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BENJAMIN THOMPSON AND THE FIRST SECRET-INK LETTER OF THE AMERICAN REVOLUTION

Sanborn C. Brown and Elbridge W. Stein

Sanborn C. Brown, Ph.D. Associate Professor of Physics, Massachusetts Institute of Technology, is engaged in a comprehensive study of the life of Benjamin Thompson, Count Rumford, and has published a series of articles on various phases of it. During the war Prof. Brown served as a physicist in the Office of Censorship where he worked extensively with secret-inks. His very thorough investigation of Benjamin Thompson's activities and accomplishments around the date of the secret-ink letter, its mode of preparation, and the composition of the sealing used on it reveals a series of facts which point strongly toward Thompson as the writer of this spy letter.

Elbridge W. Stein has long maintained a practice as an Examiner of Questioned Documents in New York City and has held office in the American Society of Question Document Examiners since its organization. In addition to his wide experience and high reputation as a document examiner, Mr. Stein had prior to entering his present profession taught penmanship and has made a diligent study of the American writing systems used since pre-Revolutionary War days. His positive and clearly illustrated identification of Benjamin Thompson as the writer of the secret-ink letter establishes without a doubt its origin.—EDITOR.

Within a few days of the Battle of Lexington, British headquarters in Boston received a secret ink letter which revealed details of the military plans of the patriot forces in New England. The message was developed, the signatures obliterated, and the document filed to be neglected for generations. This is the first known example of the use of secret ink in the American Revolution and is now to be found in the British Headquarter files in the Clements Library collection at the University of Michigan. It assumes importance now because mounting evidence indicates that the author was one of the most brilliant scientists of the era and a historical figure whose spectacular rise to political and military fame makes the motives of his early career worthy of close examination.

Benjamin Thompson, born of humble parents in Woburn, Massachusetts, lived through various fantastic episodes to become Count Rumford of the Holy Roman Empire. The story of his life, together with his record of scientific advances which remain unchallenged today, have aroused increasing interest in him as an individual. Thompson was born an American, but changed his allegiance to the British early in the Revolution. There is heated controversy over whether he was a Tory from the first or whether he was forced to join General Gage by the persecution of intolerant revolutionists. If Thompson wrote

the letter discussed here, there seems little doubt as to whom he was loyal.

Thompson, a confidant of John Wentworth, the Royal Governor of New Hampshire, had been driven from Concord, New Hampshire in December, 1774, by the angry citizens for his suspected Tory leanings. Thompson fled home to Woburn, which became his headquarters until he openly joined the British at Boston in October, 1775. It was during this period that the secret ink letter was written from Woburn on May 6, 1775.

The present condition of the secret ink letter is shown in Fig. 1. The letter was originally written in two parts, a short visible cover letter and a long invisible part which was left developed by the recipient or has become developed in the intervening years. The letter was signed, but drastic erasure has left very little trace of the original signature. The signature

* The secret-ink letter reads as follows:

“Woburn May 6th 1775

“Sir, In compliance with your desires I embrace this first opportunity that has offered since I left Boston to send you some account of the situation of affairs in this part of the Country. I need not trouble you with a particular account of the affair at Concord on Wednesday the 19th Ult. nor of the subsequent gathering at Cambridge etc. as you have doubtless already better intelligence of them affairs [sic] than I am able to give you.

“The only information that I can give you that can be of any consequence I lately received from a Field officer in the Rebel Army (if that mass of confusion may be called an Army) & from a member of the Provincial Congress that is now setting at Watertown. By them I learn that an Army consisting of 30,000 effective men is speedily to be raised in the four New England Governments, & that the quota for this Province is 13600. That as soon as this Army shall be raised & regulated it is generally supposed that the first movement will be to make a feint attack upon the Town of Boston, & at the same time to attempt the Castle with the main body of their Army.

“Whether this will be the precise plan of operation

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Operation or not I cannot determine, but really believe that the congress & their Officers in General are determined to, & really imagine that they shall be masters of both the Castle & the Town of Boston in a very short time.

“I am credibly informed that the Congress mean now to prosecute their plan of *Independence* at all adventures, & in order to this that [sic] application will speedily be made to some one of the European Powers for assistance against Great Britain. And this I am the more ready to believe as I have it from a member of the Congress, one who is intimately acquainted with the secrets of the party, & a man whom I cannot suspect of any design either to amuse or deceive me.

“But this their plan is by no means generally comonly known or suspected by the People in general, but they are still fed up with the old story that ‘their invaluable rights & privileges are invaded’, & are taught to believe that the military preparations which are now making are in defence of them & to obtain redress.

“As to the quantity of ordnance, & other military Stores that have been provided by the Congress etc. I have not been able to obtain any satisfactory accounts. But believe that the quantity is by no means equal

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equal to the plan of operation they have formed.

“Major Dunbar from Canada, & Ens. Hamilton of Regt. with their Servants are Prisoners in this Town. But I have not been permitted to see them tho’ I have made frequent applications for that purpose.

“As to my own situation, it has been very disagreeable since I left Boston, as

Woburn, May 6th 1775.

Sir, In compliance with your desires I embrace this first opportunity that has offered since I left Boston to send you some account of the Situation of affairs in this part of the Country. If you will be so kind as to direct to I need not trouble you with a particular account of the affair at Boston, the Papers which I left in your care and take his Receipt for the same. You will much oblige you have doubtless already better intelligence of them, & I am able to give you.

The only information that I can give you that can be of any consequence is, that on Saturday May 6th 1775 from a friend of mine in the British Army (if that name of confusion may be called an Army) & soon a member of the Provincial Congress that is now sitting at Watertown, By whom I learn, that an Army consisting of 30,000 effective men is speedily to be raised in the four New England Governments & that the quota for this Province is 13,600. That as soon as this Army shall be raised & regulated, it is generally supposed that the first movement will be to make a feint attack upon the Town of Boston, & at the same time to attempt the Castle with the main body of their Army.

Whether this will be the precise plan of Operations I cannot say.

I am Sir with the greatest respect
Your much obliged and
most obedient servant

P.S. [redacted] comes on purpose to bring this & the Distel you was kind enough to lend me - & I beg you would be so good as to procure him a pass to return

Figure 1

Page 1 of the developed secret-ink letter* with the covering black ink letter is shown at the top; below, the end of page 3 with its deleted signatures.

to the secret-ink letter has been cut away. The appearance of the letter leaves no doubt that the paper has been chemically treated. A study of the chemical literature available in 1775, indicates that there were three types of sympathetic ink requiring chemical development known at that time. These three types required, for the inks themselves, solutions of either lead, bismuth, or gallo-tannic acid. The lead ink, in the form of lead acetate, was developed by hydrogen sulphide. The usual compound of bismuth was the acetate, developed by ammonia water. The gallo-tannic acid was obtained by soaking powdered nut-galls in water, and was developed by an iron sulphate solution.

A very low voltage X-ray examination of the document ruled out the lead and bismuth inks. Radiograph of the letter with 7 kilovolt X-rays revealed no trace of the secret ink although both the bismuth and lead inks show up well in this kind of examination, even when their concentrations are sufficiently dilute to be useful as invisible inks. Furthermore, the developing wash which stains the document does show to some extent on the radiograph. This is evidence in favor of the nut-gall ink, since tests show that concentrations of ferric sulphate suitable for developing this ink attenuate these very soft X-rays enough to give a measurable effect on the X-ray film. It is obvious that neither the hydrogen sulphide nor the ammonia would show any effect.

For comparison with the document, a sample of nut-gall sympathetic ink was prepared and developed with iron sulphate. Under visible light, the color of both the inks and developers were essentially the same. Under illumination with ultra-violet light, the iron sulphate becomes dark purple, so dark as almost to obscure the sympathetic ink writing. Our laboratory sample matched the document in this characteristic very well. The nut-gall ink itself is rendered visible in the ultra-violet

upon my refusing to bear Arms against the King I was more than ever suspected by the People in this part of the Country. And it has been with difficulty that the few friends that I have here have more than once prevented my bein Assassinated.

"I am extremely unhappy that my confinement to this Town (by this deluded People) should put it out . . . power to do anything for the good of the service. But . . . soon to have an opportunity of giving convincing proof of my Loyalty to the King, & gratitude to all my benefactors. In the mean time you will give me leave to assure you in the most solemn manner possible that neither the threats nor promises of this wicked & Rebellious faction shall ever induce me to do any thing contrary to my professed Loyalty to his Majesty. But that on the contrary I do with the greatest pleasure & alacrity dedicate my Life & fortune to the service of my rightful sovereign King George the Third.

I am sir with the greatest respect your much obliged and most obedient Servant . . .

"PS . . . comes on purpose to bring this & the Pistol you was kind enough to lend me & I beg you would be so good as to procure him a pass to return."

without the need of developer. By masking the rest of the letter, and looking only at the few letters which were not adequately covered by the original chemical developer, a color match was also obtained under ultra-violet light between these and undeveloped nut-gall ink.

The accepted developer for nut-gall sympathetic ink (discovered and first described by Jean Batista Porta in 1480) was ferrous sulphate. This produces a colorless developer. With time and moisture, the ferrous salts oxidize to the ferric state, giving the present characteristic brown color of the document.

Under infra-red illumination, both the nut-gall ink and the developer are invisible. The so-called iron inks of the eighteenth century were essentially this nut-gall ferrous sulphate ink, mixed together instead of separately as in the case of sympathetic inks. Thus, the usual iron inks are also invisible under infra-red. On the other hand, the carbon inks, which were also common at the time, are easily detectable under infra-red light. The sympathetic ink of this letter disappears completely under infra-red light leaving only the cover message. Unfortunately the erased signature was removed by some harsh abrasive, probably a sandstone, which wore away most of the paper as well, and even the transmission of infra-red light through the document fails to bring it out.

Thus, it seems certain that the sympathetic ink was an "infusion of nut-galls" developed with an iron sulphate solution. The cover letter and address were written in carbon ink.

There is no doubt that Benjamin Thompson could have known about nut-gall secret ink. He has left a record of avid scientific curiosity and study from his early youth. He could easily have obtained the material without suspicion, since nut gall was a common anti-diarrhea drug of the day. Not only had Thompson studied medicine under Dr. Jay of Woburn, but he might have been using the drug himself at the time, for he wrote to the Reverend Samuel Parker "Since I left Boston I have enjoyed but a very indifferent share of health, having been much troubled with Putrid Bilious Disorders." Since the secret ink could only be developed by a specific chemical, preliminary arrangements with the British would have been necessary. Thompson may have made such plans, for in the same letter to Parker he wrote that he "came out of Boston a few days before the affair at Lexington on the 19th of April." There is also little doubt that Thompson had both the technical knowledge and ability to use such a method of communication if he so desired. Although he was only twenty-two years of age, his brilliant scientific career

Figure 2

A photomicrograph of sealing wax from the secret-ink letter compared with wax from a known Thompson letter sealed within two weeks of the disputed document. The area enclosed by the broken lines is the fragment of wax from the secret-ink letter. Enlargement 300X.

had already been prefaced by two publications by the American Philosophical Society.

It was the custom of the time to seal all private communications with sealing wax. This was not, however, a commodity that could be bought ready made, but each user was forced to mix his own. Thus, sealing wax becomes a very useful identification because of the peculiarities of temperature of manufacture, cleanliness, and chemical composition. The secret ink document in question has a very singular type of sealing wax. Microscopic examination shows it to be contaminated with small black coal-like particles. These spots are much more crystalline than the black candle soot often found in sealing wax. In the collection of Count Rumford material in the American Academy of Arts and Science there exists a letter signed by Benjamin Thompson which he wrote to his friend Loammi Baldwin from Woburn on May 19, 1775, 13 days after the date of the secret ink message. Both the color of the wax and the peculiar black spots in this letter signed by Thompson appear identical with those of the secret ink letter.

Through the very generous cooperation of the Clements Library of the University of Michigan, a small particle of the

wax from the questioned document was removed so that a direct comparison between the two samples of sealing wax could be obtained. A photomicrograph of the two, placed together, is shown in Fig. 2. The roughly rectangular piece at the center of the picture is the sample from the secret ink letter, and the surrounding wax is from the signed letter to Baldwin.

Another basis for determining, if possible, whether or not Benjamin Thompson wrote the secret-ink letter dated May 6, 1775, was a careful and thorough study of his known handwriting. This Thompson handwriting was extensive and covered the forty-five year period from 1769 to 1814. It included formal writing as well as his personal correspondence and carelessly written memoranda. The result of this study of the Benjamin Thompson writing when combined with an exhaustive comparison of it with the handwriting in the secret-ink letter shows that the secret-ink letter was undoubtedly written by Benjamin Thompson. The features and details of the handwriting and the way it was put on the paper all point toward Thompson as the writer. Some of these things are illustrated in Fig. 3 and are as follows.

1. Benjamin Thompson's handwriting was in a process of evolution between 1769 and 1799, and in 1775, the date of the secret-ink letter, it had reached the stage of development that exactly matched the handwriting in the secret-ink letter. Thompson had learned to write the English Roundhand system which was currently taught at the time he was learning to write. This system of writing was slowly executed and was a laborious way to put thoughts on paper. So as the necessity arose for more and more writing in his daily life, he, like many other writers of that time, naturally developed a handwriting which could be written more freely and with fewer pen raisings and less shading. This developed handwriting finally became almost a cursive script. Each writer who made this transition changed the basic system to suit his requirements or his fancy, therefore, it would be almost impossible to find at that particular time the exact kind and degree of evolution in the handwriting of two writers. The coincidence of the character and quality of the handwriting of Benjamin Thompson with that of the secret-ink letter is a very strong connection and singles Thompson out as the writer of the spy letter.

2. The English education of Thompson evidently did not extend to correct spelling nor to the accepted use of capital letters. Many words in the voluminous amount of the Thompson handwriting are misspelled, and he used capital letters without

reserve or reason even for his day. In the secret-ink letter the word "oppertunity" appearing twice is an example of incorrect spelling. Thompson repeatedly misspelled this word in the same way in his known writing. The use of capital letters, where good usage would indicate lower case letters, is found throughout the secret-ink letter and the same capitals are used incorrectly in the known writing of Thompson. Errors of this nature, when made in the same way and repeated many times, have an identifying value that would not be attached to them if they stood alone. This series of errors again points toward Thompson as the writer.

3. The evolution in Benjamin Thompson's handwriting brought into use changes, modifications, and additions in the forms of the letters and the manner of writing them as found in the basic English Roundhand system of writing which he had originally learned. These individualized letter forms in combination with the way they were written serve to make Thompson's handwriting different from that of other writers of his day and help to identify any writing that was written by him. The secret-ink letter contains the modified and personalized forms of the letters in the same degree and in the same manner as those developed by Thompson in the early part of 1775. This fact further marks him as the writer of the secret-ink message.

4. All of the developed peculiarities used by Thompson in modifying the basic English Roundhand system of writing, the individuality in the handwriting as shown by inventions in the forms of letters as well as the degree of skill or facility with which the writing was done, become more highly significant in identifying Thompson as the writer of the secret-ink letter when it is considered that the secret-ink letter was written with a colorless liquid that made no visible mark on the paper and was written with a pen made from a goose quill. The writer could not see what he was writing as he could if regular visible ink had been used. The secret-ink could not be seen until it was developed by the receiver. Writing produced under these unnatural conditions made it difficult for a writer to use his pen in his accustomed way, so that when the secret-ink letter is found to contain all of the identifying elements and qualities which are also in the known Thompson writing of this identical period, it makes a thoroughly vital and unusually strong basis for the opinion that Benjamin Thompson wrote the secret-ink letter.

Benjamin Thompson had the ability to write the secret-ink letter, he could get the information it contained, his earlier hand-

Figure 3

In this illustration consisting of four double lines, the writing from the secret-ink letter is in the upper part of each section and is marked, "letter". The writing of Benjamin Thompson is immediately below and is marked, "Thompson".

In the upper section there is shown the misspelling of a common word; an unusual break in the word after the letter "r"; and the use of two forms of capital "B", one being the English Roundhand and the other, a distinct modification of it.

In the second section, the capitals "L" and "W" are departures from the basic writing system that Thompson learned. The variety of forms of the combination "th" further individualizes his writing.

The third section contains a modernization of the form of "S" and invention of a new form of "f". The small "m" has been streamlined so as to give greater writing speed.

The bottom section illustrates a peculiar pen-raising and subsequent beginning stroke after "s" and "w". There is also the picturesque combination of the letters "ld" at the end of words and the artistic capital "A".

These similarities represent only a few of the many strong similarities connecting the writing of Benjamin Thompson with the writing in the secret-ink letter.

writing had changed enough to make it exactly agree with that in the letter, all of the peculiarities of Thompson's writing habits are in the letter, and these important similarities were put in the secret-ink letter while writing with an invisible ink. These things exclude other writers and leave Benjamin Thompson as the writer of the spy letter.

This investigation establishes clearly that the secret-ink letter was the work of Benjamin Thompson. In May 1775 he was in

Woburn. He had at that time progressed in his study of science to a point where he would know of the use of nut-galls as an ingredient of secret-ink and could have obtained the necessary material without arousing any suspicion. He had ample opportunity to obtain the information contained in the letter and the political sympathies, as shown by his acts at that time and later, to have used them as he did. The wax on the secret-ink letter is like wax he was using at this time. Finally, the penmanship of the letter is his, it contains his personal writing habits, is written with his ability, and agrees with his particular modifications of this period. All of the evidence in combination leads to an inescapable conclusion that Benjamin Thompson is the author of the first secret-ink letter of the American Revolution.