Scientific.

HOW CHROMOS ARE MADE.

CHROMO-LITHOGRAPHY is the art of printing pictures from stone, in colors. The most difficult branch of it—which is now generally implied when chromos are spoken of—is the art of reproducing oil paintings. When a chromo is made by a competent hand, it presents an exact counterpart of the original painting, with the delicate gradations of tints and shades, and with much of the spirit and tone of a production of the brush and pallet.

To understand how chromos are made, the art of lithography must first be briefly explained. The stone used in lithographing is a specious of lime-stone found in Bavaria, and is wrought into thick slabs with finely polished surface. The drawing is made upon the slab with a sort of colored soap, which adheres to the stone, and enters into a chemical combination with it after the application of certain acids and gums. When the drawing is complete, the slab is put on the press, and carefully dampened with a sponge. The oil color (or ink) is then applied with a common printer's roller. Of course, the parts of the slab which contain no drawing, being wet, resist the ink; while the drawing itself, being oily, repels the water, but retains the color applied. It is thus that, without a raised surface or incision—as in common printing, wood-cuts, and steel engravings—lithography produces printed drawings from a perfectly smooth stone.

In chromo, the first proof is a light ground-tint, covering nearly all the surface. It has only a faint, shadowy resemblance to the completed picture. It is in fact rather a shadow than an outline." The next proof, from the second stone, contains all the shades of another color. This process is repeated again and again; occasionally, as often as thirty times. We saw one proof, in a visit to Mr. Prang's establishment,—a group of cattle,—that had passed through the press twelve times; and it still bore a greater resemblance to a spoiled colored photograph than to the charming picture which it subsequently became. The number of impressions, however, does not necessarily indicate the number of colors in a painting, because the colors and tints are greatly multiplied by combinations created in the process of printing one over another. In twenty-five impressions, it is sometimes necessary and possible to produce a hundred distinct shades.

The last impression is made by an engraved stone, which produces that resemblance to canvas noticeable in all of Mr. Prang's finer specimens. English and German chromos, as a rule, do not attempt to give this delicate final touch, although it would seem to be essential in order to make a perfect imitation of a painting.

The paper used is white, heavy "plate paper," of the best quality, which has to pass through a heavy press, sheet by sheet, before its surface is fit to receive an impression.

The process thus briefly explained we need hardly add, requires equally great skill and judgment at every stage. A single error is instantly detected by the practised eye in the finished specimen. The production of a chromo, if it is at all complicated, requires several months—sometimes several years—of careful preparation. The mere drawing of the different and entirely-detached parts on so many different stones is of itself a work that requires an amount of labor and a degree of skill, which, to a person unfamiliar with the process, would appear incredible. Still more difficult, and needing still greater skill, is the process of coloring. This demands a knowledge which artists have hitherto almost exclusively monopolized, and, in addition to it, the practical familiarity of a printer with mechanical details. "Drying" and "registering" are as important branches of the art of making chromos as drawing and coloring. On proper registering, for example, the entire possibility of producing a picture at every stage of its progress depends. "Registering" is that part of a pressman's work which consists in so arranging the paper in the press, that it shall receive the impression on exactly the same spot of every sheet. In book work, each page must be exactly opposite the page printed on the other side of the sheet, in order that the impression, if on thin paper, may not "show through." In newspaper work this is of less importance, and in chromo-lithography the difference of a hair's-breadth would spoil a picture; for it would hopelessly mix up the colors.

After the chromo has passed through the press, it is embossed and varnished, and then put up for the market. These final processes are for the purpose of breaking the glossy light, and of softening the hard outlines which the picture receives from the stone, which imparts to it the resemblance of a painting on canvass.

Mr. Prang began his business in the humblest way, but has rapidly increased his establishment, until he now employs fifty workmen,—nearly all of them artists and artisans of the most skilful class,—and is preparing to move into a larger building at Roxbury. He uses eighteen presses; and his sales are enormous. His catalogue now embraces a large number of Album Cards, about seventy sets of twelve in each set; a beautiful series of illuminated "Beatitudes" and "Scriptural Mottoes;" an endless list of our great men, and of men not so great after all; of juveniles, notably, a profusely illustrated edition of "Old Mother Hubbard," and of half chromos and chromos proper. Tait's "Chickens," "Ducklings," and "Quails" were the first chromos that met an instant and wide recognition. Nineteen thousand copies of the "Chickens" alone were sold. Beecher's "Early Autumn on Esopus Creek" is one of the best chromos ever made on a small scale. The "Bullfinch" and the "Linnet" (after Cruikshank) are admirable. There are other chromos which are less successful, and one or two that are not successful at all; but they are nearly all excellent copies of the originals, with which the defects must be charged.

The chromos of Beecher's paintings are really wonderfully accurate.

Mr. Prang's masterpiece, however, is not yet published, although it is nearly ready for the market. It entirely surpasses all his previous efforts. It is Correggio's "MAGDALENA," and can hardly fail, we think, to command a quick sale and hearty recognition.

Like every modern discovery, chromo-lithography has its partisans and detractors,—those who claim for it perhaps impossible capabilities, and those who regard it as a mere handicraft, which no skill can ever elevate into the dignity of an art. We do not care to enter into those disputes. Whether an art or a handicraft, chromo-lithography certainly re-produces charming little pictures vastly superior to any colored plates that we have had before; and it is, at least, clearly entitled to be regarded as a means of educating the popular taste, and thereby raising the national ideal of art.

A correspondent, looking at chromos from this point of view, thus indicates (it may be somewhat enthusiastically) their possible influence on the culture of the people:—

"What the discovery of the art of printing did for the mental growth of the people, the art of chromo-lithography seems destined to accomplish for their æsthetic culture. Before types were first made, scholars and the wealthier classes had ample opportunities for study; for even when Bibles chained in churches, and copies of the Scriptures (then aptly so-styled) were worth a herd of cattle, there were large libraries accessible to the aristocracy of rank and mind. But they were guarded against the masses by the double doors of privilege and ignorance. A book possessed no attractions for the man who could not read the alphabet; and, *because* they were rare and hard to get at, he had no incitement to master their mysteries. Made cheap and common, the meanest peasant, in the course of a few generations, found solace for his griefs in the pages of the greatest authors of his times and of all time. Mental culture became possible for whole nations; and democracy, with its illimitable blessings, gradually grew up under the little shadow of the first 'printer's proof.'

"Until within a quite recent period, art has been feudal in its associations. Galleries of the priceless paintings, indeed, there have always been in certain favored cities and countries; but to the people, as a whole, they have been equally inaccessible and unappreciated, because no previous training had taught the community *how* to prize them. It was like Harvest College without the district school,—a planet without satellites, and too far removed from the world of the people for its light to shine in the cottage and in the homes of the masses.

"Now, chromo-lithography, although still in its infancy, promises to diffuse not a love of art merely among the people at large, but to disseminate the choicest masterpieces of art itself. It is art republicanized and naturalized in America. Its attempts hitherto have been comparatively unambitious; but it was not Homer and Plato that were first honored by the printing-press. As the popular taste improves, the subjects will be worthier of an art which seeks to give back to mankind what has hitherto been confined to the few."—*Boston Daily Advertiser.*

SIR DAVID BREWSTER.

The cable announces the death of Sir David Brewster. No ancient or modern discoverer has done more to make the study of natural science attractive than Brewster. Turning his attention to a department of physical science that was before almost wholly unexplored, his observations and experiments led to results as beautiful as they were unexpected. Sir David Brewster was born at Jedburgh, Scotland, on the 11th of December, 1781, and was, therefore, at the time of his death, in his 87th year. Educated for the Church of Scotland, he studied theology at the University of Edinburgh, became a licentiate of the Presbyterian Church, and received the honorary degree of M. A. in the year 1800. His tastes, however, led him to turn his attention from theology, and he refused a living which was offered him by the Duke of Roxbury. While studying at Edinburgh, Mr. Brewster was under the instruction of three of the most profound scholars of their time—Robison who then occupied the chair of Natural Philosophy; Playfair, the mathematician, and Dugald Stewart, the metaphysician. During the year 1810 he was married to one of the daughters of Mr. J. Macpherson, the translator, and also the author of the "Poetry of Ossian." Mrs. Brewster died in 1850, and he was married the second time, in 1857, to a Miss Purnell. In 1807, he received the honorary degree of LL.D. from the University of Aberdeen, and afterwards the degree of A. M. from Cambridge, and of D. C. L., from Oxford and Durham. In 1808, he was elected a Fellow of the Royal Society of Edinburgh, in which he subsequently filled the offices of Secretary and Vice-President. In 1808, he took charge of the Edinburgh Encyclopedia, which he edited till its completion in 1830, and in which he first published the results of his researches. From 1801 to 1812, Dr. Brewster devoted himself almost exclusively to the study of optics; and he published his first scientific work, entitled a "Treatise on New Philosophical Instruments," in 1813. While preparing an article for the Encyclopedia, on "Burning instruments," in 1811, he was led by a suggestion of Buffon to make experiments with variously constructed lenses, which resulted in the invention of a lens composed of zones of glass, each of which was built up of several circular segments, and its application to an instrument composed of lenses and mirrors, by which all the heat of the sun might be concentrated into one burning focus, or the light converted into a straight beam. This invention is now in use in many of the light-houses recently constructed in various parts of the world. In 1816 Dr. Brewster invented the kaleidoscope, an instrument of no particular value to science, but which became a very popular toy. The patent right for this was, however, evaded, and, although at one time hundreds of thousands of them were sold in a month, the inventor never received anything for it except the fame. His researches touching the mean heat of the earth and the determination of the isothermal lines were also important additions to this department of knowledge. Another instrument of his invention, and which, in connection with the art of photography, enables us to sit by the fireside on a Winter's night and enjoy the finest scenery and most finished works of art, has become almost indispensable in every home in Christendom. Dr. Brewster exhibited at the Crystal Palace the first stereoscope, constructed under his direction by the ingenious Frenchman, M. Duboscq. Almost every scientific society in Europe conferred its honors on him. In addition to the degrees already mentioned, Sir David Brewster received, in 1815, the Copley medal of the Royal Society for his discovery of the law of polarization of light. In 1816, the Institute of France awarded half of the 3,000 franc prize, given for two of the most important scientific discoveries made in Europe during the two preceding years. In 1819 he received from the Royal Society the Rumford gold and silver medals, the Royal gold and silver medals for his optical discoveries; and the Keith prize twice for his discovery of two new fluids in minerals and his analysis of solar light. In 1825 the Institute of France elected him a corresponding member, as did also the Royal Academies of Russia, Prussia, Austria, Sweden, Denmark, &c. In 1831 Dr. Brewster received the decoration of the Hanoverian Guelphic Order, and in 1832 was made a knight by William IV. In 1838 he was nominated by the crown to be Principal of the United Colleges of St. Salvador, St. Leonard and St. Andrew's, and 1839 was unanimously elected Principal of the University of Edinburgh. Dr. Brewster edited and wrote a number of scientific works, besides contributing largely to all leading English and Scotch periodicals. His best known works are "Treatise on the Kaleidoscope," a "Treatise on the Steroscope," a "Treatise on Optics," "Letters on Natural Magic." "The Martyrs of Science," "Memoirs of the Life and Writings of Sir Isaac Newton," and "More Worlds than One." It was principally owing to Sir David Brewster's exertions that the British Association for the Advancement of Science owes its existence, he having proposed the scientific meeting at York in which it originated. In January, 1849, he became one of the eight foreign associate members of the Imperial Institute of France, filling the vacancy caused by the death of the celebrated chemist, M. Berzelius. He also received the Prussian Order of Merit founded by Frederick the Great, and in 1855 the Emperor of the French conferred upon him the decoration of an officer of the Legion of Honor.—*New York Tribune.*