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.HÉLIOGRAPHIC ENGRAVING. After summarily retracing the origin. the development and the various applications of paper photography, we come to a branch of this art which enters more directly into our subject as a multiplier art: it is photographic engraving. The photographic processes make it possible to multiply to infinity the direct copies obtained by means of inverse proofs; but the operation is long, and the tests are expensive.

But the most serious inconvenience is that one is penetrated with the idea that photographic prints are of little duration, and that the most solid, the best washed, will not last fifty years.

If, therefore, the images obtained by light could be transported and engraved on metal plates, the problem would be solved, and these would always be preserved. This is indeed what we sought to achieve and we succeeded. It is again to M. Niepce de Saint-Victor, to whom photography owes so many improvements, that this result is due.

In dealing with daguerreotyping, we talked about the attempts made by several people to engrave the daguerre plates, and that, given the lack of success, we abandoned. We also talked about the images reproduced with iodine, an interesting discovery by Mr. Niepce de Saint-Victor.

Poitevin process. We will quote here the process to engrave these images invented in 1848 by Mr. Poitevin. The layer of the object to be reproduced on the silver plate, or on the silvered and polished copper plate, is made according to the method of M Niepce, which is the following: The engraving is immersed in an iodine solution and then placed on another sheet coated with a starch layer. When these leaves are pressed together, iodine is released from the blacks and deposited on the starch; and when this leaf is pressed on a plate of copper, the iodine is detached from the starch and fixed on the copper, which receives all the engraving. If pressed on a silver board, the iodine combines with the metal plate and forms a silver iodine. Mr. Poitevin then plunges the plate itself into a solution saturated with copper sulphate, where, placing it in communication with a voltaic pile, the copper of this dissolution is deposited on the parts of the plate not covered with iodide. that is to say, responding to the whites of the engraving. The plank is then immersed in a hyposulphite bath of soda, which dissolves the iodide and exposes the underlying silver surface. It heats to oxidize the part of the plate covered with copper, then hyposulphite of soda, which dissolves the iodide and exposes the underlying silver surface. It heats to oxidize the part of the plate covered with copper, then hyposulphite of soda, which dissolves the iodide and exposes the underlying silver surface. It heats to oxidize the part of the plate covered with copper, then

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one passes a layer of mercury, heating slightly. This mercury does not touch the copper oxide, but amalgamates with the silver, so that at this moment the

blacks of the engraving are represented by the amalgam of silver and mercury, and the whites by copper oxide. The plate is covered with two or three sheets of beaten gold, and the mercury is evaporated by heating; gold adheres to the silver which has just been released from mercury, and then is plunged into a solution of silver nitrate, which dissolves copper oxide. The silver plate is then almost brought back to its original state: the blacks of the engraving being only indicated by a layer of gold, and the whites by the silver surface of the plate laid bare.

It is then sufficient to treat with weakened nitric acid: the silvery surfaces, attacked by the acid, are hollowed out as deeply as possible; those protected by gold remain intact, that is, protruding. The boards thus prepared are suitable for drawing prints in the manner of wood engravings.

Mr. Niepce de Saint-Victor took over the work of his uncle, Nicéphore Niepce, inventor of heliography, did new research, and on May 25, 1853 he presented to the Academy of Sciences a thesis on a new process photographic engraving. Mr. Fox Talbot, for his part, had also presented a memoir on the same subject a month earlier, namely May 2, 1853. Mr. Arago, however, argued in the same session that Mr. Niepce's discovery of Saint-Victor, the latter having long confided his secret to M. Chevreul, a member of the Academy.

We will describe successively the two processes:

The Talbot process consists in coating a steel plate with an impressionable layer, composed of a mixture of gelatin and dichromate of potash, after having previously immersed in vinegar acidulated with a little sulfuric acid and heated slightly. If the object to be reproduced is flat, it is put on the plate thus prepared, and exposed to the open for 1 or 2 minutes. In the event that the object is not

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To be placed directly on the plate, it would be necessary to first take an inverse image by the ordinary photographic means, to draw from there a direct image on paper or glass, then we put the latter on the steel plate for the first time. in the sun. The impressed plate then plunges into a bowl of cold water for 2 or 3 minutes; we see immediately that the water whitens the image, because it dissolved the salt of Chrome and also a part of the gelatin; it must then be

removed from the water and put in the alcohol for a few moments, allowed to dry spontaneously at a moderate heat, and the photographic image is finished.On pouring on the plate a corrosive liquid, it must first of all to penetrate where he feels the least resistance, that is, where the thickness of the gelatin layer has been reduced by the dissolving action of the water; it is the platinum bichloride, mixed with a quantity of water equal to a quarter of its volume, which fulfills these functions. After 1 to 2 minutes you can see the photographic white image blooming, an obvious sign that the mordant has begun to attack the steel. After 1 or 2 minutes again the solution is poured and the plate is dried with fog paper, then washed with water containing a lot of sea salt, and the plate is strongly rubbed with a damp sponge, to detach there layer of gelatin that covered it. So we can see the engraving we got. is platinum bichloride, mixed with a quantity of water equal to a quarter of its volume, which fulfills these functions. After 1 to 2 minutes you can see the photographic white image blooming, an obvious sign that the mordant has begun to attack the steel. After 1 or 2 minutes again the solution is poured and the plate is dried with fog paper, then washed with water containing a lot of sea salt, and the plate is strongly rubbed with a damp sponge, to detach there layer of gelatin that covered it. So we can see the engraving we got. is platinum bichloride, mixed with a quantity of water equal to a quarter of its volume, which fulfills these functions. After 1 to 2 minutes you can see the photographic white image blooming, an obvious sign that the mordant has begun to attack the steel. After 1 or 2 minutes again the solution is poured and the plate is dried with fog paper, then washed with water containing a lot of sea salt, and the plate is strongly rubbed with a damp sponge, to detach there layer of gelatin that covered it. So we can see the engraving we got. After 1 or 2 minutes again the solution is poured and the plate is dried with fog paper, then washed with water containing a lot of sea salt, and the plate is strongly rubbed with a damp sponge, to detach there layer of gelatin that covered it. So we can see the engraving we got. After 1 or 2 minutes again the solution is poured and the plate is dried with fog paper, then washed with water containing a lot of sea salt, and the plate is strongly rubbed with a damp sponge, to detach there layer of gelatin that covered it. So we can see the engraving we got.

Mr. Talbot tells us that this process can be modified in various ways. Here is another: Take a steel plate with a layer of gelatin sensitive to light, it is first covered with a black veil of crepe or gauze, then exposed to the sun; it is found after exposure imprinted with a large number of lines produced by the pancake. Then we replace the gauze any object, for example an opaque leaf of a plant, and it is exposed again to the sun for a few minutes; an engraving is easily obtained which represents a sheet covered with interior lines. These lines

end at the edge of the sheet and are absolutely missing on the rest of the plate. This process, however, has produced nothing that deserves mention.

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Niepce process of Saint-Victor (') . M. Niepce de Saint-Victor, together with M. Lemaitre, engraver, made modifications to the engraving process invented by his uncle, Nicephore Niepce, and made a new application of it. The steel to be worked on having been degreased with chalk-white, is poured on the surface rjolie water mixed with a little hydrochloric acid, in the proportions of 1 part of acid to 20 parts d. 'water. By this means the varnish adheres perfectly to the metal. The plate should be immediately washed well with water and then dried. Then, with the aid of a roller covered with skin, the Judea bitumen dissolved in lavender oil is spread on the polished surface; the varnish thus applied is subjected to a moderate heat, and when it is dried one preserves the plate from the action of light and moisture. On a plate thus prepared, M. Niepce applies the recto of a direct (or positive) photographic print on albumen glass, or on wax paper, and exposes it to light for a more or less long time, according to the nature of the test to be reproduced, and according to the intensity of the light. In any case the operation is never very long, for one can make a test in a quarter of an hour in the sun, and in an hour in diffuse light. It is even necessary to avoid prolonging the exposure, because in this case the image becomes visible before the operation of the solvent, and it is a sure sign that the test is missed, because the solvent will no longer produce an effect. . action of light and moisture. On a plate thus prepared, M. Niepce applies the recto of a direct (or positive) photographic print on albumen glass, or on wax paper, and exposes it to light for a more or less long time, according to the nature of the test to be reproduced, and according to the intensity of the light. In any case the operation is never very long, for one can make a test in a quarter of an hour in the sun, and in an hour in diffuse light. It is even necessary to avoid prolonging the exposure, because in this case the image becomes visible before the operation of the solvent, and it is a sure sign that the test is missed, because the solvent will no longer produce an effect. . action of light and moisture. On a plate thus prepared, M. Niepce applies the recto of a direct (or positive) photographic print on albumen glass, or on wax paper, and exposes it to light for a more or less long time, according to the nature of the test to be reproduced, and according to the intensity of the light. In any case the operation is never very long, for one can make a test in a quarter of an hour in the sun, and in an hour in diffuse light. It is even necessary to avoid prolonging the exposure, because in this case the image becomes visible before the operation

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Three parts of rectified naphtha oil and one part of benzine (prepared by Colas) are employed for dissolving this proportion, which has generally given good results. To promptly stop the action and remove the solvent, we throw water on the plate in the form of a sheet, and thus removes all the solvent; the drops of water remaining on the plate are then dried, and the heliographic operations are terminated. To engrave these plates, Mr. Lemaître used the mordant

'(1)' See Photograpli Research. 1855, and Practical Treaty of lithographic engraving on steel and glass, by M. Niepce de Saint-Victor. Paris, 1850.

next: 36 ° nitric acid, by volume, 1 part; distilled water, 8 parts; alcohol at 36 °, 2 parts.

The action of the nitric acid extended with water and alcohol in these proportions takes place as soon as the mordant has been poured on the steel plate, prepared as has just been said; while the same amounts of nitric acid and water without alcohol have the disadvantage of not acting after at least two minutes of contact. The mordant is left very little time on the plate, it is removed, and then washed and dried well varnish and etching in order to continue and dig the metal deeper without altering the heliographic layer. For this we use resin reduced to very fine powder, placed in the bottom of a box prepared for this purpose. It is agitated by means of a bellows, so as to form a sort of cloud of dust which is allowed to fall on the plate, as is practiced for aquatint engraving. The plate is then heated; the resin forms a network on the whole of the etching; it consolidates the varnish, which can then resist longer the action of the mordant (nitric acid extended water, without addition of alcohol). It forms in the blacks a fine grain which retains the printing ink and makes it possible to obtain good and numerous proofs, after the varnish and the resin have been removed using heated fatty substances and essences. It follows from all these operations that, without the aid of drawing, one can reproduce and engrave on steel all the photographic prints, on glass and on paper, without needing the dark room. the resin forms a network on the whole of the etching; it consolidates the varnish, which can then resist longer the action of the mordant (nitric acid extended water, without addition of alcohol). It forms in the blacks a fine grain which retains the printing ink and makes it possible to obtain good and numerous proofs, after the varnish and the resin have been removed using heated fatty substances and essences. It follows from all these operations that, without the aid of drawing, one can reproduce and engrave on steel all the photographic prints, on glass and on paper, without needing the dark room. the resin forms a network on the whole of the etching; it consolidates the varnish, which can then resist longer the action of the mordant (nitric acid extended water, without addition of alcohol). It forms in the blacks a fine grain which retains the printing ink and makes it possible to obtain good and numerous proofs, after the varnish and the resin have been removed using heated fatty substances and essences. It follows from all these operations that, without the aid of drawing, one can reproduce and engrave on steel all the photographic prints, on glass and on paper, without needing the dark room. It forms in the blacks a fine grain which retains the printing ink and makes it possible to obtain

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These first tests did not completely meet the expectations, Mr. Niepce de Saint-Victor sought in subsequent tests to improve the varnish and mordant. On the 30th of October, 1853, he communicated to the Academy a new varnish which had the fluidity of albumen, which extended as easily as the collodion and dried as quickly, which made it possible to operate ten minutes after covering the plate. 'steel. D was composed of benzine, 100 grams, pure Judea bitumen, 5 gr. and pure yellow wax, 1 gr. M. Niepce made this varnish more sensitive by pouring on the plate anhydrous sulfuric ether, containing a few drops of gasoline.

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rectified lavender. In this way one could operate in ten minutes, a quarter of an hour at most, in the dark room, and a few minutes were sufficient when one operated by contact with the solar rays. The solvent was also modified and consisted of 5 parts of naphtha oil and 1 part of benzine.

New research, especially on volatile oils, brought even better results, which were published on October 2, 1854; the new varnish was composed of benzine, 90 grams, of pure lemon zest essence, 10 grams, and pure Judea bitumen, 2 grams. The essence that gives the most creamy varnish is that of pure, undistilled aspic; but that which M. Niepce prefers to all essences is that of pure lemon zest (obtained by pressure), because it gives the most beautiful heliographic results. The varnish it forms is very homogeneous, more siccative than that which is prepared with the essence of aspic; only it is drier, and that is what makes it give purer traits.

However this new varnish has a disadvantage, it is that of not offering enough resistance to the action of etching; but by means of a fumigation, which M.

Niepce has imagined, one can consolidate the layer of the thinnest varnish. This fumigation is carried out after the plate has undergone the action of light and that of the solvent. This is the way to operate the fumigation. There is a box similar to that used to pass the hermetically sealed mercury plate, the size of the largest steel plates on which one must operate, because by means of two small movable bars supported on slats placed in the interior, the bars are moved away or moved closer together, depending on the size of the surface. In the bottom of the box, which must be at a certain height from the ground, a porcelain dish is placed in the round opening of a sheet of zinc; the capsule, which contains pure, undistilled or ground essence of asphalt, is heated with an alcohol lamp so as to raise the temperature from 70 to 80 degrees at most, in order to avoid volatilizing too much of essential oil, because then the varnish dissolves

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sdranVet'ne -present, as it should be, a bright and bronze-colored layer, similar to the first aspect, of the varnished plate, before exposure to light. Mr. Niepce recommends in this fumigation to heat the gasoline only until there is a slight release of steam, to prolong the exposure for two or three minutes, to heat again, and to start again a second. fumigation if necessary 1; then leave it well in the plate, exposing it to the air for a moment before biting the etchings.

M. Niepce de Saint-Victor, composed a varnish completely impervious to acid, without the aid of fumigations; it suffices to remove the lacquer in a rubber gram, previously dissolved in turpentine, -eh form of smooth paste .then ;, but it can bear iaheat "which is required to submit the metal plate apply the aqua-tinta grain needed for reproduction-photographic prints. M. Niepce de Saint Victoire had obtained fine engravings of the portrait of Emperor Napoleon III, and of the Louvre; the heliographic operations had been made by Madame Pauline Riffaût, and the retouches in engraving by M. Riffaut.

'Mr. Niepce de Saint-Victor also undertook research to replace the etching in gravure. This is what he reported on March 12, 1835, to Ace'demia: "The fumigations I have indicated are certainly of great help, but they are difficult to employ. They often give too much or too little resistance, varnish; so that it was necessary to look for another mordant than the strong water, which could act on the metal without attacking the varnish. In the great number of experiments I have made on this subject, I have found nothing better than iodized or iodine-saturated water, at a temperature of 10 to 15 degrees at most, so that it has a golden yellow color, and does not go up to orangey red. The bite is begun by

covering the plate of iodized water; then, after ten minutes, a quarter of an hour, we renew the iodized water, because the first essence must no longer contain iodine^ part had to combine with enfor20 steel

enfor20

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iron iodide, and the other has volatilized, so that it is important to change the iodine water two or three times, that is, until the plate is sufficiently bitten. The bite is slow, and, moreover, it would never be deep enough, if it were not terminated by the use of the strong water which, in this case, must be very weakly acidulated with nitric acid. then enough to dig the metal deeper than iodine, and without attacking the varnish. The application of this process gave excellent results to Mr. Riffaut, engraver. The photographic researches and the engraving treatise of M. Niepce de Saint-Victor are adorned with a magnificent portrait of the author of these books, engraved heliographically from a photograph of M. Plumier, and finished by Mr. Riffaut. It is by means of these processes, elaborated by M. Niepce de Saint-Victor, that MM. Rousseau and Dévéria, Bisson and Riante now obtain their steel printing plates for their publication of the zoological iconography; but these methods of engraving presented a regrettable inconvenience, it was to be able to do without the intervention of the chisel, or retouches the engraver to finish them; so M. Riffaut was an auxiliary of whom we could not do without, at least for the former. However, Mr. Riffaut executed perfect steel plates engraved heliographically, and without any retouching; such are the planks that represent the two lizards, the polyp, beetles, shells, crabs, turtles and a tapir.

Charles Stfgre also distinguished himself in engraving by the action of light; the beautiful plates of the south of France, the monuments of Paris, and some genre paintings, are remarkable success stories. Mr Benjamin Deles »

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It has begun to replace photographs on paper-by gravure engravings, for its precious reproductions of old engravings, the announcement of Albert Durer is an identical copy, a true reprint of the primitive test.

Figuer method. M. Louis Figuier, for his part, proposes a method of engraving which has not yet been tried. Here is what he says on this subject: "By examining the clichés. of glass and the positive proofs of glass of MM. Rousseau and Dévéria, it occurred to us that electroplating, which reproduces with astonishing fidelity all that the human art forms of more delicate, could intervene profitably to reproduce these clichés, and thus would make it possible to avoid The use of etching, whose action on the metal, often unequal as a result of a certain permeability of the resinous coating, causes on the board defects which the engraver's chisel is later forced to rectify. We thought that by attacking the glass photographic test with hydrofluoric acid, in order to obtain an intaglio engraving on glass, and then placing the plate in an electroplated bath of copper, we could obtain a plate of this metal suitable for the letterpress printing (*). "

Baldus process. Mr. Baldus, who has also successfully worked on photographic engraving, has just imagined a new process which has the remarkable advantage of being able to do without touching up. Here, according to M. Louis Figuier, in what it consists: On a copper plate a sensitive layer of bitumen of Judea is spread, and a photographic print on paper of the object to be engraved is superimposed; this test is positive, and must therefore be negative on the metal by the action of light. After about a quarter of an hour of exposure to the sun, the image is reproduced on the resinous coating, but it is not visible, and is made to appear by washing the plate with a solvent, which removes parts not impressed by light,

re (1) of Paris, April 15, 1854.

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presented by the resinous features of bitumen. The design, however, is formed of a veil so delicate and so slender that it would not be long before it disappeared in part by the stay of the plaquet at Sein 'dii.liquid. To give it a solidity and a resistance, it is abandoned for two days by the action of the diffused light. The drawing consolidated in this way by its exponent to the day, we plunge the metal blade in a bath: galvanoplastic copper sulphate, and here now are the true marvels of the process. Attach the plate: at the negative pole of the pile, place on the metal parts - not protected by the resinous coating - a copper layer in relief - move it to the positive pole, then dig the metal at the same points, and "thus form a hollow engraving: so that can towill, and depending on the pole of the battery to which it is addressed, to obtain an

intaglio or etching for printing under the press intaglio, or a relief engraving similar to the woodcut , for printing in typographic ink. The photographic test used to transport it to the metal does not need any particular preparation when it comes to reproducing an ordinary engraving already executed on paper, and it is the case that we have admitted above. But this is not the general case; and when it comes to engraving objects, natural history, monuments, or views, the photographic proof which is used must be obtained by a means which differs a little from the ordinary process.

What constitutes the essential difficulty for the engraving of photographic prints is the reproduction of what is called in the engraving of the grain, that is to say, the thinning made by the chisel in the shadows. The photographic print shows nothing of the kind: the shadows are marked by a uniform impasto In the images of Messrs. Rousseau, Devéria and Riffaut, it was produced afterwards with the help of a chisel or a roulette wheel. the engraved metal plate M. Baldus forms this grain on the negative test, by the addition to the "impressionable chemical substances of a compound which, by crystallizing in the mass of the paper, forms there small crystalline grains and transparent. The details of the process are not yet known.

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"Lees; tests, on; obtained paper, with this news; The pictures, of photographic origin, are so perfect, that the Oji, can look as definitely solved the great problem of; the engraving by the luminous agent. ".

Various processes. M. Ziegler, in an excellent article, on the photograph, at the Universal Exhibition of 1855, we learn that M. Rousseau is now engaged in a new process of engraving, imported from Chartres. The board is delaiton; exposed first to the vapors of iodine, then to light, under a positive, the image is produced by the modifications which the iodine undergoes under the influence of luminous rays.

"AT. this operation succeeds an application of mercury by friction by means of a buffer. Mercury does not attach. that in places altered by the light, one is bitten with an acid which. attack the brass without altering the mercury. No w th n tal, any mixture of metals can replace brass. Already very remarkable results have been obtained, the tests continue as well as progress. "

"For some time Mr. Niepce de Saint-Victor has been engaged in research to obtain the direct production of the sun-steel image and engraving as a subsequent operation. Already. the. June 25, 1855 he obtained a complete success by engraving, without retouching a view of the apse of the Protestant temple qui.se. sees windows of the Louvre. This little test is also, fine, too; modeled and as delicate as tests on a plate of Dagger. The proof is made on steel, in the darkroom, by means of a. varnish, bitumen and benzine; wherever the light acts, the varnish dries and becomes impenetrable to the acid; on the contrary, instead of the shadows there. is like powdery, and. se-. The acid acts and graves all the more deeply than. the. light; was less active.

"The. varnish than Mr. Niepce. of St. Victor recommended October 2, 1854 (see page 45.6), est. excellent for app.liea - tioai.qnMl has made beyond héliographique.surv.erm engraving

(1) In the newspaper La Patrie of July 4, 1855;

In this case, as in the case of the metal plate, the glass sheet is subjected to the action of the vapor of the hydrofluoric acid to etch the mat, or the glass plate of this hydrated acid is covered. to engrave in hollow. We thus obtain very beautiful photographic drawings engraved on glass, and if we operate on a red glass whose color is applied only on one side, we have a white drawing on a red background. We could get white drawings on "any kind of colored glass."

Hélioplastîe. M. Poitevin, in 1855, made a new application of the action of light on the mixtures of salts with chromic acid and gummy organic substances, to produce immediately relief or hollow engravings. ■ The procedure which M. Poitevin calls helioplasty is based on the property of dry gelatine, impregnated with a chromate or dichromate and subjected to the action of light, to lose the property of inflating itself in water, and that, subtracted from this action, it takes a volume about six times larger.

Starting from this principle, M. Poitevin applies a more or less thick layer of a uniform solution of gelatin on a glass plate for example; it allows it to dry and then plunges it into a solution of dichromate of potash or of any other, provided that the base has no action on the gelatin itself; it lets it dry again and then it impresses, either through a positive design, or even at the darkroom's foyer. After printing, which must vary according to the intensity of the light, it

plunges into the water the layer of gelatin. Here is what happens: all the parts that did not receive light form reliefs, while those that were impressed form hollows. It then remained to transform into a metallic plate the etched gelatin surface arrived at this state;

By this process, line-negative designs provide

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embossed metal planks that can be used for letterpress printing, while the positive designs give hollow planks that can be printed like the ones in the box. It is therefore necessary that the drawings which may be reproduced by the helioplastic process of M. Poitevin, be made by hatching or an apparent dotted line, if we wish to obtain planks suitable for drawing. By operating on a layer of gelatin of a certain thickness and impressing it through a drawing not formed by lines, such as photographic portraits, for example, we obtain - after the swelling of the parts not modified by the light , a surface modeled in the kind of reliefs on medal (') •

M. Becquerel adds to these details: M. Poitevin, however, is not the first to have used the reductive action of light on the salts formed by chromic acid with the various bases, and chiefly on the chromium dichromate. presence of organic matter. Mr. Mungo Ponton used it for the printing of the positives on paper, and Mr. Ed. Becquerel for the studies on the chemical action of light and for the reproduction of images of the solar spectrum. Mr. Testud, from Beauregard, used it to obtain variously colored images, and Mr. Talbot for chemical engraving, as well as other English scientists for various applications. The chromic acid reduced by the light forms, in these different circumstances, the coloring body which must produce the drawing,

Photogalvanographie. M. Paul Pretsch, of Vienna, Austria, invented a process by which he obtained, either on glass or on any other plate, covered with glutinous substances, mixed with materials of a photographic use, a relief design, or intaglio which can be copied by the electrotypic process so as to produce professional boards (1)

pro (1) 1856, No. 2.

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close to print. The basis of his process is the action of light on a layer of glue mixed with chromium dichromate, silver nitrate, and iodide. potassium! After the exposure of the plate, it is washed in water, which contains a solution of borax or carbonate of soda; the image comes out in relief. When she is. sufficiently developed, the plate is washed in the spirit of wine, then it is covered with copal varnish which is then removed with gasoline. turpentine, and finally the plate is immersed in a weak solution of tannin. It is then ready to be copied by: the electrotypic process. The hollow design is produced in. warming slightly after washing with the spirit of wine.

liamethod of engraving from Mr. Mac-Fherson, ima? in 1855, appears to be only a modification of the primitive process of Niepce. Here it is: The metal plate, steel or. copper, is coated with bitumen of Judea dissolved in sulfuric ether; the ether evaporates rapidly and leaves on the board a slight layer of bitumen spread very uniformly. A positive on glass or paper is applied to this sensitive coating, and an impression is obtained by exposure to light; the plate is immersed in an ether bath to dissolve the unmodified bitumen with light; it remains on the plate a beautiful negative drawing. The board is then immersed in a galvanoplastic and golden bath; gold adheres to purely metallic parts without attacking the bitumen. The bitumen is then dissolved by means of alcohol helping with a gentle heat. The lines of the negative image are now represented by pure metal, and the rest of the plate is protected by gold. We finish by attacking the plate by the known processes, etching to engrave in the hollow the features of the negative image, which in the tests will give the blacks while restoring the truth of the drawing(L).

Salmon and Garnier process. Taking advantage of the properties of iodine to be worn on the black and the reliefs, d (1)

d (1) t. VII, p. 435.

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signed by Mr. Niepce de. St. Victor (see page 440), - ,. using the advantages of electroplating, MM. Salmon and Garuier de Chartres have devised several methods of photographic engraving. They differ from those of Mr. Niepce ,. because all operations can be performed in the shade, that is to say in all times and in all seasons.

One of the processes, says the direct copper decal of any kind of drawing, engraving and lithography, whatever their age and the transformation of this decal into an engraving on metal, takes place in the following way: take the drawing that you wish to reproduce (suppose an ordinary black pencil drawing) and expose it for a few seconds to the action of the iodine vapor, in the box intended for this purpose; then removing this drawing, it is applied on the polished surface of the yellow copper plate: the iodine which had been worn on the black parts, on the lines of the drawing, is decomposed on this copper plate, and if the a slight layer of mercury is then passed over the metal, the design appears on the copper; mercury is carried on all the places affected by iodine and has respected, on the contrary, those which this last substance has left intact; in such a way that we already have the drawing reproduced entirely on the brass plate, but in white. To isolate this drawing from the rest of the plate, it is sufficient to pass underneath, without further precaution, a lithography roll loaded with oily ink, which in turn only takes on places free of mercury, in the intervals of the lines. drawing, isolates it completely and makes it stand out more. To reinforce the layer of fatty substances and to enable it to withstand the operations that will follow, the powdered resin plate is completely dusted. Now that the drawing is on the copper, that each feature is perfectly isolated, and all disposed to be transformed into engraving, it is necessary to clear the plate of the mercury forming the lines of the drawing; the fatty oil here is the effect of the insulating varnish of engravers. The mercury is dissolved by means of a solution of nitrate of silver, added with nitric acid, and the metal (brass) is found bare and even slightly hollowed out, Here the work that must follow changes

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according to the use for which the board is intended and the kind of engraving that one wants to obtain.

If it is desired to engrave in intaglio, it is enough to add acid and to make bite by the ordinary processes of this kind of engraving. If, on the contrary, we wish to obtain an engraving which can be made by lithographic printing, we plunge for a few minutes the copper plate into a galvanic bath charged with iron hydrochloride, and deposit a slight iron layer. where the mercury was previously, that is to say on the lines of the drawing. The copper plate of the bath is removed, and the fatty ink is dissolved by means of turpentine, and then the whole plate is again steamed with iodine, and rubbed with water. a wad laden with globules of mercury, and as a result, as the first time, the plate takes

on a white hue, due to the amalgamation of mercury; but as this last metal does not amalgamate with the iron, it suffices to lightly rub the plate to drive it from the places where this iron is, that is to say from the drawing itself. Thus one has a drawing whose features are covered with a light layer of iron, while the rest of the brass plate is covered with a layer of mercury. If now we come to pass a roll loaded with greasy ink on the metal plate, the only lines of the drawing will take the ink, while the places covered with mercury will refuse it. We can then draw as many tests as we want, being careful to refurbish the mercury plate after a certain number of tests. do not amalgamate with the iron, it suffices to lightly rub the plate to drive it from the places where this iron is, that is to say from the drawing itself. Thus one has a drawing whose features are covered with a light layer of iron, while the rest of the brass plate is covered with a layer of mercury. If now we come to pass a roll loaded with greasy ink on the metal plate, the only lines of the drawing will take the ink, while the places covered with mercury will refuse it. We can then draw as many tests as we want, being careful to refurbish the mercury plate after a certain number of tests. do not amalgamate with the iron, it suffices to lightly rub the plate to drive it from the places where this iron is, that is to say from the drawing itself. Thus one has a drawing whose features are covered with a light layer of iron, while the rest of the brass plate is covered with a layer of mercury. If now we come to pass a roll loaded with greasy ink on the metal plate, the only lines of the drawing will take the ink, while the places covered with mercury will refuse it. We can then draw as many tests as we want, being careful to refurbish the mercury plate after a certain number of tests. Thus one has a drawing whose features are covered with a light layer of iron, while the rest of the brass plate is covered with a layer of mercury. If now we come to pass a roll loaded with greasy ink on the metal plate, the only lines of the drawing will take the ink, while the places covered with mercury will refuse it. We can then draw as many tests as we want, being careful to refurbish the mercury plate after a certain number of tests. Thus one has a drawing whose features are covered with a light layer of iron, while the rest of the brass plate is covered with a layer of mercury. If now we come to pass a roll loaded with greasy ink on the metal plate, the only lines of the drawing will take the ink, while the places covered with mercury will refuse it. We can then draw as many tests as we want, being careful to refurbish the mercury plate after a certain number of tests. while places covered with mercury will refuse it. We can then draw as many tests as we want, being careful to refurbish the mercury plate after a certain number of tests. while places covered with mercury will refuse it. We can then draw as many tests as we want, being careful to refurbish the mercury plate after a certain number of tests.

Suppose now that instead of a board to be printed under the lithographic press, we want to get one for typography, here is how we should proceed: Take the plate when it is going to be immersed in the galvanic bath, we it would be enough to substitute a preparation of gold for the iron salt and to leave a slight layer on the line (we take the gold because it is more resistant to the action of acids); the plate is inked and the drawing is bitten all around; the gold preserving the features, there is only the surrounding copper of attacked, so that the drawing itself is in relief,

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The other method of MM. Salmon and Gamier, the engraving of the photographs, differs from the first only by the starting point: once the image is fixed on the copper plate, the rest is executed as an ordinary drawing.

If, for a certain time, a polished brass plate subjected to the action of the iodine vapors is exposed for a certain time, and then rubbed with cotton wool laden with mercury globules. the following phenomenon is observed: the plate does not mercurise itself, the mercury refuses to be fixed everywhere the iodine has been influenced. If, instead of acting as we have just said, we have taken care to cover a part of the plate with some opaque body, and that we try to mercurize this plate as the previous one, we notice that the Mercury takes perfectly on the places where iodine has been removed from the action of light, while it still refuses to settle in the other parts of the plate. This discovery, due to MM. Salmon and Garnier,

Take a positive shot on glass, or a photographic print on paper, made transparent; apply this shot on an iodized metal plate, leave it in the shade for a time that varies between ten minutes and two hours; remove this cliché and mercurize the plate, you will see then attach the mercury on all the uninfluenced parts, that is to say those that correspond to the cliché black cliché, to the real features of the drawing, and leave the rest of the plate intact ; if now you come to pass over a roll of greasy ink, the parts left intact will take the ink, and the loaded drawing will stand out in white on the black background. You will only have to continue the operation as we said above,

Mr. Gueyion (2) found a way to get a test

(1) Cosmos, t. VI, March 30, 1855, p. 345.

(2) Report of the Acad. of Science, April 15, 14, 1856,

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on glass or metal, an engraving on. the strong water likely to give intaglio prints,

Heliographic Damasquinure. Mr. Charles Nègre took, on August 13, 1856, a patent for a new system of gravure engraving which he has been working for several years. He sent to the Academy, in the session of November 3rd, 1856, two plates engraved by means of his process and intaglio prints, as well as a copper plate for the graphical print of the heliographic damasquins on copper. M. Dufresne had taken a patent for the same object, and M. Niepce de Saint-Victor adds to all these means of engraving those of engraving on marble and on stone as an ornament.

LITHO-PHOTOGRAPHY. Finally, we have also tried to multiply the photographic images by transporting them on lithographic stones, so that we can print them like ordinary lithographs.

Already in 1839, hardly had daguerreotype been invented, that MJ-B.-A-M. Jobard, of Brussels, thought that the application of daguerreotype to. lithography will not be long in appearing. Here is how he conceived it: A stone covered with iodine, bromide of iodine, bromine, or the new, less sensitive composition, which Daguerre will soon make known to us, having received the impression of light, would be at the moment covered with a coating of blackened gum that would be allowed to dry in the dark. It is evident that gum would raise mercury as well as decomposed iodine dust, in order to give its preparation to the stone, whereas undecomposed iodine would preserve it from the attacks of gum. What would happen when, after having stripped the stone of all its gum by letting it dissolve in the water, we would pass the roll on this stone? Evidently black would only attach to fully preserved parts and would not adhere to those that

(1) See Report, t. XL1I1, No. 18, - Light, Nos. 46 and 47, 1856,

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there gum would have affected. It could therefore cover the fat ink stone and give it sufficient preparation to withstand a long draw. If the stone did not suffer this process, do not we have the zinc plate and the electric spark? Whoever succeeds will have done as much for the arts as. Daguerre. himself, and will be entitled to the same reward (').

By inventing, in 1852, the Litlw-photograph, MM. Isemer »cier5 Bierelbours? Barreswiî and Pavanne have fulfilled the wish of Mr. Jobard, and have created a new branch of the graphic arts which will be of a fruitful application. These gentlemen, on the 28th of June, 1852, deposited at the Paris Academy of Sciences a description of their invention. Their process consists of preparing a negative on paper and producing a lithographic stone positive. The positive is obtained by a fatty or resinous coating, soluble in a solvent by the action of light; the impregnated lithographic stone of this coating is covered with the negative and a sheet of glass, and polarized; then she is exposed, by means of a solvent. These gentlemen use for coating the properties of Judea bitumen inclined by Nicéphore Niepce,

The parts exposed by the solvent are inked; the remaining bitumen is removed from the parts where the greasy ink has not acted, the stone is acidulated, and the remainder is treated by the ordinary methods of lithography.

The first notebook of litho-photography was presented at the Academy of Sciences on January 9, 1854; it contained six folio plates, monuments of Neuville, Strasburg, Chartres, Beauvais, Saint-Loup, Baud, etc., all of a perfect success.

Other lithographic processes have been experimented, by which we have arrived at the same result.

In 1854, Mr. Herman Halleux managed to fix on the lithographic stone the images produced in the dark room, and even the images of animated objects. The methods vary with the objects to be reproduced. This is how he operates

(I) Report on the exposure, of French industry of 1839,

to fix the images of the architectural objects: We choose a lithographic stone which we take care not to take too heavy, and we close it in the frame of the exhibition, then we use it with the millstone, to give it the grain required for the des-, sin in pencil; then it is impregnated with a weak and neutral elution of iron sesquioxide oxalate, and care is taken to introduce the liquid as far as possible. Thus prepared, the stone is preserved for a long time, provided that it is sheltered from the light. The stone to be exposed in the darkroom must be, not wet, but moist, the duration of exposure varies.

At the end of the dark room, the stone already carries the image by train; pouring over a solution of carbonate of ammonia, the image becomes fixed and becomes clearer; a washing with water allows to move away the soluble salts which impregnate the stone.

To reproduce the image by means of the stone, or begins to gnaw the stone with an acid, then we pass the image to the printing ink and proceed as usual. The gnawing to be preferred is the very extensive oxalic acid. (Cosmos.)

In August 1855, M. Poitevin took a patent for a new process of lithography, which he communicated to the Academy of Sciences on January 7th, 1856. M. Poitevin, abandoning the bitumen of Judea, uses the reducing action of light on the salts formed by chromic acid with the various bases, and chiefly on the dichromate of potash, in the presence of organic matter (see page 462). .

Thus its method consists in applying one or more layers of a mixture of equal volumes of a concentrated solution of albumin or rice, substitutes, fibrin, gum arabic, gelatin, etc., and a concentrated dissolution of a chromate or dichromate alkaline base, earthy or metallic indifferently, except, however, those whose base precipitates the organic matter of the first dissolution; the concentrated solution of dichromate of potash is that which it employs preferably.

After desiccation, a negative test is placed on the sensitive layer or exposed to the dark room. When the

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The light has finished its action, we wash, we remove all the dichromate that has not been altered, and there remains on the stone a layer of gelatin carrying, more or less deeply, an image formed by chromium sesquioxide. If then we pass a stamp or a roll impregnated with greasy ink on the stone, all the points

which will have undergone the action of the light, and in which is the oxide of chromium, retain the greasy ink, while wet gelatin refuses it.

The printing of hard copies can then be done by the same processes used in lithography (Lumière, 1856, n ° 2 and 14).

M. Emile Kousseau uses the same methods for litho-photography as M. Poitevin; he communicated them on December 21, 1855 to the French Society of Photography in Paris.

M. Ernest, who has seriously studied these products, points out the disadvantages of them in the photographic journal (La Lumière, August 5, 1856, No. 14). The result of his research having led to the discovery of several methods of transporting photographic images on lithographic stone of great interest, we will give a summary.

Mr. Conduché acknowledged that the printing of the stones treated by the Poitevin and Rousseau processes is extremely limited. By limiting the number of proofs to sixty, he believes that it is all that can be obtained without impasto half-tints and the invasion of the whites by the greasy ink. Thus he doubts the practical possibility of any process in which a layer of foreign matter (gelatin, albumen, gum, etc.) is found between the stone and the oxide of chromium or any other metallic oxide which retains the lithographic ink. Indeed, the principles on which the lithography processes are based serve as proof for the observations of ME Conduché. We know, he says, that whenever a fatty substance is put in contact with a lithographic stone, this body leaves its mark on the stone; if the stone is bitten by an acid, the fatty substance not being attacked, it will remain on the surface of the stone a fatty layer which will take the lithographic ink whenever it will be presented to it, while it will be

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rocket, in all the points where the acid has bitten, if all these points preserve, a suitable degree of humidity. In this case, there is a chemical reaction which results in leaving a greasy layer on the surface of the stone, forming the image and. composed of a real lime soap. It is known, moreover, that it is possible to reproduce every kind of engraving, old and recent, by lithography, by putting the greasy ink which produces the image under special conditions, and, in particular, turning it into one. real soap. More pressure or. less energetic and

prolonged between the stone and the image of soapy nature, formed on the paper, will leave on the stone a greasy imprint which. will be treated by the.

Considering that insoluble soaps, either directly or by double decomposition, are formed with all metal bases, M. Conduché applies these principles directly to photography, and he proves that a photographic print is produced on paper by a process. In any case, the metal layer that forms the image can be transformed into soap and, consequently, transported on stone.

It is not by a single process, but by a series of processes, that M. Conduché operates, and he summarizes them in the following manner: 1 "transformation of the layer forming the image into an insoluble metallic soap; of this soap with the stone, 3 ° double decomposition produced on the stone, leaving on its surface a hard soap containing lime, which is treated like any drawing on lithographic stone, as for the bite and the drawing.

Those who are familiar with photographic studies know that it is a large number of light-sensitive metal compounds; each of these metallic compounds has a more or less marked affinity for the fat or the fatty acids. Thus we explain what happens between the metallic soap that forms the image and the stone on which it is applied by pressure and contact. Instead of soap stone on metal base, we have a soap to basic chatiXj produced by double decomposition. Now, as

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the lime-washed rubbish is much harder than it was hard
to break. Vons Ai base, metal ,, all of plusou.moins soft Nature ,, is easily-understood that the image formed thereby directly on, lapierre resist ^ anspeine to un.tirage.considérable.

Mr. Mae Pherson. from Rome, of which we have already spoken, (see p., 464), has also employed his method in lithography, here is how: One
dissolves. bitumen and spread the solution on an ordinary lithographic
stone; one applies on this layer, sensitive a negative on. glass or on wax paper,. expose it to the direct rays of the sun for a longer, longer, or, less, time according to the intensity of the light, and we obtain on bitumen a. positive image. The stone is then immersed in a bath of ether, which dissolves the bitumen instantly on the points which have not been struck by it. light, and leaves an image, formed by the bitumen that the light has modified. The stone, washed with care, may be placed immediately in the hands of a lithographer,

who, by treating it to. the ordinary way, by gum and acid, draws from it as usual (Cosmos, 1,855, Vol VII, 435). "- -.

This is the photograph as a whole, in its. details, and in its diverse applications; since his appearance, there is. that seventeen years, it is spread everywhere, growing and progressing constantly. This art now occupies a very large number of persons; there are considerable workshops and printing works, and schools to train young people and photographers. The Photographic Institute of Dr. Schnauss at Jena, founded in 1855, the first of its kind, is distinguished to the teaching, theory, and practice of science. photography. The, publications, treaties and. special newspapers are increasing day by day.

Now, and. considering, the beautiful photographic productions of Bisson, Baldus, Billardeau, and so many others, we ask, as has been done many times, what influence photography will have on. other arts, chi. drawing »Will it make it disappear? Must it.,. as, it has been claimed, that soon painters, draughtsmen, lithographers, engravers change their profession and become

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graphs to survive? - Our belief is that photography will never completely replace these arts, any more than lithography has completely supplanted chalcography. Photography is one more process, a new and more valuable means for reproduction and multiplication, a new wealth added to those already existing in the field of graphic arts.

But the most perfect photographic engraving of MM. Niepce de Saint-Victor, Baldus, Rousseau, & c., Will never reach the beautiful planks due to the chisel or tip of the Edelinck, Wille, Rembrandt, Desnoyers. The most successful lithophotography of MM. Lemercier will always remain at a great distance from the so sweet and mellow lithographs of our modern draughtsmen. A portrait made by a talented artist, if only in pencil, will always be more beautiful, more attractive than a photograph.

However, it is true to say that the arts of drawing have only to win in the contest of photography: by bringing out the true value of shadows and halftints, and by discovering a great quantity of fine details, the photography has become valuable to artists for study. Moreover, this wonderful art, practiced by a clever artist, will take place, in some cases, drawing, engraving and

lithography; for architectural details and other things of this nature, it is even superior to all other kinds of reproduction. So by photography art has risen.

The question of the place of photographic works in art and industry exhibitions has often been discussed, and it has been asked whether photography is a science, an art or an industry. We believe that she is neither one nor the other, but that she holds of each of them, and that she can perfectly rank among the graphic arts of which we have just spoken in our book. By designating them under the name of industrial arts, or graphic arts of multiplication, these arts would form a particular group, intermediary and link between the sciences, the fine arts and industry, to which they touch in many ways.

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We have arrived at the end of the task that we imposed ourselves, and whose limit was quite naturally the World Exhibition of Paris of the year 1855, a milestone in the annals of the industry and the arts.

Knowing at present all the graphic arts of multiplication, we can better measure the whole distance which separates us for ever, it must be hoped, the first attempts at engraving, and appreciate, in this respect at least, the great superiority of our epoch ; we may also have a more just and higher idea of the immense labors of these ingenious, active, ardent men for science, who have furnished us with this innumerable quantity of means which we now possess to reproduce and propagate thought.

But even though we are at the end of our investigations in the field, of graphic arts which have the special purpose of propagating by printing, and that the harvest is beautiful, either for the abundance or the richness of the processes, we are convinced that art did not say its last word. Nature is inexhaustible, and it offers to these intelligent workers, to these indefatigable seekers, to these laborious operators, in the sciences, the arts, and industry, a future no less magnificent, of which we can not readily go.
