

JAPANESE WOOD-CUTTING AND WOOD-CUT PRINTING.

Communicated by T. TOKUNO,

*Chief of Insetsu-Kioku (Bureau of Engraving and Printing) of the Ministry of Finance,
Tokio, Japan.*

Edited and annotated by S. R. KOEHLER,

Curator of the Section of Graphic Arts, U. S. National Museum, Washington. D. C.

Through the kindness of Mr. T. Tokuno, Chief of the Bureau of Engraving and Printing of the Ministry of Finance, Tokio, Japan, the U. S. National Museum has received as a gift from the Imperial Government of Japan the complete outfit of a Japanese wood-cutting and wood-cut printing establishment, accompanied by illustrated descriptions of all the tools and materials sent and of the processes used by Japanese engravers and printers. The original statements made by Mr. Tokuno were supplemented by answers to questions addressed to him by me, and the patience and courtesy shown by this well-informed official can not be too highly appreciated and too warmly acknowledged. The publication of the information thus elicited will be welcomed by those who are interested in the art of the wood-cutter and in the arts of Japan, more especially as Mr. Tokuno's communication is, so far as I know, the first authoritative statement on this subject made by a native of Japan thoroughly qualified for the task. As the information which follows is scattered through a number of letters and memoranda, it will not be possible to give it absolutely in the shape in which it was received, but care will be taken to adhere as closely as possible to Mr. Tokuno's own statements. Occasional obscurities which still remain must be charged to the necessity of corresponding in English and to the great distance between the correspondents. The illustrations which accompany this paper, so far as they relate to Japanese wood-cutting and printing, were all made either from the objects themselves or from drawings by Japanese artists furnished by Mr. Tokuno. Such remarks as suggest themselves upon a comparison of our own methods, past and present, with those of Japan will be given as an appendix to Mr. Tokuno's communication.

The tools and specimens alluded to in the following pages have been placed on exhibition in the Hall of Graphic Arts, eastern side, alcove 2, in the square case on the floor of the alcove, and in frames 28 to 34.

MR. T. TOKUNO'S COMMUNICATION.

THE WOODS USED AND THEIR PREPARATION. Although "tsuge," a variety of *Buxus Japonica*, or "adsusa," *Catalpa Kampferi* var. *Japonica*, are employed, according to the degree of fineness of the written characters or pictures to be reproduced, the wood most generally used is "sakura," a variety of cherry. In all cases, however, the texture must be very fine and hard.

The wood is first cut into planks, and these are planed until they are perfectly level and smooth, free from all traces of the plane, and show some luster on the surface. Both sides are finished alike, as the woodcutter utilizes both of them.

Cut planks which are to be printed in black only are usually mounted between strips nailed to each end. There are several reasons for this. It prevents the warping of the planks; it gives free access to the air between them, when a number are stored on top of one another, and provides the best means of keeping them dry and guarding against damage by insects; it prevents immediate contact of the blocks, and, finally, it is sometimes very convenient, as it facilitates the drawing out of such planks as may be needed from among many stored away together, the planks being marked or numbered on the sides of the strips. For color-printing, however, the same plank often has two or three designs upon it for different tints, and consequently has registering marks on different parts. In that case the end strips would be in the way, and are, therefore, omitted.

THE TOOLS OF THE ENGRAVER. For engraving, knives and chisels of the best quality are required. All the tools needed by the engraver are represented on Plates IV (1-18) and V (19-25), and with the following explanations their uses will be readily understood:

1. *Ruler* for cutting straight lines and for fixing the registering marks on the planks used in color-printing.

2. *Brush* for removing from the plank the chips thrown out by the cutting tools.

3. *Engraving knife*, for cutting out the design. Only one knife, always of the same pattern and size, is used by the Japanese woodcutters, and with this one knife they perform all grades of work, from the coarsest to the finest, the execution depending entirely on the skill of the engraver. [See Fig. 1 for a Japanese wood-cutter's knife, actual size, seen from both sides.]

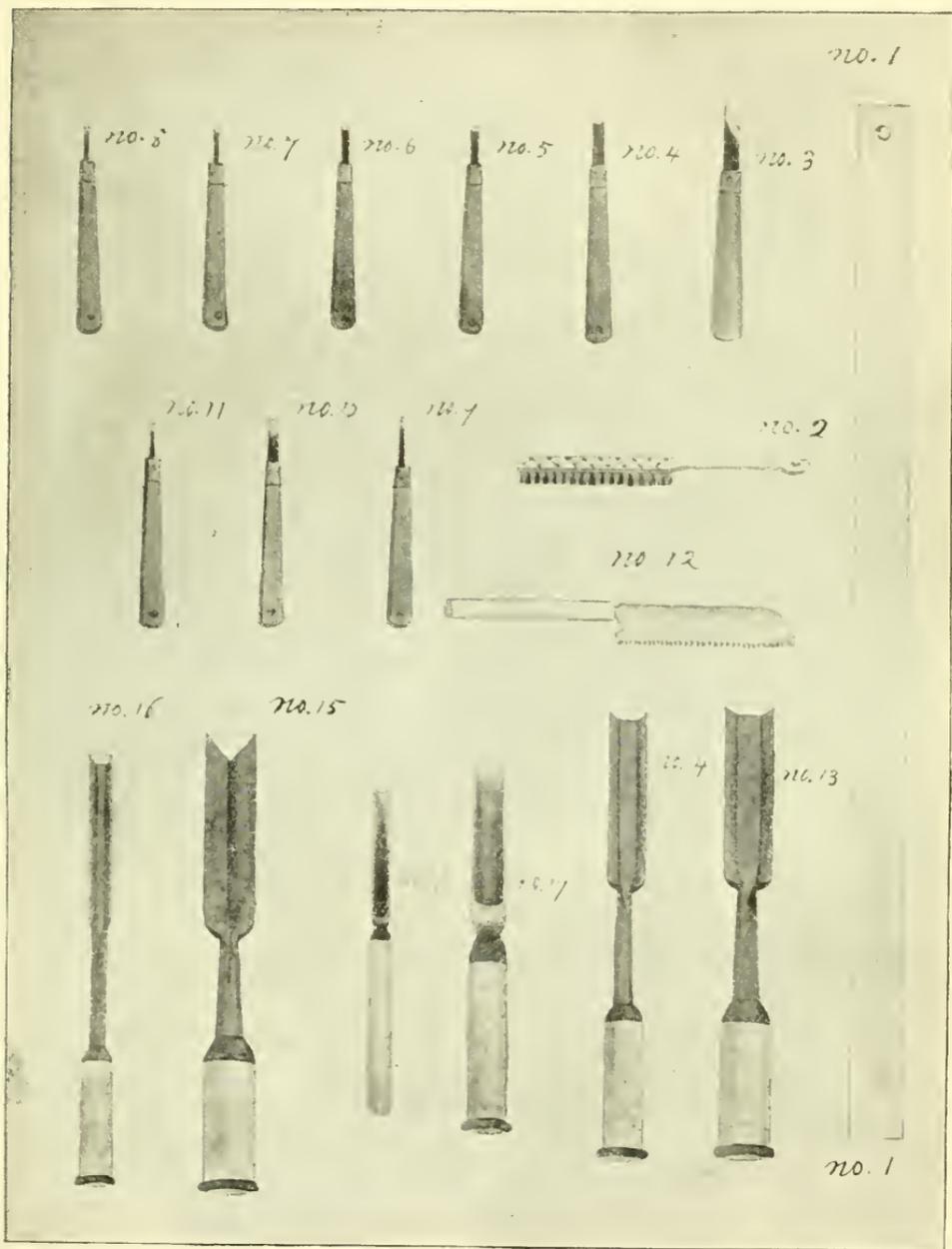
4-9. *Chisels* for removing smaller portions of wood between the lines of the design. They are used exactly like the engraving knife.

10, 11. *Chisels* for correcting unsatisfactory parts [*i. e.*, removing parts for "plugging"].

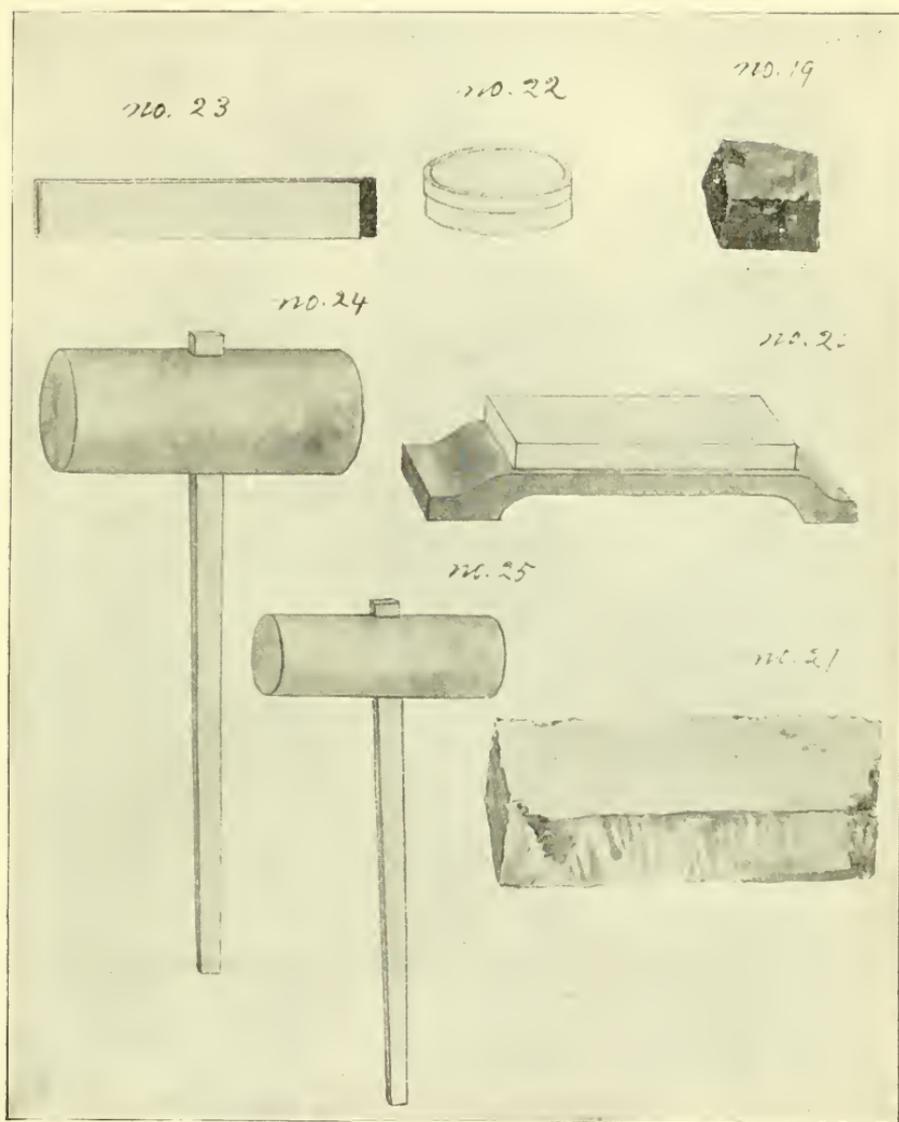
12. *Saw* for cutting small pieces of wood to be inserted in the plank where corrections have to be made.

13-16. *Chisels* for removing larger portions of wood.

17, 18. *Semicircular chisels*, used for the same purpose as 13-16.



TOOLS USED BY JAPANESE WOOD-CUTTERS.
(From a drawing in the U. S. National Museum by a Japanese artist.)



TOOLS USED BY JAPANESE WOOD-CUTTERS.

(From a drawing in the U. S. National Museum by a Japanese artist.)

19. A special kind of grinding stone, for leveling the surface of the grinding stone, No. 20.

20. Grinding stone for taking off the somewhat roughened edges of the knives and chisels, after they have been sharpened on the stone, No. 21.

21. Grinding stone. [See No. 20.]*

22. Oil pot, in which oil of *Sesamum orientale* is kept, for rubbing the portions of the plank to be cut, so as to soften the wood and make the cutting easier and cleaner.

23. Oil brush for the oil just spoken of.

24, 25. Wooden mallets for driving the chisels, Nos. 13-18.

THE ORIGINALS FURNISHED TO THE WOOD-CUTTERS, AND THE METHOD OF TRANSFERRING THEM TO THE PLANKS. Written characters or pictures to be cut on wood are drawn upon a certain kind of Japanese paper, "minogami" or "gampishi," and the drawings thus made are pasted [face downward] upon a prepared plank, by means of starch paste. The plank is now ready for the engraver. This applies to prints in black only. For color-printing, the outlines of the design are first cut and printed in black ink (Indian ink mixed with a solution of glue) upon "minogami," and the designer of the picture then marks the parts to be colored [on different sheets]. These sheets are then pasted down on the planks, as before stated, and the engraving also proceeds as before.

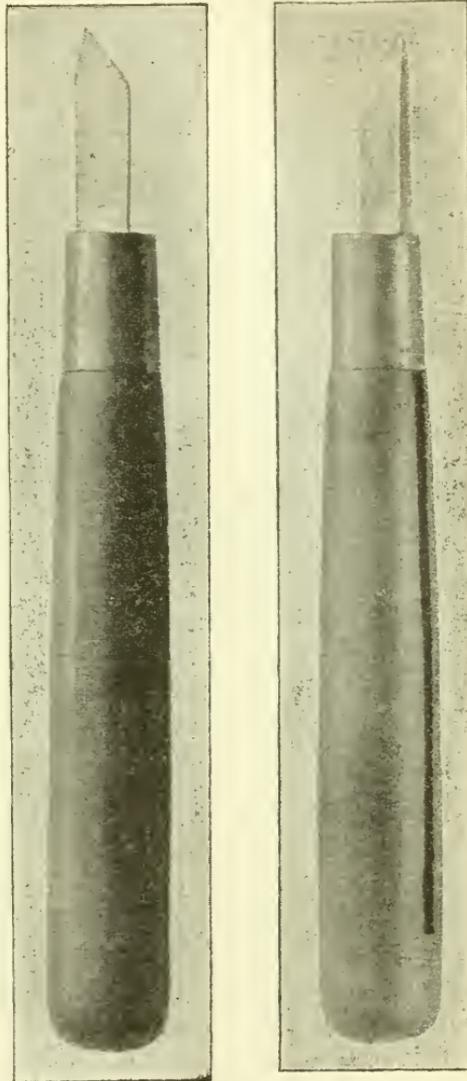


Fig. 1.

JAPANESE WOOD-CUTTER'S KNIFE.

Actual size. Two views.

(From the specimen in the U. S. National Museum.)

* Mr. Geo. P. Merrill, curator of the Department of Geology, to whom these stones were submitted, has kindly supplied the following information concerning them:

None of them correspond exactly to the stones used for similar purposes with us.

No. 19 is a dark blue-gray, fine-grained argillaceous rock, impregnated with lime,

AIM OF JAPANESE WOODCUTTING. The important point to be kept in view in characteristic Japanese wood-cutting is to show the direction of the brush in painting, so as not to destroy the features of an original picture or of written characters. The direction in which the knife is moved might be said to be almost identical with the direction of the brush, and wood-cuts by skillful hands therefore show the exact features of the originals, while, at the same time, they have a special artistic character of their own.

MANNER OF HANDLING THE ENGRAVING TOOLS. The tools, having been put into good order and well sharpened, are laid on one side of the engraving table, and upon the latter is placed the plank to be cut. The wood-cutter, holding his knife in his right hand and pushing the back of it with the middle finger of the left hand, first cuts around all the lines of the design, and then removes the wood between them by means of the chisels, so as to leave the lines in relief. He then, with a small brush, cleans and washes the plank, and has a proof taken, after which he makes corrections, if necessary.

Plate VI shows a wood-cutter at work. A is the plank; B, a grinding stone for sharpening the knives and chisels; C is a box containing engraver's tools.

DIFFERENCE BETWEEN OLD AND MODERN JAPANESE METHODS OF WOOD-CUTTING. Although the method of cutting on wood differs slightly at present from the ancient method, the principal points are, nevertheless, the same.

All ancient wood-cuts are comparatively deeper than those of the present day. The shallowness of modern cutting is due, probably, to the ability to do much finer work.

In the ancient style the outer boundaries of letters or pictures were cut away deeply before they were properly engraved. At present the stages are reversed. The latter method takes less labor and time, and it is probably one of the causes of the shallow cutting at present in vogue.

Formerly the paper bearing the original design, after it had been pasted down on the plank, was oiled, so as to make it transparent, and to enable the wood-cutter to see the design quite distinctly. This is not necessary now, as it is easy to get paper sufficiently thin and transparent in itself.

Semicircular chisels are now in use for removing some of the parts between the lines of the design. There were no such chisels formerly,

somewhat resembling our ordinary roofing slate, but softer and less finely fissiled.

No. 20 is a soft, buff-colored argillaceous rock, more like the German razor hone than anything we use.

No. 21 is a whitish, somewhat decomposed siliceous rock, rather coarse for a whetstone, giving, when breathed upon, a distinct clayey odor, indicating the presence of free argillaceous matter.



JAPANESE WOOD-CUTTER AT WORK.

(From a drawing in the U. S. National Museum by a Japanese artist.)



and hence much more time and labor was spent on this part of the work than at present.

PAPERS USED FOR PRINTING, AND THEIR TREATMENT. The papers used, whatever their quality, should be sized with a thin animal size. Among the prints sent to the U. S. National Museum are impressions on three different kinds of paper:—a special Japanese paper, made at the Insetsu-Kioku paper mills [known in America as Imperial Japanese paper], a Chinese paper, and “masa” paper.

The sheets are moistened with water before the printing begins, the degree of moisture differing according to the quality of the paper, the proper degree being determined by the judgment of the printer. “Masa” paper, for instance, on which the progressive proofs of one of the pictures (“Yinaka genji”) sent to the U. S. National Museum are printed, should be very slightly moistened by means of a brush. Experiment has shown the amount of moisture in this case to be 13.86 per cent. A single wet sheet is put between every three or four dry sheets, until a suitable layer is formed, which is pressed between two wooden press-boards. When all the sheets have the proper degree of moisture they are ready for printing.

As the printing on this moist paper is done with water colors, it can be well done only by an experienced printer. The following points are to be noted: *A.* The paper should rather be under than overmoistened. If it is overmoistened the water colors will spread beyond their limits. If the paper dries during the progress of the work, wet sheets are put between the sheets to be printed, and the heap is allowed to lie until the proper degree of moisture has been obtained. If the paper is thick and strong it should be slightly moistened from the back by means of a brush. *B.* Great care must be taken not to put an excessive quantity of color on the plank. Rice paste serves well to prevent the water colors from spreading, and it ought to be used for every impression.

The printed sheets, in the interval between two printings, are laid on top of one another, to the number of many hundred sheets. If the water colors have been properly applied there is no fear of offsetting on the backs of the sheets.

A backing sheet is not generally used, but if it is desired to avoid all traces of the “baren” on the back of the printed sheets, a sheet of thin paper is used for backing.

PRINTING ON SILK.—Silk is occasionally used for printing instead of paper, and one of the specimens sent to the U. S. National Museum is on this material. It is usually found necessary to mount the silk on paper, but some experts can print without this device. The silk on which one of the impressions of “*Nandina domestica*” is printed [in 33 colors] was mounted on paper, but only along the edge which was laid against the registering marks. When the printing was finished this edge was trimmed off.

PIGMENTS AND VEHICLES USED FOR PRINTING.—Five colors or pigments only [black, white, red, yellow, blue] are generally used for the most characteristic Japanese printing, such as the picture called “Yinaka genji,”* sent to the U. S. National Museum. They are all mixed with the necessary quantity of water, when about to be used, and the various hues, shades, and tints required are obtained by mixing the proper pigments together. These pigments, of which samples were sent to the U. S. National Museum, are the following:

a. Black, “tsūke-zumi,” is generally prepared by macerating Japanese ink (a kind of India ink) in water for a few days, until the glue contained in it is dissolved, and the ink is sufficiently softened. It is then ground by means of pestle and mortar. As, however, the “tsūke-zumi” so made is very liable to deterioration, a sample of a lampblack obtained from a Japanese ink macerated in water so as to remove the glue, was sent to the U. S. National Museum. Consequently when this lampblack is to be used, and after it has been mixed with water, glue solution, or rice paste (according to the judgment of the printer) will have to be added. If glue solution is used it should be mixed with the lampblack in a basin, but if rice paste is used, that is mixed with the pigment on the plank itself by means of the brush.

b. White, “tō-no-tsuehi,” is white lead. It is used either alone, for prints of flowers, birds, etc., or mixed with other colors, if light tints or body colors are wanted.

* “Yinaka genji” is a design in black outlines with color washes. It is printed on three sheets, intended to be pasted together, each sheet measuring about 9 $\frac{1}{4}$ inches in breadth by 14 inches in height, printed surface, or the three sheets, when pasted together, about 29 inches in breadth by 14 inches in height. It represents a hilly landscape, in the middle ground of which agricultural operations are being carried on. Six larger figures occupy the foreground, as follows: On the first sheet are represented two richly dressed ladies, the one to the left kneeling, turned towards the right, and holding a parcel in her left hand. The one to the right stands, with the body turned towards the right, but looking down upon the kneeling figure on the left, and holding in her left hand a vessel suspended by a string. In the second or middle sheet there is another richly dressed lady, kneeling, with her body nearly fronting the spectator, while her face, shaded by the left hand, is turned up towards the group in the third sheet. In her right hand she holds a fan. On the third sheet there is a group of three figures. A man, likewise richly dressed, wearing a sword in his belt, and holding a pipe in his left hand, stands, turned somewhat towards the left, but looking back upon a lady who kneels to the right of him and makes an appealing gesture with her left hand. To the right of the kneeling lady, somewhat back of and bending down towards her, is a second lady, standing, who makes a gesture of astonishment with her left hand. Both are richly dressed. The coloring is brilliant, mostly in flat masses, with little modeling or gradation, except in the sky. The first sheet has 25 printings, the second 26, the third 23, including a “blind” impression, which produces an embossed pattern in the garment of one of the figures.

“Yinaka genji” is the title of a Japanese novel, of which this picture is an illustration.

c. Red, "yō-kō," a kind of scarlet (imported), probably carmine. Formerly the best kind of safflower, called "ki-jō-mi," was used, but on account of its present high price the use of "yō-kō" has become quite popular.

d. Blue, "bero-ai," is Prussian blue. Formerly "ai-rō" paste, obtained by extraction from blue threads or rags dyed with indigo, or from "ai-gami," a paper saturated with indigo, was used. But since the introduction of Prussian blue from Europe its use has become quite general.

e. Yellow, "ki-wō," is orpiment. Formerly "zumi," extracted from a particular yellow wood; turmeric, "wukon-ko;" and a yellow ocher, "wo-do," were used, but orpiment has now taken their place.

For mixing these colors water only is used, but never any sizing, such as glue, except with lampblack, as before stated. A small quantity of rice paste is, however, mixed with the colors on the block or plank when color prints are to be made.

By mixing these pigments the various hues desired can be obtained, but the results will be as bright as those shown in "Yinaka genji" only in the hands of a skilled workman. There is, however, no particular method of producing these colors; the result depends entirely on the practical experience of the printer, who can judge the exact proportions of the pigments to be mixed, without using either balances or measuring glass, and who does the mixing either in his color dishes or upon the blocks themselves. Rice paste gives a peculiar luster to the colors, and much of their beauty depends upon the time and care devoted to grinding them with water. It is a fact well known to Japanese printers that skilled hands produce much finer colors with the same pigments than unskilled hands.

There is a brilliant purple [violet] in "Yinaka genji" which has been taken for an aniline color, although no aniline color has been used in the printing of this picture. The color in question was obtained by boiling a certain quantity of red (scarlet) and blue (Prussian blue), such as those just described, with water, and with proper treatment a bright purple [violet] can be obtained, almost the same as an aniline purple. This latter purple, however, has now come more generally into use, owing to the ease with which it can be managed. A brown color, formerly made by mixing red, yellow, and black, has now also been replaced by "bengara," which is a kind of red ocher.

The pigments used for printing "Nandina domestica"* are quite different from those so far spoken of, but the method of using them is the same. Following is a description of these pigments:

a. Black, "sumi," the best kind of India ink made in China or Japan

*This picture represents a stalk with leaves and a cluster of the fruit of "Nandina domestica," a plant belonging to the Barberry family, printed on a sheet measuring 6 inches in breadth by 9½ inches in height. It is without a background and without outlines, broadly and effectively modeled, but without any attempt at realistic rendering.

(the particular place is Nara). It is prepared for use by rubbing it with water upon the surface of a stone vessel called "suzuri," familiar to every Japanese.

b. White, "gofun," calcium carbonate [white chalk]. For use it is put in a color dish, and a few drops of glue solution are added. It is then rubbed with the finger in contact with the dish, until it becomes a wet mass and somewhat pasty. A little glue solution is again added, and the rubbing repeated, and so on several times. When the mass has become sufficiently pasty to be made into a pudding, it is beaten several times against a plank, and then reduced to a thin paste by diluting with water.

c. Pink, "sho-yen-ji." This is apparently cochineal, but its chemical nature has not yet been ascertained. It is imported from China, in the form of cotton felt dyed red. To prepare it for use this felt is put into water and gently pressed. The resulting pink water is poured into a color dish, and evaporated nearly to dryness in a water bath, or over a very slow fire, care being taken not to let it dry completely, as otherwise its brilliancy would be destroyed. It is then kept in a cool place, and protected from dust by putting a cover on the dish or by placing it upside down in a box.

d. Blue, "ai-bō," a dark blue, hard stick made of indigo. For use it is ground, like "sumi," in a color dish, with a few drops of glue solution. When a sufficiently deep blue color has been obtained, it is well rubbed with the finger in contact with the dish, and then evaporated to dryness over a slow fire. A few drops of water are now added, the dish is again placed over a slow fire, the rubbing with the finger gone through with as before, and water is added gradually, until the proper shade of color has been obtained. If these directions are not strictly followed, the pigment is not well diffused in the water, and the resulting color, as a matter of course, is not satisfactory. The treatment of the pigments *gofun*, *shōyēn-ji*, *ai-bō*, etc., requires great caution, and the Japanese printers and painters consider it one of the difficulties of their art.

e. Yellow, "shi-ō." This is gamboge, and is imported. For use it is diffused in water, and no glue whatever is added.

f. Brown, "tai-sha-bō." a hard, brown stick made of a red ocher. For use it is treated exactly like "ai-bō."

g. Red, "shu," vermilion. For use it is well mixed with a few drops of glue solution, ground thoroughly with the finger, and then diluted with water to the proper consistency.

The following pigments are also used in printing, and samples of them have been sent to the U. S. National Museum:

Red, "ki-jō-mi," safflower. This color, in solution, is very apt to suffer on exposure to sunlight, and the bottle in which it is sent is, therefore, wrapped up in black paper. After it has dried on the paper, it is not so fugitive as to make it undesirable for printing.

Red ocher, "ben-gara."

Turmeric, "wakon-ko."

Yellow ocher, "wō-do."

Yellow, "zumi," extract from a particular yellow wood.

Blue, "ai-gami." Paper saturated with a solution of indigo.

Blue, "ai-rō." Indigo paste.

Of the vehicles used by the printer in the manipulation of his colors, the following is to be said:

Glue solution. The strength of this solution differs according to the different pigments, printing papers, silks, etc., to be used.* About one-third of an ounce of glue to about three-fourths of a pint of water is, however, an approximate proportion.

Rice paste. This is used for both of the classes of pigments described. It is made by boiling rice flour with a certain quantity of water, and is kept in a suitable vessel. Newly made paste is preferable; old and rotten paste should not be used. The pigment to be used is put on the block or plank, and some of the paste is then added, care being taken to mix the two well and evenly by means of a brush. If the printing brushes are not charged with this paste, the brilliancy of the colors is much lessened.

THE TOOLS OF THE PRINTER. The use of these tools will be understood from the examination of Plates VII (1-4), VIII (5-17), and IX, in connection with the following explanations:

1. *Box*, for keeping all the tools and materials required for printing. The rack on top is used to hang the brushes on, and can be removed and packed in the box. The paper is kept on the shelf, so as to prevent its drying and being carried away by the draft. The colors are placed into the lower compartment. The box also serves to keep the dust and dirt from the paper and the colors.

2. *Boards*, for pressing wet paper.

3. *Small box*, for keeping colors, color dishes, etc. This is stored in the box No. 1, when not in use.

4. *Printing table*, which, when not in use, serves to close the front of box No. 1.

5-7. *Brushes*, for charging the cut planks with the printing colors, one particular brush being used for each color. When not in use, they are hung on the rack on top of box No. 1.

8. *Brush*, for wetting paper.

9. *Oil of Sesamum orientale*, contained in a bottle. (See No. 10.)

10. *Baren*, a little shield which answers the purposes of the European press. After the sheet has been laid down on the plank charged with color, it is rubbed on the back with the "baren," so as to make it take the impression. The face of the "baren" in contact with the paper is occasionally rubbed with oil of *Sesamum orientale*.

11-13. *Chisels and a knife*, used to correct the registering marks, if that should be necessary.

14. *Agitator*, for mixing colors in the basin, No. 17.

15. *Pads of cotton cloth*, to be placed under the four corners of the planks, while printing, to keep them from moving.

16. *The five dry colors* described above as used in the printing of "Yinaka genji," put up in bottles.

17. *Basin*, for mixing colors.

THE PRINTER AND PRINTING. The method of taking impressions is illustrated on Plate IX. The printer seats himself, and arranges all the tools and materials required, in good order, as shown. The plank to be printed is placed on the printer's table A, and the required color is laid on with the brush B. The paper being ready for printing, and having been placed upon the shelf C of the box D, a sheet of it is laid down upon the plank, and is rubbed lightly with the "baren" E. The printed sheet is then placed on a board which rests upon the box F, used for keeping colors, color dishes, etc., and when the required number of sheets has been printed, they are put back on the shelf C. Another plank is now taken, the second impression is made upon the sheets bearing the first, and this is followed by the third, fourth, etc., until the printing is completed.

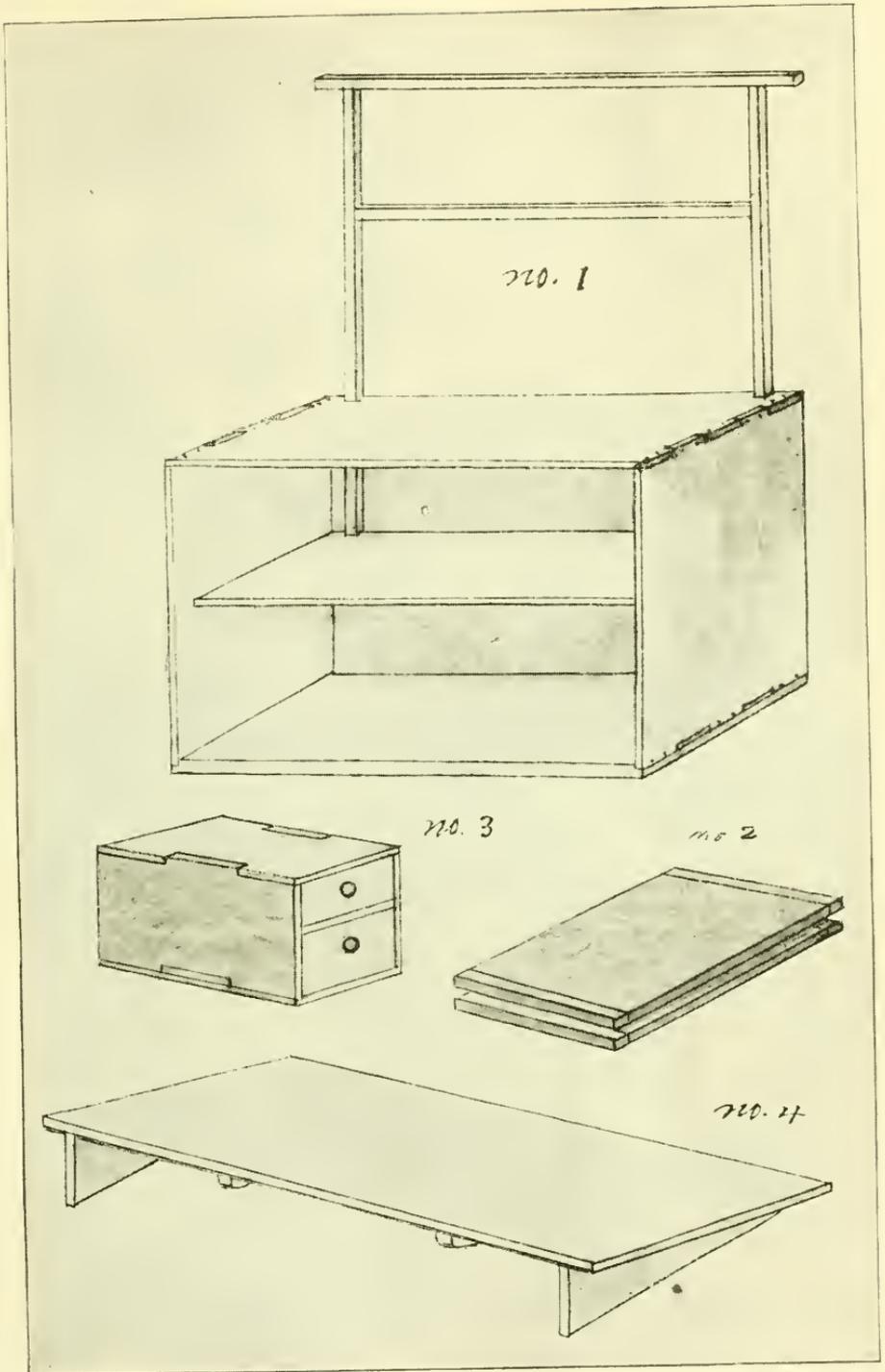
Charging the block with color. ["Inking" the block.] As before stated, the pigment to be used is put on the block or plank, and some rice paste is then sprinkled upon it. It is well, also, to soak the brush properly with this paste, so as to mix it thoroughly with the pigment. This increases the brilliancy of the colors, and also fixes them more completely.

Dry impression. [Embossing.] There is a special kind of printing, called "dry impression." This is used when it is desired to represent designs of the same color as the ground, but differing in brilliancy. It is executed after the printing has been finished, and the paper has become quite dry. The sheet is then laid upon a plank specially cut for the purpose, but not charged with color, and is rubbed with the "baren."*

The "baren" and the method of using it. The "baren" (see Plate x a-d) is a little hard shield, *d*, consisting of a stiff disk *a*, made of layers of paper pasted together, and turned up at the edge so as to form a very shallow receptacle, and covered with cotton cloth on the outside. A second disk *b*, formed of twisted cord, fits into this shallow receptacle, and is held in place by the bamboo sheath *c*, made of the ribbed leaf of the bamboo, which is drawn tightly over it and twisted together on the back, so as to form a handle. This latter is made more convenient for the hand to grasp it by a strip of paper wound around it and so arranged as to assume the shape of a rectangular pad.† The

* Some specimens in the U. S. National Museum show, however, that this embossing is occasionally done before the printing is finished.

† This description is based upon the object itself, rather than upon Mr. Tokuno's notes.



TOOLS AND APPLIANCES USED BY JAPANESE WOOD-CUT PRINTERS.
(From a drawing in the U. S. National Museum by a Japanese artist.)

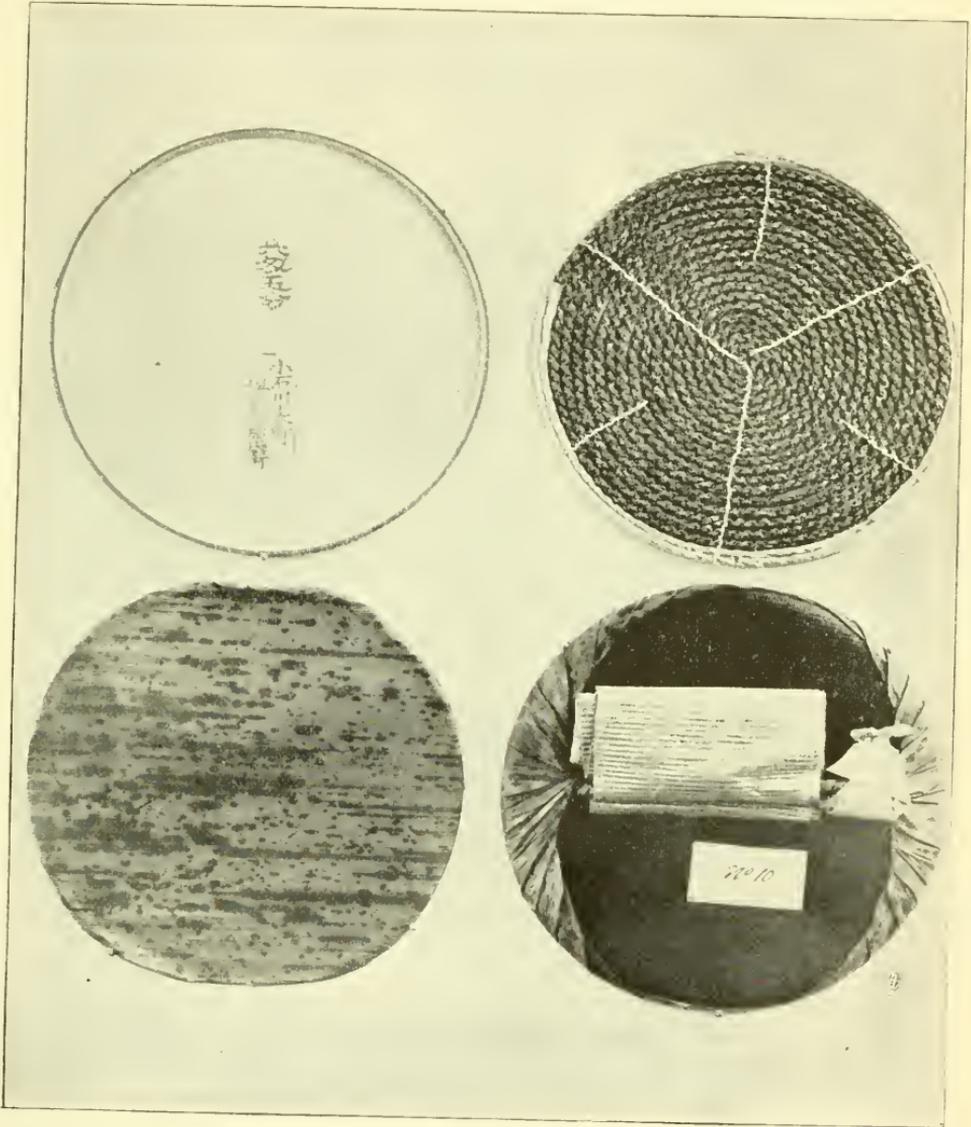


TOOLS AND APPLIANCES USED BY JAPANESE WOOD-CUT PRINTERS.
(From a drawing in the U. S. National Museum by a Japanese artist.)



A JAPANESE WOOD-CUT PRINTER AT WORK.

(From a drawing in the U. S. National Museum by a Japanese artist.)



BAREN AND ITS PARTS.

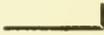
(Reduced in size. Actual size, $5\frac{1}{2}$ inches diameter.)

- a.* The stiff rimmed disc, which holds the corded disc; *b.* the disc of twisted cord; *c.* the bamboo sheath; *d.* baren complete, seen from the back, showing the handle, with the strip of paper wound around it.

(From specimens in the U. S. National Museum.)

reason why it is made so hard, besides making the filling of twisted cord, is to prevent its bending during use. Moreover, if it were not so hard and rigid, the full stretching of the bamboo sheath would be impossible. The ribbed surface of the bamboo serves not only to get a sharper impression, by limiting the contact to the ribs, but it also prevents the adhesion of the wet paper to the "baren," which would occur, to the spoiling of the paper, if the covering were smooth. The contacting surface should be applied only to those parts of the plank which have been left standing in relief. If this precaution is neglected, there is the possibility of smearing from the depressed parts of the block. The direction in the movement of the "baren" should be zigzag, as shown on Plate XI, but if a very small and isolated part of the design is to be printed, it is better to give a lighter rub with the edge of the instrument. On Plate XII the dotted line shows the direction of the "baren," while the solid curved lines mark the outlines of the design. The rib of the bamboo sheath should be kept as nearly as possible at a right angle to the direction of the "baren."

Smearing from the depressions of the block. As the depressions of the cut planks—that is to say, those parts which have been cut away between the lines and masses of the design—are rather shallow, and at the same time in many cases quite extensive, it would seem almost impossible to prevent the sinking of the sheet into the depressions and taking the color in these places, more especially when the method of applying the printing color with a brush is considered, which makes it impossible to keep the depressions clean. Experienced printers, nevertheless, work without fear of smearing, and no special precautions are used to guard against it.

Registering. As each color requires a separate cut, each plank must have certain fixed marks [registering marks], so that all the sheets may be laid down in exactly the same position, to insure the fitting of each color upon the others. No mechanical means whatever are used, either in placing the sheet, or for holding it in position after it has been placed. The Japanese printer, in these matters as in all others, depends simply upon experience. The manner of placing the sheet on the block is shown on Plate XIII. The same figure shows also the registering marks on the block or plank, which consist of a rectangular notch  at the right, and a straight notch  at the left.

General remarks about printing. The printing may differ in quality, but the method employed is always about the same. The printing of a picture like "Nandina domestica" [which is an imitation of a water-color painting without outlines] requires, of course, greater skill than the printing of "Yinaka genji" [which is a drawing in outlines, with color washes]. The aim in this case is to produce impressions which an inexperienced eye can hardly distinguish from the original. But there is no special way of treating either class of prints. The difference between the best and the less good is due entirely to the skill of the

printer in producing the various hues, tints, and shades with printing brushes, in precisely the same way as the water-color painter. This holds good also of the engraver. The arts of engraving and of printing are practiced in Japan according to the dictates of experience, with no, or at the most but very slight, mechanical assistance.

COST OF DESIGNS. The original design of "Yinaka genji," by Kuniteru, called also Yichiyusai, cost 10 yen (about \$7.60).

That of "Nandina domestica," by Chinzan, Tsubaki, cost the same sum.

COST OF ENGRAVING. "Yinaka genji," engraved by Kōkichirō, Morikawa, cost 16 yen (about \$12.30), and took the engraver about 20 days. [The three sheets, executed respectively in 25, 26, and 23 printings, or in all 74 printings, required the cutting of 37 blocks. See the notes by the editor, p. 240, concerning the discrepancy between number of printings and number of blocks.]

"Nandina domestica," engraved by Kōtarō, Kido, cost 8.4 yen (about \$6.38), and took about seven days in the doing. [There are 33 printings, but the number of blocks used is not stated.]

COST OF PRINTING. The printer of "Yinaka genji," Tsurūsabrō, Nakamura, received 70 sen (about 54 cents) per day. He printed 3,000 sheets per day from the black block, and 700 to 800 sheets per day from the color blocks.

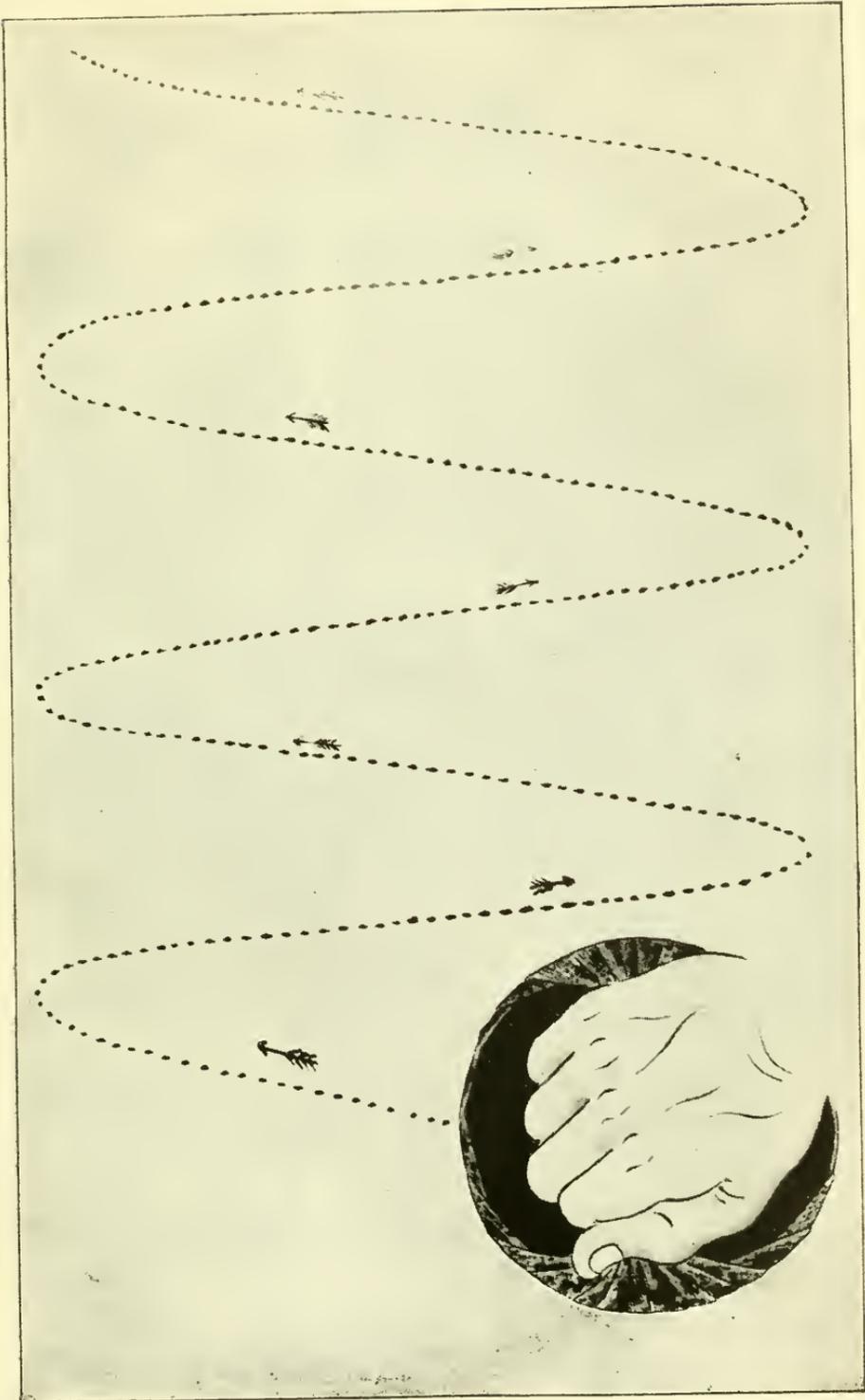
The printer of "Nandina domestica," Yiwakiehi, Yamamoto, received one yen (about 76 cents) per day. He finished about 200 sheets per week.

The people engaged in home industries do not generally take a rest on Sunday. The week, therefore, has seven days of about eight hours each. As "Nandina domestica" has 33 printings, 200 finished sheets are equal to 6,600 impressions per week, or 943 per day. The numbers differ, however, according to the different nature of the blocks. Of the easiest, for instance, such as a uniform green for the leaves, 1,200 to 1,800 sheets can be printed in a day, while of the most difficult ones, such as those giving the half-tints in the fruit, only 600 to 700 sheets can be printed.

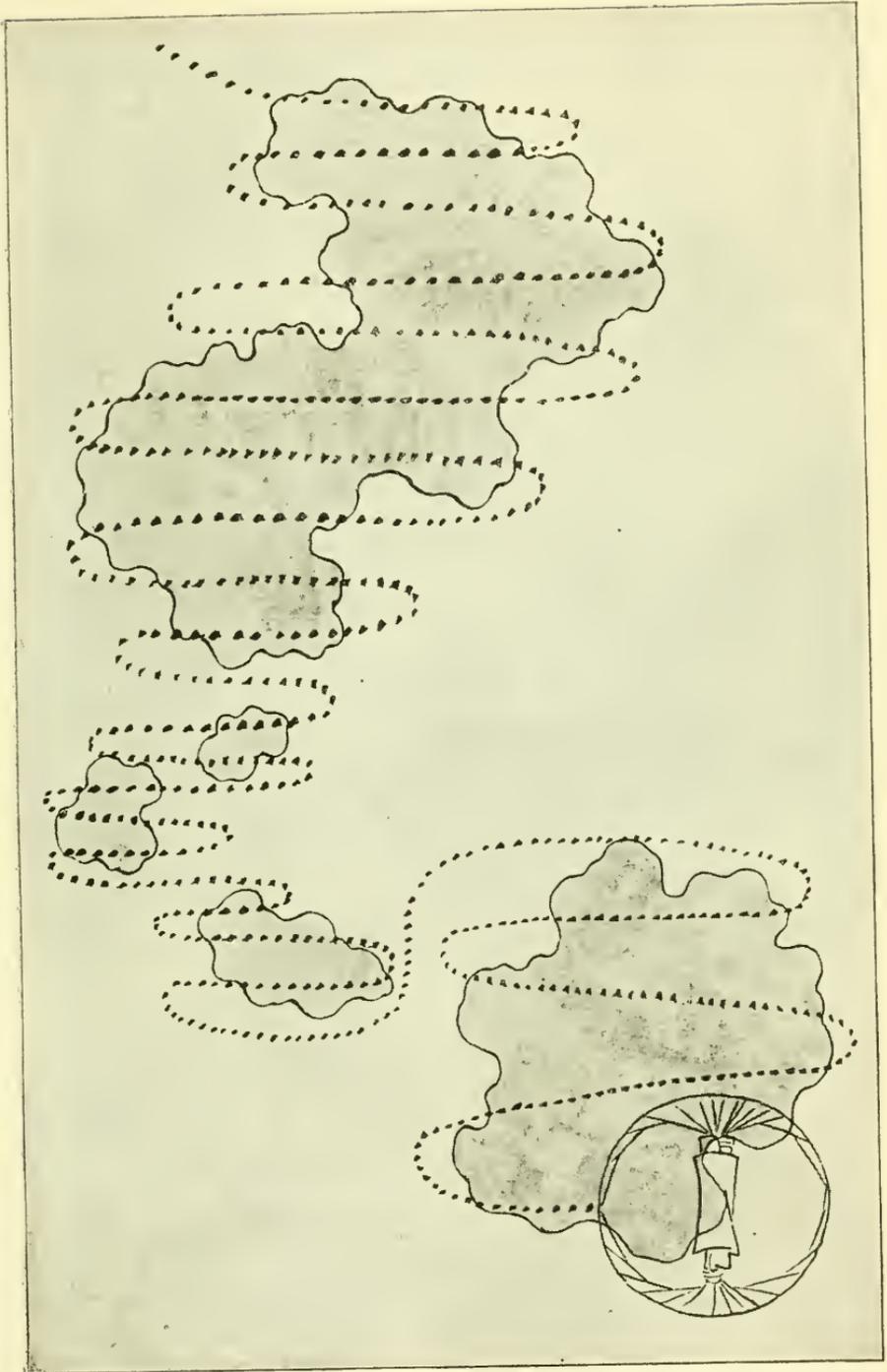
NOTES BY THE EDITOR.

To any one familiar with the history of the technique of relief engraving, the reading of Mr. Tokuno's communication makes it evident that the methods used by the Japanese engravers of to-day, so far as they have not been influenced by European precept, are precisely those used in Europe in the 15th, 16th and 17th centuries. In other words, these artists are not, correctly speaking, *wood-engravers*, but *wood-cutters*. This is apparent from the material and the tools used by them.

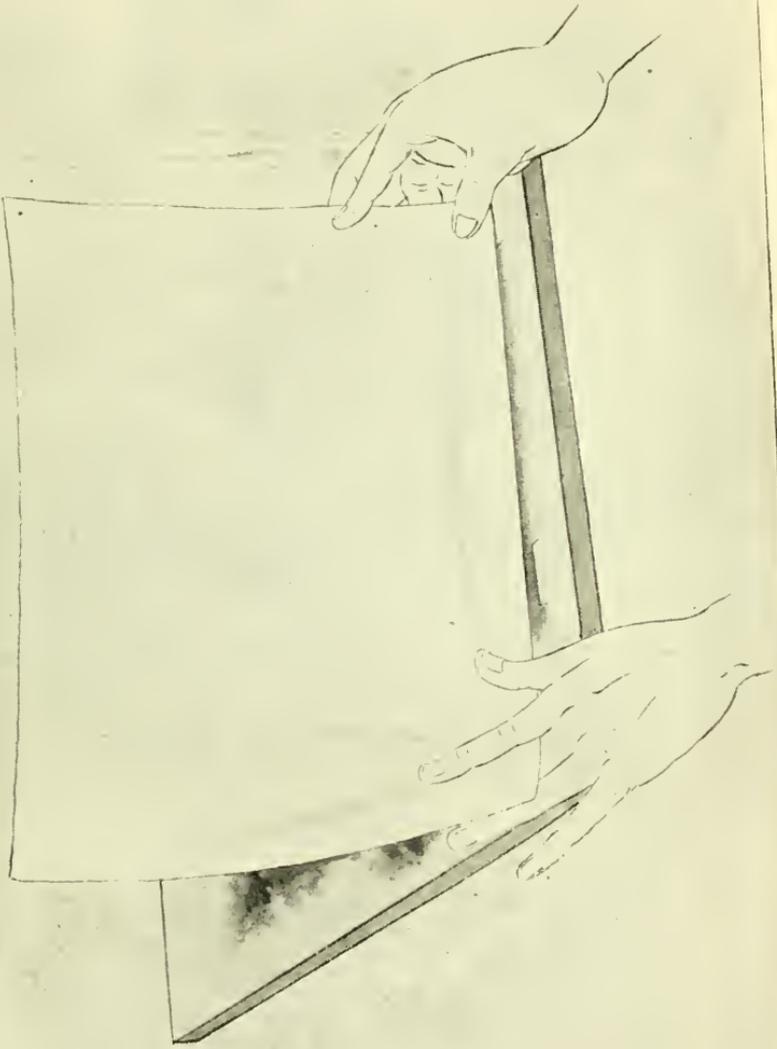
The material is wood cut in the direction of the fiber, i. e., *planks*, for which, since Bewick's time, *blocks cut across the fiber* or grain have been substituted with us.



METHOD OF USING BAREN.
(From a drawing in the U. S. National Museum by a Japanese artist.)



METHOD OF USING BAREN.
(From a drawing in the U. S. National Museum by a Japanese artist.)



REGISTERING.
(From a drawing in the U. S. National Museum by a Japanese artist.)

The tools are *knives*, which with us have been displaced by *gravers*

It is interesting to compare the representation of a Japanese wood-cutter (Pl. VI) with the oldest known representation of a European wood-cutter (Fig. 2), here reproduced from Jost Amman's "Beschreibung aller Stände" (generally, although not quite correctly, called "Book of Trades"), published in Frankfort-on-the-Main in the year 1568. As Jost Amman was a very prolific designer for wood-cutters, he must have been thoroughly familiar with the craft, and his representation may therefore be accepted as reliable. At first sight the way of holding the tool adopted by Amman's "Formschneider" (form-cutter, *i. e.*, wood-cutter) impresses one as peculiar, and perhaps unwarranted. A glance at Pl. VI, however, shows a striking analogy between the manner of holding the tool of the Japanese "Formschneider" of to-day and that of his European predecessor of the sixteenth century, *i. e.*, they both hold the tool perpendicularly, the only difference being that the Asiatic uses also the left hand in guiding it. The modern Japanese document may therefore serve to confirm the correctness of Jost Amman's delineation.



Fig. 2.

A EUROPEAN WOOD-CUTTER OF THE XVI. CENTURY.

From Jost Amman's "Book of Trades," 1568.

Of the shape of the knife used by the old wood-cutters of Europe and of the way of grinding it, we have no positive knowledge, as the representations of tools which often accompany the monograms of the "Formschneider" on sixteenth century wood-cuts are too small, and oftentimes too fantastic, to be of any use for information. The knives or "engraving points," as he called them, used by J. M. Papillon, the well-known French wood-cutter of the eighteenth century, are figured and fully described in his "Traité de la Gravure en Bois," 2 volumes, Paris, 1766. The blades were made of clock springs mounted in split wooden handles, in which they were fastened by means of a piece of string wound around them. Fig. 3 shows one of these knives, actual size, reproduced from Pl. IV in Papillon's second volume. It is flat on the side not shown in the illustration, beveled on the side shown, and

cut off obliquely at the extremity. The straight edge is the cutting edge. The Japanese knife (see Fig. 1) at first sight seems to be similarly constructed. Its blade is, indeed, heavier, but it is mounted in a somewhat similar handle, not split, however, but with only a slit

in it, into which the blade is wedged, and in which it is held in place by a ferrule.* It is furthermore beveled on one side like Papillon's knife; but the bevel is on the opposite side, and there is a bevel also along the edge which forms an angle with the long edge of the knife. This is necessary, because the cutting edge is the short oblique one and not the long edge. That this is so is apparent from the way in which the Japanese wood-cutter holds the knife on Pl. VI.

It is worth remarking that Papillon's way of holding the knife differed radically from that of his European predecessors and of the Japanese wood-cutters of to-day. Fig. 4, also taken from Papillon's second volume, illustrates this point.

In the method of transferring the design to the plank, we again find a close analogy; for although the early wood-cut draftsmen of Europe in most cases, probably, drew their designs directly on the wood with pen and ink, it is well known also that sometimes the drawing was made on a sheet of paper and pasted on the plank, face downward, in precisely the way which is practiced in Japan at present.

Still more curious, however, is the similarity between the instrument, "baren," used by the printers of Japan, and the earliest contrivance for taking impressions from cut blocks, of which mention is made, so far as at present known, in a European book. The "baren" has the form of a little shield. In the treatise on painting, written by Cennino Cennini da Colle di Valdelse, towards the close of the fourteenth century, chapter 173, entitled "How to paint on cloth with a form," the following directions are given: A wood block upon which the design has been cut is to be charged with color. For this purpose a glove is to be worn on the left hand, the color to be used is to be spread on the palm of the hand, and the block is then to be charged with the color, "carefully, so that the parts cut out do not fill up," the gloved hand doing the office of a printer's ball. The cloth is now to be laid on the block charged with color, and then, continues Cennini, "take

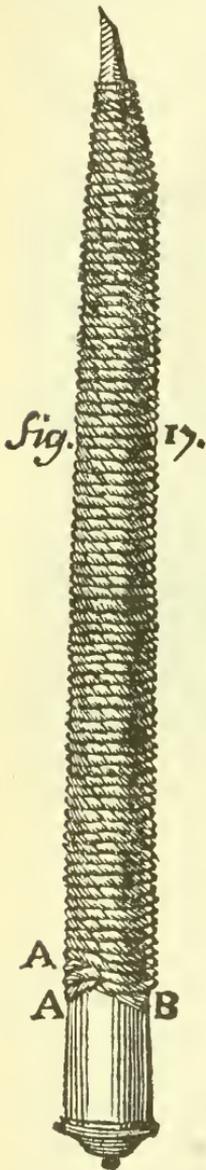


Fig. 3.

THE KNIFE USED BY
PAPILLON.

(From his "Traité," 1766.)

* Papillon also describes this arrangement, but prefers the one shown in Fig. 3.

a shield of wood in the right and press with the back upon the surface, so far as the cut plank will bear it.* It is, however, apparent from this most summary description that Cennini's rude contrivance is not to be compared for efficiency with the Japanese "baren," with its twisted cord packing and ribbed bamboo sheath. Nor does the print-

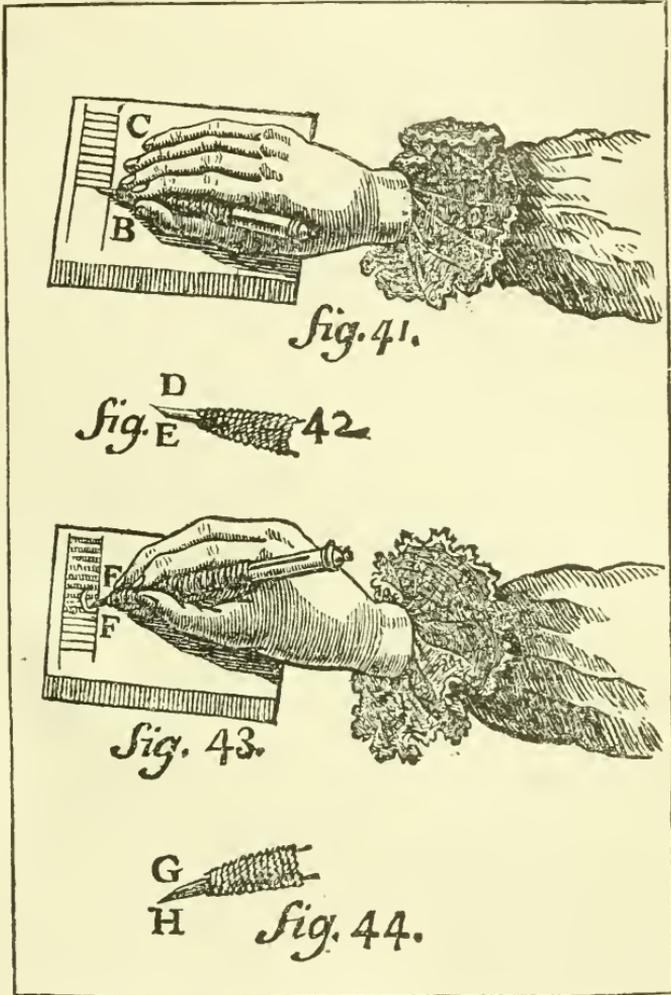


Fig 4.

PAPILLON'S MANNER OF HOLDING THE KNIFE.

From his "Traité," 1796.

ing shield mentioned by Cennini seem to have come largely into use, for the instruments generally supposed to have been employed in Europe for taking impressions previous to the introduction of the press are rubbers (which, however, might have been shield-shaped) and rollers, of which the latter remained in use for the taking of

* Quoted from Hg's translation, in *Quellenschriften der Kunstgeschichte*, Vol. 1, Vienna, 1871, p. 122.

proofs down to the time of Papillon, who describes and figures them in the book before cited.

That the method of plugging practiced by the Japanese wood-cutters—evidently by square instead of round plugs—is the same as the old European method is not to be wondered at in view of the identity of the materials used.

With these elementary factors of materials, tools, and appliances, the similarity between Japanese and sixteenth century European wood-cutting ends, however, and further examination discloses differences of a very marked kind.

It is well-known that the work of the old European wood-cutters is essentially black-line facsimile, *i. e.*, the reproduction, more or less faithfully, of drawings in black lines, generally pen-and-ink drawings, on a light ground. It was this limitation which threw the wood-cut out of the race with the other reproductive arts, until it was enabled to enter the lists again after it had been transformed into wood-engraving. The wood-cutters and printers of Europe did, indeed, attempt to produce color effects as early as 1457, this being the year in which appeared Fust and Schoeffer's Psalter, the first dated printed book, so far as we know, and at the same time the first dated piece of color-printing. This, however, was merely work of a decorative character. The first pictures really printed in colors are Cranach's chiaroscuros, the oldest of which are dated 1506, and, of works printed in positive colors, Jost de Negker's portrait of Jacob Fugger, about 1512, and Altdorfer's Beautiful Maria of Ratisbonne, about 1519. But of these two kinds of productions, only the first, the chiaroscuros (clair-obscurs, Helldunkel)—that is to say, imitations of India ink and sepia drawings and other monochromes—came largely into use during the sixteenth, seventeenth, and eighteenth centuries, while the attempts to introduce printing from relief blocks in positive colors, although renewed from time to time, never succeeded to any extent, so that it may be said even to-day that chromoxylography is practiced only occasionally, except for such coarse work as advertisements, show bills, etc.*

The Japanese, as a matter of course, have also produced and still produce facsimiles of drawings in black lines, but owing, possibly, to the fact that their artists use the brush instead of the pen or some still more unyielding point, they were soon led to attempt the reproduction of washed drawings, not only in black and grays, but also in positive colors. Their earliest productions of this kind do not, indeed, according to Prof. Fenollosa, go back beyond about the year 1745, † but

* As these notes treat only of relief printing no account is taken here of chromo-chalcography and chromolithography.

† There is considerable variation in the statements found in books concerning the oldest specimens of Japanese color-printing. From Dr. Justus Brinckmann's *Kunst und Handwerk in Japan* (Berlin, 1889, p. 222), we learn that these specimens, according to a Japanese author, Sakakiwara, date from the year 1695, although on p. 237

they made up for their later appearance in the field by a prodigious activity and a superb facility of execution—within the limitations of their art—that far outstripped the isolated achievements of their earlier European colleagues.

We have seen that, according to Mr. Tokuno, the highest aim of Japanese chromoxylography is the imitation of the original, even to the sweep of the brush, so close that an inexperienced eye shall find it difficult to tell the printed counterfeit from the painting made by the hand of the artist, and it must be admitted that the wood cutters and printers of Japan have been wonderfully successful in their efforts, not only in the reproduction of black-and-whites, for which, also, several printings are generally used, but quite as much with designs in color. It is true, certainly, that Japanese painting lends itself more easily to deceptive imitation than European painting; but there is still another cause to be assigned for the success of Japanese color-printing in this respect, and that is the method of printing practiced by the Japanese, or, more correctly speaking, their method of charging (“inking”) the block.*

of the same book it is stated that Torii Kiyonobu, who was not born until 1688, was the first painter who had his designs reproduced by color-printing. According to Theodore Duret (see *Chronik für vervielfältigende Kunst*, 1889, No. 6), the first color-prints with two or three tints were produced between 1710 and 1720. Finally, according to Dr. Wm. Anderson, the author of the *Catalogue of Prints and Books illustrating the History of Engraving in Japan*, issued by the Burlington Fine Arts Club in 1888, the date is about the year 1700 (see p. xvii of the catalogue named). Prof. Fenollosa, however, is of opinion that these earlier specimens were not color-prints, but colored prints, *i. e.* prints tinted by hand.

* Dr. Brinckmann, p. 230 of the book previously quoted, says that in Japan “we look in vain for the painted types of the color-prints, since the artist who works for color-printing creates independent works of art by its means,” while, on the contrary, he says of us that we claim triumphantly to have reached our aim in reproduction “when it becomes impossible to tell the original from the copy without close investigation.” Dr. Brinckmann, indeed, contradicts himself, when, on p. 288, he speaks of the publication of the paintings of Korin and of his brother Kenzan, a celebrated ceramic artist, by Hoitsu, about a century after the death of these artists, and Mr. Tokuno’s statement that the highest aim of Japanese printing “is to produce impressions which an inexperienced eye can hardly distinguish from the original,” certainly shows that the first statement made by the author named, however broadly it may apply to certain kinds of printing, is not true absolutely. Moreover, among the specimens sent to the U. S. National Museum by Mr. Tokuno, there are several reproductions of paintings, including a book in two volumes, “*Shu bi gwa kan*,” or reduced copies of pictures drawn by eminent old artists of the Kyoto or Shijo school.

Color-prints made without painted originals to work from are also found among our own productions, although they are of a subordinate rank and do not aspire to rival the brilliant productions of the Japanese color-printers. Sketches in color are rarely made for the colored pictures in the comic journals like “Puck.” These pictures are printed from four stones, one giving the design and modelling in black or brown, the other three supplying the coloring by means of Iris tints, two running in one direction, the third at right angles to it, and these Iris tints are mostly adjusted on the press under the direction of the designer, without an original by

The old printers of Europe, down to the beginning of this century, inked their blocks with printer's balls, such as are shown in Fig. 5, reproduced from Jost Amman's "Charta Lusoria," published at Nuremberg in the year 1588. The custom of the present day is to use elastic rollers, made of a mass consisting of glue, molasses, etc. On our steam presses the inking is also done by rollers. The ink used in all cases

is linseed-oil varnish, with which the pigment has been ground up. Water-colors have, indeed, been tried for printing occasionally, but practically without success, except for the printing of wall papers. The Japanese printers, on the contrary, so far as they have not been affected by European methods, use nothing but water-colors, and instead of balls or rollers they employ brushes, that is to say, they paint their blocks. There is a very obvious advantage in the use of water-colors by the Japanese printers, as all the originals to be imitated by them are painted in water-colors. It is evident that the brilliancy and quality of the pigments are the same in original and copy, while the pigments which we use for our chromoxylographic and chromolithographic printing, being mixed with linseed-oil varnish, are affected by it in



Fig. 5.

TWO OF PRINTERS' BALLS.

[From Jost Amman's "Charta Lusoria," 1588.

their purity as well as in their surface quality. The use of a brush instead of a roller for inking the blocks is also a factor of great importance. The brush is a pliable instrument, capable of expression in

which to be guided. A small specimen of this kind is shown in Frame 67 A, on the eastern side of the Hall of Graphic Arts. Much more brilliant work has, however, been done by the same means. The old chiaroscuro printers were also in a measure independent of the artist, not only sometimes adding tints to designs by artists long dead, but varying these tints for the same picture. The tint blocks for Dürer's portrait of Varnbuler, for instance, were added after his death, and there are impressions in brownish and in greenish tints. In this case the liberties taken by the printer were permissible, from the same cause which favors the Japanese color-printers, that is to say, because the coloring and lighting of the old chiaroscuros are purely conventional.

the hands of an intelligent being. The roller, on the contrary, even in the hands of the most skilled printer, is much less pliable, and on the steam press it is without any pliancy. This quality has, indeed, become a merit in the steam press, so that it is now looked upon as more reliable than the hand press. But this is true only in so far as uniformity of result in the impressions is concerned. The artist can do nothing with it, while with a bare block or plate and a brush full of color he can do wonders. We have seen this of late years in the renewed development of the monotype, and it may, indeed, be said of Japanese printing that it involves, at least in its best productions, the principle of the monotype. It follows from this that the Japanese printer must be something of an artist. In the words of Mr. Tokuno, he must have the skill to produce "the various hues and shades with printing brushes, in precisely the same way as the water-color painters do."

As the color is laid on the block with the brush, the facilities offered by this tool can, as a matter of course, be utilized, and are utilized to their fullest extent, by the Japanese printer. He can deposit more or less pigment on the block, according as he may need a stronger or a more delicate tint, and he can even produce gradations on it quite independent of the wood-cutter; that is to say, on a perfectly flat block. All the gradations from light to dark seen in Japanese color-prints are the result of the printer's brush used on the block, assisted sometimes, it is said, by wiping with the finger. The roller which we use for inking our blocks is not capable of producing such gradations,* as it deposits a uniform film of ink all over the surface. The consequence is that with us the gradations are produced by the engraver, who cuts away more and more of the wood, either in lines or in dots, as he proceeds from dark through lighter tints to white, while the Japanese wood-cutter furnishes to the printer blocks which are solid even in those parts which in the impression are to be gradated. It follows that what we call "engraved tints," either flat or gradated, are never seen in purely Japanese wood-cuts. The blocks offer nothing but flat masses, and such lines as appear in them serve merely to bring out the forms, patterns of stuffs, textures, etc. Whenever a European engraver has to render a sky gradated simply from a darker blue, through lighter tints downward, and finally merging into a tint so light that he must express it by white, he cuts a series of white lines, narrower and farther apart where the color is to be strongest, and gradually increasing in width and nearness as it decreases in strength, until, where the white paper is to show, he cuts away all the wood. His Japanese colleague, on the contrary, gives the printer a flat block, on which those parts merely are cut away which correspond to objects seen against the sky, such as trees, mountains, houses, etc., and which, therefore, must be kept free from the blue of the sky behind them. On this block the

* Except in "Iris printing," which, however, need not be considered here.

printer paints the gradations needed, and if he can not get a satisfactory result with one printing, he uses the same block twice, only varying the "inking." In the picture "Yinaka genji," for instance, the sky is printed once with a gradation reaching from the top of the picture to about the middle of the sky, and again a second time with a gradation reaching considerably farther down. It is evident that the upper part of the sky may thus be strengthened, and the gradual shading-off into the white along the horizon made still more gradual.

From what has just been said, it is apparent that the same block may be used twice on the same picture. This is true not only of the printing of skies, but the same device is resorted to also in other parts of the design. A block may be printed in a flat tint or color the first time, and it may then be charged a second time with another color, say a gray, but gradated, and printed on top of the first color to produce modulations. The number of planks cut for a Japanese color-print, therefore, is very far from corresponding to the number of printings. It is, moreover, reduced still further by painting the same block with different colors in different parts. These colors may, indeed, be printed at the same time,* but it happens frequently that they are used separately; that is to say, that the block is painted and printed in part only, and then laid aside, to be taken up again later and painted on those parts which were left uninked before. Thus of the three sheets which together make up the picture "Yinaka genji," the first has 25 impressions, the second 26, the third 23. Of blocks used, however, there are only 13 for the first, 10 for the second, and 14 for the third, or 37 cuts, executed on 21 planks, for 74 printings.

It is seen from the number of impressions needed for the completion of the picture just alluded to, that the Japanese printers are not bent on saving labor in this respect, a fact which is occasionally shown in a most curious manner, as when a single pair of red lips is printed by itself in a flat red, although several other red blocks are used for the same picture. From 23 to 26 impressions for a print like "Yinaka genji," seems to us an excessive number. Even for a refined, although brilliant fruit piece, like "Nandina domestica," 33 printings impresses us as extraordinary, in spite of the fact that the use of flat blocks makes it necessary to multiply them so as to produce the desired gradations. With our means of producing gradations by either wood-engraving

*According to Dr. Brinckmann (p. 228), the inking of one block with several colors is occasionally carried so far as to produce a complete picture in several colors at one impression. Among other prints, he describes one of a gray grasshopper feeding on the reddish meat of a piece of watermelon, the green rind and the black seeds of which are also seen. The four colors named are applied, each separately, to different parts of the block. We have here the principle of rubbing in a plate in different colors, used so extensively by the printers of the colored stipples produced in the eighteenth century and now again popular. The principle has not, however, been applied to relief printing among us, except by Wm. Blake, and even by him only to a very limited extent.

or lithographing, 8 to 10 printings would be considered a large number for the reproduction of an original of similar character. But even 33 is not the highest number of impressions used. I am informed by Prof. Fenollosa that as many as 120 impressions were used lately on a reproduction of a Japanese water-color painting, although the number was considerably reduced in the printing of a subsequent edition of the same picture by a different manipulation of the blocks.* It may be of interest to state here, for the sake of comparison, that the highest number of printings used on our most complicated chromolithographs is about fifty.

From the statement by Mr. Tokuno concerning the pigments used in characteristically Japanese color-printing, *i. e.*, blue, yellow, and red, besides black and white, it would seem as if the whole system of this kind of printing were based upon the old three-color theory, which prevailed also with the early chromochalcographic and chromolithographic printers of Europe. It is nevertheless true that the Japanese printers do not, at present at least, produce the so-called secondary colors, green, orange, violet, by printing the so-called primaries, *i. e.*, blue and yellow for green, yellow and red for orange, and red and blue for violet, over one another. Wherever these "secondaries" are needed—and the same observation holds good also for the "tertiaries"—they are printed by themselves, although the "primaries" which enter into them may occur in the same picture. I am again indebted to Prof. Fenollosa for having called my attention to the fact that the printing of the "primaries" over one another to produce the "secondaries" does, indeed, occur in the earlier work of the Japanese printers, but it is evident that it has now been abandoned. As subdued and broken colors were mainly used in the earlier Japanese color-prints, while the modern show a decided preference for brilliant and even glaring coloring, it is quite likely that this printing of the "primaries" over one another, which with us is considered a decided advantage, more especially in cheaper and simpler grades of work, as it saves time and money, was given up, even in such work as the printing of pictures for fans, for the sake of the more brilliant effects which can be produced by mixing the pigments themselves.

This brings us to another point of great importance, and that is the little care had by the Japanese wood-cutters and printers for labor-saving devices and mechanical aids. "Our arts of engraving and printing," says Mr. Tokuno in one of his letters, "rely entirely upon experience, with no, or very slight mechanical assistance." The manual skill, which has grown out of this reliance upon experience and disdain for mechanical aids, is truly marvelous. It is difficult to believe that all Japan-

*The earliest attempts at color-printing made by the Japanese, were, of course, much simpler, beginning with from two to four blocks. See Dr. Anderson's catalogue, before quoted, p. xvii; also Brinckmann.

ese wood-cutting, even to the finest lines in the most delicate black-and-white facsimile work, is done with the one clumsy knife represented in Fig. 1. We know from Papillon's book that he found it necessary to use three grades of knives, according to the grade of work to be executed, and we naturally arrive at the conclusion that the Japanese wood-cutter also accommodates his knife to his work. Nevertheless, Mr. Tokuno replies to a direct question on this point: "Our engraving on wood depends wholly on the skill of the engravers. With only one knife, such as that sent you, they can execute all grades of work, from the roughest to the finest. We therefore have no other kind of knife."

The answers given to questions regarding the difficulties which confront the Japanese printer, and which to us would seem insurmountable, are of the same tenor. It seems impossible to prevent smearing, with blocks having great shallow hollows, inked with a brush, and therefore charged with color, not only on the parts left standing in relief, but also in the depressions, and with the thin moist paper used, held down on the plank with one hand, while the other guides the "baren." To the question whether any special precautions are adopted to prevent smearing, Mr. Tokuno replies: "Although smearing from the depressions in the block seems almost unavoidable, experienced printers, nevertheless, work without fear of it, and there is no special way of preventing it." Again, to the question whether mechanical means are not used for registering, the reply is: "Our printers use no mechanical means whatever, depending simply upon experience." To illustrate this point, a water-color drawing was sent, of which Plate XIII is a reproduction. To the inquiry, how it is possible to print with water-colors on moist paper, keep the paper moist to prevent contraction, and lay the sheets on top of one another without offsetting, the answer given is: "This can only be done well by an experienced printer," to which laconic statement a few technical points are added, which have already been given in Mr. Tokuno's communication.

A visitor to the U. S. National Museum, who sees, for the first time, and without explanation, the exhibit of Japanese wood-cutting and wood-cut printing, the whole (except the printed specimens and the drawings illustrating tools, etc.) crowded into a case measuring about 4 by $3\frac{1}{4}$ by $2\frac{1}{2}$ feet, will most probably take it for granted that he has before him a collection of miniature models. In this assumption he would, however, be grossly mistaken. Considerably more room would, of course, be needed to arrange the tools, etc., for practical working use, but both the tools and the materials shown are actually those employed by the wood-cutters and printers of Japan. It needs only to think of the heavy machinery used by our printers, even by those who confine themselves to taking proofs for wood-engravers, to realize the contrast between the methods of Japan and our own. Other occasions for comparing these methods have been brought out by the questions addressed to Mr. Tokuno, as

given above, and the answers returned by him. The contrast becomes still more marked when we recall, for instance, the methods of preparing colors described by Mr. Tokuno. It is true, no doubt, that, influenced by us, the Japanese are coming to depend more and more on machinery, but it is also true that by their old and simple methods, trusting to their experience, their skill, and their artistic feeling, they have produced the best of their work, in which their national characteristics have found their most original expression. Nor have they, according to Mr. Tokuno's statements, suffered in productiveness in consequence of their methods. The short time spent in cutting the 37 planks needed for the printing of "Yinaka genji," *i. e.*, twenty days, is astonishing enough in spite of the simplicity of the blocks, but our astonishment increases to wonder when we read of the number of impressions made per day by the Japanese printers, and consider at the same time the tedious methods employed in charging the block with color. As I feared a misunderstanding on my part of the figures given by Mr. Tokuno, I asked him to consider my interpretation of his statements, and in reply the original figures were confirmed, *viz.*, 3,000 sheets per day of about eight hours from the black block, and 700 to 800 sheets per day from the color blocks of "Yinaka genji," and on an average 943 sheets per day of "Nandina domestica," the number varying from 1,800 for the simplest to 600 for the most difficult blocks. It is impossible to make a direct comparison between the productivity of the Japanese and our own printers, as the methods differ too radically, and as long editions of wood-engravings are but very rarely printed nowadays on the hand-press. The following figures will nevertheless be of some interest: Mr. Thos. H. Brennan, wood-engraving proof-printer, of Boston, assures me that 250 impressions from a block measuring 11 by 14 inches and 350 from one measuring 5 by 7 inches is a fair average for a working day of nine hours. This is, of course, for first-class work and for first-class engraving. Messrs. L. Prang & Co., the well known chromolithographers, also of Boston, write me that the number of impressions which a lithographic printer prints on the hand-press, whether it be from a crayon stone or a pen-and-ink stone, in black or in colors, varies from 175 to 250 per day of nine hours, and that 200 would be considered a good average.

It goes without saying that the Japanese methods described above are not suitable for application to our art. A complicated sky, for instance, with all its wealth of delicate tints, such as we find it in the works of our best landscape painters, or the human countenance, expressive of the deepest emotions of the soul, as our best figure painters set it up before us, can be interpreted for us by the skill of our wood engravers, and even their coloring can be successfully approached by our color-printing processes in their most refined development, but they can never be rendered by means of flat blocks, even when painted in delicate gradations by the most skilled of Japanese printers. In try-

ing to arrive at an estimate of Japanese color-printing, it must not be forgotten, therefore, that problems like those just alluded to are never offered to the Japanese reproductive artists. The originals which they are asked, not to interpret, but rather to imitate, or the original color-prints which they produce, are, indeed, exceedingly beautiful, and worthy of attentive study as giving embodiment to the ideals of a highly gifted people, moving in an intellectual atmosphere quite different from our own, but it remains true, nevertheless, that they are purely and frankly conventional. Looking at the technical side of the question only, it may be said that it is this fact which has enabled the Japanese wood-cutters and printers to find methods answering their wants almost to perfection. In a more searching study of Japanese art, other conditions would, indeed, also have to be considered, but their discussion would be out of place in a report like the present, which is of necessity limited to a statement of facts.