

J. B READE, F.R.S., AND THE EARLY HISTORY  
OF PHOTOGRAPHY

PART II. GALLIC ACID AND TALBOT'S CALOTYPE PATENT

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[PLATE XIII]

THE Rev. Joseph Bancroft Reade, F.R.S. (1801-1870), has been given some prominence in histories of photography as an early independent discoverer of the photographic process, as well as the first person to use sodium thiosulphite (hypo) as a fixer.

Part I of this paper<sup>1</sup> presented definitive contemporary evidence that Reade did not discover photography independently of W. H. Fox Talbot: Reade only began his photography, as did many other persons, immediately after Talbot's disclosure of his photogenic drawing technique in January 1839. But it is also necessary to investigate any evidence regarding Reade's use, during 1839, of nut-gall infusion to make Talbot's photogenic paper more sensitive; and to consider if this could have contributed to the discovery of the use of gallic acid as a developing agent in Talbot's Calotype process.

Allegations that Reade had used gallic acid in photography prior to the sealing of the Calotype patent became of some significance during the early 1850s; attention will therefore be given to the Calotype patent lawsuits of 1852 and 1854, and to the agitation that led up to these events.

*Talbot's Calotype Patent*

The Calotype paper process, which was published in 1841, is often considered to be W. H. F. Talbot's principal contribution to the evolution of the basic system of photography with which we are familiar today.

The Calotype paper negative was obtained by washing over 'iodized paper' (paper pre-treated with silver nitrate/potassium iodide) with 'gallo-nitrate of silver' (a freshly prepared mixture of silver nitrate/acetic acid and gallic acid), and after exposure was again washed with 'gallo-nitrate of silver'.<sup>2</sup> Talbot's original photogenic drawing technique of 1839 was a print-out process - the salted paper had really been suitable only for the production of photograms; but the Calotype paper was much faster and could be used as a negative in a camera because the gallic acid was acting as a developer.

Present address: [ ]

1. *Ann. Sci.*, 1971, **27**, 13.

2. H. F. Talbot, *Proc. Roy. Soc. London*, 1841, **4**, 312-315: -- see also *Compte Rendu Acad. Sci. Paris*, 1841, **12**, 182, 225 and 1055.

In spite of this really radical advance the Calotype paper technique was still not so widely used as the Daguerreotype in the 1840s.<sup>3,4</sup>

The clarity and fine detail of the Daguerreotype had seemed miraculous to everybody when they were first seen in England late in 1839. An early response, made in June 1839, by the editor of the *Athenaeum* was a common one; ‘all comparison between photogenic drawing and the works of M. Daguerre is quite ridiculous.’<sup>5</sup>

The revolutionary improvement over the photogenic drawing technique made by Talbot’s invention of the Calotype process was not able to alter substantially this response, although surely the greatest photographs taken in the 1840s are Calotypes. But the Daguerreotype was (in H. Gernsheim’s words) a *cul-de-sac* of photography. The Calotype process, however, was a fruitful system of working which led on to the wet collodion technique (which commonly used pyrogallic acid as the developer) invented by Frederick Scott Archer in 1851.<sup>6</sup> Unhappily Talbot took out a patent for his Calotype process in 1841, and few photographers were prepared to accept the stringent conditions imposed by Talbot on the use of the process, even when they would have preferred the method to the Daguerreotype. Great Britain was particularly unfortunate as it was the only country in the world in which the Daguerreotype was also subject to patent restrictions during the 1840s.<sup>8</sup>

3. Helmut and Alison Gernsheim, *The History of Photography*, Thames and Hudson, 2nd Edn. London, 1969, chapter 14 (‘The Calotype and other paper processes in Great Britain, 1841-c. 1857’)

4. D. B. Thomas, *The First Negatives*, Science Museum Monograph, London, 1964.

5. *Athenaeum*, 1839 (8 June), 435-6.

6. ‘F. S. Archer, 1813-1857’, *D.N.B.*, 1885, vol. ii, p. 69. F. S. Archer ‘On the use of collodion in photography’, *The Chemist*, 1851, (March), **2** (N.S.) 257-8; ‘On the use of Pyrogallic acid in photography’, *Ibid.*, 1850, **1** (N.S.) 360-1, 450-1.

7. Patent No. 8842, sealed 8 February 1841, enrolled 8 August 1841, Patent Office. *Repertory of Patent Inventions*, 1841 (September), **16** (N.S.), 165-173. *London J. Arts and Sciences*, (edit. W. Newton) 1842, **19** (conjoined series), 189-197.

8. A useful outline of the Daguerreotype in England is found in H. and A. Gernsheim, *op. cit.*, chapter 12; but although the facts given in that work regarding the Daguerreotype patent legal action Beard v. Egerton are satisfactory, it should be noted that the primary source reference given is erroneous; the source must have been *Common Bench Reports*, 1848, **3**, 97-132, and 1851, **8**, 165-216. Reports of Beard v. Egerton were also published in *Rep. Pat. Invent.*, (enlarged series), 1845, **6**, 256; 1846, **8**, 47; 1849, **14**, 293; and in *London J. Arts Sci.*, (conjoined series), 1846, **28**, 368; 1847, **31**, 64; 1849, **34**, 438.

When proposals were made, in 1854, that the Photographic Society should officially oppose the renewal of Talbot’s patent, an editorial in the *Liverpool Photographic Journal* (1854, **1**, 97-98) suggested that, ‘The public have no right to expect more from this gentleman [Mr. Talbot] than from Mr. Beard’ (Beard was the English purchaser of the Daguerreotype patent - Patent No. 8194). This argument had no force in 1854, although it could have been valid in the early 1840s; but indeed the argument would have been unnecessary at the time, for the public were far from happy about Beard’s patent.

However, during the decade 1845-1855, Talbot's persistent attempts to impose restrictions on other people's improvements of the photographic process, and especially his activities in the early 1850s regarding the Collodion process, were justifiably looked upon with particular distaste. The situation regarding these restrictions was especially aggravated when Mr. Talbot sealed a second photographic patent in June 1843.<sup>9</sup>

This second patent was hardly better than a rag-bag assortment of techniques invented by other persons which, because he was using them in conjunction with gallic acid as developer, Talbot claimed as his own. The reaction of G. Francis, the editor of the *Magazine of Science*, to this in 1844, was that part of the patent was 'preposterously ridiculous'.<sup>10</sup>

Talbot's patent specification was insufficient to be used as practical instruction in the Calotype technique: this want was supplied by the commercial photographic suppliers. There were three such 'Opticians and Philosophical Instrument Manufacturers' in London who produced well-known Photographic Manuals in the 1840s. T. Willats, of Cheapside in the City of London, produced the first edition of their Photographic Manual No. 1 (which concerned the paper processes) in 1844. Regarding the Calotype process it stated that:

'It may be necessary to remind the reader that the CALOTYPE is a patented process. In the two patents obtained by Mr. Fox Talbot, the use of the following processes [a detailed list followed] is claimed as his exclusive right. Some of these claims must, however, be considered invalid, and would possibly affect the value of the entire patents if brought to trial'<sup>11</sup>

These prophetic remarks were surely aimed at the more ridiculous claims of Talbot's second patent, and there is no reason to suppose that, at this stage, the patentability of the use of gallic acid (the crux of the first patent) was being contested. However, three years later the 1847 edition of this Manual said:

'The Calotype, or Talbotype, is, as we have already mentioned, the invention of Mr. Fox Talbot, or is claimed by him. - So early as April 1839, the Rev. J. B. Reade made a sensitive paper by using infusion of galls after nitrate of silver; by this process

9. Patent No. 9753, sealed 1 June 1843, enrolled 1 December 1843, Patent Office. *Rep. Pat. Invent.*, January 1844, 3 (e.s.), 47-53; *London. J. Arts. Sci.*, 1843, 23 (c.s.), 430-433. Strictly speaking two other patents had previously been sealed by Talbot, in 1841 and 1842 (No. 9167 and 9528). These concerned the silver coating of metal plates - in fact Daguerreotype plates - and can conveniently be considered outside the mainstream of Talbot's photographic patents.

10. *Mag. Sci.*, 1843-4, 5, 323.

11. Anon [J. H. Croucher], *Plain Directions for obtaining photographic pictures by the Calotype and Energiatype*. Willats Scientific Manual No. 1, 1st edn. London, 1844, p. 10; 2nd edn. edit. J. H. Croucher, 1845, p. 13

Mr. Reade obtained several drawings of microscopic objects by means of the solar microscope; the drawings were taken *before the paper was dry*. In a communication to Mr. Brayley, Mr. Reade proposed the use of gallate or tannate of silver: and Mr. Brayley in his public lectures in April and May explained the process.’<sup>12</sup>

In August the same year (1847) Sir David Brewster published an article on ‘Photography’ in the *North British Review*. In this article J. B. Reade’s letter to E. W. Brayley, which had been read by Brayley at the London Institution on 10 April 1839, was quoted. This publication of the Reade’s letter to Brayley, and Brewster’s explicit comment that ‘...The first public use of the infusion of nut-galls, which, ... is an essential element of Mr. Talbot’s patented process, appears due to Mr. Reade...’, was obviously the most important starting point from which Reade’s name came to public notice with regard to Talbot’s Calotype process.<sup>13</sup>

There was, however, one more published mention of J. B. Reade with regard to this question prior to the agitation against Talbot’s patents in the 1850s. This was in the *Photographic Manual* of another London Philosophical Instrument supplier, George Knight and Sons, of Foster Lane, Cheapside, who were only about 200 yards from Willats. Robert Bingham [1824-1870] was the author of the 1850 edition of Knight’s *Manual*, and had been a chemical assistant at the London Institution: Bingham wrote in the *Manual*:

‘Mr. Brayley has informed me, that so early as April 1839 the Rev. J. B. Reade used gallic acid to develop pictures. . . and that he (Mr. Brayley) had explained the process in his lectures at the London Institution’.<sup>14</sup>

The London Institution, in Finsbury Circus, was only a little more than half a mile away from both Knights’ and Willats’ premises.

12. John H. Croucher, *Plain directions for obtaining photographic pictures by the Calotype... and other processw on paper*, Willats Photographic Manual No. 1, 3rd edn. 1847, p. 11. (and in the later 1851 edition, which was also by Croucher).

13. See also Part I of this article, pp. 20, 21, and Part II, pp. 77-78.

14. Robert Bingham, *Photographic Manipulation*; part I, George Knight & Sons, London, 7th edn. 1850, p. 13. Bingham is designated ‘late chemical assistant in the laboratory of the London Institution’ on the title page of the *Manual*. He was certainly at the London Institution in 1846 (see address of his letter to *Phil. Mag.*, 1846, **29**, 287); but there are also statements that he was at the Royal Institution - that he had been Michael Faraday’s assistant and had carried out chemical experiments on collodion as a result of this association, (*Phot. J.*, 1867, **12**, 98, and J. Werge, *Evolution of Photography*, London, 1890, p. 87-88.) Perhaps Faraday’s occasional visits to the London Institution could resolve these statements? I have been unable to find any edition of this manual written by Bingham earlier than that of 1850: the 1843-1845 (1st-3rd) editions of Knight’s *Manual* were written by G. T. Fisher, Jr. Fisher was also Chemical Assistant at the London Institution, but no remarks about the Calotype were however made by him. I have found no editions of the *Manual* between that of 1845 (by Fisher) and that of 1850 (edited by Bingham).*[extra note added to 2003 online reprinting: Fisher was at the London Institution from April 1841 to May 1845 and Bingham (at £1-1shilling weekly) from June 1845 to Feb 1848.]*

*Legal action.*

When the use of the wet collodion technique spread very rapidly in the early 1850s, making the Calotype obsolete, Mr. Talbot's misguided claims that this was an infringement of his Calotype patent resulted in his being heartily disliked by very many professional photographers. The reminiscences of Thomas Sims<sup>15</sup> disclose an unpleasant picture of Talbot, and his lawyer, during their encounters with a professional photographer of the period. Once the first patent was taken out Fox Talbot was bound, quite rightly, to protect his own licensees against others who had not paid to use the Calotype; although his foolish attempt, in 1854, to *renew* the patent does weaken much of that justification. There was, however, no excuse for instituting actions against photographers who were using the wet collodion process, and it is difficult not to describe his behaviour at this time as other than reprehensible. But the extent of the legal action undertaken by Talbot has probably, on the other hand, been exaggerated; the few stories about the encounters of professional photographers with Talbot's lawyers, which appeared in the photographic journals and related publications are, in fact, suspect because they were written by a small number of no doubt interested parties. These meagre reports have been the sole source of information used by historians of photography.

I have tried to confirm, from other sources, the extent to which injunctions were issued. A search of legal records at the Public Records Office, London, has shown that no proceedings were instituted against either Miss Wigley<sup>16</sup> or Thomas Sims. The latter was supposed to have received an injunction from Talbot in the spring of 1853, but he must have been approached only informally.<sup>17</sup> Of course, a casual threat could just as easily ruin a professional photographer as could formal legal action. Possibly it was Sims who was described when Talbot's Solicitor stated,

one other case only of obstinate infringement ...has occurred ... the infringer was in poor circumstances and the Photographic Pictures exhibited by such infringer were of such a very low character in Art that the Plaintiff [Talbot] considered them unworthy of notice by legal proceedings.<sup>18</sup>

There were in fact three legal actions brought by Talbot against professional photographers.

15. E. R. Ashton, 'Memoirs of a photographic pioneer' [Thomas Sims 1826-1910] *Brit. J. Phot.*, 13th June 1930, 77, 353-5.

16. The story of Miss Wigley [three sisters, Emma, Caroline, and Jane Wigley at 108 Fleet St], who, with her 'woman's obstinacy, boldly stated her determination to brave alike Mr. Talbot and the Vice-Chancellor', is briefly mentioned in *The Art J.*, 1854, 238.

17. Sims' reminiscences do seem in fact to be otherwise reliable; for his stated figures for the cost of Calotype licences have been basically confirmed by the author from legal records.

18. Affidavit sworn by J. H. Bolton on 6 May 1854; Talbot v. Henderson, Court of Chancery, P.R.O., Affidavit C31/1048/664.

*Talbot v. Colls.*

On 22 January 1852 in the Court of Chancery, Talbot was granted an injunction to restrain a Richard Colls, who had premises in New Bond Street, London, called the 'Gallery of Modern Art', from producing, and selling, photographs on paper.<sup>19</sup> Although the *Talbot v. Colls* case has been unnoticed by historians<sup>20</sup> it undoubtedly had great influence at the time. In 1848, three and a half years before the granting of the injunction, Colls had applied for a licence for himself, his brother, and Robert Bingham, to use the Calotype technique. Talbot's terms were too demanding for Colls; the sum of £400 was suggested, and later Colls was required to 'give his bond for £500 or £1000 to secure the due performance of the Contract to pay 25 %' of his proceeds to Talbot. There was abortive haggling over terms during the following two years. In 1851 it appears that Colls exhibited, at the Great Exhibition at the Crystal Palace, some paper prints - including some that were 'taken from designs of Etty'. That November a clerk of Talbot's solicitor was sent - anonymously - along to Colls' Gallery. There he asked to see Calotype pictures like those which had been exhibited at the Crystal Palace. The pictures had not been exposed on view in the window because of the patent; they were kept in a portfolio along with other paper prints of figures and landscapes, all of which had been made by Richard Colls and his brother. The solicitor's clerk selected a paper print of 'a picture after Etty', paid his five shillings, and returned to his employer; but not however before he had carefully obtained some careless - and incriminating - statements from Colls regarding Talbot's patent, and regarding Mr Talbot, who he said was 'a very difficult person to deal with'. In this way an injunction was finally obtained to stop Colls from using the Calotype process.<sup>21</sup>

The Colls case is important firstly because it provided the Ruling upon which later threatened actions depended;<sup>22</sup> secondly it was important

19. *Talbot v. Colls*. Court of Chancery, Hilary Term 1852: Public Record Office (P.R.O.), Cause Book C32/328 (1852 Cause T.1), Pleading C14/1371/T1; Affidavits C31/856 Part I (No. 4 filed 21 Jan, and No.s 6, 8, 21 filed 15 January 1852); Decrees and Orders C33/1006/214. [see also *The Times*, 23 January 1852, 7d]

20. Colls had been mentioned briefly in the *Art J.*, 1852, 193: 'Injunctions are terrible things. A friend of Mr Talbot persuades Mr Colls to copy for him a painting of Etty's, and forthwith, armed with this, the patentee goes to the Vice-Chancellor and obtains an injunction, under the influence of which Colls retires from the field'.

21. Presumably Colls was still using the Calotype process. Although, due to his association with Robert Bingham, it is conceivable that he was, even at this early date, really using the wet-collodion technique. Unfortunately no affidavit was sworn by Colls, and collodion is not mentioned in any of the legal documents.

22. The case probably did not become known to historians because the ruling was referred to not by its name but by such phrases as 'the terms of the injunction granted in a former case by the late V-C Sir James Parker'.

because the injunction was granted at a critical period, a period when photography was ready to surge forward in England. To some extent this great growth of photography in the early 1850s seems to have obtained some stimulus from the Great Exhibition of 1851, but it was more especially due to the introduction of the wet-collodion technique which was just beginning to be widely known. It was at exactly the same time as the Colls injunction that a suggestion was put forward to establish a photographic society in London.

#### *The Photographic Society and Talbot's Patent.*

The existence of the Calotype patent meant that even amateurs were legally required to obtain a licence from Talbot<sup>23</sup>: and it obviously threatened to forestall this attempt to form a Society. Roger Pension, Peter Fry, and Robert Hunt, amongst others, were associated in this. Hunt approached Talbot in an attempt to solve the patent difficulty. He wrote on 5 March 1852 to Peter Fry reporting that Fox Talbot had said that,

‘the Vice-Chancellor’s decision in the case of Talbot v. Colls is clear that a man cannot practise the Calotype, for his own amusement even, without a licence from the patentee, but he has no wish to act on this.’<sup>24</sup>

Talbot did agree that if a Society was formed, ‘upon a very respectable basis’, he would give a licence to every member as long as they abided by a number of conditions concerning the sale or exchange of prints. Hunt believed that ‘Mr Fox Talbot clearly desires to make no profit by his process where it is used for amusement only or for scientific enquiry’. Talbot wrote to Hunt later the same month confirming their conversation, and that he would ‘give free permission to the members of the Society to exercise the art for their amusement, they on their part acknowledging my rights as an inventor and patentee.’ Talbot suggested to Hunt that if a provisional committee was formed they would quickly be able to negotiate a satisfactory settlement with him. But there was some considerable feeling against Talbot at this time, and Talbot confided to Hunt that he had ‘best wishes for the

23. W. R. Sedgefield stated, in *Phot. News*, 1861, **5**, 81-82, that he was asked, in 1842, to pay £20 for an amateur’s licence. However, an 1846 advertisement (reproduced in H. and A. Gernsheim 1969, *op. cit.*, p. 171) gives the cost of licences for amateurs as 1 guinea; while another advertisement of the same year (reproduced in V. F. Snow and D. B. Thomas, *Phot. J.*, Feb. 1966, **106**, 65) seems to suggest that, by that time, amateurs did not *have* to take out a licence, although if they did have a licence, then prepared paper could be obtained more cheaply from the Talbotype Establishment at Reading.

24. Letter from Robert Hunt to Peter Fry, dated 5 March 1852, published (p. 832-3) by J. Dudley Johnstone, ‘The Origins of the Photographic Society’, *J. Roy. Soc. Arts*, 1939, **87**, 831-837. (also reprinted in *Phot. J.*, 1939, **79**, 549-553.)

formation of a prosperous society, but it appears to me that there is not much *reciprocity of feeling* on the part of those who would naturally take a leading part in it'.<sup>25</sup>

The provisional committee met in the offices of the *Art Journal*, and in Mr Hunt's rooms, and they seem to have had several interviews with Talbot. However, the conditions upon which Talbot was insisting were unacceptable to the committee.<sup>26</sup> In fact there is no doubt that the persons concerned were loath to accept any conditions; some of them were amongst the leading photographers of the day and the wide net cast during Talbot's patenting activities could not fail to rouse frustration and anger amongst them. Peter Fry, a leader of collodion photography, a little later moderately expressed his own view that he did not contest the right of Mr Talbot to take out a patent; the fault which he found was that Talbot, having taken out a patent, 'endeavoured to embody in it the discoveries which had been made by other persons'.<sup>27</sup> This was moderately put; but the impression gained from much of the photographic writing of the period is often of the passion which was aroused by Talbot's patents. Talbot's patenting activity had not lessened during the ten years since the first patent. That patent had been basically acceptable; the second had been the source of some scorn; while the third and fourth patents were the cause of much disgust. 1852 was a time of change and great growth for photography. But Talbot's third and fourth photographic patents had also recently been published;<sup>28</sup> it is therefore not at all surprising that 1852 was also a time of annoyance, amongst many of the persons involved in this growth, with Talbot; for his patent claims seemed to offer the prospect that restrictions would be continually placed upon the use of processes which had been evolved, and made freely available, by other experimenters.<sup>29</sup>

25. Letter, H. F. Talbot to Robert Hunt, dated 24 March 1852, in J. Dudley Johnstone, 1939, *op. cit.*, p. 833-4.

26. As well as the five conditions originally mentioned by Talbot to Hunt at least one other was added: that the Society should exclude any member 'who should employ the art as an auxiliary agent for engraving or lithographing any object'.

27. *Phot. J.*, July 21 1854, 2, 3.

28. Patent 12906. *Repertory of Patent Inventions*, August 1850, 16 (enlarged series), 97-102. Patent 13664. *Rep. Pat. Invent.*, January 1852, 19 (e.s.), 41-48.

29 The annoyance expressed in the writings on the subject in the *Art Journal* at this period occasionally verges on the hysterical; but at the same time it is far from easy to deny the case thus put forward against Talbot's patenting activities. The anonymous editorial writer of these articles (*Art J.*, June 1852, 193-194; and 1854, 236-238.) was obviously closely associated with the photographic society group. There are problems in assigning these articles; but there is some evidence (see forthcoming paper 'Herschel and Talbot v. Henderson', footnote 1 [page 241]) that Jabez Hogg was, at least partly, involved. Hogg became closely associated with J. B. Reade in the late 1860s, when Hogg was Secretary, and Reade was President, of the Royal Microscopical Society.



The provisional committee who were negotiating with Talbot felt that ‘the existence of the patent was the great obstacle, not only to the formation of the society, but to the improvement of the art itself.’ Therefore, as an independent Society was found incompatible with the existence of the patent, the committee was adjourned.<sup>30</sup> This was ‘not, however, before those gentlemen had fully impressed upon Mr Talbot the necessity of resigning his patent claims.’<sup>31</sup>

Talbot must have been in little doubt about the extent of the hostile feelings which were held about his patents; he does however seem to have had some concern about the influence and respectability of the persons with whom he was negotiating. He would consider the matter further only if he was applied to, ‘numerously and influentially’, by the ‘artistic and scientific world.’ The Royal Society of Arts was approached, by Peter Le Neve Foster, and agreed to provide facilities for obtaining signatures for an appeal to Mr Talbot. It also appears that Talbot would have liked ‘some acknowledgement of “obligations conferred” from high quarters’, and there may have been some correspondence about this with Sir John Herschel, Brewster, Wheatstone, Babbage and others.

*Talbot withdraws patent; except for commercial Portraiture.*

Finally the question was resolved by representation from Art and Science, in the form of a letter, sent to Talbot that July, from the President of the Royal Academy and the President of the Royal Society. This appeal, which asked, ‘whether it may not be possible for you, by making some alteration in the excise of your patent right, to obviate most of the difficulties which now appear to hinder the progress of the art in England’, was published, along with Talbot’s reply, in *The Times* on 13 August, 1852.<sup>32</sup>

Thus it came about - due to the efforts of the persons concerned with the earliest attempt to form the Royal Photographic Society<sup>33</sup> -- that Talbot responded by ‘offering the patent (with the exception of the single point hereafter mentioned) as a free present to the public’. ‘The exception’, he added, ‘which I am desirous of still keeping in the hands of my own

30. Report of the Provisional Committee read by Mr Fenton; *Phot. J.*, March 3, 1853, 1, 3.

31. *Art J.*, September 1852, 270.

32. Letter No. 1, dated July 1852 from Earl Rosse and C. L. Eastlake to H. F. Talbot, Esq., F.R.S.; Letter No. 2, dated 30 July, from H. F. Talbot to the Earl of Rosse: *The Times*, August 13th, 1852, 4.

33. For the events involving Talbot’s patent during these negotiations to form a society see; *Art J.*, 1852, April p. 103, June p. 193, August p. 262, September p. 270; *Athenaeum*, 29 May, 1852, p. 610; *Phot. J.*, 1853, 1, 3. (Report of Provisional Committee read by its hon. sec., Roger Fenton); *Phot. J.*, 1854, 2, 14-15. (remarks of Sir William Newton): J. D. Johnston, 1939, *op. cit.*

licensees, is the application of the invention of taking photographic portraits for sale to the public’.

This announcement afforded the opportunity for the widespread enthusiasm for photography to have its head. The (Royal) Photographic Society consequently became established in January 1853; the enthusiasm for photography can also be witnessed, for example, in the issues of the journal *Notes and Queries* which immediately followed a letter drawing attention to Talbot’s announcement.<sup>34</sup>

Much of the heat engendered over the patents was in this way dissipated, and the following year was quiet. It might have remained so, but for the problem, for the professional photographer, concerning the wet-collodion technique.

### *The Collodion Technique*

In April 1852 a reviewer in the *Athenaeum*<sup>35</sup> had confidently stated the widely-held opinion that, ‘the new and valuable Collodion process... is destined to supersede every negative and positive process yet discovered’; but he added - as confidently perhaps, but with less validity - that ‘unshackled as we believe it to be by the Patent Laws, we look forward to this vigorous cultivation with great interest’. A few weeks later in the *Art Journal*, the outlook, to the writer of an article on ‘Photography and its Patents’,<sup>36</sup> had seemed darker: ‘that every improvement is to be crushed because one man has a patent, is a case too monstrous for even the worst form of patent laws to contemplate. We have heard it questioned whether or not the collodion process was free from patent restrictions. We cannot conceive how it can by any possibility be involved.’

But involved it was: although Archer had not taken out a patent for the process - it became entangled in Talbot’s Calotype patent. This was basically due to the fact that photography was then of a dual nature: on one hand there had always been a process which gave a picture on metal; and on the other hand a negative/positive technique which resulted in a picture on paper. Talbot and his agents came, through-out the years, to be watching out for any appearance of paper prints as evidence that the Calotype patent was being infringed. But after 1851 the display of a paper print did not mean that a paper negative process had been used; however it was, quite naturally,

34. Letter by *W. J. Thoms*, *Notes and Queries*, 28 August 1852, 6, 192. (In fact *W. J. Thoms* was the editor!) Dr Hugh Diamond’s name became well known particularly due to his series of articles on photographic technique in this antiquarian journal during the following months. Later Dr Diamond was presented with a testimonial, and it seems £300, as he had ‘given his discoveries to the world instead of retaining his knowledge for his own personal interest’. One might suspect that Dr Diamond may have played a greater part in the agitation against Talbot’s patents than is apparent.

35. *Athenaeum*, 24th April 1852, 461-462.

36. *Art J.*, June 1852, 193

not easy, particularly for Talbot and his agents, to recognize that the long habit of equating paper prints with a complete paper process (and thus with the Calotype process) was no longer a valid concept. Whether the professional photographers generally thought that the collodion process should have been considered as part of the Calotype patent is extremely doubtful; most, at least in central London, must however have been aware that it was considered so by the Calotype patentee.

1851, the year of the publication of the Collodion technique, provides the critical division in the history of the Calotype Patent; a more meaningful division, in fact, than the change of August 1852 to cover professional portraiture only. For the three years after this date more than 100 applications for licences throughout England were received by Talbot's solicitors. In the important area of central London one licence was granted in 1852, and (after the August 1852 portraits-only change) three in 1853 and two in 1854.<sup>37,38</sup> Some of these licencees were certainly using Archer's wet-collodion negative technique;<sup>39</sup> indeed it would be most surprising if any of them were not. One of the reasons that Talbot gave in justification of the use of the Collodion process being considered an infringement of the Calotype patent was that the Commissioners of the 1851 Great Exhibition had applied to him for permission to use his Calotype process to illustrate the *Reports by the Juries*, and that they required, and he had arranged for, glass negatives to be used instead of paper:

'it was the intention of the Commissioners . . . (comprising individuals of the first rank in this realm) ... expressed to me at the time of their said application to make or cause to be made photographic images of divers objects ... upon plates of glass covered with a photographic skin or film instead of making them upon iodised paper... and accordingly

37. J. H. Bolton, deposition sworn 30 June 1855; Talbot v. Henderson, P.R.O., C15/157/T39.

38. The most common fee for these licences was £100 for the first year and £150 for each following year; although sometimes 25% of the proceeds or 8 shillings on each portrait taken was payable. (At this period the common charge for a portrait sitting, with one print, was one guinea, and each print thereafter five shillings). Negotiations were also being made, during this period, for 'Calotype' licences by three London studios associated with Mr Beard (who had been the daguerreotype patentee).

39. H. and A. Gernsheim have drawn attention (*op. cit.*, 1969.) to an advertisement, in *Notes and Queries*, 23 April 1853 (vol. 7, p. 420.) by De la Motte of the 'Photographic Institution', 168 New Bond St., London: This incredibly worded advertisement states; 'Calotype Portraits. (by Licence of the Patentee) Mr. Phillip De la Motte begs to announce that he has concluded an arrangement with the Patentee, Mr. H. F. Talbot, which enables him to take portraits by the newly-discovered Collodion Process...' . The advertisement appears also in *The Athenaeum*, 16th April 1853, p.485 [and throughout May 1853 in *J. Soc. Arts*]. . 168 New Bond St., had before this time been Richard Colls' picture 'Gallery'.

a large number of photographic images upon glass were made by Nicolas Henneman or the artists employed by him’<sup>40</sup>

Nicolas Henneman, who had originally been Talbot’s valet/assistant, was Talbot’s principal licensee. The exact details of Henneman’s agreement with Talbot are not clear; his licence extended for half a mile around his premises at 122 Regent Street, London, and he stated that ‘I was to pay £1,000 for this and a percentage on picture and paper preparation but not on portraits.’<sup>41</sup> In fact, Henneman had himself been using the collodion method since 1852. He was afraid, quite naturally, of competition in central London, and always kept an eye open for possible infringers of Talbot’s patent.<sup>42</sup>

### *Talbot v. Henderson.*

Early in 1854 Henneman noticed that a photographer at 204 Regent Street, who was supposedly a daguerreotypist, was displaying paper portraits. That photographer, James Henderson, received early in May, a ‘Bill of Complaint’ regarding his alleged infringement of the Calotype patent; completely unaware, he had a few days before supplied a ‘Customer’ with evidence that he was using the wet -collodion negative technique in taking portraits.

A hearing, *Talbot v. Henderson*, consequently took place in the Court of Chancery on 26 May 1854; and on that day an injunction was granted to restrain James Henderson from ‘in any manner using, exercising, or putting in practice the invention of the plaintiff . . . or resembling the same, or any part thereof, in the preparation of portraits . . .’ The injunction was granted primarily because of the ruling in the previous case (*Talbot v. Colls*); but because the question of the collodion process had been raised the Vice-Chancellor stated that there was sufficient ‘to shew that an action must be tried as to whether there had been an infringement’ and directed that the action be brought forthwith.

Unlike the *Colls* case<sup>43bis</sup>, of two years before, the Henderson hearing of 26 May was widely published in *The Times*.<sup>43</sup> The granting of the injunction to restrain Henderson had two immediate, and provocative, sequels: firstly, the following warning was inserted in the press by Talbot’s solicitors:

40. W. H. F. Talbot, Chancery Affidavit, sworn 6 May 1854; *Talbot v. Henderson*, P.R.O., C31/1048/666. But, in fact, the ‘skin or film’ should not too readily be assigned collodion; for the albumen-on-glass technique (another acquisition to his patents) seems to have been used.

41. N. Henneman, Examination (30 June 1855) on his affidavit, *Talbot v. Henderson*, Court of Chancery, P.R.O., C15/157/T39. Presumably Henneman’s agreement was made in 1847.

42. N. Henneman, Chancery Affidavit, sworn 6 May 1854, P.R.O., C31/1048/665, and Examination (30 June 1855) *Talbot v. Henderson*, C15/157/T39.

[43<sup>bis</sup> *Correction Footnote added to 2003 online reprinting*: Immediately after publication of this article in 1971 the author found that a very brief report of *Talbot v. Colls* had indeed appeared in *The Times*, 23 January 1852, 7d]

43 *The Times*, Saturday 27 May, 1854, p. 11.

‘Photographic Portraits - Collodion process – CAUTION - Talbot v. Henderson - His honour Vice Chancellor Wood has this day issued an injunction to restrain the defendant from making and selling Photographic Portraits by the above process without the licence of the patentee ... All infringers of the patent rights will be proceeded against...’<sup>44</sup>

Concurrently with this, formal public notice was given that Talbot intended to apply to the Privy Council, during the following month of July, for an extension of the usual fourteen-year term of his Calotype patent.<sup>45</sup>

These two announcements could not fail to lay bare the not-so-old sores; the matter therefore came to a head in the summer of 1854.

#### *A gitation against patent, 1854*

At this opportune moment the Rev J. B. Reade’s name again came before the public.

Robert Hunt (who was preparing the second edition of his book *Researches on Light*) had written to Reade, about January 1854, asking for information about his early experiments in photography. Reade replied to this on 13 February 1854. The letter, under the title ‘On some early Experiments in Photography...’, was published in the May 1854 issue of the *Philosophical Magazine* a few weeks before the granting of the injunction against James Henderson. In this letter,<sup>46</sup> which he wrote before he was aware of any legal proceedings involving Talbot’s patent, Reade discussed his experiments with gallic acid in 1836 (Sic)<sup>47</sup> and 1839, and drew attention to his letter of 1839 to E. W. Brayley, which had later been published by Sir David Brewster in 1847.

The immediate question involved in the photographic patent agitation during 1854 concerned whether or not the use of the collodion process could be an infringement of the Calotype patent. But a further weapon was to be used by the professional photographers to defend themselves, and to challenge the original validity of the sealing of the patent and of its proposed prolongation. The crux of the Calotype patent was the development of the latent image with gallic acid, and it seemed that this substance had been used by the Rev. J. B. Reade before Talbot took out the patent — could the patent therefore be exposed as being invalid?

This article has given considerable attention to the whole question of Talbot’s patents up to 1854 so as to enable the subject to be placed in its

44. *The Athenaeum*, 1854, June 3rd, p. 669; June 10th, p. 701; June 17th, 734.

45. Notice of application to be made for prolongation of patent, *London Gazette*, six issues between 30 May 1854, p.1652, and 27 June 1854, p.1994.

46. Rev. J. B. Reade, *Phil. Mag.*, (4th series) May 1854, 7, 326-331; and reprinted later in *Notes and Queries*, 3rd June 1854, 9, 524-5, and R. Hunt, *Researches on Light*, 2nd edn, 1854, appendix 2 (pp. 371-375).

47. It was here that Reade first put forward the claim to have begun his ‘early researches in photography in 1836’.

true context. However, although the question concerning the similarities and dissimilarities, of the collodion process and the Calotype process were much discussed in the two legal actions of 1854 this will not be given any further attention here. Our terms of reference are to examine the use of gallic acid as a developer in the Calotype process and, especially, to consider what part, if any, J. B. Reade could have played in this.

James Henderson decided to contest the injunction which was served on him on 26 May 1854, and an action against him was begun immediately by Talbot's lawyers. This injunction and the two announcements that were made afterwards by Mr. Talbot's solicitors stirred up resentment amongst many photographers. A suggestion was made to open a subscription list to aid Henderson in his defence,<sup>48</sup> and, furthermore, steps were taken to oppose the renewal of the patent. As R. S.N. 'wrote to the *Photographic Journal* that June, they aimed to show that as

'the essential elements in this patent, the infusion of galls and gallic acid, were *invented, used and published* by the Rev. J. B. Reade before the date of Talbot's patent, it is quite evident that the patent is bad, and ought not to be renewed.'

and 'R.S.N.' added, 'I hope that Mr Reade will be one of the opponents'<sup>49</sup>

An editorial in the journal *Notes and Queries* sums up the situation at that time :

'We understand that the Rev. J. B. Reade, from whose letter [to Hunt] in the Philosophical Magazine we published an extract ... showing that "the use of gallate of silver as a photogenic agent had been made public in two public lectures by Mr. Brayley, at least two years before Mr. Talbot's patent was sealed", is about to publish a second letter [to Talbot] on the subject. Any communication from a gentleman of the position and scientific attainments of Mr. Reade, will be looked for with great interest at the present moment... A special general meeting of the photographic society is to be held... to receive a report from the council respecting the intention of Mr. Fox Talbot, in reference to renewal of his patents'.<sup>50</sup>

At the Extraordinary meeting of the Photographic Society of London held on 6 July 1854 a proposal, by George Shadbolt,<sup>51</sup> that the Privy Council should be informed that the Society deprecated any extension of the patent was

48. H. D. Sands, *Notes and Queries*, 24 June 1854, **9**, 598. In fact a defence subscription was opened - but for Martin Laroche.

49. Letter signed 'R.S.N.' dated 12 June 1854, *Phot. J.*, 21 June 1854, **1**, 222.

50. *Notes and Queries*, 1 July 1854, **10**, 15.

51. Shadbolt (1817 or 1818 - 1901) was also, like Reade, a prominent member of the Microscopical Society of London. Later he was also for many years editor of the *British Journal of Photography*. Some letters by Reade, which were later influential in establishing his reputation as an early inventor of photography, were published by Shadbolt in the *B. J. Phot.*, at a time when they were very friendly, in the 1860s.

carried by a small majority; and Mr Mayall ‘entered at some length. into proof ... that in his opinion the credit of the invention was not due to Mr. Talbot but to Mr. Reade.’<sup>52</sup>

The council of the Photographic Society had been led to consider the question particularly because of a letter which they had received from a London Oxford Street photographer called Laroche.<sup>53</sup> Laroche, who used the Collodion technique for portraiture, stated that he had first had an action commenced against him the previous December; but that Talbot delayed proceeding with this for some time.<sup>54</sup> However, Laroche continued, a fresh action was recommenced against him in May of that year and Talbot had pressed for an early trial. Furthermore, concluded Martin Laroche, his own solicitors had ‘entered a caveat against Mr Talbot’s application for an extension. of his patent term, and that it is my intention to resist such application to the utmost of my power and ... that I may meet with the well-wishes and support of all who are interested in the art of photography.’ It was this independent act of Laroche’s that had spurred the Council of the Photographic Society to put the question before their members.

The Laroche trial was in fact due to be held before action against Henderson was continued; the only other published reference to the Henderson injunction was in *Notes and Queries* on 8 July 1854. Two affidavits, which had been sworn by Sir John Herschel and Sir David Brewster on Talbot’s side in the application for the injunction against Henderson, were there printed, along with a letter that J. B. Reade had written to Talbot the previous month.<sup>55,56</sup> Reade had obviously had his attention drawn, (presumably by letter from somebody closely associated

52. Extraordinary Meeting of the Photographic Society ‘On the subject of Mr Talbot’s Patents’, *Phot. J.*, 21 July, 1854, **2**, 1-4. See also brief report and comments about this meeting in *Liverpool Phot. J.*, 1854, **1**, 81, 97-98, 105-106.

53. Sometimes called Sylvester Laroche; but John Werge, (*Evolution of Photography*, London, 1890, p. 116) who knew him, states that Sylvester was his surname, Laroche being a professional name. Werge also states that he died in 1886, but I have been unable to confirm any of these statements. Talbot and his solicitor speak, in their legal documents, of the Talbot v. Henderson action, of Martin Laroche; this name is to be preferred. M. Laroche’s letter to the Photographic Society was read at the Extraordinary meeting’ of 6 July 1854, and is recorded in the report of the meeting in *Phot. J.*, 1854, **2**, 2.

54. This delay was almost certainly due to Talbot being advised to disclaim some parts of his patents before proceeding further with any actions; he filed disclaimers to parts of his 1841 and 1851 Patents (No. 8842 and 13,664) on 8 March 1854.

55. *Notes and Queries*, 8 July 1854, **10**, 34-36. ‘Photographic Correspondence. Rev. J. B. Reade, on Mr. H. Fox Talbot’s claim to the Priority, of Discovery of the Use of Gallic Acid in Photography’ (letter dated June 24, 1854); ‘Affidavits made by Sir David Brewster and Sir J. Herschel respecting the Calotype Photographic Process invented by H. F. Talbot, Esq. In Chancery - Between ... Talbot, and Henderson’.

56. Reade’s letter to Talbot was also reprinted at the time in *Phot. J.*, 21 July 1854, **2**, 9-10, and in *Art. J.*, August 1854, p. 237.

with the legal proceedings) to an affidavit made by Talbot in which Talbot had seemed to deny that Reade had used gallic acid before himself.<sup>57</sup> Reade drew attention in some detail to the earliest published references to his experiments with nut-gall infusion and then added,

‘I have often been asked to oppose your patent; but I had no wish to meddle with law, or to interfere with the high reputation which your discovery of a process, named after yourself, secured to you ... This however was both subsequent to my own use of gallate of silver, of which you appear never to have heard, and also essentially dependent upon it’.

From the Ms legal records of the Henderson action it does appear that Reade did in fact later have some contact with Henderson and supplied him with some unpublished information (though of little significance) about his early experiments with nut-galls.

The solicitors of both parties in the Henderson case agreed to delay proceedings until judgement was made regarding Laroche; but although Talbot v. Henderson thus disappeared from public knowledge it was by no means the end of the story for the participants. As we shall see later<sup>58</sup> the final consequence of bringing the injunction against Henderson was not a happy one for Talbot.

### *Talbot v. Laroche*

Although Fox Talbot stated in May 1854 that he had commenced an action against Martin Laroche for infringement of his patent, and that he intended to ‘proceed with the said Action with all possible expedition and to seek to recover substantial damages against him’,<sup>59, 60</sup> it was not until the last month of that fateful year 1854 that the Laroche trial was finally held. Just before Christmas, from Monday the 18th until Wednesday the 20th December 1854, the Talbot v. Laroche case was heard before a jury, at a three day

57. Talbot had, in fact, not strictly stated this; but rather that Reade had not used gallic acid for the purpose of developing an invisible image. W. H. F. Talbot, Chancery Affidavit filed 25 May 1854, Talbot v. Henderson, P.R.O., C31/1048/722).

58. Details of the case are reported in a forthcoming paper, ‘Herschel and *Talbot v. Henderson*’.

No attention has been paid before to the Henderson case, for the Laroche trial completely overshadowed it at the time, and the two cases are in complete contrast in regard to the extent, and ease of access to historians, of published reports of their proceedings. However, the Henderson case records, which I have been able to find, reveal an unsuspected and unique source of primary information for the historian of photography concerning that important period of the early 1850s.

59. W. H. F. Talbot, Chancery Affidavit, filed 6 May 1854, Talbot v. Henderson, P.R.O., C31/1048/666.

60. The amount of the damages sought was £5,000 (*Common Bench Reports*, 1855, **15**, 311); it is worth noting, that the Henderson injunction also stipulates that he was to be ‘restrained under penalty of £5,000’.



*Nisi Pruis* sitting, in the Court of Common Pleas held in the Guildhall, London:<sup>61, 62</sup>

‘This important case, which has excited so much interest in the photographic world... was listened to with profound attention by a numerous audience, among whom were nearly all those who have attained great eminence in the art.’

Numerous persons well known in the photographic world also gave evidence; but we are concerned with one witness in particular - the Rev. J. B. Reade, F.R.S., at that time Vicar of Stone, Buckinghamshire.

Many persons were examined in an attempt to determine what were the similarities, or dissimilarities, of the materials collodion and paper, and of gallic acid and pyrogallic acid (which was used in the wet collodion technique, rather than gallic acid.) But the other major consideration for the jury was to determine the implications of the alleged publication by J. B. Reade of the use of gallic acid prior to Talbot’s sealing of his patent in 1841. Reade was examined at some length on this, and much attention was given to the question by the judge. Finally, the jury, after retiring for an hour, although noting that Talbot was ‘the first and true inventor [of the Calotype process] within the meaning of the patent laws, that is, the first person who disclosed it to the public’, found Laroche not guilty of infringing that patent.

‘This announcement was greeted by an attempt to applaud by several persons in Court, but the interruption was suppressed by his Lordship threatening to commit anybody who should so offend.’

The wet collodion process was therefore free to be used by professional portrait photographers without the risk of their being driven out of business.

Talbot’s immediate reaction<sup>63</sup> was both to appeal against this decision and to continue with his application to renew his Calotype patent,

61. The major report of the hearing is in *Phot. J.*, 21 December 1854, **2**, 84-95; it is from this that the reports of witnesses’ evidence given in this paper are taken. Other reports are in the *Art J.*, February 1855, pp. 49-54 (especially useful for the verbatim report of the judge’s summing-up), *The Times*, 21 December 1854, p. 11 (also reprinted in *Notes and Queries*, 30 December 1854, **10**, 528-530), *London. J. Arts. Sci.*, 1855, **1** (n.s.), 116-7.

62. Unlike the Colls and Henderson cases, which were heard in Chancery, no MS legal records have been found for the Talbot v. Laroche trial. The Common Pleas *Nisi Pruis* MS records are lacking for this period; a statement regarding Assize *Nisi Prius* hearings, in the *Guide to the Contents of the Public Record Office*, H.M.S.O., 1963, vol. **i**, p. 127, is probably relevant to this lack of full records: ‘The nisi pruis records, with the *posteas*, appear generally to have been handed to the parties concerned upon application’. Legal reports of the case are to be found, however, in the published *Common Bench Reports*, 1855, **15**, 310-321, and *Common Law Reports for 1853-4*, **2**, p. 836-841; but these reports are concerned with the legal rulings only.

63. Letter to his wife dated 21 December 1854, quoted in ‘W. H. F. Talbot, F.R.S. Material towards a biography’, by J. D. Johnston and R. D. Smith, *Phot. J.*, December 1968, **108**, 361-371.

which was due to be put before the Privy Council on 10 January 1855.<sup>64</sup>

But, although the public remained for a longer period in doubt as to his intentions, Talbot had within two weeks decided not to appeal against the Laroche judgement, and furthermore did not attempt after this to renew his Calotype patent;<sup>65</sup> paper processes were anyway almost obsolete.

The result of the trial was, of course, of immediate importance to the professional photographers; less than a year later Antoine Claudet and Nicolas Henneman both stated that competition in portraiture in London had increased 'at least a hundred -fold' (although we may perhaps allow them some exaggeration here).<sup>66</sup> But its importance was by no means limited to this; for the emotional effect of the verdict was incalculable.

Talbot had always been at pains to point out that his patent did not apply to the scientific world; but in practice the liberality with which he tried to impose restrictions upon the use of techniques that had been evolved by other experimenters could not fail to affect those workers. Talbot's patenting activities, therefore, had for more than a decade annoyed two groups: the professional photographer and the photographic experimenters. To these two groups photography was now 'unshackled'. But later a third group became involved; the historians of photography.

Without the drama of the Laroche trial, and the accompanying events of 1854, J. B. Reade's name would never have come into any prominence. His position in the history of photography is inseparable from that trial. There would always have been Sir David Brewster's comment about Reade, and the Reade/Brayley letter to tease the historian on searching through the literature; but there would not have been a legend. Reade's name was a heroic one to the professional portrait photographer John Werge; Werge knew Reade and many years later was an influential historian. Talbot's behaviour, in 1854, over his patents, and Reade's appearance at the Laroche hearing, make a dramatic story - the detailed report of the Talbot v. Laroche hearing is a fascinating document, but it should not be allowed to influence our view of previous events.

### *Evidence for Reade's use of Nut-gall infusion during 1839*

We have seen, in Part I of this article, that Reade's recollections of having begun his photography in 1836 were incorrect. At the Laroche hearing his

64. *London Gazette*, 1 December 1854, part II, p. 3915. *Phot. J.*, 21 December 1854, 2, 99-100.

65. *Notes and Queries*, 6 and 27 January 1855, 11, 16 and 71. *Liverpool Phot. J.*, 13 January 1855, 2, 1.

66. Chancery Affidavits filed 27 November 1855, Talbot v. Henderson. It is ironic that much of the argument on Talbot's side in the later stage of the Henderson case during 1855-6, depended upon this very change in professional photography which had, in fact, been brought about by the Laroche verdict.

use of nut-gall in-fusion in 1839, and its relationship with Fox Talbot's Calotype patent, was one of the important items in the defence case. The judge pointed out to the jury that Reade's method of using gallic acid was, in fact, different in several ways from the use of that agent in the Calotype process. Also the jury did, in effect, decide that his use of nut-gall infusion in 1839 did not affect the validity of Talbot's patent because Reade's display of photographs at the Royal Society soirée, and Brayley's description of Reade's method at the London Institution, could not be considered to be true publication. But there had been one piece of evidence presented during the hearing regarding a connection between Reade's work in 1839 with Talbot's later use of gallic acid which could not fail to make an impression; how does this item stand today, and can we now put it into its true context?

Mr Andrew Ross, the well known London 'optician and manufacturer of photographic apparatus' was called to give evidence at the Laroche hearing. Ross stated that he had known Reade for many years;<sup>61</sup> that Reade had been in the habit of calling upon him frequently when he came to town and that 'about the middle of 1839 Mr. Reade had told him that he had made a discovery as to the use of infusion of galls.'

Mr. Talbot was also asked, by the lawyer for the defence, if he had been acquainted with Mr. Reade, or with his experiments; Talbot replied that

'he first became acquainted with Mr. Reade's experiments when he [sic - Brewster] published them in 1847, but he had heard a vague account in 1840, while speaking to a scientific friend. He thought that friend was Mr. Ross.'

He continued:

'What occurred was this; he was talking with his friend concerning photographic drawings, and the means of making them more rapidly. Mr. Ross said that Mr. Reade had recommended infusion of galls. He did not remember Mr. Reade explaining the matter at a soirée at the Royal Society, in 1839, nor did Mr Ross tell witness that Mr. Reade had discovered the means of fixing the images, and used hyposulphite of silver [sic]. He did not know that Mr. Reade had developed his images by washing with infusion of galls or gallic acid, ...'

Reade many years later recalled <sup>68</sup> - and one can well believe him in this - that Talbot's acknowledgement, that he had received this information about the nut galls from Ross, was heard 'in an almost breathless court' .

67. Both Ross (1798-1859) and Reade were founder members of the (Royal) Microscopical Society in 1839, and certainly were acquainted by late 1836. See also Part I of this Paper, p.25.

68. Letter from J. B. Reade to Lyndon Smith, dated 16 Dec., 1859, *Brit. J. Phot.*, 1 March 1862, 9, 79-80.

Can these notable statements be confirmed in any way today? Indeed they can: for there is important contemporary evidence available that Talbot first carried out chemical experiments with gallic acid in April 1839. In Fox Talbot's notebook<sup>69</sup> can be found: 'Dilute gallic acid, & dilute nit. silver mixed turn dark in daylight (I believe Mr. Reade discovered this)'. This notebook entry was not made by Talbot in 1840, as we would have thought from his evidence at the Laroche hearing; but is headed 'April 5. Lacock.' 1839.

April 5th 1839 is a surprisingly early date for Talbot to have heard about any experiments made by Reade with gallic acid; what then was the time-table of events in this respect in 1839?

*Reade experiments with nut-galls early in 1839*

We have already seen in part I of this article<sup>70</sup> that J. B. Reade carried out his first trials of Talbot's photogenic drawing technique towards the end of February 1839. One month after that (it would seem on 26 March 1839) Reade for the first time used a wash of nut-gall infusion onto paper treated with silver nitrate. He used this to record images of 50 to 150 times magnification projected by a solar microscope equipped with an achromatic cemented lens. An exposure of 5-10 minutes was required, and he believed that the wash of nut-gall infusion had formed a more light-sensitive compound, 'a gallate or tannate of silver'.

Three days after this, on Friday 29th March, he unexpectedly travelled from Peckham to visit his father at Leeds.<sup>70a</sup> There he stayed until 3 April, returning via Manchester to London. It would therefore seem most likely that Reade spoke to Ross about his experiments as he began the journey to Leeds, on 28 or 29 March 1839.

Fox Talbot was staying in London during most of the early part of that year; the entry in his notebook headed "April 5, Lacock" is the first indication that he had travelled down to his home at Lacock Abbey in Wiltshire. Talbot must have seen Andrew Ross, whose premises were in Regent Street, well within seven days after Reade had spoken to Ross. Talbot made his first chemical experiment with gallic acid on Friday 5th April immediately after his arrival at Lacock from London. Talbot therefore had heard a vague comment about Reade's experimentation with silver salts and 'gallic acid' (note that this, not nut-galls, was mentioned) before E. W.

69. This notebook, which covers the period 6 February 1839 to 25 June 1840, is in the Photography Collection of the Science Museum, London. I would like to thank Dr. D. B. Thomas, Assistant Keeper, for allowing me to examine the notebook. Attention was first drawn to Talbot's remark, here quoted, by Dr Thomas in his *The First Negatives*, Science Museum Monograph, 1964.

70. *Ann. Sci.*, 1971, **27**, note especially pp. 32-38.

70a. *Ibid.*, p. 30.

Brayley's description of Reade's photographic work at the London Institution on 10 April, and before Reade's pictures could have been seen at Lord Northampton's soirée towards the end of April 1839.<sup>71</sup>

On 1 April 1839 Reade wrote to his brother that he had, six days before, discovered, 'a prepared paper sufficiently sensitive to be readily acted upon by solar light after it has been greatly attenuated by passing thru' a double French combination of Achromats with an angle of aperture just more than 20°. <sup>72</sup> Unfortunately he gave little more than this vague idea of his experiments to his brother; indeed we can only guess that these remarks must have concerned his work with nut-galls, because of what is found in the important letter written about one week later to E. W. Brayley. Accordingly it is to this later letter to Brayley, who described the method given at a soirée held at the London Institution on 10 April 1839, that we have to turn to obtain any information about how Reade was using the nut-galls.

#### *J. B. Reade's original use of nut-gall infusion*

Reade wrote to E. W. Brayley in April 1839 that he used paper that had been pre-treated with silver nitrate solution, and had then been allowed to dry in the dark. He said:

'When perfectly dry,<sup>73</sup> and just before it is used, I wash it with an infusion of galls prepared according to the pharmacopeia, and immediately, *even while it is yet wet*, throw upon it the image ...' <sup>74</sup>

In later years he added the further information that

'the solution which I used at first was too strong. . . It was evident that the *dilution* of so powerful an accelerator would probably give successful results. The large amount of dilution greatly surprised me. . . In reference to this point, Sir John Herschel, writing from Slough, in April 1840, says to Mr. Redman, then of Peckham (where I had resided), and now a photographic artist in Cornhill :- "I am surprised at the weak solutions employed, and how, with such, you have been able to get a depth of shadow sufficient for so very sharp a re-transfer is, to me marvellous". I may speak of Mr. Redman as a photographic pupil of mine, and at my request he communicated the process to Sir John, which, "on account of the extreme clearness and sharpness of the results," to use Sir John's words, much interested him.' <sup>68</sup>

71. It can hardly be considered, of course, that Reade's pictures were on public display at Northampton's soirée; nor is there any evidence that Brayley's soirée attracted any particular attention.

72. J. B. Reade to Mr. George Reade, letter dated Leeds, 1 April 1839. MS in Royal Photographic Society Collection, London: also quoted in full by A. T. Gill, *Phot. J.*, 1961, **101**, 10-13.

73. But thirty years later he said (of course much more unreliably) that he washed it with nut-galls 'before the previous washing of a nitrate of silver solution evaporates to dryness'; *Brit. J. Phot.*, 7 February 1868, **15**, 60.

74. *North Brit. Review*, August 1847, **7**, 470.

I have been able to find this letter from the hitherto mysterious ‘Redman of Peckham’ to Sir John Herschel, and extracts from it are published, by permission of the Royal Society, at the end of this article.<sup>75</sup> However, the letter does not mention gallic acid or galls, although Reade said that it did (it would be unlikely that there could have been two letters). The letter merely describes the use of ammonium chloride, instead of the more usual sodium chloride, to treat paper already prepared with silver nitrate. This paper was not being used in a camera, but was used to obtain printout photograms as in the simple photogenic drawing technique. Perhaps Sir John Herschel was being polite if he did say that it greatly interested him.

### *Reade’s original notion*

Fox Talbot, although he first used gallic acid empirically, later realised that he was developing a latent image: but what had been J. B. Reade’s original idea in using nut-galls?

He stated in later years that his use of nut -galls was an inference from his knowledge that Thomas Wedgwood, in his pioneer experiments published in 1802, had found that leather treated with silver salts was more sensitive than paper. The first time that Reade mentioned this, which was to Robert Hunt in 1854, he added,

‘it is highly probable that the tanning process, which might cause the silver solution to be more readily acted upon when applied to the leather, suggested my application of the tanning solution to paper’.<sup>46</sup>

Reade’s story about this became more elaborate as the years passed. His raconteur account of using his wife’s white leather gloves (see part I, p. 23-24) is very nice; John Werge especially seemed very pleased to recount the story, and even to romanticise (!) about it ;<sup>76</sup> indeed, the happiness of historians to tell the story has extended up to today; but it is by no means reliable, and just does not accord with the contemporary evidence.<sup>77</sup> A statement much more worthy of our attention is found where Reade first

75. Letter dated 31 March 1840, T. S. Redman to Sir John Herschel; Herschel Correspondence, HS 14.474, Royal Society, London. (see p. 82 and 83).

76. J. Werge, *Photography, its origin, progress and practice; a lecture*, London, 1880, pp. 4-8.

77. Not the slightest mention was made by Reade in his letters of 28 February, 1 April 1839, or in the 9 ‘March’ (April ?) 1839 letter to E. W. Brayley. Of course Reade also alleged that these experiments took place in 1837. In fact the argument regarding the tanning solution is almost certainly invalid; for white glove leather (dark leather being unsuitable, of course, because the silver would not show) was not tanned, but ‘tawed’ with aluminium chloride. Perhaps it is even conceivable that better results could be achieved when using silver nitrate on ‘tawed’ leather - for double decomposition might occur with any remaining aluminium chloride in the glove leather, resulting in an improved sensitization of an incomplete silver chloride!

said that it was due to his knowledge of Wedgwood's use of leather that had led him to his own treatment of paper with 'tanning solution'; for he noted that 'I have no doubt, though I have not a distinct recollection of the fact ...'.<sup>46</sup> There is one fact, available to us from a contemporary source, that might have provided a related germinal centre for the growth of this recollection: Reade carried out his earliest trials of Talbot's photogenic drawing process late in February 1839, but he had failed to produce satisfactory results by following Talbot's directions about the alternate silver nitrate and common salt washes. On 28 February 1839 he wrote,<sup>78</sup>

'It occurred to me however that the surface of common "calling Cards" being glazed with Isinglass might possibly facilitate the process, ...especially by presenting a substance which might at once combine with the Nitrate of Silver and thus enable us to dispense with the previous saline preparation.'

Again we have only a tantalizingly vague remark at which to clutch; why should it occur to him that isinglass could be substituted for the sodium chloride? This certainly presents a, fresh way of looking at Talbot's use of sodium chloride.<sup>79</sup> 'A substance which might at once combine with the nitrate of silver'. - This may indicate that Reade had the idea of using cards treated with isinglass<sup>80</sup> as 'animalized paper', and that this depended upon an idea regarding the affinity of silver nitrate, and its strong staining, for skin, hair etc., which was common knowledge at the time. The effect of slight impurity of water on silver nitrate would be familiar to anyone handling this substance; but, apart from the effect of chlorides in the water, the presence of organic matter especially, was, 150 to 200 years ago (just as, of course, it is today) looked upon as being necessary for the blackening by light of silver nitrate.<sup>81</sup> The great difficulty in those years in using silver salts as photosensitive agents lay in their contradictory properties of solubility and

78. Letter from J. B. Reade dated 28 February 1839, Misc. Correspondence, MC 3.15, Royal Society. (See also Part 1 of this paper, *Ann. Sci.*, 1971, **27**, 32-3.)

79. Sir John Herschel's remark, in his 1840 publication in *Phil. Trans.*, **130**, 1-59 (para. 29), is of some interest here: he remarked that his own use of lead oxide might be analogous to 'a similar *mordant* action of the chloride of silver itself, in Mr. Talbot's curious process of successive alternate washes with salt and nitrate of silver ...'.

80. Isinglass is fish gelatine; pure collagen. Presumably he was not himself treating cards with isinglass but was using commercially available sized and highly-glazed cards.

81. John Davy, 'Miscellaneous chemical observations', *Edinb. New. Phil. J.*, 1828, **6**, 129-130. R. Scanlan, 'On the blackening of Nitrate of Silver by light', *Adv. Sci. Brit. Assoc. Rep.*, for 1838, part II pp. 63-64 (Reade especially would have had the opportunity to know of Scanlan's paper, for he was at the 1838 Brit. Assoc. meeting.). W. T. Brande, *Manual of Chemistry*, London, 1830, 3rd edn., vol **ii**, p. 182.

sensitivity: the photo-sensitive element is the halide ion, not the metal. The widely known and available photosensitive silver salt at that time was Horn silver - silver chloride; the problem was its insolubility in water. C. W. Scheele, in his experiments published in 1777 (see part I, p. 41), used horn silver sprinkled on paper. Professor Hessler published a report of experiments on the chemical effects of the solar spectrum in 1835 in which he used silver chloride glued to paper with ‘Gummiwasser’, i.e. water –gum =Isinglass.<sup>82</sup>

The most common silver compound, Lunar Caustic-silver nitrate, was much more convenient as it is very soluble in water: but pure silver nitrate is not photosensitive. At the time with which we are concerned lunar caustic was used as an astringent, in medicine and for cosmetic purposes, and for marking linen; i.e. was used to oxidize organic matter, being reduced to the black metal in light. Presumably it was this knowledge that led Thomas Wedgwood to use silver nitrate on leather as a better organic material than paper. Wedgwood is believed<sup>83</sup> to have been Influenced by William Lewis’ book of 1763, *Commercium PhilosophicoTechnicum*, in which we find the following:

‘Ivory, bone, horn, and other solid parts of animals ... receive a deep black stain from solution of silver... the matter being exposed as much as possible to the sun, to hasten the appearance and deepening of the colour.’<sup>84</sup>

Reade’s use of isinglass - and indeed the organic nut-gall infusion was therefore a far from unlikely idea; it was fully derived from common knowledge of the period. This is shown well in a contemporary article on

82. Poggendorf’s *Ann. Physik.Chemie.*, 1835, **35**, 578. (stated thereto have been reprinted from Baumgartner’s *Z. f. Physik, Math. Wissenschaften*, 1835, **3**, 336; but I have not been able to verify that reference.)

83. A link between W. Lewis and Thomas Wedgwood is given in James Waterhouse’s paper ‘The beginnings of photography... the history of... salts of silver’, *Smithsonian Report for 1903*, Washington 1904, pp. 333-361; and, before revision, in *Phot. J.*, June 1903, **43** (n.s. vol. **27**), 159-178. This paper is an excellent one; although Waterhouse pays no attention to the important differences between silver nitrate and chloride, or to the organic combination of the nitrate; neither does he consider the use of silver salts after 1802, a fact that no doubt explains the continuance of the erroneous idea that little work was done except by Talbot, after that date; for recent histories of photography have obviously relied upon his paper, sometimes without acknowledgement.

84. W. Lewis, *Commercium Philosophico-Technicum*, London, ‘printed by H. Baldwin for the author’, 1763, p. 435. After the sentence quoted Lewis refers the reader to the later pages on ‘Black from silver’, in which J. H. Schultze’s experiments of 1727 with silver/nitric acid/chalk are discussed.



‘Photogenic Drawing’ by Alfred Smee,<sup>85</sup> which was published on 18 May 1839:<sup>86</sup>

‘The two soluble salts of silver with which we are most acquainted, are the nitrate and sulphate,<sup>87</sup> both of which *communicate to organic textures and substances made from them a black stain when exposed to light*; but these, neither on paper nor in combination with albumen, *gelatin*, gums, or glutea, have sufficient delicacy to be applicable for the manufacture of photogenic drawings’ (my italics).

During the early decades of photography considerable attention came to be given to the type of paper - to the influence of the sizing upon the sensitization; indeed there is a record of Reade’s contributing to a discussion about this at a Photographic Society meeting in 1856,<sup>88</sup> but, as we have seen, the effect of organic substances on silver compounds was not merely derived from the experiences of the early photographers, but pre-dated the discovery of photography.

As J. B. Reade was using silver nitrate only in his 1839 photography, it is obvious that a high concentration of organic matter, in the form of the smooth-surfaced isinglass, on cards would have been seen as very desirable by him in obtaining a, fully black image. It is important to note that he also believed that the organic combination of silver nitrate with nut-galls was important (see p. 73); but furthermore, the use of isinglass could have contributed to his later use of nut -galls in another way, for isinglass, being pure gelatin, was used at that time as a test for tannin (but not reacting with gallic acid) during the extraction of tannin and gallic acid from nut-galls.<sup>89</sup>

We have absolutely reliable evidence that Reade in his first experiments used isinglass. He may afterwards have read about Wedgwood’s use of leather (Talbot, of course, had briefly referred to Wedgwood, and Brande in his 1836 edition of his *Manual of Chemistry* had mentioned Wedgwood’s work) and this could have given him further ideas leading on from his own use of the collagen isinglass. Perhaps referring again to W. T. Brande’s

85. Alfred Smee (1818-1877), *D.N.B.*, 1897, vol. **lii**, p. 398; *Memoir of Alfred Smee with a selection from his miscellaneous writings*, by his daughter E. M. Odling, London 1878. Smee, a metallurgist and chemist, ophthalmologist and surgeon to the Mint, had close connections with the London Institution.

86. Alfred Smee, *Literary Gazette*, 18 May 1839, pp. 314-316, and p. 332. This interesting article, which seems surprisingly to have been unnoticed by historians, also mentions that gallic acid had been tried as a fixer(!), and, perhaps important regarding the later use of developers, that ‘photogenic paper may be blackened ... by a dilute solution of proto-sulphate of iron’.

87. In fact silver sulphate is only very slightly soluble.

88. *Phot. J.*, 21 March 1856, **3**, 2-6.

89. K. W. Fiedler, *Nickolson’s J. Nat. Phil.*, 1802, **1**, 236-7. M. Faraday, [*Q.*] *J. Arts.*, 1819, **6**, 154-7. H. Davy, *J. Roy. Inst.*, 1802, **1**, 273-5. In 1854, at least, Reade knew of Fiedler’s work on gallic acid.

*Manual of Chemistry* he could find;<sup>90</sup> ‘Leather is a compound of gelatine and vegetable astringent matter, formed by steeping skins of animals in the infusions of certain barks ... infusion of oak bark’. This could easily lead Reade into using his own ‘compound of gelatine and vegetable astringent matter’; i.e. using oak -gall infusion on his own gelatine treated with silver nitrate, in the hope of obtaining better results. This is even more likely when we consider that he could, from the same book, have learnt about the combination of gall infusion with silver nitrate to give permanent dense compounds (see p. 75).

This idea can never be more than mere supposition; it can never serve more than to suggest how his story about the use of leather might have had a source from which it could, over the years, have grown. Reade’s use of isinglass, and later of nut-galls, can therefore relate, via the use of nut-galls on skin collagen, to parallel ideas about the use of leather; but his early use of isinglass does also show that there was not, in the first instance, any direct linking by him of Wedgwood’s experiment<sup>91</sup> with tanned skin, and his own use of nut-galls on collagen sized paper.

We have available only two other statements by Reade regarding his use of nut-gall infusion; he used this, ‘in order to strengthen the image which had been produced’,<sup>92</sup> and, ‘My original notion was, that the infusion of galls, added to the wet chloride or nitrate paper ... produced only a new and highly sensitive compound’.<sup>68</sup>

These statements give not the slightest real indication as to his intention or reasoning. No considered arguments were put forward by him, and the work seems to lack completely any conceptual framework. Indeed, this very lack of rationale on Reade’s part for his use of nut-gall infusion is itself the most significant point in the evaluation of his work. Therefore, although it may be of some interest to investigate fully the *possible* ideas available to him, it is more important to evaluate the effect that his use of nut-galls might have had on the work of Fox Talbot, and to observe the significance of his work within the context of the contributions made by others to the discovery of latent-image development.

### *Reade’s Achievement*

What could Reade have achieved photographically by his use of nutgall infusion, and what importance did he himself place upon this work?

90. Brande, 4th edn, 1836, pp. 1182-3.

91. If, in February 1839, Reade had read Wedgwood and Davy’s paper, he could, in fact, have been directly influenced about the organic combination of silver nitrate; for Davy noted ‘both in the case of the nitrate and muriate of silver a portion of the metallic oxide abandons its acid to enter into union with the animal or vegetable substance’ *J. Roy. Inst.*, 1802, **1**, 174.

92. Reade’s evidence at Talbot v. Laroche, *Phot. J.*, 1854, **2**, 91.

*The photochemical action of nut-gall infusion*

Galls are small round bodies formed on plants by parasitic insects, the most common being the oak nut-gall, or oak apple. Extraction of the nut gall yields about 50% tannin, and on hydrolysis, about 3% gallic acid.

When, in 1854, it was suggested to Reade that gallic acid had probably not really been the active ingredient of his infusion, he recalled that he had also tried pure tannin and pure gallic acid, both separately and mixed; but, he said, the solar microscope pictures thus obtained were ‘less pleasing to my eye, than the rich warm tone which the same acids produced when in their natural connexion with solutions of vegetable matter in the gall -nut’. He had preferred the ‘organic combination’ of tannin and gallic acid. However, he did also add that ‘though gallic acid is largely formed by a long exposure of an infusion of gall -nuts to the atmosphere, as first proposed by Scheele<sup>93</sup> yet this acid does exist in the gall-nut in its natural state, and in sufficient quantity to form gallate of silver as a photogenic agent’.<sup>46</sup> In spite of that opinion, however, it is difficult to say, with any certainty, what active constituents there would have been in his infusion. He used ‘an infusion of galls prepared according to the pharmacopeia’; this was probably the simplest method of taking bruised galls and macerating them in water only-although a small amount of alcohol could have been added later. The temperature especially, and also the length of time of the maceration, any variation in pH, and the possible presence of moulds, would, it seems, greatly influence its final make-up. It is least likely, however, that gallic acid was active.

There is just one statement, however, which might indicate that Reade really was, quite unaware, developing an image; for he found it important to expose his paper treated with silver nitrate ‘immediately, even while it is still wet’ with the infusion. It is not impossible, then, that development (in fact ‘physical’ development) was really taking place. But this fact, that he was exposing the paper while it was still wet with the nut-galls, is important in another way. It means that Reade would not have had the same opportunity, as did Talbot, of observing the occurrence of any development; for the exposure, development, and appearance of the image, would all have been taking place together.

Reade was not using a partial chloride paper, but a silver nitrated paper only; this Robert Hunt found<sup>94</sup> was much less sensitive to the effect of gallic acid than any other common silver salt.

There is no dependable evidence about the quality of Reade’s pictures that were obtained using the treatment with nut-gall infusion; it should be remembered that they were negatives only, although, of course,

93. C. W. Scheele discovered gallic acid, and described its isolation from nut-galls, in 1786.

94. R. Hunt, *Researches on Light*, 1st edn, London 1844, p. 65.

photomicrographs would not be at such a disadvantage in this respect. There is, however, a statement about Reade's 1839 pictures, which although not entirely dependable, is still worth recording: a reviewer of the Royal Photographic Society's first exhibition in January 1854 stated that Mr Reade could claim priority in the use of photography in microscopical studies, a fact, he said, which would not 'be forgotten by those who saw the beautiful specimens exhibited by the Rev. J. B. Reade at the Marquis of Northampton's *Soiree* some years since'.<sup>95</sup>

*How does Reade's original use of nut-galls rate in terms of scientific achievement?*

At no time did Reade put forward any basic rationale for his work; it appears to have been limited to a desultory empiricism. In fact, it was just not necessary for Reade to have used any special inductive reasoning involving Wedgwood's leather and tanning to have arrived at the use of nut-galls in conjunction with silver nitrate; for it was, at that time, a reasonably obvious agent to try out with silver salts.

Talbot's Photogenic Drawing technique was, in fact, far from entirely successful; many persons complained, and justifiably, that Talbot's description of his method was entirely inadequate regarding the chemicals used. Several persons attempted to improve the method.<sup>96</sup> Naturally, the image obtained with photogenic paper that had been sensitized by treatment with the simple silver salts left much to be desired, especially after the treatment with the silver halide solvents resulted in coloured images. The necessity of improving both the sensitivity, and the image tone, was obvious to all who made the first trials of the Photogenic Drawing technique. It was accepted that the silver salts darken by light because of the 'de-oxidizing power of the chemical rays' and it was obvious that the silver could also be blackened by a variety of chemical reducing agents.<sup>97</sup>

The idea of using the organic reducing agent gallic acid must have been reasonably generally obvious,<sup>98</sup> in attempts to obtain darker silver products.

95. *Athenaeum*, 7 January 1854, p. 23.

96. For example, A. Smee, *op. cit.*, 18 May 1839; Golding Bird, *Mag. Nat. Hist.*, 1839, **8** (n.s.), 188-192, (this communication, which was dated March 25th, was also reprinted in *Mirror of Literature, Amusement and Instruction*, April 20th 1839, **33**, 243-4); C. T. Downing, *Literary Gazette*, 13 April 1839, p. 236.

97. See Sir John Herschel, 'Note on the Art of Photography', *Proc. Roy. Soc. London.*, 1839, **4**, 131.

98. Two examples of this will suffice: Mrs Fulhame, in her *Essay on Combustion with a view to a new art of Dying and Painting*, London, 1794, p. 160, stated 'other acids, as the gallic, the formic, &c... have the power of reducing some of the metals, facts well known to chymists'; and Robert Hunt said (*op. cit.*, 1844, p. 64) 'the part which gallic acid plays in this [Calotype] process is sufficiently obvious. The chemical action of this acid on most of the metallic salts is well known'.

Suppose that we were to put ourselves in the position of Reade, and indeed any other person, who was trying out the Photogenic Drawing technique early in 1839.

We would surely, when the technique was presenting difficulties, look up information about silver salts in one of the standard chemistry textbooks. In the very popular book, which we know Reade [and Talbot] used, we find considerable details on the reaction of metallic salts (including silver nitrate) with gall infusion, to form various coloured metallic ‘tannogallates’; also attention is given to the way such compounds are of use in obtaining dense and permanent inks. This book is Brande’s *Manual of Chemistry*.<sup>99</sup> Incidentally, Brande adds a note that ‘Upon these subjects much valuable information will be found in Lewis’s Philosophical Commerce of the Arts ‘. Indeed, no one, on reading Lewis’s work, can fail to be struck by the way in which all the elements of the chemical subjects, with which we are concerned, are there intertwined: silver salts, gelatin, paper, leather, nut-galls, ink, are all very intimately associated on Lewis’s pages.<sup>100</sup> Most unfortunately we do not have the comfort of knowing if J. B. Reade knew of this book. Indeed there would have been little point in drawing attention to these facts about the ink connection between silver salts and galls, if it were not for the fact that around 1839 Reade was interested in the subject of inks; for a few years later he took out a patent for improve ments of inks.<sup>101</sup>

Lacking positive guidance from Reade we should therefore at least bear in mind the possibility that an analogy with the use of galls in inks could have contributed to his use of galls with silver nitrate; for the following two remarks by Brande and Lewis would have some relevance. ‘The colour of ink is apt to fade... and when thus illegible, it may be restored by washing the writing with vinegar, and subsequently with infusion of galls’ (Brande); and

99. Brande, 3rd edn., 1830, vol ii, p. 521-524; 4th edn., 1836, vol. ii, p. 930.

100. W. Lewis, *op. cit.*, 1763, pp. 350-2, p. 435, and for inks, galls, tanned skins/treated papers see pp. 380, 393-5.

101. J. B. Reade, *Certain Improvements in Inks, and in the processes by which the same are manufactured, and the application of some of these processes to the production of certain salts*, Patent No. 11,474, sealed 3 December 1846, Patent Office.

Reade mentions the use of various metallic salts in the patent specification, including silver salts, and galls and tannin.

It should be noted, however, that no earlier reference made by Reade to experiments with ink has been found by the author earlier than May 1843. (Letter, J. B. Reade to Dr. John Lee, dated 14 May 1843, Hartwell Mss, Folder 9/10, Bucks Record Office, Aylesbury.) Reade does, however, state in his patent that, in his work with ink iron salts, he was ‘led to these results by a microscopical examination of the metallic colours in salts of the ashes of plants’; it should be noted that his micro -incineration studies of the ashes of plants go back to 1837.

‘it should seem probable, that if the paper was impregnated with astringent matter (galls) the colour of the ink would be more durable’ (Lewis).<sup>102</sup>

Reade’s use of nut galls, then, was a very limited achievement; the hypothesis regarding its use that must be given the greatest weight is that ideas about the ‘organic combination’ of silver nitrate were probably involved.

### *A contribution to the discovery of latent image development*

‘Had Reade concealed his success and the nature of his accelerator, Talbot might have been bungling on with modifications of the experiments of Wedgwood and Davy to this day’

This was John Werge’s attitude towards Reade’s part in the discovery of the latent image and development. But what was Reade’s own opinion about this?

‘Mr Talbot was led to make trial of gallic acid in consequence of receiving from the late Mr. Ross a detailed statement of the manner and effect of my early application of a weak solution of Aleppo galls to the paper on which the image was thrown ... I was, as it were, shut up in my camera, and Mr. Talbot was in the open; hence he saw what I failed to see. Had my experiments not been so much confined to solar-microscope enlargements, but of the more usual kind, like Mr. Talbot’s, there can be little doubt that the development of the latent image, which in one recorded instance I witnessed, would have been a feather in my cap. But I can admire it just as much in Mr. Talbot’s cap’.<sup>103</sup>

‘I was, indeed, myself fully aware that the image darkened under the influence of my sensitizer, while I placed my hand before the lens of the instrument to stop out the light: ...I did not realize the master fact that the latent image which had been developed was the basis of photographic manipulation. The merit of this discovery is Talbot’s, and his only; and I honour him greatly for his skill and earlier discernment.’<sup>68</sup>

This latter comment was made by Reade in a letter to a Lyndon Smith in 1859. Smith, who was preparing for a lecture on photography, had written from Reade’s old home town of Leeds, asking for information about his early photography. Reade’s reply was an over enthusiastic and careless statement that later became the source of many of the legends about his early work. But even in this major careless lapse of Reade’s he, as we can see, gave full acknowledgment to Talbot’s achievement; indeed he always gave great honour to Talbot regarding the discovery of the latent image. Much of the

102. The latter statement could, perhaps, suggest the use of galls as a sort of fixer, as was mentioned by Alfred Smee, *op. cit.*, 18 May, 1839. (It is of interest that Smee also was interested in gall inks).

The concept of a latent image might even have been arrived at through an analogy with inks; for there was a well known method of using nut-gall infusion for revealing invisible writing. (W. Lewis, *op. cit.*, 1763, p. 395; J. B. Porta, *Natural Magic*, Facsimile of English translation of 1658, Basic Books Inc., New York 1957, pp. 340-1.)

103. J. B. Reade, letter on the discovery of the latent image, *Brit. J. Phot.*, 7 Feb., 1868, **15**, 60-61.

high regard in which Talbot is held regarding this in the works of historians can indeed be seen to have derived some prompting from comments made by Reade in the late 1860s.<sup>104</sup> Paradoxically, these comments also gave Reade a reputation for fairmindedness, both at the time and later, which resulted in his being championed against Talbot. Reade's letter to Smith was published in the *British Journal of Photography* almost three years after it was written; for its publication was stimulated by a visit to Leeds. There, on 8 March 1862, Reade gave a lecture on polarized light at the Philosophical Institution. He had been invited to give the lecture in the place of Sir David Brewster; this prompted him to write soon after to Sir David. A few letters<sup>105</sup> passed between them that not only show well Reade's attitude to Talbot, but also supply a sidelight upon Brewster's influential publication, in 1847, of Reade's letter to Brayley.

### *Correspondence with Brewster, 1862:*

Reade wrote to Brewster on 2 April 1862:

'...I think you will feel some interest in my correspondence with Mr. Lyndon Smith of Leeds, lately published in the "British Journal of Photography". I am indebted *to you* for the first important notice of my early photographic labours, as given in ...the "North British Review", and I have been content with that valuable record of my claims. Mr. Smith... requested more specific information. In replying to his queries, however, I did not write with any idea of publication in the formal manner now adopted; but as Mr Shadbolt, the Editor of the Journal, lately heard of the correspondence and wished to insert it, I could not withhold my assent. I have often felt a regret that Talbot did not give me the credit I fairly deserve by acknowledging my priority in the use of Gallate of Silver. This might have been done without diminishing his well earned fame in dealing with the invisible image; and indeed I think that it ought to have been done, because his knowledge of my use of this sensitizer communicated to him by Ross, was the turning

104. Reade made some spontaneous remarks from the chair at a Royal Photographic Society meeting in December 1867 about the discovery of the latent image being the greatest advance in photography; and that Talbot should be given great honour for this. (*Phot. J.*, 17 Dec. 1867, **12**, 152). This drew the surprised attention of the *British Journal of Photography's* Philadelphia correspondent, M. Carey Lea, to which Reade responded with a letter on the subject which was published in *Brit. J. Phot.*, 7 February 1868, **15**, 60-61. (also reprinted in *Phot. J.*, 1868, **13**, 14-17.) For Carey Lea's remarks see *B.J.P.*, 1869, **15**, 43 and 152.

105. This correspondence, of which extracts only are here given, has only been obscurely published in a genealogical work, *The Reades of Blackwood Hill in the parish of Horton, Staffs; a record of their descendants*, by Aleya Lyell Reade, published privately, 1906. The copyright of this book remains in the hands of H. R. Reade Esq., of Sevenoaks, Kent, who also possesses the A. L. Reade collection of family papers. The Mss of the Brewster letters are not in that Collection. The letters were obviously in the hands of A. L. Reade (1876-1953) of Liverpool, or W. P. Baildon (1859-1924), F.S.A., about 1906, but after extensive archive enquires I have failed to find them.; Two letters dated April 2nd and 12th, 1862, Reade to Brewster; one letter dated April 3rd, 1862, Brewster to Reade; published in A. L. Reade's book, 1906, p. 97.

point in his own manipulation. This fact came out, however, clearly enough in Court, and there I have quietly rested until this direct application from Lyndon Smith for more specific information on the nature of my early experiments. But after all, facts are stubborn things, and the world's verdict will be no doubt given in the right direction ...'

Brewster replied as follows:

'I had read with much pleasure your letter to Mr. Lyndon Smith, and was much pleased with the manner in which you speak of Mr. Talbot. It was very agreeable to me to have been able to speak of your claims as I did in the *North British Review*, and this recognition of them was the more sincere, as I was then, and still am, one of Mr. Talbot's best friends and warmest admirers. In justice to him I should say that he never was displeased with what I had done.'

Reade on 12 April 1862 wrote:

'...it is a great pleasure to me to hear from you that Mr. Talbot rec'd kindly your early notice of my photographic experiments and I trust he is not displeased with my letter to Mr. Lyndon Smith. I have never sought for an opportunity of advancing my claims in a spirit of opposition, and I have always spoken of Mr.' Talbot with the respect which his talents inspire ... I always regretted Mr. T's patent - it was a bar to progress and added nothing to the real merits of the patentee.'

It is ironic that Brewster had given Talbot early encouragement in his patenting activities, and had supported him in 1854 both by swearing an affidavit to help Talbot obtain an injunction against James Henderson, and by agreeing to give evidence at the Talbot v. Laroche trial. Apart from the very misleading comments made by Brewster about Reade in 1847,<sup>106</sup> it does seem as if Brewster was fully aware that Reade had not begun his photography until after Talbot's announcements of early 1839.<sup>107</sup>

Brewster and Reade seem to have been only slightly acquainted; but it is interesting that they could easily have met in 1847, on an occasion when Brewster visited Dr. John Lee, at Hartwell; it is significant that such a meeting could have contributed to Brewster's mention of Reade's work, in the *North British Review*, a little later that year.<sup>108</sup>

106. see Part I, p. 18. It should also be noted that Brewster's remark, in the article of 1847, that the use of *Sodium* hyposulphite was not published by Herschel until 1840, was an error - or half truth - which persisted until comparatively modern times; this was an important element in the argument supporting Reade's supposed priority in the use of hypo.

107. See Part I, p. 36.

108. Brewster visited Hartwell on 1 July 1847; for his signature, of that date, appears in a Hartwell Library Autograph Scrapbook, vol. ii (1840 onwards) p. 107; Gunther Mss No. 10, Museum of the History of Science, Oxford. (An early photographic paper portrait of Brewster appears on page 160 of this Scrapbook.) For Reade at Hartwell, see Part I, p. 15, p. 39 and footnotes 60 and 79. There is only one occasion when Reade and Brewster met that is recorded. This was at a party held at 144 Piccadilly, the house of the antiquarian Lord Londesborough (Albert Denison), on 22 May 1851; Letter dated 23 May 1851, Reade to Dr. John Lee, Hartwell Mss 9/16, Bucks Record Office, in which Reade said, 'I had a little conversation with Sir David Brewster, and ... Mr Akerman of course'.



*The esteem of Reade's contribution*

W. H. F. Talbot's Calotype process is today generally considered to have provided the fundamental basis of modern photography; the negative-positive mode of working was fully established, but, most important, the development of a latent image was used. Talbot's discovery of this was made quite suddenly; during experiments with gallic acid from 20th to 23rd September 1840. His development of a latent image with gallic acid on 23rd September 1840, is linked directly by modern historians to the time, almost one and a half years before, when Talbot heard from Andrew Ross about J. B. Reade's use of gallic acid. Reade's own attitude concerning his contribution to the discovery of the latent image is, in fact, fully integrated into photographic lore today; indeed historians have received considerable prompting from Reade regarding ideas concerning the discovery of the latent image. This story has held a very firm position in the history of photography since 1964, when it was first pointed out (see footnote 69) that the Reade-Ross-Talbot conversations of early April 1839 received considerable confirmation from an entry in Talbot's notebook: this entry, made on 5 April 1839, regarding gallic acid and silver nitrate, and stating, 'I believe Mr. Reade discovered this' ensures J. B. Reade's name a permanent place in the history of photography. Indeed this is a very just situation.

We should not, however, allow this to dominate our understanding of the growth of the concept of the latent image and its development. The idea of development was not invented simply by Talbot; the situation is really much more subtle than that. The idea of development of an invisible image was not an entirely alien, concept before September 1840. Talbot's use of gallic acid was not solely influenced by J. B. Reade.

Another man, who surely would have had greater influence on Talbot, also used gallic acid in 1839; for Sir John Herschel must also appear in the story. This will be described and discussed in a following paper.

*Conclusion*

Part I of this article was able to show, contrary to long-held claims, that J. B. Reade did not discover photography independently from Talbot; and was not the first person to use 'hypo' as a photographic fixer.

Part II has been able to establish the facts regarding Reade's use of nut-gall infusion upon silver nitrate in an attempt, during March 1839, to obtain a

more sensitive paper. It has been possible to show that a letter from 'Redman of Peckham' to Sir John Herschel did not report Reade's method of using gallic acid. And it has been possible to see how his use of gallic acid had an important effect upon the history of photography by examining the events involving the Calotype patent during the 1840s and 1850s; and furthermore the uncovering, during this investigation, of documents concerning the Calotype lawsuits of the early 1850s has revealed an unsuspected source of information regarding professional portraiture in London during that important period.

However, it has not been possible to establish any conclusive facts concerning the reasons that led Reade to use nut-gall infusion. The fact, revealed in his letter of 28 February 1839 to the Royal Society, as reported in part I, that Reade had earlier used gelatine in conjunction with silver nitrate, has enabled speculation to be made that Reade was aware, in early 1839, of ideas about 'organic combination' of silver nitrate being necessary for the darkening of that substance by light; this could have contributed to his use of nut-galls. It is possible that knowledge of the use of galls in conjunction with metallic salts in inks could also have been involved; but these early photographic experiments seem principally to have been mere empirical trials of a variety of substances with a known association with silver salts.

The most significant fact about this work of Reade's is that he did not publish it; for he was not normally slow to publish slight work, and this would surely indicate that the use of nut-galls was not so satisfactory as was later alleged. This is also suggested by the fact that Reade's 'pupil' T. S. Redman, did not mention gallic acid to Sir John Herschel in 1840.

Neither has it been possible, of course, to arrive at any final decision about the extent of Reade's contribution towards the establishment, by Talbot, of the latent image development mode of working. Was the fact that Talbot heard, in April 1839, about some experiment made by Reade with gallic acid and silver nitrate of such crucial importance to Talbot's later work? Impossible to give any simple answer, of course. We cannot make any useful judgment about this without undertaking further investigations: investigations of work done by other persons at the time that could have influenced Talbot, a more detailed look at Talbot's own work during 1839 and 1840, and a review of the true significance of Talbot's Calotype process regarding the introduction of development. I do, however, believe that too much weight is given, at least at the present time, to the influence that Reade might have had on Talbot; for as we shall see in a following paper, Reade was not the sole influence; it is also necessary to bear in mind the effect of other persons on Talbot - especially Sir John Herschel.

Sept. 20. 2d paper washed with nit. sil. + [redacted] is very  
sensitive, & turns very black. W paper also sensitive, but  
in a less degree. It also renders yellow paper (or fixed  
with much iodine) sensitive, which is very useful, if  
found manageable.

Sept. 21. [redacted] increases the sensibility of W or Brown  
paper, but much more than of yellow or Iodine paper.

The exciting liquid composed of  
1 part by measure nit. sil. common strength  
1 " acetic acid  
1 " [redacted] strong solution

If the paper is only partially washed with this mixture, the edges of  
the part washed discolour the most. Paper washed with this  
L. not exposed to light, has not actually discoloured at first,  
but does so when it begins to get dry.

Sept. 22. Prep<sup>n</sup> of paper. First, wash with nit. sil. <sup>anal. soln.</sup> by at fire.

Dip in dish of iod. sol. for 2 min. Wash by at fire. There must not  
be too much nit. sil. else the paper changes spontaneously as soon  
as it is touched by the exciting liquid (which is that described yesterday).  
When excited, gives a picture in 5' cloudy on the <sup>exciting</sup> <sup>conv.</sup>  
be like on the roof do. Contact with glass checks the effect  
perhaps by preventing evaporation. This is proved by putting a slip of  
paper curved so as to touch the glass only in its middle part.

Fixation. Wash in alcohol. Dip in dish iod. sol. for 5'. Wash in cold water.  
Do. When proved by putting in light, the shades change from  
grey to white and to nearly black. The lights are little altered.  
When remains transparent in the interior. The fixation is not  
perfect; some hours exposure fades the darker parts.  
Do. sol. also fixes it.

(By courtesy of the Science Museum)

Plate XIII. Page from W. H. F. Talbot's chemical notebook on which he records his first experiments with the Calotype process. In three places, words, that must have been *gallic acid*, have been cut out of the page. See p. 81 and footnote 109.

Due to Talbot's patenting activities, gallic acid became, and indeed almost still is, an emotive word. Just how emotive can be judged from the fact that the word has been carefully out out of Talbot's chemical notebook on the page that records the discovery of his Calotype process.<sup>109</sup> J. B. Reade's name is intimately linked with the early use of gallic acid; although his use of nut-galls was of influence probably not so much on photography, as on the history of photography. He has an indisputable significance in the Calotype patent agitation of the early 1850s, and on the writing of the history of photography.

The terms of reference of this article must perforce lead to a distortion of the complete Joseph Bancroft Reade. His great scientific fault was his lack of thoroughness and accuracy; his writing especially suffered from being too discursive. He fits well in the enthusiastic world of the Victorian Scientific Society, a man who chaired the meetings of the Microscopical and Photographic Societies with great amiability. His recollections during the 1850s and 60s, of his early photography were indeed confused: but, as we have seen, there were most honest and understandable reasons for this.

One gains the impression of a kind and genial man; a man who, when he died in December 1870, received most exceptional tributes from his fellows:

'He was a dear old man, and there must have been few who knew him who did not also love him'; 'his high character and amiable manners endeared him to all'; 'he will be remembered by all who knew him not only for his striking appearance, but for his kind and genial disposition, and his readiness to impart from the rich stores of his knowledge any information he possessed'. 'One of his numerous friends happening to be visiting his former parish of Ellesborough, and lighting on one, who from his age, appeared to be the "oldest inhabitant"', received for answer to his affectionate observations about the late Rector. "Ah! sir, he was a *homely* man".'

The Rev. Joseph Bancroft Reade., F.R.S., briefly enters the story of Fox Talbot, and of the early history of photography, because of his attempt to improve the picture obtained on photogenic paper by using an infusion of

109. This page, for 20, 21 and 22 September 1840, of W. H. F. Talbot's Chemical Notebook (June 1840 - April 1843) is reproduced on Plate XIII. I would like to thank Mr. F. Greenaway and Dr. D. B. Thomas, the Keeper and Assistant Keeper of the Chemistry Department, Science Museum, London, for permission to reproduce this facsimile.

When, by whom, and for what reason, this word was cut from the page is completely unknown; a most intriguing mystery. It is on the following page, 23rd Sept., 1840, that Talbot observes the development of a picture on paper that was blank when removed from the camera.

nut-galls. Let us, while remembering it is not the whole story, allow him the concluding remarks:

‘the first most important step, that which converted photography from a baby to a man, was the discovery of the latent image and its development. To Fox Talbot belonged the enduring honour of making this substantial advance in the art.<sup>110</sup> ...However, I *threw the ball* and Talbot caught it; and no one can be more willing than myself to acknowledge our obligations to this distinguished photographer. He compelled the world to listen to him, and he had something worth hearing to communicate; and it is a sufficient return to me that he publicly acknowledged his obligation to me in court...’<sup>111</sup>

*Appendix: Letter, dated 31 March 1840, T. S. Redman to Sir John Herschel.*<sup>112</sup>

Peckham 31st March 1840.

Dr. Sir,

It having been intimated to me by the Revd. J. B. Reade that you are desirous of ascertaining the method in which I prepare the Photogenic Paper, and process of taking drawings, fixing the same &c. - I assure you it will give me infinite pleasure to afford you all the information that lay within my reach, concerning this new and very interesting Art. It is now nearly nine months since I commenced my experiments to obtain a paper that would become exceedingly sensitive to light, and at the same time of a dark color - from a series of experiments with, Muriate of Ammonia, Soda, & Acid, Nitrate of Soda, Bromide of Potassium &c. &c., combin'd with Nitrate of Silver. I have found the Muriate of Ammonia, (perfectly pure, and free from any portion of iron, which nearly all sold contains), in the proportion of ten grains to the ounce of distilled water, and Nitrate of Silver in the proportion of one drachm to the ounce, makes the most sensitive and darkest paper. I have found no advantages in Mr. Talbot's plan of increasing the number of coats beyond one of each upon the paper. . The method I adopt in preparing the paper is upon frames made the proper size, first pasting the edges, placing it upon frame, and damping it with a clean sponge and water, then straining it rather tight, when dry applying the solution of Muriate of Ammonia with a piece of sponge about three inches wide, cut rather flat, & tied to a piece of

110. *Phot. J.*, 1867, **12**, 152.

111. *Phot. J.*, 1868, **13**, 16. Reade's own extract from his letter to Lyndon Smith to which he added the words 'in Court' ).

112. Herschel papers, letter H.S. 14.474, Royal Society, London. I am most grateful to the Royal Society for permission to publish this letter.

wood of the same width; a flat camels hair brush has been usually used for this purpose, but I find both the Muriate of Ammonia & Nitrate of Silver acts upon the Animal matter contain'd in the hair, & causes the paper to become discolored within a day or two after being prepared; the coat of Muriate of Ammonia being dry, the same process is to be observ'd with regard to the Nitrate of Silver.

With respect to fixing the drawings, very little difficulty will be found, the chief object being to cleanse them as free as possible from the Muriate of Silver, by immersing them in water & sponging them well, two or three times, then pressing as much of the moisture out as possible between a dry cloth, then placing them in another vessel and well saturating them by means of another piece of sponge, with the Hyposulphite of Soda, until what Muriate of Silver remains becomes perfectly dissolv'd & again immersing in water as at first.

As some little nicety is required in the process of taking drawings, I shall give it in full detail, ... [Details follow of making contact prints, and of obtaining paper negative impressions of plants and feathers between glass] ...

I have been trying a variety of experiments to obtain a black paper, that would be equally sensitive to light as the white, & discharge its color; not many eminent Chemists have given me to understand the thing is impossible, such a discovery would be highly desirable & important, and I have no doubt ere long this much wish'd for Discovery will be made.<sup>113</sup>

Should the above information prove of any service to you it will give me great gratification, & in the event of my making any further improvements in this Art, I shall feel much pleasure in communicating it to you.

I remain dear Sir,  
Your most Obt Servt,  
T S Redman.

To Sir Herschel Bart -

#### *Acknowledgment*

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113. This desire of Redman to, 'obtain a black paper' etc., concerns the production of a direct-positive paper. This had, in fact, already been achieved by Sir John Herschel (*Phil. Trans.*, 1840, **130**, 1-49 (item 17), and *Athenaeum*, 28 March 1840, p. 255) as well as by Hunt, Talbot, Lassaigue and Bayard.