can be lifted from the kiln quickly. Also the pieces should not be too fragile or delicate. It is possible to raku fire large pieces by building a temporary kiln structure of loose bricks around the pot. When the glaze is mature the kiln is turned off and combustable material can be dumped in the kiln around the pot. Some of Soldner's students did this and used rotten oranges and anything else which was handy for their reduction atmosphere. It made quite a stink but apparently it worked.

It is necessary that the pot be throughly dried after the glaze is applied before it is put in the kiln or it will explode. It is best to glaze the day before you plan to fire. There is also the possibility of glazing a pot at stoneware temperatures and then refiring it like raku ware. One can experiment with various kinds of combustable materials. I have seen pots where people used green grasses for reduction and it produced interesting markings on the pot. I have tried different kinds and coarseness of saw dust but have found little difference in the results. There is some controversy whether the saw dust should be damp or dry. I prefer using dry sawdust because I feel that it gives a heavier reduction. There are many variables possible when firing raku ware. I find that trial and error is the best method of experimentation.

Since there is always quite a loss of heat when the kiln door is opened, it is difficult to keep the kiln at an even temperature, especially when several pots are fired in succession. I think that I usually fire at about 1700°. I know other people fire raku at lower
temperatures, about $1400\degree$, but I have also fired up to cone 04 without much variation in the results. It depends on what glaze is used. The raku body which I used was based on the following proportions:

\[
\begin{align*}
\text{clay} & \quad 50 \quad (\text{I used a combination of Gold Art and Kentucky Ball Clay}) \\
\text{talc} & \quad 20 \\
\text{grog} & \quad 30
\end{align*}
\]

I seemed to have a higher percentage of cracking with this body than I did with the body which I used in California where Lincoln Fire Clay was used with the above percentages of talc and grog. I would suggest further experimentation with clay bodies but feel that a certain amount of breakage is inevitable due to the drastic changes involved in the raku process.

When decorating the pots I generally overglazed with oxide or carbonate washes. I found that copper carbonate or oxide, lead chromate, cobalt oxide or carbonate and potassium dichromate worked best. Stains also work well as these temperatures. As far as glazes are concerned, I think that most any low-fire glaze will work. The ones which I used are as follows:

<table>
<thead>
<tr>
<th>Soldner's Semi-matte</th>
<th>Chrome Red #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>silica 10</td>
<td>lead carbonate 256</td>
</tr>
<tr>
<td>kaolin 20</td>
<td>chrome oxide (0.5)</td>
</tr>
<tr>
<td>perstley 30</td>
<td>china clay 26</td>
</tr>
<tr>
<td>borate 30</td>
<td>silica 48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chrome Red #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>red lead 200.6</td>
</tr>
<tr>
<td>potassium</td>
</tr>
<tr>
<td>dichromate 14.4</td>
</tr>
<tr>
<td>soda ash 6.1</td>
</tr>
<tr>
<td>china clay 26</td>
</tr>
<tr>
<td>silica 53</td>
</tr>
</tbody>
</table>
Glazes

I consulted with Professor Cowles concerning the problem of formulating glazes. I wanted to calculate a cone nine reduction glaze which would be semi-transparent, have a buttery surface and be suitable for glazing sculptural pieces. He suggested that I could calculate a glaze from the empirical formula or I could try arbitrary combinations using a basic limit formula such as:

feldspar and two secondary fluxes 60%
clay 20%
silica 20%

I tried both of these methods and came up with some usable glazes.

Professor Cowles helped me establish and satisfy the following empirical formula in this manner:

\[
\begin{align*}
0.200 & \text{ KNaO} \\
0.100 & \text{ Li}_2\text{O} \\
0.300 & \text{ CaO} \\
0.400 & \text{ MgO} \\
\end{align*}
\]

\[
\begin{align*}
\text{Al}_2\text{O}_3 & = 0.500 \\
\text{SiO}_2 & = 3.5
\end{align*}
\]

<table>
<thead>
<tr>
<th></th>
<th>KNaO</th>
<th>LiO</th>
<th>CaO</th>
<th>MgO</th>
<th>Al2O3</th>
<th>SiO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornwall</td>
<td>X</td>
<td>.214</td>
<td>.193</td>
<td>2.320</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petalite</td>
<td>X</td>
<td>.214</td>
<td>.400</td>
<td>.93</td>
<td>.800</td>
<td></td>
</tr>
<tr>
<td>Dolomite</td>
<td>X</td>
<td>.186</td>
<td>.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talc</td>
<td>X</td>
<td>.93</td>
<td>.248</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaolin</td>
<td>X</td>
<td>.186</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cornwall: X

Petalite: X

Dolomite: X

Talc: X

Kaolin: X
Batch

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornwall</td>
<td>192.0</td>
<td>48</td>
</tr>
<tr>
<td>Petalite</td>
<td>61.2</td>
<td>15</td>
</tr>
<tr>
<td>Dolomite</td>
<td>39.4</td>
<td>10</td>
</tr>
<tr>
<td>Talc</td>
<td>23.4</td>
<td>6</td>
</tr>
<tr>
<td>Kaolin</td>
<td>24.0</td>
<td>6</td>
</tr>
<tr>
<td>Alumina</td>
<td>40.8</td>
<td>10</td>
</tr>
</tbody>
</table>

(to make 1-4 (2.5 gr 4X) ratio)

The basic batch at cone nine was too shiney. The following alternations were tried:

Test #1 Add Alumina
1. 2.5  1B.  5  1C.  7.5  1D.  10

Test #2 Add Kaolin (if the alumina is left out and kaolin is added it will give it more silica but the Al2O3 will stay the same. It will take approx. 25gr. kaolin to replace 10gr. alumina to compensate in mol. wt.)
2A. 10  2B. 14  2C. 16  2D 22

Test #3 replace Alumina with Alumina Hydrate (Alumina Hydrate is almost one-half heavier than Alumina, so will need more for the same results.)
3A. 10  3B. 15  3C. 17  3D. 19  3E. 21  3F. 23

Test #2B. with 14 kaolin was the most successful of these tests and resulted in a good semi-transparent, buttery, cone nine glaze.

Using the cone nine limit formula mentioned before I tried the following combinations:

#1. 20 Cornwall
10 Neph. Syn.
10 Albany Slip
10 Silica

#2. 10 Petalite
10 Clinchfield
10 Dolomite
5 Kaolin
5 Albany Slip
10 Silica

#3.
10 Lithium Carb.
10 Kingman
10 Neph. Syn.
10 Kaolin
10 Silica

#4.
10 Cornwall
10 Kingman
10 Neph. Syn.
10 Ken. Spec. Ball Clay
10 Silica
Of these five experimental combinations, only one of them (#2) produced a useable glaze. I discussed the results of these tests with Professor Cowles. He suggested that further tests be run on these samples to improve the defective ones and to give additional variations of test number two. From this second group of tests the following results are worth mentioning:

The original batch #4 resulted in a very dry, non-fluid glaze. This was because I had used all feldspars in the RO group which caused the glaze to have almost two times as much Al₂O₃ as is usual for a cone nine glaze. Professor Cowles suggested these variations be tried:

#4A. substitute Petalite for cornwall to take advantage of the Petalite-feldspar eutectic which occurs at about a 48-52 ratio.
   try 18 Petalite

#4B. add Dolomite to variation #4A.

   #4B-1. 18 Petalite and 5 Dolomite
   #4B-2. 18 Petalite and 10 Dolomite
   #4B-3. 18 Petalite and 15 Dolomite

Test series #4B. was the most successful. Variations one, two and three were all useable, but #4B-3 was closest to the surface quality which I wanted.

For variations on glaze #2 Professor Cowles suggested the following tests:

#2A. use kaolin in place of Albany slip
#2B. to help matt the glaze try using
   5 Petalite and 15 Clinchfield
#2C. try using a more refractory feldspar such as Cornwall Stone

Variations #2B. and #2C. both resulted in good, semi-transparent, cone nine, buttery glazes.
My experimentation with technical problems and glaze calculation was limited to the findings which I have stated here. This was due partially to my lack of knowledge in this area but was more strongly influenced by my dominant concern for form. At times I was so involved with glaze experimentation that I found I had no good pots to put the glazes on. This paradox was compounded by the fact that having a large number of glazes to choose from makes the decisions of glazing all the more difficult if not unbearable. I found that it was more satisfactory to have about five basic, reliable glazes, know several color variations of each and become familiar with the proper firing conditions of each. By combining these with colored slips and in-glazing techniques, the range of possibilities is quite ample. I enjoyed the simplicity of experimenting with local clays and the spontaneity of firing raku ware. In the future I should like to do experimentation with ash glazes.
Photographs

Covered Container (built solid then hollowed) p.29
Covered Container (built with heavy slabs) p.30
Covered Container (built with thin strips) p.31
Raku Covered Container p.32
Strip Pot 36” p.33
Brother Roy Monument p.34
Cookie Box p.35
Covered Container p.36
Planter p.37
Raku Candle Holder p.38
Raku Candle Holder p.39
Raku Sun God p.40
Branch Pot p.41
Planter p.42
Raku Weed Pot p.43