Photography in Colors.

About once in two or three years some one professes to have solved the problem of color photography; but the photographic world doesn't become wildly excited over these assertions, as it did formerly. Too many of the processes have proved to be fake, pure and simple, and those founded upon scientific truth have been only modifications of earlier discoveries.

Color photography has been a facinating problem for scientists ever since the early part of this century. In 1810 Prof. Seeback of Jena made some interesting experiments in the reproduction of the natural colors of the spectrum, and a host of scentists followed his lead. Becquerel in 1848 succeeding in reproducing all of the hues of the spectrum upon a plate covered with a film of violet subchloride of silver, and even photographed various objects in their natural colors, but found no way of fixing these tints so that they would stand exposure to the light. Other men experimented and obtained varying results by modified chemical processes, but the instability of color baffled them, as it had baffled Bacquerel. It was one thing to understand that muriate of silver, through reflection and interference of light rays among its partices, would take the colors of the spectrum, and quite another thing to fix these colors permanently when they had been obtained. Many scientists have abandoned the idea that a direct photography in color with resulting permanent and satisfactory prints, will ever be obtained. Others, more optimistic, insist that the thing is a possibility, even though a remote one. In the meatime what development does occur lies along one or two lines, either being based upon the trichromatic theory of vision, and composite photography, or following Lippman's interferential method, founded upon the law of wave vibration in light.

Lippmann's discoveries in color photography were really the last to stir up any great excitement among scientists. M. Lippmann was a professor of physics in the Sorbonne, with no practical knowledge of photography. Not even the kodak mania had marked him for its own; but he knew a thing or two about abstract physics and in the course of lectures to young France on the subject of acoustics and the neutralizing of sound by the meeting of advancing and reflected sound waves, it occurred to him that the same theories applied to color would produce color photographs. He turned to photography and demonstrated his theory to his own satisfaction and the edification of the scientific world, but he never attempted to make commercial profit of his discovery, and he went on serenely lecturing upon abstract physics. The results he obtained are what might be expected of so theoretical a scientist. He unquestionably accomplished the nearest thing to pure color photogradhy that has been achieved, and he vindicated his theory, but any practical application of his methods to general purposes is out of the question. The process is complicated and difficult, and the multiplication of the photographs obtained is impossible, so few impressions were made by his method, and these few with great expenditure of time, work and money.

The success of this method depended upon the same principle that explained the reproduction of color in muriate of silver—the interference of light waves, through reflection. Lippman put a transparent, highly sensitized film in immediate contact with a mirror backed with mercury. Light passing through the film was reflected back along the same line by the mirror. Aduancing light waves and reflected light waves, meeting under certain conditions, cancel or neutralize one another, the result being white light minus these cancelled waves—that is, colored light. Color waves differ in wave length according to the different lines of the spectrum, so the conditions under which the direct and reflected waves meet vary according to their color, and the film records this variance. The white light entering the camera has been separated into its component parts—pure white light being composed of all the hues of the spectrum—and, when the film is again exposed to white light, it shows the impression received in colors. One great disadvantage of these Lippman photographs is that the white light must fall upon the completed film at a certain angle in order to give the color effect. Seen at any other angle the photographs look like colorless negatives.

The only practical success in color photography so far has been accomplished by indirect methods, and, though these processes may not be so interesting from the viewpoint of abstract science as the Lippman process, their commercial value is infinitely greater. Indirect color photography primarily consists in the production of three separate negatives, taken through screens of the three primary colors, red, green and blue, and in the optical superposition of these images; but there have been innumerable developments of this process. The original composite color photography, requiring three separate exposures and three separate positives projected by a single lantern, was too cumbersome and complicated to be practicable. A great effort has been made to bring the process into such shape that it could be easily accomplished even by the amateur and the apparatus required for it carried as easily as the ordinary camera. No such conditions have been attained, but a good deal has been accomplished, and the photochromoscope, with its more recent developments the kromskop, is thought by scientists to come as near a solution of the problem as any of the later inventions.

By this photochromoscope process the three negatives are taken upon a single sensitive plate at one exposure, and the contact positive cut into three sections with scissors and mounted upon a folding cardboard is dropped into the photochromoscope which as well as the camera, may be made stereoscope, the size of the ordinary hand stereoscope. The camera illuminates three colorless transparent positives separately by lights of the three primary tints, and these impressions are optically recombined into one colored image in the seeing apperatus or photochromoscope. Of course, this seeing instrument is necessary to carry out the sense of color, so the process is far from being the one long desired, which is to produce colored prints that may be framed and hung on the wall. Through this viewing device, however, color images of marvellous fidelity are obtained, giving all qualities of texture, sheen translucency and atmosphere to a degree impossible to any color print on paper. Pictures of the old masters can be produced and seen in the photochromoscope with all their original qualities Scientific object, specimens for natural history collections, beauties of landscape, botanical specimens, tapestries and textile fabrics of all kinds may be studied through these color images as satisfactorily as from reality. The color records take up no more room than ordinary photographs, and if the cost and difficulty of the production can be decidedly reduced this form of color photography may be utilized to great advantage in schools, in medicine, in many of the other sciences and in commercial business, where it could represent the quality and appearance of goods more satisfactorily than any print or fragmentary sample. Colored photographs of the most beautiful species of butterflies have been among the greatest triumphs of this process and not the smallest element of the beauty of the original is lacking in the reproduction. The miniature kromskop is the latest and simplest development of the apparatus and is less expensive than the original instrument.

Another method of color photography finding great favor to-day applies the same principles in another way. The light is projected upon the plate, not through three screens, but through one screen closely ruled in orange, green and violet. These lines are ruled on gelatine plates in pigments made up as inks, and these are from 800 to 1,000 to the inch, although when the lines exceed 400 to the inch the eye ceases to be annoyed by them The resultant lines upon the positive register, of course, the degrees in which the three color sensations would have been produced. Then a second screen, ruled in red, green and violet, and gauged exactly in accordance with the first, is moved over the positive, producing waves of all colors until it reaches such a position that the red lines fall exactly over the lines recording red sensations, &c, when the picture appears in vivid and realistic color. In this process, as in the other described a seeing apparatus is necessary as well as a taking apparatus; but as the whole secret in this case lies in two adjustable screens, both the taking and the seeing instruments are much more simple.

Within the last four years a Frenchman has attracted great attention by his assertions concerning a new and efficient form of indirect color photography, but as he has maintained absolute secrecy in regard to certain features of his process, scientists have accepted his results with some doubt and have withheld judgment. Members of various English and French and American scientific societies have, however, investigated the method as far as possible, and have reported that it seems to be a legitimate scientific process, although the inventor reserves information as to the ingredients of a solution used by him. His negative is taken on ordinary gelatine plate, prepared by treatment with the solution of unknown composition. The negative obtained shows no trace of color. A print is taken from it on albuminized silver paper treated with the solution. This print shows no color. When dry it is washed with the secret solution and treated successively with color solutions in red, blue and green, under which process the print assumes the natural colors of the object photographed. This process has an advantage in producing a permanent print, but the colors are faint and the image not to be compared in fidelity and beauty with those secured through the other methods described.

WAITING AT THE PORTAL.

A Horse's Confidence,

We often hear it said than an animal is almost human, and now and then one does give evidence of feelings which seem to transcend brute nature. Not long ago a noble horse, named Poindexter, was taken ill in Boston. The animal's nerves was keyed up to a high pitch of excitement, and he could not be induced to lie down and go to sleep.

The veterinaries were in despair, when Poindexter's devoted groom went into the stall and lay down. The horse seemed soothed by his presence. By degrees he grew calmer, and finally lying down, laid his delicate head on the man's shoulder and went to sleep.

The nervousness and apprehension of the horse seemed very human. Possibly he was afraid of death, afraid that the end might come when he slept, and wished to remain on his feet. Who knows? Certain it is that for three nights the horse slept quietly by his friend, and thus alone passed safely through the critical stage of his disease.

KHAKI.

How The Process For Dyeing It Was Discovered.

The London Daily News, to illustrate the part played by lucky accident in the discovery of inventions, told the other day a story about khaki, the olive colored canvas cloth worn by the English and American soldiers in hot countries.

This cotton stuff has been worn in India by British troops for many years. Its tint was a greenish brown, but it always faded when it was washed with soap.

A business man from Manchester, while travelling in India, happened to fall into conversation with an English officer, who remarked carelessly that the first manufacturer who could produce a cotton drill that would not fade would make his fortune.

The young Englishman never forgot this hint. He came home, found a skillful dyer, and with him began the search for an olive dye which, when used on cotton cloth, would not yield to soap or soda. They spent years in these experiments, all of which proved fruitless.

One day they found among several scraps of dyed cloth one which retained its colour under the most severe tests. The puzzling fact was that it had been cut from the same piece of cloth, and subjected to the same process as the other scraps, all of which faded.

The two experimenters were greatly puzzled, and for months tried in vain to solve the riddle. The one little fragment of khaki was the only one which kept its color against all attacks.

By chance one day they found that the dye in which this scrap had been dipped had remained for a time in a metal dish of a peculiar kind. The secret was found. The metal of the dish, in combination with the chemicals of the dye, had furnished the one thing needful. They tried the experiment with other pieces. The dye held, and their fortunes were made.

It was not chance which gave them their success, but the indomitable patience and persistence which pursued the chance, and the intelligence which seized it.

Too Long to Wait.

The Japanese, as is generally known, are mainly vegetarians, their diet consisting for the most part of rice and a few other simple vegetables.

While they are a healthy and happy people, they are undersized as compared with the meat-eaters of Europe and America, and it was seriously recommended, a few years ago, by advisers of the emperor, that he should encourage his subjects to adopt a diet of flesh, with a view to increasing the average Japanese stature.

An American who was visiting Japan tells of a jinrikisha man with whom he became acquainted, who although able to trot forty miles a day without fatigue, was vexed because at his small size and had begun to eat meat. He asked his American friend one day, in the best English at his command, how long a time would be required, on an animal diet, to make the Japanese a larger race.

"I should say a hundred years at least," replied the American.

The "ricdshaw' man went back to his rice.

Sign Language

As Russians are quick to understand signs, they are ready at devising ways to make their thoughts known.

An English surgeon, coming across a Russian officer in a hospital, managed to give the official to understand that he—the doctor—desired to know whether the officer had left a family at home. The information was forthcoming.

'The Russian replied with ecstatic energy. He kissed his hand fervently, placed it about two feet from the ground, then kissed it again and placed it about a foot higher. This action he repeated until I had learned that his family consisted of a wife and three children. He had also given an idea of the relative sizes of the several members.'