VI

PICTORIAL STATEMENT WITHOUT SYNTAX THE NINETEENTH CENTURY

DURING the nineteenth century there were a great many experiments and trials of novel technical ideas in print-making. Many of these techniques had appreciable merits from practical points of view, but inevitably most of them vanished very rapidly as still newer methods were introduced. In the lack of any extrinsic evidence it is frequently difficult if not impossible to tell from the face of a relief print made in the middle years of the century just what process was actually used in its making.

The adherents of the old traditional techniques, in their losing battle for supremacy, set up an idea which for a long time influenced not only the critics but the general public. It was that, somehow, the old processes were intrinsically more artistic than the newer ones. In the print-collecting game there were purely verbalistic definitions of what was artistic that had nothing to do with either design or expression. Thus there gradually grew up in

the public mind a notion that there was an artistic hierarchy of the graphic media. In the United States, for example, there was a strongly and generally held opinion that etching was more artistic than line-engraving, that both were more artistic than wood-engraving, that wood-engraving was more artistic than wood-cutting, and that all were more artistic than lithography. Lowest of all and utterly contemptible, were photography and any medium that bore the name of some 'process'.

I have, myself, been scolded by gentlemen of the older school for buying lithographs for my institution when I could have bought etchings for it, and for buying the horrid rough old woodcuts by such artists as Dürer and Cranach when I could have bought the charming, refined, and delicate, white line reproductive, wood-engravings of such modern masters as Timothy Cole and Elbridge Kingsley. Any so-called 'original' print by any minor artist was *per se* more artistic than one made under the supervision of even the greatest artist and after a design that he had made specially for the purpose. A well-known collector, famous for his artistic perception and taste, once took me severely to task for showing in the same exhibition prints from Turner's *Liber Studiorum* in which the work was all done by Turner himself and prints from the same series in which all the work on the plates was done by professional engravers working under Turner's immediate supervision. Later, when this doctrinaire had become very enthusiastic over some colour prints in an exhibition, I showed him that they were merely the front covers of an old French weekly journal, carefully matted so as to cover up their tell tale titles and type printing. Had he seen them first unmatted they would have been what in his estimation was the lowest of the low, mere process reproductions of drawings that had been specially made to be reproduced that way.

As we look back from the middle of the twentieth century all that kind of talk and opinion seems very silly, for it has become obvious that what makes a medium artistically important is not any quality of the medium itself but the qualities of mind and hand that its users bring to it.

Thus, there is doubtfully any more ungrateful medium than the now forgotten chalk plate, and yet it was probably the medium in which Daumier in the 1830's produced some of his more astonishing prints. In the middle of the century at Paris many of the best artists made prints by the various processes associated with the names of Gillot and of Comte. Because they were known, not as etchings, or engravings, or lithographs, but as the Comte process or the Gillot process, and because their results came out in popular books and magazines, they have been overlooked by the students of prints, although many of them were fully autographic, involved no use of photography, and were often of great interest and charm. Perhaps the funniest of these instances in which verbal definitions got in the way of eyesight and appreciation is provided by the *clichés verre* or *clichés glace*, which had a short vogue among such painters as Corot, Millet and Rousseau. After the invention of photographic paper that could be bought in packages, ready made and ready for use, these artists took to covering sheets of glass with a light resistant coating and then scratching or working a design through this, so that the glass could be used as a photographic negative from which photographic prints could be taken. So far as the artist was concerned it was a much more direct and simple process than etching. But because these prints were neither etchings, nor lithographs, and because they were not actually photographs made with a camera, they never became popular among collectors or public. People simply could not adjust themselves to such shocking and novel technical ideas as were exemplified in these prints. In this way tradition won out over the actual fact that here were some of the most thoroughly original and indubitably artistic prints of the century. I have sometimes wondered whether there is any field of art collecting which is more hidebound and hamstrung by arbitrary definitions than that of prints.

In any case, as seen from today's point of view, the great events in the nineteenth-century history of prints were the discoveries of photography and its attendant photo-mechanical

processes. The tradition of snobbery is still so strong, however, that neither of these things is ever mentioned in any of the general histories of prints. Actually they have worked one of the major revolutions not only in vision but in the recording of its observations, and they have very completely changed taste and valuations in the field of the older prints.

As pointed out in the first chapter of this essay, the ancients had all the materials and basic techniques that were needed to make many kinds of prints. The one thing that they lacked was the idea of making prints. With photography, however, we come to a kind of print that no one could have made before the nineteenth century. The reason for this was that photography, instead of being based upon simple manual techniques and immemorially familiar materials, was based on quite recent developments in the sciences of physics and, especially, of chemistry. I have an idea that a very good argument could be put up for the claim that it is through photography that art and science have had their most striking effect upon the thought of the average man of today. From many points of view the histories of techniques, of art, of science, and of thought, can be quite properly and cogently divided into their pre- and post-photographic periods. It may be doubted if even the renaissance itself, or, if one prefers, the baroque seventeenth century, brought about such thoroughgoing changes in values, attitudes, and ideas, as took place in the nineteenth century and the early years of this one. Many of these new notions are intimately related to photography and its materials.

The prehistory of photography consists of two very different sets of observations, one of them optical, the other chemical. They were not brought into conjunction until the nineteenth century.

In all probability men have always wondered about the fact that when the sun strikes through an angular hole it makes a round spot of light on the surface it hits. Also many must have had the experience of seeing a brilliantly lighted street scene portrayed on the wall or ceiling of a darkened room by a beam of light that came through a chink in the window blind. It is said that

Daniel Barbaro's book on perspective, of 1568, was the first to point out that a sharper image could be procured if a proper lens were inserted in the chink in the window blind. This was the origin of the camera obscura, a name which is merely the Italian for a darkened room. In the eighteenth century and the early years of the nineteenth century the camera obscura was developed into a portable means of enabling people to take tracings of landscapes and other well-lighted subjects. Little practical use was made of it, and in general it was no more than a gadget for people who did not know how to draw. The only outstanding exception was Girtin, who, with its aid, produced one of the most remarkable sets of architectural etchings that has ever been made.

From the earliest times men have unavoidably been acquainted with the fact that some substances, such for example as human skin and freshly cut meat and wood, change colours when exposed for a while to the brilliant sun. In 1727, a German chemist named Schulze noticed that a liquid mixture of various things in a bottle became purple where it was exposed to the sun, but did not change colour where the sun did not strike it. He discovered that this was due to the presence in his mixture of a trace of nitrate of silver. During the rest of the century chemists recorded their discoveries of the action of the sun on a number of chemical salts. Among the other discoveries made by them was that of the existence at either end of the visible spectrum of invisible rays which affected their chemicals.

The first man, apparently, to try to put these experiments to practical use in picture-making was Thomas Wedgwood, who, in 1802, announced that he had been able to get an image of a leaf or other object that was laid on a piece of paper treated with nitrate of silver and exposed to the action of the sun. Where the sun hit the paper directly the paper turned dark, where the sun had to go through the leaf it turned the paper dark in proportion to the amount of light that went through it. Unfortunately, after a little while, the image of the leaf went dark also. Wedgwood and his collaborator Humphry Davy found no way of making these

images permanent, though Davy, later on, did discover that chloride of silver, when substituted for nitrate of silver, materially reduced the time required to get the image. Wedgwood also tried to make his images by exposing his sensitized paper to light in a camera obscura, but his chemicals were so slow in their reaction to the light that came through the lens of his camera that he did not succeed.

The story now divides into two quite separate and different parts, one of which led to the discovery of the daguerreotype and the other to that of the photograph. These are two very different things, and, in spite of long tradition to the contrary, should not be mixed up. A photograph is an image, usually on paper, in silver or pigment, or stain, that can be exactly repeated. The daguerreotype not only was not exactly repeatable, but its image instead of being composed of pigments or stains was made by the minute shadows cast by the light in microscopically small reticulations or pits in the surface of a highly polished metal plate. That this is so, is shown by the fact, discovered long afterwards, that an electrotype can be taken of a daguerreotype, and that the cast or mould made in this way also shows the image that is seen on the original daguerreotype.

As the making of daguerreotypes went out of fashion in the 1860's and has never returned, I shall deal with it first, so that later we may be able to get an uninterrupted story of the photograph.

Some time before 1826, Niépce, a Frenchman, discovered that a bitumen which was normally soluble in a certain kind of oil ceased to be soluble after it had been exposed to the sun. In 1826 he prepared a metal plate by covering its surface with his bitumen. He then waxed an old engraving, so that its paper became translucent. He put the waxed engraving on top of the prepared plate and exposed them together to the sun. Where the sunlight was prevented by the black lines of the engraving from reaching the bitumen, the bitumen remained unaltered, but where the light came through the paper the bitumen was made insoluble. Then by bathing his plate in his oil, he dissolved away the bitumen that lay under the lines

of the engraving. It was now a simple matter to bite the plate just as though it had been an etching plate, and to print from it in an etching press. One of the original plates is still in existence. The prints pulled from it were not photographs, but, curiously, were nevertheless the first crude instances of what today we call photo-mechanical process reproduction.

Niépce then carried the matter further. He coated a sheet of glass with his bitumen and exposed it for a long time in a camera obscura to the light reflected from objects. This time he seems to have got not only whites and blacks but middle tones between them in the coat of hardened bitumen left on his glass after he had bathed it in his oil. Niépce, however, kept his processes secret, and, as all the pictures of objects he made with them have vanished, the only record of his experiments is that which is contained in some very unrevealing letters and the lone metal plate and such prints from it as may exist.

In 1827 Niépce went into partnership with an inventive painter named Daguerre, but he died before the partnership produced any notable results. By 1837 Daguerre had produced a daguerreotype of a corner of his studio, by a process which he discovered by accident. He tried to keep his process secret even from those to whom he tried to sell it, and it was not until January, 1839, that, forced by a fire which had burned him out, he agreed to make his process public to the world in return for annuities to be paid by the French government to him and to the son of Niépce. The government had to look into the matter, and so it was not until August 19, 1839, that, at a great and theatrical meeting, attended by many notables and accompanied by all the publicity that was then possible, he demonstrated his process.

The daguerreotype plates had polished silver surfaces. These surfaces were exposed to the fumes of hot iodine, which covered them with minute dots of iodine which formed iodide of silver. The plates were immediately placed in a camera which had been already focussed on the object of which a picture was desired, and exposed to the light that came through the camera's lens. At that

time it required, depending on the kind of a day it was, from five to forty minutes to make the necessary exposure. The plate was then immediately exposed to the vapour from a bath of hot mercury, which by forming an amalgam with the dots of iodide of silver that had been acted on by the light, made the image visible. To make the image permanent, it was necessary to get rid of the dots that had not been acted upon by the light. This was done by washing the plate in a bath of common salt, for which later on a bath of what we now call 'hypo' was substituted. The daguerreotype was thus a sheet of silver covered by an amalgam in which there were minute pits where the light had not affected the surface.

The detail and the accuracy of the pictures were astonishing, but the pictures were faint, they were in reverse, the tones were harsh, the surfaces were extremely fragile and could not be touched, and they could not be exactly repeated. Furthermore, the time required for the exposure was so long that it was impossible to make a portrait, let alone a picture of a human being or an animal in motion. Various people immediately attacked these problems with vigour. Bigger and more accurate lenses were made for the cameras which admitted more light and thus cut down the time required for an exposure. New ways of sensitizing the plates were discovered which made them much more rapid. By 1840 it was possible to take a portrait in a minute. The same year a way was found of toning the plates with gold, so that they were not so stark and harsh. In a very short time daguerreotypes were being made all over the world. Daguerreotype plates were worked up by etching and engraving so that they could be printed in the etcher's press. Prints of this kind appeared in a book printed at Paris in 1842. Among them were two, made by Fizeau, that might be called primitive photogravures. But in spite of everything, daguerreotypes were still in reverse, they were fragile, and they were not exactly repeatable. Their images could only be seen when the plates were held at such an angle to the light that it cast pale shadows in the microscopic pits in the surfaces. They were not photographs, and photography did not grow out of them.

While all this was going on in France, even more important things were happening in England. In 1833 William Henry Fox Talbot, a very remarkable country gentleman, was staying at Lake Como. He could not draw, but he wanted to make some pictures of the landscapes there, and so he tried to use a camera lucida. As in the case of many another man, the result of this was a great irritation. Talbot's mind turned to an old camera obscura that he had had many years before. While thinking about that he remembered 'the inimitable beauty' of the images he had seen in the camera obscura, and, to quote his own words, 'it was during these thoughts that the idea occurred to me . . . how charming it would be if it were possible to cause these natural images to imprint themselves durably, and remain fixed upon the paper! And why should it not be possible? I asked myself.' When he got home to England in 1834 he started to work. He repeated the experiments of Wedgwood and Davy, and went on from them. By 1835 he had discovered how to get images on paper of things he saw in the camera obscura. In that year he took a minute photograph of a leaded window in his house, and was pleased to note that when examined with a magnifying glass it was possible to count each of the several hundred panes in the window. More than that he had discovered how to make his images somewhat permanent, and, most importantly, he had found a way of exactly repeating them as positives. To do this he simply waxed his paper photograph, and, using it as a negative, printed positives from it on paper—as many as he wanted to make.

He used the process to make pictures of buildings and landscapes and pieces of sculpture and plants. These pictures he called 'photogenic drawings'. At last the problem that had defeated the Greek botanists, and that had been responsible for the difficulties of many of their successors, was solved. Talbot not only had an exactly repeatable image, but one that did not require the distorting services of either a draughtsman or an engraver. In 1841 he discovered that if, after making an exposure, he treated the exposed negative with a solution of gallic acid and silver nitrate,

he could build up a very feeble, even an invisible, image into a strong one. He had discovered not only the latent image but the idea of developing or bringing it out. He called the results of his improved process 'calotypes', a word composed of two Greek words meaning 'beautiful images'. All these things taken together meant that Talbot had discovered the basic principles of photography as we know it today.

The permanence of the photographic silver image was assured by the use, suggested by Herschell, of what we call 'hypo' to dissolve out from the paper the silver salts that had not been affected by the light. Daguerre, when he learned of this, promptly adopted it for his process, but Talbot for a while kept on using his original solution of common salt, with the result that many of his early prints have faded away. Luckily, sharp photographs were taken of some of them before this happened.

Hearing of Daguerre's secret process, Talbot, to secure priority, read a preliminary paper before the Royal Society on the 31st of January, 1839, i.e. more than six months before Daguerre made his public disclosure. The following month, Talbot gave the same audience a description of his process, and demonstrated that he had secured some permanency for his images. The title of his first paper is interesting in itself—'Some Account of the Art of Photogenic Drawing, or the Process by which Natural Objects may be made to Delineatè Themselves without the Aid of the Artist's Pencil'. In other words, he fully realized that these images which he made were not subject to the omissions, the distortions, and the subjective difficulties that are inherent in all pictures in which draughtsmanship plays a part. Here were exactly repeatable visual images made without any of the syntactical elements implicit in all hand made pictures. Had Talbot been an accomplished draughtsman instead of an incompetent one he would probably not have recognized this fact, even if he had discovered how to make the images.

Immediately after the announcements by Talbot and Daguerre many other investigators flocked into the fields that had thus been

opened up. The two processes were rapidly refined and improved. But it was not until the 1860's that photography caught up with daguerreotyping in the favour of the public, which was primarily interested in portraiture and liked the minute detail of the daguerreotype, as well as its preciousness and fragility. The daguerreotype had stepped into the place previously held by the painted miniature. The calotype was used by D. O. Hill in 1843 to make what have become some of the most celebrated portraits that have been made in photography, but they did not then suit the public taste.

The story of the development of photography is clouded by the fact that many of the workers kept their discoveries secret, that others did not bother to give them adequate publicity, and that many of the discoveries were made almost simultaneously. Local patriotism has played its part in the stories as told by the historians. The long and short of it, however, was that ways were swiftly found of sensitizing various colloids, such as albumen, collodion, and gelatine, which could be applied to paper and to glass. New chemicals were discovered with novel photographic qualities. The emulsions became much faster, and sensitive to more and more of the spectrum. Originally the glass plates had to be sensitized and then immediately exposed while still moist. But ways were found of making plates that could be used dry, and therefore could be made and stored until they were wanted. They were soon being made and sold on the market. The same thing happened to the paper. The crux of the matter, in the competition between calotypes and daguerreotypes, was the fact that the calotypes being printed from rough paper negatives on a rough paper, were unable to produce the minuteness of detail that was the distinguishing mark of the daguerreotype. It was not until the glass plate and the shiny colloid surfaced paper had enabled the photographers to get detail comparable to that of the daguerreotype, that the battle was won for the photograph. We can see here the same factors at work that in the past had played such a determining role in the competition between the old graphic processes. Always the exactly

repeatable image that gave the most detail in the same space won out.

Seemingly the first book to be illustrated with actual photographs was Fox Talbot's own *The Pencil of Nature*, which came out in 1844. Its illustrations were mounted calotypes. In 1847 William Stirling's *Annals of the Artists of Spain*—the book that discovered Greco, Velasquez, and Goya, to the English speaking world—made its appearance. The very rare fourth volume, of which only twenty-five copies were printed, contained a series of calotypes by Talbot after paintings and prints. Because of its method of illustration it is to be regarded as the cornerstone of all modern artistic connoisseurship, for it contained the first exactly repeatable pictorial statements about works of art which could be accepted as visual evidence about things other than mere iconography. It was no longer necessary to put faith in the accuracy of the observation and skill of the draughtsmen and the engravers. These reports were not only impersonal but they reached down into the personality of the artists who made the objects that were reproduced.

The early photographs were in black, or brown, and white. The negatives were, as the photographers say, 'blind' to the different colours of the spectrum except the blues and the violets—as is still the case with our ordinary modern photographic papers. Gradually, by the use of various stains, ways were discovered of making emulsions that were sensitive to the different colours of the spectrum in approximately their black and white values as seen by the eye. Thus it became possible to make photographs that showed white clouds against the brilliant blue sky, and in which the reds were not represented by blacks. It was not until it became possible to develop negatives in the dark by the present familiar 'time and temperature' methods, and without constant inspection by the trying light of the dark room, that it became possible to use these very sensitive emulsions to their full extent.

As early as 1810 Seebeck, in Germany, called attention to the fact that when a spectrum was thrown on a sheet of moist paper

sensitized with chloride of silver the paper took colours that were different in the different bands of the spectrum. Seebeck's investigations were followed by those of Herschell, in England, in 1839. In 1848, Becquerel, in France, succeeded in reproducing on a daguerreotype not only the colours of the spectrum but to some extent the colours of objects. It was not, however, until 1907 that Lumière, in France, introduced his method of making colour transparencies. It is only within the last few years that it has become possible to produce photographic prints in full colour.

As I have already pointed out, Bolton, in England, about 1860, succeeded in getting a photograph of a work of art on the surface of a wood-block, which he then engraved. Until the end of the century in England and America wood-engraving over or through a photograph printed on the face of the block remained the typical way of reproducing drawings, paintings, and photographs, for use as illustrations in books and periodicals. It was not until after the turn of the present century that the making and printing of half-tones was sufficiently perfected for them to yield brilliant impressions without supplemental re-engraving with the engraver's tool.

In 1839 Mungo Ponton, in England, discovered that when a coat of albumen on a sheet of paper was treated with bichromate of potassium any parts of the albumen that were hit by the light became hard and insoluble. Later, other experimenters found out that gelatine and other colloidal materials did the same thing. By mixing pigments with the bichromated gelatine it became possible to make photographic prints in any desired pigment. In the 1850's it was discovered that a coat of bichromated gelatine that had been exposed under a negative would hold printers ink on the parts that had been hardened by the light. Out of this came the first printing surfaces for the reproduction of photographs. They were what today we might call crude photolithographs. This technique was shortly followed by that which we call collotype. Next came that for the making of what today we call 'line blocks'.

William Blake, in the 1790's, had made relief etchings by

drawing his design on the copper with dissolved etching ground, and after it had hardened, biting out the spaces between his lines with acid. He used the method in his *Songs of Innocence* and later on in his various Prophetic Books. A photographic 'line block' of a line drawing is merely an adaptation of Blake's idea. The metal plates of the line blocks, from which the reproductions are printed, instead of having drawings made directly on them, are coated with some bichromated colloidal substance which hardens on exposure to light. The plate is exposed under a negative, after which it is treated in various ways, and then washed in water, which dissolves away the part of the coating that has not been hardened by the action of the light through the negative. It is said that Talbot was the first to do this. The plate is next treated with an acid-resisting substance which adheres to the remaining areas of the coating but not to the bare surface of the metal. It is then bitten in an acid bath which eats away the spaces between the lines. An edition of *Pablo de Segovie*, illustrated with line drawings by Daniel Vierge and published at Paris in 1881, has been said to be the first book illustrated with photomechanical relief etchings, but there is little doubt that the process had been well tried out before being used in such a book as that.

The greatest and most valuable of all the photomechanical processes, however, is that known as relief half-tone. Half-tones, with which we are all familiar in the common reproductions of photographs in our books, magazines, and newspapers, may be regarded as inverse aquatints made in such a way that they can be printed as relief blocks locked up in the printer's formes with type. It is in them that the aquatint with which Goya made his prints has come to its final great fruition.

In aquatint the irregularly shaped minute white dots are surrounded by wider or narrower lanes of ink—the white is always the solid white of the paper and the ink always a solid colour of the same tone or intensity. The appearance of changing tones is secured by the varying balance between the whites and the blacks, which themselves are always of the same unvarying tones.

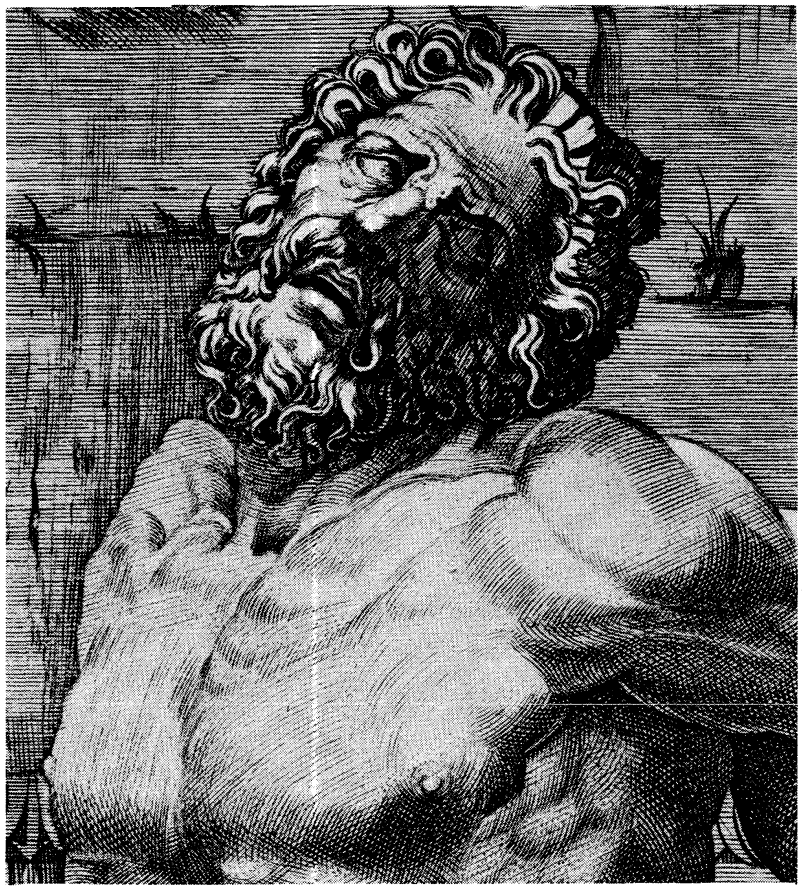
It occurred to Talbot that it would be possible to make a photographic aquatint plate that could be used in the etching press. It also occurred to him that the dots in his aquatints would be more regular and dependable if they were made by the use of a screen instead of by the necessarily irregular methods of powdering the surface or flowing a solution of resin over it. In 1852 he took out a patent for using what he called a screen made either of textile or of ruled lines on glass. His scheme was to coat a plate with a bichromated layer of suitable colloid and then expose it to the light, first under a screen and then under a pictorial negative. Where the light came through the screen it would harden the coating in bigger or smaller dots according to the amount of light that came through the negative. Where either the screen or the negative kept the light from coming through, the coating would remain soluble. After the soluble coating was washed away it was an easy matter to bite the plate with acid in such a way that the lines between the dots were sunk below the surface of the plate. Talbot sent some prints made from such a printing surface to Paris in 1853.

Talbot's patent envisaged the making of intaglio printing surfaces, but the same technique was applicable to the making of relief printing surfaces. The early commercial half-tones, however, were made not with a screen but with rather a coarse aquatint grain. Easily available examples are to be found in some of the art journals of the early 1880's, such as *L'Artiste*, in which they were used to reproduce drawings by the masters. It would have been impossible to achieve comparable results by any of the older hand made methods of making relief blocks for book illustration. Poor as the blocks were, the only personal qualities visible in them were those of the men who made the drawings that were reproduced.

In the 1870's various experimenters began to use screens made of glass ruled with parallel lines, which sometimes were straight and sometimes were waved. This method, however, had its distinct drawbacks and limitations. In 1880 a New York newspaper ran the first cross-line half-tone to appear in a daily newspaper.

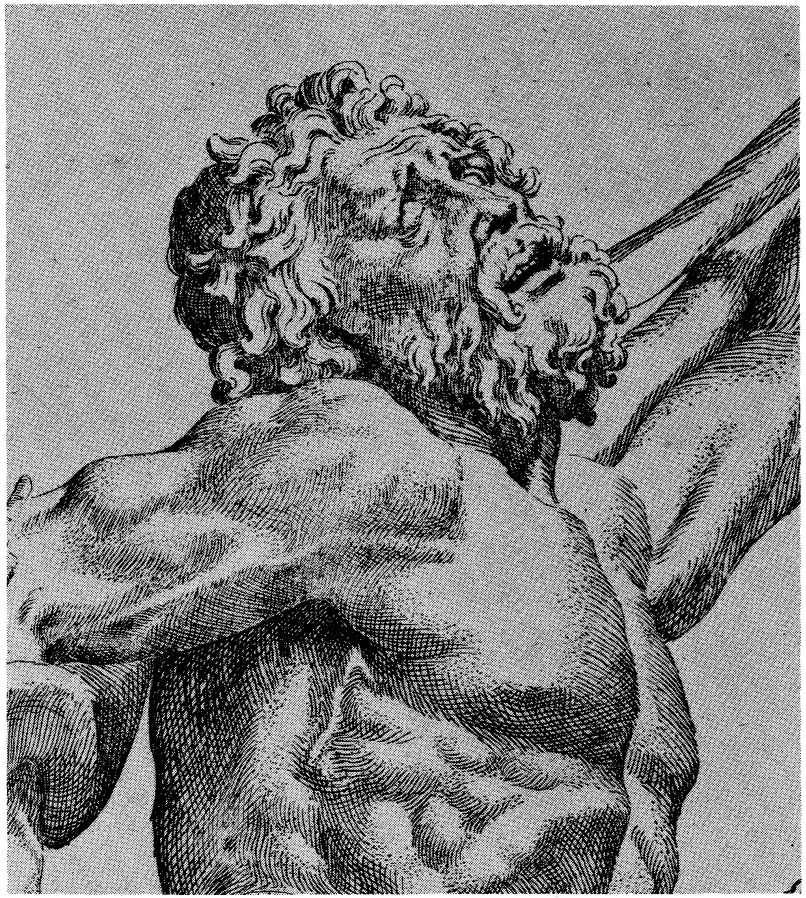
It was made through a screen of textile and was very rough and imperfect. In 1886 Ives, of Philadelphia, patented his idea of the modern ruled cross-line half-tone screen—which he produced by taking two sheets of glass, each of which was covered with ruled parallel lines, and fastening them together face to face in such a manner that their lines ran at right angles to each other. In 1892 Levy patented his method of ruling the lines on sheets of glass in such a way that the screens became both cheap and practicable. Before the outbreak of the first world war the ruled cross-line half-tone screen was in common use all over the world. The older generation of reproductive wood-engravers had nothing to do but die out, their hard-won art and craft a victim of what the engineers so simply call technological obsolescence.

The great importance of the half-tone lay in its syntactical difference from the older hand made processes of printing pictures in printer's ink. In the old processes, the report started by a syntactical analysis of the thing seen, which was followed by its symbolic statement in the language of drawn lines. This translation was then translated into the very different analysis and syntax of the process. The lines and dots in the old reports were not only insistent in claiming visual attention, but they, their character, and their symbolism of statement, had been determined more by the two superimposed analyses and syntaxes than by the particularities of the thing seen. In the improved half-tone process there was no preliminary syntactical analysis of the thing seen into lines and dots, and the ruled lines and dots of the process had fallen below the threshold of normal vision. Such lines and dots as were to be seen in the report had been provided by the thing seen and were not those of any syntactical analysis. If there remained the same complete transposition of colour and loss of scale that had marked the older processes, the preliminary syntactical analyses and their effects had been done away with, and the transposition of colours was uniform. At last men had discovered a way to make visual reports in printer's ink without syntax, and without the distorting analyses of form that syntax necessitated. Today we are so accus-

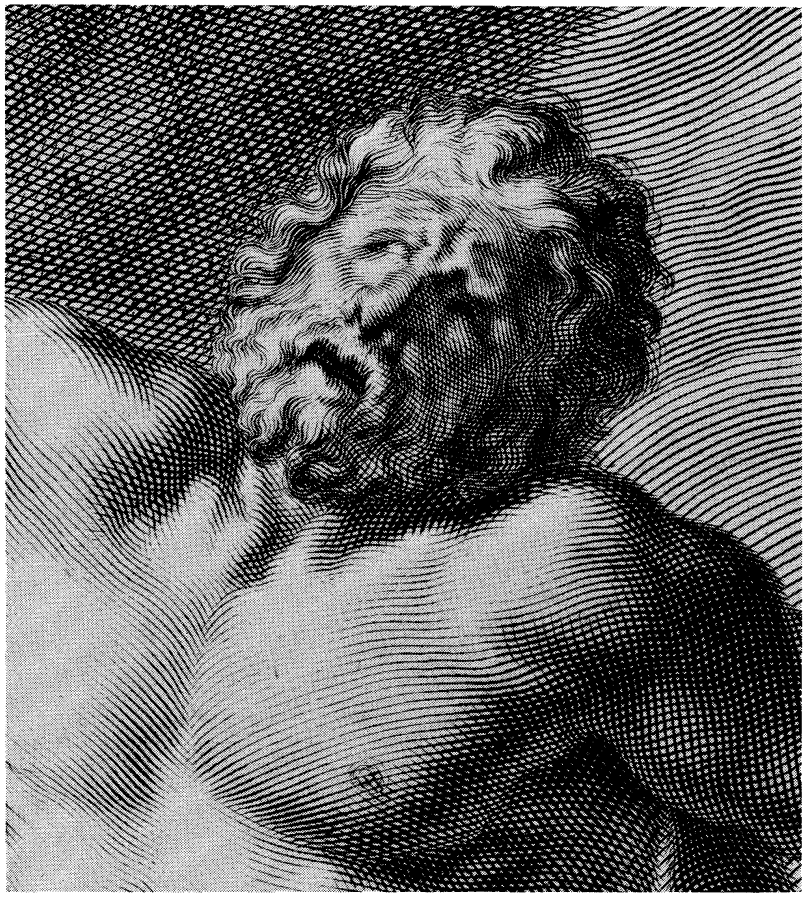


73A. The head of Laocoon, as engraved by Marco Dente, who died in 1527.

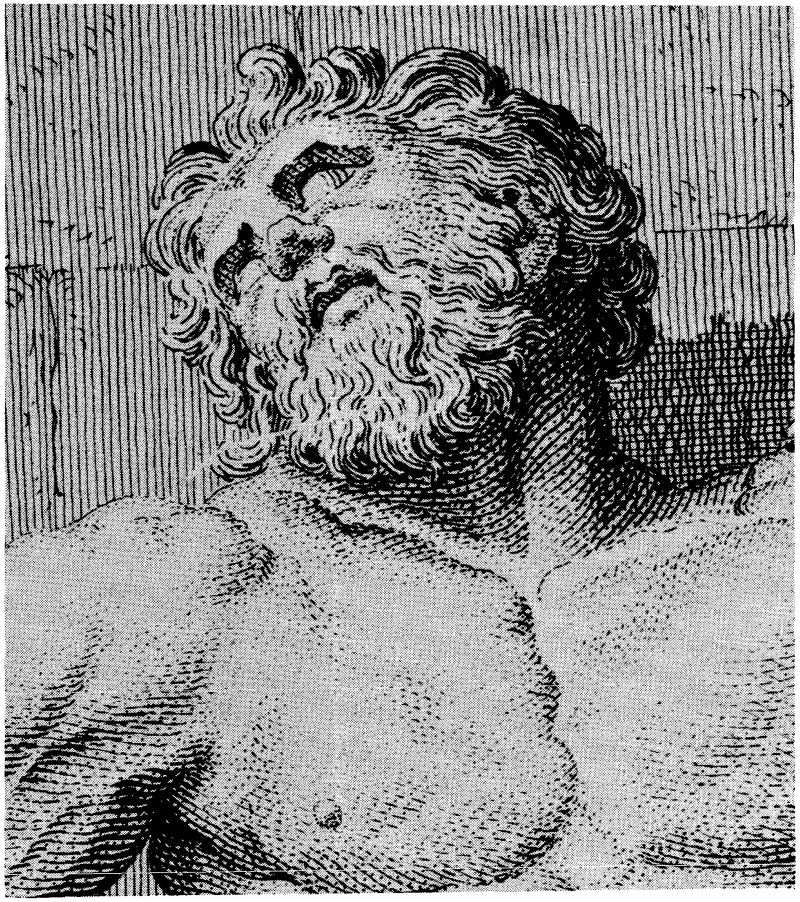
73B. The head of Laocoon as cut on wood for Marliani's *Urbis Romae Topographia*, Rome, 1544.



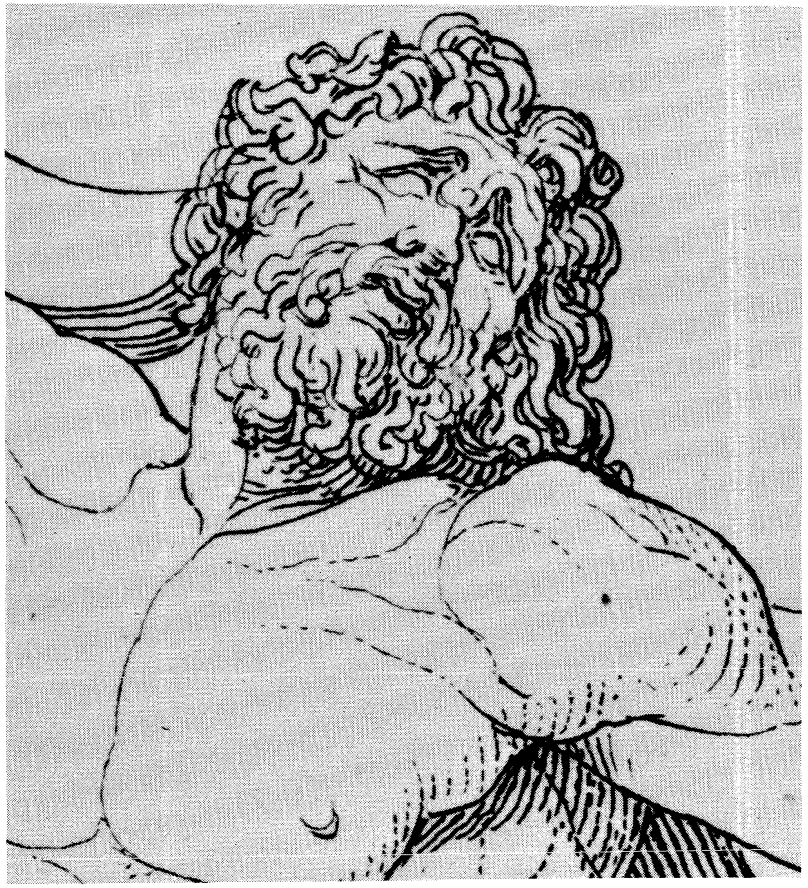
74A. The head of Laocoon, as etched by Badalocchio, about 1606.



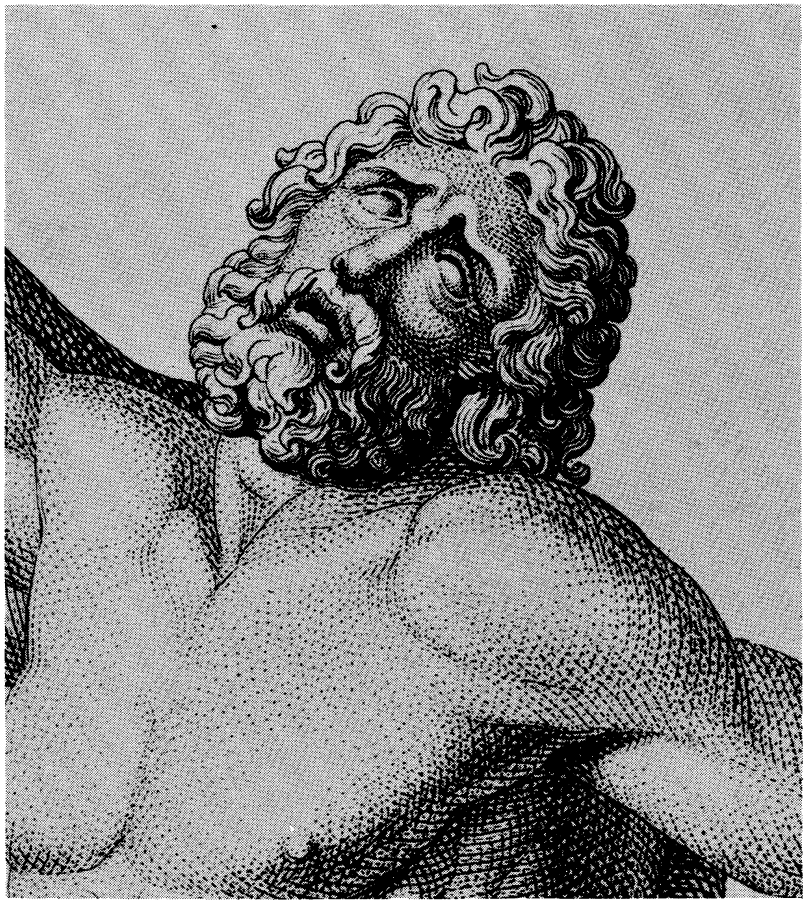
74B. The head of Laocoon, as it appeared in Sandrart's *Sculpturae veteris admiranda, sive delineatio vera*, Nuremberg, 1680.



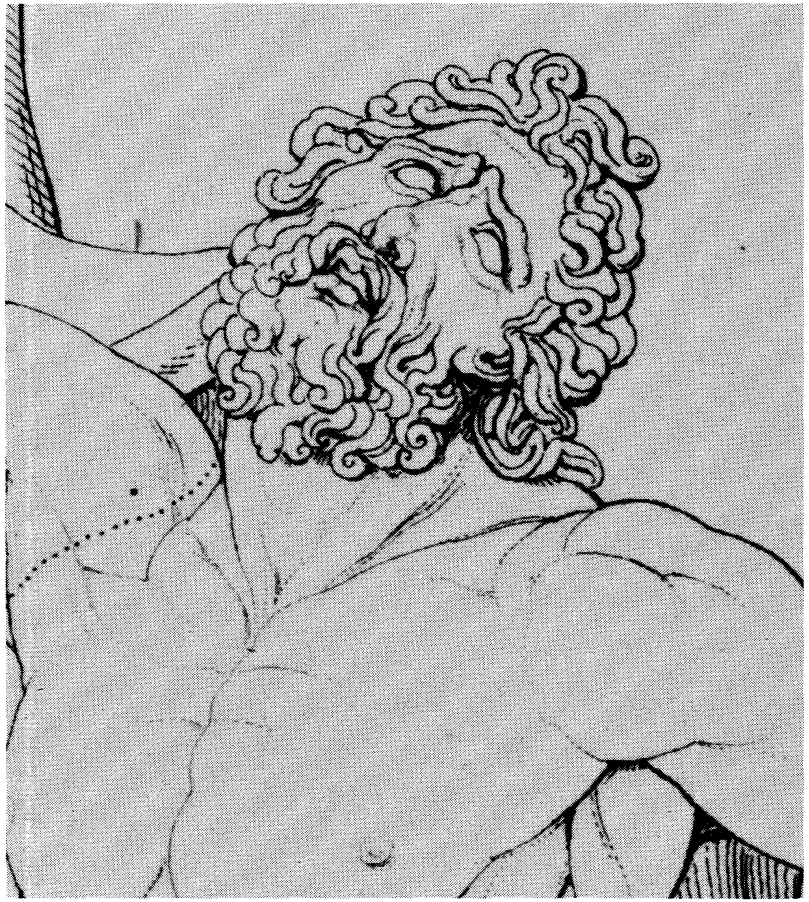
75A. The head of Laocoon, as it appeared in Poncelin's *Chef-d'oeurves de l'antiquité*, Paris, 1784.



75B. The head of Laocoon, as it appeared in the *Musée Napoléon*, Paris, 1804.



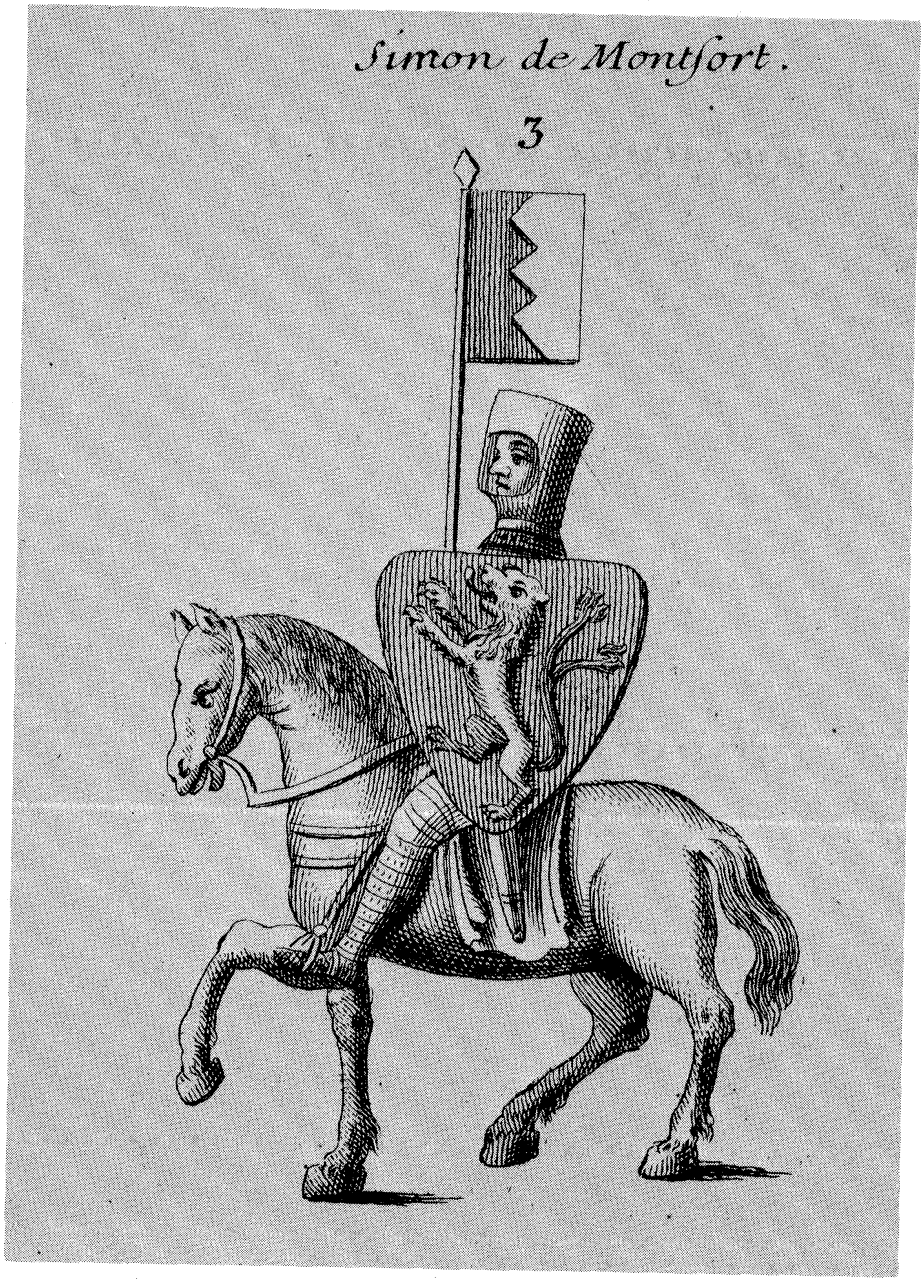
76A. The head of Laocoon, as it appeared in the complete edition of Winckelmann, Prato, 1834.



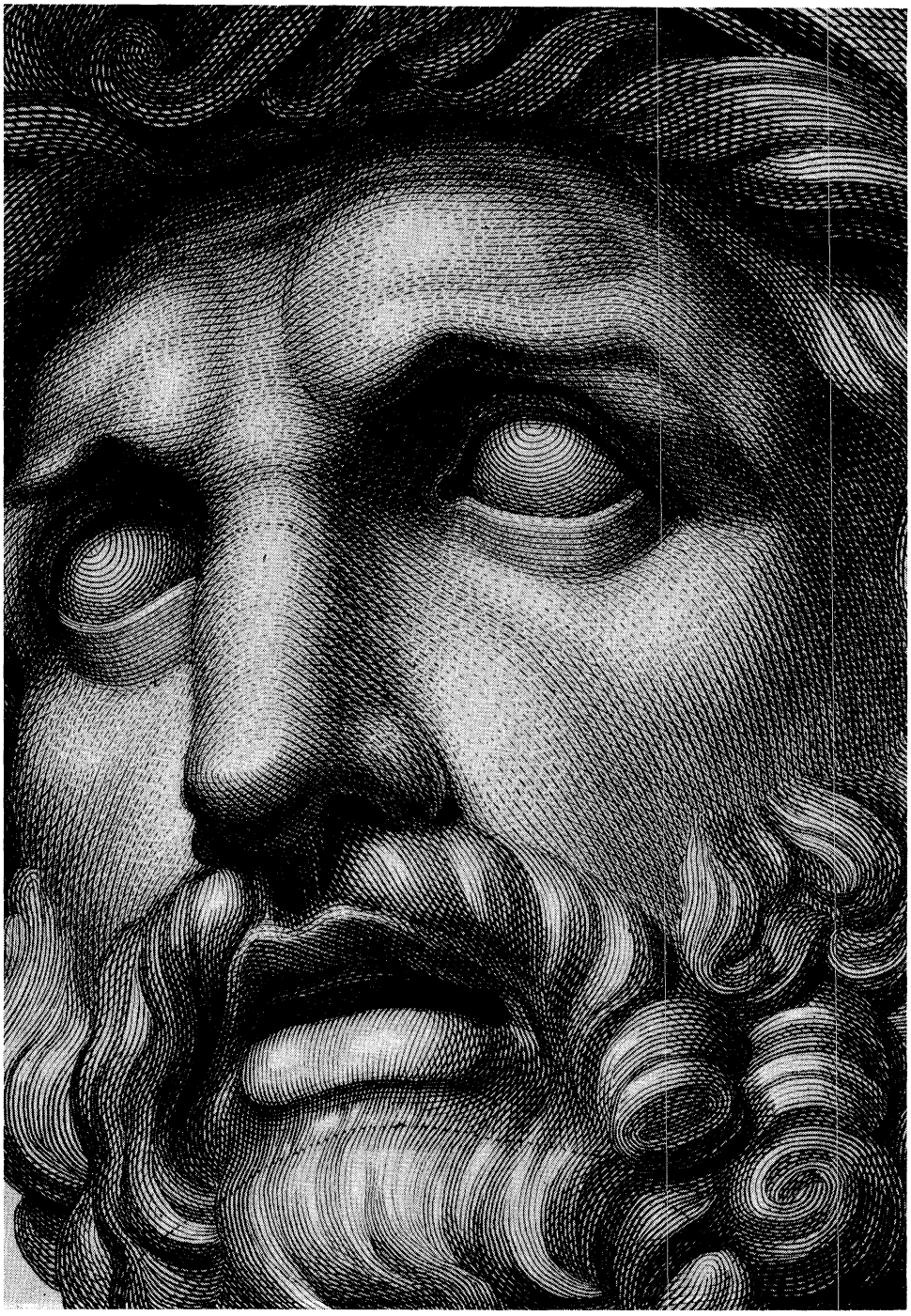
76B. The head of Laccoon, as it appeared in Clarac's *Musée de Sculpture*, Paris, 1839.

77A. The head of Laocoon, as it appeared in Lübke's *Grundriss*, Stuttgart, 1868.

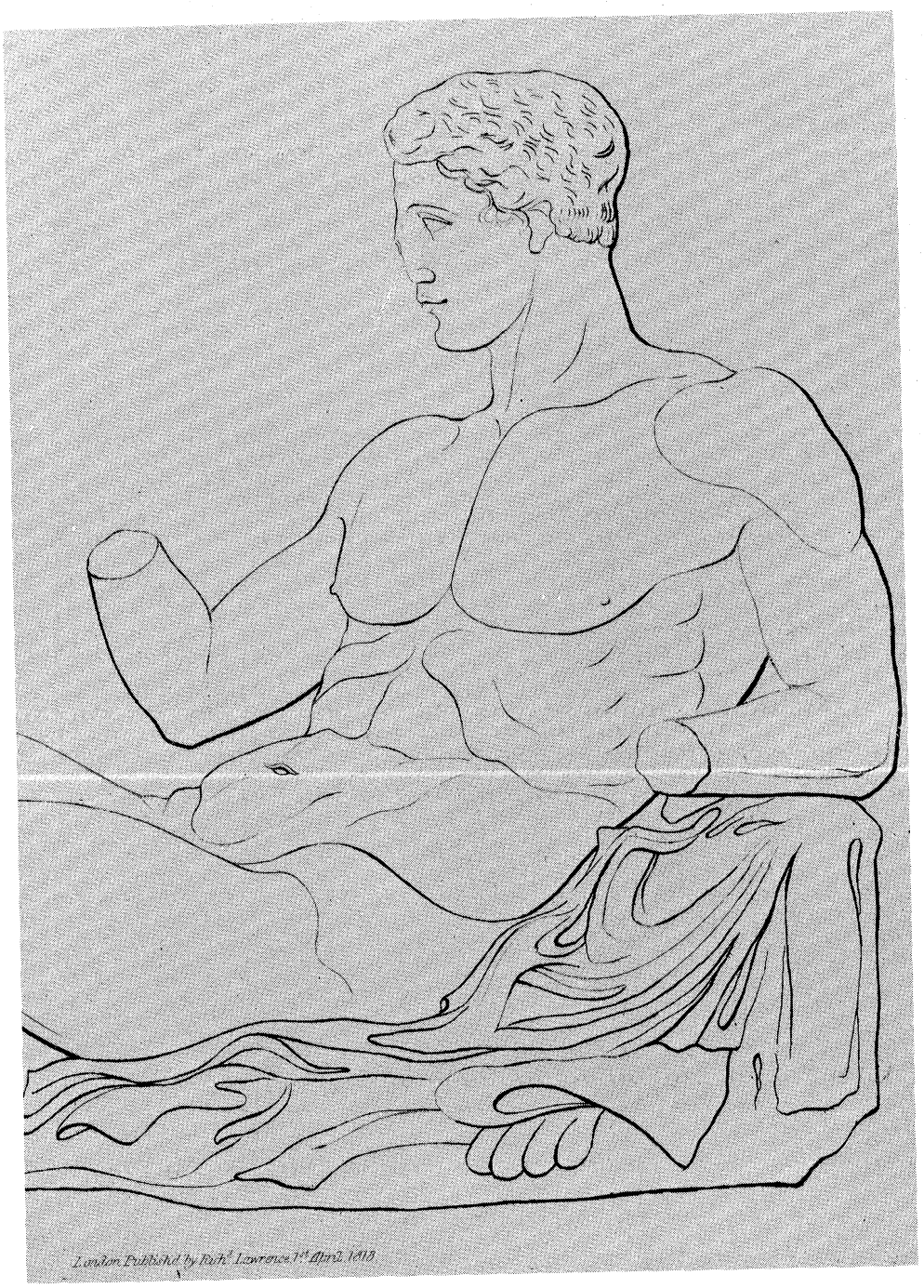
77B. The head of Laocoon, as it appeared in Murray's *History of Greek Sculpture*, London, 1890.



78. Detail from a mediaeval painted window, as reproduced in Montfaucon's *Monuments de la Monarchie Française*, Paris, 1730.



79. A classical head, as engraved for the Society of Dilettanti, London, 1809.



80. Portion of an etching of the Parthenon Theseus, from R. Lawrence's *Elgin Marbles*, London, 1818. Reduced.

tomed to this that we think little of it, but it represents one of the most amazing discoveries that man has ever made—a cheap and easy means of symbolic communication without syntax.

Great as was the change brought about by the pervasion of the Bewickian wood-engraving in the presses of the printers and the techniques of their use, that which was enforced by the half-tones was even greater. Paper-making underwent a very complete change, becoming ever more smooth and even in thickness. It is interesting to observe how few people realize the meaning of the fact that one of our modern line or half-tone blocks is treated as though it were a piece of type once it begins to be printed from. It is not only the largest piece of type the printer has to cope with, but from a strictly mechanical point of view the most difficult one that he uses. The half-tone may have anything from seventy-five to more than three hundred dots to a linear inch, each of which has its particular and essential size and shape that must be kept without change in the inking and printing, if the tints printed from the block are to be properly graduated and smooth. The printer has to adjust all his techniques of printing to the demands made by these particular printing surfaces. Had it not been for these demands many of the modern type printing processes would never have reached their present day mechanical perfection. It is all very well to talk about the pressmanship exhibited in the early printed books and in the books that come in limited editions from the modern special presses, but actually the pressmanship exhibited in any one of our modern large dictionaries or in many of our contemporary newspapers, as for example, in *The Times*, of London, and in that of New York, is very much more remarkable.

We have seen how the older type presses were unable to cope with the problem presented by the larger wood-blocks that began to be made about 1820. The photomechanical blocks made a much greater demand for strength and precision than had been made by any of their predecessors. The design and the tooling of the old presses was loose and inexact and the thickness of the papers used was irregular and varying. To secure an even impression of the

paper on the blocks and types it was necessary to interpose between the paper and the platen—i.e. the smooth surface of metal that squeezed the paper down on to the inked printing surfaces—a blanket or felt that took up all the little irregularities and maladjustments of the machine, the blocks, and the paper. Gradually the makers of printing presses and of paper discovered how to make them into instruments of a precision so great that the blankets (or soft pack) could be done away with. The problem was complicated by the need to run the presses at the high speeds required by the large sizes of modern editions. We are all aware of the difference between the accuracy with which the old horse-drawn vehicles were made and that which is essential to the motor-car, but very few of us are aware that a similar change took place in the mechanics of printing a generation before the motor vehicle came into common use.

With the gradual pervasion of the use of photomechanical processes of reproduction from relief blocks, first of line drawings, and then, through the half-tone, of photographs and wash drawings and paintings, it became obvious that most of the work that had been done in the past by the painters, draughtsmen, engravers and etchers, had basically been informative or reportorial rather than artistic in purpose, and that the new pictorial processes filled the pictorially informative needs far more accurately, far faster, and far more cheaply, than was possible with the other, older, techniques.

In spite of this evident fact, the tradition and the values of the past held on. The tradition said that engravings and etchings on copper and engravings on wood were not only the nice ways to reproduce pictures, but, more than that, the best ways. The fact that the old hand-made methods of reproduction never gave any indication of the surfaces and the tool marks in the originals was not regarded as of importance by the adherents of the tradition. I can well remember difficult conversations held less than thirty-five years ago with persons very highly placed in American art museums, who, still thinking in terms of the so recent, but already so dead, past, insisted that the best and the only really dignified

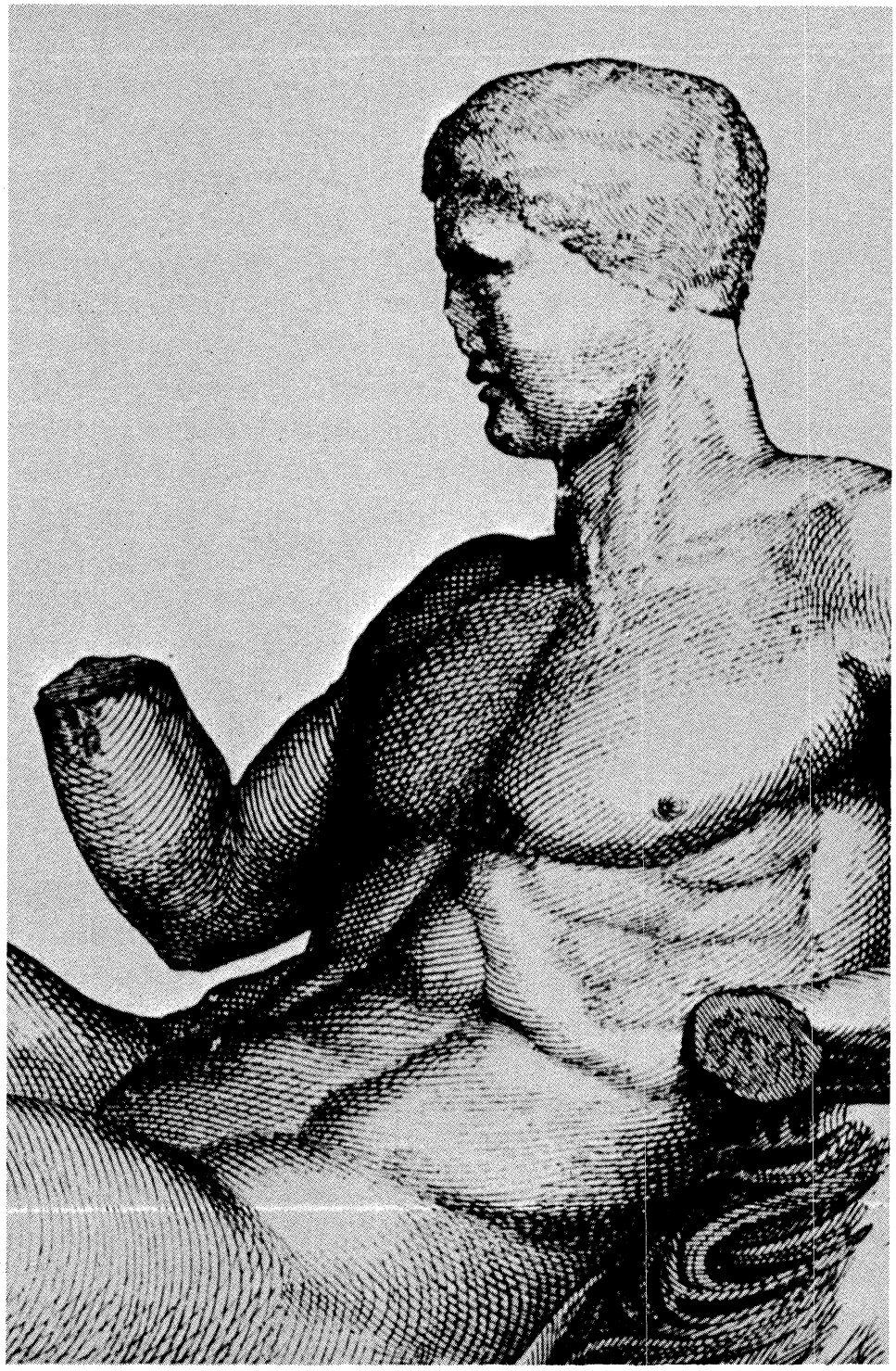
way to reproduce important paintings and sculpture was to have them drawn by recognized artists and then etched or engraved by recognized etchers or engravers. One of these old fashioned gentlemen had actually, for a while before the first world war, been able seriously to hamper the library of his institution by his insistent and powerful belief that half-tones and shiny paper were nasty and should not be allowed to disgrace its shelves.

One of the ever recurrent arguments in the age long discussion and comparison of the different arts was the idea that, while words could give a sense of movement and development, the picture by its very essence was confined to a single moment. But photography was to change all that so violently that today it is to photography that we turn for all our studies and analyses of movement and action. There must be many hundreds of thousands of cameras in this country that, to use photographic jargon, can 'stop' a human figure in action at any point in its movement by taking so fast a picture of it that it appears to be perfectly still no matter how fast it is moving.

Oddly, the fastest way there is of taking photographs was, perhaps, the first fast one to be devised. As early as 1851, Talbot fastened a copy of a newspaper to a wheel that could be made to revolve with great speed. He focussed his camera on the newspaper, started the wheel to revolving, darkened the room, opened his camera, and took his exposure by the light of an electric spark. So far as we human beings are concerned the electric spark is pretty nearly the absolute in speed. When Talbot developed his negative he found that his exposure had been so much faster than the motion of the wheel that in the photograph the type of the newspaper could be seen—'every letter being perfectly distinct'. The latest developments of this method of what is now called stroboscopic photography have shown us the remarkable configurations which occur, for example, when a drop of milk falls into a saucer of milk or a golf club hits the ball. Photographs are essential to our studies of the air currents set up by projectiles and supersonic aircraft.

But fast single photographs only show the configuration at a single moment, so that it appears to be frozen. Recourse was therefore had to the old fashioned idea of the zoetrope, a toy in which a series of hand-made pictures were arranged on a drum which was then rapidly revolved. The pictures on the revolving drum melted into one another in human vision so that they gave the appearance of motion. The trick was, therefore, to get a series of photographs taken very fast and in very close succession. At first this was done by using a battery of cameras so arranged with a timing mechanism that their exposures were taken extremely close together in time. Muybridge was, perhaps, the first to use this method for a detailed study and analysis of the motions of men and animals. His investigations began in 1872, and his first set of photographs to be published came out in 1878. At least as early as 1879 he had devised what he called the zoöpraxiscope and combined it with an oxy-hydrogen light and a projection machine, in such a way that he was able to give extremely short 'movies' of men and animals in action. The idea, however, did not become practical until some years after Eastman, of Rochester, had in the 1890's devised methods of coating long strips of celluloid with a photographic emulsion for use in hand cameras.

By early in this century the moving picture in a very primitive form had begun to take a place in popular entertainment. At first one dropped a coin into a slot and peered through a peep-hole in a contraption to see a few seconds of moving picture. Nice people in those days regarded the thing as somehow beneath the consideration of serious persons—just as many of them did the motor-car. It took some time for the technique to be developed to such an extent that it became possible to give shows in theatres. Today it is not only 'big business' but the technique has taken its recognized place in many scientific laboratories, and it is used in educational institutions for teaching. The first movies were 'silent', then someone devised the 'sound track', which made it possible by photographic means to reproduce not only the figures and action of the persons represented but what they said or sang. This



81. Portion of a wood engraving of a drawing of the Parthenon Theseus, from Overbeck's *Geschichte der Griechischen Plastik*, 1869. Enlarged.

82. Portion of the etched state of an engraving, after Moreau le jeune, from the *Monument du Costume*, Paris, 1777. Enlarged.

completely changed the technique of the movie drama and made possible, for all sorts of purposes, such a recording of the faces, figures, action, and speech of men as had previously been undreamed of. Incidentally, the sound track can be changed without changing the photography of the action, so that the same movie with the same actors can be produced in as many languages as are desired, by 'dubbing in' different sound tracks. This has made possible a study of many things in linguistics that had previously been difficult of access. Among the amusing things it has brought out is that one of the most exacting problems the photographer in the studio has to cope with is the fact that the same things said in different languages take different times to say. Spanish is almost as fast as English. French is materially slower. And German takes a much longer time. Due allowances have to be made for this when 'shooting' the original action 'on the lot'. Today movies are made in full colour, as are also photographs and process reproductions of views and objects.

Daguerreotypes were taken through a microscope as early as 1839. Today microphotography is a regular proceeding in almost all laboratories, from those of the biologist to those of the metallurgist. It is said that Dr. Draper of New York was the first to take a daguerreotype of the moon. He did this in 1840, but it was too small to be of practical use. In 1865 a practically useful photograph of it was finally achieved. Today, at the great observatories, practically all the observations are made by photographic means. In actual fact, the enormous telescopes are merely camera lenses.

The light waves or rays at either end of the visible spectrum affect the photographic emulsions. Talbot was aware of this and, although he had no means of carrying his idea into practice, he imagined that photographs could be taken in complete visual darkness without the use of what we physiologically recognize as light. He called attention to this possibility as early as 1844. Today it is common practice to take photographs with the infra-red rays, which not only work in the dark, but penetrate through coatings of varnish that deface and cover old paintings and go

through haze so that pictures of far-distant landscapes can be made. The infra-red rays are in regular use in hospitals, as are also the so-called X-rays. In 1895 Roentgen, in Germany, thanks to a lucky accident which he had the wit to follow up, discovered that it was possible to take shadowgraphs of things that were invisible to the eye because they were deep under the surfaces of things. The X-ray machine and technique have today become essential parts of the routine in hospitals, doctors' offices, art museums, and metallurgical shops.

Thus photography from being merely another way of procuring or making images of things already seen by our eyes, has become a means to ocular awareness of things that our eyes can never see directly. It has become the necessary tool for all visual comparison of things that are not side by side, and for all visual knowledge of the literally unseeable—unseeable whether because too small, too fast, or hidden under surfaces, and because of the absence of light. Not only has it vastly extended the gamut of our visual knowledge, but through its reproduction in the printing press, it has effected a very complete revolution in the ways we use our eyes and, especially, in the kinds of things our minds permit our eyes to tell us.

It has taken a hundred years of slow progress in the technology to produce this result, which, except for the flurry of excitement that accompanied the first announcements by Talbot and Daguerre, has come into being by such gradual steps that few people are very much aware of it. We take its results so much for granted that we never think of the situation before there was photography.

Thus we find ourselves in the peculiar dilemma of having a technical knowledge and capacity that are far in advance of many of our settled, accepted modes of thought and valuation, which have remained just as they were before even the initial steps were taken towards photography and are based on notions that in many respects are incompatible with its modern developments. I know that this is true in what is called art, and I have a suspicion that it is true in much of academic philosophy also.

VII

NEW REPORTS AND NEW VISION

THE NINETEENTH CENTURY

At the end of the nineteenth century photography had been known in one or another of its forms for sixty years, and some of the photomechanical processes for at least half that time. The traditional graphic processes had been defeated on most of what had been peculiarly and essentially their own ground—the making of exactly repeatable pictorial statements about the shapes and surfaces of things. The change had come about so slowly and gradually that, after the first explosion of interest and excitement which accompanied the announcements of Talbot and Daguerre in 1839, very few people were aware of what was taking place under, and especially *in*, their eyes. For a long time photographers were laughed at good-naturedly and were one of the stock subjects for jokes and caricatures. Slowly, as the community itself began to take photographs with hand cameras, there was no joke left because the photographer was everybody. As so many times before, men were doing something long before they knew what they were actually doing.

The photograph and its attendant processes took over at one