

EARLY THREE-COLOUR MAGIC LANTERN SLIDES

The Dr Miethe Three-Colour Camera

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A few years ago I was lucky enough to be able to buy some interesting photographic collectibles from a junk dealer. As it turned out later, these originally came from the archive of the Liesegang company in Düsseldorf, which was sold as a result of an insolvency. Among the objects are 14 slides in the standard format 8.5 cm x 10 cm for projection through a magic lantern, each with a label saying 'Dr. Schmittmann Düsseldorf', the subject of the image and location. The special feature is that they are three-colour photographs.

I knew about three-colour slides from the 'Ives Kromskop' viewer and the related three-colour projectors. There, however, sets of three slides per image were used via appropriate coloured filters for viewing/projecting the final colour image. I had never seen photographic colour slides that could be viewed or projected directly without these aids.

After reading Sandra Lawrence's article in *TML* 35 about 'Miss Willmott's lantern lectures' I searched the internet for the Sanger-

Shepherd process and found a description that matches my slides¹ and is similar to the description at the end of this article. I also looked for information about Dr J. Schmittmann and finally found a reference to a commemorative publication of the Natural Science Association in Düsseldorf on its 25th anniversary in May 1909. In this commemorative publication there was a contribution under the heading 'Physics' with the topic: "The first circumnavigation of the world with the natural colour camera. From Dr. J. Schmittmann."

The captions on my slides and the subjects in Italy, Rangoon, Java, Japan and Honolulu only allowed one conclusion: they were the photographs for this contribution. Fortunately, there is a copy of the commemorative publication in the art and museum library of the city of Cologne, and I was able to make a copy of the article. Since the challenges of three-colour photography are described there in great detail by a practitioner of the time, I reproduce the article here more or less in full (see note at the end).



1. Riviera Levante Italy



2. On the Riviera Levante



3. Sheve-Dagon Pagoda. Rangoon

The First Circumnavigation of the World with the Natural Colour Camera by Dr J. Schmittmann, Düsseldorf

Only a few decades have passed since the invention of photography, but in this relatively short time work has been done on this subject with an almost inhuman perseverance and with enormous financial expenditure, which can hardly be found in any other part of the natural sciences. But curiously enough, while the human mind was able to make the simple photographic plate almost entirely docile, the paths which should lead to the attainment of a photograph in the natural colours proved rather thorny and almost impassable. But in spite of, or perhaps because of, the great difficulties that confronted this problem, photochemists and physicists were greatly tempted to try everything and to spare no effort in showing the astonished mankind pictures in their natural colours. The most varied paths were taken, which, although of great importance for science, could not be used in practice with very few exceptions.

Today, if someone wants to take pictures of natural colours while travelling, he has to choose between two methods: Lumière Autochrome plates here, three-colour camera there. After overcoming the enormous technical difficulties, the Lumière brothers marketed these autochrome plates some time ago and, if you know how to work with them, they give excellent results. I had already thought about working with the Autochrome plate on my trip around the world, on which it was particularly important to me to take natural colour photographs in the tropical regions, which are so dangerous for the plate material. But I gave up on that for a variety of reasons. So, as things stood at the time, I had no choice but to set off with Miethe's heavy three-colour camera, which was quite extensive in comparison to modern, simple apparatus. I didn't regret it because 70% of the Perutz Perchromo plates I took with me gave satisfying negatives.

But in order to remove any doubt, I want to explain from the outset that it is far from enough for the happy owner of a three-colour camera to simply start snapping to get good pictures. On the contrary, the principle of Kodak, which so often causes mischief, should be better left

alone at home. It is necessary to consider each recording if you don't want to have too many failures at first. You can only learn to select the appropriate subjects through proper 'exercise in the field'.

Since I had been planning for a long time to take natural colour photographs in tropical and subtropical regions, I undertook successive test trips to India, France and England, all countries with different lighting conditions; because the correct analysis of the light is one of the most important factors in the process. You have to learn to distinguish whether there are too many red or yellow rays and then expose the red or green filter exposure a little longer or shorter.

The scientific principle of three-colour photography is extremely simple in itself and is several centuries old. Newton, who found the composition of white light, also proved that all visible colours are created by mixing the three primary colours – red, yellow and blue – in very specific proportions. For example, one only needs to photograph a landscape through a blue, green and red glass in order to capture all the existing colour tones on the plate, although these have been converted into brightness values. Finally we get three negatives of this landscape one below the other on the same plate, which, of course, to emphasise again, are not coloured, but contain the grey silver in the places where the sensitive colour rays struck. Colouring is done in the projection apparatus by three filters coloured in the primary colours, in reproduction, e.g. in the most commonly used Autotype, by colouring the three zinc plates.

Now, before beginning a journey, a few preliminary tests must be made, which are of the greatest importance. Above all, care is taken to ensure that the Perchromo plates ordered from Perutz in Munich have the same emulsion number. Then determine as precisely as possible, if you want to be successful in your photographs, the sensitivity values for the blue, green, and red rays. This determination is best carried out as follows:

A plaster figure, which one can easily buy from Italian sources, is set up against a background that is as black as possible, and photographed three times in succession using a Perchromo plate of size 9:24, namely through the blue, green and red filters of the camera. These attempts are repeated until the three figures lying one below the other on the negative



4. Old Temple of Boro-Bodner. Java



5. Javanese landscape



6. Temple of Nikko. Japan



7. Temple of Nikko. Japan



8. Forest at Nikko. Japan



9. Temple entrance in Nikko. Japan

show exactly the same congruence. Only then do you know the ratio of the exposure times of blue : green : red. In order to be on the safe side, one presents the corresponding slide, shines it through the three-colour projection apparatus with the blue, green and red rays, and after the three partial images have been brought together, the figure must appear on the screen in the correct white plaster colour. Once this determination has been made it is, of course, sufficient for all the plates of this emulsion. With each new emulsion number one has to make new experiments, and it is quite astonishing how differently the individual emulsions react to the different rays. It may happen, for example, that if one takes one second for blue, one has to expose three seconds for green and ten seconds for red, but in another case five seconds for green and twelve seconds for red. It is so obvious that anyone who fails to make this determination before the start of the journey cannot count on any success at all.

Another important point when preparing for a trip is the packaging. The relatively large, abnormally-shaped plates must be soldered into tin cans in groups of twelve for the humid tropical regions. Of course, this makes transport much more difficult. If you also add the very large camera and a particularly stable wooden tripod, it is not surprising that a special tin case, in which only the utensils for three-colour photography are packed, has to be carried along. Of course, it goes without saying that on the journey these plates have to be soldered in again after exposure. It's quite a tedious business, especially in somewhat primitive areas. Then in the evening, dead tired after a strenuous excursion, you run to the next native village, look there for a man who knows how to use a soldering iron, and only feel reassured when the exposed plates are safely encapsulated, well hidden and protected from the otherwise all-pervasive moisture.

The exposure itself, which lasts an average of 20 seconds, requires the greatest care. The tripod must have a very stable position, because only a slight shift of the camera during the exposure would result in the three partial images not being able to be brought together precisely in the projection or the three-colour print. In the past, in order to be able to expose each individual frame, one was forced to press down the sliding

frame by hand, but this very easily led to the camera being changed from its original position. Now a pneumatic release has been cleverly designed in such a way that the lens shutter opens when you press a rubber ball, and the shutter closes when you release it and the sliding frame with plate and filter falls down by itself. You can take the three shots one after the other without touching the camera. But as well as this pneumatic trigger worked in European countries, it failed just as quickly in tropical countries. On the other hand, the wooden camera with the Zeiss Tessar, which was particularly suitable for three-colour photography, rendered excellent service.

I'll now come to the exposures themselves. Above all, it means: keep as calm and cool as possible, because once you start to get angry, you can't shed the anger. In the case of landscapes as well as people, the success of a picture depends on countless, often unforeseeable side effects. One of the main troublemakers is the wind, which makes itself felt quite noticeably even in tropical regions and tends to show up almost every day with constant malice. Then it sets the bushes and trees in motion, and if you try to project an otherwise good slide at home with great excitement, the branches and leaves gleam in the most beautiful colours of the rainbow. Of course, a slight trace of the wind when recording is to blame; the three partial slides cannot be brought together.

I would also like to warn against being tempted by too much sun and light. For this reason, in the areas near the equator, one should only work in the morning or evening hours or when the sky is overcast. Too much sun blurs the colours, it outshines everything and you get completely wrong colour tones when projecting. But basically, the annoyance you have with landscape shots is nothing compared to the inconvenience of taking pictures of people. It is impossible to convey the seriousness of the situation to people in countries whose language you don't speak and whose customs you poorly understand. They have no idea how valuable such an irreplaceable Perchromo plate is.

Just think how difficult it is to get a European [to whom you can explain the process] to sit still for 20 to 30 seconds, and then it's no wonder that [a person] from Central Africa who doesn't even know what



10. Japanese coast



11. Japanese pilgrims and the Fuji. Japan



12. Temple of Nara. Japan

it's about suddenly starts [moving] in the middle of the shot, and the Japanese woman [...] suddenly bursts out in her mischievous giggle. That you often have to waste four or more attempts with such exposures is actually not surprising.

Then you come home, laden with the treasures in tin cans, and the development begins, which of course has to be done in complete darkness because of the red sensitivity of the plates. With practice it is possible to reach the end point of development. Strengthening or weakening cannot be performed on the three-colour plate. As a developer, it is best to use Rodinal 1:15.

I repeat again: extensive preliminary tests, studies in the field and calm and careful work when taking the picture are the most important factors in three-colour photography. However, once you have acquired the necessary routine and brought home a nice collection of three-colour negatives, you also have an irreplaceable treasure that allows you to savour the memories of the trip to the last drop, in your own four walls.

The Carl Zeiss Optical Institute in Jena kindly made the three-colour prints of my natural colour photographs available to me. Unfortunately, it was not possible in the short time and because of the difficulty of the printing process to produce the intended pictures from the tropics.²

The article is listed in the table of contents of the 1909 publication as:

"7. Dr Schmittmann: Presentation of approx. 60 natural colour photographs with Miethe's three-colour camera, taken on a journey through India, Java, Japan, etc."

Unfortunately, it is not known whether the presentation took place with a three-colour projector or the three-colour slides.

As mentioned above, 14 of these 60 natural colour photographs have been preserved as slides and are shown here. The trip around the world took place before 1909, probably in 1907 or 1908. It is unlikely that, by then, many other photographers would have taken pictures with a three-colour camera in the countries visited. Therefore, these are probably some of the first natural colour photographs taken at the respective locations.

The slides were certainly produced by a subtraction method similar to the Sanger-Shepherd process, as described (item 2 below) in Otto Lueger's *Lexikon der gesamten Technik* ('Encyclopaedia of all Technology'):

"By mixing three main colours (e.g. red, yellow and blue = Brewster's colour system 1831, or red, green, violet = Young's colour system 1807) all colour nuances can be mixed; this method of mixing colours is called the three-colour system and, when it comes to prints, three-colour printing. A distinction is made between two types of colour synthesis, as Helmholtz first made clear:



13. Japanese village



14. Landscape (sunset) Honolulu

"1. colour synthesis by addition, in which the colour rays are first mixed in the eye of the observer (this is where the photochromoscope etc. belongs),

"2. colour synthesis by subtraction, in which the coloured layers are placed on top of each other so that the colour of the layer below must pass through the layer above; here colour rays of the lower layer are stopped (subtracted). This includes: three-colour printing in the narrower sense of the word, as well as three-colour slides from Lumière, etc. [...] If transparent copies (slides) are made using the three-colour process, particularly vividly coloured images are obtained. Pigment slides can be used for this purpose, or colourless photographic chromate gelatine images can be produced, which are then impregnated with suitably chosen tar dyes, giving blue, red, and yellow partial images in the form of thin sheets, which are fastened one on top of the other in an exact fit."³

Fig. 15 shows scans of the front and back of the picture in Fig. 11. You can clearly see the blue and the red coloured thin sheets of the partial-pictures. Between these lies the yellow sheet.

Unfortunately, I have been able to find out almost nothing about Dr J. Schmittmann. However, he must have been wealthy, since he was able to travel extensively around the world. There are some indications on the internet that a J. Schmittmann published travel reports (e.g. about Argentina in *Petermanns Geographische Mitteilungen* in 1911).

The quoted text included words that may now be seen as offensive and inappropriate. These have been omitted with minimal editorial changes. Otherwise the text is reproduced in full. The captions for Figs 1 to 14 comprise the information written on the labels on the slides, omitting 'Dr. Schmittmann Düsseldorf' that appears on each one. All translations from the German are by Helmut Wälde, assisted by Google Translate.

REFERENCES

1. www.earlyphotography.co.uk/site/entry_132.html#1122
2. 'Die erste Weltumseglung mit der Naturfarbenkamera von Dr. J. Schmittmann, Düsseldorf' in *Festschrift zur Feier des 25jährigen Bestehens* (Düsseldorf: Naturwissenschaftlicher Verein, 1909), pp. 111-115.
3. Otto Lueger, *Lexikon der gesamten Technik und ihrer Hilfswissenschaften*, Bd. 3 Stuttgart, Leipzig, 1906, pp. 102-103



15. The front and back of the slide in Fig. 11 showing the blue (left) and red (right) coloured thin sheets of the partial pictures. Between these lies the yellow sheet.