

Anon, *Couple with a motor car*, c.1910
Autochrome



Anon, *Boy with a parasol*, c.1910
Autochrome

Autochromes: The Dawn of Colour Photography

In 1839, when photographs were seen for the first time, they were regarded with a sense of wonder. However, this amazement was soon tempered by disappointment. How could a process that captured the forms of nature with such exquisite detail, fail so dismally to record its colours? The search for a practical process of colour photography soon became photography's 'Holy Grail'. Yet, while scientists, businessmen and experimenters grappled with the problem, the public became impatient. Photographers, eager to give their customers what they wanted, soon took the matter into their own hands - literally and began to add colour to their monochrome images. In the right, skilled hands, effects of great subtlety and beauty could be achieved. Even at its very best, however, hand-colouring remained an arbitrary and ultimately unsatisfactory solution. What was desired was a purely photographic process that would transform photography from being, in W H F Talbot's famous phrase, 'The Pencil of Nature' to 'The Paintbrush of Nature'.

However, before colour could be faithfully reproduced, the nature of light had first to be clearly understood. The scientific investigation of light and colour had begun in the seventeenth century when Sir Isaac Newton famously split sunlight using a prism to show that it was actually a combination of the seven colours of the spectrum. Nearly 200 years later, in 1861, James Clerk Maxwell, conducted an experiment to prove that all colours can be reproduced through mixing red, green and blue light. Maxwell made three

separate magic lantern-slides of a piece of tartan ribbon, through red, green and blue filters. These slides were then projected through the same filters using three separate magic lanterns. When the three images were carefully superimposed, they combined to produce a single coloured image which was a recognisable reproduction of the original subject. Known as additive colour synthesis, this principle was to form the basis of the Autochrome process.

However, while the fundamental theory may have been understood, a practical method of colour photography remained elusive. Several pioneers did succeed in making colour photographs but their processes were complex, impractical and not commercially viable. Despite its theoretical importance, their work was to be of limited practical value because the photographic emulsions of the time were limited in their colour sensitivity. It was not until the end of the nineteenth century that the first so-called 'panchromatic' plates, sensitive to all colours, were produced. Now, at last, the way lay clear for the invention of the first practicable method of colour photography - the Autochrome process, invented in France by Auguste and Louis Lumière.

The Lumière brothers are best known as film pioneers with their invention of the *cinématographe* in 1895. However, they had also been experimenting with colour photography for several years. In 1904, they presented the results of their work to the French *Académie des*



John Cimon Warburg, *Peggy in the garden*, c.1908
Autochrome



Baron de Meyer, *Flower study*, 1908
Autochrome

Sciences. Three years later they had perfected their process and had begun the commercial manufacture of Autochrome plates. On 10 June 1907, the first public demonstration of their process took place at the offices of the French newspaper *L' Illustration*. The event was a triumph.

News of the discovery spread quickly and critical response was rapturous. Upon seeing his first Autochrome, for example, the eminent photographer, Alfred Stieglitz could scarcely contain his enthusiasm: 'The possibilities of the process seem to be unlimited and soon the world will be color-mad, and Lumière will be responsible'.

The manufacture of Autochrome plates, undertaken at the Lumière factory in Lyon, was a complex industrial process. First, transparent starch grains were passed through a series of sieves to isolate grains between ten and fifteen microns (thousandths of a millimetre) in diameter. Many different types of starch were tried, but the humble potato was found to give the best results. These microscopic starch grains were separated into batches, dyed red, green and blue-violet, mixed together and then spread over a glass plate coated with a sticky varnish. Next, carbon black (charcoal powder) was spread over the plate to fill in any gaps between the coloured starch grains. A roller submitted the plate to a pressure of five tons per square centimetre in order to spread the grains and flatten them out. On every square inch of the surface of an Autochrome plate there are about four million transparent starch grains, each one of which acts as a tiny coloured filter. Finally, the plate was coated with a panchromatic photographic emulsion.

Although complicated to make, Autochrome plates were comparatively simple to use - a fact that greatly enhanced their appeal to amateur photographers. Moreover, they did not require

any special apparatus. Photographers could use their existing cameras. However, they did have to remember to place the Autochrome plate in the camera with the plain glass side nearest the lens so that light passed through the filter screen before reaching the sensitive emulsion. Exposures were made through a yellow filter which corrected the excessive blue sensitivity of the emulsion and gave a more accurate colour rendering. This, combined with the light-filtering effect of the dyed starch grains, meant that exposure times were very long - about thirty times that of monochrome plates. A summer landscape, for example, taken in the midday sun, still required at least a one second exposure. In cloudy weather, this could be increased to as much as ten seconds or more. Spontaneous 'snapshot' photography was out of the question, and the use of a tripod was essential.

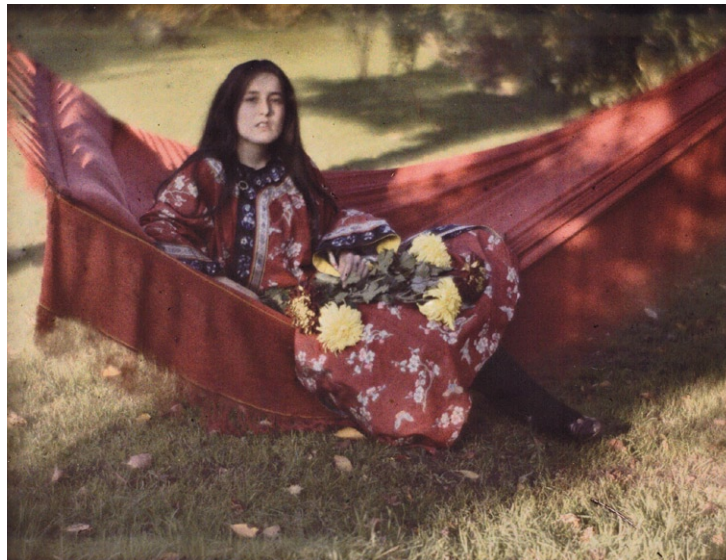
Following exposure, the plate underwent development to produce a positive transparency. In the finished plate, transmitted light, passing through the millions of tiny red, green and blue-violet transparent starch grains, combines to give a full colour image.

No mere technical description, however, can adequately convey the inherent luminous beauty and dream-like quality of an Autochrome, reminiscent of pointillist or impressionist painting. This beauty has a very down-to-earth explanation. In theory, the coloured starch grains were distributed randomly. In practice, however, some grouping of grains of the same colour is inevitable. Whilst individual starch grains are invisible to the naked eye, these clumps are visible - the reason for the Autochrome's unique and distinctive beauty.

Following highly favourable publicity in the summer of 1907, photographers were naturally



Helen Messinger Murdoch, *Colombo Gardens*, c.1914
Autochrome



Alvin Langdon Coburn, *Elsie Thomas*, c.1908
Autochrome

keen to try out Autochrome plates for themselves. At first, however, they were to be frustrated since demand far outstripped supply. It was not until October that the first, eagerly awaited, consignment of plates went on sale in Britain. By 1913, the Lumière factory was making 6,000 Autochrome plates a day, in a range of different sizes.

The complexity of the manufacturing process meant that Autochrome plates were inevitably more expensive than monochrome. To compensate for this, Autochrome plates were sold in boxes of four, rather than the usual twelve. In 1910, a box of four quarter-plates cost three shillings (15p), compared with two shillings (10p) for a dozen monochrome plates. Their relatively high cost was the subject of frequent comment in the photographic press and clearly had some effect in limiting the process's wider popularity.

In its annual survey for 1908, *Photograms of the Year* commented on the growing interest in the Autochrome process. The Salon Exhibition of 1908, for example, contained almost 100 Autochromes by leading figures such as Edward Steichen, Baron Adolf de Meyer, Alvin Langdon Coburn and James Craig Annan. These were the subject of considerable critical attention. However, after a brief period of intense interest, most 'artistic' photographers soon abandoned the process. There are a number of reasons for this. Firstly, Autochromes were extremely difficult to exhibit. For private viewing they could, of course, simply be held up to the light. However, for ease and comfort, Autochromes were usually viewed using special stands, called diascope, which incorporated a mirror. These gave a brighter image and allowed several people to look at the plate at the same time. For public exhibition, Autochromes were also projected using a magic lantern. Stereoscopic Autochromes, viewed in

stereoscopes, were particularly effective: As *The Photographic News* noted in 1908: '...when the effect of relief is joined to a life-like presentation in colour the effect is quite startling in its reality. It is not easy to imagine what the effect of anything of this kind would have been on our ancestors and witchcraft would have been but a feeble, almost complimentary term, for anything so realistic and startling.' Many photographers were bewitched by the twin spells of depth and colour.

Another, possibly more significant, reason for the Autochrome's loss of popularity amongst some photographers was the fact that the process did not allow for any manipulation of the final image. For many photographers, the Autochrome, unlike printing processes such as gum and bromoil, was a totally unresponsive and therefore ultimately unsatisfactory medium, inherently unsuited to the 'pictorialist' aesthetic. As the name itself suggests, the beauty of the Autochrome depended largely on the process itself rather than in any personal intervention by the photographer, whose role was confined to composition rather than manipulation.

Crucially, for the first time, photographers now had to develop an empathy with colour closer to that of painters. As the distinguished photographer Robert Demachy soon realised: '... the Lumière process will make us learn the intricate laws of colour. It will not be done in a day, and we must resign ourselves to the inevitable atrocities that the over-confident amateur is going to thrust upon us.' However, it was by no means just 'over-confident amateurs' that were prone to produce 'atrocities'. Many prominent photographers found themselves adrift in an alien world of colour - a world that they were very glad to leave behind as soon as the initial novelty and excitement had worn off.

The vast majority of Autochromes were taken by amateur photographers, attracted to the process by the novelty of colour combined with its comparative simplicity. In 1908, R Child Bayley, editor of *Photography* magazine, wrote an article on the process for *The Strand* magazine. Bayley was keen, above all, to stress its advantages for the amateur photographer: 'There is now a process by which we can get a faithful picture in the camera, giving us the colours of Nature in a most startlingly truthful way. Moreover, it is essentially an amateur process. It calls for no great amount of skill and takes no great time to work.' Many amateur photographers eagerly embraced the world of colour that was now, finally, within their grasp.

The subjects chosen by this first generation of colour photographers, reflected both the possibilities of the Autochrome process and its inherent technical limitations. A colourful subject was paramount, and even if absent in nature, could always be introduced through props such as parasols. Portraiture was, of course, a very popular application. Whilst indoor portraiture was possible, the long exposure times required meant that most portraits were taken outdoors. The sunny garden portrait with a background of a flower border or trellis quickly became a visual cliché of the Autochrome process. Gardens themselves, with or without people, were also a popular subject. As *The British Journal of Photography* noted: 'Colour is the very essence of the delight of the garden... The garden lover wants photographs as records of what he has accomplished, and which will last long after the glory of the original has departed.' Flowers were probably the most frequent subject, since they possessed the essential twin attributes of colour and immobility. Photography's potential as a means of documenting 'reality' had, of course, long been realised. However, the Autochrome process brought a whole new dimension to the pursuit of realism - the recording of colour as well as form. The value of the process for scientific, medical and documentary photography was recognised almost immediately and Autochrome plates were widely used to photograph botanical and natural history specimens.

Photography shapes our vision of the world and travel is one of the greatest motives for taking photographs. The ability to capture the world in colour was one of the major reasons for the popularity of the Autochrome. Undoubtedly, the most extraordinary example of its use was the

project initiated by the wealthy French banker Albert Kahn. In 1909, Kahn decided create his *Archives de la Planète* 'a photographic inventory of the surface of the planet as it is occupied, and managed, by man at the beginning of this twentieth century'. Kahn employed a team of photographers who were dispatched all over the world. The result, spanning over twenty years, was a collection of 72,000 Autochromes taken in 38 different countries. Whilst on an entirely different scale, of course, many wealthy amateur photographers followed Kahn's example and used the Autochrome process to record their travels all over the world.

The success of Autochrome plates prompted the appearance of several other additive colour processes, all based on the principle of a screen made up of microscopic colour filters. None of them, however, was as commercially successful and most are now long forgotten. Despite its limitations, the Autochrome process dominated the market for colour photography for nearly 30 years. In 1932, responding to a growing trend away from the use of glass plates towards film, the Lumières introduced a version of their process which used sheet film as the emulsion support. Marketed under the name *Filmcolor*, within a couple of years this had virtually replaced glass Autochrome plates. However, these changes occurred at precisely the same time that other manufacturers were successfully developing new multi-layer colour films which reproduced colour films through subtractive synthesis - thus doing away with the need for filter screens. It was with these pioneering multi-layer films such as Kodachrome that the future of colour photography lay. The Autochrome was confined to history but it retains its place as not only the first colour process but also probably the most beautiful photographic process ever invented.

Endnotes

Alfred Stieglitz, *The Color Problem for Practical Work Solved*, *Photography*, 13 August, 1907, p136.

The Photographic News, 6 March, 1908, p234.

Robert Demachy, *The Pictorial Side in France*, *Photograms of the Year*, 1908, p62.

R Child Bayley, *The New Colour Photography*, *The Strand* magazine, April 1908, pp412-4.

The British Journal of Photography, Colour Supplement, 7 July, 1922, p28.