P08 A Man of Very Obliging Disposition
Frederick Scott Archer and the Invention of Wet Collodion

WC 3555

In March 1851, the London-based sculptor Frederick Scott Archer gave an account of his new photographic process based on collodion in a journal called *The Chemist.* Immediately, the ever-vigilant William Henry Fox Talbot claimed that the collodion process was covered by his patent for the Calotype.

Frederick Scott Archer, inventor of the wet collodion method.

While the collodion process of photograpy was news, Fox Talbot's action was old hat: he had been suing photographers all over England for breaches of his patent and claiming exorbitant sums for a licence. One photographer, Thomas Sims, claimed Talbot had demanded £350 for a licence for his two studios and when he refused to pay because he found this excessive, Talbot slapped an injunction on him which put him out of business.

Fortunately, in 1854 Talbot sued Martin Silvester La Roche for infringing his calotype patent by making portraits using the collodion process. I say "fortunately", because in this landmark case, *Talbot vs Laroche*[1], the court found for the defendant, thus freeing photographers in England to use this greatly superior method. Archer himself published a manual on the new process, *The Collodion Process on Glass*, with the result that he was legally deemed the inventor because he was the first to publish. Unlike Talbot, however, he never took out a patent on this process and because it remained freely available, it rapidly replaced both the calotype and the daguerreotype, not only in England, but throughout most of the world.

[1] For an account of the case, see http://www.midley.co.uk/laroche/TalbotvLaroche.htm

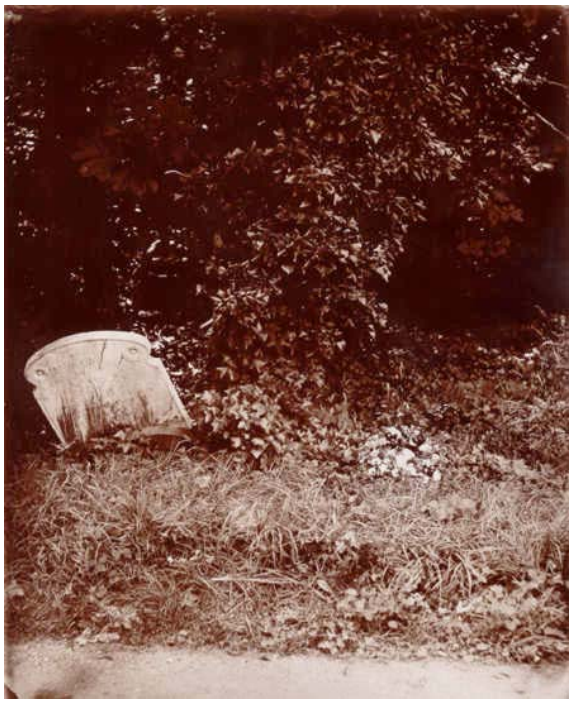
The one exception seems to have been in the United States where, home of the free, an enterprising Boston businessman James Ambrose Cutting did take out a patent in 1854 on the *ambrotype*, which relies upon the wet collodion process, and on the inclusion of silver bromide in the collodion. This of course allowed him to claim license fees from every wet-plate photographer in the country, severely restricting the use of the new process and no doubt forcing the daguerreotype to remain in favour in America for long after it had disappeared elsewhere in the world. It was not until Cutting applied to renew his patent in 1869 that the US Patent Office realised they had made a mistake, that the process and the inclusion of bromide had been in use before Cutting claimed it was his invention, and so, with the lapse of the patent, all restrictions were at long last removed.

But who was Scott Archer and what was the wet collodion process?

Frederick Scott Archer

Frederick Scott Archer was born in 1813, the son of a Hertfordshire butcher, but both of his parents died while he was still a child and so he was raised by relatives. He became interested in coins while apprenticed to a London silversmith and bullion dealer and this led him into sculpture. With the help of friends he established a studio in Henrietta Street where he sculpted busts of many important people. Stylistically, as far as I can gather, he was one of the Pre-Raphaelites but, unfortunately, I have not been able to find any photos of his work as a sculptor. In terms of personality, he seems to have been a quiet, unassuming and even retiring man. The British Journal said he was "*a man of very obliging disposition*." It is thought he also suffered from some kind of congenital liver deformity which might or might not have accounted for his early death.

Like David Hill in Scotland, Archer hoped that photography would help with his art and so he learned the calotype process. However, he found the texture of the paper negative disappointing and turned his attention instead to finding a new way of making a negative which would give him greater clarity and detail. In 1849 he successfully tried coating a glass plate with iodised collodion which he then exposed while still wet. The following year he published an article in *The Chemist* indicating that pyrogallic acid was a faster, better developer than gallic acid. It was not until the following year — 1851, the year of the Great Exhibition — that he finally published the details of the wet collodion process in *The Chemist*, having waited until he was able to get reliable and consistent results from his experiments. It was following this, of course, that Fox Talbot struck and had the judgement in the LaRoche case gone otherwise, the development of photography might well have been held up for another decade or two. Happily that was not to be and the wet plate process took off, tens of thousands adopting it around the world so that within just a few years, except in America, the daguerrotype and calotype were were little more than historical curiosities.



Because Scott Archer did not patent his invention, he made no money from it although others made fortunes using his technique. He died on May 2nd 1857, penniless, and was buried in a grave in Kensal Cemetery which, to this day, still has no marker.

Scott Archer's unmarked grave in Kensal Cemetery – note that his grave is to the viewer's right of someone else's headstone and is marked by only the wreath of white flowers.

After his death, the Royal Photographic Society collected £767 for his children and his wife was awarded a Crown pension of £50 a year. However, Fanny herself died the following year leaving the three children orphaned. Only one of these three, Alice, survived into adulthood but whether or not she had children is unknown.

Scott Archer's unassuming nature and his generosity to the world did not pass unnoticed by a country accustomed to Fox Talbot's litigiousness. Shortly before his death, The Liverpool Photographic Journal said of him:

> *Mr. Archer's disinteredness cannot be too highly or substantially complimented. Had the secret of the medium employed in the production of his pictures been kept, its use under restrictions, merely allowed, he would have unquestionably maintained in his own hands a great power, which might have conduced to his own pecuniary advantage... – the discovery might have been worth a fortune... In every direction indeed in which we turn, we perceive alike its value and the generosity which bestowed it – free as air – on the public, for the public good.*[2]

And, for the sake of history, I cannot understate the importance of Archer's contribution: although collodion ruled supreme for only the next 30 years, it was this which transformed photography from a rather arcane and impractical hobby into an ubiquitous and practical art. A generation on, the collodion was replaced with gelatine and the glass plate with film, but those were but modifications, not changes of fundamental principle.

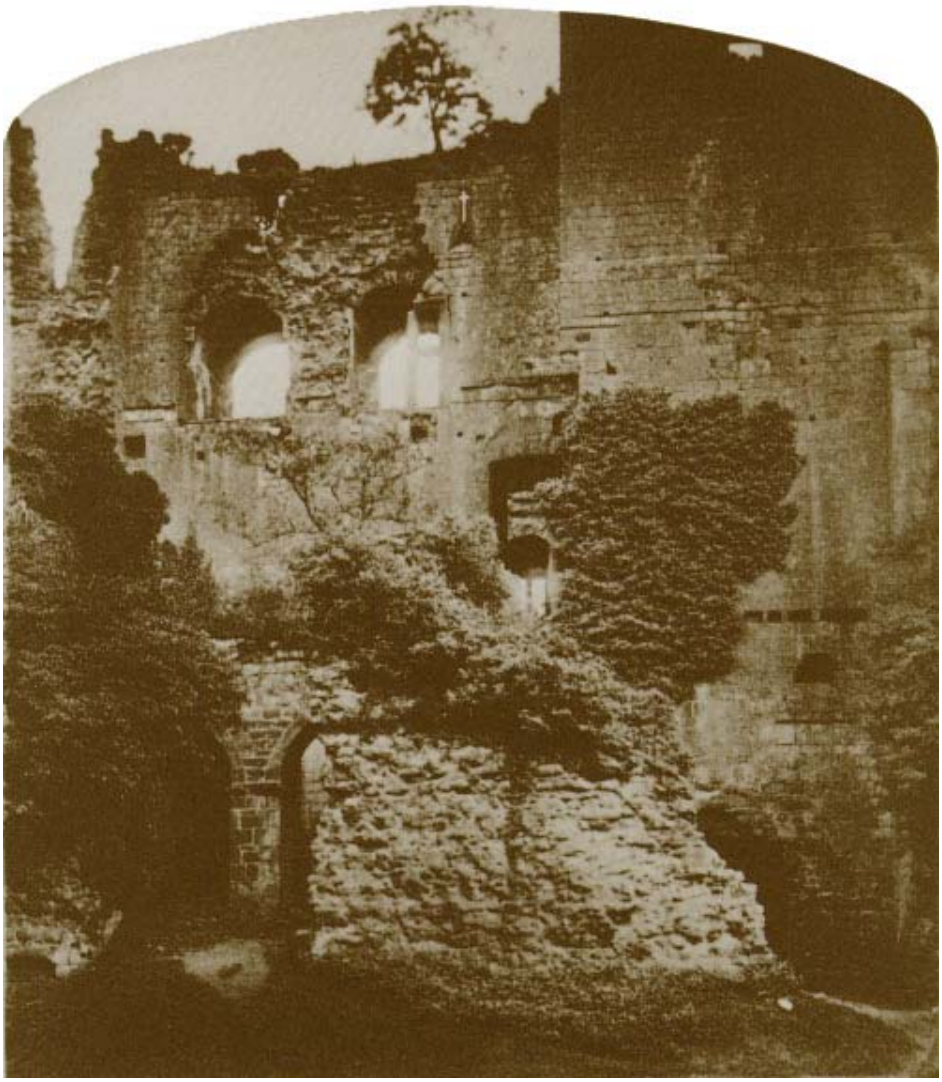
[2] Quoted at http://www.dunniway.com/archer/


"Sparrow's House, Ipswich" by Frederick Scott Archer, probably 1857 (Left) And "Sparrow's House, Ipswich" October 2001[3] Seán MacKenna who lives and works in London is a practicing wet collodion photographer. MacKenna who has set up several web sites in honour of Archer's memory.

Announcing Scott Archer's death, *Punch Magazine* for June 1857 published the following:

> *To the Sons of the Sun.*
>
> *The inventor of Collodion has died, leaving his invention, unpatented, to enrich thousands, and his family unapportioned, to the battle of life. Now, one expects a photographer to be almost as sensitive as the Collodion to which Mr. Scott Archer helped him. A deposit of silver is wanted (gold will do) and certain faces, now in the dark chamber, will light up wonderfully, with an effect never before equalled by photography. A respectable ancient writes, that the statue of Fortitude was the only one admitted to the Temple of the Sun. Instead whereof, do you, photographers, set up Gratitude in your little glass temples of the sun, and sacrifice, according to your means, in memory of the benefactor who gave you the deity for a household god. Now, answers must not be Negatives.*

[3] Photos from http://www.dunniway.com/archer/sparrow.html



***F Scott Archer: Kenilworth*[4]**
Caesar's Tower from the Inner Court, early 1850's

The Pre-Raphaelite Brotherhood was formed in 1848. How close Archer's contact with the Brotherhood is unknown but his work shows many influences. For example,

> *Scott Archer's views of Kenilworth Castle are among the earliest in the genre of photographs of ruined buildings so popular in the 1850's and 60's. They suggest several Pre-Raphaelite themes. Kenilworth was the setting of a novel by Walter Scott, whose mediaevalizing romances were read avidly by the young painters, especially D. G. Rossetti. The suggestive motif of ivy spreading across crumbling brick appears frequently in Pre-Raphaelite work, beginning with Millais' 'The Huguenot' (1852). It allowed the painters to display fastidious handling, just as it showed up the merits of Scott Archer's invention.*

[4] Photo and quotation from http://www.libfl.ru/pre-raph/1.html

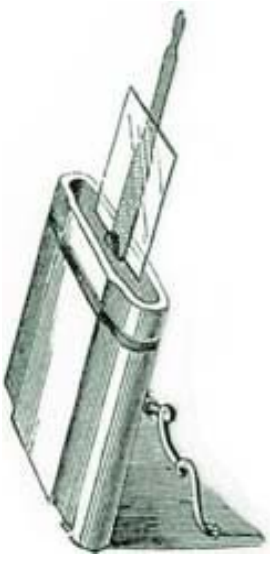
The wet collodion process

The photographic use of collodion was discovered in 1846 by the French chemist and writer Louis Ménard. Chemically it is described as a solution of *nitrocellulose in ether or acetone*, sometimes with the addition of alcohols and is often known as *pyroxylin* solution. It is toxic and very flammable. If allowed to dry, it forms a celluloid-like film. While still wet, however, it is very sticky and adheres to just about anything[5].

That description however, does not tell the whole story: the nitrocellulose or pyroxlin is actually made by soaking raw cotton in a mixture of nitric and sulphuric acid.[6] If the cotton was soaked in the acid for longer than was needed for collodion, it actually produced what was known as *gun cotton*, a very powerful explosive.

The discovery of gun cotton, and hence of collodion itself, was actually made in 1838 by the French chemist T J Pelouze, but is generally attributed to the German-Swiss chemist Christian Friedrich Schönbein (1799-1868) who, working one day in his wife's kitchen, he accidentally spilt a bottle of nitric acid on the table. He grabbed the nearest cloth, which happened to be his wife's apron, and mopped up the acid. Hanging it on the stove door to dry he was shocked out of his wits when, no sooner was the apron dry than it exploded!

Collodion was not itself sensitive to light but had to be sensitised in much the same way as earlier photographic methods had sensitised paper or even white leather. The procedure for making a negative was as follows[7]:



Lowering the plate into the silver nitrate bath

1. Collodion is mixed with an 'iodiser', which contains bromides and iodides dissolved in alcohol.

2. A glass plate is carefully cleaned and either edged with rubber solution or coated with an albumen substratum layer

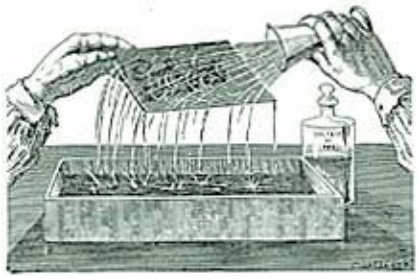
3. A pool of the mixed collodion is poured onto the plate, which is tilted to spread it evenly, and excess is poured off.

4. When some ether and alcohol has evaporated and the

[5] See http://en.wikipedia.org/wiki/Collodion

[6] If memory serves me correctly, this mixture of nitric and sulphuric acids was known as *aqua regia* and was the only known substance which would dissolve gold.

[7] The above quotation has been taken directly from http://photography.about.com/library/weekly/aa111802a.htm. An illustrated and more detailed account can be found at: http://www.pbs.org/wgbh/amex/eastman/sfeature/wetplate%5Fstep1.html. The small illustrations here are from this source.



surface is tacky, the plate is put into a solution of silver nitrate in water for 2-3 minutes. This stage produces light-sensitive silver halides.

Pouring on the developer

5. The plate is drained and quickly put into the plate holder

6. The exposure must be made before the plate dries out (about 10 minutes.)

7. Exposure times in good light were typically around 1 -10 seconds at f11

8. Developer solution (usually acidified ferrous sulphate or pyrogallol) was poured onto the plate and tilted to cover it evenly and kept moving until development was complete - usually several minutes

The negative (digitally contrived) of a modern gold-toned photograph by TR of Milwaukie, Oregon[8]

9. The plate was briefly rinsed with water

10. It was fixed using a bath of potassium cyanide (poisonous) or sodium hyposulphite

11. It was washed for a couple of minutes (longer if hypo was used)

12. Often plates were intensified, most commonly using a mixture of developer and silver nitrate, although lead or mercury intensifiers were also used.

13. Plates were then dried, usually over a spirit lamp

14. The plate was heated gently over a spirit burner and a varnish was then poured onto the collodion and flowed across to give an even coat.

When this had set the plate was ready for printing

Printing a positive image from the negative followed a similar course of action although collodion was not used as the medium which held the light-sensitive silver halides to the surface of the paper stock. In 1850, Louis Désiré Blanquart-Evrard found he could print from a negative onto paper coated with a mixture of egg-white and light sensitive silver halides. While albumen was unsuccessful as a medium for negatives, on paper it became the dominant base for photographs on paper from 1855 to 1900 and was at its peak in the decades from 1860 to 1890. We will see it at its most popular in the production of cartes-de-visite, cabinet and stereographs of this era.

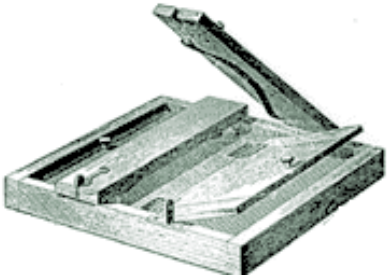
8 Author not further identified. This "negative" was obtained by inverting the positive for purposes of illustration. The original is at http://imtheomega.blogspot.com/2007/06/gold-toning.html

The process is as follows[9]*:*

1. A piece of paper is coated with an emulsion of egg white (albumen) and table salt (sodium chloride), then dried. The albumen seals the paper and creates a slightly glossy surface.

2. The paper is then dipped in a solution of silver nitrate and water which renders the surface light-sensitive.

Sensitising the paper



3. The paper is then dried in total darkness.

4. The dried, prepared paper is placed in a frame in direct contact under a negative, often a glass negative with collodion emulsion, and exposed to light until the image achieves the desired level of darkness. Direct sunlight is preferable, as the paper is most sensitive to ultraviolet light.

A direct printing frame

5. A bath of sodium thiosulfate fixes the print's exposure, preventing further darkening.

6. Optional gold or selenium toning improves the photograph's tone and stabilises against fading.

The positive, gold-toned photograph by "TR" of Milwaukie, Oregon

While we will deal with it again later, it is worth mentioning here that toning, using a variety of salts including those of gold, platinum and selenium, was often used throughout this latter half of the 19th Century, not only because different hues could be obtained but also — and most importantly — toning made the photographs much more permanent. Silver exposed to air in which there are other gases, especially sulphur dioxide, rapidly discolours and chemical changes occur. For example, sulphur dioxide causes prints to change from black silver to a complex mix of silver sulphide, a brownish and not necessarily attractive colour. To avoid blotchiness, prints can be toned in a

[9] Again, this outline has been taken from http://photography.about.com/library/weekly/aa111802a.htm. The illustrations are once more from http://www.pbs.org/wgbh/amex/eastman/sfeature/wetplate%5Fstep1.html. A detailed description of the processes including recipes can be found at: http://cprr.org/Museum/Photography.html

solution of "liver of sulphur" which, apart from producing a foul smell of rotten egg gas, changes the image to a sepia tone. A more attractive sepia, a slightly warmer variety, is better produced by selenium salts.

Another reason prints became degraded over time was because they had not been washed sufficiently to remove all traces of *hypo*, sodium thiosulphate. It took time and experience with the wet collodion/albumen print method of photography for photographers to realise the importance of washing both their prints and their negatives thoroughly if they were to remain in archival condition. Even so, with the amount of sulphur dioxide pumped into the air by the factories of the industrial revolution and the coal fires of Victorian homes, photographs, no matter how well washed, tended to change colour unless toned and/or hermetically sealed inside good frames.

The ways of the future

Although not yet seemingly as simple as photography is to us today, the wet collodion process and the albumen print together were a huge step forward and allowed thousands to take an active part in what had previously been very much the preserve of a privileged or professional few. That so many did, however, is also tribute to their determination because not only was a considerable laboratory of chemicals required, if you wanted to go further afield than your own back yard, you had to carry a dark-tent — a portable darkroom — and many bottles of liquid as well as glass plates and a bulky camera if you were to record your travels. Many did, climbing mountains and exploring the wild places as well as the civilised wonders of the world and bringing back with them many of the beautiful images we still treasure of the world as it was a century or more ago.

But we will return to these intrepid travellers and their precious images later. Meanwhile, I want to take a quick look at two hugely popular uses to which wet collodion was put but which were, like the daguerreotype, photographic dead ends. These were the *ambrotype* and the *tin-type*.

Ambrotypes

Ambrotypes look very much like slightly dingy daguerreotypes, lacking the sparkle of the

polished silver backing of the older invention. They first appear in 1854 (remember this was the year of Eureka Stockade in Australia) and had virtually disappeared within a decade or so.

The principle on which the Ambrotype works was first noted by Sir John Herschel, but the actual process was patented in the USA by James Ambrose Cutting who, at least in the spiritualist press with which he had associations, was credited with the invention of the process. I have already described how this patent greatly hampered the adoption of the wet collodion process in the USA and that it was not until the Patent Office refused to renew it in 1869 that American photographers were at last free to use the superior process.

The structure of the Ambrotype[10]

The Ambrotype looks very much like the daguerreotype but instead of being an image on polished silver-plated copper plate it is actually a wet collodion negative mounted on a black background. The negative image then appears as a positive when viewed in incident light.

Although the image itself can be scratched or damaged and to protect it, it is sandwiched between glass and enclosed in a case like the daguerreotype, the ambrotype is remarkably durable. In fact the name given it by Marcus Root was taken from the Greek word, *ambrotos*, meaning "immortal". In Europe, the ambrotype was called an *amphitype*.

Ambrotypes have a charm of their own. They are nearly always used for portraits but, because the wet collodion process was faster than the daguerreotype, the poses are usually more relaxed and often informal. They are also easier to view than daguerreotypes but retain some of the precious jewel-like quality the earlier photographs had.

[10] Photo credit: http://digitalhistory.uwo.ca/ma0607/index.php/Image:Ambrotypon_glass_%28painted_black_background%29.jpg

Tintype and Ferrotype

Tintypes were the same as ambrotypes but the collodion image was laid on a metal plate. Posh studios preferred to call them *ferrotypes* but the general public, with whom they were immensely popular, never gave up calling them *tintypes* even though there was no tin anywhere in the little photographs — the word *tin* here, as in *tin* cans, actually referred to *iron*.

The first successful creation of a positive collodion image on a metal plate was done by French photographer, Adolphe Alexandre Martin in 1853[11]. Like Niépce and others before him, he too was looking for a way to aid printing, in this case, engraving.

In 1856, an Ohio daguerreotypist and professor of chemistry, Hamilton L Smith (1819-1903) patented the process after he had translated Martin's paper on the subject. Smith called his tintypes *melainotypes,* but the name never stuck. Later, another patent was granted to Victor Griswold who had found a way of using both thinner metal and paper.

Tintype, about 1870[12]

Tintypes became very popular, especially with working class people for whom daguerreotypes and ambrotypes were usually too expensive. The advantages of the tintype were, according to Robert Leggat,[13]

** the process was simple enough to enable one to set up business without much capital.*

** It was much faster than other processes of the time: first, the base did not need drying, and secondly, no negative was needed, so it was a one-stage process.*

** Cheap to produce, a typical price for a tintype was 6d (2 ½ p) and 1 shilling (5p).*

** being more robust than ambrotypes it could be carried about, sent in the post, or mounted in an album.*

[11] http://photography.about.com/library/weekly/aa111802a.htm
[12] Photo credit: http://www.phototree.com/dating%5Fambro.htm
[13] http://www.rleggat.com/photohistory/history/tintype.htm

** The material could easily be cut up and therefore fitted into lockets, brooches, etc.*

Most tintypes were the size of *cartes de visite*, that is about 2 ¼ and 3 ½ inches, but there were larger and smaller ones, the smallest being the *Little Gem*, which was about the size of a postage stamp and was made using a camera which had 12 or 16 lenses each of which produced an image on the plate which, after processing, would be cut into separate tintypes. A size up was called *The Victoria*. These were particularly suitable for jewellery such as lockets or even under glass, in rings. Often too, they were fitted into a card the size of the CDV so they could be mounted in standard photograph albums.

The tintype remained popular up until the end of the century although the occasional photographer could still be found decades later on piers, promenades and other holiday places.

In the following sessions we will look at Cartes de visite, Cabinets or Imperials, and postcards, and before moving on to examine stereo photograpy. After that, we will deal with the replacement of collodion and albumen by gelatine and of glass by film, the evolution of the camera from the camera obscura to the SLR, and finally, some of the philosophies, styles and fashions in photography during the 20th Century.
