

A SERIES OF MOSAICS

by

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TABLE OF CONTENTS

CHAPTER		Page
I	INTRODUCTION	1
II	GENERAL AESTHETIC CONSIDERATION.	4
III	TECHNICAL PROCEDURE.	8
	BIBLIOGRAPHY	23
	APPENDIX	24

LIST OF PLATES

	Page
PLATE 1	11
PLATE 2	14
PLATE 3	17
PLATE 4	19
PLATE 5	21

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CHAPTER I
INTRODUCTION

This terminal project grew out of a wish to construct a picture from small movable units of color as a discipline that would force the attention on the picture surface and its design and on an emphasis on a process in which this design is almost literally built together. While theoretically any material would have served the same basic purpose, at a previous time I had made a series of color samples of enamel on sheet copper and the possibility of using these little pieces as a source of color in pictures came to mind. After firing a number of pieces each of several colors, arranging them in various combinations, observing some peculiarities of visual effects and considering the permanence and manageability of the material I began to see that a series of mosaics in enamel could be an interesting study in its own right as a terminal project.

Mosaics have traditionally been made of small cubes of colored stone and glass. The great mosaics in the churches of the Byzantine Era were made chiefly with cubes broken

from sheets of glass of various thicknesses. As the broken surfaces were used for the face of the mosaic the result is slightly irregular and faceted.

Although enamel was used as a material in this project because of its availability, flexibility, permanence and its wide range of rich colors, there was little attempt made to explore the many possibilities of the enameler's art, such as the various methods of combining different enamels and different colors to get different effects on the same piece of metal. Nor was any study made of the reasons for the varying behavior of the colors under different conditions. Enamel was merely a source of color and the enameling experiments done and reported in the appendix were directed solely toward the purpose of varying the colors by mixing and by various means of firing to add to the variety of the commercial colors that are available. Since most of the commercial colors are of high intensity, variations in the direction of neutrality were needed.

Neither was any attempt made to imitate other mosaic styles, either traditional or modern, although as the work progressed reasons for the use of certain arrangements of tesserae rather than others for specific purposes became

apparent. Some of these are discussed in the descriptions accompanying the illustrations.

CHAPTER II

GENERAL AESTHETIC CONSIDERATIONS

These mosaics were made as individual pictures with the hope of working out the same problems of color and spatial organization as those with which painting is involved. It was suggested at the preliminary examination that, as regards the representation of depth, Byzantine paintings and mosaics were conceived largely as figure and ground situations, but that an important difference in today's approach to painting is in a concern with organizations of a number of overlapping planes, so that if figure and ground are still involved, what is the ground for one figure might be also the figure on still another ground, and so forth. A consciousness of complexities in depth structure as brought about by such overlappings was maintained during the work on all of the mosaics in this project.

The square shape of the tesserae was decided upon after making an experiment with pieces of random shape and discovering that to close each unit of four or five pieces a special piece would have to be made, or a great deal of time would be spent selecting pieces for the best fit. In an

attempt to keep the squares from looking too mechanically alike the sizes were varied slightly and the proportion varied from square to rectangular. Narrow strips were made in each color for details and lines, and a few angular pieces were added to aid in filling spaces left when the rows of tesserae met at angles other than a right angle.

Certain physical characteristics of the enamel presented problems to be overcome or minimized. First was the tendency of the powdered enamel to fall away from the edges of the square leaving dark edges on the fired piece. As the edges seemed obvious enough without this added rim an attempt was made to eliminate it by clustering the pieces closely against each other and spraying them with turpentine before shaking the enamel on.

The second problem had to do with the melted quality of the surface which, particularly when the enamel was thick, tended to give the tesserae the rounded appearance of little pillows. Such a shape was undesirable because of the glare cast by these glassy curves. There could hardly be a source of illumination that would not cause some edges of all the pieces to shine. However, by hollowing the copper pieces slightly and by taking advantage of the edges curled up by

the tin shears a reasonably flat finished surface was obtained.

The rich and jewel-like quality of the colors seemed to me to present certain dangers. The first was the temptation it presented to begin with startling or flashy surface effects instead of allowing a surface effect to result from the refinements of a meaningful design. I generally tried to avoid such possibilities as the arrangement of the tesserae in a way that would call attention to themselves, or the use of graded, mottled or textured effects within the tesserae except as these might result from the technical means of achieving specific colors.

One difficulty was unavoidable once I had decided to use opaque and transparent colors together for the sake of the increased color range; namely, the presence of two kinds of light reflection. Light is reflected from the surface of the opaques, but from the depths of the transparents, and in the case of very thin transparents from the copper itself. If the mosaic is viewed from an angle almost equal to the angle of illumination the light bleaches the opaques but intensifies the transparents. Furthermore, some of the transparents, when applied thinly have to be fired briefly to

preserve their color, leaving a pebbly effect which sparkles in this glaring light. All of these variations provide a great deal of surface interest beyond that provided by the color relationships.

As the project developed it was interesting to adapt the rectangular shapes of the tesserae and their arrangement to various methods of drawing. The first picture (Plate 1) was done with the idea that broken color, broken edges and a minimum of actual delineation would be appropriate, and that the tesserae could be in general square with the picture rectangle throughout. By the time the second picture (Plate 2) was under way the strong effect of the direction of the tesserae on the appearance of overlapping was observed, so to utilize this effect the edges were made more continuous than in the first, and the directions in which the tesserae were laid varied somewhat according to the configurations they were to form. In this respect the third and fourth pictures are similar to the second. In the fifth picture (Plate 5) the changes of color and value do not coincide with the boundaries of the figures and these boundaries are only partially suggested by single rows of darker or lighter tesserae.

CHAPTER III
TECHNICAL PROCEDURE

Enamel is essentially glass fused to metal. It is composed of silica, lead oxide, potash, soda, and borax. Tin oxide is added when opacity is desired, and other metallic oxides provide the colors. These ingredients are melted together, or fritted, in a furnace and the resultant glass, when cold, is ground to a powder, and it is this powder which the artist applies to the surface of the metal to be enamelled. When the metal is brought to a red heat the enamel melts again to a glassy appearance, adhering firmly to its base. "Art enamels" are used over gold, fine silver or copper, while industrial enamel, a leadless product, is used over iron.

The following outline gives briefly the procedure used in making the mosaics. More specific details concerning the achievement of certain color variations are given in the appendix.

1) Preparing the copper.

Sheets of copper 20 or 24 gauge (20 for multiple coats of enamel, 24 for single thin coats) were cut with tin shears into strips approximately one half inch wide and then polished with fine steel wool. These in turn were cut into squares and, since the tin shears curl the edges and warp the pieces, flattened with a smooth hammer on a hardwood block.

2) Applying the enamel.

To facilitate applying the powdered enamel forty or fifty copper pieces were closely arranged on a piece of screen and sprayed lightly with turpentine. A small piece of nylon stocking was tied over a bottle of enamel and the enamel shaken through this to form a thin layer just covering the cluster of copper pieces.

3) Firing the tesserae.

To fire the tesserae twelve to sixteen of the pieces were lifted with a palette knife onto a nichrome wire screen, spacing them an inch or two apart, and the screen was placed on a support of bricks high enough to allow a torch to be held underneath. The torch, a "Prepo" with a utility burner, was then lighted and when

warm turned on full and pointed up to the under side of the copper pieces, bringing each in turn to a red heat. The firing time ranged from five to twenty seconds for each half inch square piece, with the majority being done at about ten seconds.

4) Securing the tesserae.

Each picture was completely assembled on a large piece of plywood before any of the pieces were secured to the backing material. When the work seemed complete the entire picture was covered with a sheet of paper of which rubber cement had been applied. In a few minutes a cloth padding and a piece of plywood the size of the working board were clamped over it and the whole thing turned up-side-down. The working board was then lifted off and cut to dimensions a half inch larger each way than the picture to allow it to be set later into a frame. It was then given a coat of "Wilhold Glue" or "Elmer's Glue-All", both of which dry clear, and laid carefully over the back of the tesserae. It was then weighted down with bricks and left for two or three hours. When set the picture was turned face up, and the paper peeled off. If any scattered pieces remained loose they were glued down individually.

PLATE 1

This first study, representing birds and foliage, makes use of broken color and a minimum of modelling to give the effect of filtered light. After the first color sketch indicating the disposition of color and value areas over the surface other sketches were made to work out the relative placement of the areas in depth. Except for the intense red of the heads, the birds are differentiated from the foliage only slightly, one being a little darker than its background and the other a little lighter.

At the time of making this picture I felt that the arrangement of the tesserae and the angles at which they were placed would have little to do with the composition, and my concern was only to prevent them from looking too mechanically even, and to give them a little drift in one direction or another. However, to prevent the bird on the right from having a saw-tooth profile I angled the tesserae. Still I was reluctant to make a sharp break between the bird and its background so I carried the angling into the background. However, this merely moved the problem from one area to another.

Most of the enamels used here were opaque with only enough transparent pieces used as were needed to add to the color variation. A few of the greens were obtained by mixing several enamels together.

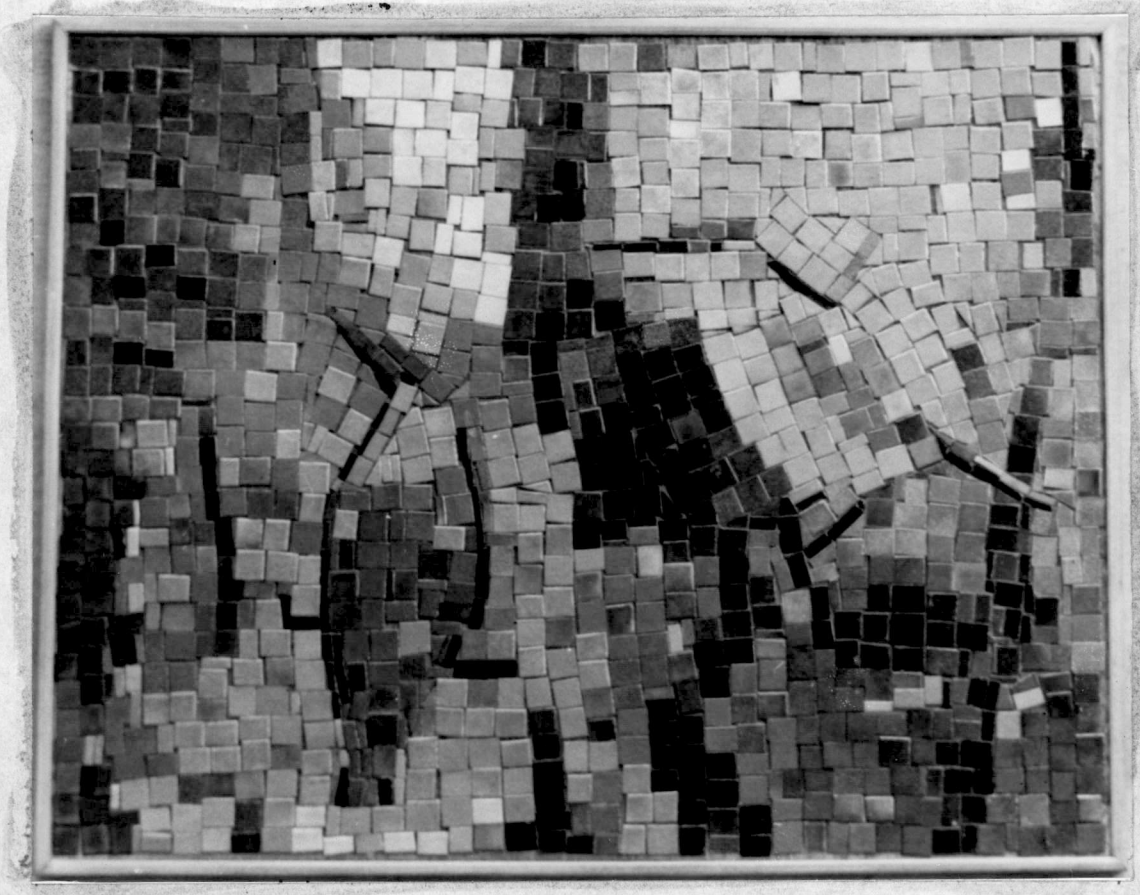


PLATE 2

In this picture of two horses in an enclosure the overlapping of forms is more clearly shown than in the first study. However as I was looking for ways to break up the obvious shapes and group them so that new arrangements would result, I placed similarly colored horses, one in front of the other and supposed them to be back lighted from low at the left of the picture. The resulting areas of yellow and violet could cross the edges of the horses and the yellow could be picked up and carried through the field behind. The further breaking up of the front horse with gray related it to the gray of the fence and building. In general the red and violet areas of the vertical surfaces cross the picture from upper left to lower right, and the yellow and green horizontal surfaces cross from lower left to upper right. The left side is chiefly dark enclosing areas of light, and the right is chiefly light enclosing areas of dark.

In working out this mosaic it became obvious to me that a sudden change in the direction of the tesserae produced the appearance of one plane overlapping another regardless of the color, value or intensity of the areas. In joining two color areas composed of tesserae lying at different angles the area

that continues with whole tesserae appears to be in front of the area that fits against it with angular pieces. It seemed necessary to make use of this principle especially where either a cool or a low intensity color which normally would appear to recede was made to overlap one which was warm or of high intensity. For this reason, and to prevent the meaningless breaks that occurred in the first picture I allowed these changes of direction to occur chiefly at the edges of the forms in this and the following mosaics.

Both transparent and opaque enamels were used here, but to a large extent they were kept in separate areas in order to get the greatest effect of luminous color from the transparents.

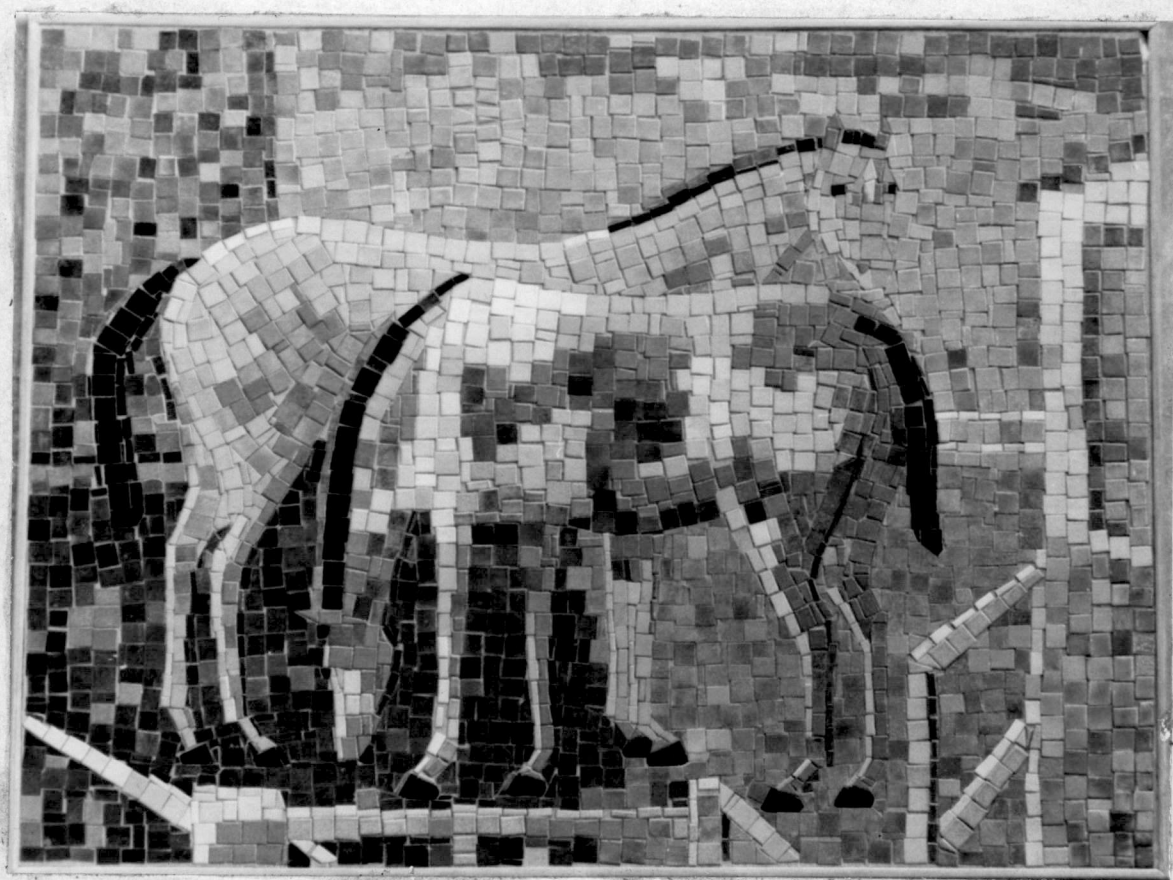
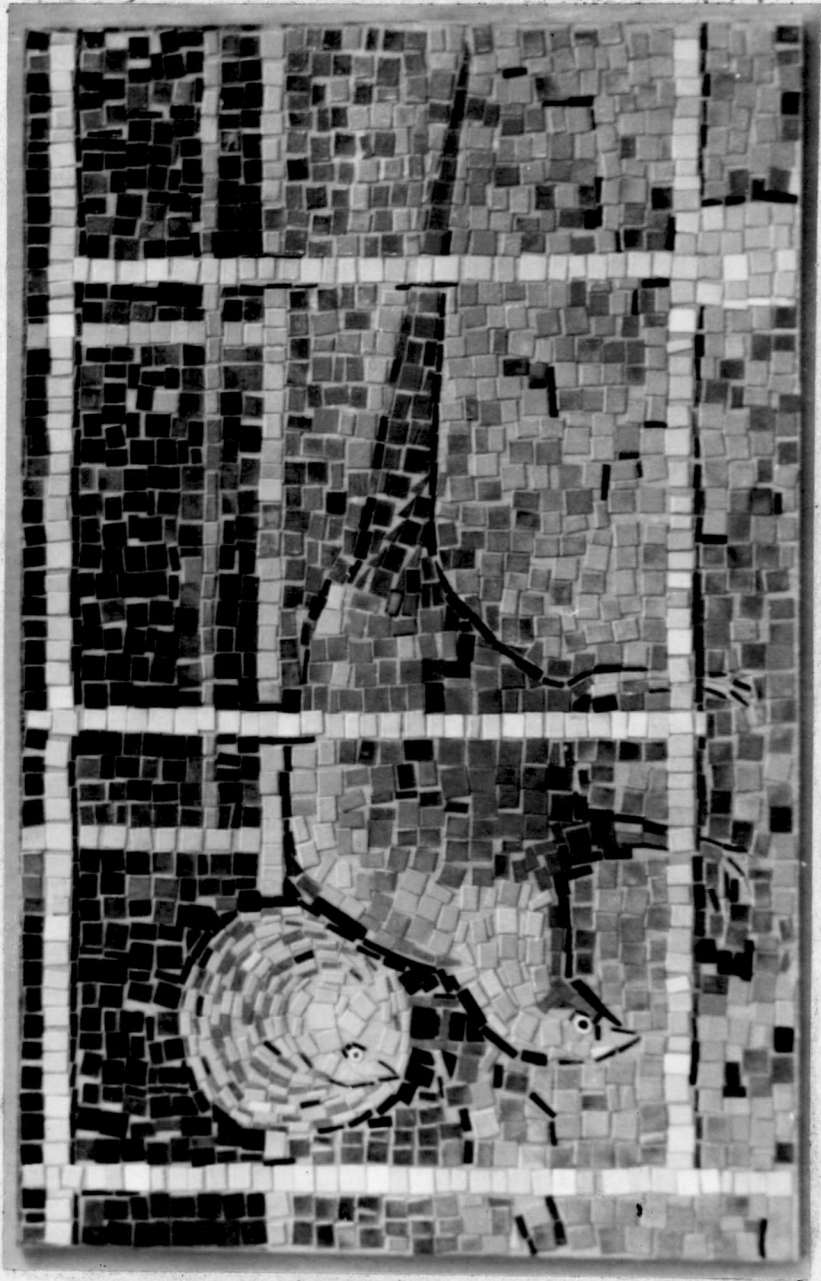


PLATE 3

The study of two pheasants was intended as an uncomplicated composition with shallow picture depth and with the relative placement of areas one behind the other indicated mainly by cage bars. There is less interplay between figure and ground than in the two previous pictures, and the color and textural interest is frankly centered in the pheasants.

The tesserae were more loosely assembled, giving the picture the appearance of having been more freely executed than the previous studies, and eliminating much of the tedium of fitting them together. Too they were used in a more differentiated manner, the frontal view of the hen pheasant being described almost entirely by the direction of the tesserae.

Transparent and opaque colors were used together in almost all areas, and considerable use was made of mixed enamels.



PLATE, 4

In working up sketches for this picture of raccoons I was struck by the triangular appearance of their faces, so grouped the three faces into a larger triangle and from there developed the angular quality of the composition. Considerable use was made of overlapping areas, and to keep the neutral color of the animals in front of the rather insistent yellow of the ground their convex curves and decorative markings were emphasized. The color areas are flatter, more positive and less broken than in any of the previous pictures.

The tesserae are still more loosely assembled than in the third picture, and the darker gray of the mounting board has a chance to affect the appearance of all the colors. As a subordinate interest transparent and opaque areas are kept generally separate with the expectation that they would show a noticeable change of pattern as the illumination changed. However, since the transparent colors tend to show as lighter colors, although more brilliant, under a glaring illumination, and as I had already used opaques in the lighter areas of the picture, the results from this phase of the experiment were negative.

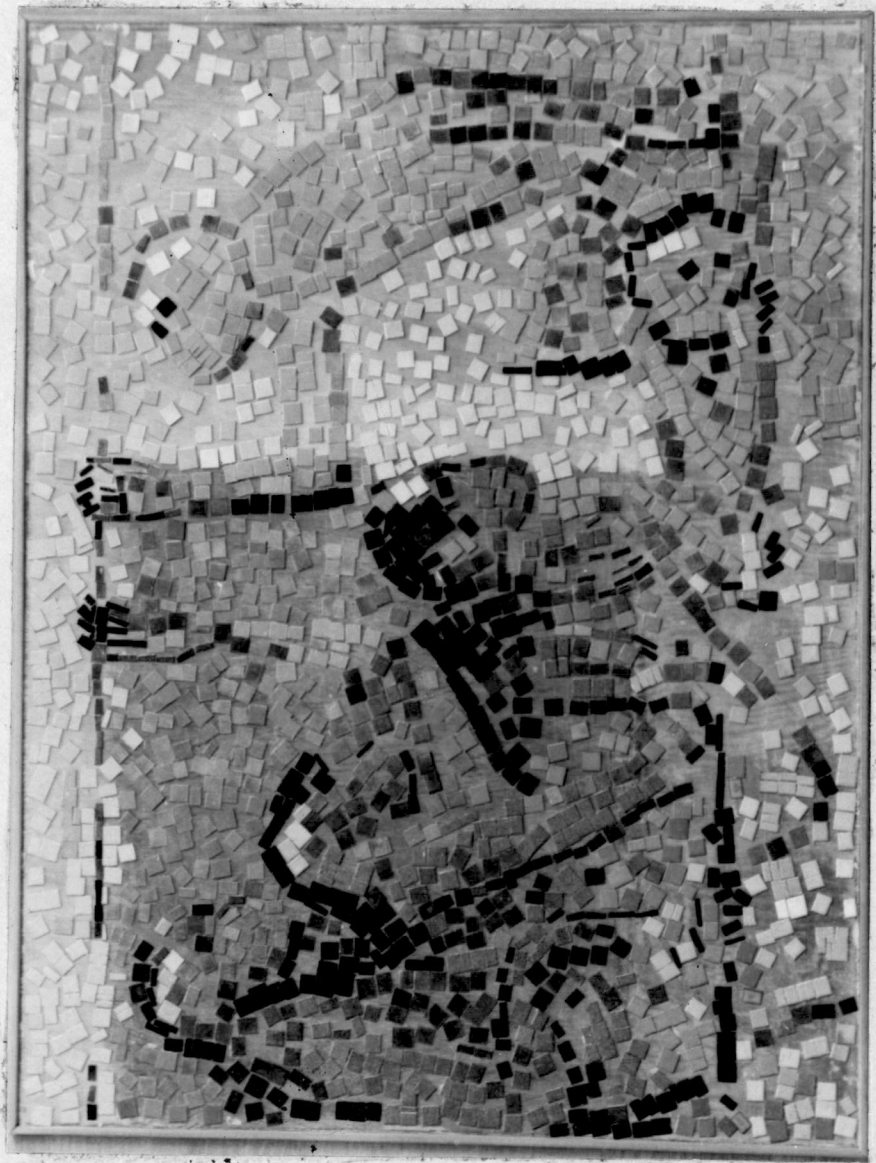


PLATE 5

This picture of a group of monkeys began with the idea of grouping black areas and lines in an active motion across the picture without necessarily describing edges or patterns of marking that might appear on the animals, but using them to make the colors appear lighter and more luminous.

Having used the color of the mounting board as part of the color in the preceding picture, I decided to use it in a more varied way in this composition. Accordingly the board was divided into four variously proportioned rectangular areas and each was given a different value of gray. The tesserae were then clustered about rather than spaced evenly, suggesting rather than describing the forms of the monkeys and the space of their cage.

Both opaque and transparent enamels were used, but only in their capacity of color variations with most of the transparents falling in the darker value range.



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APPENDIX

Powdered enamels can be purchased in a wide range of colors, both opaque and transparent. In addition there are a number of methods of varying each color, some of which are given in the following outline.

1) Transparent over varied backgrounds.

The transparent colors are strongly influenced by the color over which they are fired. They can be fired directly over the metal, or over a coat of clear enamel (flux) or over opaque white. In addition they can be used over other opaque colors providing the base coat is of a lighter value than the transparent, and does not mature at a much lower temperature. The color of a transparent enamel varies also with its thickness.

2) Mixing enamels.

Grinding or mixing two or more colors together does not produce a homogenous new color, but one with a speckled appearance. The specks are scarcely noticeable when the different colors are in the same value range, however, and indeed, even when the values are quite different the effect is not always unpleasant.

Consequently a number of the less intense colors needed were achieved by this means.

3) Effect of the speed of firing.

The exact hue of some of the opaques, light blues, light greens, and grays especially depends upon the speed with which they are fired, being bluer and darker if fired slowly and lighter and greener (or grayer) if fired rapidly. In the case of any of the transparents fired directly over copper the speed with which fusion is effected has a bearing on the specific hue which results. Heating causes the copper to darken rapidly, so to obtain the clearest, lightest color the enamel must be fused to the surface quickly while the copper is still bright. However some very rich reds, oranges, red-browns and red-violets can be achieved by deliberately delaying the fusion.

4) Duration of firing after fusion.

Still another factor involved in the exact color obtained from a given enamel is the length of time a high temperature is maintained after fusion takes place. There is a great variation both within the transparents and within the opaques with regard to the amount

of heat that can be applied after fusion before the enamel either gathers up in droplets (crawls) or burns black. Opaque reds and yellows can be fired only long enough to produce a smooth surface as they quickly blacken at the edges. Some opaque violets, blues and greens become transparent and turn a deeper color under the influence of a long fire. Transparent reds become a deep ruby, but unless a close watch is kept they will suddenly crawl. Dark transparent green turns a deep yellow-green that in certain lights appears green gold. on the other hand light transparent greens can be kept very light and silvery appearing if the coat is thin, the heating rapid and the torch removed while the surface is still somewhat rough.

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