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Printmaking: a phenomenological art

Nancy Keehn

PRINTMAKING: A Phenomenological Art:

NANCY L. KEEHN

Candidate for the Master of Fine Arts

in the College of Fine and Applied Arts

of the Rochester Institute of Technology.

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L. Williams.

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INTRODUCTION

THESIS PROPOSAL:

I would like to investigate the uses of photography in printmaking and to design a set of intaglio plates, exhibiting some of these possibilities.

My research work for this Thesis will include the reading of photographic literature and technical manuals of both printmaking and photography, as well as visiting Kodak laboratories to observe their relevant work. I will also be taking "Independent Study" in photography and "Multi-media techniques".

I wish to concentrate on metal intaglio printmaking and for my Thesis Project to design three or four large color works, as a portfolio edition. These prints will exhibit some of the research and techniques described in the Thesis Report. They also will be used to illustrate the above report, should it be published in book form, as one of a series of manuals on printmaking techniques by R.I.T. graduate students.

PHOTOGRAPHY AND PRINTMAKING

The above proposal was intended to be fulfilled as part of an attempt to clarify for myself the position of photography - a "symbolic communication without syntax" as Ivins calls it - both in the history of printmaking and in relation conceptually to another printmaking method, namely that of intaglio.

This clarification is an attempt to make reference

to the main sequence of the historical development of print-
making. It brings into account the fact that printmaking,
or replication of images, was not just a Chinese or fifteenth
century European invention, but that the phenomenological
origins of modern printmaking were in prehistory. Phenomenology
is the study of direct experience, as distinct from a thing
itself or how it is known, and contemporary photography is
capable of presenting this quality of its images, just as
metal plates or wood blocks contain inherent material quali-
ties also.

   After 500 years of other uses for the woodcut and
the copper plate we are now back at the position of cavemen
searching out valid uses of new materials. Photography as
mentioned has it's place within this phenomenological approach,
both as a printmaking medium with film as it's matrix, and as
a photomechanical medium with a metal plate as it's matrix.
The camera's capacity for the documentation of reality may be
implemented compositionally in many ways, by juxtaposition
or by a serial sequence of several images, for instance. Of
all the possible structures, it is not only the above men-
tioned, however, or any intellectual relationships which are
only of interest, but also the organic qualities of a connec-
tion between the realities of photographed materials and
abstractly designed metal plates. In this media-mixing there
is presumably a tension which is created between two visually
close yet quite different qualities of direct physical

experience and design. It also represents a relationship
with the historic origins of printmaking.

Of necessity, in this thesis, much information has
been forfeited in order to maintain a clearer framework
over a vast period of printmaking time.

VIEWPOINT

When it is accepted that a print is a design on any material that can be made from any matrix that permits an identical design or designs to be reproduced from it, and the relevant historical facts are specified, then it becomes clear that the present print renaissance is actually a reversion to the phenomenological attitudes conceived in prehistory. Contemporary use of computer graphics, collaged shirts, vacuum forming and folded prints is part of this process and exploration. Photography is also a part of this renaissance not only because of it's informational or expressive capacity, but because of the viewer's phenomenological experience projected from it's images.

Printmaking is normally assumed to have started with the development of the woodcut in China. In Europe printmaking supposedly appeared about the start of the 15th century with the beginnings of mass literacy there. But various principles of printing were implemented and understood long before this, and evolved from the quality of the only materials available at the time.

From the 15th century to the present century printmaking has been considered mainly for communicating information or for reproduction. Since the reproduction of visual

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and verbal information is today mostly taken over by other techniques printmakers are released from these roles. This leaves them free to consider aesthetically the intrinsic values of each process and of any material.

Cavemen discovered the concept of replication on cave walls. The Sumerians and the Egyptians extended the use of it with clay, and the Chinese eventually used it for printing information with wood and paper. The original concepts of printmaking are replication and appropriate use of each material. Some artists now redirect their expression and experiments to this end. This paper attempts to plot the main incidents and links in this development from the original phenomenological stage to the present one.

I
BEGINNING CONCEPTS

PREHISTORY:

Several forms of printing existed in 25,000-18,000 B.C.
On the walls of the caves of Cougnac and Altamira are differ-
ing kinds of handprints from this period. It is not known
precisely how these prints were achieved any more than it is
known how contemporary paintings were applied. But it is
clear that in one case hands were dipped in paint (earth
pigments mixed with either fat, urine or honey) and then ap-
plied to the wall. This could be said to represent the letter-
press principle of printing from the surface of a matrix.
Some hands were printed in the negative, however, and pressed
against the cave wall to act as a stencil or a screen, while
pigment in either liquid or powder form was blown around the
fingers. In both cases either a right hand or a left was
the matrix. Sometimes one or two fingers are missing. Pos-
sibly they were folded under during printing for some symbolic
reason or had been lost altogether in an animal fight before-
hand. These are prints that in concept make use of the prin-
ciple of replication. Other techniques essential to later
printmaking, such as engraving or cutting designs into bone
or stone, were also developed then but not with any aim of
replication.

MESOPOTAMIAN MOLDS:

By the time of the first historical cultures in the valleys of the Tigris and the Euphrates, and in the valleys of the rivers Nile and Indus, replication of images was begun in another fashion, with other materials and for other purposes.

Trade relations developed extensively between certain of these regions in oil, wood, metal and many other commodities. Populations increased along the commuting rivers and land became a precious commodity to be passed from father to son and therefore to be protected legally. As the concept of ownership developed seals and small matrices were invented from which innumerable like images could be printed on clay or papyrus. These created permanent records of ownership. Stamped around the necks of oil jars for instance they established ownership. Deeds and private property could be marked in similar fashion.

SEALS were first devised by the Sumerians of the Jemdet Nasr and Uruk period about 3500-2800 B.C. There are examples in the Louvre of cylinder seals to be rolled along a surface and of stamp seals of the late fourth millenium and early third millenium B.C. Some seals were made before the invention of writing (3000 B.C. in Mesopotamia), and images or symbols were cut into hard materials such as stone, marble and gems, cast or engraved and tooled in metal to impress a softer substance such as wet clay, which was then

dried or baked with that form. Such imprints could act as legal evidence or as decoration (illustration A.).

The importance of clay is obvious in the development of the Mesopotamian civilisations. The scarcity of stone and wood for building led to the invention of bricks made from clay. At first molded by hand and sun dried they were later cast from molds during the Pre-Sargonid period in the early third millenium B.C. and finally baked. Some have indentations on one side and some have patterns stamped on them. Developed into standardised forms by molds, bricks became in concept prints.

According to contemporary burial practices, figurines representing ancestors and servants were required to be placed in tombs along with the deceased. These figurines were molded by hand during the Pre-Sargonid and Sargonid periods (Sargon 2340-2305 B.C.) but, possibly because the demand for them increased, the Neo-Sumerians (from the end of the Akkadian Dynasty in the 23rd century B.C. to the fall of the third Dynasty of Ur in the 20th century B.C.) invented molds for these figures. They introduced the concept of mass production, and each figurine could also be called a print in concept therefore. Most of the terra cotta plaques or figurines discovered are between 8" and 4 1/2" high. Very few molds have been discovered but the terra cotta plaques have been discovered "by the million" from the period up to the first Dynasty of Babylon, after which business slackened apparently[1] (illustration B.).

With the invention of seals the marking of ownership and the concept of private property became codifiable in law. With the invention of writing the course of history could be charted. Because of the marking of ownership, and because of writing, historical recording and all mass information became possible. In this way it can be seen how the concept of printing used so far for structure, belief and possession became incorporated into a proliferation of verbal communication and facts. It often lost sight in the process of some of printmaking's intrinsic qualities. The West has mainly understood printing to be for this purpose until the present century.

CHINA AND JAPAN:

To hew each stone, to mold each brick, or to carve every image or letter separately not only would be very time consuming but would cause each to be at least slightly different. All repeated hand drawn information was therefore likely to be inaccurate. Printing overcame such problems as each image is in principle the same from any given matrix. However, to utilise this specific quality, that of a reliable transference of information, required a material cheaper and more easily come by than stone, cloth, skin, wood or papyrus. Such a material did not exist until 105 A.D. in China.[2] Ts'ai Lun, who invented paper, first made it from rags though later the Chinese made it from mulberry, bark of trees, hemp, bamboo, rice and straw.[3] Paper is made from a macerated

substance, whereas papyrus from which our word "paper" comes, is a laminated material, made from stalks of reeds, and is not considered to be paper for this reason. One thousand years later paper was made in Europe for the first time. It was not until paper was invented that printing could truly be used as a disseminator of information. It was not until the need for mass information became established also that printing became necessary as a disseminator of information.

STONE:

This was the first matrix to be used for the spread of information, before the use of woodblocks and before the invention of movable type. As far back as the Chi'in Dynasty (221 B.C.-206 B.C.) it was the practice among the Chinese to carve inscriptions on stone tablets or directly onto rocks. In the year 175 A.D. the Emperor of the Eastern Han empire, Ling Ti, ordered the inscription of the seven Confucian classics to be erected in front of the Imperial Academy at Loyang. This was the first formal publication of the official texts of these writings. They became known as the "Stone Classics". Before the advent of printing calligraphy such as this was on display in metropolitan centers to be seen and copied by anyone. With the invention of paper in 105 A.D. it became possible to circulate accurate texts by taking rubbings from them and pilgrims would interrupt their journeys to take such rubbings.[4] In this way the edicts of the Chinese Emperors as well as literature and religion were

spread to the frontiers of the Empire. Rubbings also pre-
served for centuries the calligraphic style of the greatest
scholars. (Rubbings are better for this than most other
print methods for there is no need to reverse letters when
making the matrix). The earliest rubbing that exists today
dates from the 7th century A.D., but according to historians
it is possible that the art's origins were about 300 B.C.
(illustration C). However, the use of the rubbing technique
was certainly coincidental with the intellectual growth and
artistic development of China and was doubtless instrumental
in her great expansion during the Han period (206 B.C.-
220 A.D.).

WOOD:

Wood block printing was, according to some sources,
well established in the period between the fall of the Han
Dynasty in 220 A.D. and 819 A.D. (after which Buddhist perse-
cutions occurred until 845 A.D.

Around 1907 Pelliot and Aurel Stein discovered a
group of one volume woodcuts that were mass-produced during
the Tang period (618-907 A.D.) as copies of religious paint-
ings. Aurel Stein also discovered, in "The Caves of the
Thousand Buddhas" near Tunhuang in Kansu Province, a Buddhist
text called "The Diamond Sutra" (illustration D). This is
considered to be the world's earliest extant printed book or
roll. It was printed in 686 A.D. by Wang Chieh. The earliest
dated wood block print apart from this is a Buddhist charm of

770 A.D. and a printed notice of 594 A.D. which states "Beware of the Dog." The year 594 A.D. is the legendary Chinese date for the invention of printing from a negative surface. There is however, a description of Taoist rites which was included in a history of the Sui Dynasty (589-618 A.D.) which says "The priest makes charms out of wood by engraving them with constellations, the sun and the moon. Then grasping them in their hand and holding their breath they make the imprints. Many invalids have been cured." This not only suggests an earlier date for the printing from a negative surface, but a stamping technique for printing.

There is some possibility that printing was not a Chinese invention, but came instead from India, Central Asia or even Tibet. However printing developed faster where literacy was more common, which was China, where it was per-petuated by the need for textbooks by the Civil Service. Oral and unorganized exams had been used since the Han period for the Civil Service, but systematic exams were begun in the Sui period of 589-618 A.D. and were stabilised during the Thang period of 618-907 A.D.

Another impetus to the invention of woodblock print-ing was, according to Needham, the advent of Thang Buddhism in China. Buddhism was taken to China during the 2nd or 3rd centuries B.C. from India, where it had developed during the 5th and 6th centuries B.C. It used an unending repetition of sacred names, sutras, pictures of Bodhisattvas and Holy

Ejaculations and a quicker method than stone carving and rubbings was doubtless needed to cope with this need. In this way, by the 8th century A.D. printing was widespread in China and expertly done there.

Though the Chinese are reputed to have invented paper, wood block printing and later, in the 11th century, movable type too (1041-49 A.D.) it was apparently due to an epidemic of smallpox in Japan in the year 735 A.D., or to the revolution that occurred after it in 764, that the first (extant) text printing took place. Whatever the reason the Empress Shotoku of Japan ordered 116 priests to her court to drive out the demons and also ordered the printing of one million paper prayers or "dharanis", which were distributed to various temples where each prayer was enshrined in its own small three storey pagoda. A Japanese scholar called Kibi-no-Mabi, trained in culturally superior China for twenty years, became the tutor of the Empress and it was under his lead that the first wood block text printing was carried out in Japan. Some authorities have suggested that copper plates were used and others consider that the blocks were made by pouring metal into molds of clay, while still others think that stone was used as the matrix. The Nara period (mid 7th century-end of 8th century A.D.) in Japan, especially the 8th century, was the golden age of Japanese Buddhist art. It was dominated by Chinese thought of the Tang period.

By 1330 two-color printing and embossing from

multiple blocks had developed in China, samples of which
reached Japan, and by 1590 full polychrome printing was known
there though registry was poor at that time. Not until 1482
was printing in color from multiple blocks attempted in
Europe by Ratdolt.

FOOTNOTES

1. André Parrot, _Sumer_. New York: Golden Press, 1961.
   André Parrot, _The Arts of Assyria_. New York: Golden Press, 1961.

2. Unfortunately the invention of woodblock printing and movable type occurred several hundred years after the invention of paper in China. Consequently many manuscripts written on fragile paper instead of skins for example will have been lost or have disintegrated. The same thing did not occur in Europe, where the two inventions coincided at the same time.

3. Joseph Needham, _Science and Civilisation in China_. London: Bentley House, 1954.

4. "Rubbings" is a comparatively recent term for what was known as "Ta-pen" or ink squeeze. It is a distinctive form of Chinese art. Though "Rubbing" became popular throughout the Far East, it never even in Japan achieved the popularity and use it had in China.

   The "Rubbing" technique was used frequently to take prints from the Chinese figurative stone reliefs, for which the finest periods were the HAN (206 B.C.-220 A.D.), the WEI (265-420 A.D.) and the TANG (618-907 A.D.) all of which developed stylistically from the art of the Steppes. For the technique of making "Rubbings", see Appendix 1.

II

EUROPEAN PRINTMAKING MATERIALS OF THE
FOURTEENTH AND FIFTEENTH CENTURIES

A. WOODCUT:

As in the East there was already an obscure history
of printing in Europe on cloth and leather that prepared the
way for the development of printing on paper when it arrived.

Printing was first introduced into Europe by caravan
traders and by Christian missionaries, and because it arrived
in Europe before paper mills started and before paper was
readily available the technique of wood cutting was first
used for printing on fabrics. It was not till the end of
the 14th century that the manufacture of paper in Europe per-
mitted the cheap production of prints there. The first known
mill in Europe was at Xativa near Valencia in Spain. It was
Italy, however, that became the most important source of
supply for paper in Europe throughout the 14th century with
its first mill at Fabriano in east central Italy. This mill
was established in 1276.

First Uses:

The oldest extant European woodcut "Le Bois Protat"
is dated 1370-90 (illustration E) and is an example of the
early application of woodcuts for FABRIC PRINTING.[1] The

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block was found in 1898 in a monastery in eastern Europe
which was being demolished. It has been cut on both sides
but only on one side has it lasted well enough to print from.
The style of the armour on the figures is Burgundian, and
since the size of the complete scene measured at least two
feet square - larger than any medieval paper - the block
must have been used to print a BANNER,[1] (for instance the
size of the paper used by Caxton in the mid-15th century was
15 3/4" X 22") or an altar hanging. From the second half of
the 14th century there are occasional examples of woodcuts
that correspond more nearly to the early woodcuts on paper.
One of the most important of these is the "Sion textile" of
the second half of the 14th century, but opinion is divided
as to where it comes from - France in the Avignon area, or
northern Italy. In Europe as in the East small blocks were
used for STAMPING, and preceeded the printing from blocks by
the press probably. Royalty made use of stamps for SIGNATURES
from the time of Charlemagne if not before (8th century A.D.).

In 600 A.D. paper was first made outside China, in Korea.
It was then taken to Japan in 610 by a Buddhist monk. In a
westerly route the craft of making paper travelled via The
Old Silk Route through Tunhuang and Samarkand in 751 A.D.
This was the year of a battle on the banks of the river
Tharaz in Turkestan, from which some Chinese prisoners were
left behind. They happened to be paper makers by trade.
From Samarkand the craft spread to Baghdad, Egypt and Morocco.

From Morocco it travelled with the Arabs to Spain in 1100 and from there to France by 1151, Italy by 1275, and to Germany and England in 1495, Scandinavia in the 17th century and to U.S.A. in 1690. Papermaking was at first distrusted in Europe because it was introduced by Jews and Arabs and it therefore suggested the Moslem invasions. Paper only became plentiful in Europe around 1400.

On paper FLOCK PRINTS[1] were made especially for children. They had the appearance of velvet. The block was inked with glue, printed and then dusted with a fluffy minced wool. Some of these flock prints have survived on paper and have been found pasted on the inside of book covers or the inside of a cabinet. For book covers the designs for both covers and spine were printed from a single block. As paper became generally used and accepted by the European cloth printers, woodcuts were frequently pasted inside deed boxes, which lawyers and merchants used to keep documents in. Some travellers pasted or sewed them inside clothes as amulets for personal safety, or they may have been pasted onto the BACKS OF CHOIR STALLS[1] or doors and later on used as CEILING AND WALL DECORATION.[1]

In Ulm a declaration of property was made in 1430. It listed "WOODBLOCKS FOR PLAYING CARDS AND SAINTS".[1] This probably indicates the most important and earliest uses for printed pictures. Playing cards seem to have been the leader in the field however. An incident in the life of St.

Bernardino of Sienna is thought to bear the theory out although it occurred in 1423. The saint is said to have preached so eloquently against gambling cards that a manufacturer asked "How shall I earn my living?" The saint replied to this by drawing the sacred monogram on a piece of paper saying, "Make pictures like this."

Cards for playing were probably invented by the Europeans and emerged by the mid 1300s. In the 1400s cheap woodcut cards were made for the masses, while engraved ones were for the élite or middle classes. Cards, like musical notation, had to be quickly recognised and consequently the forms of these early, especially the woodcut, figures were simple and standardised. Since the Italians made paper a century before the Germans it might be expected that they should be the first to print woodcuts. If this were so none has survived and Northern Europe led the way. There are no playing cards printed from woodblocks that have survived from earlier than 1460 but the word "paiter" or maker of playing cards occurs in German documents from 1402 onwards.

Woodcutters had no guilds of their own in the early Middle Ages. They were originally grouped with the larger class of carpenters. This class was fairly low in the social and educational scale and their position was often insecure due to fluctuating religious beliefs of the period. The word "formschneider" or cutter of forms or blocks does not occur in documents until 1398.

Alternatively there are reasons for believing that religion was the first to utilize printing for the reproduction of images. It is known that when the Popes were in Avignon between 1309 and 1376 they diverted pilgrims from Rome by the granting of indulgences to northern shrines. These shrines sold enough holy pictures to establish the woodcut as a medieval industry and perhaps to cause its major development to occur in the north. The citadel of Nuremberg, for instance, preserved the lance-head that was supposed to have pierced Christ's side. This was the Emperor of Germany's most treasured and sacred possession, and pilgrims were sold woodcuts of the sacred heart which had supposedly been stabbed by the lance. This particular print was made on vellum so that it would last longer as an amulet for health purposes. Most holy pictures have disappeared, however. Some were printed on linen to bind wounds and sores and some were pinned to shrouds to help the dead in purgatory and others were pasted on wafers to be swallowed by sick men and cattle.

In 1520 Martin Luther complained of monasteries that were deserted except for a single friar "who sits all day in the church to sell souvenirs and little pictures to the pilgrims". Nevertheless illustrations in early books and prints on cards and indulgences gradually prepared the north European to read.

Early woodcut illustrations, especially in Northern Europe like the early single sheet prints, were often daubed

carelessly with color.[2] Especially, the single sheet wood-
cuts seem to have been made for a very simple people, and the
identification of personages in them was often accomplished
by the use of respective symbols or attributes. Different
saints would often have identical bodies clothes and acces-
sories but interchangeable heads. These methods were also
printers' shortcuts in book production. They used varying
wooden plugs and inserted them appropriately to adapt blocks
to other subject matter. Most of these early woodcuts were
made of pear wood, beech and sometimes of boxwood.

Prints possible to date precisely are so few in num-
ber up until 1460, and of such diverse characteristics, that
it is impossible to form any integrated series. After 1460
the history of the woodcut is known by a whole series of close-
ly dated documents and prints.

B. THE BOOK:

It is assumed that in the 1440s movable type was used
in Europe for the first time.[3] This is the time that
GUTENBERG (born 1394-99 and died 1468) began to experiment
with such printing in Strasbourg where he was a political
refugee from Mainz. He was not the only one working with the
idea. In Avignon, Bruges, and Bologna other people were also
engaged in methods of producing an "artificial script". The
multiplication of texts had become a lucrative trade for
scribes by Gutenberg's time and the need for printed books
was obvious. Books had been printed before his time in any

case by block-book.[4] However Gutenberg perfected his inven-
tion in 1450 in time to exploit it commercially, and his "42
line Bible" (the only work that can be with certainty
attributed to him) was set up from 1452 and published before
1456 from movable type.[5]

Gutenberg's main invention lies not in his invention
of movable type but rather in his synthesis of all the dif-
ferent trends, needs and techniques already known at his time:
Goldsmiths had always cut punches (Gutenberg's father was a
goldsmith) from metal, the wine press was already invented,
and so was paper. By applying the principle of replica cast-
ing, he overcame the problem of innumerable letters which
were required for even one page of type. Letters could be
cast and recast exactly alike by pouring molten lead into an
intaglio form or matrix ("female die"). This is one of the
two genuine inventions that he made. The second was the pre-
paration of an ink that would adhere well to metal.

Before 1501 few books were printed in editions
larger than one thousand copies. This was the same as some
handwritten manuscripts were editioned. After this began a
proliferation of information books, herbals, almanacs "Bibles
of the Poor" and "The Arts of Dying" as well as novels, and
these began to direct the way of printing (See Appendix 2).
In 1462 the Sack of Mainz scattered young printers who had
been trained by Gutenberg around Europe. Meanwhile Gunther
Zainer (died 1478) in Augsburg began the first mass produc-
tion of books in 1468.

After 1462 Germans made a great concentration of presses in northern Italy. Among the refugees was the son of an Augsburg sculptor, Ratdolt. He made the first sheet of type specimens printed in gold, probably the first metal casts of woodblocks and the first modern title page. More important, however, were his first pictures printed in three colors. While in Venice, Ratdolt saw liturgical texts being printed in black and red through stencils. He took the next technical step in 1482 and printed the phases of the moon from three separate woodblocks in black, red and yellow. After mastering the art of color registration in Venice, Ratdolt was summoned home by the Bishop of Augsburg to modernise German church printing. His first real color print imitates a Gothic painted woodcut, by overprinting patches of printed red, olive and yellow with a complete design in black lines. This book's success in 1487 established Augsburg as Germany's center for printing in color and for expensive church books. Some 15th century prints were printed in black and colored by stencilling.

In the 1490s, as well as in Augsburg and Ulm, there burst out a widespread production of fine woodcut illustrations and printing in Florence, Milan, Paris, Nuremberg, Basel, Lubeck and Venice. Book printing stimulated the development of printmaking but the intrinsic quality of the woodcut was not long to survive because due to work pressures a division of labour began to occur. In the 16th century artists began

to draw their designs on paper which was then stuck onto the block and cut by "formschneiders" or cutters of pattern blocks. These craftsmen were asked to cut around pen lines and create tonal values achieved by other mediums. By 1550 the woodcut had reached it's limits of minuteness of detail on account of the coarseness of the paper and the method of inking (which was by large leather balls charged with ink). A few 15th century books were illustrated with engravings, but mainly woodcuts were used. About 1550 more and more books began to contain etchings or engravings, presumably because greater detail could be obtained and printed without limitations from the paper and ink, though the copper plate yielded smaller editions than wood did. By the 1600s pictorial woodcuts were only to be found in small elegant books, in chap books and broadsheets for the peasants, and artist's single sheet woodcuts. They were not to be revived from the end of the 16th century until 1860 when Millet cut his first long grain block and when, a little later, Gaugin inspired others to use the woodcut as an art form.

C. THE ENGRAVING OF METAL:

Though woodcuts were made before engravings were printed, by the mid century both were practised widely, and before the end of the century etchings were also made in south Germany.

Woodcuts are examples of relief printing for the most part while engraving is mainly a method of intaglio printing

as also is etching. Its origins are obscured by antiquity as
are those of the woodcut and all other techniques of print-
making except those of lithography. While the woodcutters
were originally taken from the carpenters' guilds, a class of
artisans, the metal engravers, were a part of the goldsmiths'
guilds. Socially they were very different, and goldsmiths
were given artistic training during apprenticeship. Engrav-
ing was used on metal dishes, jewellry and armour among other
things. As a technique it goes a long way back into history
and until about 1430, before printing from them occurred, it
was customary either to leave the lines open or to fill them
with another metal.

It is not known how the idea of taking prints from
metal first started. Giorgio VASARI (1511-74) attributed the
discovery of this use to a Florentine goldsmith, Maso
FINIGUERRA, Who was working around 1449 (illustration F).
Small engraved silver plates known as "nielli" were filled
with a black substance (nigellum)[6] and polished so that the
design showed black against a bright silver ground. It is
from these plates, it is thought, that engraved prints were
first made.

Despite these developments in Italy, and despite
Vasari's claims, there is proof that engraving for prints was
first practised north of the Alps. The earliest known engraver
called "THE MASTER OF THE PLAYING CARDS" is thought to have
been Swiss or south German in origin and to have been working

from about 1430-1450. Besides printing religious subjects
he also made a set of playing cards now mostly in Dresden or
Paris.

The earliest date on an Italian engraved print is
1461. Most of the early metal prints from Italy, including
those that seem to date from a few years before the mid 15th
century, were the production of Florence, which was the
center of the goldsmiths trade and craft. There, from the
techniques of the nielli workers, the "Fine Manner" of engrav-
ing developed and was dominant until 1470 to 1475. This
manner consisted of fine lines cut close together and irregu-
larly crosshatched. After that time the alternate engraving
style of Florence developed "The Broad Manner", which con-
sisted of open parallel slanted shading, often with a light
return stroke between the lines. It gave more the impression
of a pen drawing than "The Fine Manner", and must have
developed from other workshops - from the copying of silver-
point drawings it has been suggested. POLLAIUOLO'S famous
engraving "The Battle of the Naked Men" of the late 1460s is
tooled in the "Broad Manner".

Prints by "The Master of the Playing Cards" are re-
ferred to in manuscripts of 1446. It is possible that they
are earlier however than the earliest known dated intaglio
print of 1446, "The Flagellation", from a Passion series in
the Berlin Print Room by "THE MASTER OF THE YEAR 1446".
These earliest engravers had no systematic way of shading or

laying their lines. As trained draughtsmen began to use the print mediums their styles became influential.

The technical advances made by "The Master of the Playing Cards" were mainly developed by "THE MASTER E.S.". He is the earliest engraver to sign his work - in 1466. His home was in Strasbourg or nearby and it is possible that he served his apprenticeship at Basle as a goldsmith, or on the Upper Rhine where "The Master of The Playing Cards" had his school. His most ambitious work is "The Madonna of Einsiedeln". It was probably sold as memorial prints to pilgrims at that place.

Martin SCHONGAUER, (1445-91) the first German engraver known to have been more of a painter than a goldsmith, was probably a pupil of "The Master E.S.". Colmar, where he lived, is not far from Strasbourg. The first northern engravers worked on copper, mainly, and with tentative strokes, but "The Master E.S." started to vary his burin strokes and Martin Schongauer organised a basic rhythm of lines including long curves as well as cross hatching, which could only have been produced with the help of a hard leather pillow to pivot a copper plate on while keeping the burin hand steady. Schongauer could be called the first virtuoso engraver. He assimilated the painting techniques of Flanders and Rogier VAN DER WEYDEN, and he began to draw people and furniture convincingly situated in their relative spaces. His techniques had a wide influence on the pen drawings of GHIRLANDAIO in

Florence and on MICHELANGELO, who copied his print "The

Bedevilling of St. Anthony", when young. The "Master E.S."

had engraved all subjects but Schongauer really specialised

in saints and in the New Testament.

Printing was pioneered in Italy mainly by immigrant

northerners about 1465 but the art of engraving, though pos-

sibly suggested by Flemish or German work, developed indi-

vidually there, and it was not until several decades after

its inception that the northerners influenced the engravers

of Italy much. Especially until 1470 the Italian printers did

not possess the technical proficiency of the others. But

while the northerners used prints mainly for devotional work,

the output from the south was a lot wider in scope, composi-

tion and subject matter. From the beginning and contrary to

the north of Europe, painters had dominated printing in

Italy and this caused different styles to develop in their

respective works. The Italians spent most of their time on

outlines and their shading was mainly a rapid way of produc-

ing an added sense of three dimensionality. The Germans, on

the other hand, went in for mechanical neatness in their

shading and tried to combine all sorts of information and

local detail. POLLAIUOLO and MANTEGNA drew firm careful out-

lines and shaded by means of parallel lines tilted from

right to left without regard for the direction of the outlines.

This gave a flat wash effect to their work whereas the German

artists such as "The Master E.S.", Schongauer and Dürer drew

and shaded with lines that had a tendency to follow the shapes. They hated any pictorial vacuum and felt the honest workman should fill his plate from corner to corner. The great Italians saw something the Germans never discovered, that space was the relation between the objects. Neither the Italians nor the Northerners habitually scraped the burr from their lines. This gave an added richness to the early prints.

Paintings were copied and reproduced by printmaking in the late 15th century, mostly by a few Italians. VAN MECKENEM and F.V.B. seem to have been the only non-Italians at that time to do so. Also the art of engraving was used by several great Italians who possibly felt that by its means their work could travel where their paintings could not. Mantegna's engravings exerted a great influence, being the first important Italian works of art to cross the Alps (illustration G). They were collected by artists such as Rembrandt, Ribera and Dürer. His paintings had only a local effect at that time. Mantegna (1431-1506) established the painters dominance over Italian printmaking. He forced his hired professional engravers to unlearn their craft conventions in order to use the graver like a quill and to work in the "Broad Manner". Professionals tended to work the whole plate but Mantegna reserved areas of space to contrast with packed areas of visual energy. By these means Mantegna raised the craft of printmaking to an art. He was also one of the first

to use printmaking as a means of reproducing work from other mediums, while the northerners, for the most part, developed the techniques of printing to impart information. BOTTICELLI (1444-1510) as Mantegna was influential on Italian printing. His illustrations for "The Divine Comedy" were perhaps the first attempts to use copper engravings instead of woodcuts to illustrate a book. By mounting them on wood they would be made type high and so printed at the same time as the text. By the 1490s, after all this development and after Florentine engraving had somewhat acquired a personality, it was disrupted by Dürer from the north.

D. DRYPOINT:

This technique is an extension of the engraving process. It was first used by "THE MASTER OF THE AMSTERDAM CABINET" (or "The Master of the Housebook"), probably in 1480 (illustration H). Drypoint was not a commercial proposition, and was infrequently used therefore, especially on lead as his are. In 1857 electroplating developed and the vulnerable surface and burr could be protected to permit reasonable editions to be pulled.

E. ETCHING:

This metal technique was conceivably brought back by the Crusaders from the East. The name "etching" comes from the German word "aetzung" meaning biting, or from the dutch word "etsen" to eat. Gothic armour was originally covered

with oil paint and the bare steel around the paint pattern often rusted down. Perhaps, noticing this, armourers after 1400 began to decorate swords and armour by scratching a wax coating with designs. After applying sal ammoniac, vinegar and vitriol for three to four days to the bare metal revealed by these scratches, a design was etched in the iron plates. A second course was also available to the armourer, that of painting the design onto the armour with a protective medium while leaving the background to be etched away. That there is a strong link between etched prints on paper and the etching on armour is suggested by the fact that most early etchings were on iron, and also that the signature of at least one etcher known for his prints, DANIEL HOPFER of Augsburg (14?-1536), appears on armour.[7/8] He worked on iron as armourers did and is probably the earliest worker in the medium of etching for prints whose work has survived. The practice of taking impressions from etched plates may possibly go back to the last few years of the 15th century. However there is no authenticated date for an etching earlier than 1513. This is the year given to Urs GRAF'S "Girl bathing her feet" of which the only known impression is in Basle. Dürer also made five of the earliest dated etchings on iron between 1515 and 1518. One of these is "The Canon" of 1518, but he disliked the coarseness of the material.

The use of acids goes back to the development of alchemy in Alexandria.[9] Acids such as nitric were capable of

being produced only in very small quantities until the 18th century,[10] and artists used other concoctions to bite their plates. Most early etchings were made, as mentioned, on iron. The first artist to use copper to etch on was LUCAS van LEYDEN (1493-1533). His work in etching was done in about 1520 and he sometimes combined it with engraving. Lucas copied Dürer's woodcut of Maximilian 1 very soon after the latter's death so that it was on sale while his death was still news. It also incidentally, initiated the concept of picture journalism at the same time.

Lucas used to rapidly etch most of his plate and re-serve the graver for the head and hands. By using copper he managed to etch lines neat enough to blend with the engraved additions. Etching was quicker than engraving and this mixed technique was to become standard practice later for copperplate work. After 1700 all so-called engravings were really etchings touched up with the graver to smooth transi-tions. In the 18th century etching was practically abandoned to return about 1873 with a renewed interest in mediums and originality.

Before the end of the 15th century, then, the use of printmaking to copy work from other mediums was started. Some of the inevitable misuses of the materials of printmaking though not yet obvious, which were to be accentuated in the following centuries, were thereby instituted.

FOOTNOTES

1. Arthur M. Hind, An Introduction to a History of Woodcut.
   Vol. 1. 2 vols. New York: Dover Publications, 1963.

2. It is very probable that early prints were sold "penny
   plain and tuppence colored", as was the Nuremberg
   Chronicle of 1493.

3. S.H. Steinberg, Five Hundred Years of Printing. Middlesex,
   England: Penguin Books, 1966.

4. A block-book is printed from page sized woodblocks on which
   book text and illustrations are cut.

5. The "Edelstein" of Ulrich Boner, a book of popular tales
   decorated with woodcuts, was printed in 1461 by Ulrich
   Pfister at Bamberg. Pfister apparently had no connection
   with Gutenberg and his circle.

6. Nigellum, or powdered niello, is copper, silver, lead and
   sulphur laid on an engraved surface. It is then melted,
   cooled and hardened and finally polished, to shine out
   black against the background. It was known to the Romans
   and the Anglo-Saxons but was not much used till the 15th
   century.

7. Etched ornament on armour was derived from Italy where it
   appears on suits dating from the last quarter of the 15th
   century. The use of it spread from Italy to the famous
   armourers of Augsburg and Greenwich and became more intri-
   cate in the 16th century when tournaments became more amd
   more extravagant.

8. J.F. Hayward, Armour. London: H.M. Stationery Office, for
   The Victoria and Albert Museum, 1951.

9. At the end of the first century A.D. the study of alchemy
   arose among the Greek scholars in Alexandria and spread to
   the Eastern Mediterranean and especially Syria before the
   rise of Islam. "Alchemy" is an arab word, and the arabs
   took the knowledge of it from the Middle East to Spain,
   from where it travelled to Italy and Northern Europe,
   probably with the returning Crusaders. By the 16th century
   it was appreciated that alchemy was more useful for medical
   purposes than for obtaining gold. The Alchemists thought
   that gold was obtainable from base metals by heat and by
   acids used to separate them.

10. Nitric acid (aqua fortis) was made from vinegar or pyroligeous acid by 1650. Hydrochloric acid (aqua regia, or spirits of salts) was made soon after from sal ammoniac plus nitric, or from salt and alum, or salt and vitriol.

Acids were not made on a commercial scale until 1750 when sulphuric was also manufactured as well as glass bottles to store acid in.

The early etchers used, at first, the acids made for separating gold and silver, sulphuric, saltpetre and alum, distilled together.

A more controllable mixture described by Abraham Bosse replaced this mixture in the 17th century, and was probably the one used by Rembrandt, Seghers and Callot. It is an example of a boiled acid, and contains white vinegar, sal ammoniac, salt, verdigris (from the action of lees of wine on copper). This solution was poured over a plate continually. It is similar to Dutch Mordant in that both attack the metal without producing bubbles of gas.

COMMERCIAL DEVELOPMENTS AT THE END OF THE FIFTEENTH CENTURY

AND THE BEGINNING OF THE SIXTEENTH CENTURY

In 1490 forward-looking publishers opened up a new
market by publishing books to catch the general reader, the
way the Augsburg publishers had done in the 1470s and 1480s.
These opportunities led to the extension of the crafts of
printmaking and to the rise of several major artists, and to
a more literate public. DURER (1471-1528), the son of a
goldsmith of Hungarian origin, was apprenticed to Wolgemut
and was the first major producer of WOODCUTS.

Dürer had many print styles. He mastered the tech-
niques of wood-cut, engraving and etching and invented water-
color work. He in fact drew in every medium except red chalk.
Dürer completed the transformation started by Mantegna and
"The Master of The Amsterdam Cabinet", that of entirely free-
ing printmaking from its craft origins. After Dürer, print-
makers were trained as draughtsmen, not as workers in wood
or metal, and all the different kinds of print media fused
together under the leadership of painters for a short time.
Dürer's work developed at a time when the woodcut was just be-
ginning to stand on its own as a black and white picture with-
out coloring. His work made a tremendous advance on anything
previously done. It was able to incorporate the rounder

softer style of the Italians with the angular gothic style
of the north. The cutters of the period had become so skil-
ful that artists like Dürer took hardly any account of the
limitations of their craft, and drew on the blocks and cross-
hatched in a completely free way. They permitted, therefore,
Dürer's rhythmic organisation of lines of shading plus his
power of draughtsmanship to develop and be a great advance
on printwork that was just beginning to emerge from outlining
and shading with cursory diagonal strokes.

In 1495, after returning to Nuremberg from his first
trip to Italy, Dürer started cutting (by himself Panofsky be-
lieves) the sixteen blocks (based on the illustrations to
the "Quentell Bible" of 1479) for "The Apocalypse" issued in
1498 (illustration I). These were soon followed by a "Large
Passion" of twelve blocks and a "Life of the Virgin" of twenty
blocks. They were printed in 1511 on his own press. The
influence of these on the outside world can be seen by the
speed with which they were copied (by Marcantonio, for
example). A set of thirty six smaller woodcuts that Dürer
made in 1511 is known as the "Little Passion" and these also
were very widely copied.

Dürer's father being a goldsmith must have taught his
son his craft, and the first ENGRAVINGS attributed to Dürer
are placed as early as 1494. "The Four Witches" is the first
to bear a date, though, which is 1497. His work, especially
his early engraving work, shows the influence of Schongauer.

Of all his engravings three are referred to as his "master prints". These are "The Knight death and the devil" of 1513. "St. Jerome" of 1512 and "Melancholia" of 1514 (illustration J). These three have been classified as representing moral, scholastic and intellectual virtues respectively. The last contains a number of symbols relating to the Aristotelian theory that all superior men are subject to melancholy.

As LEONARDO (1452-1519) and GIORGIONE did in painting, Dürer in printmaking helped to precipitate the development chiaroscuro from the previous daylight scenes. But because each medium creates it's own style the linear web of Dürer's engravings is not the same as that of his etchings nor of his woodcuts. He used drypoint sometimes on his engravings but did not, as Mantegna did not, scrape off the burr always (eg. "The Promenade"). From this time on artists tired of Mantegna's and Schongauer's equivalents for various kinds of quill drawings, and the imitations of silverpoint drawings in the Florentine "Broad Manner". Light and shade, not merely to model form with, became important.

When Dürer went to Italy in 1505, it was supposedly to stop the piracy of some engravers such as Marcantonio RAIMONDI and Guilio CAMPAGNOLA, who had copied his designs. He appealed to the Signoria for protection in 1506 because Marcantonio had copied his "Life of the Virgin". (It has since been established that Dürer really had gone to Venice to paint an altarpiece for the German colony there). A

censure by the Signoria however did not deter Marcantonio
from copying "The Little Passion" and also to substitute his
own tablet in place of Dürer's monogram at the bottom of the
print, which the Signoria had forbidden him to use. Because
of all this, however, certain of Dürer's methods (for example
his translations of tonal qualities into lines, which avoided
the mere slanted or diagonal shading within a heavy outline
of the "Broad Manner") influenced Marcantonio a great deal
and through him passed on to all the following schools of
process engravers.

The breadth of Dürer's woodcut lines taught Marcan-
tonio how to indicate form without particularising textures,
and he also assimilated the work of Lucas van der Leyden.
From these influences his line became so clear that it could
surround a shape without drawing attention to itself as a
line. The French called Marcantonio's work "Interpretative
engraving" and he has been blamed for inaugurating the almost
completely interpretative role which line engraving now be-
gan to assume. He went to Florence from Venice and then on
to Rome where he made a fine engraving of "The death of
Lucretia" from a drawing by RAPHAEL. This, according to
Vasari, inspired Raphael to issue prints after his own de-
signs. The printing of these was entrusted to Il Baviera,
who had been employed by Raphael as a boy to mix colors.

MARCANTONIO was born in Bologna in 1480 and he died
in 1534. He was apprenticed to a goldsmith and painter

Francesco Francia, and he has been classed with Dürer and Lucas van der Leyden as one of the three greatest early engravers. He was not however an original artist, but rather the first of the "Interpretative engravers" who reduced line-engraving from an original form of art to a largely subordinate role . . . a means of reproducing the work of others. Marcantonio's[1] adaptation of northern engraving styles made his prints more comprehensible and therefore more influential for northern artists than Raphael's original drawings or paintings. The earlier copyist engravers who worked for Mantegna simply copied the pen lines of Mantegna. Raphael's drawings were a different matter however. His outlines were broken and within there was no close system of shading but they conveyed great volume. From his experience in copying Dürer, Marcantonio worked out a method of shading that represented the humps and hollows on a surface not by light falling across it nor by local texture, but by a kind of geographical survey type of drawing. From this developed the syntax or grammar used by all the following schools of process engravers. The German influence was in the laying of the lines and these lines interpreted the Italian sense of volume.

Marcantonio's almost anonymous crew of assistants perfected a system of collaboration that was practised until about 1875,[2] when reproductive engraving and printmaking began to give way to the cheaper and more accurate photomechanical processes. In fifteen years the shop produced about one

thousand engravings after Raphael, Romano, Del Sarto etc.,
projecting the Italian Renaissance into the rest of Europe.
Marcantonio's shop ran until the German and Spanish sack of
1527 when it scattered. The most individual of his assistants,
CARAGLIO, went as far as Poland. All of these printers and
apprentices carried with them Marcantonio's systems of engrav-
ing.

COMMERCIAL AND REPRODUCTION BUSINESSES DEVELOP IN THE SIXTEENTH
CENTURY:

After 1510 when trade with the Americas and the new
route to India round Africa swung commerce away from Venice
towards Antwerp, and following the success of Il Baviero in
publishing Marcantonio's engravings after other artists, a
number of people established similar businesses in Rome,
Antwerp and elsewhere. Such mannerist print designers as
HEEMSKERCK in Haarlem and SPRANGER (1546-1611) in Antwerp all
worked for print publishers such as LAFRERI in Rome and COCK
in Antwerp. These publishers and their hack engravers gave
the world all the visual information possible at that time.
In the process they also standardised engraving and the per-
formance of technique began to tyrannise over the creative
use of technique.

COCK (1510-1570) established his famous publishing
house at the sign of "The Four Winds" and employed a number
of engravers and artists. His publications after BOSCH and
Pieter BREUGHEL the Elder (1528-1569) are considered his chief

accomplishments. Cock trained several artists and engravers. Among them was Cornelius CORT (1530-1578). Cort continued the northern line-engraving tradition which had evolved through Master E.S. Schongauer, Dürer and Lucas of Leyden.

Many artists since Raphael and Mantegna saw the use of printing their paintings to sell and spread their influence. Not least among these were TITIAN (1477-1576), and he employed Cort, retrained him for his own purposes and lodged him in Venice in 1565 to engrave his paintings as advertisements for princely distribution. Cort affected print history by his amalgamation of the styles that he handed on to his pupils and followers, such as Goltzius, Villamena and Carracci.

Hendrik GOLTZIUS (1558-78) was the last of the professional engravers who drew with individual authority and the last to invent pictures for others to copy. His style survives today on dollar bills and his style of reproduction engraving flourished till the end of the nineteenth century for show pieces, when photography began to supplant reproduction printmaking (illustration K). He imitated the muscles of Michelangelo's work and those of antique marbles in Rome by developing a network of swelling lines. VILLAMENA was a direct pupil of Cort. He flowed lines in parallels in a style which was later to be developed by Charles MELLAN and the French engravers. Villamena also made the first heroic engravings of beggars (possibly because at that time Annibale CARRACI was drawing street criers). Villamena's work intro-

duced low life subjects to Rembrandt. In Italy, Cort's greatest follower was the engraver Agostino CARRACCI of Bologna. Most Italian printmakers however followed Parmigiano preferring to etch instead of engrave, and generally all over Europe engraving began to deteriorate as a craft. Etching was appreciated, a much quicker method than engraving. PARMIGIANO (1503-1540) was an experimenter. He had been obsessed with alchemy and had experimented with acids, being probably the first Italian to do so.[3] He was the first printmaker after 1500 to disregard Dürer's complexities, and was the first etcher of shadows. Parmigiano also combined etching with woodcut and he introduced the German color woodblock into Italy.

CALLOT (1592-1635) studied under some of Cort's pupils and then went to Rome to learn the hack engravers' routine there. He made two technical innovations that were to change printmaking on copper. One was to abandon the old hard etchers ground, which often flaked off to cause foul biting, and he adopted the lute maker's tough varnish with linseed oil instead. When this innovation turned etching into a more predictable method, he made his second innovation, that of inventing the échoppe. This was a steel cylinder honed to a slant at the end. By twisting this he could start a slim line which swelled in the way an engraved line swelled, and could suggest light and shade by it's swell. To give more tonal range Calliot also developed, though he probably did

not invent, repeated bitings to widen or deepen lines dis-
criminately. He drew beggars and cripples and war victims in
his famous mannered etchings which were consulted by Rembrandt
and all the Dutch. Abraham BOSSE was a follower of Callot
and lived at the same time that Rembrandt was working. In
1645 Bosse wrote a famous textbook on printmaking in which he
described the recipes and techniques of etching in the 17th
century, and some of the engraving methods also. He etched
plates on the scenes of Parisian life as his contemporary
Molière wrote about them, and he wrote that "the etchers chief
aim is to counterfeit engravings". Bosse used the graver as
a finishing tool to smooth off transitions between values.

RUBENS (1577-1640) was an astute business man. In-
spired by Titian and by the publishing houses, he saw the
great financial gain to be made by having engravings made of
his paintings to sell in large editions. Some of these
prints after his pictures are the work of outsiders working
for themselves, but a great many were published either by
Rubens himself or by firms in which he was a partner. He is
not known to have made more than one print actually himself.
After finding that the engravers he first employed from a
local Antwerp workshop were unfitted stylistically to copy
his kind of work, Rubens imported about a dozen Haarlem
engravers trained by Goltzius to cut more vigorous lines. He
retrained the pupils of this man to his style and changed his
own technique in grey and black to make his black and white

values clear for them. Not having steel facing available in the 17th century to preserve plates, the Rubens school worked out a linear arrangement of lines which would withstand long runs. Any painting of Rubens processed through this shop emerged to look alike, and through these prints Rubens' international influence was exercised.

Having entered the 17th century, then, with a great spate of virtuosity and the development of reproduction engraving, Mantegna, Raphael, Titian and Rubens were followed by VAN DYCK (1599-1641) and BAROCCI (1528-1612)[4] and influenced the development of French engraving and etching in BELLANGE (working 1602-1617) and CALLOT.

Pure engraving was not to return until the 1920s in Paris and then at first only for expressive open calligraphy.

FOOTNOTES

1. Painters such as Degas have appreciated Marcantonio's work
   for it's feeling of great calmness. Marcantonio's "Judge-
   ment of Paris", after a lost drawing by Raphael, has been
   copied or adapted in thirty four or more works of art, of
   which the most notorious is Manet's "Lunch on the Grass".

2. William M. Ivins, Jr. Prints and Visual Communication.
   Massachusetts: M.I.T. Press, 1953.

3. F.L. Wilder, How to Identify Old Prints. London: G. Bell
   and Sons Ltd., 1969.

4. They softened edges by running free parallels over their
   contours along with a powdering of dots, and in this way
   started to break down forms and the spaces between forms.

IV

TECHNIQUES FOR THE REPRESENTATION OF TONE

The 15th century had seen little in the way of tonal
values produced except that possibly Hopfer had rusted his
plates to achieve tone. In the 16th century, apart from the
use of stippling and lines on engravings to create value
change, Cranach and Ugo da Carpi had worked the "CHIAROSCURO
CUTS". These woodcuts were an attempt to suggest shade other
than by the use of line or stipple. They imitated the style
of Dürer and other northern masters at the commencement of
the 16th century. They also imitated contemporary drawings
made on tinted paper heightened with white or with gold.
Early German cuts were made from two or three blocks, one to
print the ground, usually green, blue or brown, with white
highlights cut out. A second block was for printing the
black outlines and a third sometimes for a stronger tint or
a white paste to which gold cust could be applied when damp.
The Italians used three or four blocks to print in grades of
the same color to imitate drawings made in the grisaille or
the cameo manner, styles used by Raphael, Parmigiano and
others. The inventor of the process was either LUCAS CRANACH,
1506 was the date of his first chiaroscuro cut, or JOST DE
NEGKER, whose first cut is dated 1508. Cranach worked for
the Elector of Saxony at Wittenberg and Negker was a chief

cutter or formschneider at Augsburg working under Peutinger
for the Emperor Maximilian 1. Though Vasari has claimed that
Ugo DA CARPI was the inventor of the "Chiaroscuro Cut"[1] this
is doubtful because his first cut is dated 1518. Ugo da
Carpi (1455-1523) obtained the patent from the Signoria in
Venice to work the Chiaroscuro Woodcut process, and consequent-
ly Vasari claimed that he was the inventor.

Even in the 17th century little consistent work was
applied to the development of the tone techniques. In some
of Rembrandt's etchings such as "The Entombment" of 1645 the
ink has not been cleanly wiped off the face of the plate.
Rembrandt used this method frequently for suggesting shadows.
However, Benedetto CASTIGLIONE (1616-1670), Rembrandt's
junior by ten years, is supposed to have invented the MONOTYPE,
so making Italy's only technical invention in the field of
printmaking. His invention may have been due to Rembrandt's
influence or it may have been an individual effort. Special-
ist printmakers have tended to be disgusted with this incon-
sistent method and no artist used it again till Degas made
over four hundred monotypes. TIEPOLO (1696-1770) etched in
a style based on Castiglione's Rembrandtesque works and he
was later to inspire PIRANESI (1720-1778) and GOYA (1746-
1828).

Seventeenth century artists and publishers were how-
ever interested in the depiction of shadows and the use of
chiaroscuro, and commercial printers therefore were obliged

to give some thought to the reproduction of tonal values. But other and quicker methods than crosshatching were needed to achieve this and to keep up with increased book publication also.

MEZZOTINT[2] was one of the first of these tone techniques to be invented. It was discovered about 1642 by VON SIEGEN and it became known as the "English Manner". KNELLER promoted the technique in England before it was promoted in it's hometown of Amsterdam. VON SIEGEN was a half German, half Spanish soldier, who was experimenting in Amsterdam while Rembrandt worked there. In 1642 von Siegen rolled a roulette over copper, wherever he wanted a roughness to catch the tone of ink. This was a form of localised mezzotint. But in 1657, PRINCE RUPERT, another soldier of the Palatinate perfected von Siegen's method by rocking a curved saw edge to roughen the whole plate. The whites were made by scraping off some of the prickles with a knife and then burnished. In 1660 Prince Rupert took the method to the court of his first cousin Charles 11 of England, where it became popular as "The Dark Manner". Mezzotint never became popular in Germany or Holland, nor in France, but in England it became the standard way of reproducing the tonal portraits. By the middle of the 19th century it had, as a method, become antiquated.

The 18th century brought out more tone and also texture techniques, for printers were interested in reproducing

values and creating shades quickly enough to keep pace with an increasing demand. THE CRAYON MANNER[2] was introduced by Jean FRANÇOIS in 1740, though others claim the invention. This method was intended to imitate the texture of pencil strokes for there was in 18th century France a great interest in framed drawings. By using a macehead, which was a kind of small club with irregular teeth, the artist would make grained strokes in an etching ground. Some of Boucher's red chalk drawings were reproduced this way. Watteau's red chalk drawings were likewise reproduced and were also accented with black. François is thought to have invented an aquatint process as well.

STIPPLE ENGRAVING[2] was a method infrequently used in the 16th century to suggest tone. It is basically the use of dots instead of lines to represent values, and was first attempted by Guilio CAMPAGNOLA in the early 1500s. It was later, in the 18th century, re-invented by the French but used more extensively by the British during the same century and during the 19th century. Today the technique is obsolete. The plate was pitted finely with tiny dots by a drum roulette through a wax ground. Then multiple needles were used for the finer gradations and the plate was finished with the engraving of tiny dots. It is a combination of etching and engraving techniques. One of the main exponents of the crayon and stipple methods was the Italian BARTOLOZZI (1727-1815). Like so many Italians of that period, he was attracted to

England at the time of George lll and much of his work was after the drawings of HOLBEIN and earlier GUERCINO. He also engraved official virtuoso portraits of the aristocracy.

A completely different method of achieving a textured line was also introduced early in the 18th century. SOFT GROUND ETCHING[2] sometimes looks very like the Crayon method. In this technique a soft ground is laid down, which has vaseline, axle grease or tallow added to a hard ground mixture, of asphaltum wax and rosin. A piece of paper or other material is then drawn through or impressed through the ground on this coated plate thereby leaving the plate open, in these textures, to be bitten by acid. The technique leaves an irregularity not possible with the roulette, and was invented to imitate pencil drawing, as was the "Crayon method".

AQUATINT[2] was the most used of these 18th century methods, and one of the few to be used by artists. Goya was the first major artist to use it. As the name implies it was invented to imitate wash drawings and water-color work. There are several variations of it, salt, sand, rosin and sulphur. Though JAN VAN DE VELDE had invented a form of aquatint in the 1650s, his process had been forgotten until Stapart's book on the process came out in 1773 and that of J.B. LE PRINCE in 1780. The latter revolutionised etching by publishing recipes for aquatint tones. It is also possible that the method was invented separately by ABBE ST. NON in 1770. St. Non belonged to the "picturesque" school working

in Italy and owed his success to artists who used aquatint to produce views for "Grand Tour" visitors. Le Prince's first aquatint pieces were made and exhibited in 1768 however. The medium creates a transparent effect not possible with mezzotint.

In the 1770s tone processes, mezzotint, aquatint, crayon and stipple engraving, were printed in color, usually after a plate was very worn. The printer would paint the plate in oily pigment with a dolly (or poupée). In the 18th century, also, printers sometimes used a different plate for each color.[4]

Before the invention of aquatint, another method with which aquatint is often used in conjunction was invented. Hercules SEGHERS[5] who was a contemporary of Rembrandt's invented a process using, it is thought, a bistre ink to lift through a varnish on a plate when soaked in water. In Segher's early prints there are many foul bites which he evidently tried to stop out with varnish. He was obviously interested in tone and wanted to achieve the effects of the Italian chiaroscuro woodcuts. Gradually this stopping out became less an act of covering the false bites than the development of a new technique, the "Lift Ground Process" or the "sugar lift process". Seghers was born approximately in 1589, and lived in Haarlem, Amsterdam and The Hague till his death in 1638.

The French Revolution of 1789 preceeded by the Ameri-

can Revolution in 1775-83 had meanwhile begun to change the
social structure of the world. In Germany another much
faster tone method than those just mentioned was being in-
vented. LITHOGRAPHY was invented in 1797 and was the last
tone technique to evolve. It was utilized in England and in
France more quickly than it was in Germany. THE INVENTION
OF LITHOGRAPHY in 1797 by SENEFELDER did two remarkable things.
It freed the original artist or draughtsman from the tyranny
of the reproductive engraving methods, and it enabled the
public for the first time to receive exactly repeated picto-
rial statements as the artist had drawn them. For this reason
and because of the speed of the new process, lithography was
used by such weekly magazines as "La Caricature" which pub-
lished Daumier's satires from 1832 on. Values of light and
shade could more quickly be achieved by lithographic methods
than by wood-engraving or by etching or engraving and drawings
in all their spontaneity could reach the press sooner. The
busy 18th and 19th centuries with their urge for reproductive
perfection and compulsion for speed, largely forgot the quali-
ties of each graphic process and the methods of lithography
and of wood-engraving (see Appendix 3) which also developed
at the end of the 18th century were furthered as reproductive
methods rather than as art methods, thereby furthering the
trend set in the 15th century. Lithography was developed as
an art medium in France however more than it was in any other
country at that time.

Senefelder was not the only one nor the first to be interested in the possibilities of "chemical printing" as it was called.[6] His compatriot Simon Schmid was an important co-discoverer of the technique. Stone plates were even etched but not printed centuries before his time. In the 16th century Solnhofen stones were etched for memorial slabs. The idea of "chemical printing", a method dependant on the rejection of grease by water, provides the link between the classic processes and the photolitho and offset printing of today. Senefelder usually called his process "Steindruckerie" or stone printing, but the word "lithography" first occurs in France and comes from the Greek for "stone", "drawing" or "writing". It is the only major process whose invention was described by its inventor.

Being too poor in the 1790s, in Munich, to pay for the publishing of his songs and plays, or even to buy copper to etch them himself, Senefelder had instead written in grease on paper and then pressed the greasy lines onto limestone which he soaked with water. It is thought that at this time, Senefelder was also writing on stone with an acid resistant ink and eating the rest of the stone down with acid. Blake had used the same concept with metal for his relief plates eg. "Songs of Innocence".[7] Etching a drawing on stone with dilute nitric actually opens the pores of the stone to permit grease from the crayon to reach further in and need not lower the level of the stone. The process when developed as

a planographic process changes the surface of the stone from a carbonate of lime (and absorbent of grease), to nitrate of lime (a grease repellent and hygroscopic surface). Throughout the whole procedure, the greasy crayon will receive the greasy ink and reject water, the opposite of its stone surround providing the stone is kept moist.

The technique of "chemical printing" spread from Munich as far as London in 1800-1, to Vienna in 1801, and Paris in 1802. In London, Senefelder studied the technique for seven months and with Philip André published "Specimens of Poly-autography" in 1803. To produce this volume Senefelder sent out stones to various artists with the necessary instructions for working on them. These are considered to be the first artists' lithographs ever created. The Philadelphian artist Benjamin WEST started the series in 1801 with the earliest dated lithograph by any artist still remembered. In 1804 CHALON added to the process by using chalk, pen and tusche was used before this and in 1827 Gottfried VON SCHADOW transposed drawings onto zinc plates and etched them in phosphoric acid. In 1892 Algraphy or the lithographic use of aluminium plates was patented in Mainz. GAUGUIN incidentally made his first print from this last material.

The officers who went to Munich with Napoleon's armies played a considerable part in introducing the process into France, where, in contrast to Germany and England it first attracted the attention of major artists such as INGRES (1780-

1867), DAVID and GROS. Between 1820 and 1830 a number of lithographs of artistic importance appeared in France. In England after the initial encouragements, the process had everything against it. British aquatinters had recently perfected their skill at the beginning of the 19th century and to protect their monopoly, a heavy duty was imposed on the import of Munich stones to squash the new technique.[8] Also RUSKIN was against it, he said as late as 1857 "Let no lithographic work come into your home if you can help it". Even in New York, Currier and Ives felt that they had to advertise their lithographs as engravings in order to sell them. Eventually in the 1840s, aquatint commercially gave way to the less expensive lithos and the 1860s lithography gave way to the cheaper wood-engravings and photographs, (Appendices 3 & 4).

Lithography's final flare up occurred in the last decade of the 19th century, when it was used for a short time as the simplest and easiest medium by which to reproduce advertising posters some of which were of enormous size. The great master of this episode was of course TOULOUSE LAUTREC (1864-1901).

The last print technique to evolve and the one which was to take all others from their pedestals in the history of communication and to bring about a reassessment of the role of art, was first conceived in 1727. A German chemist SCHULZE noticed that a bottle containing some liquid became purple

when exposed to the sun's rays. He traced this action to the presence of nitrate of silver in the liquid, and experiments on the subject were continued throughout the next century. It is interesting to note that aquatint was at this time being developed. Lithography was in it's early stages when WEDGE-WOOD in 1802 obtained an image from an exposed leaf, which he was unable to make permanent however. The experiments on the chemical action of light continued until NIEPCE, in 1826, invented the first photomechanical plate by means of a bitumen coating over a metal plate which became insoluble where it was exposed to the sun. This was not photography really but a light image had been made entirely permanent for the first time. Efforts persisted until the present stage of print-making by means of light and chemicals, had evolved. Even without going into details at this point it is clear that photography must bring with it a whole new range of visual possibilities in the photomechanical techniques as well as in those of paper prints and film, (See Appendix 3).

FOOTNOTES

1. Arthur M. Hind, An Introduction to a History of Woodcut. Vol. 1, 2 vols. New York: Dover Publications, 1963.

2. Arthur M. Hind, A History of Engraving and Etching. New York: Dover Publications, 1963.

3. Anthony Gross, Etching Engraving, & Intaglio Printing. London: Oxford University Press, 1970.

4. William M. Ivins, Jr. How Prints Look. Boston: Beacon Press, 1960.

5. Charles James Wright, "Hercules Seghers", Artists Proof. Prof. Fritz Eichenberg, ed. (1967), VII, pp. 92-97.

6. W. Weber, The History of Lithography, London: Thames and Hudson, 1964.

7. S.W. Hayter, New Ways of Gravure, London: Oxford University Press, 1966.

8. The leading landscapists of the time, Turner and Girtin, never worked on stone, they etched. Lawrence waited until the last weeks of his life before beginning his first and only litho.

V

THE EXPRESSIVE AND THE NON-COMMERCIAL

To the process engravers, to Rubens, Callot, Bosse and others, printmaking was a commercial undertaking, as it was for Titian. But for two other artists working in the first half of the 17th century, it was a self expression, with little concern for commercial considerations. While a good many prints of the Rembrandt-Seghers tradition are remembered, all but a very few from the Rubens-Callot-Bosse tradition have been forgotten except as technical interests.

Between 1573 and 1610, CARAVAGGIO's (1573-1610) cellar lit scenes from Rome and ELSHEIMER'S (1578-1610) small night landscapes from Frankfurt, had a considerable effect on artists via Goudt's engravings. Rembrandt and Claude Lorrain learned from these engravings which exhibited the longest black to white scale then known. Seghers was also affected, especially, by a little painting by Elsheimer, "Tobias and the Angel", engraved by GOUDT. He made a plate of it which Rembrandt eventually acquired and used as a point of departure in his drypoint "Flight into Egypt".

SEGHERS (1590-1638) was the only contemporary print-maker of Rembrandt's, with enough originality to interest Rembrandt. Unlike any contemporary, Rembrandt included,

Seghers drew with a pen in a sugar solution on bare copper. After coating the plate with etchers ground, he soaked it in water to dissolve the syrup and to expose the drawn lines. This is a "sugar lift" technique. He also pitted the lines with some form of aquatint process. It is possible that his seeming aquatints were obtained by either applying acid or other mordants to bare copper with a brush or feather, or by applying a slow gentle mordant such as a paste of oil and sulphur.[1] Seghers also sometimes printed on linen, apparently making offsets by pressing the cloth against a freshly printed etching on paper. His etchings were described as "printed paintings" and some were made with ink of one color on tinted paper. These are considered to be the first attempts at color printing from intaglio plates. There are sixty four plates attributed to Seghers, but lately some of them have been reassigned.

REMBRANDT[2] (1606-1669) as well as Seghers was very different from the Rubens, Callot and Bosse traditions. He was interested in neither any systematisation of shading nor longevity for his plates, nor was he interested in the use of printmaking to reproduce his paintings. Rembrandt did not use the mezzotint medium though he must have known of it's existence and possible use to him. Rembrandt did sometimes use a sulphur tint however and he achieved his tones by other and more translucent ways than the mezzotint process was capable of, such as wiping, drypoint and the use of the

graver. The purpose of his shading was to obtain light and dark areas and was not primarily to model form with.

In etching, outlines had already begun to be broken down by BAROCCI and by the CARAVAGGIO revolution in painting, and Rembrandt in the later stages of his plates used few outlines. He must have begun to etch in his late teens, for he was no novice by the age of twenty two, from which time there is a signed plate. The presence of two presses in his house when he died indicates how he explored etching as a third way of seeing, rather than as a way to imitate or reproduce drawings and paintings. He knew the work of Goudt, and of Seghers, but it is improbable that he knew the work of CASTIGLIONE his contemporary, who made the first monotypes. Yet, Rembrandt with his highly idiosyncratic plate making would sometimes vary a calm open etching by painting ink on the bare copper and not wiping it all off. This is partially a monoprint technique of which the "Entombment" (1654) is an example.

Rembrandt's work may be divided into three periods. In the first period (1628-1639), a pure etched line is the most common technique. There is a certain timidity in the work and carefulness such as in "Christ before Pilate" (1635/6) or in "Student at a table by candlelight", of the same period. By the end of this period, at the end of the thirties, Rembrandt began to explore etching more. He began to use drypoint a little and to pay increased attention to tone. By

1640 this was even more significant, though he still achieved his tones by means of close lines of shading. "The Entombment" of 1654 is an example of this second period. Hand wiping gradually became more relevant "Jan Six standing" (1647) belongs to this same time, and "The Hundred Guilder Print" of 1649 shows his ability in his early forties to control the high key areas of his work, in contrast to the equal areas of low keyed working by his blend of etching drypoint and wiping. By his third period, the lines of shading are more open. He uses drypoint in a freer fashion and shading is often left to the inking on the plate. "Christ presented to the people" of 1655 represents this final stage.

Before Rembrandt, etchers had relied almost entirely as had engravers, on a drawing done first. This method meant the exclusion of any spontaneous ideas inspired by the technique and led to little more than a reproduction. Rembrandt, however, etched in stages and developed and changed his compositions as proofs were taken. He was forty nine when he made his print "Christ presented to the people" after studying LUCAS VAN DER LEYDEN'S engraving from over a century before. Compositionally this latter print had an effect. In Lucas van der Leyden's time (1494-1533) miracle plays were still performed on platforms as wide as city squares and Rembrandt used this idea as a unifying structure for his print. He also used the methods used by Schongauer in his "Road to Calgary" to suggest tremendous crowds. This is evi-

dent in the first stages of this etching. By the seventh state, however, having realised that this surge of people cuts off the main subject, he burnished it out of the plate. In this way the presence of the main figures is made to feel more immediate. Rembrandt possessed one of the largest collections of prints in his time. Through the auction rooms came his knowledge and influences from Italian art, for he never visited Italy. Raphael's portrait of Castiglione and Raphael's impeccable sense of layout, from the reproductions of the Vatican tapestries by Ugo da Carpi, inspired Rembrandt, and Mantegna's work inspired him long after other artists had abandoned it in favour of Marcantonio's.

Frequently Rembrandt used an S curve in his composition especially in his low lying landscapes, like the drypoint "The Goldweighers Field" of 1651, or the earlier pure etching "Jan Six's Bridge" of 1645. This device was to push back the horizon and to suggest depth without resorting to the traditional stage wings, which Poussin, for instance, used regularly. Instead the Dutch bogs had been the origin of his ideas, with their horizontal lines and a marsh river which winds through the landscape. He used the S curve even when making a print with hills in it such as the "St Jerome" of 1653.

During his own lifetime Rembrandt had little influence outside a very small group around him. He had no ready made recipes for the use of others.

By 1824, as mentioned previously, there had come to the new process of lithography such artists as Ingres, Géricault and Delacroix. Daumier followed also though he was not considered to be of artistic calliber at that time.

GERICAULT (1791-1824) was the first major artist to lithograph, and in the last six years of his short life he produced about eighty such prints. He was one of the first artists to obtain a colorful textured effect with chalk lithography, a technique used since about 1817, but he hardly affected contemporary lithography at all. It was DELACROIX (1798-1863) who more affected lithography by giving it his prestige as an established painter. He became known as "the liberator of lithography". Like Géricault he evolved a looser style, in lithography, while making his first experiments with the medium as early as 1814. At the age of 25 Delacroix was drawing pale dry caricatures on stone. In the 1825s Goya's "Bullfights" appeared in Bordeaux, and by only three years later Delacroix had started the great French production of luxurious books, with lithographs by painters, when he illustrated Goethe's "Faust" (illustration L). This venture however lost so much money that Delacroix was never able to induce a publisher again to sponsor his lithographs on literary themes. For this reason no text accompanies his longest series, the sixteen lithographs for Hamlet. Delacroix's "Hamlet" series sold as badly as had his "Faust" series and Delacroix ended his print activity in about 1835.

Paris became the center of original lithography in
the nineteenth century. The medium was also used more and
more for it's quality of draughtsmanship and spontaneity to
illustrate such magazines as "La Caricature" and "Charivari"
and to provide on the minute description and comment of
political and everyday events. DAUMIER[3] exhibited this use
of the medium to publish 4000 lithographs for these magazines
in his lifetime. He condemned the system of favouritism
under Louis Philipe's rule, around the middle of the century.
Daumier's commercial attitude is quite different from that of
the reproductive lithographers or printmakers, however. He
never became a professional lithographer and made only one
reproductive print after another man's work in his life time.
He also never attempted to play the virtuoso with the medium,
and simply drew with the lithographic crayon on a stone while
giving no real thought to technical possibilities of the
medium.

Honoré Daumier was born in Marseilles, during the
Napoleonic Wars, on the 26th of February, 1808. He became a
"Gutter jumper" or a lawyer's errand boy. Eventually he
worked in Belliard's a lithographer of portraits. Daumier be-
gan by preparing others stones and then his own. But his
career began with the founding, by Charles Philipon and his
brother, of the illustrated journal "La Caricature", a week-
ly which began to import British freedom of the press into
France. In 1830 at the age of twenty two Daumier joined its

staff. Daumier found his real style by studying the structure
of Michelangelo's sculptures and those of the Ancient Romans
in the Louvre. His assignments however led him to his per-
sonal expression of these influences.

Two years before the end of "La Caricature" Philipon,
with great foresight, started a daily in which social satire
predominated over politics. He called it "Le Charivari"
after the serenade of pots and pans flung at the windows of
unpopular people. Each day one sheet came out folded into
four and when Daumier was thirty one he was contracted to
supply between one hundred and two hundred lithographs per
year for $10 a stone. At thirty five years of age his wages
were cut and at fifty two years he was dismissed because he
not chic enough. He was left to peddle his watercolours and
paintings around the streets of Paris. After three years,
when he was taken back on the daily journal, it's circulation
had increased, and his stones were jammed through the press
too quickly. This destroyed the greys and blacks of his
early shadings. He countered this treatment by adopting a
very rugged manner, which no printer could ruin, a manner
which he used in his paintings. He roughed out his masses by
smudging the stone here and there. On top he then drew the
lines wherever planes changed direction, in this way display-
ing the structure on top, instead of burying it underneath.
At sixty Daumier's eyes began to fail and his work became
even more open. All his elimination of non-essentials served

him well in 1870 when Charivari cut costs again by eliminating it's sheet fed press and hand inked stones, in favour of relief plates which could print the pictures along with the text. This kind of print was called a "Gillotype" after its invention in 1850 by Firmin Gillot. A fresh impression of a lithograph was pressed against a zinc plate to offset the ink onto the metal and dusted rosin stuck to the greasey ink, while acid bit down the unprotected metal around. Haphazard dots of metal were caused to stand up in relief and the gillo-type tended to disintegrate the greys of any delicate drawing. All of these pressures that speed and techniques inflicted onto Daumier caused him to produce drawings which suggested new styles and dramatic free composition to French painters from Manet to Vuillard. Themes from the café, the bus, train or theatre Daumier used and he sliced rooms and drew the backs of scenery on the stage. Degas and his followers were all to be influenced by this. Honoré Daumier died in 1879.

Throughout the early developments of lithography GOYA (1746-1828) was working first on etchings and then towards the end of his life on lithographs. Lithography had been introduced into Madrid in 1819 when the first lithography press was installed there, and Goya had settled in Madrid in his late twenties. The two series of etchings by Giovanni Battista TIEPOLO, the "Capricci" and the "Scherzi", were probably known there then, shortly after he had died in Madrid in 1770. They undoubtedly inspired Goya to etch his

own work, the tapestry cartoons. Goya maintained their
translucent style for the rest of his life, enriching it
gradually through the study of Rembrandt. In a pure Venetian
style he etched sixteen of Velasquez' paintings from the king's
collection, then little known, and he began his life long
study of VELASQUEZ. He painted tapestries and portraits until
illness and deafness overcame him at the age of forty six.
When he recovered he learned the new technique of aquatint,
to overlay on his eighteenth century lines. At the age of 53
he published the first long set of prints ever to be made in
Spain, the eighty "Caprichos".[4] These were published in
1799, and three hundred sets were printed. However Goya
withdrew them from the advertised sale[5] of 320 reales in
"Diario de Madrid" to sell to the King Charles IV in 1803, in
exchange for a pension for his son. Two hundred and forty
sets remained to be sold at this time. In the "Caprichos"
Goya disclaims any intent of certain personalities. He
merely chose subjects as examples of certain prejudices -
hypocracy and ecclesiasticism especially. His only other
large sets of prints were "The Disasters of War" of 1810-
1815 (eighty two plates) and "The Proverbs" of 1818 or "Dis-
parates" or "Follies" as Goya called them (eighteen plates).
The latter plates were only printed in proof form during his
lifetime and were first issued as sets, in 1863 and 1864 re-
spectively, after the death of Goya's son. The point of
Goya's satire is more obscure in these than in the "Caprichos",

and it is possible that Goya did not publish them because the "Tauromaquia" of 1816 had been a commercial failure, as had "The Caprichos". "The Caprichos" were the first of his works to reach the outside world, and were copied by Delacroix and French lithographers. His paintings stayed in Spain apart from a few lent to the Louvre in the 1840s and consequently were not the prime influence on the rest of Europe which his prints were. "The Caprichos" have always been his most popular work in any medium.

Goya's plates are almost all entirely bitten, and one called "Por que feu sensible" from the "Caprichos" of 1803 is entirely and successfully bitten in aquatint (illustration M). This is a feat as pure aquatint can be very deadening compositionally. Goya occasionally used drypoint to strengthen the etched lines, but consistently he used the combination of an aquatint with line. He stands as one of the greatest virtuosi of an art aquatint, which had only been introduced a few years before his lifetime. He no doubt chose aquatint for its translucency. Goya is thought to have used mezzotint, however, or a form of it on one plate called "El Coloso" (the giant). Though the ground is obviously not that of a rocker, it may have been laid by aquatint, or a sand ground. Possibly then it was worked on with a scraper and burnisher, as for a normal mezzotint. Aquatint is a less important factor in "The Disasters of War" than in any other of his series, and twenty eight of the plates are pure etching though they are

sometimes slightly worked with dry point. On the night of
May 2/3 1808, Madrid revolted against Napoleon's invasion.
For six years the Spaniards resisted and at last drove the
French out. Hostilities during this time meant few commis-
sions, and Goya etched the eighty "Disasters of War" named
in analogy with Callot's "Miseries of War". After the six
years of war had ended he produced his sequence of thirty
three aquatints, the "Bull Fights". From this experience of
war he also made his "El Colosa". Even as an intellectual
rebel and despite "The Caprichos" Goya reached the position
of chief painter to the Spanish court. He did not scruple
to maintain his position at the sacrifice of his loyalty
to the king, and on the invasion of Napoleon gave apparent
allegiance to Bonaparte in 1808. On the restoration in 1814,
Goya still kept his seat and though branded by Ferdinand VII
as "worthy of the garotte" he was nevertheless allowed to
keep his position as court painter. Not till ten years later
did he ask the king's permission to retire from Madrid, and
at the age of 78 Goya joined other exiles in Bordeaux where
he spent the last four years of his life.

In 1821 at the age of seventy five, Goya had tried
his hands at transfer lithography in Madrid, very soon after
the first litho press had been installed there. It was in
1825, however, at the age of 79 while in exile that he drew
his four large lithographs of Bull fights. He propped the
lithographic stone on an easel like a canvas, and scraped

and crayoned it in that position. These prints are some of the first lithographs of artistic merit, and they had a considerable effect on Delacroix and the subsequent development of lithography.

Like Rembrandt and Seghers, Goya is one of the artists to whom the artistic development of printmaking owes the most. He, like Rembrandt, was influenced by Italian artists, and also like Rembrandt, he was one of the few artists in history to use the printmaking techniques as mediums for major and individual expression, to be explored for their own natures.

FOOTNOTES

1. F.L. Wilder, How to Identify Old Prints. London: G. Bell and Sons Ltd. 1969.

2. K.G. Boon, Rembrandt, The Complete Etchings. London: Thames and Hudson, 1963.

3. Oliver W. Larkin, Daumier: Man of his Time. Boston: Beacon Press, 1968.

4. The word "Caprichos" refers to the goat (cabra) who scorns the huddle of sheep on the valley floor, to browse danger-ously on the cliffs. Goya's "Caprichos" comment on the ignorance of Spain's medaevalism then being revealed by the new ideas from France and England.

5. Madrid had no print shops at this time (Paris had 30) and Goya put them on sale in bound condition in the perfume and liquor store under his house. After four years only 27 sets were sold for an ounce of gold each. As an old man, Goya remembered that foreigners bought more than the Spaniards.

VI

THE REVIVAL OF PRINTMAKING

By adopting an overall view of history one can see a
gradual withdrawal of important artists from printmaking,
until only Goya is left. After 1800 in France a few creative
artists began to creep back to printmaking again, and gradual-
ly the realms of printmaking became a field for their expres-
sion, rather than an employment for their colleagues, the
process engravers. A certain difference had begun to become
clear, between printing used for pictorial expression and
printing used for pictorial communication of fact. It had
become evident that the process or reproductive engravers
who dealt with the latter were reporters of art and not makers
of it. This clarity of thought descended for certain ines-
capable reasons, and first became obvious in France. It
started with a mid-century revolt against the tyranny of the
traditional lozenge and dot of the line engravers led by
GAILLARD, for one. It started with the vogue for photography
which even as early as 1855 was exhibited in the Salons as an
art form, and it became clear that by 1890, in France, the
twentieth century had begun and that a renaissance of art and
printmaking had also begun. This renaissance was in the
hands of those artists who were interested in originality of
expression and in the use of any and often several techniques

to achieve this. The revival of printmaking, then, did not arise through the craft or specialist systems, though it implemented them naturally.

1. With the announcement of DAGUERRE'S techniques[1] in 1839 came the urgent concept of originality. Painting was thought to be at an end. The concept was initiated aesthetically when photography began to drive out other methods of reproduction. It's quality of quick accuracy in reporting, portraiture and for recording documents and works of art, caused artists and publishers alike to reconsider the purpose of painting. Drawing and painting maintained their places as a means of making abstractions but lost them as a means of representing reality. Not only the humble everyday artists who illustrated books and periodicals suffered, but artists like MEISSONIER who had built up pre-photographic reputations by their skill in representing details. Etchers like JACQUEMART, who had gained tremendous reputations in their renditions of the textures and sheens of materials and precious objects, were replaced by the camera's greater capacity for such reproduction. At first confusion reigned. Original etchers like SEYMOUR HADEN (1818-1910) and WHISTLER (1834-1903) who first introduced a reassessment of the function of the print and of originality, especially in etching, emulated the spontaneity of Rembrandt. Their prints were rejected by the Royal Academy while those of the reproductive steel engravers[2] were accepted and

enormous sums paid for their reproduction rights. HADEN and
WHISTLER followed the lead of the shrewd publisher CADART in
Paris, who first established the "Société des Aquafortistes"[3]
in his house in 1861, and who brought out an annual folio of
etchings by JONGKIND and MANET etc. They also followed the
example of BRACQUEMOND who in 1889 formed the "Société des
Peintres-Graveurs" to perpetuate original work versus the
copyist work of the reproductive engravers. In England,
Haden and Whistler inaugurated "The Society of the Painter-
etchers" and in 1883 fulminated on "The relative claims of
etching and engraving to rank as Fine Arts." Whistler con-
sidered that all mechanical processes and the methods of
GOUPIL'S engravers were heresy, and that only acid, the burin
and lithography were legitimate as original print media. Many
of his principles would still be considered valid among cer-
tain circles today.

Etching had virtually been abandoned by the last
quarter of the 18th century, but with the limited editions,[4]
the histrionics and the help of the press, in the middle of
the 19th century, a revival of original etching and printmak-
ing began to occur. It countered all the photographic and
mechanical methods of such artists as Gustave DORE,[5] as well
as the methods of Goupil's engravers. Gauguin (1848-1903) as
well as Haden and Whistler joined in swearing that wood-
engraving was losing it's special characteristics and becom-
ing every day "more like photogravure . . . detestable".

With the announcement of Daguerre's techniques came not only the considerations of what art really was and the pursuit of originality in printmaking and painting too, but the discovery of the specific uses and possibilities of photography itself.[6] Not only did NIEPCE initiate photo-mechanical printing (Appendix 4), but photographs themselves could be used as illustration and as art. The first book to be illustrated with photomechanical relief etchings, of drawings by VIERGE, was "Pablo de Segovie"[7] and was published in Paris in 1881. In 1844 FOX TALBOT'S "Pencil of Nature" came out, including mounted calotypes as illustrations. This was the first book to be illustrated with actual photographs. The first exactly repeatable pictorial statements and the first exact evidence about works of art came in 1847, when William STIRLING'S "Annals of the Artists of Spain" was published. This was a book about the work of El Greco, Velasquez and Goya and introduced these artists to the English speaking world. Apart from all these advantages to the reproduction of information, photography became in it's own right, however, a medium and process of selection and of artistic expression. It was also a great visual influence on such artists as Degas, Monet, the Futurists, Duchamp and many others.[8] Because of photography artists were at first forced to take a position and some were then inspired by the visual results of the new medium.

2. But photogravure and the photomechanical reproduction processes were not the only reasons for all this aesthetic questioning. In the 1850s, Degas' friend BRACQUEMOND had discovered HOKUSAI. In 1862 Madame Soye had opened a shop "La Conque Chinoise" in Paris on the Rue de Rivoli. In 1862 at The World Exhibition in London JAPANESE woodcuts had appeared. In 1867 Japanese paintings were shown at the Paris "Exposition Universelle." Since then "Japonisme" had been popular amongst, and stimulating to, original printmakers including Whistler, and to contemporary painters.

Compositionally, to some extent the influence of the Japanese print was similar to the influence of photography. The cropped flattened shapes for instance, and the low horizons of their perspectives. Other visual influences were specific to the Japanese print. All of these were added to the visual or optical thinking of the IMPRESSIONISTS, who first exhibited in 1874 in the studio of NADAR the photographer and gained some recognition about 1890, and to the POST-IMPRESSIONISTS a little later.

A long history of Japanese printing[9] leads up to this point bound up with great social changes which had occurred in Japan during the 17th century. The wood-cut was the only means of pictorial reproduction known to the Japanese till trade with the west began in 1854. Originally used to disseminate devotional pictures designed by Buddhist priests the first primitive black and white woodcuts developed into

the "UKIYO-E" prints of the 17th century, which later proved influential to contemporary artists. The word "Ukiyo-e" means painting of the "Floating world". This was a name used to describe art which dealt with the pleasures of the common people. At first, expecially in the 17th century, it was a school of popular painting, but later it became synonymous with the wood-block prints of that period. Hishikawa MORONOBU, an early Yedo or Edo artist, was the first to divert the various brush styles which, rather than subject matter, differentiated the fine art styles. The "Kano" style was splintery and the "Tosa" was a stiff ritualistic kind of stroke and he amalgamated these strokes of painting on his black and white block prints. The color was added by hand, often on the back to shine through the translucent paper. From the middle of the 17th century color became more important. Additional blocks for red and green were added at first, and by the 18th century the color wood cut was fully developed and referred to as a "Nishiki-e" or "brocade" print. This was the creation of the artist Suzki HARUNOBU. He is considered to be the father of the Japanese color print, and along with KIYONAGA, UTAMARO, SHARAKU, HOJUSAI and HIROSHIGE was one of the masters of the "Ukiyo-e" print.

These prints were the product of a group effort. An artist composed the block design which the engraver carved into the wood block after the drawing had been stuck down upon it, and a printer made the final copy. This whole group

including the artist was at the mercy of the publisher's dictates. He could criticise, advise and change the design at any stage of the process. These artists were also highly restricted by official censorships and restraints on the use of printing media. In the 1650s the population of the new capital Yedo (or Edo) grew quickly. Education was more widely dispersed than ever before and a middle class of tradesmen - artisans and merchants emerged, a class of people that had no precedent in Japan. It was for this class that the "Kabuki" or popular drama, the marionette theatre and the immensely varied and voluminous literature was created, and it was to illustrate the latter that the first "Ukiyo-e" wood cuts were made. They were also made to advertise the "Kabuki" and the pleasures of the Yoshiwara district. Nevertheless they were looked upon as insignificant in comparison with Japanese fine art. This is attested to by the way they were so randomly exported. Van Gogh for instance discovered that a cannister of green tea he had bought was wrapped in one of these prints. After the death of Hiroshige in 1858, and in post-Meiji Japan's changed social conditions, they gradually ceased to exist. By the mid 17th century Edo was already Japan's most populated city (it later became Tokyo) and it had been here, for the first time in the East, that there had been enough connoisseurs to absorb a mass produced art. This unique expression lasted from the mid 17th century till the mid 19th century.[10] The end of the "Ukiyo-e" in

Japan coincided with the revival of printmaking as an original
art form in the west.

3. It was not only the Japanese prints nor the photographs
which has effect upon the revival of printmaking though. The
whole SOCIAL CHANGE of Europe affected it. Archaeology and
history of art came to the fore about the middle of the 19th
century also. In 1793 the Louvre opened its doors to the
public. "Picturesque" work began to dominate the art scene
until about 1830 when a more documentary historical interest
began to grow. Travel became common and explorations became
more frequent. Captain COOK (1728-1779) brought back work
from New Caledonia and the Islands of the South Pacific.[11]
DARWIN in 1836 brought back ethnographics,[12] and Napoleon
from his conquests filled the Louvre. But these were all
housed in the general museums. It was not till Von Siebold
in 1843 urged the importance of ethnographical museums for
the purpose of understanding "the subject peoples" that the
nuclei of the Berlin, London, Rome, Leipzig and Dresden Museums,
were started in the third quarter of the 19th century. The
purpose of understanding "the subject peoples" was for trade
improvement. In Paris the project of an ethnological Museum
was first conceived for "The Universal Exposition" of 1855,
the year that New Caledonia was annexed and Gabun and Senegal
were being penetrated. It was the Exposition of 1878 which
gave the final impetus, however, for the founding of the
ethnological museum "The Trocadero" in 1878. Ethnographical

work was at first exhibited to the public as indications of mechanical development. GAUGUIN (1848-1903) acquired a piece of Javanese carving and photographs of Cambodian sculpture, and he copied Aztec sculpture at the exhibition of 1889. He not only started the public's appreciation of these primitive mechanical developments as art, but assimilated their influence into his own work and influenced the course of art thereby. He wrote about the "unparalleled sense of decoration" and the "very advanced decorative art" of the people from the Marquesan islands. The German Expressionists were to be similarly inspired by the work in the Dresden ethnological Museum a little later.

In 1775 the craft and technique of the woodcut had deteriorated to the point where Papillon, the first historian of woodcutting, complained that printers only bothered to ink blocks once for every five impressions. After Gauguin returned home from Tahiti to publish his prose poem "Noa Noa" (Fragrance Fragrance) with large woodcuts, the situation began to change, however. Gauguin began to use the restrictions of the woodcut to create his most widely imitated works in any medium. Sometimes he used pins and needles to scratch filaments of lines, and coarse sand paper to create values and other textures, and sometimes he experimented with the printing of one color over another, such as black over orange. He might smudge the register to enrich the tone, or fog the design by pressing the inked block against paper under the

mattress on which he sat or stood. Gauguin's innovations quickly inspired other artists in Germany and elsewhere. By his illustrated book which was never quite completed, he influenced artists like MUNCH and the GERMAN EXPRESSIONISTS. It was Gauguin's woodcuts (illustration N), rather than his paintings which prepared people for the influence of African sculpture. His last designs were chiefly cover designs for a satirical magazine which he called "Le Sourire" and printed only a few numbers of in 1899. In these, the little white furrows hardly contribute any more to the print's general appearance, which depends on the large ampty white spaces and the groupings of black lines, which also run round the forms.

Implicit in Gauguin's complain about wood engraving becoming more "like photo-gravure" is the meaning that various materials possess specific qualities which should be explored and incorporated into printmaking.

4. Other social changes also affected art especially lithography. For many years DAUMIER and GRANDVILLE and GAVARNI, respectively (1808-1879) (1803-1847,) and (1804-1866), had been the only creative artists in lithography. In France as well as Germany the technique soon after its invention became debased to a purely reproductive craft. Such an exceptional artists as Rudolph BRESDIN (1825-1885) could find no recognition anywhere and had to earn an existence by road sweeping. However during the last decade of the 19th century, attitudes to individual living fostered lithography's final flare up. The be-

lief that the interesting part of city life existed after dark promoted the first posters in the modern sense. They advertised the night life of Paris. Initially it all started with the Parisian publishers who, in the 1830s and on, had begun to advertise their illustrated books with large lithographs drawn by the book's illustrator, (Grandville illustrated for instance "Fables de Florian"). Other kinds of poster appeared in 1866 when Jules CHERET made immense lithographic posters to advertise theatres and music halls, cigarettes and champagne. CADART who was, in 1982, almost the only patron in France of original graphic work, invited the painters MANET, FANTIN LATOUR, LEGROS and others to make portfolio lithographs for him also. He sent them stones and the artists used to meet at his shop along with the etchers such as Bracquemond. Of them all, MANET (1832-1883) was the most important to the progress of lithography. He hit on the commercial technique of chromolithography, used then solely to reproduce oil paintings. In 1874, ten years before Lautrec made any color lithographs, he designed "Punchinello" with seven colors and using seven stones. It was the first lithograph in the modern sense of color lithography though of course it pales besides Lautrec's work and posters of 1893 and on.

Manet, partly inspired by Japanese art, did a great deal of research into new technical methods and artistic methods of working on the stone. In 1874 he created the

famous series of illustrations for Poe's "The Raven" trans-
lated by Mallarmé.[13] They were executed in brush on transfer
paper, not directly on the stone. Nobody bought the folio
sized "Raven" at 25 francs (5$) or his smaller etchings at 2
francs each (40 cents) and they were financial failures. The
five lithographs for "The Raven" were his last illustrations
almost, though he frequently dashed off drawings in transfer
or autographic ink which he called "autographies", for
example "The Chair" of 1875. His friends thought these incom-
plete, but he worked for an appearance of spontaneity. Manet
rarely forgot Goya in his etchings, but in the lithographs,
because of his methods with autographic ink, his work was
freed from Goya's influence. Meanwhile copperplate and litho-
graphic commercial traditions continued.

All of these attempts were to bear results from 1889
to 1891 when they began to affect the work of BONNARD (1867-
1947) who initiated VUILLARD (1868-1940) and LAUTREC (1864-
1901) into color lithography by way of the poster.[14] These
three painters then experimented on the billboards of Paris
more freely than in the Salons. Their posters in a decade
altered the concept of printmaking by their techniques, the
impact of their size, their free asymmetrical and dynamic
design and their pure color. These cheap and quickly produced
litho posters were the final flare of lithography as a medium
of reproduction in the last decade of the 19th century and
they acted as a catalyst for the development and revival of

original lithography, to be fostered by VOLLARD a little
later.

Through the lithographic posters of LAUTREC in the
1890s and early 1900s, and through the great liberties taken
with traditional forms and colors in them, the public learned
that verisimilitude, which they loved in the wood-engravings
and reproductions, was not the be all and the end all of pic-
ture making. Lautrec grew up artistically on Degas and
Japanese prints and drew his first lithograph when he was
twenty six years old. In the ten years he had to live, his
lithographs and posters changed the course of art and print-
making concepts more than his oils did. In 1885 Lautrec made
his first "gillotage" on a zinc plate, but his real develop-
ment began when he made his first litho in 1891 in black and
white. His first color lithographs in 1893 were contribu-
tions to "Revue Blanche" at "The Moulin Rouge" for which
Bonnard also designed posters. Printers trained by Chéret
helped him make use of his command of line and achieve his
tertiary colors. Lautrec produced in his life three hundred
and seventy prints and all but nine were lithos. Though
Chéret had made multi-color lithographs first in 1869, it was
Lautrec who really developed the medium, and brought about
it's revival as an art form.

As well as posters, Lautrec also produced portfolio
lithographs, though the one form naturally influenced the
other. In 1893 André Marty founded "L'Estampe originale" to

stimulate artists and to extend the scope and field of lithography. Lautrec's work was on the cover. In 1896 he designed a series of portfolio sized lithos called "Elles" issued by Pellet and for which Clot was the printer. Lautrec's methods of working are described briefly by a contemporary in 1885. "The charcoal line is limited to it's essentials. Then on a contact proof, on which he experiments with color Lautrec prescribes his color scale for the printer" and Paul Leclercq wrote "When Lautrec made a lithograph he drew directly on the stone without making corrections. This stone was then brought to the printer called Stern, who printed the impression in Lautrec's presence, Lautrec examined each individual sheet of the edition. The ones which did not satisfy him he tore up . . . After the printing was finished he defaced the stone so that it became unusable. In order to avoid forgery he put a different, unobtrusive mark on each print."

The development of lithography in France became especially affiliated again with book illustration,[15] as it had started with Delacroix in 1828, when in 1898 Bonnard created the cover for the folio "La lithographie en couleurs" for André Mellerio. Bonnard then produced the color lithos "Quelques aspects de la vie de Paris", the illustrations for Verlaine's "Parallèlement" and for "Daphnis and Chloe" for VOLLARD. Vollard sold paintings and made a fortune in Paris after he had gone there from the West Indies. This fortune

he lavished on publications and prints from artists who were not professional printmakers, like Bonnard and Vuillard and Rouault. He encouraged Bonnard and Vuillard to suppress line in lithography and replace it with a riddle of tangles and overlays, thereby extending the repertoire of the medium beyond the tones of Daumier, REDON (1840-1916) and the splatters of Lautrec. He left many books unfinished in 1939 when a car accident killed him.

Artists in other countries were inspired by the developments in France. MUNCH (1863-1944) developed his lithographic technique in Paris when he stayed there in 1885 and at odd times until 1897. In 1895 his first important prints "Self portrait" and "The Scream" appeared. Towards the end of the 19th century, lithography once again began to interest German artists. The spontaneous quality of lithography like the primitive quality of the woodcut inspired the artists of "DIE BRUCKE" (1905 -).[16] Many of them drew, like Emile NOLDE (1867-1956), on transfer paper, though after 1911 he worked directly on the stone. They often exhibited an interest more in the quality of the works, than in printing editions. KIRCHNER developed a special technique for printing four or five colors from one stone which used a special etching process. ROTTLUFF, HECKEL, BECKMAN and KOKOSHKA also made large numbers of lithographs.

LOURLOT the lithographic printer in Paris stimulated many artists like PICASSO. Though he had actually made his

first lithographs in 1919-21, Picasso really developed into
the most influential and resourceful of modern lithographers
after he had worked with Mourlot for four months in 1945-46.
In his later work he often took his stones through many
states before an edition was printed. He was obsessed with
the technical possibilities of lithography and used varieties
of techniques to modify his original conception of the forms.
He therefore continued the attitude started by Manet and
Lautrec, that of redirecting printmaking back to it's original
concepts. When Picasso used color, however, it was more for
decorative purposes than of compositional importance. BRAQUE
and CHAGALL used color more carefully, and Braque might over-
print the same area several times in order to achieve a full
rich velvety black color for instance. Though lithography
was already the most popular of graphic techniques among
artists, it was not till after the second World War that
color lithography truly evolved. In America with the work of
Leonard BASKIN, Misch KOHN, MOTHERWELL, DAVIS and Sam FRANCIS,
lithography was explored more for its possibilities in color
relationships than for draughtsmanship or texture.

The formation of the "Société des Aquafortistes Fran-
çais" in 1885, the "Peintres-Graveurs Francais" in 1889, and
it's English counterpart gave birth to modern etching. But
HAYTER, since the 1930s in Paris, has pursued an experimental
approach in intaglio work. His greatest technical innovation
is his method of color printing from one plate by means of

inks of different viscosities. NESCH in 1925 found, by accident, the sculptural quality of a bitten through plate and he experimented with this and with soldered plates. Intaglio has, since the 1920s, as lithography especially did after World War 11, evolved an open minded experimental approach to the specific qualities of its medium.

Silk screening or serigraphy, though looked upon with scorn traditionally, has within the last two decades gradually filtered into the art field from the commercial world. The technique has been especially useful for "hard-edge" work and impersonal flat surfaces of pure color, optically related, or for adding color and alternate qualities to other types of prints.

FOOTNOTES

1. Helmut and Alison Gernsheim, L.J.M. Daguerre, The History
   of the Diorama and the Daguerrotype. New York: Dover
   Publications, Inc., 1968.

2. In 1860 £4,500 was paid for the steel engraving "Railway
   Station" by Frith, by the publishers. Holl the engraver
   was paid £2000 for two years work and each print cost
   fifteen guineas to buy.

3. Jean Adhémar, Twentieth Century Graphics. New York:
   Praeger, 1971.

4. A signed lithograph by Whistler would sell for four
   guineas, whereas an unsigned one would sell for half the
   price. Now the difference between a signed Chagall and an
   unsigned one can be several hundred pounds.

5. Doré once indicated the repetition of windows in a drawing
   of his to be reproduced, by drawing in one window and writ-
   ing "etc." to indicate the rest. The cutter engraved
   "etc." onto the block. Gustave Doré lived from 1832-1883.

6. Beaumont Newhall, The History of Photography. New York:
   The Museum of Modern Art, 1964.

7. William M. Ivins, Jr. Prints and Visual Communication.
   Massachusetts: M.I.T. Press, 1953.

8. Aaron Scharf, Art and Photography. London: Allen Lane, 1969.

9. Ronald G. Robertson, Contemporary Printmaking in Japan.
   New York: Crown Publishers, Inc., 1965.

10. James A. Michener, The Floating World. New York: Random
    House, 1954.

11. Robert Goldwater, Primitivism in Modern Art. New York:
    Vintage Books, a division of Random House, 1967.

12. Darwin's "Origin of Species" was published in 1858.

13. Kristan Sotriffer, Printmaking, History and Technique.
    London: Thames and Hudson, 1968.

14. Bevis Hillier, Posters. London: Weidenfeld and Nicholson
    Lts., 1969.

15. Jacques Buigard and others, The Art of the French Book. André Lejard, ed. London: Paul Elek, (n.d.).

16. Carl Zigrosser, The Expressionists. New York: George Braziller, Inc., 1957.

VII

THE ARTIST PRINTMAKERS

Since printmaking from 1890 on has been mainly an
artists' terrain, and by that I mean neither a craftsman's
terrain nor a process engraver's, one has to look to the
artists for it's subsequent developments. These developments
due to the training of artists not only in the techniques of
painting but in the sense of pictorial design tended to be
conceptually free compared with the ideas exhibited by the
trade or craft printers. Goya had used printmaking in this
uninhibited expressive way as had Rembrandt and Seghers.
They had dealt with existing techniques of printmaking and
used them as materials or qualities rather than as crafts.
The results consequently were compositional developments
rather than technical media developments. This freedom was
perpetuated and supported, fortunately, as early as 1848 by
the willing and open minded assistance given by Auguste
DELATRE, an intaglio printer in Paris to MERYON, (1821-1868)
HADEN (1818-1910) and to WHISTLER (1834-1903), just as CLOT
or MOURLOT had assisted others during the development of
artists lithography. Many artists such as those of the "DIE
BRUCKE" group in 1905 wanted to feel the actual printing
quality and use of their materials, however, as a vital part
of their composing. Nesch and Hayter for this reason, mainly

printed their own woodcuts and intaglio work.

Among the early group of artist printmakers, DEGAS (1834-1917) explored more media than anyone between Dürer and Picasso. Fascinated by photography and by printing, he pulled prints of his aquatints and etchings only to check his progress, apparently untroubled about editions. Between 1874 and 1893, he concentrated on monotypes producing as many as 400 of them during his lifetime.

The FUTURISTS (1909) and the CUBISTS (1907) are less known for their prints than their paintings. But, in 1911 the first cubist prints were published by KAHNWEILER who ordered them from Picasso to illustrate Max Jacob's "Saint Matorel". They were made in 1910 at Cadaques. Jacques VILLON (1875-1963) perhaps remains the standard of cubist printmaking however though he was not primarily a painter. The technique of etching was very adaptable to cubist analysis. Cubist prints at first passed unnoticed, even among artists, though they were exhibited in the Salon d'Automne of 1912-1913. The Futurist group included a few engravers such as BOCCIONI, ROSSOLO and ROMANI. They were conceptually influenced by the dynamic possibilities in photography after seeing MAREY'S work of the 1880s. But these groups (Villon excepted) really used prints to continue something investigated originally in a painting media.

The FAUVES (1905) also used print media as alternate expressions of their styles evolved in painting, even ROUALT

(1871-1958) and his struggles with the 50 "Miserere" prints, published eventually in 1948, extracted his painting style from the intaglio medium, by a mixture of photographic methods and straight acid bites.

The DADAISTS (1916 -)[1] and the SURREALISTS (1924 -)[2] perhaps were the first artists to allow any medium to lead the way compositionally. The latter artists made "frottages", which were in principle, the same as the ancient Chinese "rubbings" of the Han period. They juxtaposed these with old wood engravings from 1880s sales catalogues, and they carried Picasso's statement that "objects give rise to new states of consciousness" further than he meant it at the time. ERNST (1891 -) illustrated many books. For example in 1919 his "Fiat Modes" was published in Cologne, and "Femme 100 têtes" was published in 1929 by Carrefour publications. These pointed a new direction, which, along with the cubist ideas and those of Léger led to many of the present contemporary experiments, of putting together photographically real fragments from existing materials, into one print.[3] RAUSCHENBERG'S (1925 -) large silk screens of the 1960s are composed almost entirely of ready made images (illustration O). The silk screen and the use of photographic exposures by various graphic tech- niques are an ideal way to preserve a collage effect, of juxtaposed fragments of images, and to experiment pictorially with their arrangement.

ROSENQUIST and many others, HAMILTON,[4] PHILIPS or

LICHTENSTEIN,[5] and KITAJ for example have used photographic
fragmentation a great deal. By enlarging certain photographic
images unnaturally or by making a medley of specific imagery
from the everyday world, and mixing this with graphic elements,
they have created depths and layers of immediate information
which give rise to "new states of consciousness". Sometimes
the fragments are woven basket fashion in a shallow space as
in "Booster" a silk screen and litho by RAUSCHNEBERG published
in 1967 by Gemini. Sometimes their arrangement forms a grid
within which Andy WARHOL, for instance, serialises the frag-
ments of recognisable motifs, the faces of popular heroines
such as Liz Taylor, or makes use of the multiple images of a
dramatic event, by screening them onto canvas. The silk-
screen is obviously at present a very popular and objective
medium to combine with other mediums, and to transpose
photographic images.

Other media than these are frequently explored how-
ever. Vacuum forming is used by Joe TILSON for example, cut
and folded prints by Richard SMITH and PERICOT and computers
by others.[6] Such artists work closely with a new breed of
specialist printers like the ones at Kelpra Studios, Tamarind,
or Gemini presses, whose degree of expertise while fostering
a renaissance in printmaking, as Cadart the publisher did in
the 19th century, nevertheless makes it almost impossible for
the artist-printmaker to work separately from them.

Plastics and canvas all have different qualities from

paper and like Ford cars which also must be accepted as prints, bring us back to the original, caveman's problems of how to use each material with validity. Now at last however two courses have become clear in printmaking; one is the use of printing for either informational or practical commercial purposes, and the other is for expressive and aesthetic communication. It is the purpose which defines the difference rather than the process or material.[7]

FOOTNOTES

1. Hans Richter, Dada. London: Thames and Hudson, 1965.

2. William S. Rubin, Dada, Surrealism, and Their Heritage.
   New York: The Museum of Modern Art, 1968.

3. Lucy Lippard, "Dada,Surrealism and Ernst" Changing. New
   York: Dutton, 1971.

4. Richard Morphet, Richard Hamilton. London: Tate Gallery,
   1970.

5. Sidney Chafez, "Four Early Lichtenstein Prints", Artists
   Proof. Prof. Fritz Eichenberg, ed. (1970), X, pp. 48-52.

6. Pat Gilour, Modern Prints. London: Studio Vista Ltd., 1970.

7. Christopher Finch, Image as Language. Middlesex: Penguin
   Books Ltd., 1969.

CONCLUSION

It has been my intention, in this Report, to convey
an abbreviated history of making prints within the thesis
that the concept and the use of printmaking have changed con-
siderably during the past, and that they have now reverted
more or less to the original understanding of what printmaking
actually is. This original understanding is, that printmaking
is the use of any material as a matrix from which an identical
design or designs can be taken, and that each material has
it's own nature, expression and laws.

Some of the qualities of printmaking techniques have
often been misunderstood and forgotten in the past, because
of their inherent property by which replications or designs
can be made. Replicating techniques were needed to dessimi-
nate information before the photographic era. Cavemen and
the first historic peoples initiated this principle with
phenomenological qualities in mind as did the Mesopotamians.
From the 15th century this connection began very gradually
to be forgotten, however. Printmaking then started to become
mainly a means for the mass reproduction of verbal informa-
tion and pictorial information frequently translated from
other mediums. Only rarely was aesthetic expression the in-
tent of printers. With the invention of the photograph and

the consequent changing attitudes towards and within art,
printmaking became relieved of it's commercial duties, and
it's techniques were once more implemented for original arts.
Artists since the middle 19th century have been using lithog-
raphy, intaglio and the woodcut plus many other mediums, not
to reproduce their work executed in other mediums but to
explore the visual possibilities of each process and material.
This attitude represents a return to the original concepts of
prehistoric man. Historical matter relevant to this theme is
used to document this thesis, and the thesis itself is derived
from the documentary evidence. The two currents complement
each other by necessity.

Printmaking is of course a common name for a number
of media. All of these media have specific aesthetic and
material characteristics and are technical disciplines.
Photography like all print media can be used to transpose de-
signs from one material to another, as well as to create and
produce expressive art itself. It can be used also for repro-
duction, and for reproducing the phenomenological appearance
of visual reality. Images from visual reality can be combined
in various sizes, repetitions or metamorphoses, by photo-
montage or photo collage, as they have been used by Rosenquist,
Pop artists and Surrealists, etc. Such imagery can also be
visually incorporated with many other materials, the silk
screen, for instance, or non-objective metal intaglio plates,
and the designs which are appropriate and specific to them.

The connection between these last different quali-
ties or phenomenologies has been the background to all four
of my Thesis prints. Various methods of photo-fabrication
have been used to transpose the qualities of one medium, and
material, onto that of another and to permit prints to be
pulled from both together, while retaining each medium's
separate characteristics. The photographic images in all of
them have realities as well as shapes and designs which are
quite different in style or structure from the lines and
shapes around them worked by hand. They are also close in
value and size of texture, however, and connect visually
therefore with the surrounding work.

To clarify all this, the pattern of the history of
printmaking had to be established and sorted out first, and
this represents my written Thesis. It is the premise upon
which any analysis rests and is the reason why I have not
discussed my Thesis Project in more detail.

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Appendix 1

RUBBINGS

Once the surface to make a rubbing from was selected,
it was carefully cleaned to receive the paper. A multi-
layer of paper was dampened and laid over the surface. A
mixture of plants or of mineral salts was then concocted to
make the paper lie flat, and the paper was brushed or tapped
and allowed to dry against the stone or wood surface. Wax
was sometimes used to polish the paper before applying the
ink, to insure a sharp image. Inkstones and dabbers or tam-
pons were commonly used, and the inks were of carbon and
mineral oils, combined with glue and then molded into stick
shapes and dried. In Japan this ink is called "Sumi" and it
was ground in a special dish and mixed with water to the
right consistency to rub on the paper when the latter was
dry on the matrix. There is a dry method of taking a rubbing
also, which was the one mainly used in the west.

To take a wood block print by means of rubbing the
back of the paper once the surface of the block has been
inked is still common practice especially in Japan, and is a
combination of the early stamping method of a seal and textile
printing, and the ink rubbing techniques of China. Therefore
ink rubbings may represent some possible transition in the
development of block-printing techniques, occurring as they

did, well before the first wood block prints of the early

7th century A.D. and yet after the first seals were stamped.

Appendix 2

KINDS OF BOOKS

Illustrated INFORMATIONAL books started to be issued by 1467. The earliest set of datable prints claiming to be of identifiable objects was published in Rome in that year. It was Cardinal Torquemada's "Mediations on the Passion of Our Lord". Five years later there appeared in Verona an edition of Valturius' "Art of War" with woodcuts which were a deliberate attempt at the communication of information. This represents the first precisely illustrated informational book. Soon, however, encyclopedias on every conceivable subject, botany, machinery, travel, astronomy and perspective were published.

There were also in the 15th century several other kinds of books published, many of which were of course only relatively informational. The woodcuts in HERBALS were often merely copies of illustrations, also copied and therefore suspect as far as accuracy is concerned, in earlier manuscripts. The "Pseudo-Apuleius" published in Rome in 1480 was such a book. It was a copy of a 9th century botany book, which had been taken further from scientific exactness with each copying. ALMANACS were published from 1470 onwards. Almanacs showed the occupations of the months, the seasons for sowing and harvesting, the best seasons for bleeding, or the safe

veins to open under each zodiac sign. Saints days sometimes
appeared in red ("red letter days") and almanacs were pub-
lished in small folded sheets or as booklets that must have
been given away as New Year Presents. BOOKS OF HOURS - some
pocket sized and others exceptionally large developed from
the common almanac. The "Grandes Heures" were printed by
Parisians and included prayers for families in or near France,
doggerel verses on the labours of the months, readings from
the gospels and special masses for the dead. "Heures Royales"
were printed at the king's orders. In the mid 1100s French
churchmen began to demonstrate the holy unity between both
testaments, by matching each event of Christ's life with two
prophetic events from the Old Testament. This was in response
to some early heretics who advocated purging the bible of the
wicked worldly Old Testament. These ideas were at first
illustrated and sculpted on the cathedrals. The "bibles in
stone" were later made use of in the "BIBLES OF THE POOR" or
"Biblia Pauperum", where drawings of scenes from Christ's
life plus their Gospel texts were placed between Old testament
figurations. These cuts, which included men and women often
depicted in contemporary dress, were to provide the main
models for "The Master E.S." and Martin Schongauer a little
later. The "MIRROR OF MAN'S SALVATION" books, which developed
from the "Bibles of the poor", and some books devoted to the
Apocalypse were printed only in the north of Europe.

A subject greatly studied during the Middle Ages was

"THE ART OF DYING" or "Ars Moriendi". Books on this subject were written in two versions, one long and the other short, the shorter version being illustrated to teach by means of pictures. An illustration could show a dying man being tempted by devils, who represented despair, pride, anger or greed. From each temptation the man is rescued by his good angel. Due to the frequency of the plague in those days, these books of inspiration for man's final hours were very popular.

FABLE books which came out simultaneously in Germany and Italy, after 1485, developed into the modern novel, and books on ROYAL PROGRESSES were printed to remind subjects of their overlords from the beginning of the 16th century. Dürer's "The Triumph of Maximilian" is an example of the latter.

Between 1450 and 1480 printed books were almost in-distinguishable from the calligraphy of manuscripts, and they provided the general public with more accurate texts at about one fifth of the price of the manuscripts made for princes.

All these books printed for the masses gradually had an effect and influence on the evolution of society. It has even been suggested that the first home study book, by Moxon, "Mechanik Exercises, intended to be Monthly continued.", serialised and printed in England in 1678, though never com-pleted, was originally responsible for the trade schools which replaced the apprenticeship system and for the early start of The Industrial Revolution in England.

Appendix 3

THOMAS BEWICK and subsequent developments

in commercial printing.

Though Urs GRAF (1485-1527) is reputed to have invented the use of white line engraving, Thomas Bewick is usually acredited with it's discovery. He used metal engraving tools on the end of grain of boxwood or other hard woods, in the 18th century (illustration P).

Thomas BEWICK (1753-1828) was a copper plate engraver from Newcastle on Tyne in England. Since about 1780 he had tried his tools on the end grain of wood. The plank was not capable of withstanding as many runs as was a copper plate, but the end grain of boxwood outlasted even copper. Bewick ploughed the white lines in the wood as he had in the copper and this was the origin of white line engraving as a relief process on wood. By pushing a graver instead of pulling, as with the knife, he could cling to the lines of a drawing more closely. The major problem with the printing of this fine work in relief was, as had been discovered in the 17th century, that paper was too coarse to take a good impression and inking methods were too coarse. Bewick obtained good impressions however by burnishing the back of the paper on the inked block with his engraver's burnishing tool. He also ob-

tained some China paper, in which the Chinese wrapped their exports of tea, and much later in life he used India paper as well.

The English glue roller was patented in 1818 to replace the ink ball, which had been used since the 15th century. Robert in France invented the paper making machine in 1798, and with these improvements wood could now begin to rival copper for the reproduction of minute detail. Wood engravings were easier to combine with type in one run than copper, and gradually the picture deluge in the periodicals began. Englishmen who were eager for news of Napoleon bought such unprecedented numbers of newspapers, that in 1814 "The London Times" installed two steam driven cylinder presses for printing 2200 sheets per hour. "The Penny Magazine", in 1832, published new events, art and inventions, and others like "Punch" followed in 1841. By 1840, England had to find ways of preparing large illustrations quickly and the divided labour system, started as early as the 16th century, reached unknown heights. A draughtsman trained in the process of making appropriate drawings for engraving would translate an artist's work onto an assembly of boxwood blocks bolted together. These blocks were then separated and distributed to a team of engravers, some of whom were specialists on skies and others on trees or faces. These hack craftsmen would then work the separate pieces almost to the edges. After the pieces had been bolted together again a master engraver would finish

the joins for printing, while the material was hopefully
still news. Wood-engraving and then the photo-mechanical
processes multiplied detailed instructive pictures in an inter-
national burst of popular education. Wood-engraving and
printing helped to shift Europe, the Americas and Japan from
the apprenticeship system to trade schools and correspondence
courses. This shift from muscle power to steam power was by
means of cheaply produced manuals amply illustrated with
cuts. All this was advanced when in 1860 a minor wood-
engraver, called Thomas BOLTON, had the idea of sensitizing
the surface of his wood block, on which he then exposed a
photograph. He then engraved through this photograph on the
block. This of course was displaced, as a method of making
pictures to reproduce, at the end of the century when the
engraver himself was dispensed with. Until that time the
reproductive engraver remained fully employed and despite the
development of lithography was not entirely displaced in cer-
tain spheres of printing. Stones were not so adaptable for
printing text and pictures at the same time, the two being
of different heights. The art or craft of wood-engraving was
renewed and maintained by social commentators as Gustav Doré
and his tone blocks. By 1880 the tone block had become
greatly over-refined, and photographic reproduction gradually
took over.

Appendix 4

PHOTOGRAPHY, A brief history

The history of photography goes back considerably
further than is expected. It goes back further than Le
Prince's first aquatint and back further than the first
lithographs. Before the German chemist SCHULZE found out in
1727, however, that it was due to a trace of nitrate of silver
that a certain liquid changed color when exposed to the sun's
light, alchemists in the Middle Ages had employed the phenome-
non to entertain the nobility and their children. They had
added a silver salt to a suspension of chalk in a glass flask
and set it in a window along with a stencil such as a leaf
skeleton. From the direct reduction of the salt to silver,
an image would result. The flask could then be shaken up
and renewed for another image, as the image was ephemeral in
any case.

After Schultze, experiments continued on this phenome-
non for the rest of the 18th century. But until 1802, when
Thomas WEDGWOOD put these experiments to the service of pic-
ture making, scientists had only considered two separate sets
of observations both of which were later to be, as Wedgewood
proved, useful to a new art of photography. One was to do
with optics and the other with chemistry. Wedgewood however

was also unable to make his images permanent and it was
Henry Fox TALBOT, an English scientist who first succeeded in
fixing photographic images on paper in 1835 with common salt.
John F. HERSCHEL in 1839 suggested the use of sodium thiosul-
phate as a fixer instead of salt. In 1835 Talbot not only
fixed his images which later faded a good deal but after mak-
ing an exposure he waxed his paper photograph and used it as
a negative. He could now print positives from this negative
onto paper, and make as many exactly repeatable images as he
desired. Talbot read a paper describing his techniques six
months before Daguerre made his experiments public in 1839.
Meanwhile another branch of photography had been conceived of
by NIEPCE, that of photo-engraving. About 1825 he was experi-
menting with bitumen of Judea which hardens and becomes in-
soluble in light petroleum when exposed to light. He then
waxed an old engraving print and placed it on top of a pewter
plate coated with this mixture and exposed them both together
to the sun. In the places where the light went through the
transparent paper the bitumen hardened and became insoluble,
whereas, where the black lines of the engraving had prevented
the sunlight from affecting the bitumen he was able to wash
it off leaving the plate beneath clean and ready to bite in
acid and then to print it like the etching it was. The prints
pulled from such plates were not photographs, but were the
first examples of photo-mechanical process reproduction.
Niépce went into partnership with Daguerre, who evolved his

own methods. These methods implemented fumes from hot iodine to coat a silver plate, which was exposed to the image in sunlight for possibly forty minutes and then exposed to vapour from hot mercury to make the image visible. This plate was then washed in a bath of common salt to make it permanent. "Daguerrotypes" were worked up by etching and were printed in books from 1842 onwards. They were not photographs any more than Niépce's were, and moreover, they were in reverse and very delicate and were not really repeatable, as were Fox Talbot's prints on paper. In 1851 the wet collodion process was developed by ARCHER and then the dry plate process in 1874, followed by the real advance of the gelatin emulsion dry plate in 1870s. The first natural color photography arrived with James Clerk MAXWELL in 1861 and until 1907 his was the only practical way for taking color photography. High speed photography began in 1875 after the early work of MUYBRIDGE on moving animals in the 1870s, which brought about all kinds of reassessment about the actual movements of humans, long needed for medical purposes as well as for art purposes. The 1880s are connected with the beginnings of the motion picture.

At the same time as Daguerre and Talbot were making their separate discoveries, Mungo PONTON in England found out that when gelatine and other colloidal materials were hit by light they became hard and insoluble. In the 1850s it was discovered that a coat of bichromated gelatine that had been exposed under a negative would hold ink on parts that were
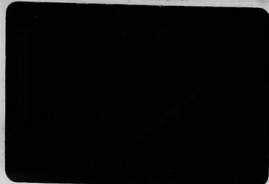
hardened by the light. From these ideas came the first printing surfaces for the reproduction of actual photographs, and the development of the collotype. But it was with the invention of the relief half tone that the irregularity of aquatint was controlled to render the appearance of changing tones. Talbot was the first, it is believed, to envisage this. He first thought of a photographic aquatint, and then of a more regular aquatint and then in 1852 he took out a patent for using a screen made of either textile or ruled glass. He intended to expose the screen forst and then a pictorial negative onto a plate coated with a bichromated layer of colloid. Where the screen or the negative prevented the light from hardening the coating, it could be washed away, and then the plate could be bitten by acid, leaving a grid of larger or smaller dots to indicate the tonal values, when printed. In the 1870s glass screens with ruled parallel lines were used, sometimes straight and sometimes wavy. The first cross-line half tone appeared in a New York daily newspaper, 1880 and was made through a screen of textile. The modern rules cross-line half-tone screen IVES of Philadelphia first made from two pieces of glass ruled and fixed at right angles to each other. His idea was patented in 1886. However LEVY, in 1892, patented his method of ruling lines on glass which was cheaper and more practicable, and before 1914 his ruled cross-line half-tone screens were used all over the world. Most of them were manufactured in an old coalmine in Pennsylvania by Levy brothers.

To cope with the increased detail required by photographic plates, paper making was improved as were presses. The older 15th century presses had been unable to cope with the demands of fine wood engraving in 1820, and the photographic plates needed an even greater precision and strength to secure fine impressions.

The visual awareness from the second half of the 19th century on could only expand under the influence of photography, it's techniques, the movement never seen before but now "stopped" by Muybridge, the microscope daguerrotypes taken as early as 1839, and the possibilities suggested by Talbot of using light waves past the visible spectrum to affect photographic emulsion. The reporting of portraits, views and news was taken over by photography from the traditional print medias and so was the documentation of curios and art and information of all kinds. Photography made clear the difference between pictorial expression and pictorial communication of facts.

INDEX OF ILLUSTRATED MATERIALS

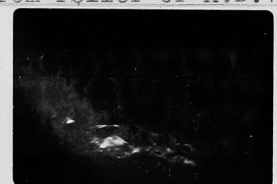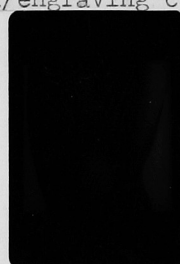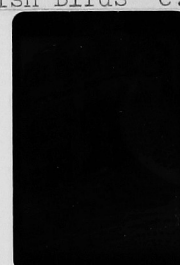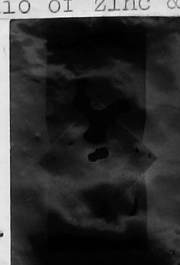|			
Neo-Sumerian. Cylinder seal and impression. c.2150 - 1950 B.C.	Neo-Sumerian Molds.Terra-Cotta.Late 3rd millenium.	Chinese stone rubbing. "Battle on the Bridge" from relief of A.D.147.	"The Diamond Sutra"A.D.868 Chinese
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E	**F**	**G**	**H**
Dürer"St.Michael fighting the Dragon". (Apocalypse). wood -cut 1498	Dürer. "Melencolia".1514, line-engraving.	Goltzius"Hercules Victor" detail/engraving c.1600.	Delacroix.Illustration, Goethe's"Faust"1828.litho
I	**J**	**K**	**L**
Goya"Por que fue sensi-ble"(Caprichos)1803(det.)	Gauguin"Women,animals and foliage" woodcut c. 1899.	Rauschenberg. "Booster". litho & silk screen.1967.	Bewick.wood-engraving.(d.) "British Birds" c.1790 .
M	**N**	**O**	**P**
Nancy Keehn "Preface"1972 intaglio of zinc & copper	Nancy Keehn "Chapter 1"72 intaglio of zinc & copper	Nancy Keehn"Chapter11"72 intaglio of zinc & copper	Nancy Keehn "Chapter111" 1972.Intag.zinc & copper
		S	**T**