Pamphlets on Art Teaching. No. 9
EDITED BY HENRY T. WYSE, LECTURER IN ART
EDINBURGH PROVINCIAL TRAINING COLLEGE

ART PRINTING PROCESSES

By HENRY T. WYSE

EDINBURGH: ANDREW BAXENDINE & SON,
15 CHAMBERS STREET.

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No. 1. WOOD ENGRAVING.

Taking impressions on paper from carved wooden stamps is the oldest kind of picture printing. It has been employed by all civilised nations from time immemorial, and was the common method in use for all illustrated magazines in Europe and America till about the year 1885. About that time it was superseded by a photographic process in which metal plates etched by acid, replaced the wooden blocks engraved by hand.

A wood-cut is a block of hard wood rather less than an inch thick. Boxwood is generally used in this country, while the Japanese wood engravers employ cherry wood. The surface of the "block" is made perfectly smooth, after which it is coated with Chinese white water-colour paint. The lines of the picture are then drawn upon or transferred to this smooth white surface, in a reversed position, so that the right of the block is the left of the print. This is necessary in all printing so that the picture may print right way up. The lines are now gone over with Indian ink, so that the surface of the block is really a drawing in black on a white ground. The engraver—not usually the artist himself—now cuts away all the white parts with sharp tools called gravers, and leaves the black lines untouched. This he does by cutting a V-shaped groove on both sides of every black line, and then with a larger graver cuts away all the white part to a depth varying from 1-16th to 1-4th of an inch. He has now a block with raised black lines—type-high—which print black, and sunk interspaces which do not print at all. The engraver now hands on the block to the printer, who takes a pliable roller charged with ink and inks the surface of the block equally, by rolling in all directions. Only the raised lines take any of the ink; the depressions being below the level remain uninked. The printer now places a sheet of damp printing paper on the inked surface and applies pressure to it in the proving press; and a black and white print, exactly the same as the original drawing in pen and ink, is produced. A very large number of replicas may be

A

B

made. A reference to the accompanying prints will show that *all* the lines are equally black. The effect of light and dark tones is got by the different thicknesses of the lines and the variety of distances between them. During the time when wood engraving was a common means of reproducing pictures, some artists made their drawings entirely in lines; the engraver had merely to cut these exactly the same in wood. Other artists made their pictures in water-colour—without lines—the engraver translated the different tones into suitable lines. Such an engraver was much more than a skilled workman; much of the character of the finished print was the result of his ingenuity and art. Wood engraving in colours has been practised in Japan since the eighteenth century, a separate block being required for each colour. Illustration A is from a sixteenth century block and B from a nineteenth century wood engraving; both are twice the size of the originals.

No. 2. STEEL ENGRAVING.

The essential difference between printing from a wood-block, and from an engraved steel plate, is, that in the former the print is made from the *raised lines* of the block, while in the latter the ink lies in the *sunk lines* cut by the graver, the superflous ink having been wiped off the level surface. Wood blocks may be printed along with type on an ordinary printing-press. The printing of steel engravings is a slower and more costly method of printing, the plate having to be inked and wiped clean by hand for each single impression. Steel engravings were the popular pictures of fifty or sixty years ago, and were also inserted as plates in the art magazines of the same period. The process consists of carving or engraving the picture on a plate of steel, which has had its "temper" removed so that it may be more easily cut by very hard gravers. The picture is transferred face down to the steel plate, and the lines are carved out with a V-shaped tool. The parts of the picture which are to remain white and unprinted are left untouched. This is exactly the reverse of wood-engraving—in which the white spaces are cut away and the black lines left uncut—type-high. It will be observed on looking at the specimen print —magnified to twice the original size—that the engraved lines are of a special character, usually beginning very faint and thin and gradually becoming thicker. It will also be noticed that they are arranged in such a way as to bring out the characteristic form of the different surfaces portrayed. The child's curls are expressed by lines of a different character from those used in the flesh, which are cross-hatched in more than one direction. The interspaces are also accented by dots of varying sizes made by the point of the graving tool. The hardness of the engraving surface compels a certain neatness and precision which is characteristic of all steel engravings. In printing, the steel plate is slightly warmed, so that the greasy printing-ink may be easily rubbed into the engraved lines of the plate. The

surplus ink is then removed with a cotton pad covered with rough muslin, and the surface and edges of the plate are polished. The ink still remains in the engraved lines. A sheet of damp soft paper is now laid on the surface of the plate, several thickness of blanket being laid on it and the whole subjected to a very heavy rolling pressure which forces the paper into the engraved lines. The lines of the resulting print are not only black but also embossed. The accompanying print does not show this, as it is merely a black and white diagram to illustrate the positions of the lines and dots used. Many thousands of prints may be made from the plate before signs of deterioration appear. Engraving in brass or copper of the sixteenth, seventeenth and eighteenth centuries was replaced by steel engraving in the early nineteenth century. The process has virtually died out owing to modern mechanical processes which depend primarily on the camera.

No. 3. ETCHING.

Many people confuse a pen-and-ink drawing with an etching. Etching is a process of picture-printing which has been in use for several centuries, and is now more popular than ever it was. It occupies this position because it is not a transcription by an engraver, but a print from the artist's own work on the copperplate. A wood or steel engraving is a translation from the artist's picture by an intermediary engraver. An etching is a print from a plate actually etched by the artist. The printing of an etching is the same process as the printing of a steel engraving, but the making of an etching-plate is quite a different process. In steel engraving the lines are cut with a graver ; in etching they are drawn with a needle and sunk or "bitten" by means of acid. Etchings are usually printed from zinc or copper plates. The plate is prepared by coating it with a thin film of wax (etching-ground). The picture is drawn with a fine needle upon the surface of the plate through the film of wax. The back of the plate is coated with Brunswick Black to protect it in the acid. When the plate is immersed in a shallow tray of acid and water, the scratched lines are attacked by the liquid, which dissolves the metal and converts the lines into shallow grooves. When the faintest lines are bitten deep enough, the plate is taken out of the bath, washed in water and dried. The lines which are to print faint are now "painted out" with Brunswick Black, and the plate is returned to the bath to be re-bitten. The exposed lines are again attacked by the liquid which both deepens and broadens them. This process of painting out and re-biting is repeated as often as is necessary, only the broadest and darkest lines being exposed in the last biting. The wax ground is removed from the plate which is now ready for printing from. Etching-ink of a suitable colour—usually black or brown—is now rubbed into the sunk lines, the plate being slightly heated so as to facilitate this. The surplus

ink is wiped off with coarse muslin. A print is made by covering the plate with a sheet of soft damp paper and several thicknesses of blanket. The pressure of the circular roller of the printing-press produces the impression. Etchings are usually characterised by a free artistic and nervous line, quite different from those seen on a steel engraving. The etched head by Rembrandt has been enlarged to twice its original size for the purpose of emphasising the special character of the line. It is not a real etching—merely a black-and-white diagram. The lines of a real etching are embossed on the paper. Etchings are usually, though not always, printed in brown, and are identified by a faint film of ink over the whole print and by a sunk plate mark. A limited edition of from twenty to fifty prints is usually printed, after which the plate is generally destroyed.

No. 4. LITHOGRAPHY.

Lithography literally means writing on a stone. In the three printing processes already described, the ink is transferred from raised surfaces or sunk grooves to the paper. In lithography the parts which print—the lines or spots—and the parts which do not print—the interspaces—are both practically on the same level. Lithographic printing depends on the well-known fact that oil and water will not mix. The printing-ink is greasy, the stone is kept wet. A variety of limestone—found at its best in Germany—is employed, where lithography was invented more than a hundred years ago. Two kinds of lithographic drawing are shown in the illustration. That of the old sailor's head is known as "grained work," that of the girl's head as "line-work." Grained work is drawn with a crayon composed of soap and lampblack, either on a granulated stone or on a specially prepared surface-paper which is afterwards transferred by pressure to a smooth stone. Line-work is drawn with a pen and special ink either directly on the stone, or on transfer paper which is transferred also to a smooth-surfaced stone. The stone is then flooded with weak acid water which is absorbed by the stone but not by the greasy drawing. A roller, charged with lithographic printing-ink, is then passed over the stone. This ink readily adheres to the greasy drawing but not to the damp, absorbent surface. The application of a sheet of suitable printing-paper and the pressure of the printing-roller, transfers the drawing from the stone to the paper. The process may be repeated *ad infinitum*, the stone being damped between each printing. It will be noticed that the grained effect—seen in the old sailor's head—is a special characteristic of lithography not possible in any of the three printing processes already described. Lithography, especially in colours, has been so much employed for posters and other commercial reproductions that its full artistic possibilities have been realised

by artists only in recent years. It has some of the same advantages that etching has, in that facsimiles of an artist's drawing may be made without the intervention of any technical art-worker. In colour-lithography a separate drawing and a separate stone are required for each colour, as many as fifteen to twenty printings being sometimes necessary. The well-known "oleographs" of forty years ago were produced by colour-lithography. A modern substitute for lithographic stones has been found in zinc plates, which are cheaper, lighter, and more easily handled. These plates have been employed in recent years in the "Offset Rotary Process," which is the fastest of all art printing processes.

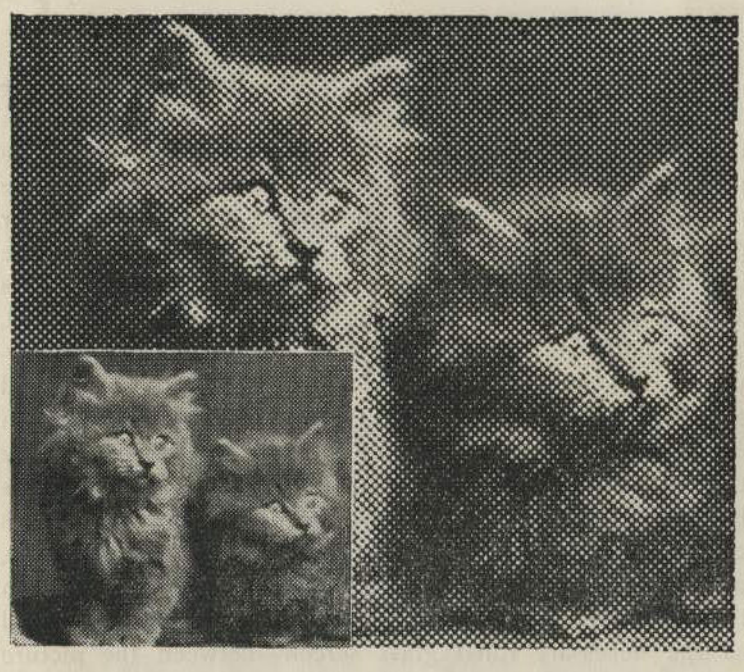
No. 5. ZINCOGRAPHY.

The first two processes described in this pamphlet—wood engraving and steel engraving—are translations of the artist's work by engravers either in wood or metal. The second two are direct processes in which the artist makes the printing surfaces unaided. (Etching and Lithography.) The last three—Zincography, Half-tone, and the Three-colour printing process—are purely mechanical means which depend upon the camera and the etched plate for the multiplication of prints. The intermediary block-maker is not a fellow-artist who translates the artists' picture, but a skilled photographer whose business is to produce in fac-simile the original picture with all its excellences and defects. By the processes he employs he may neither improve nor degrade a single line, tone or colour. In appearance a zincograph print is exactly the same as the original drawing in black ink on white paper. It may be smaller, larger, or exactly the same size as the original drawing. Zincography is suitable only for the reproduction of originals which consist of lines or spots of black on a white ground or *vice versa.* The process consists in making a negative of the original by means of a camera. The negative is placed in contact with a sensitized zinc plate. This plate is washed and treated with a special acid-resisting ink, and etched. The resultant zinc plate is essentially the same as a wood block, with type-high lines which print, and sunk interspaces which, being below the inking surface, remain white in the printing. All line prints in illustrated magazines and printing generally are now produced by means of zinc blocks. The process came into common use about 1880, replacing the wood block of former times. Its accuracy, speed of production, and reduced cost, very soon displaced the more expensive and less accurate wood engraving. In the accompanying illustration it will be noticed that every line and scratch of the artist's pen has been reproduced—twice the size of the

original—with extreme accuracy. The process is based upon that of etching, the camera being employed to transfer the original to the zinc plate. The white ground is cut away by means of acid, the printing lines being type-high as in the case of wood engraving. Such magazines as "Punch," the illustrations of which consist almost entirely of line drawings, use this process only. The rapidity of production of such blocks is of great value to "Punch," whose cartoons must be produced rapidly, so as to be appropriate to the political atmosphere of the moment of issue. A zinc block has many advantages over a wood block. Unlike a wood engraving which was a translation of an original by a technical artist, a zinc block is a fac-simile of the artists' original pen and ink drawing. Zinc being much more durable than wood, enables a larger number of impressions to be made without loss of definition.

No. 6. HALF-TONE.

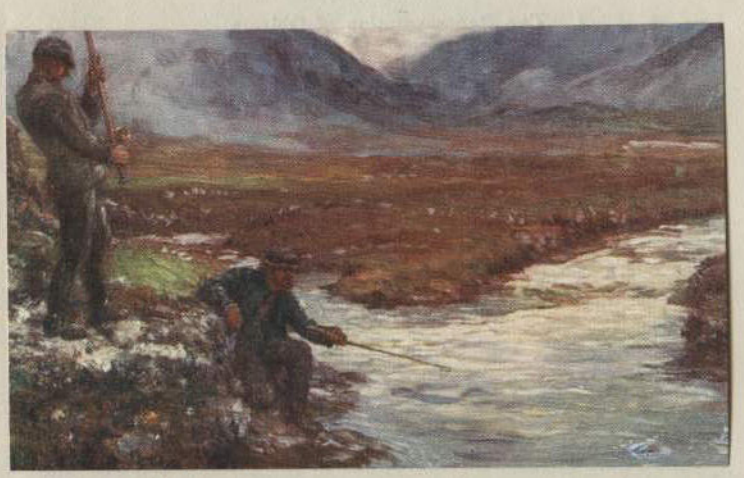
It will be noticed that the accompaning print appears like a photograph—that is it is not composed of lines like a pen and ink drawing or zinco print. It is the process employed for all the illustrations in the picture papers, and for magazine and book pictures generally. It is printed from a block twice as large as the original print for the purpose of emphasing the spots or dots of which it consists, all of which are equally black though differing in size and distance from each other. The original from which the block was made was a photograph from nature, in which the tones ranged from white to black by insensible gradations. The camera and a special glass screen translated these varying tones of black, white and greys into spots of varying size, which, when printed to the usual scale, produce the effect of the original photograph. The larger the spots and the closer they are to each other, the darker is the tone; the smaller the spots and the further apart they are, the paler the tone appears. The translation of the tones of the original into spots of varying size is effected by a glass screen, ruled with vertical and horizontal black lines very close together, averaging about 120 per inch. This screen is interposed between the original and the negative. The tones of the original pass through this screen and are condensed into spots of varying size on the negative. The subsequent operations are the same as those employed in making a zinc block. The coarser the screen, the opener the resultant print. For newspaper work, 80 lines to the inch is a common number; for fine printing about 135 lines to the inch. The accompanying illustration has about 40 lines to the inch. The process has been in common use since about 1890. Without this process the extraordinary development of modern pictorial journalism would have been impossible. Magazine illustration before the advent



of photo-mechanical printing processes consisted entirely of wood engravings, in which the illustration was first drawn by an artist. This was translated by a wood engraver into a wood block. This work, in the case of most illustrations, involved days and sometimes weeks of work. Now a scene or pictorial incident of yesterday appears in the picture papers of to-day; or an event of the forenoon appears pictorially in the evening papers. Means have even been found of transmitting photographs by telegraph, so that incidents which take place in America appear pictorially next day in our newspapers. This, of course, is not a question of art reproduction but merely one of commercial photography. In the small print above, the grain of the surface is so fine as to be hardly noticeable; in the larger illustration the varying sizes of white and black dots are plainly visible.

No. 7. THREE-COLOUR PROCESS.

The three-colour process of printing is so called because only three blocks and three coloured inks are employed in it. In coloured wood-engraving and colour lithography as many as fifteen to twenty blocks or stones and the same number of printings are required, but in the three-colour process every conceivable colour, tint and shade may be imitated by means of three printings only. The process is a development of the half-tone method already described. Three half-tone blocks—one for each primary colour—yellow, red, and blue, are used. The first block prints all the yellow in every tint; the second block all the red in every tint; the third block prints all the blue in every tint. The process of producing such a variety of tints is based on the scientific knowledge that every colour is compounded of varying proportions of one, two, or three, primaries. The method of extracting all the yellow from the picture is by interposing a violet glass filter—as well as the necessary ruled glass screen—between the picture and the negative. The Red, Blue, and Violet rays are absorbed by the sheet of violet glass; only the yellow rays reach the photographic negative. A green filter is used for extracting the red rays, and an orange one for the blue rays. The three negatives are made into half-tone blocks which, when printed with their appropriate printing-inks, one above the other, produce the coloured print. It may not be out of place to remark that the primaries are Yellow, Red and Blue, and that those colours, when combined in varying proportions in pairs, produce green, orange and violet. The exact tint depends upon their relative quantities. When three primaries are combined, black, brown, and grey, as well as an infinite variety of modified secondaries, are produced. By examining the accompanying scrap of three-colour printing, it will be observed that it is composed of spots of varying size of a uniform bright yellow, crimson,



and blue. Large spots of blue and small spots of yellow produce blue-green. Dull blue-green is produced by the addition of still smaller spots of red. The process has been in common use since 1900 for magazine prints and book illustrations.

It will be seen that the various printing processes which have been described show a characteristic evolution. The earliest process of carving away the "whites," by hand and gravers, in wood-engraving, is now effected on metal plates by acid. The imitative copying of the artist's original picture by an art workman is now done automatically by the camera. The wood and steel engraver could not avoid impressing his own art character in his translation of the artist's picture. The modern photographic prints by zincography, half-tone and three-colour printing, reproduce with absolute fidelity every tint and brush-mark on the original picture. They are in themselves, however, scientific copies only, not works of art. Of the seven processes described, only two remain unaffected by the passage of time; these are the ones in which the printing surface is produced by the artist himself, namely, Etching and Lithography.

PAMPHLETS ON ART TEACHING.

1. **The Representation of Objects.**
2. **Memory and Imaginative Drawing.**
3. **Blackboard Drawing and Writing.**
4. **Formal Writing (Pupils' Copy Books).**

Opinions of the Press.

There have just been published by Messrs Andrew Baxendine & Sons, Edinburgh, at the price of 6d. each, a series of four pamphlets on Art Teaching edited by Mr Henry T. Wyse, Lecturer in Art, Edinburgh Provincial Training College. These should prove of great service in the teaching profession. The first of the series, "The Representation of Objects; a Summary of Teaching Principles," is by Mr Francis Cooper, A.R.C.A. (Lond.), Art Master of George Watson's Ladies' College, Edinburgh, with a foreword by the editor. The author, who speaks with the authority of a long and varied experience, deals in a definite and helpful way with the difficulties both of teachers and pupils in the primary schools, and his observations are calculated to show that, along with sound method, the qualities which are successful in other departments of study will be equally so in the drawing class. The second brochure, for which Mr Wyse himself is responsible, is entitled "Memory and Imaginative Drawing." It deals with the case of the modern child, and expounds simply the suitable methods of instruction. The other pamphlets, "Blackboard Drawing and Writing" and "Formal Writing," are both by Mr Wyse, the former being full of valuable suggestions as to the many purposes the blackboard can be made to serve, while the latter treats shortly the development of writing, and particularly the present-day styles from the point of view of legibility. A further series of pamphlets is in preparation, namely, "Script Writing" (pupils' copy books), "Stencilling," "Embroidery," and "Pottery Painting." —*Edinburgh Evening News*, 16*th June* 1923.

We are glad to welcome a very useful series of "Pamphlets on Art Teaching" under the able editorship of Mr Henry T. Wyse, Lecturer in Art at the Edinburgh Provincial Training College. (Andrew Baxendine & Sons, 15 Chambers Street, Edinburgh, 6d. net each.) The first four pamphlets have been issued. These are, No. 1, "The Representation of Objects," No. 2, "Memory and Imaginative Drawing," No. 3, "Blackboard Drawing and Writing," No. 4, "Formal Writing." The subjects are treated in an eminently practical, interesting and concise way. They are intended for the use of class teachers who, owing to the variety of subjects they are required to teach, cannot become experts in any one subject. Other subjects to be included in the series are "Script Writing," "Stencilling," "Embroidery Design," and "Art Appreciation of Pictures." The practical nature of the methods described and the low cost of the pamphlets ensure a very wide circulation.

—*The Scottish Educational Journal*, 25*th May* 1923.

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NOW READY

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2. Memory and Imaginative Drawing.
3. Blackboard Drawing and Writing.
4. Formal Writing (Pupils' Copy Books).
6. Stencilling.
7. Embroidery Design.
8. Simple Pottery.
9. Art Printing Processes.
10. Art Appreciation (General).

IN PREPARATION

5. Script Writing (Pupils' Copy Books).
11. Colour Harmony.
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