THE PROSPECTS AND PRESENT STATE OF PHOTOGRAPHY IN NATURAL COLORS.

IN TWO CHAPTERS.

I.

From the fact that the production of photographs in natural colors has twice within the past few weeks been brought forward with some degree of prominence, once at a meeting of the Polytechnic Section of the American Institute, and also at the last meeting of the Association of Operative Photographers of New York, a brief glance at the nature, modes, and prospects of heliochromy may be useful. Already photographs are taken on plates prepared by modern processes possessing such sensitiveness as to enable one to depict the action of the horse's foot in trotting, or, as was shown at the recent fair of the above institute, the swift steamboat arrested as it dashes at full speed across the line of vision of the camera. It only now remains that the splendid discovery of photography be crowned by the further discovery of the means of obtaining pictures possessing all the colors of nature, and by means so simple and certain as to be within the compass of the powers of the average operator.

The fact that several wise men, who have been imperfectly acquainted with the subject, have shaken their heads at the idea of its being possible to produce photographs having the colors of nature, need not greatly distress the experimentalist. What scathing contempt was hurled by the College of Physicians at the head of the discoverer of the circulation of the blood when he announced the fact! With what keen point did the far-seeing Sir Walter Scott ridicule the idea of a street being lighted by gas! Who is unaware of the pity expressed for the mental condition of those who proposed ocean steam navigation, communication by telegraph, and indeed nearly every startling advance in the applications of science? Even the unreasoning bigotry displayed by the British Parliament when George Stephenson advocated railway traveling by steam, was insufficient to prevent his gifted son, Robert Stephenson, from ridiculing the French project of the now accomplished Suez Canal; while in the science of photography the late Sir David Brewster often declared the impossibility of producing an accurate photograph unless by a lens the size of that of the human eye. The true investigator, while not ignoring past experience, must march beyond it.

It is a fact, to which some of the earlier volumes of the SCIENTIFIC AMERICAN bear attestation, that photographs bearing the colors of nature have been taken, and this not by a happy accident, but by design. The beaten tracks in photographic chemical routine must be departed from to secure an end, in the accomplishment of which certain well accredited laws of physical science are overridden; for, as was remarked by a speaker at one of the meetings alluded to, heliochromic chemistry recognizes an entire change in the relative activity of the various colors of the spectrum. Blue or violet light, which in ordinary photography is synonymous with white in its actinic power, here acts in the most laggard manner, while the comparatively non-chemical red light, which produces so little change upon the sensitive plates in common use, here acts in the most energetic manner.

Two objections may reasonably be urged against such examples of heliochromy as up to the present time have been produced: It is an exceedingly difficult matter to fix the colors when once obtained; and when so fixed the colors are sadly deficient in beauty and brilliancy. True, they are sufficiently pronounced to render it easy to distinguish the colors from each other, but they are yet far from being able to satisfy the requirements of a utilitarian age. Their production is a scientific, but not yet a commercial fact. Owing, perhaps, to some imaginary innate difficulty in the operations, or possibly to a want of faith in ultimate success, the laborers in this field are indeed few, the progress being commensurate. The whole superstructure of heliochromy rests as yet upon the foundations laid in 1839 by the late Sir John Herschel, who observed that paper sensitized by chloride of silver and darkened by exposure to light was then in a condition to reproduce certain colors when again exposed to the action of light under pieces of glass of various colors. From his experiments he was led to declare his belief that photography in natural colors might reasonably be expected to be brought within the range of accomplishment.

For the guidance of those readers who may feel desirous of instituting researches in this direction, we shall give out lines of the most successful methods by which experimentalists have worked. A polished plate of silvered copper, as used for daguerreotype, is immersed in a mixture of one part of sulphate of copper, two parts of common salt, and five of water, three ounces of which, together with a like quantity of a saturated solution of common salt, are diluted with eighteen ounces of water. It will be perceived that bichloride of copper and sulphate of soda are formed by the mixture of these substances. Into this bath the plate when immersed is rapidly coated with a violet subchloride, and this, after washing and drying, is all the preparation the plate requires to enable it to receive the colors of nature. Another method of preparing silvered plates consists in attaching one to the positive pole of a galvanic battery, a piece of platinum foil to the negative pole, and then immersing in greatly diluted muriatic acid. In the course of a minute it will pass through several stages of coloration, including yellow, blue, green, rose, and violet, at which last it must be removed, washed, dried, and heated slightly till it becomes a red color. It is now sensitive, and becomes readily impressed with all the colors. There is reason for believing, although such fact has never been published, that by this method were prepared the plates upon which Becquerel produced his famous photographs of the spectrum showing the colors. When paper or glass plates are employed instead of the silvered copper the methods by which they are prepared are analogous to those described, at least in principle. A sheet of subchlorized paper having been floated upon a solution of bichromate of potash, chloride of potassium, and sulphate of copper, and then dried in a darkened room, is now ready for exposure. In one experiment made it required an exposure under a painted magic lantern slide for a quarter of an hour to print the colors, on which occasion it was noticeable how much sooner the reds printed than the blues. Modifications of this method of preparing paper, involving the employment of nitrate of mercury, with the subsequent use of chlorate of potash and dilute sulphuric acid, have yielded paper so sensitive as to receive impressions in less than a minute. When glass or porcelain are used instead of paper, a film of collodion should be the medium in which to form the sensitive subchloride of silver, a process now easy of accomplishment.

When making some experiments under the direction of M. Chevreul, M. Niepce de St. Victor, who tried his heliochromic experiments on a large doll bedecked with jewels and resplendent with colored silk, made the remarkable discovery that black is not the mere absence of light, but is entitled to be considered a color of itself, and has a special chemical action of its own. The color of the sensitive plate was violet, and on this the camera impressed all the colors of the doll, including white; but, as the blacks had also been impressed *as* black, it led to this experiment: A hollow tube, black from the absence of light, was presented to the camera, together with another article of a definite black color, with this result, that the former was represented by an unaltered state of the original violet color of the surface, while in the latter case a very deep black resulted. The philosophy of or deductions from this singular discovery do not now claim our attention.

If the present state of photography in colors by natural or chemical means is unsatisfactory, not so is that by artificial pigments, applied, however, by the agency of light itself. This phase of heliochromy will be treated in another article.

Completion of the Eddystone Lighthouse.

Within another month or so—much earlier than was originally anticipated—the actual building of the new Eddystone Lighthouse, so far as the masonry is concerned, will be completed, and the work of furnishing it with the lighting apparatus will then speedily begin. The whole of the stonework of the lighthouse is in fact not merely constructed, but in the hands of the actual builders, whose work consists in conveying the already prepared blocks to the reef, and fitting them in their places there. The contract for the provision of the stone for the construction of the lighthouse was, it will be remembered, taken by Messrs. Hugh Shearer & Co., of 21 Great George street, Westminster, the owners of the De Lank granite quarries near Wadebridge, and of granite quarrying rights away to Rough Tor, over an area of something like twenty square miles. The stones have been wrought in a yard at Wadebridge, where every one of 2,200 of which the lighthouse is composed—they weigh in all 6,000 tons—has been brought to the precise dimensions required and fitted to a hair's breadth, the whole of the structure being built up section by section preparatory to its shipment. This work has now been brought to a close by Messrs. Shearer & Co. six months before the expiration of the time allotted in their contract, and the last stone of the outward curve of the top gallery was dropped into its place in the presence of Mr. Douglass, the engineer of the work, who heartily congratulated Mr. Shearer upon the style in which the contract had been executed.

The completion of the work by the present date is a matter of great importance, as it saves very much more time in the erection than the six months gained on the contract, in consequence of the early period of the season, which will enable the fitting of the lantern, and is to be proceeded with almost at once. The lighthouses of the Great and Little Basses, Ceylon—executed at the Dalbeattie granite quarries of Messrs. Shearer, Field & Co.—were also carried out much to the satisfaction of all concerned, as in the present instance well within the time named in the contract. The stones for the Eddystone have, of course, varied somewhat in size, but those of the base may be cited as fair examples, and they are each 6 feet 6 inches deep, 2 feet thick, and 3 feet 10 inches on their outer circumference.—*Building News.*

Important Photographic Discovery.

At the meeting of the Photographic Society of Great Britain, London, May 10, Mr. Warnerke proceeded to give the details of a new discovery he had made respecting the action of pyrogallic acid on gelatino-bromide. This discovery consisted in the fact that a gelatine plate submitted to pyrogallic acid became insoluble in those parts acted upon by light, exactly in the same way as gelatine acted upon by chrome salts, the insolubility being in proportion to the amount of light and the thickness of the gelatine. This property Mr. Warnerke proposes to utilize in various ways. The drawback in the ordinary gelatine process being that, unless the exposure is very accurately timed, there is considerable danger of overexposure, and intensification being very difficult, pictures by the gelatine process are often inferior to those by collodion. By the new process he was, however, able not only to intensify, but also to overcome the drawbacks arising from overexposure. The latter he effected by using the emulsion on paper. He had found that no matter how much the paper was overexposed, the picture, provided the developer was restrained sufficiently, was not injured, while in the case of the emulsion on glass, there was not only halation of the image, but a reversal also. The transfer of the image from paper on to the glass is very easy. The paper is immersed in water, and placed in contact with a glass plate. The superfluous moisture being removed by a squeegee, the paper may then be stripped off, leaving the gelatine on the glass. Hot water is then applied, which dissolves all the gelatine not acted on by light, and the image is left upon the glass in relief. Intensification Mr. Warnerke effected by mixing with the emulsion a non-actinic coloring matter, and which is not affected by silver. Aniline colors he had found answered the purpose, and in this way special emulsion for special purposes could be prepared. This method of preparation he thought would be especially suitable for magic lantern slides. Mr. Warnerke claimed that by his discovery relief could be obtained far more easily than by the ordinary bichromatized gelatine, and therefore it was especially suitable for the Woodburytype process. By mixing emery powder with the emulsion it was rendered fit for engraving purposes, and by a combination with vitrified colors the image could be burnt in, and being so adapted for enamels. By using a suitable emulsion, however, so little gelatine could be employed as to obviate all difficulty in carbonizing. The process could also be adapted for collotype printing.

In the course of his remarks, Mr. Warnerke demonstrated the removal of a gelatine picture produced by his method from paper to glass, and showed that the mere immersion and washing in hot water fixed the picture by the dissolving of the gelatine unacted upon by light, which thus carried away the unchanged bromide of silver.

In conclusion, Mr. Warnerke stated that the sensitive paper could be used in the camera in lengths, wound on rollers, and exhibited a slide which he had made for the purpose.

MISCELLANEOUS INVENTIONS.

An improved ice house door fastener has been patented by Mr. Francis Keil, of New York city. The invention consists in a novel combination of latching and locking mechanism, and the combination therewith of mechanism for wedging the door to its seat.

An improved gate, which can be conveniently opened from a vehicle, has been patented by Mr. Henry Salisbury, of Newburg, N. Y. The gate consists of a series of horizontal rails or slats pivoted to end uprights, the inner one of which is hinged to a post, and has a beam pivoted to its upper end, the outer end of which beam is connected with the outer end of the gate by a pivoted rod, and the inner end of this beam is provided with a weighted roller and suitable stops, so that when a rope is pulled the latches will be raised, the inner end of the beam will be raised, and the weighted pulley will roll to the end of the beam, thereby raising the outer end of the gate, which can be swung open by pulling on the rope.

A simple, inexpensive, and efficient reflector, which may be readily applied to ordinary lamps or lanterns, and as readily detached when not desired, has been patented by Mr. Henry E. Haley, of Monroe, Me.

Mr. Henry W. Mattick, of Lawrenceburg, Ind., has patented a composition for filling the pores of wood, consisting of gum shellac cut in alcohol, kauri gum, spirits of turpentine, drying oil, raw linseed oil, and red lead.

An improved bail fastener, patented by Mr. John A. Marston, of Centre Sandwich, N. H., consists in combining with a splint basket and bail a metallic strip clasped about the bail, and having both ends then passed between two splints and bent divergently over them.

An improved corset has been patented by Imogene E. Banker, of Brooklyn, N. Y. The object of this invention is to furnish corsets that will give proper shape and can be worn without discomfort, and to dispense with paddings and other devices used to give form to ill-shaped persons.

Neckties and scarfs, as usually worn, are pinned to the collar, so as to be retained in place. Mr. Myer Hellman, of New York city, has patented an improved device, which is a substitute for pins for accomplishing the same object, and has the additional advantage of being more convenient in use, always at hand, and allowing adjustment after the collar and neckwear are put on the person.

A head rest, which can be folded compactly for transportation, and can be erected in a short time, has been patented by Mr. Heinrich Strauss, of Nüremberg, Germany. The head rest is formed of a sheet or piece of fabric attached to a frame, which is so constructed that the sheet is held inclined, and its tension can be regulated at will.

An improved tool for handling, opening, closing, and scraping boxes, barrels, bales, etc., has been patented by Mr. William H. Bickelhaupt, of New York city. The invention consists in a hook attached to a transverse handle, with a hammer head at one end and a claw at the other end, the hook being provided with a scraping knife projecting in the opposite direction of the hook.

Mr. Jean Escoubés, of New York city, has patented an improved shutter bower, in which a curved bar is used in combination with a catch.