accomplish this he is obliged to go through a great deal of simply manual practice in cutting lines. The beginner learns to cut straight lines and curves of various degrees of depth, and to cross them so that the interstices may form squares, lozenges, triangles, &c. These exercises, after long practice, give a degree of manual skill which has been often misemployed in ingenious trifling, to the detriment of true artistic quality, so that laborious men have wasted their time in cutting patterns like woven wire, and carefully inserting a dot in the middle of every lozenge or square. Whilst avoiding this error, which has been the bane of engraving, the student should train his hand and eye by copying portions of good prints directly on the metal, as a modern engraver cannot work in ignorance of the language of his art, though he may employ it in his own way afterwards. It is, however, unfortunately true that set methods, which may be called the business of engraving, have a tendency to become much more predominant than in the sister art of painting, so that real originality expresses itself much less frequently with the burin than with the brush.

Elements of burin engraving on metal.

The elements of engraving with the burin upon metal will be best understood by an example of a very simple kind, as in the engraving of letters. The capital letter B contains in itself the rudiments of an engraver's education. As at first drawn, before the blacks are inserted, this letter consists of two perpendicular straight lines and four curves, all the curves differing from each other. Suppose, then, that the engraver has to make a B, he will scratch these lines very lightly with a sharp point or style. The next thing is to cut out the blacks (not the whites, as in wood engraving), and this would be done with two different burins. The engraver would get his vertical black line by a powerful ploughing with the burin between his two preparatory first lines, and then take out some copper in the thickest parts of the two curves. This done he would then take a finer burin and work out the gradation from the thick line in the midst of the curve to the thin extremities which touch the perpendicular. When there is much gradation in a line the darker parts of it are often gradually ploughed out by returning to it over and over again The hollows so produced are afterwards filled with printing ink, just as the hollows in a niello were filled with black enamel; the printing ink is wiped from the smooth surface of the copper, damped paper is laid upon it, and driven into the hollowed letter by the pressure of a rolling cylinder; it fetches the ink out, and you have your letter B in intense black upon a white ground.

When the surface of a metal plate is sufficiently polished to be used for engraving, the slightest scratch upon it will print as a black line, the degree of blackness being proportioned to the depth of the scratch. Most readers of these pages will possess an engraved plate from which visiting cards are printed. Such a plate is a good example of some elementary principles of engraving. It contains thin lines and thick ones, and a considerable variety of curves. An elaborate line engraving, if it is a pure line engraving and nothing else, will contain only these simple elements in different combinations. The real line engraver is always engraving a line more or less broad and deep in one direction or another; he has no other business than this.

We may now pass to the early Italian and early German prints, in which the line is used with such perfect simplicity of purpose that the methods of the artists are as legible as if we saw them actually at work [1]

The student may soon understand the spirit and technical quality of the earliest Italian engraving by giving his attention to a few of the series which used erroneously to be called the *Playing Cards of Mantegna*. "The series," says Professor Colvin, "consists of fifty pieces, divided into sets of ten each. Of these five sets, each is marked with an initial letter, A, B, C, D, E, and every print of the series carries besides an Arabic numeral, 1, 2, 3, up to 50. Only the numerical order, which shows how the series is meant to be arranged and studied, reverses the alphabetical order which corresponds with the respective dignity of the subject; thus Nos. 1–10 are lettered as class E, Nos. 11–20 as class D, and so on. This number, fifty, and this plan of subdivision by tens, are quite inconsistent with the supposed destination of the series as playing-cards; and so also are the subjects of the series. They represent a kind of encyclopædia of knowledge, proceeding upwards from earthly to transcendental things,—first, the various orders and conditions of men; second, the nine muses and Apollo; third, the seven liberal arts, with poetry, theology, and philosophy added to complete the group of ten; fourth, the four cardinal and three theological virtues, with three singular personifications or geniuses added to complete ten —a genius of time, a genius of the sun, and a genius of cosmos, the world; fifth, the planets, in their mythological, astrological, and astronomical signification, with the three outer spheres added to make up the ten—viz., the eighth, or sphere of the fixed stars, the Primum Mobile, or inclosing sphere, which by its rotation imparts rotation to the rest within, and the Prima Causa, or empyrean sphere, the unrevolving abiding place of Deity The series is, therefore, as the most recent critics have called it, a moral and educational series, or instructive picture-book."

We have not space to enter into the controversy about the origin of these engravings. They are supposed to be Florentine; they are certainly Italian; and their technical manner is called that of Baccio Baldini, of whose biography nothing is known. But if the history of these engravings is obscure, their style is as clear as a style can be. There is not room for a moment's doubt about the artist's conception of his art. In all these figures the outline is the main thing, and next to that the lines which mark the leading folds of the drapery, lines quite classical in purity of form and severity of selection, and especially characteristic in this, that they are always really engraver's lines, such as may naturally be done with the burin, and they never imitate the freer line of the pencil or etching needle. As for shading, it is used in the greatest moderation with thin straight strokes of the burin, that never overpower the stronger organic lines of the design. Of chiaroscuro, in any complete sense, there is none. The sky behind the figures is represented by white paper, and the foreground is sometimes occupied by flat decorative engraving, much nearer in feeling to calligraphy than to modern painting. Sometimes there is a cast shadow, but it is not studied, and is only used to give relief. We may observe that in this early metal engraving the lines are often crossed in the shading, whereas in the earliest woodcuts they are not; the reason being that when lines are incised they can as easily be crossed as not, whereas, when they are reserved, the crossing involves much labour of a non-artistic kind. Here, then, we have pure line-engraving with the burin, that is, the engraving of the pure line patiently studied for its own beauty, and exhibited in an abstract manner, with care for natural form combined with inattention to the effects of nature. Even the forms, too, are idealized, especially in the cast of draperies, for the express purpose of exhibiting the line to better advantage. Such are the characteristics of those very early Italian engravings which were attributed erroneously to Mantegna. When we come to Mantegna himself we find a style equally decided. Drawing and shading were for him two entirely distinct things. He did not draw and shade at the same time, as a modern chiaroscurist would, but he first got his outlines and the patterns on his dresses all very accurate and right, and then threw a veil of shading over them, and a very peculiar kind of shading it was, all the lines being straight and all the shading diagonal. This is the primitive method, its peculiarities being due, not to a learned self-restraint, but to a combination of natural genius with technical inexperience, which made the early Italians at once desire and discover the simplest and easiest methods. But whilst the Italians were shading with straight lines the Germans had begun to use curves, and as soon as the Italians saw good German work they abandoned their old stiff practice and tried to give to their burins something of the German suppleness.

The characteristics of early metal engraving in Germany are seen to perfection in Martin Schongauer and Albert Dürer, who, though with striking differences, had many points in common. Schongauer was the earlier artist of the two, as he died in 1488; whilst the date of Dürer's death is 1528, just forty years later. Schongauer was therefore a whole generation before Dürer, yet scarcely inferior to him in the use of the burin, though Dürer has a much greater reputation, due in great measure to his singular imaginative powers. Schongauer is the first great German engraver who is known to us by name, but he was preceded by an unknown German master, whom we now call the master of 1466, who had Gothic notions of art (in strong contrast to the classicism of Baccio Baldini), but used the burin skilfully in his own way, conceiving of line and shade as separate elements, yet shading with an evident desire to follow the form of the thing shaded, and with lines in various directions. Schongauer's art is a great stride in advance, and we find in him an evident pleasure in the bold use of the burin. Outline and shade, in Schongauer, are not nearly so much separated as in Baccio Baldini, and the shading, generally in curved lines, is far more masterly than the straight shading of Mantegna. Dürer continued Schongauer's curved shading, with increasing manual delicacy and skill; and as he found himself able to perform feats with the burin which amused both himself and his buyers, he over-loaded his plates with quantities of living and inanimate objects, each of which he finished with as much care as if it were the most important thing in the composition. The engravers of those days had no conception of any necessity for subordinating one part of their work to another; they drew, like children, first one object and then another object, and so on until the plate was furnished from top to bottom and from the left side to the right. Here, of course, is an element of facility in primitive art which is denied to the modern artist. In Dürer all objects are on the same plane. In his St Hubert, the stag is quietly standing on the horse's back, with one hoof on the saddle, and the kneeling knight looks as if he were tapping the horse on the nose. Dürer seems to have perceived the mistake about the stag, for he put a tree between us and the animal to correct it, but the stag is on the horse's back nevertheless. This ignorance of the laws of effect is least visible and obtrusive in plates which have no landscape distances, such as The Coat of Arms with the Death's Head and The Coat of Arms with the Cock. Dürer's great manual skill and close observation made him a wonderful engraver of objects taken separately. He saw and rendered all objects; nothing escaped him; he applied the same intensity of study to everything. Though a thorough student of the nude (witness his Adam and Eve, and other plates), he would pay just as much attention to the creases of a gaiter as to the development of a muscle; and though man was his main subject, he would study dogs with equal care (see the five dogs in the St Hubert), or even pigs (see the Prodigal Son); and at a time when landscape painting was unknown he studied every clump of trees, every visible trunk and branch, nay, every foreground plant, and each leaf of it separately. In his buildings he saw every brick like a bricklayer, and every joint in the woodwork like a carpenter. The immense variety of the objects which he engraved was a training in suppleness of hand. His lines go in every direction, and are made to render both the undulations of surfaces (see the plane in the Melancholia) and their texture (see the granular texture of the stones in the same print).

From Dürer we come to Italy again, through Marcantonio, who copied Dürer, translating more than sixty of his woodcuts upon metal. It is one of the most remarkable things in the history of art, that a man who had trained himself by copying northern work, little removed from pure Gothicism, should have become soon afterwards the great engraver of Raphael, who was much pleased with his work and aided him by personal advice. Yet, although Raphael was a painter, and Marcantonio his interpreter, the reader is not to infer that engraving had as yet subordinated itself to painting. Raphael himself evidently considered engraving a distinct art, for he never once set Marcantonio to work from a picture, but always (much more judiciously) gave him drawings, which the engraver might interpret without going outside of his own art; consequently Marcantonio's works are always genuine engravings, and are never pictorial. Marcantonio was an engraver of remarkable power. In him the real

[1] It may be well to say something here about the accessibility of examples. Any one living in London can study engraving at its sources to the fullest extent in fine impressions belonging to that little-appreciated treasure-house, the print-room of the British Museum, but the difficulty is for students who live in the provinces or in distant colonies. This difficulty has been overcome of late years by the perfection to which M. Amand Durand has brought the art of photographic engraving originally invented by Niepce, and now called *héliogravure*. By means of this a new plate can be produced from an impression of an old engraving without touching the print, and so perfect that the impressions yielded by the new plate can only be distinguished from old prints by an expert, and not always with certainty by him, so that they have to be marked on the back to prevent fraud. M. Amand Durand has made it his principal business to reproduce engravings by the old masters; so that the provincial or colonial student may now possess in his own cabinet a selection of the best examples. One thing only it is necessary for him to bear in mind. There are two sorts of *héliogravure*,—that which prints like a copper-plate and that which prints like a woodcut. Both are used for book illustration, and indiscriminately, so that the student will often meet with a plate-engraving which has been reproduced to print like a woodcut, and whenever he does so he ought not to pay the slightest attention to it, for no plate-engraving can ever be reproduced as a woodcut without the loss of its finest technical qualities. A plate so reproduced will no doubt retain its composition and expression, though even the expression may often lose a little from the greater coarseness of the lines; but all its quality as workmanship, all the delicacy of the manual art, is sacrificed, merely that it may be printed more cheaply. The student should therefore resolutely turn away from all *typographic* héliogravures after engraved plates, and confine his attention to those which are printed as the original plates were printed, a matter which he can easily ascertain for himself by seeing that there is a plate mark, the colourless mark produced by the edges of the plate upon the paper. M. Amand Durand has published many copies from engravings by different old masters, including complete sets from the original works of Vandyke, Paul Potter, Claude, and Albert Dürer. Such reproductions as these are really available for purposes of study, but the quantity of different photographic processes invented of late years has inundated the market with the most various kinds of more or less defective reproductions, which the student ought carefully to avoid. And however perfect the process may be, all reproductions *on a reduced scale* should be rejected at once by students, for the manner of working adopted by a true master depends always upon the scale of his engraving. Dürer will put more into a large plate than into a little one; and when a large plate by Dürer is reduced by a photographic process, the reduction, by its microscopic abundance of detail, conveys a false idea of Dürer's practice as an artist. The reductions of old engravings which are now so frequently used for book-illustrations are more injurious than helpful to any right appreciation of engraving Reduction is good only when the artist worked with a view to it, as is now often done in drawings *intended* to be reproduced photographically with a *foreseen* diminution of scale.

pure art of line-engraving reached its maturity. He retained much of the early Italian manner in his backgrounds, where its simplicity gives a desirable sobriety; but his figures are boldly modelled in curved lines, crossing each other in the darker shades, but left single in the passages from dark to light, and breaking away in fine dots as they approach the light itself, which is of pure white paper. A school of engraving was thus founded by Raphael, through Marcantonio, which cast aside the minute details of the early schools for a broad, harmonious treatment.

We cannot here give a detailed account of the northern and southern schools of line-engraving, which, after Dürer and Marcantonio, developed themselves with great rapidity and were ennobled by many famous names, but although we cannot give lists of these, we may direct the student to a school of engraving which marked a new development, the group known as the engravers of Rubens. That great painter understood the importance of engraving as a means of increasing his fame and wealth, and directed Vorsterman and others, as Raphael had directed Marcantonio. The theory of engraving at that time was that it ought not to render accurately the local colour of painting, which would appear wanting in harmony when dissociated from the hues of the picture; and it was one of the anxieties of Rubens so to direct his engravers that the result might be a fine plate independently of what he had painted. To this end he helped his engravers by drawings, in which he sometimes went so far as to indicate what he thought the best direction for the lines. Rubens liked Vorsterman's work, and scarcely corrected it, a plate he especially approved being Susannah and the Elders, which is a learned piece of work well modelled, and shaded everywhere on the figures and costumes with fine curved lines, the straight line being reserved for the masonry. Vorsterman quitted Rubens after executing fourteen important plates, and was succeeded by Paul Pontius, then a youth of twenty, who went on engraving from Rubens with increasing skill until the painter's death. Boetius a Bolswert engraved from Rubens towards the close of his life, and his brother Schelte a Bolswert engraved more than sixty compositions from Rubens, of the most varied character, including hunting scenes and landscapes. This brings us to the engraving of landscape as a separate study. Rubens treated landscape in a very broad comprehensive manner, and Schelte's way of engraving it was also broad and comprehensive. The lines are long and often undulating, the cross-hatchings bold and rather obtrusive, for they often substitute unpleasant reticulations for the refinement and mystery of nature, but it was a beginning, and a vigorous beginning. The technical developments of engraving under the influence of Rubens may be summed up briefly as follows:—1. The Italian outline had been discarded as the chief subject of attention, and modelling had been substituted for it; 2. Broad masses had been substituted for the minutely finished detail of the northern schools; 3. A system of light and dark had been adopted which was not pictorial, but belonged especially to engraving, which it rendered (in the opinion of Rubens) more harmonious.

Vorsterman and other engravers of Rubens.

The history of line-engraving, from the time of Rubens to the beginning of the 19th century, is rather that of the vigorous and energetic application of principles already accepted than any new development. From the two sources we have already indicated, the school of Raphael and the school of Rubens, a double tradition flowed to England and France, where it mingled and directed English and French practice. The first influence on English line-engraving was Flemish, and came from Rubens through Vandyke, Vorsterman, and others; but the English engravers soon underwent French and Italian influences, for although Payne learned from a Fleming, Faithorne studied in France under the direction of Philippe de Champagne the painter, and Robert Nanteuil the engraver. Sir Robert Strange studied in France under Philippe Lebas, and then five years in Italy, where he saturated his mind with Italian art. French engravers came to stay and work in England as they went to study in Italy, so that the art of engraving became in the 18th century a cosmopolitan language. In figure-engraving the outline was less and less insisted upon. Strange made it his study to soften and lose the outline. Meanwhile, the great classical Renaissance school, with Gérard Audran at its head, had carried forward the art of modelling with the burin, and had arrived at great perfection of a sober and dignified kind. Audran was very productive in the latter half of the 17th century, and died in 1703, after a life of severe self-direction in labour, the best external influence he underwent being that of the painter Nicolas Poussin. He made his work more rapid by the use of etching, but kept it entirely subordinate to the work of the burin. One of the finest of his large plates is St John Baptizing, from Poussin, with groups of dignified figures in the foreground and a background of grand classical landscape, all executed with the most thorough knowledge according to the ideas of that time. The influence of Claude Lorrain on the engraving of landscape was exercised less through his etchings than his pictures, which compelled the engravers to study delicate distinctions in the values of light and dark. In this way, through Woollet and Vivarès, Claude exercised an influence on landscape engraving almost equal to that of Raphael and Rubens on the engraving of the figure, though he did not, like those painters, direct his engravers personally.

Line engraving in the 19th century.

In the 19th century line-engraving has received both an impulse and a check, which by many is thought to be its death-blow. The impulse came from the growth of public wealth, the increasing interest in art and the increase in the commerce of art, which now, by means of of engraving, penetrated into the homes of the middle classes, as well as from the growing demand for illustrated books, which have given employment to engravers of first-rate ability. The check to line-engraving has come from the desire for cheaper and more rapid methods, a desire satisfied in various ways, but especially by etching and by the various kinds of photography. Nevertheless, the 19th century has produced most highly accomplished work in line-engraving, both in the figure and in landscape. Its characteristics, in comparison with the work of other centuries, are chiefly a more thorough and delicate rendering of local colour, light and shade, and texture. The elder engravers could draw as correctly as the moderns, but they either neglected these elements or admitted them sparingly, as opposed to the spirit of their art. If you look at a modern engraving from Landseer, you will see the blackness of a gentleman's boots (local colour), the soft roughness of his coat (texture), and the exact value in light and dark of his face and costume against the cloudy sky. Nay more, you will find every sparkle on bit, boot, and stirrup. Modern painting pays more attention to texture and chiaroscuro than classical painting did, so engraving has followed in the same directions. But there is a certain sameness in pure line-engraving which is more favourable to some forms and textures than to others. This sameness of line-engraving, and its costliness, have led to the adoption of mixed methods, which are extremely prevalent in modern commercial prints from popular artists. In the well-known prints from Rosa Bonheur, for example, by T. Landseer, H. T. Ryall, and C. G. Lewis, the tone of the skies is got by machine-ruling, and so is much undertone in the landscape; the fur of the animals is all etched, and so are the foreground plants,

Characteristics of modern work.

the real burin work being used sparingly where most favourable to texture. Even in the exquisite engravings after Turner, by Cooke, Goodall, Wallis, Miller, Willmore, and others, who reached a degree of delicacy in light and shade far surpassing the work of the old masters, the engravers have recourse to etching, finishing with the burin and dry point. Turner's name may be added to those of Raphael, Rubens, and Claude in the list of painters who have had a special influence upon engraving. The speciality of Turner's influence was in the direction of delicacy of tone. In this respect the Turner vignettes to Roger's poems were a high-water mark of human attainment, not likely ever to be surpassed.

Pure line-engraving is still practised by a few artists in England and France. In England, Mr Jeens is a direct descendant of the great line engravers, and will take high rank in the future by the perfection of his drawing and the good taste with which he has used the burin in shading. In France, the lovers of line-engraving have endeavoured to keep it alive by organizing themselves into a society for its encouragement. The most recent direction of the art, in the works of Ferdinand Gaillard, is a return to studied outline, but in combination with the most elaborate modelling. In his St Sebastian the outline is studied and marked with careful firmness throughout, and the modelling is thoroughly worked out in minute touches and fine lines, giving powerful relief without any but the most delicate chiaroscuro.

Gaillard.

Etching.

We mentioned etching amongst the causes which have operated destructively on line-engraving. The chief difference between the two arts is that in line-engraving the furrow is produced by the ploughing of the burin, whereas in etching the copper is eaten away by acid. The English word is merely an Anglicized form of the Dutch *etsen*, which has the same origin as our verb to eat, consequently, unless there is corrosion, or eating away of substance, there is no etching. The word is vulgarly and most erroneously used for pen drawing.

Etymology.

To prepare a plate for etching it is first covered with etching-ground, a composition which resists acid. The qualities of a ground are to be so adhesive that it will not quit the copper when a small quantity is left isolated between lines, yet not so adhesive that the etching point cannot easily and entirely remove it; at the same time a good ground will be hard enough to bear the hand upon it, or a sheet of paper, yet not so hard as to be brittle. The best is that of Abraham Bosse, which is composed as follows:—Melt two ounces of white wax; then add to it one ounce of gum-mastic in powder, a little at a time, stirring till the wax and the mastic are well mingled; then add, in the same manner, an ounce of bitumen in powder. There are three different ways of applying an etching-ground to a plate. The old-fashioned way was to wrap a ball of the ground in silk, heat the plate, and then rub the ball upon the surface, enough of the ground to cover the plate melting through the silk. To equalize the ground a dabber was used, which was made of cotton-wool under horsehair, the whole inclosed in silk. This method is still used by many artists, from tradition and habit, but it is far inferior in perfection and convenience to that which we will now describe. When the etching-ground is melted, add to it half its volume of essential oil of lavender, mix well, and allow the mixture to cool. You have now a paste which can be spread upon a cold plate with a roller; these rollers are covered with leather and made (very carefully) for the purpose. You first spread a little paste on a sheet of glass (if too thick, add more oil of lavender and mix with a palette knife), and roll it till the roller is quite equally charged all over, when the paste is easily transferred to the copper, which is afterwards gently heated to expel the oil of lavender. In both these methods of grounding a plate the work is not completed until the ground has been smoked, which is effected as follows. The plate is held by a hand-vice if a small one, or, if large, is fixed at some height, with the covered side downwards. A smoking torch, composed of many thin bees-wax dips twisted together, is then lighted and passed repeatedly under the plate in every direction, till the ground has incorporated enough lampblack to blacken it. The third way of covering a plate for etching is to apply the ground in solution as collodion is applied by photographers. The ground may be dissolved in chloroform or in oil of lavender. The plate being grounded, its back and edges are protected from the acid by Japan varnish, which soon dries, and then the drawing is traced upon it. The best way of tracing a drawing is to use sheet gelatine, which is employed as follows. The gelatine is laid upon the drawing, which its transparence allows you to see perfectly, and you trace the lines by scratching the smooth surface with a sharp point. You then fill these scratches with fine black-lead, in powder, rubbing it in with the finger, turn the tracing with its face to the plate, and rub the back of it with a burnisher. The black-lead from the scratches adheres to the etching ground and shows upon it as pale grey, much more visible than anything else you can use for tracing. Then comes the work of the etching-needle, which is merely a piece of steel sharpened more or less. Turner used a prong of an old steel fork which did as well as anything, but neater etching-needles are sold by artists' colourmakers. The needle removes the acid and lays the copper bare. Some artists sharpen their needles so as to present a cutting edge which, when used sideways, scrapes away a broad line; and many etchers use needles of various degrees of sharpness to get thicker or thinner lines. It may be well to observe, in connection with this part of the subject, that whilst thick lines agree perfectly well with the nature of woodcut, they are very apt to give an unpleasant heaviness to plate engraving of all kinds whilst thin lines have generally a clear and agreeable appearance in plate engraving. Nevertheless, lines of moderate thickness are used effectively in etching when covered with finer shading, and very thick lines indeed were employed with good results by Turner when he intended to cover them with mezzotint, and to print in brown ink, because their thickness was essential to prevent them from being overwhelmed by the mezzotint, and the brown ink made them print less heavily than black. Etchers differ in opinion as to whether the needle ought to scratch the copper or simply to glide upon its surface. A gliding needle is much more free, and therefore communicates a greater appearance of freedom to the etching, but it has the inconvenience that the etching-ground may not always be entirely removed, and then the lines may be defective from insufficient biting. A scratching needle, on the other hand, is free from this serious inconvenience, but it must not scratch irregularly so as to *engrave* lines of various depth. The *biting* in former times was generally done with a mixture of nitrous acid and water, in equal proportions; but in the present day a Dutch mordant is a good deal used, which is composed as follows:—Hydrochloric acid, 100 grammes; chlorate of potash, 20 grammes; water, 880 grammes. To make it, heat the water, add the chlorate of potash, wait till it is entirely dissolved, and then add the acid. The nitrous mordant acts rapidly, and causes ebullition; the Dutch mordant acts slowly, and causes no ebullition. The nitrous mordant widens the lines; the Dutch mordant bites in depth, and does not widen the lines to any perceptible degree. The time required for both depends upon temperature. A mordant bites slowly when cold, and more

Preparation of the plate.

Etching ground.

Bosse's ground.

and more rapidly when heated. To obviate irregularity caused by difference of temperature, the writer of this paper has found it a good plan to heat the Dutch mordant artificially to 95° Fahr. by lamps under the bath (for which a photographer's porcelain tray is most convenient), and keep it steadily to that temperature; the results may then be counted upon; but whatever the temperature fixed upon, the results will be regular if it is regular. To get different degrees of biting on the same plate the lines which are to be pale are "stopped out" by being painted over with Japan varnish or with etching-ground dissolved in oil of lavender, the darkest lines being reserved to the last, as they have to bite longest. When the acid has done its work properly the lines are bitten in such various degrees of depth that they will print with the degree of blackness required; but if some parts of the subject require to be made paler, they can be lowered by rubbing them with charcoal and olive oil, and if they have to be made deeper they can be rebitten, or covered with added shading. Rebiting is done with the roller above mentioned, which is now charged very lightly with paste and rolled over the copper with no pressure but its own weight, so as to cover the smooth surface, but not fill up any of the lines. The oil of lavender is then expelled as before by gently heating the plate, but it is not smoked. The lines which require rebiting may now be rebitten, and the others preserved against the action of the acid by stopping out. These are a few of the most essential technical points in etching, but there are many matters of detail for which the reader is referred to the special works on the subject.

The two countries in which etching has been most practised are Holland and France. It has also been successfully practised in Italy, Germany, and England, but not to so great an extent. It has resembled line engraving in receiving a powerful impulse from celebrated painters, but whereas with the exception of Albert Dürer the painters have seldom been practical line engravers, they have advanced etching not only by advice given to others but by the work of their own hands. Rembrandt did as much for etching as either Raphael or Rubens for line engraving; and in landscape the etchings of Claude had an influence which still continues, both Rembrandt and Claude being practical workmen in etching, and very skilful workmen. And not only these, but many other eminent painters have practised etching successfully, each in his own way. Ostade, Ruysdael, Berghem, Paul Potter, Karl Dujardin, etched as they painted, and so did a greater than any of them, Vandyke. In the earlier part of the present century etching was almost a defunct art, except as it was employed by engravers as a help to get faster through their work, of which "engraving" got all the credit, the public being unable to distinguish between etched lines and lines cut with the burin. During the last fifteen or twenty years, however, there has been a great revival of etching as an independent art, a revival which has extended all over Europe, though France has had by far the largest and most important share in it. It was hoped, at the beginning of this revival, that it would lead to the production of many fine original works; but the commercial laws of demand and supply have unfortunately made modern etching almost entirely the slave of painting. Nearly all the clever etchers of the present day are occupied in translating pictures, which many of them, especially Unger, Jacquemart, Flameng, and Rajon, do with remarkable ability, even to the very touch and texture of the painter. The comparative rapidity of the process, and the ease with which it imitates the manner of painters, have caused etching to be now very generally preferred to line engraving by publishers for the translation of all pictures except those belonging to a severe and classical style of art, for which the burin is, and will always remain, better adapted than the etching-needle.

Influence of Rembrandt and Claude.

The revival of etching.

Yet, notwithstanding the present commercial predominance of etching from pictures, there are still some artists and eminent amateurs who have cultivated original etching with success. Mr Seymour Haden, Mr Whistler, Mr Samuel Palmer, and others in England, MM. Bracquemond, Daubigny, Charles Jacque, Appian, Lalanne, and others on the Continent, besides that singular and remarkable genius Charles Méryon, have produced original works of very various interest and power. Etching clubs, or associations of artists for the publication of original etchings, have been founded in England, France, Germany, and Belgium. The real difficulty of the art, and its apparent facility, have led to much worthless production, but this ought not to make us overlook what is really valuable.

The following is a brief analysis of different styles of etching. 1. *Pure Line*.—As there is line engraving, so there is line etching; but as the etching-needle is a freer instrument than the burin, the line has qualities which differ widely from those of the burin line. Each of the two has its own charm and beauty; the liberty of the one is charming, and the restraint of the other is admirable also in its right place. In line etching, as in line engraving, the great masters purposely exhibit the line and do not hide it under too much shading. 2. *Line and Shade*.—This answers exactly in etching to Mantegna's work in engraving. The most important lines are drawn first throughout, and the shade thrown over them like a wash with the brush over a pen sketch in indelible ink. 3. *Shade and Texture*.—This is used chiefly to imitate oil-painting. Here the line (properly so called) is entirely abandoned, and the attention of the etcher is given to texture and chiaroscuro. He uses lines, of course, to express these, but does not exhibit them for their own beauty; on the contrary, he conceals them.

Of these three styles of etching the first is technically the easiest, and being also the most rapid, is adopted for sketching on the copper from nature; the second is the next in difficulty; and the third the most difficult, on account of the biting, which is never easy to manage when it becomes elaborate. The etcher has, however, many resources; he can make passages paler by burnishing them, or by using charcoal, or he can efface them entirely with the scraper and charcoal; he can darken them by rebiting or by regrounding the plate and adding fresh work; and he need not run the risk of biting the very palest passages of all, because these can be easily done with the dry point, which is simply a well-sharpened stylus used directly on the copper without the help of acid. It is often asserted that any one can etch who can draw, but this is a mistaken assertion likely to mislead. Without requiring so long an apprenticeship as the burin, etching is a very difficult art indeed, the two main causes of its difficulty being that the artist does not see his work properly as he proceeds, and that mistakes or misfortunes in the biting, which are of frequent occurrence to the inexperienced, may destroy all the relations of tone.

Aquatint.—This is a kind of etching which successfully imitates washes with a brush. There are many ways of preparing a plate for aquatint, but the following is the best. Have three different solutions of rosin in rectified alcohol, making them of various degrees of strength, but always thin enough to be quite fluid, the weakest solution being almost colourless. First pour the strongest solution on the plate. When it dries it will produce a granulation; and you may now bite as in ordinary etching for your darker tones, stopping out what the acid is not to operate upon, or you may use a brush charged with acid, perchloride of iron being a very good mordant for the purpose. After cleaning the plate, you proceed with the weaker solutions in the same way, the weakest giving the finest granulation for skies, distances &c. The process requires a good deal of stopping-out, and some burnishing, scraping, &c., at last. It has been employed very successfully by M. Brunet Debaines in his plates from Turner, especially in Agrippina landing with the Ashes of Germanicus. Aquatint may be effectively used in combination with line etching, and still more harmoniously with soft ground etching in which the line imitates that of the lead pencil.

The natural tendency of the three kinds of engraving we have studied is from line to shade and from shade to texture. The perfection of line is seldom maintained when the attention of artists has been directed to the other elements, for line is a separate study. Shade is its enemy, but line may still survive under a veil of half shade. When chiaroscuro becomes complete the delicacy of line, which is an abstraction, is nearly lost; and when texture becomes an object also, the line is lost altogether. This appears to be the natural law of development in the graphic arts, and it is an approach to nature, which is all shade and texture without line; yet the pure line is a loss in art, from its ready expression of the feeling of the artist, and a loss for which more natural truth is not always a compensation.

Mezzotint.

Invention of mezzotint engraving.

Of all the kinds of engraving, mezzotint comes nearest to nature, though it is far from being the best as a means of artistic expression. It is said to have been invented by Prince Rupert, or by Lewis Siegen, a lieutenant in his service, in or about the year 1611, and to have been suggested by the rust on a weapon which a soldier was cleaning. The plate is prepared (before any design is made upon it) by means of an instrument like a chisel, with the edge ground into the segment of a circle like the rocker of a cradle, and so engraved as to present when sharp about 100 or 120 small teeth. This cradle is rocked from side to side with the hand, and every tooth makes a small dent in the copper, and raises a corresponding bur. The whole surface of the plate is gone over with this instrument about eighty times, in different directions, before it is in a fit condition to be worked upon. When sufficiently prepared it presents a fine soft-looking and perfectly even grain, and if in this state a proof is taken from it by the usual process of copper-plate printing, the result is nothing but the richest possible black. The engraver works from dark to light by removing the grain with a scraper, and exactly in proportion as he removes it the tint becomes paler and paler. Pure whites are got by scraping the grain away entirely, and burnishing the place. As the process is from dark to light, the engraver has to be very cautious not to remove too much of his grain at once. He proceeds gradually from dark to half-dark, from half-dark to middle-tint, from middle-tint to half-light, and from half-light to light. He has nothing to do with line, but thinks entirely of masses relieved from each other by chiaroscuro. When the work is good the result is soft and harmonious, well adapted to the interpretation of some painters, but not of all. As the art has been most practised in England, some of its most successful work has been employed in the translation of English artists. More than a hundred engravers in mezzotint employed themselves on the portraits of Sir Joshua Reynolds, and the best of their works are now valued as the classics of the art, which is connected with the name of Reynolds just as line engraving is connected with that of Raphael. Turner and Constable's landscapes were also admirably engraved in mezzotint by Lupton and others, Turner himself being a good mezzotint engraver, though he practised the art little. Mezzotint engraving is still practised in England with great skill by Cousens and others, and would no doubt be more resorted to than it is if the plates yielded larger editions, but unfortunately they soon show signs of wear.

Preparation of the plate.

The process.

Dry point is really nothing but mezzotint in line. As the point of the stylus makes its scratch on the copper, it raises a bur, which retains the ink in the printing just as the bur from the cradle does in mezzotint. The bur of dry point also wears away fast, and yields but few impressions.

Copper, steel, and zinc are the metals chiefly used for engraving. Steel is less employed than formerly, because copper is now covered with a coat of steel by the electrotype process, which enables it to resist printing indefinitely, as the steel can be renewed at will. Zinc is similarly coated with copper, and sometimes used for small editions.

AUTHORITIES.—A real knowledge of engraving can only be attained by a careful study and comparison of the prints themselves, or of accurate facsimiles, so that books are of little use except as guides to prints when the reader happens to be unaware of their existence, or else for their explanation of technical processes. The department of art-literature which classifies prints is called *Iconography*, and the classifications adopted by iconographers are of the most various kinds. For example, if a complete book were written on Shakespearian iconography it would contain full information about all prints illustrating the life and works of Shakespeare, and in the same way there may be the iconography of a locality or of a single event. The history of engraving is a part of iconography, and there are already various histories of the art in different languages. In England Mr W. Y. Ottley wrote an *Early History of Engraving*, published in two volumes 4to, 1816, and began what was intended to be a series of notices on engravers and their works. Mr H. Ottley has also written upon the same subject. The facilities for the reproduction of engravings by the photographic processes have of late years given an impetus to iconography. One of the most reliable modern writers on the subject is M. Georges Duplessis, the keeper of prints in the national library of France. He has written the *History of Engraving in France*, and has published many notices of engravers to accompany the reproductions by M. Amand Durand. He is also the author of a useful little manual entitled *Les Merveilles de la Gravure*. Count de Laborde collected materials for a history of wood-engraving, and began to publish them, but the work advanced no farther than a first number. Jansen's work on the origin of wood and plate engraving, and on the knowledge of prints of the 15th and 16th centuries, was published at Paris in two volumes 8vo in 1808. Didot's *Essai typographique et bibliographique sur l'histoire de la gravure sur bois* was published in Paris (8vo) in 1863. A *Treatise on Wood Engraving*, by John Jackson, appeared in 1839, and a second edition of the work in 1861. A good deal of valuable scattered information about engraving is to be found in the back numbers of the principal art periodicals, such as the *Gazette des Beaux-Arts*, *L'Art*, and the *Portfolio*. In the year 1877 Professor Colvin published a series of articles in the *Portfolio* on "Albert Dürer, His Teachers, His Rivals, and His Followers," which contain in a concentrated form the main results of what is known about the early engravers, with facsimiles from their works. Professor Ruskin has also published a volume on engraving, entitled *Ariadne Florentina*, in which the reader will find much that is suggestive; but he ought to be on his guard against certain assertions of the author, especially these two,—(1) that all good engraving rejects chiaroscuro, and (2) that etching is an indolent and blundering process at the best. The illustrations to this volume are of unequal merit: the facsimiles from Holbein are good; the reductions of early Italian engravings are not good. The reader will find information about engraving, and many facsimiles of old woodcuts, in the different volumes by Paul Lacroix on the Middle Ages and the Renaissance, published by Firmin Didot; the information may be relied upon, but the facsimiles, though effective, are not always perfect. Roret's *Collection de Manuels formant une Encyclopédie des Sciences et des Arts* contains a pocket volume on engraving which is full of useful practical information, and another similar volume on plate-printing, also very useful to engravers on metal, who ought always to understand printing; these volumes may be had separately. Etching has been the subject of several different treatises. The oldest is that of Abraham Bosse, published at Paris in 1645, 8vo, and in 1701, 12mo. The revival of etching in our own day has been accompanied by the publication of various treatises. The first was a short account of the old process by Mr Alfred Ashley; then came the French *brochure* of M. Maxime Lalanne; then *Etching and Etchers* (450 pages, in the stereotyped edition) by the writer of this article, and a smaller treatise, *The Etcher's Handbook*, by the same. These were followed by another short French handbook, that of M. Martial. For information about the states of plates, their prices, their authenticity and history, the student ought to consult the best catalogue-makers, such as Bartsch, Claussin, Charles Blanc, &c. The literature of engraving