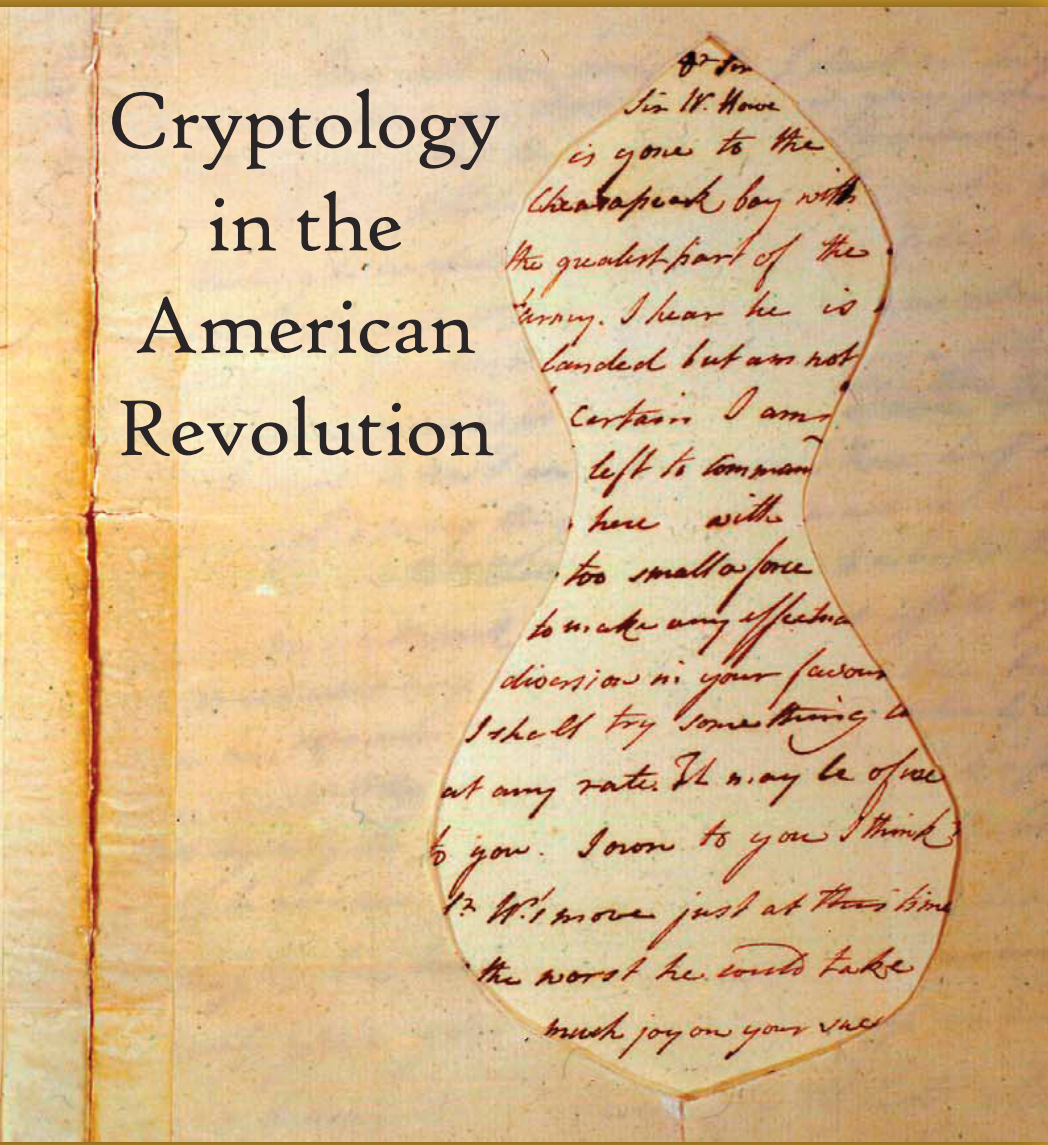
Revolutionary Secrets:

Cryptology in the American Revolution



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Cover: Letter from British General Henry Clinton to General John Burgoyne with hourglass-shaped mask revealing true message. Clements Library, University of Michigan

Revolutionary Secrets: Cryptology in the American Revolution

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Revolutionary Secrets: Cryptology in the American Revolution

In the late summer of 1781, General George Washington finally saw an opportunity to take New York City away from the British. Virtually from the beginning of the War for Independence six years earlier, the British had held this key city, and Washington had long desired to take it into American hands. Washington laid siege to the town all summer. With the expected arrival of Admiral de Grasse and ships of the French fleet along with an additional 3,000 French soldiers, he believed he finally had his chance. But on August 14, he changed his mind and turned his eye to Yorktown, Virginia.

Washington received intelligence, gained partially through the decryption of captured British messages, that gave him the assurance he needed to complete his move on Yorktown.

Communication plays an important role in both a country's diplomacy and its wars. Keeping those communications secret and understanding the adversary's communications can make the crucial difference in a leader's actions and abilities.

At the time of the American Revolution, both the British commanders and the American rebels practiced a variety of methods to keep their written communications secret. Both turned to invisible inks, hidden messages, and secret writing in the form of ciphers and codes.

Cryptography—the use of ciphers and codes—makes messages unintelligible to an adversary by the use of keys and lists. *Ciphers* rearrange letters or change individual letters into a different letter, number, or symbol based on a prearranged setting known as a key. *Codes* change entire words or phrases into other words, number groups, or symbols based on a list or a book. To decrypt the secret messages, the receiver needs access to the original key, list, or book. Theoretically, the adversary wouldn't have the original source and therefore could not understand the message even if it were captured.

Solving a message without having the original key or list—cryptanalysis—has been employed by governments and militaries for as long as people have used cryptography to make messages secret. The ability to capture and read the enemy's communications provides invaluable information for a military commander. With foreknowledge of an adversary's intentions, leaders can develop counteractions and turn a battle in their favor.

This is the story of revolutionary communications and cryptologic secrets and the role they played in America's war for independence.

The Battles Begin

Even before the first shots at the Battles of Lexington and Concord, Paul Revere had a private code system in place: a visual signaling system. Revere arranged to use two lanterns in Boston's North Church to send a signal. This code was understood only by Revere and his friends in Charlestown. Seeing the lamps across the bay, his compatriots knew that the British regulars were crossing to Charlestown over the Back Bay and sent out riders to warn Sam Adams and John Hancock in Lexington. The signal was in place in case Revere were unable to cross the water himself to give the warning.

The early warnings of the patriotic rebels, initiated by the lantern code, helped enable a colonial victory at Concord. With knowledge that the British regulars were coming, the colonists pulled their militia forces together and successfully engaged the British at the North Bridge in Concord. They also had time to remove most of their

The Midnight Ride of Paul Revere. *National Archives*

supplies from Concord to safe places. Finally, the forewarning allowed Adams and Hancock to escape capture.

Although the British lost the early battles at Lexington and Concord, they had every reason to believe they would win the war. They had superior numbers, experience, and capabilities. They also had the support and assistance of some loyal inhabitants.

"Sympathetic Stain"

A few weeks after the battle in Concord, a British loyalist named Benjamin Thompson used invisible ink to send secret information to British headquarters in Boston.

The use of invisible inks is an ancient art, and the idea of disappearing writing was not new at the time of the American Revolution. Giovanni Battista Porta included several recipes for secret inks in his works of the

late 16th century.[1] The practice of invisible writing was often included in cryptologic skills until WWII when the technique fell more under the auspices of covert operations than cryptographic methods.

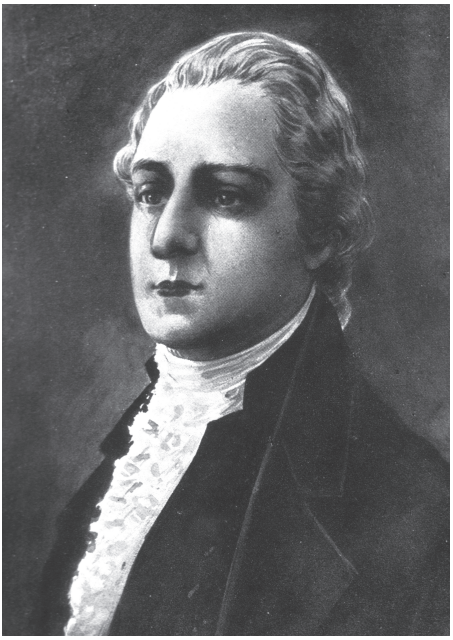
After the Battles of Lexington and Concord, Thompson learned of some military plans in New England from conversations with well-placed patriots. He never named his sources, though he stated the information came "from a Field officer in the Rebel Army (if that mass of confusion may be called an Army) & from a member of the Provincial Congress that is now setting at Watertown."[2]

To relay his information, Thompson used a method Porta described to create an invisible ink: gallotannic acid. The Redcoats used ferrous sulfate to reactivate the ink.[3]

Thompson also used a common technique when writing with "sympathetic stain," as invisible ink was sometimes called. He wrote an ordinary message in plain ink to be read if the message were intercepted by the enemy. The dark ink included nothing suspicious. It was merely a request to deliver some papers and obtain a receipt. Thompson's real message, once revealed, detailed how many men the Colonists hoped to raise and that their first movement would be against Boston. He then revealed that the Colonists would apply to European powers for assistance almost immediately.[4]

What may have seemed odd, and might have given the game away had anyone other than the British received this message, is that the visible portion in dark ink covered barely half a page and yet there were three pages enclosed in the letter.

Loyal to the crown, Thompson left his wife at the outbreak of the war to serve General Gage as a colonel in the loyalist army. When the British evacuated Boston, he moved (without his wife and daughter) to London where he became an assistant to Lord George Germain,[5] the secretary of state for the American Department. After the war, his work as a scientist gained prominence. Today, Sir Benjamin Thompson, Count Rumford, is known for his work in thermodynamics as well as other scientific endeavors. Less known is his secret involvement at the opening of the Revolutionary War.



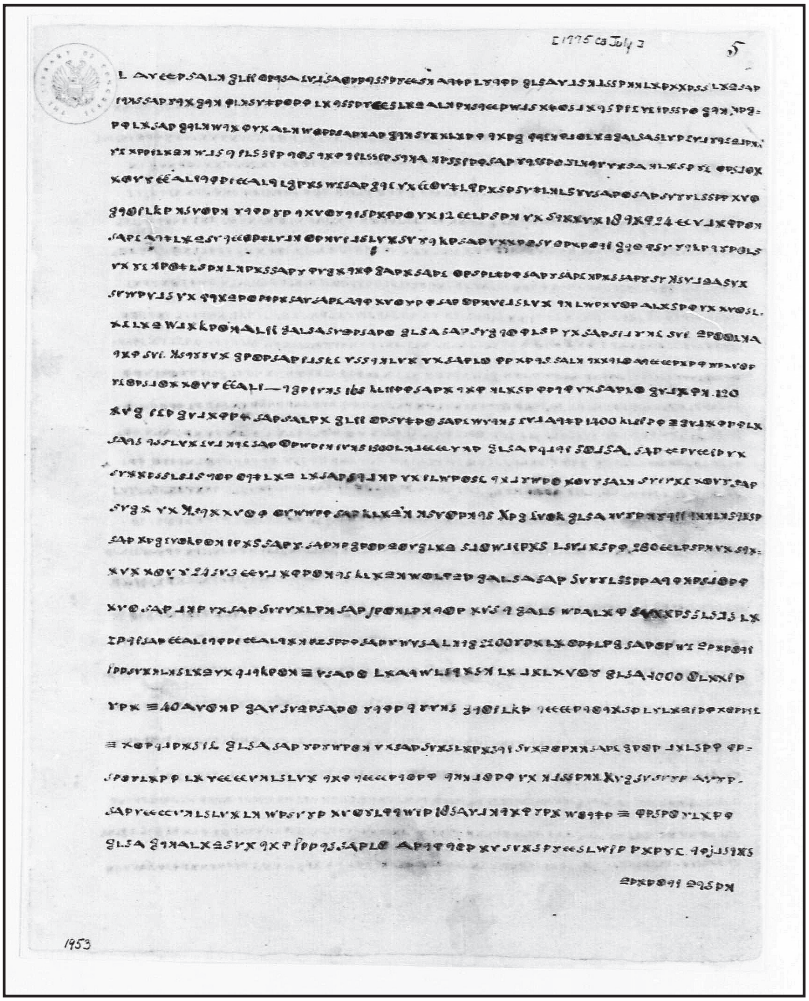
Dr. Benjamin Church. *National Library of Medicine*

Benjamin Church, British Spy

Not all of General Gage's spies fared as well as Benjamin Thompson. Dr. Benjamin Church's fate was less than glorious.

Dr. Church was perhaps General Gage's most highly placed spy. He was a member of the Sons of Liberty and the Committees of Correspondence and Safety in Boston. He was elected as a delegate to the Massachusetts Provisional Congress and a liaison to the Continental Congress. General Washington named him chief physician of the Continental Army, effectively the surgeon general. And all the while he spied for General Gage.

Church was one of the spies who provided information about the military supplies held in Concord. It was this information that prompted Gage to move his men to Lexington and Concord, which led to the first shots of the war.



Cipher message from Dr. Benjamin Church. *George Washington Papers, Library of Congress*

However, when the war began, Church, unlike Benjamin Thompson, continued to work with the patriots and shared what he learned with Gage. It was an encrypted letter that brought about his downfall.

The former mistress of Godfrey Wenwood, a Newport, Rhode Island, baker, approached Wenwood in August 1775. She asked him

to help her get in touch with some British officers so she could give them a letter. Suspicious, Wenwood convinced her to leave the letter with him to pass on. Instead, he gave the letter to a friend who opened it to discover cryptic writing of letters, symbols, numbers, and Greek characters. Unable to understand it, he gave it back to Wenwood who kept it while trying to decide what to do. When Wenwood received a message from the woman complaining that he hadn't forwarded the letter, he became even more suspicious. He went up the chain of command and in September 1775 presented the enciphered letter to George Washington.

The mistress was brought before Washington, and under interrogation she admitted the letter came from Dr. Church. Washington was stunned by this news since the doctor was a highly valued and trusted man in his army. He called for the doctor to explain the incriminating evidence. Church admitted he had written the letter, but claimed it was to his brother and of little import. The letter, however, was addressed to Major Cane of the British military. Church refused to decrypt the letter and prove his innocence.

Washington searched for someone to decipher the message. Dr. Samuel West, a pastor and former classmate of Church's, took on the task. Elbridge Gerry, a member of the Massachusetts Provisional Congress (and later the fifth vice president of the United States) and Elisha Porter, a colonel in a Massachusetts regiment, also worked on it as a team. They both came up with the same solution.

The cipher used a simple monoalphabetic substitution. Each letter of the alphabet was replaced by a different letter, number, or character. For example, Church used the number 9 to represent the letter *A*, a capital *W* replaced *B*, capital *S* was *C*, the Greek letter Phi (Φ) was *D*, and so on.[6] Because the actual, or plain text, letter was always replaced with the same cipher character, the system was fairly easy to solve. Church may have believed the common misconception that the use of nonalphabetic characters made a substitution system more difficult to decipher. West, Gerry, and Porter solved the message in only a day or two. Washington received both decryptions on October 3.

The monoalphabetic cipher revealed that Church was providing General Gage with information on American ammunition supplies; rations; recruiting; a proposed attack on Canada; artillery in Kingsbridge, New York; troop strength in Philadelphia; and the general mood of the Continental Congress.

Presented with the decryption, Church claimed he was trying to show the British the strength of the Americans in order to deter them. He had in fact greatly exaggerated the Americans' numbers and used this as proof of his motives. Church's words only made the patriots more thoroughly convinced of his guilt. However, the depth of Church's dealings with Gage was not known until the 20th century. Washington knew only of this one encrypted letter, but it was enough to seal Church's fate.

After being jailed, and a prisoner exchange refused, Church was finally exiled to the West Indies in 1780. The ship he was on sank and Church was never heard from again.[7]

Hiding Secrets

The loss of a valued officer was only one of Washington's setbacks in the first few years of the war. The British, under the command of General Howe, took control of New York harbor in the summer of 1776. Washington knew that if he were to defeat the British, he needed to know the current status of their troops and supplies as well as have foreknowledge of their intentions. He needed a volunteer to enter the British lines and spy. Nathan Hale agreed to go.

Unfortunately, Hale was recognized as a rebel and arrested. Incriminating notes were found hidden in his boots and he confessed to being a soldier in the Continental Army. He was accused of spying and immediately sentenced without a trial to hang the next morning.

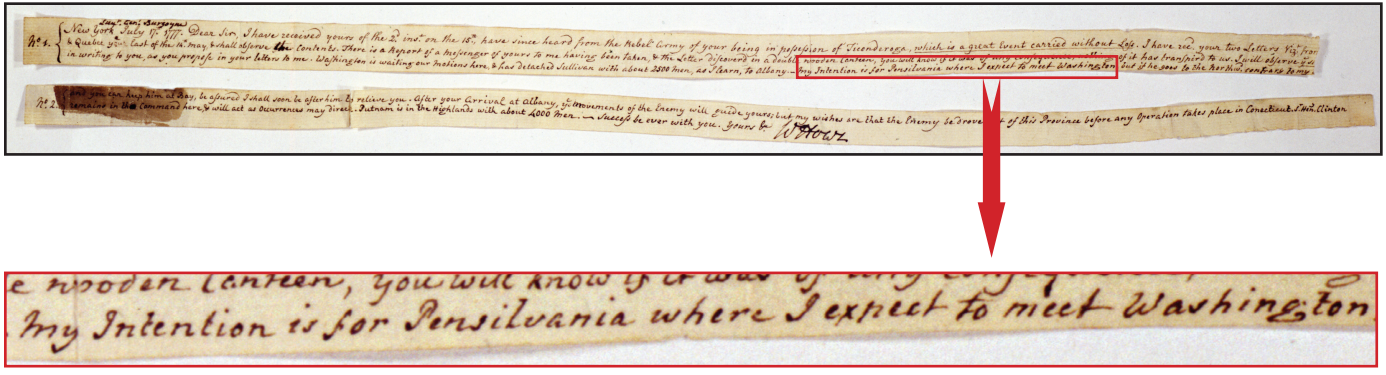
Hale's attempt to hide his notes in his shoes was a feeble attempt at best. The British were far better at hiding messages. They secreted communications inside canteens, silver balls the size of bullets, feather quills, and even within ordinary-looking letters. Generals Burgoyne, Howe, and Clinton used a few these techniques prior to the Battles of Saratoga.

Map of General Burgoyne's plan to capture Albany

Burgoyne planned to cripple the Continental forces by moving his troops from Quebec to Albany. A second column would come through the Mohawk Valley in central New York, while a third British force, under William Howe's command, would come north from New York City. When the British controlled the Hudson River valley, they would sever New England from the rest of the colonies.

However, this was not to be. General Howe decided to change the plan.

After George Washington's recent victories in Trenton and Princeton, New Jersey, Howe sought and received permission from Lord Germain to take Philadelphia. Howe made Burgoyne aware of his intentions to move to Philadelphia instead of moving north toward Albany via a message hidden inside a quill. He inserted the long, narrow, messages into a large, hollow quill feather (see next page).



General Howe's quill messages and detail.
Clements Library, University of Michigan

Part of the note hidden in the quill said:

> Washington is waiting our motions here … My intention is for Pensilvania where I expect to meet Washington, but if he goes to the Northw.d … you can keep him at Bay, be assured I shall soon be after him to relieve you. … S.r Hen.y Clinton remains in the command here, & will act as occurrences may direct. Putnam is in the Highlands with about 4000 men. - Success be ever with you. Yours. & [etc.] WHowe[8]

The Hourglass Mask

Distressed that he would not have the support he needed, British general Burgoyne attempted to change Howe's mind, but to no avail. Even Sir Henry Clinton believed Howe's move unwise. In another secret message to Burgoyne, Clinton expressed his concern. However, his words are cleverly disguised as approval.

> You will have heard, Dr Sir, I doubt not long before this can have reached you that Sir W Howe is gone from hence. The Rebels imagine that he is gone to the Eastward. By this time however he has filled Chesapeak bay with surprize and terror. Washington marched the greater part of the Rebels to Philadelphia in order to oppose Sir Wm's army. I hear he is now returned upon finding none of our troops landed but am not sure of this, great part of his troops are returned for certain. I am sure this countermarching must be ruin to them. I am left to command here, half of my force may, I am sure, defend everything here with much safety. I shall therefore send Sir W 4 or 5 Bat[talio]ns. I have too small a force to invade the New England provinces; they are too weak to make any effectual efforts against me and you do not want any diversion in your favour. I can, therefore very well spare him 1500 men. I shall try something certainly towards the close of the year, not till then at any rate. It may be of use to inform you

> that report says all yields to you. I own to you that I think the business will quickly be over now. Sr W's move just at this time has been capital. Washingtons have been the worst he could take in every respect. Sincerely give you much joy on your success and am with great Sincerity your HC.[9]

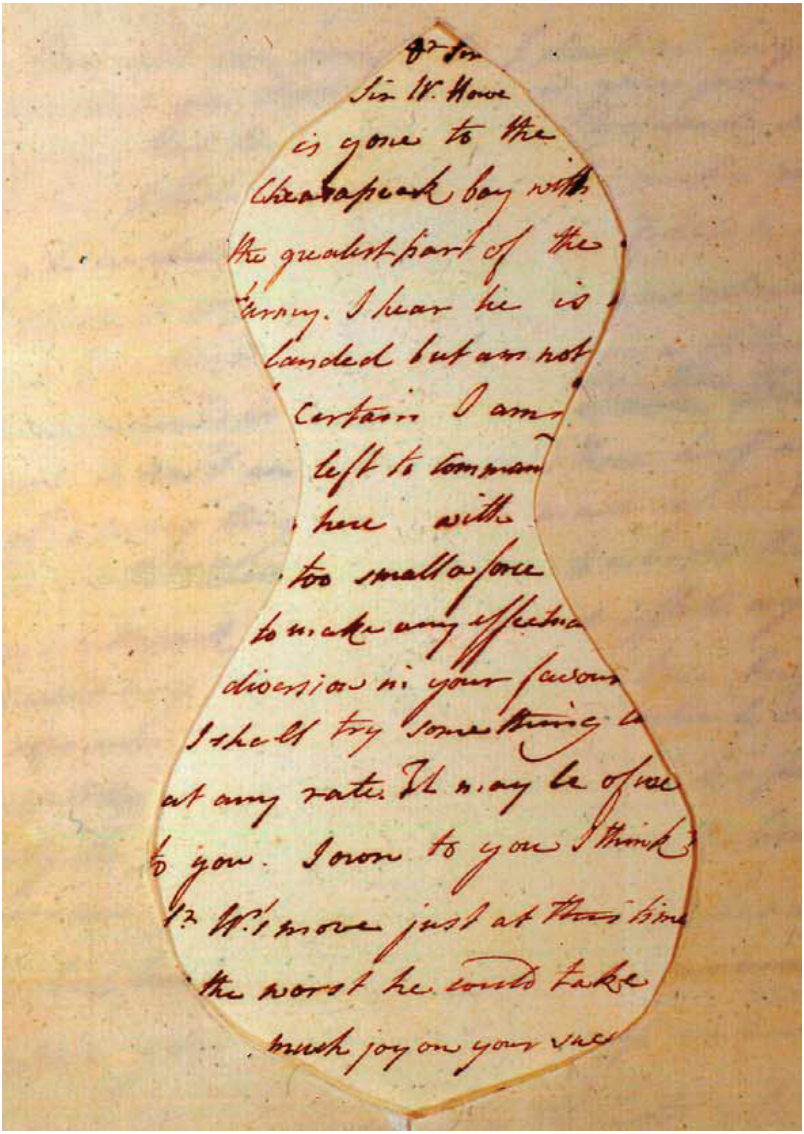
The actual message, however, was hidden within. It can be revealed through the use of a mask. A sheet of paper with an hourglass shape cut from it could be placed over the full letter allowing only a smaller portion of the writing to be visible. With the mask in place, the message Henry Clinton relays is vastly different from the full letter:

> Sir W Howe is gone to the Chesapeak bay with the greatest part of the army. I hear he is landed but am not certain. I am left to command here with too small a force to make any effectual diversion in your favour. I shall try something at any rate. It may be of use to you. I own to you I think Sr W's move just at this time the worst he could take. Much joy on your success.[10]

These masked messages may have been England's most secure form of written communication because they provided no discernable patterns; however, they were difficult to construct. They required two parts: the letter and the mask. The mask is laid over the blank paper, and the true message is written within the open space. Then the mask is removed and the rest of the letter is composed around the true message. This can be quite difficult since the letter must make sense when read even without the mask. However, if done properly, it can effectively protect secret messages.

Despite the fact that Burgoyne received these and other hidden messages without issue, he still failed to take Albany. The lack of reinforcements and his determination to still move forward resulted in his defeat at the Battles of Saratoga. Burgoyne was forced to surrender to General Horatio Gates on October 17, 1777. This was the first major battle won by the Continental Army and a turning point in the war.

With this victory, the French openly sided with the Americans. On February 6, 1778, the French and Americans signed the Treaty of Alliance.



Clinton letter to Burgoyne with hourglass-shaped mask revealing true message. *Clements Library, University of Michigan*

New York's Spy Ring

In the late spring of 1778, George Washington set up a perimeter around New York City, but the harbor and waters still belonged to the British, now under the command of General Clinton. The French opted to engage the British in the West Indies rather than on the American coast. Although the French action was helpful to the United States because it pulled British attention and forces away from New York, it wasn't precisely what the Americans preferred.

Washington wanted New York, and to get it he needed information. After the failed espionage attempt by Nathan Hale, Washington knew what he really needed was a resident inside New York. Someone in the city who put on the airs of a loyalist would not stand out and could gather better information. Washington also needed a transmission route to get the information safely out of New York and into his hands.

In the summer of 1778, Washington ordered Major Benjamin Tallmadge to create a spy network.

Tallmadge was born and raised in Suffolk County, NY, and attended Yale College. When the war began, Tallmadge joined the Continental Army and participated in several battles with Washington, including the Battles of Long Island, Brandywine, and Monmouth.

Tallmadge knew that a coordinated network of well-placed spies and couriers, all working under specific and clear direction, could take the information from the city without throwing suspicion on its members. For his agents, Tallmadge, who took on the code name John Bolton, turned to the neighbors he knew and trusted in Setauket, NY. This group became the Culper spy ring.

Sailor, Merchant, Landlord, Spies

Caleb Brewster was a childhood friend of Tallmadge, but he wasn't recruited into the spy ring. In fact, he offered his services to Washington even before the Culper spy ring began.

Brewster had been a whaleboatman before serving in the Continental Army. In his free time, he took whaleboats and crossed Long Island Sound to harass the British on the opposite shore. He offered to provide Washington with British naval movements, troop numbers, the status of their provisions, and any signs of embarkation. Washington was happy to have the information.

Brewster was the clear choice to carry Tallmadge's information requests from Connecticut across the Sound to Abraham Woodhull in Setauket.

As another childhood friend, Woodhull was Tallmadge's first recruit. Known by the code name Samuel Culper, Woodhull began providing Tallmadge with information from New York City since he made routine trips there. Despite being devoted to the cause, Woodhull was not made to be a spy. Ever fearful of being discovered, Woodhull insisted on anonymity. After a few close calls with the British, he decided to stay out of the city. However, he knew how important the work was to Washington and took pride in being a part of it. He found a man to fill his place in New York City while he remained in Setauket gathering information from Long Island.

Tallmadge gave his requests to Brewster, who took them across the Sound to Woodhull. Woodhull reviewed them and gave instructions to Austin Roe. Roe was the spy ring's primary courier. As a tavern owner in Setauket, he had reason to travel the fifty-five miles between New York City and Setauket to pick up supplies for his business. He carried Woodhull's instructions, which were frequently hidden between the lines of a shopping list in invisible ink, to New York City. Once in town, he would pass the request to Robert Townsend.

Robert Townsend, Woodhull's replacement in the city, couldn't have been a better choice. He resided and worked in the city as the owner of a dry goods store. However, he too was very concerned about his safety should his identity be discovered. Even Washington knew him only by his code name, Culper Jr. Handwriting analysis and comparison of activities and places by the author Morton

Pennypacker in the 1920s finally revealed that Culper Jr. was Robert Townsend.

Townsend was known to write articles for the King's newspaper *Rivington's Royal Gazette*. Those British soldiers whose names and military activities appeared in British papers seemed to be promoted more quickly, so officers were eager to share their stories with Townsend, an apparent loyalist. They would discuss their exploits in the coffee house conveniently located near Rivington's press and Townsend's store.

Roe passed on to Townsend the request for specific information on the British. At his first opportunity, Townsend took the message to his private quarters and used a reactivation agent on the note, causing the real instructions to appear from the invisible ink.

Jay's "Stain and Counterpart"

The ink used by the spy ring, as well as by others under General Washington's command, was a concoction developed by Dr. James Jay.

Jay, a physician born in New York, moved to England in 1762 but remained loyal to his homeland. Before the outbreak of the war, Jay realized a secret form of communication was needed. After much experimentation, he came upon a successful mixture. It was a two-part solution: one chemical acted as the invisible ink and another made it visible.[11]

George Washington particularly liked Jay's invisible ink and directed his spies to make use of it. In a letter to Benjamin Tallmadge, he wrote: "I send twenty guineas and two fials containing the stain and counterpart of the stain for C__ Jr. which I wish may be got to him with as much safety and dispatch as will conveniently admit of."[12]

Washington also believed information should be transmitted, as Jay recommended, hidden between the lines of an innocent letter. The "shopping list" used this method. However, Townsend preferred to respond using blank paper. He then hid the stained page within

a ream of paper at a specific location. This method allowed Roe to return to Setauket with the papers as part of his supplies.

Riding the fifty-five miles back, Roe stopped at Woodhull's farm. Woodhull, signing his letters as Culper Sr., included his own comments and information separately in black ink and partially in a code that Tallmadge created in 1779.

Codes replace words with other words, numbers, or even symbols. A wide variety of codes exist, but Tallmadge's was a simple replacement of one number for one word. Tallmadge's code list consisted of more than 763 terms and names. Like several other codes, it was based on *Entick's Spelling Dictionary*, but he selected the words to be included. It was a one-part code both alphabetic and numeric in order. *A* was number 1 and *Zeal* was 710. At the end he added additional numbers for people, place-names, and dates.[13]

Culper Jr. (Townsend) made good use of the system. For example, the last two sentences from a coded message of August 1779 to Tallmadge read, "The Renown and Daphne Eli 625 only 592.431.680.282 Rqlv – In 379 pizv 683.281 possible acxi 707.1.526 Eggqwpv 431.625 situation 431.625.655 – Yours 723." This decodes to say, "The *Renown* and *Daphne Eli* [are] the only ships of war in port. In my next will if possible give you a particular account of the situation of the troops. Yours Culper Junior."[14]

Culper Sr. (Woodhull) also used the code, but with less effect. Most of his letters were written in plain text with only a few code numbers included. A typical letter from Woodhull begins as this November 1780 message does:

> 729 427 ef 1780.
> Dear Sir,
>
> Your favour of the k instant is received and observe the contents. In answer to your first question, I again informe you that I was at 727 about the 20 of last month. I then with the advise of C__ Junr and others transmitted you the most accurate account of the embarkation of Gen Mathews.[15]

The code simply states that Culper Sr. was writing from Setauket (729) on November (427) 12th (ef). He says he received Tallmadge's letter of the 5th (k) and that he was at New York City (727) about the 20th of last month. Most of the message is in plain text.

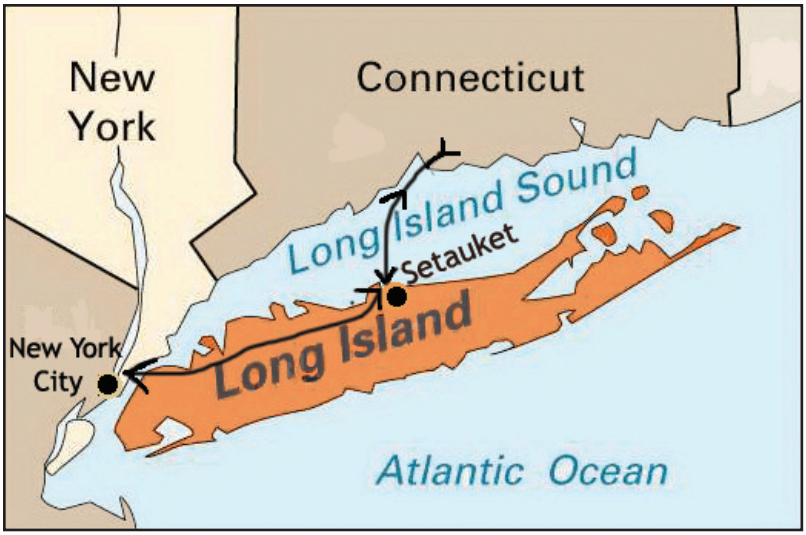
Having added his information to that of Townsend's, Woodhull delivered the missives to Brewster. However, because the process of requesting and obtaining the information took days, Woodhull didn't always know when and where Brewster would be found. Another member of the ring provided the necessary information through a unique signaling system.

Anna Strong, known as Nancy, lived on a farm on Long Island Sound within sight of Woodhull's farm. Strong hung a black petticoat on her clothesline to indicate that Brewster was in place. Then she would hang between one and six handkerchiefs to indicate in which of six possible coves he was waiting. Though the line was in sight of anyone who wished to look, the code meant nothing to the British.

Once Brewster had the secret messages that were written in code and invisible ink, he took them across the Sound to be carried to Tallmadge and on to General Washington.

This very circuitous route by which messages traveled—from Connecticut across Long Island Sound to Setauket, to New York City, back again, and only then to George Washington—though successful, frequently took too long. Washington complained that the information was quite valuable, but by the time he received it, it wasn't as useful as it could have been. In a letter to Tallmadge, Washington implores,

> It is my further most earnest wish, that you would press him [Culper Jr.] to open, if possible, a communication with me by a more direct route than the present. His accounts are intelligent, clear, and satisfactory, consequently would be valuable, but owing to the circuitous route through which they are transmitted I can derive no immediate or important advantage of from them, and (as I rely upon his intelligence) the only satisfaction I derive from it, is, that other accts are



Information route of Culper spy ring

> either confirmed or corrected by his, after they have been some time received.[16]

This situation was a constant complaint of Washington's, but it was never resolved to anyone's satisfaction. Woodhull refused to communicate with anyone he couldn't personally vouch for. On one occasion Townsend forwarded a message through a courier who, being in enemy territory, posed as loyalist. The message he carried was intercepted. Fortunately, it was intercepted by a patriot who believed the courier to be a Tory and gave the message to Washington. An alternate route was never further pursued.

Culper Information Aids Washington

Most of the information Culpers Sr. and Jr. provided concerned the number of British troops, ships, and provisions in New York City as well as the general spirits of the regulars and Tories. However, on one occasion, the Culpers warned that a man working with Washington was in fact loyal to the mayor of New York City and therefore

should not be trusted. "Mr C Junr informed me at our intervene that Christopher Dyeink [Duychenik] … of 10 [New York] … is amongst you and is positively an agent for David Mathews Mayor of 10 under the direction of Tyron [major-general in British Army and governor of the Province of New York.]"[17]

Possibly the most valuable information Townsend sent was in July 1780. Washington, knowing the French fleet was about to arrive in Newport, Rhode Island, asked for any information concerning the British activities in New York City and Long Island. Within days of the request, the message went from Tallmadge to Caleb Brewster, who took it across Long Island Sound to Austin Roe. Roe rode virtually nonstop from Setauket to New York City and waited while Townsend gathered the information.

Townsend learned that the British had gathered 8,000 troops and sailed to the north side of Long Island. British general Henry Clinton planned to attack the French before they became entrenched.

Clinton knew of the imminent arrival of the French through his own source, Benedict Arnold.[18] In a letter to his superiors in England, Clinton wrote, "Immediately on my arrival from the southward I received, from such authority [Arnold] as I should have risked an action upon, that the French fleet and 6,000 troops were expected at Rhode Island."[19] Benedict Arnold, a trusted major general in the Continental Army, received his information directly from Washington's headquarters. It was not the first correspondence between Arnold and Clinton, nor would it be the last, but it did inspire Clinton to make a move against the French fleet. He began his preparations to move men out of New York City. It was these actions that Townsend reported back to Washington.

However, Culper Jr.'s usual means of writing with invisible ink on a specific piece of paper in a stack and carrying the stack back with other goods would have delayed the response by a day. Townsend decided instead to write a short message to a known Tory saying that the goods he had requested were not currently available.[20] This would explain why Roe returned without supplies, should he be stopped

along the way. The real information was written in the "sympathetic stain" on that letter. That same day Austin Roe rode the fifty-five miles back to Setauket and delivered the letter to Woodhull.

Woodhull's accompanying letter to Caleb Brewster emphasized the importance of Townsend's information. "The enclosed requires your immediate departure this day. By all means let not an hour pass: for this day must not be lost. You have news of the greatest consequence perhaps that ever happened to your country."[21]

Brewster took Townsend's and Woodhull's letters back across the Sound. Because he didn't know the current location of Major Tallmadge, Brewster gave the information to a dispatch rider to deliver them directly to headquarters. Another copy made its way to Tallmadge. At Washington's headquarters, Alexander Hamilton received the messages the following afternoon (Washington was not at headquarters at the time). The entire procedure from Washington's initial request to Hamilton's receipt took ten days.

Hamilton, who was acquainted with the Culpers' methods, used the reactivation agent and read the letter. He forwarded the news to the Marquis de Lafayette, who was on his way to Newport to meet the French fleet. When Tallmadge received the information, he immediately sent it on to General Washington.

With this new information, General Washington knew he needed to keep Clinton from getting to Newport and the French fleet. He also knew, as did Clinton, that the reduction of forces in New York left the city vulnerable. Though Washington wanted to take the opportunity to attack, he knew his troops were too few to succeed. However, in order to protect French lieutenant general Rochambeau's arrival in Newport, Washington needed only to stop Clinton's movement to Rhode Island.

Washington moved his troops toward New York in a feint to draw Clinton's attention. "During this time," Clinton reported, "Washington, by a rapid movement, had, with an army increased to 12,000 men, passed the North-river, and was moving towards King's-bridge, when he must have learned that my armament had not proceeded to

Rhode-Island. He (I apprehend in consequence of this) re-crossed the river, and is now near Orange Town."[22]

Washington's ruse worked. Clinton called back his troops to protect New York City from an attack that would never come. And thus Rochambeau and the French fleet's arrival in Newport went unchallenged. Washington then began to make plans to join forces with the French for a real attack on New York City.

Benedict Arnold's Treason

As Townsend and Woodhull were hurrying to gather the information Washington requested, Benedict Arnold was plotting to sell West Point to the British. For more than a year Arnold had been providing the British with information.

While in command of Philadelphia, Arnold met a beautiful young woman, Margaret "Peggy" Shippen, the daughter of a prominent loyalist family. She and her sisters had previously caught the attention of British officers stationed in the town. Among those men was John Andre, adjutant-general in the British Army and chief of its intelligence service. When he left Philadelphia with the British troops, Peggy managed to maintain communications with him.

Despite a twenty-year age difference, Arnold sought and eventually won Peggy's hand. Soon after their marriage in April 1779, Arnold began a secret correspondence through John Andre with the British general Sir Henry Clinton.

Page, Line, and Word: Book Codes

Arnold communicated with the British using book codes and ciphers in addition to invisible ink. Book codes and ciphers (sometimes called "dictionary codes") were quite common at the time of the Revolution. They can provide excellent security if the sender and the receiver each have access to the same edition of the book and the book contains many of the necessary words. This generally requires lengthy volumes on a subject similar to the topic to be encoded. Ideally, the most commonly used words could be found repeatedly

Benedict Arnold. *H. B. Hall, Anne S.K. Brown Military Collection, Brown University Library*

throughout the book, allowing several choices to encode the same word. Book codes, however, are a bit cumbersome. When the sender attempts to encode, locating the required words within the text can be time consuming, assuming the word is used in the book at all. Arnold's book of choice was a legal tome: Blackstone's *Commentaries on the Laws of England*.

Although the actual process varies, Arnold used a standard encoding procedure in which a three-number code group replaces a word. The numbers represent the page, line, and word count in that line; for example, 43.23.12 indicates the twelfth word on the twenty-third line of page 43.

However, Blackstone's law book contained few of the words Arnold needed to relay military information, and much of his message was tediously ciphered. To use a book as a cipher tool, individual letters spelling out a word are located throughout the book. The code group represents the page, line, and letter count. To indicate a let-

ter instead of a word, the final number has a line drawn through it: 43.23.~~12~~ indicates the twelfth letter on the twenty-third line of page 43. This book cipher proved so tedious that Arnold and Andre quickly began using *Nathan Bailey's Dictionary.*

Dictionaries contain the all necessary words. However, each word is listed only once and therefore frequently used words will have the same code group appearing repeatedly in messages. Also, they are in alphabetical order. This makes the words easy to locate, but it also gives an adversary an advantage at guessing a word. The code 6.1.14 indicates a page early in the dictionary; therefore, the word begins with a letter at the beginning of the alphabet. The use of a dictionary over another book becomes obvious in a coded message as well. Instead of indicating which line, the second number indicates the column. Thus 6.1.14 represents the fourteenth word listed in the first column on page 6. When the middle number is always either 1 or 2, a dictionary code is in use.

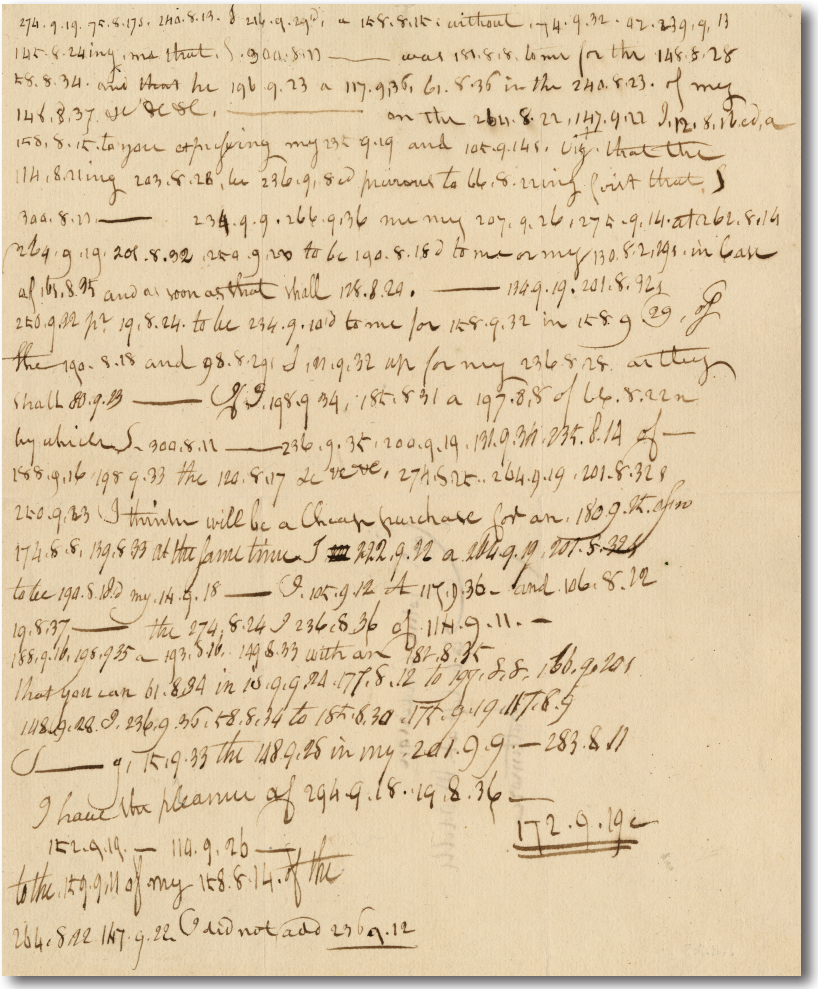
West Point for Sale

In a July 15, 1780, coded message using a dictionary code, Benedict Arnold proposed the sale of West Point. (In his letter, the middle number of the code group is always an 8 or 9 because Arnold added seven to each of the numbers.)

West Point was an important fortification on the banks of the Hudson River, valuable not only for its strategic location but also for its supplies. (The U.S. Military Academy would not be officially established there until 1802.) Arnold knew West Point would be a significant asset to the British. If he had command of the garrison, he could turn it over to the British … for a price.

Decoded, Arnold's message reads as follows (italics added to indicate the words in plain text):

> Two days since *I* received *a* letter *without* date *or* signature, inform*ing me that* S. Henry —— *was* obliged *to me for the* intelligence communicated, *and that he* placed *a* full confidence *in the* sincerity *of my* intentions, *etc. etc. etc. On the* 13th



Dictionary coded message from Benedict Arnold proposing the sale of West Point. *Clements Library, University of Michigan*

Instant *I* addressed *a* letter *to you expressing my* Sentiments *and* expectations, *viz, that the* following preliminaries *be* settled previous *to* cooperating. – *First, that S.* Henry secure to *me my* property, valued *at* ten thousand pounds Sterling, *to be*

paid *to me or my* heirs *in case of* loss; *and, as soon as that* shall happen, —— hundred pounds *per* annum *to be* secured *to me for* life, *in* lieu *of the* pay *and* emoluments *I* give *up, for my* services *as they shall* deserve – *If I* point out *a* plan *of* cooperation *by which S*. Henry shall possess himself *of* West Point, *the* Garrison, *etc. etc. etc*. twenty thousand pounds Sterling *I think will be a cheap purchase for an* object *of so* much importance. *At the same time I* request *a* thousand pounds *to be* paid *my* Agent – *I* expect a full *and* explicit answer – *The* 20th *I* set *off* for West Point. *A* personal interview *with an* officer *that you can* confide *in is* absolutely necessary *to* plan matters. In the mean time *I* shall communicate *to* our mutual friend *S*_____*y* [Stansbury, the courier] all *the* intelligence *in my* power, until *I have the pleasure of* your answer.

Moore [Arnold]
July 15th [1780]
To the line *of my* letter *of the* 13th *I did not add* seven.[23]

Clinton responded with a message agreeing that the garrison with 3,000 men, artillery, and supplies was worth £20,000.[24] He didn't, however, agree to compensate Arnold with an additional £10,000 regardless of how events turned out.

Arnold did not always use the dictionary code. His August 30 reply to Clinton is disguised as business correspondence. He writes signing the name Gustavus and refers to himself as Mr. Moore. He opens by saying he received Clinton's message and expects to reply in full at a later date.

> … and to procure you an interview with Mr M___e [Moore] when you will be able to settle your commercial plan I hope agreeable to all parties. Mr M___e assures me that he is still of opinion that his first proposal is by no means unreasonable and makes no doubt when he has a conference with you that you will close with it. He expects when you meet that you will be fully authorised from your house: that the risques, and profit of the co-partnership may be fully and clearly understood.

> A speculation might at this time be easily made to some advantage with ready money, but there is not the quantity of goods at market which your partner seems to suppose, and the number of speculators below I think will be against your making an immediate purchase. I apprehend goods will be in greater plenty and much cheaper in the course of the season; both dry & wet are much wanted and in demand at this juncture, some quantities are expected in this part of the Country soon.
>
> Mr M___e flatters himself that in the course of ten days he will have the pleasure of seeing you. …[25]

Andre and Clinton would have understood the true meaning of Arnold's message: Arnold still believed that his original request for £10,000 was reasonable. The second paragraph warns that West Point doesn't have the number of men Clinton seems to believe, and with the Americans (speculators) nearby, now would not be a good time to move. The message concludes that Arnold expects things to improve shortly and hopes to have their face-to-face meeting within ten days.[26]

This particular message was given to an innocent courier who had no knowledge of its contents or purpose. However, he was suspicious of the circumstances in which Arnold gave him the letter to carry. Rather than follow Arnold's delivery instructions, the courier passed the message to General Parsons of the Continental Army. As Arnold had hoped, should it be intercepted, Parsons believed it was merely a commercial correspondence and thought little of it. He didn't turn it over to Washington until Arnold's treachery was known.

The Betrayal Exposed

Why Benedict Arnold chose to betray his country has long been debated. His desire for recognition and his need for money most likely played a role. The lifestyle he maintained with his young wife was well outside his means, causing him to go into debt. Also, in April 1780 he faced a court martial on eight charges for actions committed while in command of Philadelphia. Although he was convicted of only two minor offenses, this, combined with his previous

perceived slights, undoubtedly further angered him. (Not only had General Gates failed to mention Arnold in his report on Saratoga, but also Congress passed over Arnold while promoting junior officers in 1777.) In April, amidst the court martial, Arnold resigned as military governor of Philadelphia. Shortly thereafter, following up on Washington's promise of a prominent position, he requested command of West Point.

On August 3, 1780, Washington granted Arnold's request, never knowing Arnold was already conspiring to give up the stronghold to the British.

To make the arrangements for the sale and capture of West Point, General Clinton sent John Andre to meet with Arnold. The two had long been connected through the secret correspondence chain. Though no one knows exactly what was discussed, they spoke until almost dawn on September 22. Arnold also passed papers concerning West Point's fortifications and other details to Andre, insisting that he hide them in his stockings.

Arnold arranged for a friend, Joshua Smith, to escort Andre back to the British over a land route. He wrote passes for "John Anderson," the code name for Andre, and Joshua Smith to present if they were stopped by the American posts. Arnold then returned to his home near West Point.

The next day, Smith led Andre, dressed in civilian clothes, toward White Plains, NY. Smith turned back several miles short of White Plains, leaving Andre to continue on his own. They were past the usual American lines, and neither expected any trouble the rest of the way.

Three volunteer militiamen stopped Andre outside Tarrytown. Despite having the pass Arnold signed naming him "John Anderson," Andre was searched and the papers hidden in his boot were discovered. The militiamen turned him in to the nearest Continental Army camp, North Castle.

Capture of John Andre. *J. Baillie. Andre is offering his watch and horse for his release. Library of Congress*

Major Tallmadge, who arrived at North Castle shortly after, immediately realized the implications of the situation. Even if "Mr. Anderson" stole the papers without Arnold's knowledge, it was apparent that Arnold met with a spy for some reason. If not incriminating, it was highly suspicious.

Despite these suspicions, there was no proof of involvement, and the commander of North Castle insisted on sending a report of the incident to his commanding officer, Benedict Arnold. However, he sent the confiscated papers to General Washington.

When Andre learned the documents were being taken to General Washington, he knew he was lost. He confessed to being Major John Andre, Clinton's adjutant-general. This confession proved not only that he was a spy, but also that Arnold was guilty.

Arnold received the report sent to him from North Castle. He hurriedly ordered a horse and asked that General Washington, who was expected shortly, be told that he had urgent business at West Point. He mounted up and rode away to the nearest British outpost, making his escape.

Washington arrived at Arnold's home and then went to West Point where Arnold claimed he would be. The captured documents and Andre's confession finally reached him. Washington must have been stunned that his brave, trusted, and tactically brilliant general was in fact a traitor. He didn't hesitate long, however, and quickly sent Alexander Hamilton to catch up with Arnold, but Arnold was already safely behind British lines aboard the HMS *Vulture*.

Arnold's turning shut down the Culper spy ring for some time. Several of the spies feared that Arnold knew their names and had revealed them to the British. Arnold did know that Tallmadge ran a network in New York City and at one point sought out their names on the pretext that as commander of West Point he could use their services as well. Fortunately, no one provided the identities to Arnold, and the spies remained undetected. However, Washington felt the loss of intelligence for several months.

The Tide Turns for the Americans

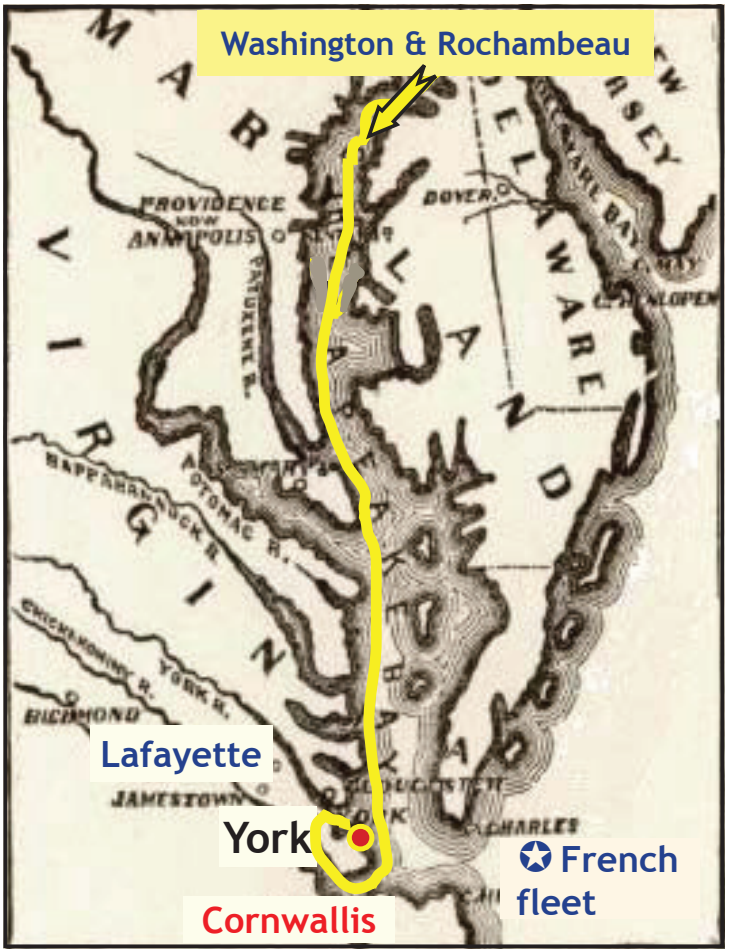
The following summer, 1781, British general Sir Henry Clinton ordered General Charles Cornwallis to fortify a post to protect ships in the Chesapeake Bay. Clinton, along with Admiral Graves, suggested that York (later called Yorktown) might be favorable.

Cornwallis knew that the towns of York and Gloucester, which lay across the York River from each other in Virginia, could not easily be defended. However, he agreed, "to seize and fortify York and Gloucester, being the only harbour in which we can hope to be able to give effectual protection to the line of battle ships."[27] And so Cornwallis found himself forced to defend posts that "would require a great deal of time and labour to fortify… For York and Gloucester, from their situation, command no country."[28]

Meanwhile, George Washington still hoped to win back New York. He had been laying siege to the town all summer and hoped the activities in the south would draw Clinton away, thus weakening the defenses around New York. He planned an assault on the city with Rochambeau's forces and the additional French forces of Admiral de Grasse, who was coming from the West Indies. However, on August 14, 1781, Washington learned that the French fleet would go no farther than Chesapeake Bay. De Grasse would use his fleet, and the troops it carried, to stop the British from establishing a stronghold at the bay.

Washington changed his mind about New York and turned his attention to the south. Along with Rochambeau, Washington began to plan an attack on Cornwallis in Virginia. Washington disguised their activities by playing into Clinton's assumption that the Americans would attack New York City. He made it look as if he planned to move troops to Staten Island, and he set up a false camp in New Jersey knowing Clinton's spies would report it. His deception worked; Clinton didn't realize the Americans' true intentions until the French and American troops were well on their way south.

On August 30, 1781, de Grasse and the French fleet arrived at the mouth of the Chesapeake Bay from the West Indies. He brought with



Washington's route to meet Cornwallis at York

him not only 28 ships of the line and supporting frigates but also 3,000 French troops to reinforce Lafayette's men in Williamsburg, Virginia.

For the next week, almost daily, Cornwallis sent encrypted messages to General Clinton informing him of the arrival of de Grasse and the number of ships involved.

Clinton intended to reinforce Cornwallis. He sent Admiral Graves and some of the British fleet to the Chesapeake. He would

wait for more ships and troops to arrive from Europe and then they would relieve Cornwallis.

The Americans intercepted a message Cornwallis sent on September 8. It described the arrival and forces of the French fleet between the capes of the Chesapeake. Cornwallis added to this letter that Washington and his troops were expected to arrive soon and that Lafayette was in Williamsburg. General Cornwallis also reported that firing was heard from the Chesapeake on September 4–6.[29]

The firing would have been the Battle of the Chesapeake Capes. Admiral Graves's British ships met the forces of the French fleet under de Grasse. To communicate from one ship to another, the British used a visual flag signaling system. The Americans had a copy of the flag code book. One of Washington's men, McLane, had picked it up from James Rivington.

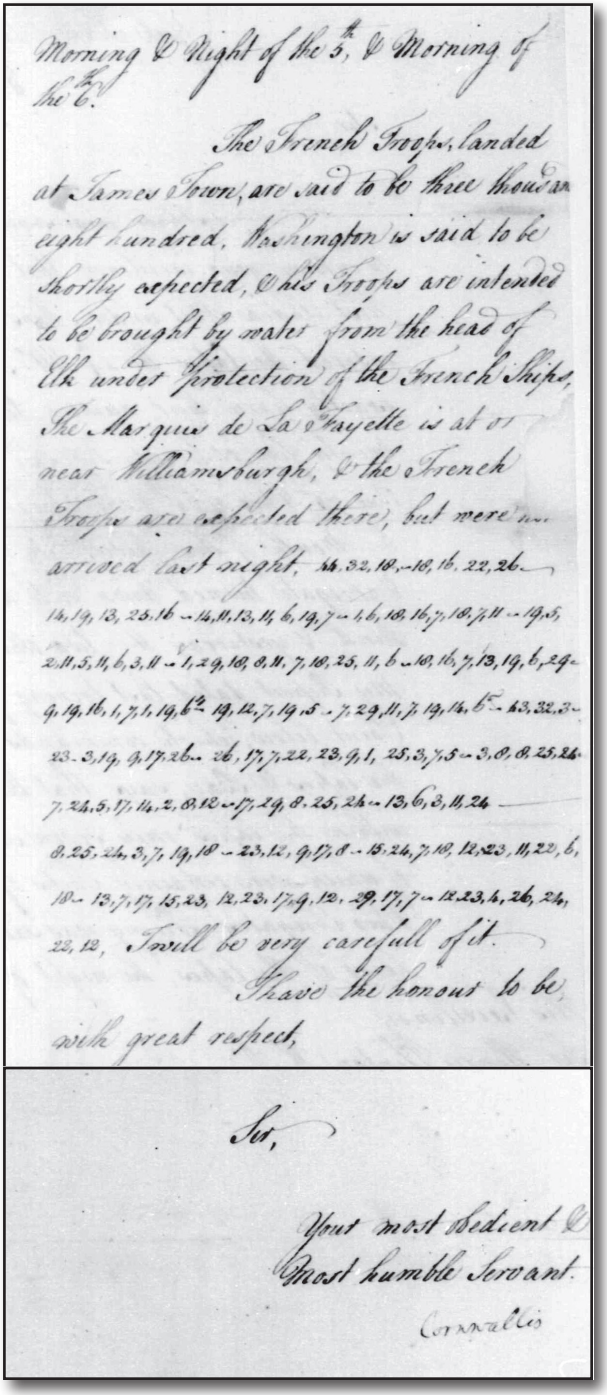
Rivington was the official printer for the King in New York and also a spy for George Washington. In his Tory newspaper, *Rivington's Royal Gazette,* he reported in great exaggerated detail the losses of the Americans while he glossed over any British failures. His apparent dedication to the Crown allowed him access to British military information.

How Rivington came to have the British flag code book is not known, but he was believed to be an ardent loyalist and had frequent contact with the British military in New York. Access to the book may have come openly or secretly. Rivington turned the code book over to McLane, but it isn't known whether McLane got it back to the mouth of the Chesapeake in time for de Grasse to make use of it in the battle.

In the end, with or without the flag code book, de Grasse defeated Admiral Graves. The British ships returned north, leaving Cornwallis to suffer the consequences.

Following all this, Cornwallis, in his September 8 letter, reported his own position (see next page). The details of the American actions are in plain text, but he encrypted the portion of the message revealing his own situation. "As my works were not in a state of defence I have taken a strong position out of the town. I am now working hard at the redoubts of the place."[30]

Cornwallis's partially encrypted message of Sept. 8, 1781. *Washington's Papers, Library of Congress*



Morning & Night of the 5th & Morning of the 6th.

The French Troops, landed at James Town, are said to be three thousand eight hundred, Washington is said to be shortly expected, this Troops are intended to be brought by water from the head of Elk under protection of the French Ships, The Marquis de La Fayette is at or near Williamsburgh, & the French Troops are expected there, but were not arrived last night. 44, 32, 18, -10, 16, 22, 26 — 14, 19, 13, 25, 16 — 14, 11, 13, 11, 6, 19, 7 — 4, 6, 10, 16, 7, 10, 7, 11 — 19, 5, 2, 11, 5, 11, 6, 3, 11 — 1, 29, 10, 8, 11, 7, 10, 25, 11, 6 — 10, 16, 7, 13, 19, 6, 29 — 9, 19, 16, 1, 7, 1, 19, 6 — 19, 12, 7, 19, 5 — 7, 29, 11, 7, 19, 14, 6 — 23, 32, 3 — 23 — 3, 19, 9, 17, 26 — 26, 17, 7, 22, 23, 9, 1, 25, 3, 7, 5 — 3, 8, 8, 25, 24 — 7, 24, 5, 17, 14, 2, 8, 12 — 17, 29, 8, 25, 24 — 13, 6, 3, 11, 24 — 8, 25, 24, 3, 7, 19, 10 — 23, 12, 9, 17, 8 — 15, 24, 7, 10, 12, 23, 11, 22, 6, 10 — 13, 7, 17, 15, 23, 12, 23, 17, 9, 12, 29, 17, 7 — 12, 23, 4, 26, 24, 22, 12, I will be very carefull of it.

I have the honour to be, with great respect,

Sir,

Your most Obedient &
Most humble Servant.
Cornwallis

The intercepted letter uses a simple substitution cipher. The alphabet is randomly scrambled, and each letter is assigned a specific number between 1 and 29, less the numbers 10 and 20.

However, Cornwallis complicated the simple substitution slightly. First, he ran numbers together, separated only by periods, making it difficult to determine word length until it was actually deciphered. Second, after the first encrypted sentence, Cornwallis changed to a different cipher alphabet for the remainder of his message. The original cipher and the cipher change are indicated in separate number groups that include numbers higher than 29 (i.e., 44.32.10 and 43.32.3).

This Cornwallis message was one of several encrypted communications captured by the Americans. James Lovell in the Committee of Foreign Affairs, previously known as the Committee of Secret Correspondence, solved the ciphers.

James Lovell was a pioneer in cryptographic methods. He studied at Harvard and was later elected to the Continental Congress. Shortly thereafter he was assigned to the Committee of Foreign Affairs. He took his assignment to the committee quite seriously and stayed there for five years as other members came and went. Among Lovell's responsibilities on that committee were the writing and deciphering of dispatches.

Comparing intercepted British messages taken from October 1780 through August 1781, Lovell realized that the British made only minor changes to their cipher. "For, it appears to me that the Enemy make only such changes in their Cypher, when they meet with misfortunes ..."[31]

In late September, Lovell sent the keys to these ciphers to George Washington believing they might be of assistance should the general have access to other intercepted messages. On October 6, in a note to Lovell, Washington confirmed, "My secretary has taken a copy of the cyphers and by help of one of the alphabets has been able to decypher one paragraph of a letter lately intercepted going from Lord Cornwallis to Sir Henry Clinton."[32]

These ciphered messages and the corroborating intelligence from other sources gave Washington a full picture of Cornwallis's situation. Cornwallis was desperate. Washington also had word from the north that Clinton and his troops had not yet left New York since they awaited favorable conditions to sail. With everything to his advantage, Washington moved his troops from Williamsburg toward Yorktown, meeting little resistance along the way, and encamped outside Cornwallis's fortifications. The Siege of Yorktown began September 28.

Completely surrounded, Cornwallis could not escape through the bay or by land. His only chance was to hold out until Clinton arrived with reinforcements. His messages to Clinton became more and more desperate as he reported the Americans' encroachment and attacks. On October 11, he insisted in his encrypted message, "I have only to repeat what I said in my letter of the 3d, that nothing but a direct move to York river, which includes a successful naval action, can save me." After describing the rebel actions, he related, "We have lost about seventy men, and many of our works are considerably damaged; with such works on disadvantageous ground, against so powerful an attack we cannot hope to make a very long resistance."[33] Four days later another cipher letter conveys the deteriorating situation and concludes, "The safety of the place is, therefore, so precarious, that I cannot recommend that the fleet and army should run great risque in endeavouring to save us."[34]

Two days later, Cornwallis sent a letter to General Washington requesting cessation of hostilities in order to discuss the surrender of York and Gloucester. Washington was happy to comply.

On October 19, 1781, Cornwallis's deputy officially surrendered to the combined French-American forces. General Benjamin Lincoln accepted the surrender sword at Washington's request.

The day after the surrender, Washington received British intelligence that was still of some importance. It was an intercepted and decrypted message from General Clinton to Cornwallis written on September 30:

> I am doing everything in my power to relieve you by direct move, and I have reason to hope, from the assurances given me

Surrender of Lord Cornwallis. *John Trumbull. General Benjamin Lincoln (center, on horse) accepted the British surrender. Washington is behind on brown horse; Cornwallis himself was not present. French officers are on left.*

> this day by Admiral Graves, that we may pass the bar by the 12th of October, if the winds permit, and no unforeseen accident happens: this however is subject to disappointment …[35]

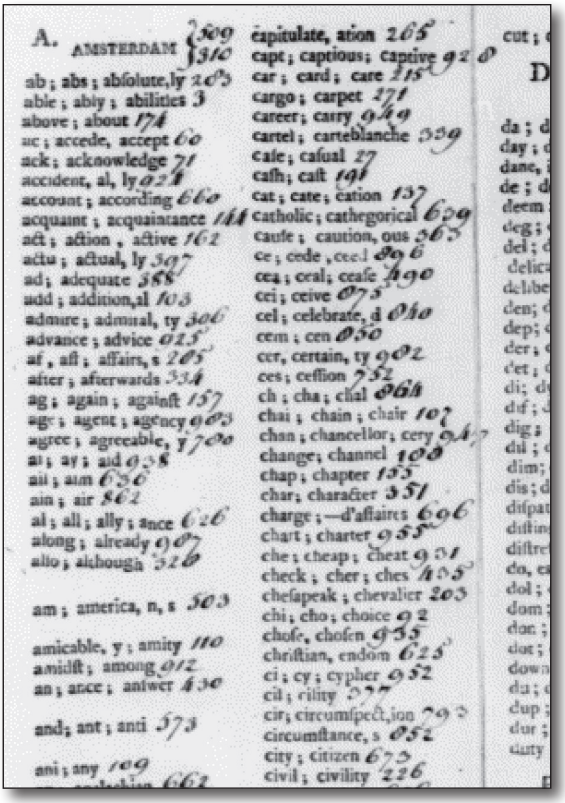
Washington wasted no time in relaying this intelligence to Admiral de Grasse. When Clinton and the British fleet finally arrived at the end of October, he found the French alerted to his activities and learned that Cornwallis had already surrendered. The fleet returned to New York without engaging de Grasse.

Diplomatic Communications Conclude the War

The surrender at Yorktown signaled the beginning of the end of British control in America, but intelligence continued to play a role throughout the remainder of the war. American representatives in Europe expressed the necessity for secret communications and used a wide variety of encryption systems to accomplish it.

Because so many people during the American Revolution created their own systems for correspondence with specific individuals, a multitude of different codes and ciphers were constantly in use. Each system differed from the others in the key that was used. Cipher keys and code lists needed to be accurately copied and transmitted to the various receivers prior to messages being sent in that system. This variety could be quite confusing and required that multiple systems be held by each person. However, it was also quite necessary. It was common practice for European governments to have "Black Chambers" that opened and read other countries' diplomatic mail.

"Whenever you write to me," John Jay, the minister to Spain, wrote to a Philadelphia businessman in 1781, "recollect that your letters will, in nine instances out of ten, be inspected before they reach me; write nothing, therefore, that you would wish concealed."[36] He then described a code using *Entick's Spelling Dictionary*. Rather than using the page-column-word count method, he recommended that 20 be added to the page number and 10 to the word. To indicate in which of the two columns the word was located, he put a dot over the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above ; about 174
ac ; accede, accept 60
ack ; acknowledge 71
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account ; according 660
acquaint ; acquaintance 144
act ; action , active 162
actu ; actual, ly 397
ad ; adequate 388
add ; addition, al 103
admire ; admiral, ty 306
advance ; advice 025
af , aff ; affairs, s 205
after ; afterwards 334
ag ; again ; againſt 157
age ; agent ; agency 003
agree ; agreeable, y 700
ai ; ay ; aid 038
ail ; aim 636
air 862
al ; all ; ally ; ance 626
along ; already 007
alſo ; although 526
am ; america, n, s 303
amicable, y ; amity 110
amidſt ; among 012
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and ; ant ; anti 373
ani ; any 109
capitulate, ation 265
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car ; card ; care 215
cargo ; carpet 271
career ; carry 969
cartel ; carteblanche 359
cafe ; caſual 27
caſh ; caſt 191
cat ; cate ; cation 137
catholic ; cathegorical 629
cauſe ; caution, ous 365
ce ; cede , ceed 906
cea ; ceal ; ceaſe 490
cei ; ceive 075
cel ; celebrate, d 040
cem ; cen 050
cer, certain, ty 902
ces ; ceſſion 752
ch ; cha ; chal 968
chai ; chain ; chair 107
chan ; chancellor ; cery 04
change ; channel 109
chap ; chapter 135
char ; character 351
charge ; —d'affaires 696
chart ; charter 955
che ; cheap ; cheat 951
check ; cher ; ches 405
cheſapeak ; chevalier 203
chi ; cho ; choice 92
choſe, choſen 933
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ci ; cy ; cypher 952
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down
du ;
dup ;
dur ;
duty

Portion of Robert Livingston's code list, 1781. *George Washington Papers, Library of Congress*

first or second number. "For instance, the word *duration* is the first word in the first column of the 139th page, and must be thus written, 159.11."[37] However, when corresponding to a different Philadelphia businessman, Jay suggested changing the page numbers by renumbering them from back to front.[38]

Code lists were also quite popular among the representatives to foreign countries in Europe. One of the earliest two-part codes to be used in America was developed in 1781. The page listed a series of numbers on one side and selected words, letters, or syllables in

alphabetic order on the other side. The users randomly wrote in the words next to the numbers to create their own code. The corresponding numbers were written on the opposite side next to the words.[39]

A Dutchman's Cipher

In addition to the wide use of code lists, the diplomats also favored a cipher Charles Dumas created early in the war.

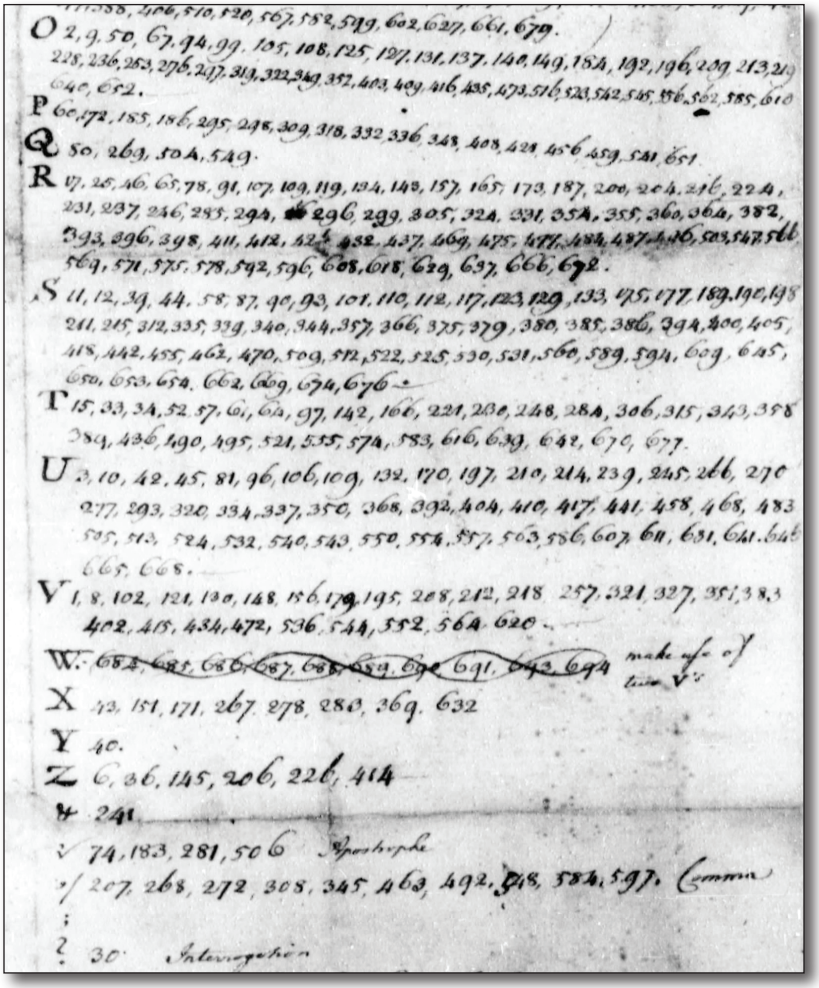
Dumas, a German-born scholar, struck up a friendship and correspondence with Ben Franklin while Franklin served as an American representative in London (1757–1775). At the time of the Revolution, Dumas was in Holland. At Franklin's suggestion, the United States made Dumas an agent. He was paid £100 and given secret assignments. He was to report on foreign diplomats in Holland, disseminate propaganda favorable to America, and win Dutch support for American war maneuvers.

Well aware of European Black Chambers, Dumas understood the need for encryption. He created his cipher from a paragraph of French prose. Each letter and punctuation mark was numbered in a one-up order. For example, the first word of the paragraph was *Voulez-vous*. *V* was numbered 1, *O* became 2, *U* was 3, and so on.

He then wrote out a two-part sheet. One page listed each letter and symbol followed by all the possible number choices to represent that character. The second page listed each number and its corresponding letter or symbol.[40] The French paragraph was 682 characters long, providing several options for the most commonly used letters. The letter *E*, for example, could be replaced by any one of 127 different numbers.

James Lovell's System

Less popular, but often used, was a keyword cipher created by James Lovell in the Committee of Foreign Affairs. He liked systems that could be committed to memory because they provided more



Part of the Charles Dumas cipher. *Continental Papers, National Archives*

security than lengthy code books or lists. Lovell's system used the first few letters of a keyword to create the first letters of multiple alphabets. Then, to create the cipher, each row was numbered 1–27 (the ampersand was one of the characters in the alphabets).

Using *Jefferson* as the keyword in this example, the three alphabets created begin with *J*, *E*, and *F*.

1	**J**	**E**	**F**
2	K	F	G
3	L	G	H
4	M	H	I
5	N	I	J
6	O	J	K
7	P	K	L
8	Q	L	M
9	R	M	N
10	S	N	O
11	T	O	P
12	U	P	Q
13	V	Q	R
14	W	R	S
15	X	S	T
16	Y	T	U
17	Z	U	V
18	&	V	W
19	A	W	X
20	B	X	Y
21	C	Y	Z
22	D	Z	&
23	E	&	A
24	F	A	B
25	G	B	C
26	H	C	D
27	I	D	E

To cipher a word, such as *Fleet*, the user simply moves down the columns, finding each letter and writing down the corresponding

number. *F* in the column under *J* in the keyword corresponds to 24. The second letter is found in the second column and its number is noted: *L* in the column under *E* is 8. The process continues, rotating through columns, until the message is complete. *Fleet* becomes 24, 8, 27, 23, 16.

However, the system didn't always work as well as it could have. One problem came from the way Lovell sent the keyword. For example, in a message to John Adams, Lovell suggested the keyword this way: "You certainly can recollect the name of that family where you and I spent our last evening together with your lady before we sat out on our journey hither. Make regular alphabets in number equal to the first sixth part of that family name."[41]

In a letter to Robert Livingston, the Secretary of Foreign Affairs, Adams complained: "I know very well the name of the family where I spent the evening with my worthy friend Mr. ___ before we set off, and have made my alphabet accordingly; but I am on this occasion, as on all others hitherto, unable to comprehend the sense of the passages in cypher."[42]

Another diplomat and member of the Continental Congress, Francis Dana, on one occasion found Lovell's message unintelligible because he could not remember "the name of the family in Charlestown, whose nephew rode in company with you from this city to Boston."[43]

Because Lovell encrypted official communications from the Continental Congress to its delegates abroad, the members of the Peace Commission in Paris received their instructions in Lovell's cipher.

John Adams, who, as always, had trouble deciphering the Lovell cipher, didn't read an important part of the letter. The instructions included the recommendation that the committee follow the direction of France. He even accused Benjamin Franklin of intentionally withholding the information from him. It wasn't an instruction he was inclined to follow anyway.[44] In the end, the committee, particularly John Adams and John Jay, negotiated with the British representative without consulting the French.

Signing of Preliminary Peace Treaty in Paris, November 30, 1782. *Painting by C. Seiler, Library of Congress*

In November 1782, the British and Americans signed the preliminary treaty without the knowledge of the French. The final Treaty of Paris, signed in September 1783, officially ended the Revolutionary War in America and established the United States as a free, independent, and self-governing country.

On November 25, 1783, the British evacuated New York. George Washington victoriously entered the city right behind them. The Americans were finally in possession of New York City, and the War for Independence was over.

Conclusion

Hard-fought independence from Britain was achieved with the help of codes, ciphers, invisible ink, visual communications, and hidden messages. These techniques protected information traveling between the United States and its representatives in Europe. They also helped George Washington decisively plan his strategy. Spies,

like those in the Culper spy ring in New York, used various methods to keep him abreast of British movements, supplies, and intentions. Because of the spies' efforts, Washington learned of British spies in his midst as well as British plans against American and French forces. With this foreknowledge he was able to successfully protect the French fleet's arrival in Newport and make his move against Yorktown.

Unfortunately, secrets couldn't always be protected from trusted men who also served the British. Men like Dr. Benjamin Church and Benedict Arnold supplied the British commanders with important details of the American intentions. Church used a simple cipher to inform General Gage of patriot supplies and plans. Arnold used a dictionary code to tell the British of Washington's movements as well as propose the sale of a major, strategic American stronghold, West Point.

The British too, used similar methods to communicate their own secrets. Hiding messages behind masks or inside ordinary objects was a common way to protect their information. However, long practiced in the arts of encryption, they used other techniques to a great extent. Loyalist Benjamin Thompson used invisible ink to provide details of rebel intentions very early in the war, while Cornwallis used ciphers to relay his situation at Yorktown near the end of the war.

Reading some of the intercepted messages of the British gave the Americans vital information. Understanding encrypted messages between British generals Clinton and Cornwallis helped confirm and solidify Washington's plan at Yorktown.

Although the war was not won or lost based on any one secret, the secrets of the revolution—those kept and those revealed—played a role in changing the world.

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Notes

1. David Kahn, *The Codebreakers* (New York: Macmillan, 1967), 138.
2. Benjamin Thompson, "Letter to ? 6 May 1775," *Spy Letters of the American Revolution*, in the Sir Henry Clinton Collection of the Clements Library, University of Michigan. http://www2.si.umich.edu/spies/index-gallery.html.
3. Kahn, *Codebreakers*, 180.
4. Thompson, *Spy Letters.*
5. John Bakeless, *Turncoats, Traitors, and Heroes*. (Philadelphia: Lippincott, 1959), 36.
6. S. Tomokiyo, "Benjamin Church and the Cipher Letter," First Codebreaking in the American Revolution, 2009, http://www.h4.dion.ne.jp/~room4me/america/code/church.htm.
7. Kahn, *Codebreakers*, 175–176.
8. William Howe, "Letter to John Burgoyne, 17 July 1777," *Spy Letters.*
9. Ibid. "Henry Clinton to Burgoyne, 10 Aug 1777."
10. Ibid.
11. "Intelligence Techniques," *Intelligence in the War of Independence* (Washington, DC: Public Affairs, Central Intelligence Agency, 1997), 30.
12. George Washington, "Letter to Benjamin Tallmadge, 5 Feb 1780," *George Washington Papers at the Library of Congress*, http://memory.loc.gov/mss/mgw/mgw4/064/0200/0226.jpg.
13. Benjamin Tallmadge, "Talmadge, 1783, Codes," *Washington Papers* http://memory.loc.gov/mss/mgw/mgw4/094/0000/0022.jpg.
14. Samuel Culper Jr., "Letter to John Bolton, 6 Aug 1779," *Washington Papers* http://memory.loc.gov/mss/mgw/mgw4/060/0800/0873.jpg.
15. Samuel Culper, "Letter to John Bolton, 12 Nov 1780," [Benjamin Tallmadge] *Washington Papers* http://memory.loc.gov/mss/mgw/mgw4/072/0700/0704.jpg.
16. George Washington, "Letter to Benjamin Tallmadge, 5 Feb 1780," *Washington Papers* http://memory.loc.gov/mss/mgw/mgw4/064/022/0226.jpg.
17. Samuel Culper, "Letter to Benjamin Tallmadge, 15 July 1779," *Washington Papers* http://memory.loc.gov/mss/mgw/mgw4/060/100/0178.jpg.

18. Carl Van Doren, *Secret History of the American Revolution* (New York: Viking, 1941), 362; quotes British chief justice Smith as saying Clinton told him he had learned about the fleet from Arnold.
19. Ibid., 271, citing B. F. Steven's *Facsimile of the European Archives,* 730.
20. Samuel Culper, "Letter to Richard Floyd, 20 July 1780," *Washington Papers*; http://memory.loc.gov/mss/mgw/mgw4/068/0400/0422.jpg.
21. Samuel Culper, "Letter to Caleb Brewster, 20 July 1780," *Washington Papers*; http://memory.loc.gov/mss/mgw/mgw4/068/0400/0421.jpg.
22. Morton Pennypacker, *General Washington's Spies on Long Island and in New York* (Brooklyn, NY: Long Island Historical Society, 1939), 87, uses an uncited report from Clinton to Lord Germain. See also Alexander Rose, who cites B. F. Steven's *Facsimile*, vol. 7, no. 730, as having a similar letter addressed to William Eden, chief of British intelligence.
23. Benedict Arnold, "Letter to John Andre, 15 July 1780," *Spy Letters*, http://www2.si.umich.edu/spies/index-gallery.html.
24. £20,000 was then equivalent to more than $31,000. According to a conversion website, £20,000 from 1780 would be worth more than £2,130,000 today, which equates to more than $3,375,000. http://www.measuringworth.com/calculators/ppoweruk/ and http://coinmill.com/GBP_USD.html.
25. Benedict Arnold, "Letter to 'John Anderson' (John L. Andre), 30 Aug 1780," *Washington Papers*, http://memory.loc.gov/mss/mgw/mgw4/070/0100/0184.jpg.
26. Van Doren, *Secret History,* 298.
27. Charles Cornwallis, *An Answer to that part of the Narrative of Lieutenant-General Sir Henry Clinton, K.B. which relates to the conduct of Lieutenant-General Earl Cornwallis During the Campaign in North America in the year 1781* (London, 1783), 174; Google Books, 2011.
28. Ibid., 173–174.
29. Charles Cornwallis, "Letter to Henry Clinton, 8 Sep 1781," *Washington Papers*, http://memory.loc.gov/mss/mgw/mgw4.080/1000/1035.jpg.
30. Ibid. For decryption, see also Cornwallis, *An Answer*, 192.
31. James Lovell, "Letter to Nathanael Greene, 21 Sep 1781," in *Letters of Members of the Continental Congress*. Ed. Edmund C. Bur-

nett (Washington, DC: Carnegie Institute of Washington, 1933), vol. 6, 224.

32. George Washington, "Letter to James Lovell, 6 Oct 1781," *Washington Papers*, http://memory.loc.gov/mss/mgw/mgw4/081/0300/0391.jpg.
33. Charles Cornwallis, "Letters to Sir Henry Clinton, 11 and 15 Oct 1781," *An Answer*, 204.
34. Ibid., 204–205.
35. Sir Henry Clinton, "Letter to Charles Cornwallis 30 Sept 1781," *An Answer*, 202–203.
36. John Jay, "Letter to William Bingham, 8 September 1781," http://www.familytales.org.
37. Ibid.
38. John Jay, "Letter to Robert Morris, 19 November 1780," http://www.familytales.org.
39. Kahn, *Codebreakers*, 184.
40. Charles W. F. Dumas, "Cipher," *Continental Congress–Papers*, U.S. National Archives and Records Administration (NARA), 2006. http://www.footnote.com/image/#172689.
41. Ralph E. Weber, *United States Diplomatic Codes and Ciphers: 1775–1938* (Chicago: Precedent, 1979), citing Burnett's *Letters of the Members of the Continental Congress*, vol. VI, 125.
42. John Adams, "Letter to Robert Livingston, 21 Feb 1782," *Continental Congress–Papers*, http://www.footnote.com/image/#436097.
43. Weber, *Diplomatic Codes*, 33, cites this quote in a letter from James Lovell to Francis Dana dated 6 January 1781 in the papers of John Adams. This author was unable to verify that letter. A later letter states that Dana could not decipher the letter because "I cannot recollect the person whose family name is alluded to." Francis Dana, "Letter to John Adams, 16 Mar 1781." *Founding Families: Digital Editions of the Papers of the Winthrops and the Adamses*, 2007, http://www.masshist.org/publications/apde/portia.php?id=PJA11d175.
44. Gregg Lint and William Hay, "The Men Who Signed the Treaty of Paris," in presentation for *The National Archives Experience*, 3 Oct 2008, 5, 17. See also Weber, *Diplomatic Codes*, 31.

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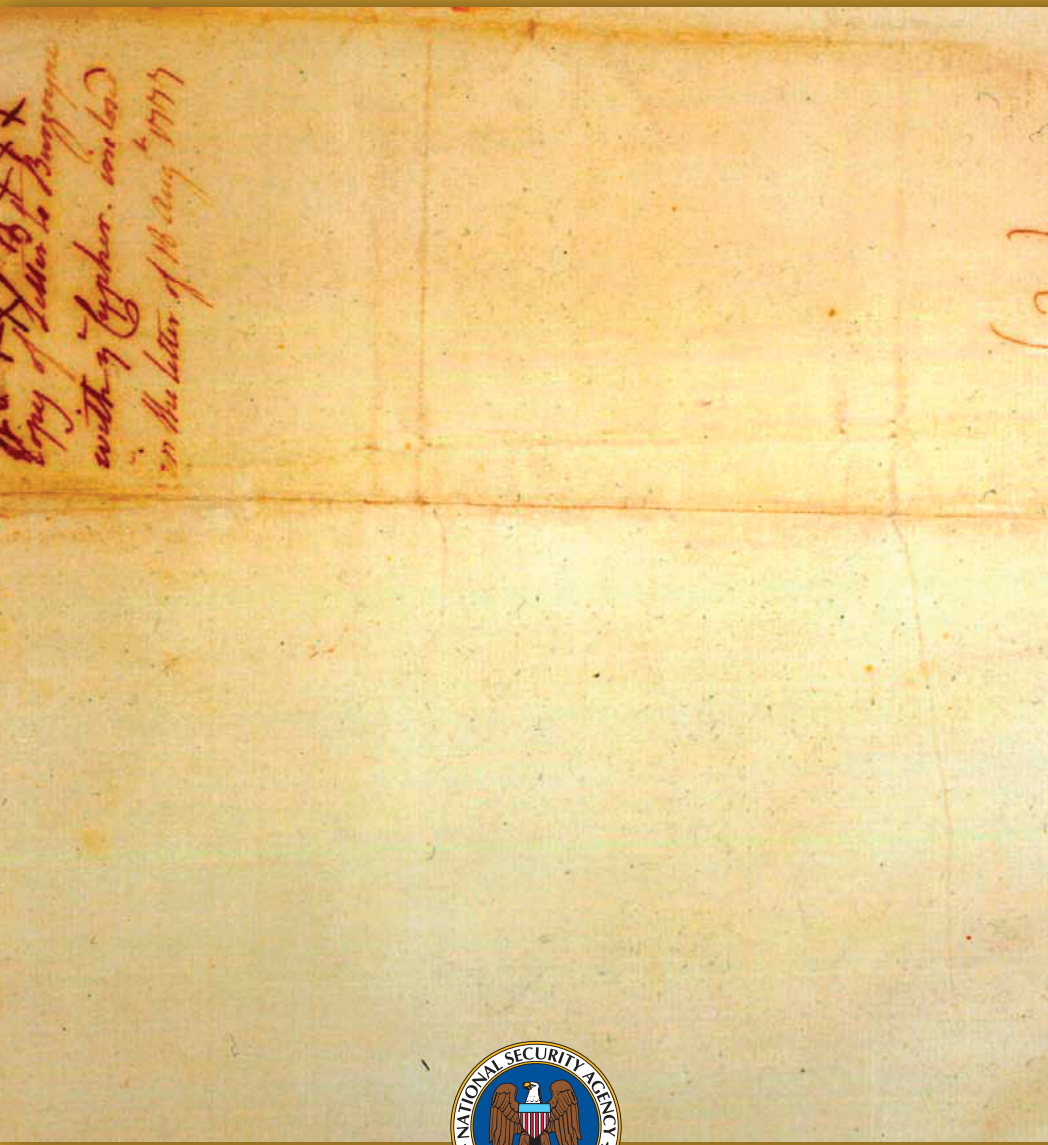

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