

The Spiral-Locked Letters of Elizabeth I and Mary, Queen of Scots

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Introduction

This article introduces the spiral lock, an extremely complex and highly secure letterlocking technique used throughout early modern Europe by people from a range of social backgrounds. Letterlocking – the process by which a flat writing substrate is turned into its own envelope – is a system of document security used to send letters for centuries before the invention of the mass-produced gummed envelope in the early nineteenth century.

Letterlocking was a vital component of securing almost every letter shut for delivery for centuries, across cultures, borders, and social classes, and it plays an integral role in the history of secrecy systems as the missing link between physical communications security techniques from the ancient world and modern digital cryptography. Among hundreds of letterlocking variations identified to date, the spiral locking method is particularly intriguing because famous regents, including Elizabeth I (1533–1603) and Mary, Queen of Scots (1542–1587), seem to have had exceptional skills at using it.¹ A number of the European monarchs who used it were related to and were corresponding with one another, raising the prospect that use of this letterlocking method was spread across European courts through royal correspondence.

One of the most spectacular examples of spiral locking that we examine in this article is Mary's last letter (National Library of Scotland, Adv. MS. 54.1.1; see fig. 1), a document of enormous national importance in Scotland. The letter's contents are powerful and moving: written on the eve of her execution, it acts not only as a letter – a document intended to be sent to and read by someone at distance – but also a last will and testament and a bid for martyrdom. It is sometimes said that writing the letter was Mary's last act; in fact, after she wrote it, the letter had to be folded and secured shut. After writing her last message, Mary used letterlocking to prepare it for delivery. Our article explains how to understand letters such as Mary's as objects with their own material history, how to read their unique evidence, and how to contextualize them within letterlocking, a new field of study. We hope that our findings prompt and model novel kinds of archival research, and allow even very well-known artefacts to be examined anew.

¹ Because the elder sister of Elizabeth Tudor (Elizabeth I of England) was also a Mary (Mary Tudor; Mary I of England) and the two are commonly confused, it is useful to clarify that Mary Stuart (Mary I of Scotland; Mary, Queen of Scots) was Elizabeth's cousin, not sister. Mary Stuart's son, James Stuart (James VI of Scotland), succeeded Elizabeth to the English throne as James I of England.

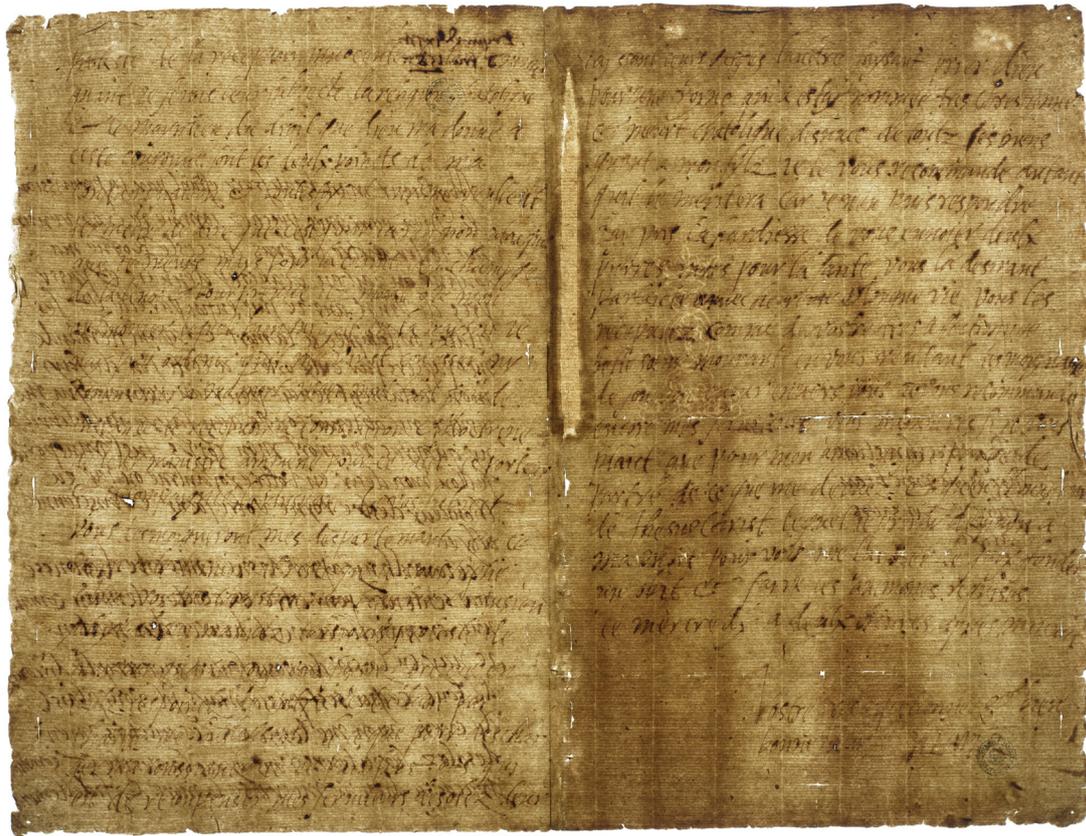


Fig. 1. UH135, backlit to show paper-making artefacts (laid lines and chain lines) and evidence of repair.

One of the challenges of studying letterlocking is that the evidence for this practice has often been damaged or obscured in the process of opening letterpackets. Like a modern gummed envelope that is torn to access a letter, historical letterpackets were designed to be opened by their intended recipient – which is to say that they are designed to be broken. In the case of a high-security system such as the spiral lock, portions of the letter are actively designed to be destroyed as an additional security measure, as we explain below. Like all documents, letters deteriorate over time especially if they are frequently handled; if they are moved into archives and libraries, they are often subject to a range of storage practices and other interventions designed to protect collections while providing access to researchers. Repair techniques used to stabilize documents, or storage options such as binding them into letterbooks, might themselves cover up important material features that attest to the locking process.

This article describes spiral locking in detail, using both verbal and visual descriptions. It shows researchers what to look for in examples that have been opened and have lost evidence (whether in the opening process, through wear and tear caused by handling, or in the repair process). The spiral lock is important to trace because it can help historians identify contents that were considered especially sensitive, and it can help scholars track some of the most sophisticated users of document security. It is compelling in and of itself as an unstudied example of historical communications security systems. Yet it also seems to offer a completely new window into the activities of individuals whose lives have been pored over extensively.

This article reconstructs spiral-locked letterpackets based on an exacting study of multiple archival documents, each of which supplied evidence missing in the others. After two decades of research into letterlocking – and twelve years on this particular locking method – these findings have become particularly timely because our discoveries coincide with three scholarly developments in the study of early modern history: the launch of letterlocking as a field of study in March 2021 by the Unlocking History Research Group, presenting the first

systematization of letterlocking techniques, based on the consultation of 250,000 documents in some seventy archives; a major exhibition at the British Library, *Elizabeth and Mary: Royal Cousins, Rival Queens* (8 October 2021–20 February 2022); and the initiation of a large-scale research project into the documents that record the Scottish Queen’s life, *Truth, Myth and Material History: Situating Objects Relating to Mary, Queen of Scots Within a Digital Connected Collection* (Principal Investigator Steven Reid; Co-Investigators Paul Gooding, Anna Groundwater, and Alison Wiggins).

We demonstrate here both how letterlocking features can be described and recorded, and how conclusions about them can be incorporated into various kinds of research output; see Response 1 below by Alison Wiggins of the University of Glasgow, and Response 2 by Andrea Clarke and Alan Bryson of the British Library. As well as linking to free online instructional videos, the article debuts methods developed by the Unlocking History Research Group for visually depicting physical features such as folds, adhesive, and paper locks in diagrams.²

What is letterlocking?

The early modern period in Europe (broadly understood here as 1500–1700) witnessed a major expansion of interpersonal and intercultural exchange. Alongside the famous ‘print revolution’, increasingly formalized postal networks rewired global trade, imperial governance, and familiar correspondence and, as part of an enormous growth in literacy and spread in the availability of paper, epistolary writing (from the Latin for letter, *epistola*) was transformed profoundly. However, letter-writers in this period were not able to purchase ready-folded and pre-gummed envelopes from the shops – because they had not yet been invented. Most writers wishing to send a letter in this period would have had to use letterlocking, the act of folding and securing an epistolary writing substrate to function as its own envelope or sending device.³ Letterlocking facilitated global correspondence in the early modern period as fundamentally as computer coding underpins digital communication today.

² Annie Dunn established the core visual principles of our vector diagrams, creating our step-by-step diagrams and the spiral-lock cross-section illustrations. Matthew Li and Jana Dambrogio refined aspects of diagrams and images. Nicole Araya subsequently developed foldable models and further step-by-step diagrams, and standardized the visual language we use for manipulations.

³ The core tenets of letterlocking are set out in: Jana Dambrogio, Amanda Ghassaei, Daniel Starza Smith, Holly Jackson, Martin L. Demaine, Graham Davis, David Mills, Rebekah Ahrendt, Nadine Akkerman, David van der Linden, and Erik Demaine, ‘Unlocking History through Automated Virtual Unfolding of Sealed Documents Imaged by X-ray Microtomography’, *Nature Communications*, xii:1184 (2021) <<https://doi.org/10.1038/s41467-021-21326-w>>. Cf. Smith and Dambrogio, ‘Letterlocking: Securing Correspondence before Envelopes’, *Routledge Encyclopaedia of the Renaissance World*; Smith and Dambrogio, ‘Unfolding Action: Letters as Props in the Early Modern Theatre’, in Tamara Atkin and Laura Estill (eds.), *Early British Drama in Manuscript* (Turnhout, 2019), pp. 229–45; and Dambrogio and Smith (eds), Letterlocking.org <<http://letterlocking.org>>. A monograph, *Letterlocking*, and the *Dictionary of Letterlocking (DoLL)* are in preparation.

Earlier studies of material documents that especially informed the work of Unlocking History include: Giovanni Riggi di Numana, *Il segreto epistolare nel periodo della civiltà della carta* (Cortina, 2008); Pierre Chaplais (ed.), *Diplomatic Documents Preserved in the Public Record Office* (London, 1964); Colette Sirat, Ada Yardeni, and Malachi Beit-Arié, Comité de Paléographie Hébraïque, *Les Papyrus en caractères hébraïques trouvés en Égypte* (Paris, 1985); Colette Sirat, Lenn Schramm, and W. C. Watt (eds.), *Writing as Handwork: A History of Handwriting in Mediterranean and Western Culture*, Bibliologia Series (Turnhout, 2006); Giovanni Riggi di Numana and Piero Damilano, ‘La “nizza” questa sconosciuta’, *Il Foglio*, xxxvi (1985), pp. 43–6.

Solène de la Forest d’Armaillé proposes some diagrammatic representations of letterpackets, including a spiral-locked letter by Catherine de’ Medici; our diagram differs from hers in accounting for the recursive perforation made by the lock as it passes through itself. ‘Sous le pli du secret. L’apparition des “cachets” de gomme laque dans les correspondances diplomatiques (1560-1580)’, in Thérèse Bru (ed.), *Les Échanges de correspondance du XVIe au XIXe siècle* (Saint-Denis, 2017), pp. 53-80.

Despite their vital importance to communication security over centuries, only recently have we begun to understand how letters actually *worked* as engineered objects. Letters are normally encountered today in archives as flat, two-dimensional artefacts; the study of letterlocking seeks to understand the physical manifestation of a letter throughout the many stages of its existence, including its preparation for sending and its opening by the recipient; our study reverse-engineers these items into models that can be opened and closed repeatedly in order to understand how they operated at various points in the epistolary life-cycle. Turning a writing substrate into a locked letterpacket involves the use of one or more ‘manipulations’: folding/rolling, slits/holes, tucks, the application of adhesive, and the use of locks.⁴ Locks might be sourced from the writing substrate itself (e.g. a corner of the letter entirely cut off, or a strip of substrate remaining attached to the main body), or they might come from elsewhere (e.g. a length of silk thread, or another piece of paper). The Unlocking History Research Group has documented dozens of key letterlocking methods, with extensive, essentially infinite variation at the micro level. Some folding and locking methods stand out as particularly flamboyant, and some demonstrate much higher degrees of security than others. Variations of the spiral lock are both of these: inventive and attractive, with built-in self-destruct mechanisms that ensured some of the highest security among early modern communication technologies.

Letterlocking traditions can be traced in papyrus, vellum, and other materials, but the majority of documents consulted by Unlocking History to date have been paper. Paper sheets have been transformed into letterpackets since the 1390s or earlier, and the thinness, economy, and foldability of paper have made it the material of choice for correspondence since the fifteenth century. It is worth stressing that paper was a relatively new technology in the early modern period, and innovations in document security at this time reflect that novelty. Letterlocking is part of a 10,000-year-long document security tradition, and the early modern period in Europe has left us a particularly rich dataset for study.

While most researchers’ attention is naturally drawn to a letter’s written contents, the material evidence on surviving opened letters, such as crease marks and wax seals, testifies to thousands of folding techniques employed over the centuries to turn a flat sheet of paper into a secure letterpacket. With careful study, this evidence can be used to reverse-engineer historical letterpackets, which consequently become a key dataset for the study of historical communications security. The study of letterlocking is built on extensive modelling, both in the presence of the original artefact and afterwards. Future publications by Unlocking History will explain the modelling process in more detail. This article supplies links to multiple instructional videos on *YouTube* which demonstrate the value of physically making letters to see how they functioned and their external appearance as folded and secured letterpackets.

Information about a letter’s folding and locking can be gleaned from observation of historic examples, and this article will provide an introduction to some of the important material features that make up a locked letterpacket. A true understanding of those features, however, often depends on noticing the tiniest of details, and including them in our modelling practices. This article draws attention to some of those tiny details, which could be overlooked all too easily, but which are ultimately the key to our understanding of the most complicated of historical locking mechanisms. We show how the spiral lock worked as an engineered paper closure system and demonstrate how conclusions about it were reached in the face of partial evidence. To truly understand its functionality, one must have an idea of how it is created.

⁴ For more information on these terms and how they are used, please see the *Dictionary of Letterlocking (DoLL)* <<http://letterlocking.org/dictionary>> under development, or Appendix: Glossary of letterlocking terms below.

Some letters were not folded to become their own envelopes, but were folded and then enclosed in a separate piece of paper which we call a ‘wrapper’ to distinguish it from the modern pre-made envelope. If the wrapper also contained writing beyond an address, we call it a ‘letter-wrapper’.

How to make a spiral lock

The spiral lock is so named because of the distinctive action of its locking mechanism, which repeatedly passes through both the letterpacket and itself in a series of circular movements. This section takes the mechanical principles we have derived from the study of multiple examples and turns them into generic instructions; later in the article we show individual examples and point to their unique qualities, as well as certain variants. To create a spiral-locked letterpacket, the letterlocker needs only paper (substrate), a sharp blade, and a small tool with a flat, thin point, like a bradawl. Some of our diagrams below show the process working on a single folio; others show it on a bifolium, as in our reconstruction of Mary's last letter.

In a typical example, the writer begins by folding the left edge to create a panel approximately 25mm wide down the full length of the substrate, and then *unfolding it again*, so that the crease creates a writing margin. In the early modern period, this kind of margin is a common manipulation made to assist writing, not a letterlocking manipulation.

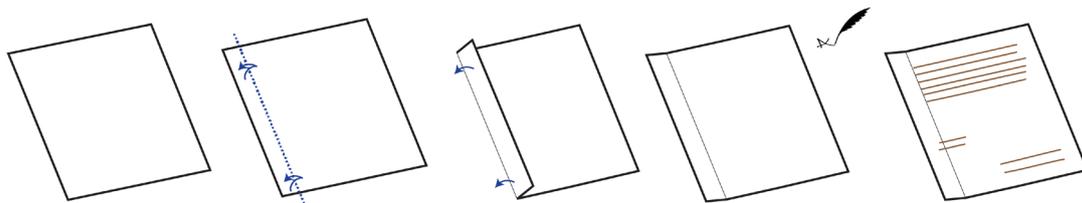


Fig. 2. Locking steps for spiral lock.

After writing, the letter is then folded in half short edge to short edge, *and then unfolded again*, creating a crease across the centre of the substrate running from long edge to long edge.

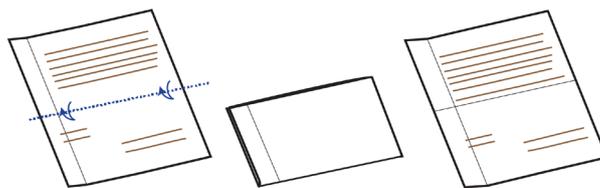


Fig. 3. Locking steps for spiral lock.

The left long edge folds over on itself, aligning with the margin crease. That flap – approximately 13mm wide, or half the width of the writing margin – remains folded.



Fig. 4. Locking steps for spiral lock.

Keeping this edge folded, a strip of the substrate is sliced out along the crease from near the top edge to the central horizontal crease. When the margin fold is unfolded, a thin strip of the substrate sticks out, while remaining attached at one end. This acts as the ‘lock-SA’: a lock cut into or sliced internally from the writing substrate of the letter, but not detached entirely before it is used to secure the letterpacket shut. SA signifies ‘Same substrate, Attached’.

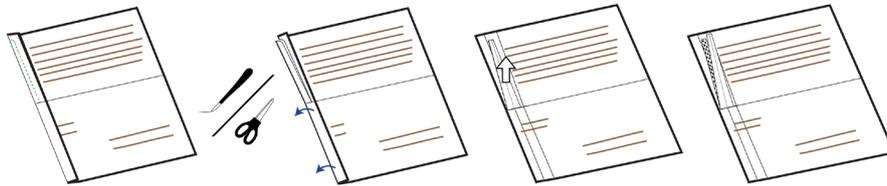


Fig. 5. Locking steps for spiral lock.

The substrate is folded again, aligning short edge to short edge (using the existing central crease), with the lock left protruding. The packet is then roll-folded twice to make a thin strip, which is folded in half along the vertical axis to make the final packet shape – all the time with the lock protruding.

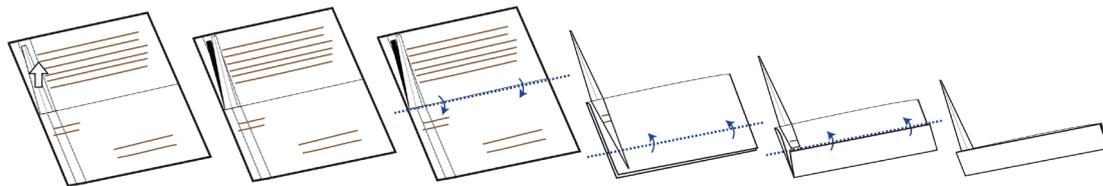


Fig. 6. Locking steps for spiral lock.

The next goal is to secure the packet by passing the lock through the packet multiple times. The lock (formed of a single layer of paper) is folded in half along its vertical axis to make it both thinner and stronger. Following an imaginary line down from the centre of this fold, a small slit (about 3mm long) is stabbed in the packet with a bradawl (a hand tool with a tiny straight blade which produces short slits with an even shape from beginning to end), and the tip of the lock is threaded through.

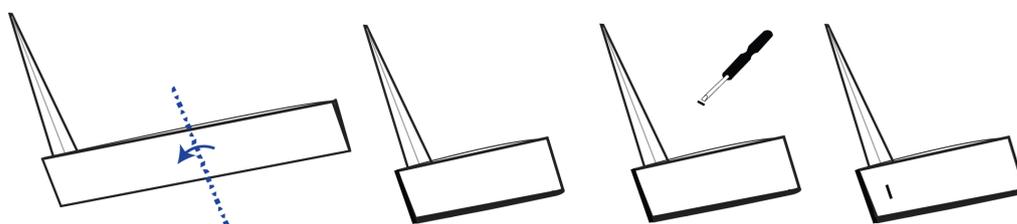


Fig. 7. Locking steps for spiral lock.

Once the tip has passed through the slit, the body of the lock is flattened to lie flush with the packet.

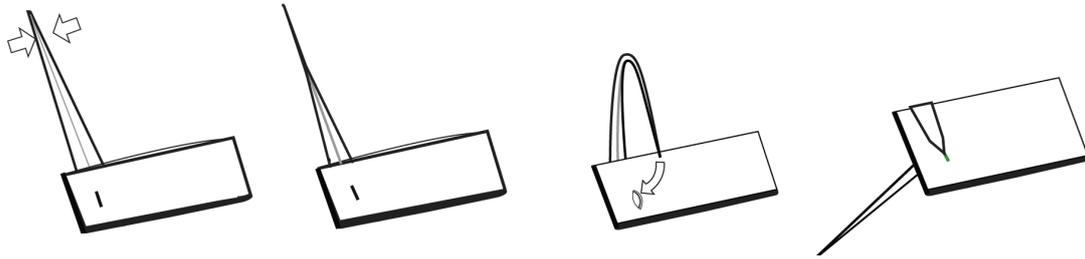


Fig. 8. Locking steps for spiral lock.

At this stage, the packet is turned over. Another slit is made, this time passing through the whole packet *and* the lock on the other side. The tip of the lock passes through them all and is pulled tight, with the body of the lock flattened out.

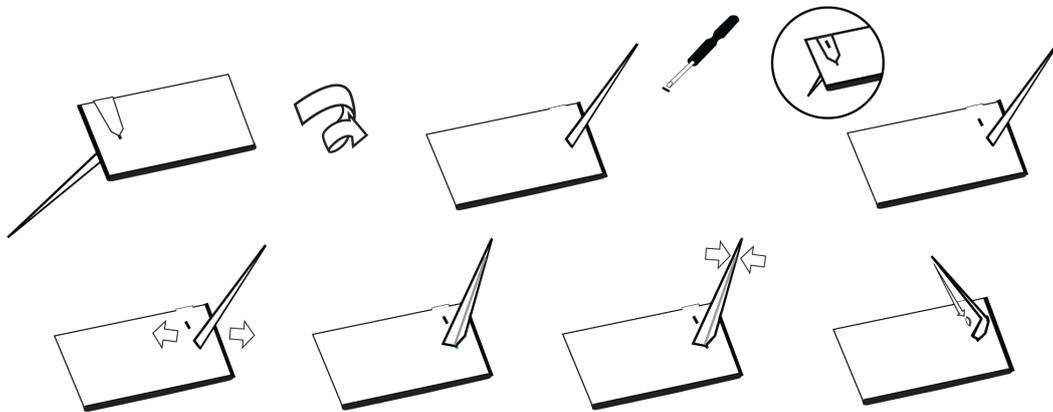


Fig. 9. Locking steps for spiral lock.

The packet is turned over again, and another slit made, through both the packet and the lock so that the lock can pass through the packet in a spiral motion, until the tip is left protruding.

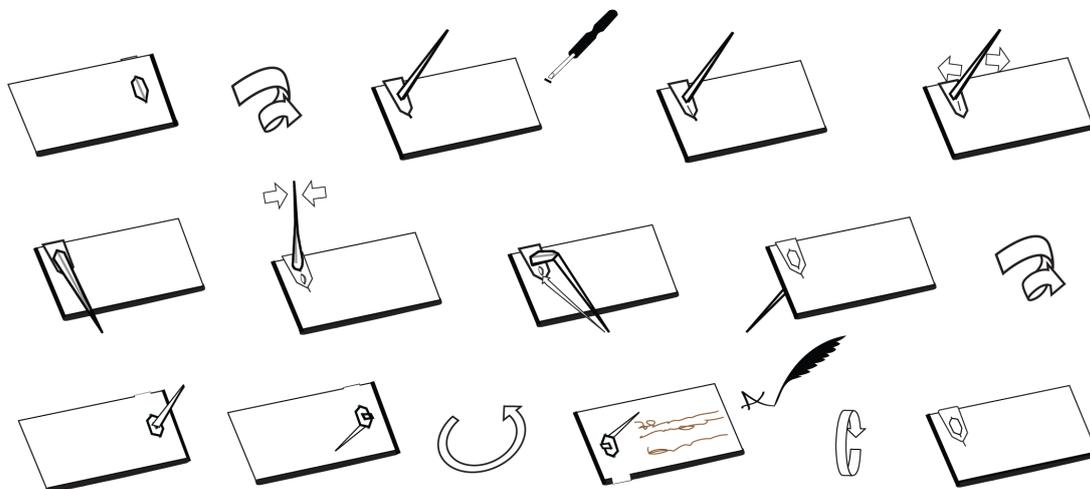


Fig. 10. Locking steps for spiral lock.

At this point – after a process of thirty or more steps – the lock may be considered complete; the application of a little water (or even saliva) would cause the paper fibres to expand enough that the lock would have to be torn in order to gain access. To fix the lock even more securely, some practitioners would apply adhesive over the tip of the lock, sticking the tip down. The letterlocker might then add an additional layer of paper or other material to create a covered (or papered) seal. Whether the adhesive was covered or left exposed, it is likely that it would have been impressed with a seal stamp. If extra paper was added in this way, it is counted as a lock-O, a lock cut from a substrate **O**ther than the main writing substrate.

Viewing the spiral lock closure system in cross-section

Figure 11 shows the spiral lock closure system in cross-section, with the interior view of the packet stretched in order to show various details; and a reconstruction of the paper lock-SA as if unfolded intact, highlighting its creasing and panels. Both images have been simplified in order to emphasize the locking mechanism itself. In reality, the areas labelled here Side I and Side II would each consist of multiple layers of the writing substrate (usually between twelve and eighteen layers of paper, but up to thirty-two in the letters we have studied); here they are represented as a single line. This image shows how the lock passes through the packet and itself in a spiral motion. The slits made for the lock to travel through are labelled X, Y, and Z consecutively. Each section of the lock is numbered 1 to 12 from the base to the tip so that its progress can be tracked.

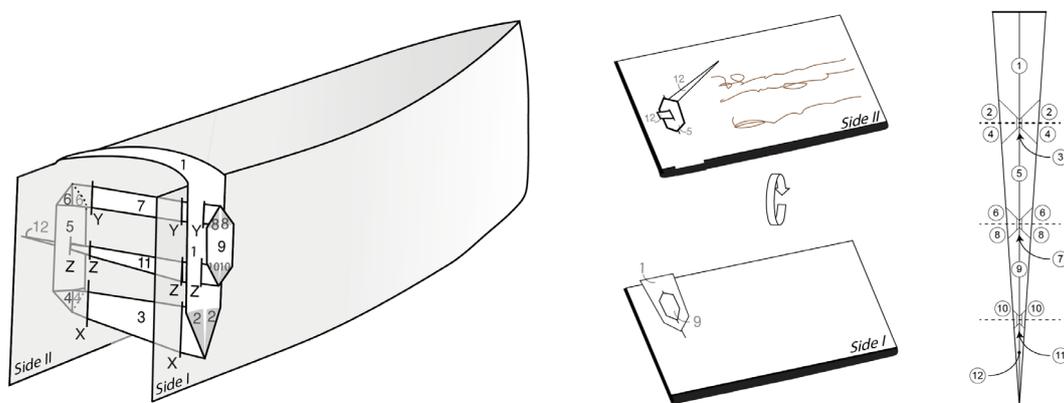


Fig. 11. The workings of the spiral-lock locking mechanism. **Left:** Model of the locking mechanism showing the threading sequence taken by the lock-SA; 1–12 indicate different sections of the lock as it wraps around and passes through the slits made into the packet and itself (3, 7, and 11); X–Z indicate slits through the packet and lock. **Centre (top and bottom):** Model of a closed packet using this lock (front and back). **Right:** Diagram of the lock indicating different folded sections; numbers on the lock correspond to the image on the left.

Figure 11 shows how the closed packet looks when the lock has completed its journey, in cross-section (left), and on both the address side (centre top) and the reverse side (centre bottom). Note that slits Y and Z travel through the lock itself as well as the main body of the letterpacket. The tip (the section numbered 12 in Figure 11, right) can be secured with adhesive at this point, but the lock is also secured without adhesive sometimes, as explained below. The image on the right in Figure 11 shows the lock itself as if unthreaded, intact, and

flattened, so that its crease patterns can be read. Numbers correspond to the sections of the lock caused by folding, and these numbers can be matched to the other images.

Opening the spiral-locked letter

The mechanics of this lock force the person opening the letter to tear the lock apart in order to access the contents. In the case of our example above, the paper lock will have to be broken in at least four places: 1, 7, 11, and 3 in our diagram (see fig. 12). The locking mechanism is essentially destroyed in the opening process – although the lock’s components can survive attached to the letter, with or without the presence of adhesive (see examples in Figure 30).

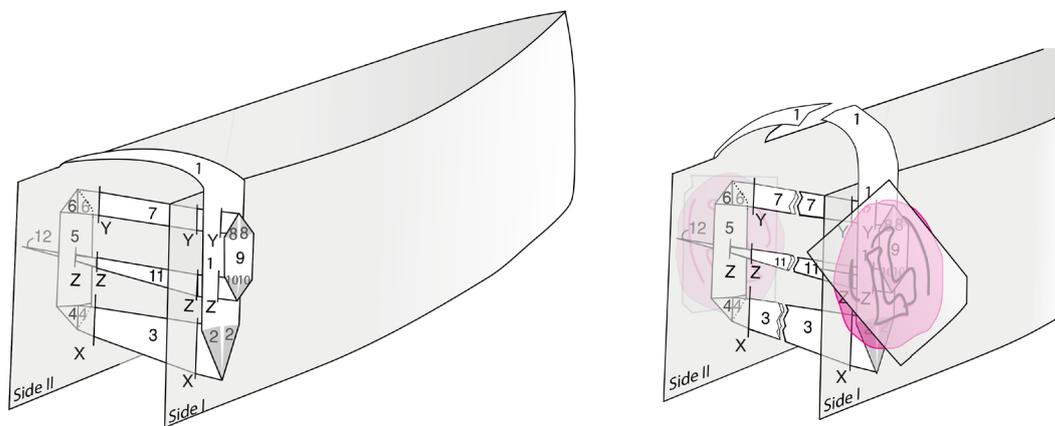


Fig. 12. Spiral lock shown with addition of sealing wax, lock-O, and a papered seal.

The almost guaranteed destruction of the lock-SA is precisely what makes this mechanism so secure. When a letter using this locking system is opened, a hole is visible indicating where the lock was slit from (see fig. 13 and various images of real letters below). Because the lock breaks in multiple places, it is impossible to piece back together in a way that would allow it to pass through the slits again; if someone thought their correspondence had been tampered with, it would be relatively simple to detect interventions.

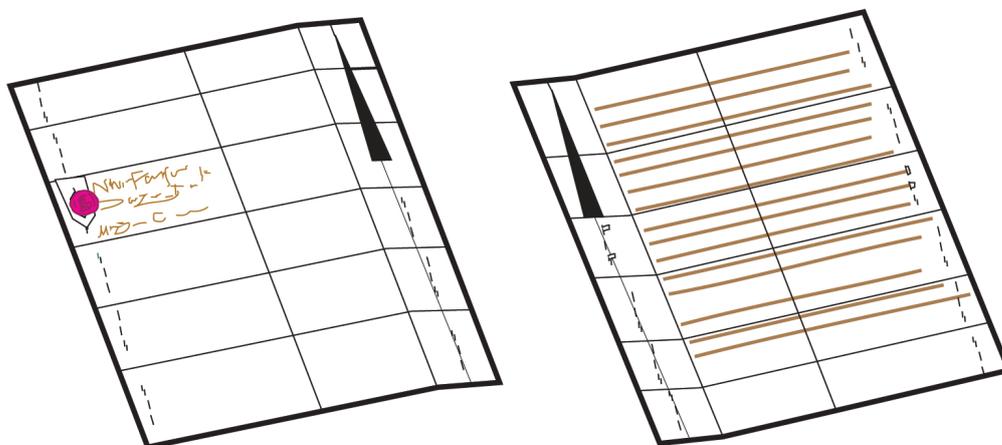


Fig. 13. A spiral-locked letter in opened manifestation, emphasizing hole where lock-SA has been torn off during opening.

Spiral-locked letters: category, format, security score

Letterlocking data is grouped by two main subsets: **category** and **format**. A letterlocking category is a distinct class of locked letters defined by the unique combination of physical manipulations used to transform a writing substrate into a letterpacket. We define the letterlocking format according to the number of edges of their silhouette and orientation relative to the address when the letterpacket is closed. More information about these concepts can be found at <http://letterlocking.org/categories> and <http://letterlocking.org/formats>, and Appendix: Glossary of letterlocking terms, below. For a visual representation of these concepts, see our Categories and Formats chart, which can be downloaded from Unlocking History's online repository in Dataverse <<https://dataverse.harvard.edu/dataverse/uh>>.

The spiral-locking mechanism uses the following manipulations at a minimum: a lock-SA, folds, and slits. This means it is a letterlocking category 27 (LC27). If adhesive is added, it becomes LC31. We have also seen examples that use an additional lock-O, bumping the spiral lock up to LC47. The final packet shape is a rectangle; letterlocking format is determined by the orientation of the packet relative to the address when the packet is held to be read. In the surviving examples we have seen, senders have made a rectangle-wide packet (LF4RW). To these we can also add a security score.

A letterlocking security score (**Zero**, **Low**, or **High**) is assigned to indicate how difficult a letterpacket would be to open and reclose undetected. Security scores can be assigned to an opened letter that preserves its locking evidence; to a locked letter, by the locker themselves or someone who has watched them lock it; or to a locked letter scanned and digitally unfolded. In the example shown above, enough evidence survives about the lock that we can assign a High (H) security score: since it is both difficult to break into and employs particularly complex tamper-evident mechanisms. A lock cut from the substrate itself (a lock-S, with S referring to the Same substrate) brings a major boost to security score. In an age before identical, industrially produced writing surfaces, if a lock-S was broken during opening, it could only be replaced by something similar, rather than identical, since each writing surface made of parchment, papyrus, and early handmade paper (i.e. pre-1830) is unique. In handmade paper, watermarks, chain lines, laid lines (also known as wire lines), colouring, and even the distribution of paper fibres all attest to a unique substrate. A suspicious recipient could compare the remnant of the torn lock with the area of the substrate from which the lock was cut, and check if they tally.

Identifying the spiral lock in archives, understanding conservation protocols

Most surviving examples of spiral-locked letters will be encountered in archives, where packets are likely to be stored in an opened manifestation, sometimes after flattening, humidification, and a series of other repairs that may compromise folding evidence. Even though these artefacts can reveal much in the way of locking evidence, letterlocking research is fundamentally based on letters with zero or minimal conservation. In the next section, we show three historical artefacts with varying degrees of visible evidence which have proved vital to understanding this technique. First, though, it is useful to establish the kinds of features that can be detected on opened surviving examples of spiral-locked letters.

The main distinguishing feature of a spiral-locked letter is a dagger-shaped or sword-shaped hole running along a blank margin, which indicates where the lock has been slit out. Certain conservation techniques might fill this hole with repair paper in order to stabilize the substrate so that the letter could be handled without tearing. Some examples of opened letters discussed below have not been conserved, keeping this hole visible. Being able to see spiral locks

without repairs helps emphasize the missing area as a key feature of the letter, even when no part of the actual lock remains. Once a hole like this has been identified, there is a high likelihood that a series of slits will run down the long edges of each page. The number and size of these slits help researchers reconstruct how the packet was locked: as we shall see, on some occasions Mary, Queen of Scots used a single large slit rather than multiple smaller slits.

The material evidence establishing category, format, and security score in letterlocking is often small or detachable (and, hence, subject to loss). Locks and adhesives have frequently fallen away, and centuries of storage and handling increase the chance of loss and damage. Material features that might be read as ‘damage’ in archival contexts become liable to ‘repair’ during conservation. Examples of repairs that obscure evidence include filling holes, covering slits with paper and adhesive, flattening creases so that their mountain/valley assignments can no longer be determined, and surface-cleaning substrates so that the outer and inner panels are no longer distinct from one another. Seals, wax, and lock remnants that have fallen from a substrate may have been stored separately from the rest of a letter, reattached to the wrong area of a substrate, or may even have been discarded. Custodians who desired a neat appearance may have had damaged or uneven edges trimmed. Letters formerly stored loose or in bundles may have been re-folded and/or bound into letter-books, whether to keep related subject matter together or to present collections safely to researchers.

The study of letterlocking relies on letters preserved and stored in a way that does not destroy, damage, or obscure their material evidence, or seem to suggest a letterlocking innovation where none exists. This is why we pay particular attention in this article to a letter’s state of conservation, so that we can be confident that we are making our argument based on original material evidence rather than later interventions. We are also lucky that a rare few intact locking mechanisms provide the data required to understand historic examples that no longer retain all their evidence.

As part of the broader Unlocking History research project, we are seeking to develop a language for talking about conservation which is both descriptive and impartial. We realized that terms such as ‘well-preserved’ or ‘pristine’ are insufficiently nuanced to capture the different kinds of evidence that the study of letterlocking foregrounds: a torn and dirty letter might preserve evidence of opening and transportation *extremely well*, but could look unattractive to a reader expecting carefully cleaned up historical documents (in an exhibition, for example). We have found it most valuable instead to estimate how much evidence is present as a percentage.⁵ By carefully reverse-engineering multiple models of letter we can understand how it worked as a locked letter, and use this information to propose an estimate of how much evidence is present or missing. This way, we avoid imposing a misleading sense of hierarchy on data which is all the more rich for showing different stages of the epistolary life-cycle.

The spiral lock: three historical examples

So far, we have demonstrated how the spiral lock worked, based on our methods of reconstruction. Later in the article we will share how we use this information to interpret the letters of Elizabeth and Mary. In this section, we turn to some historical examples of this locking method, both to reveal more information about real spiral-locked letters, and to indicate the process by which we arrived at our claims, piecing together evidence for the spiral lock from multiple incomplete examples. The locking mechanism is presented in three states of preservation on three letters that appear to be without repairs or interventions. Two cases retain as much as 99% of the locking mechanism intact (Examples 1 and 2), while a third has a much more typical loss of evidence (Example 3), retaining more like 30%.

⁵ For an existing system of assessment based on percentage analysis of damage, see Nicholas Pickwood’s Assessment Manual for the Ligatus project (2004) <<https://www.ligatus.org.uk/node/19>>.

Example 1, UH127: unidentified author, 1638

Our first letter survives in the Musée de La Poste, item MP 6048 in the Vivarez Collection, from an unidentified author to the city consuls on 16 December 1638. The writing substrate is a single folio of paper measuring 296.5mm high x 170mm wide; three sides are deckle and one trimmed, implying that it was cut from a full sheet of paper. The manipulations used in the letter are fold, slit, and lock-SA. This combination makes it a letterlocking category 27; despite the fact it used no adhesive, this is a high-security letter, so we give it the overall code LC27H. As a folded packet, oriented so that the address can be read, it is a wide rectangle in shape, so its format is LF4RW. In the Unlocking History Research Group archive (MC0760), it is catalogued as UH127.⁶ The lock is 112mm long and 21mm wide at the base. You can watch an instructional video about this letter here < <https://www.youtube.com/watch?v=1ZRA8KZrNTQ>>.

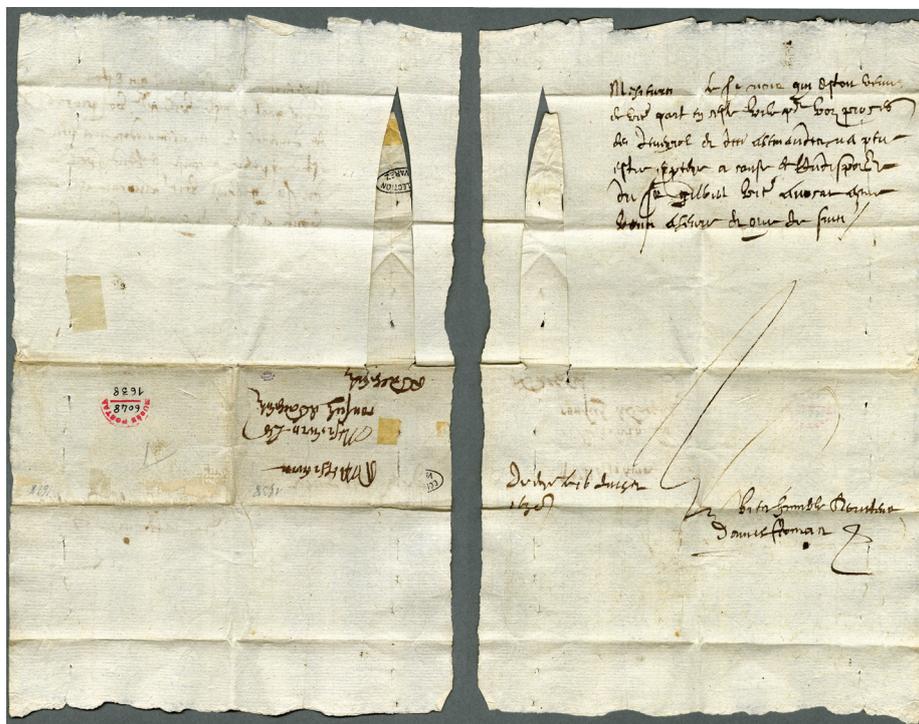


Fig. 14. UH127, verso (left) and recto (right).

This 1638 letter is the only one we have identified to date which preserves the majority of its perforated lock-SA. Because no adhesive was used on or near the lock, the recipient or a later owner was able to unravel the lock with almost no damage: only the tip of the lock is missing.⁷

⁶ UH numbers allow a single item to be tracked across various manifestations: the original, working models, exact models, step-by-step diagrams, print-at-home foldable models, and instructional videos. Thanks to Rebekah Ahrendt and David van der Linden for providing us with a translation of this letter.

⁷ Some adhesive has been used on this letter, but it comes from a later collector, who stored the letter in its folded state, wrapped the lock around the outside, and stuck it down with modern adhesive tape. This has left discoloration on the end of the tip, and in a square-shaped patch on the address panel. An ink stamp has also been made across the address panel and lock, suggesting it was stamped while the letter was in a folded state.

The intact lock supports the modelling proposed above: the letter's lock remains attached at one end, and during the locking process it seems to have passed through slits in both itself and the letterpacket. Crease patterns on the unfolded lock show how it was shaped, and the slits along its length, which match up to slits on other panels, confirm that it must have passed through itself. Figure 15 below maps our model of the locking system onto the real letter, highlighting the distinctive pentagonal, hexagonal, and quadrilateral shapes formed by the creases on the lock-SA.

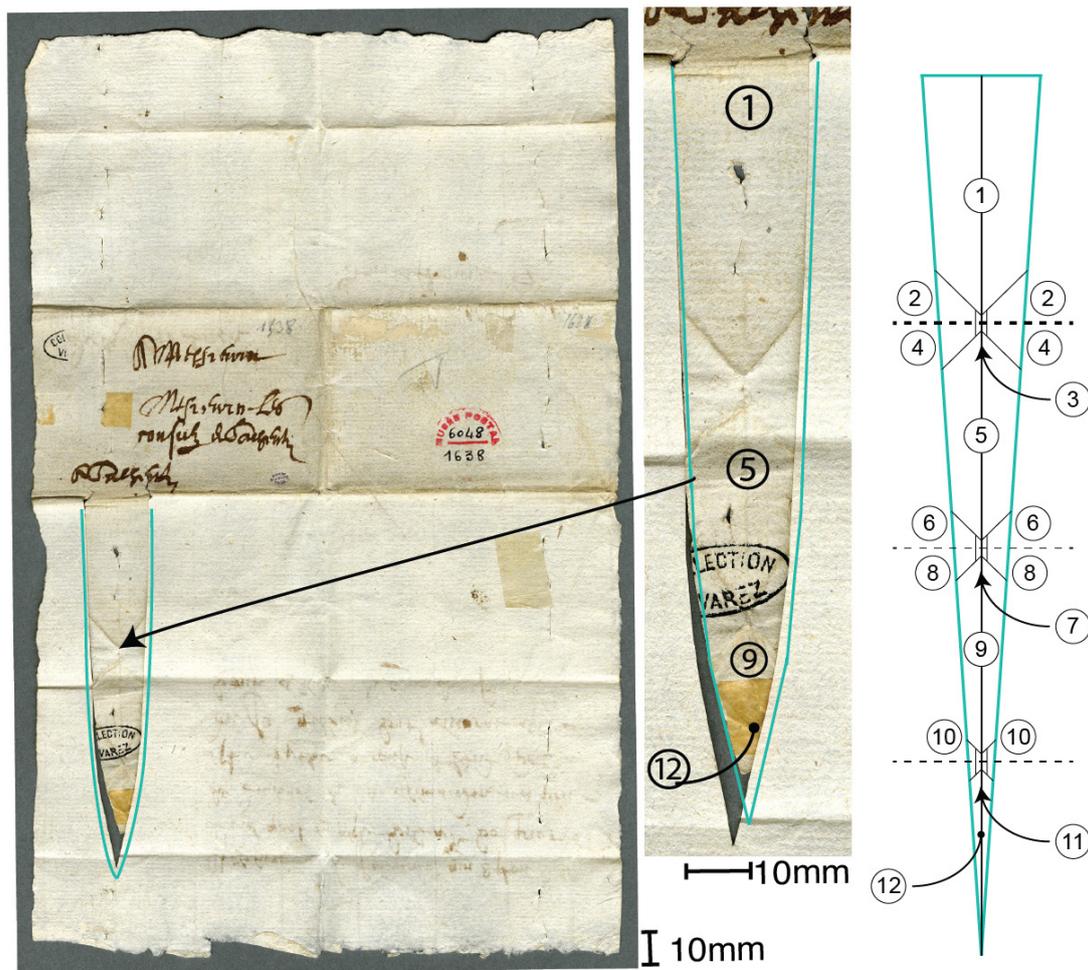


Fig. 15. UH127. **Left:** The open letterpacket, highlighting where the 99% intact lock-SA was slit out of the substrate. **Centre:** Detail of the lock, with sections 1, 5, 9, and 12 labelled. **Right:** Diagram of the lock indicating different folded sections.

Example 2, UH224: Catherine de' Medici, 1570

The second example demonstrates a spiral locking technique with almost 100% of the evidence intact – although it is not easy to see at first (fig. 16). Now that you recognize the sword-shaped lock, you may spot a gap of the same shape in the paper. The evidence is a little harder to detect because the letter substrate has torn at the edge during the opening process, but the illustrations of the letterpackets below will help you see the shape of the letter in its intact closed manifestation.

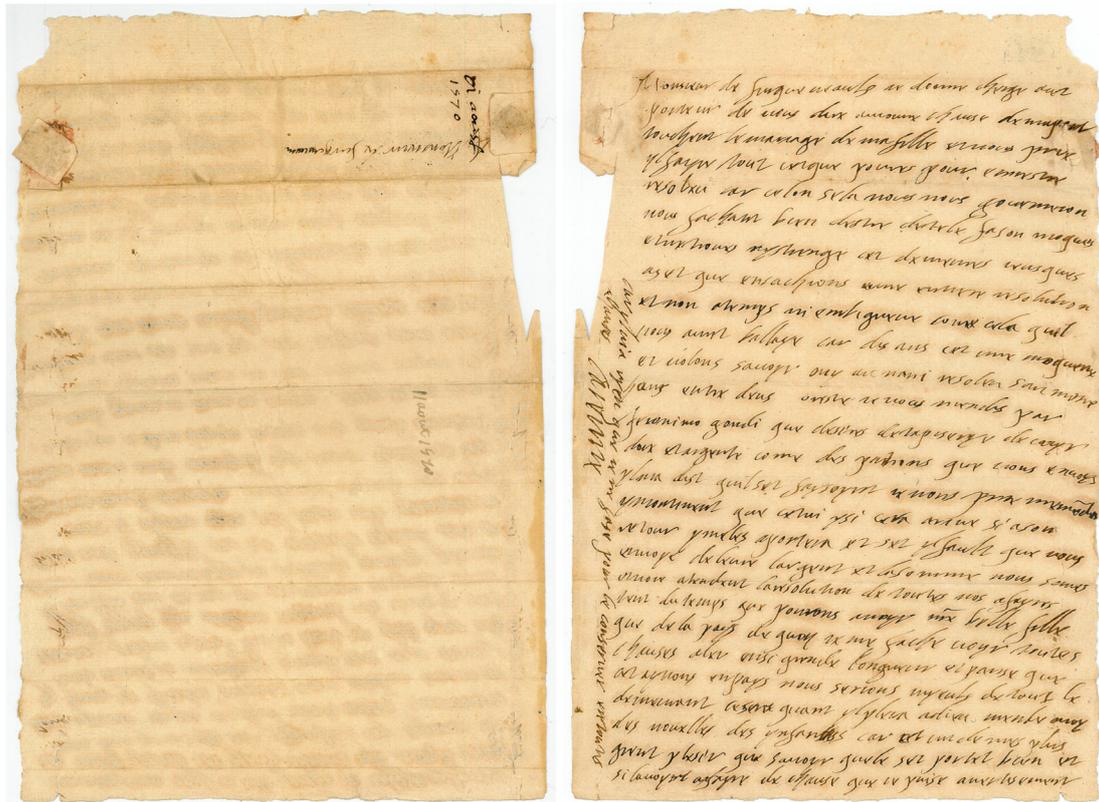


Fig. 16. UH224. Catherine de' Medici to Raimond de Beccarie, Monsieur de Fourquevaux (1570). MIT Libraries, DC111.A2.C38 1570, f. 1 verso (left) and recto (right).

This letter was sent from Catherine de' Medici, Queen Consort of France, to Raimond de Beccarie, Monsieur de Fourquevaux, in 1570. Dambrogio and Smith found this letter for sale online, and MIT Libraries purchased it in support of the Libraries' collecting goal to represent women in technology. It is now MIT Libraries, DC111.A2.C38 1570. The writing substrate is a single folio of paper, measuring 305mm high x 203mm wide, three sides deckle and one trimmed, implying that it was cut from a full sheet of paper. The letter has never been repaired, and the main body of the substrate is mostly intact; one corner appears to be missing, but, on close inspection, this is due to flaws in the papermaking process rather than a tear. In the Unlocking History collection, it is catalogued as UH224. The creases on the letter indicate that the letter was folded into a smaller packet than UH127 above, and its lock is shorter, 72mm long, and 13mm wide at its base.⁸

In UH224, after the steps illustrated above in figures 2–10, sealing wax was applied on both sides of the locking mechanism, covering sections 1, 5, 9 and 12 of the lock. An additional piece of paper (not cut from the writing substrate) was then pressed onto the sealing wax on both sides, creating a papered seal.

⁸ For an instructional video of this letter, see Jana Dambrogio, Daniel Starza Smith, and the Unlocking History Research Group, 'Catherine de' Medici's concealed spiral-locked letter to Raimond de Beccarie, Monsieur de Fourquevaux (c.1570)', Letterlocking Instructional Videos. Unlocking History number 0224/Letterlocking Unique Video number: 0224. Date filmed: 30 July 2021. Duration: 7:51. Date posted: November 2021. Video URL: <<https://youtu.be/U3IGlmRPMKw>>.

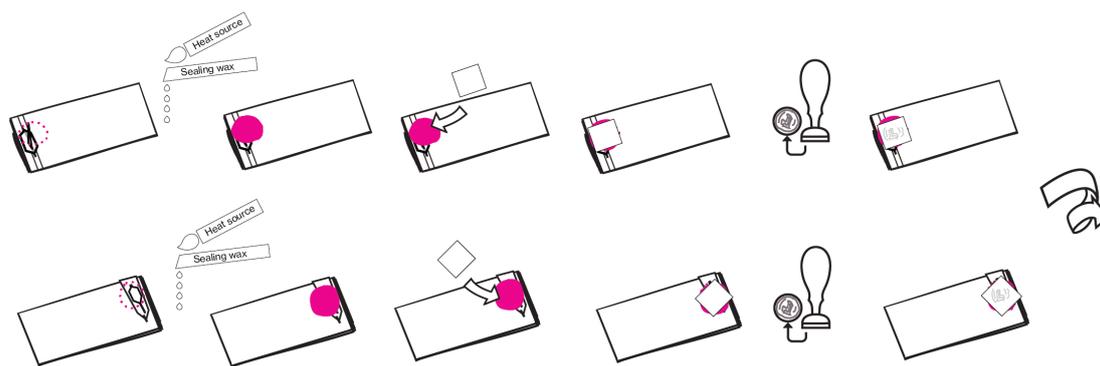


Fig. 17. UH224, final steps of the locking process.

The manipulations used in the letter are therefore fold, slit, adhesive, lock-SA (i.e. the spiral lock), and lock-O (the extra square of paper). This combination makes it a letterlocking category 47. All the exposed parts of the lock are covered and stuck down by the adhesive; some of the sealing wax may also have seeped through the slits before hardening, meaning that the substrate around the lock would be more likely to tear as the locking mechanism was opened. This is a high-security letter, so we give it the overall code LC47H. Its format is LF4RW. Figure 18 shows how the elements of this lock fit together.

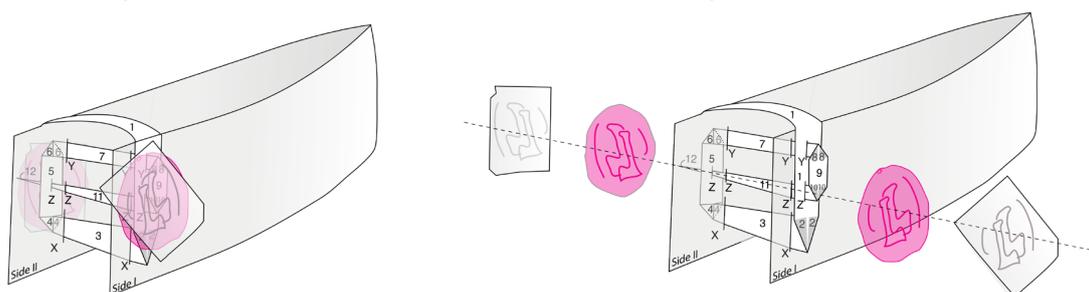


Fig. 18. UH224, cross-sections of locking mechanism.

At first it may seem that – unlike in UH127 (example 1) – the lock is missing, perhaps torn off in the opening process. In fact, remarkably, when the lock was torn open all its fragments remained stuck in place, and we estimate that as much as 99% of this letter’s lock survives. The evidence is fragmentary and dispersed in various places around the letter as a result of the opening process, so we have to look very carefully for it. The following images show how we can work through the visible and concealed features to understand how its security mechanics functioned. The evidence is hard to discern precisely because the lock has been designed to destruct when opened, but this is precisely the kind of evidence that offers invaluable support to the theories of letterlocking, and an example of why we advocate non-interventive preservation. Mending over holes, flattening folds, removing small fragments, or filling the ‘loss’ left by a cut-out lock would serve only to erase critical features of this artefact.

In figure 19, we enlarge the section of the letter where most of the lock evidence can be found. All the different features that are present have been overlaid onto the image, and we can then work through them one by one.

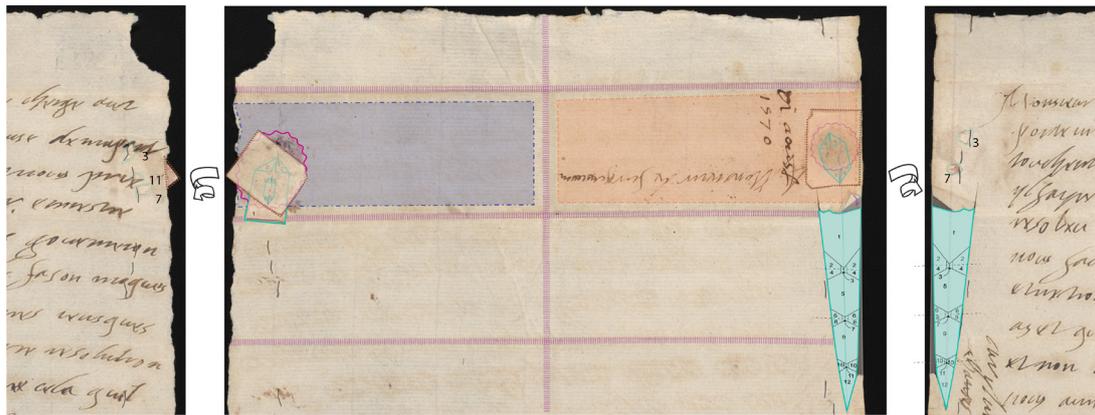


Fig. 19. UH224, detail of locking mechanism (centre), with digital overlays to show letterlocking manipulation and, left and right, the opposite side of the paper. See Key below (fig. 20).

We have labelled each kind of evidence with lines or boxes of different colour, each of which also has a different pattern so that readers who cannot see those colours can distinguish between them, according to the following key:

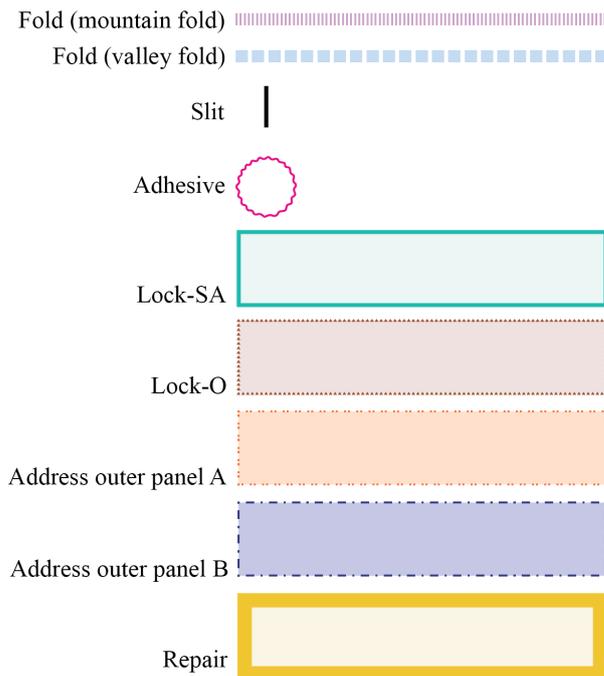


Fig. 20. Key to digital overlay.

Figure 21 illustrates a single lock-SA at two different stages in the locking process. The image on the left indicates where it would have been before being sliced out of the substrate, and where it now lies on UH224. In the centre we show a reconstruction of the lock as it would have been threaded through the folded substrate in its spiral pattern, with a jagged line showing where the paper would have been torn to open the letter. On the right is a rendering of the lock-SA as in figure 15 above, showing all the different sections so that they can be identified in the other two images.

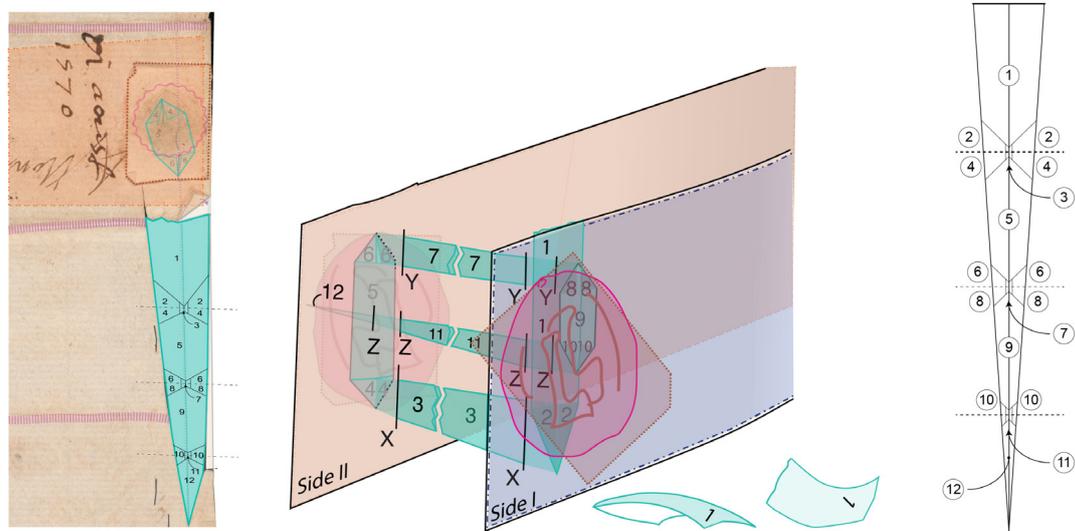


Fig. 21. UH224. **Left:** Detail of letterpacket with overlay showing hole where lock-SA was sliced out, and components of the locking mechanism. **Centre:** Reconstruction of the lock as it would be broken by letter opener. **Right:** Detail of the folded sections of the intact lock.

Secondly, we indicate where each of those sections currently lies on the packet. The base of the lock appears is partially concealed under adhesive and the lock-O, but can be detected in figure 22:

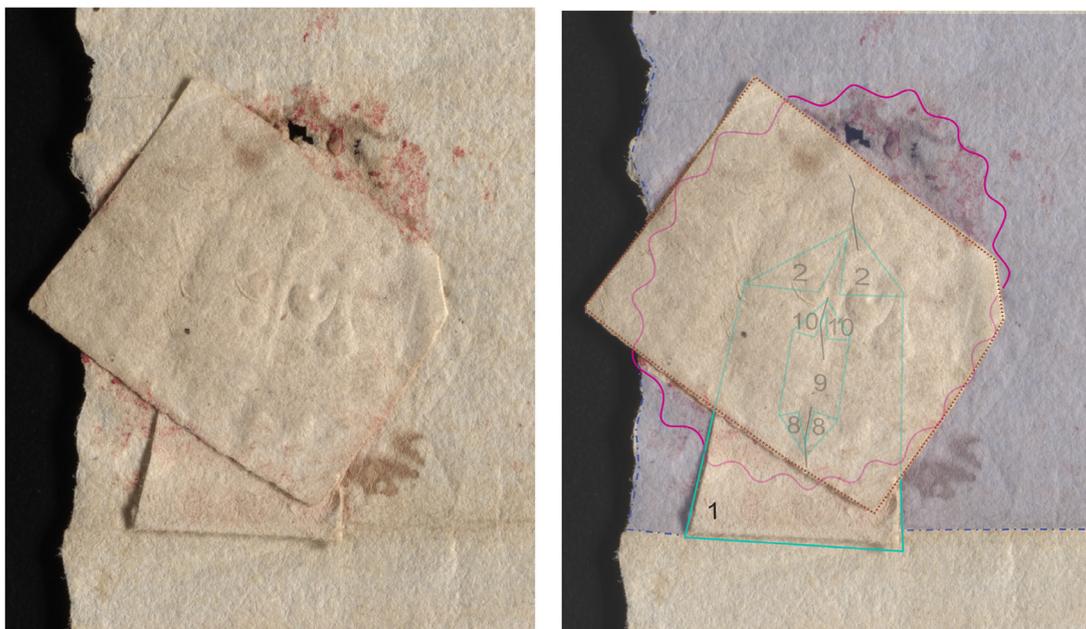


Fig. 22. UH224, details of locking mechanism (left), with overlays to show lock and adhesive evidence (right).

If we isolate section 1 of the lock-SA, we can see more clearly how it correlates to our diagrams, as in figure 23.

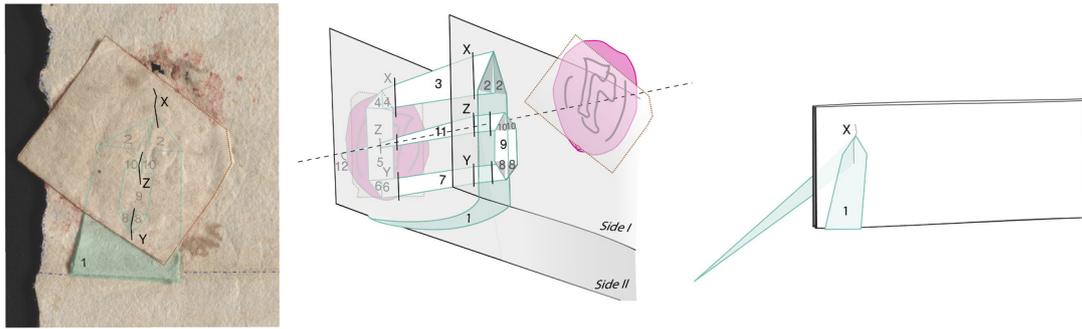


Fig. 23. UH224, detail of locking mechanism, highlighted to show the lock wrapping around the outside of the letterpacket.

We can in fact be more fine-grained in our understanding of this evidence. In order to make it pass through the ‘X’ slits, the lock would have been squeezed and puckered into a ‘penguin head’ shape, forming a thinner, stiffer strip we label ‘3’. In this process two small panels were formed, which we label together as ‘2’. When the letter was opened, the ‘beak’ of this penguin head was torn or cut through, leaving two small flaps (both labelled ‘3’ here).

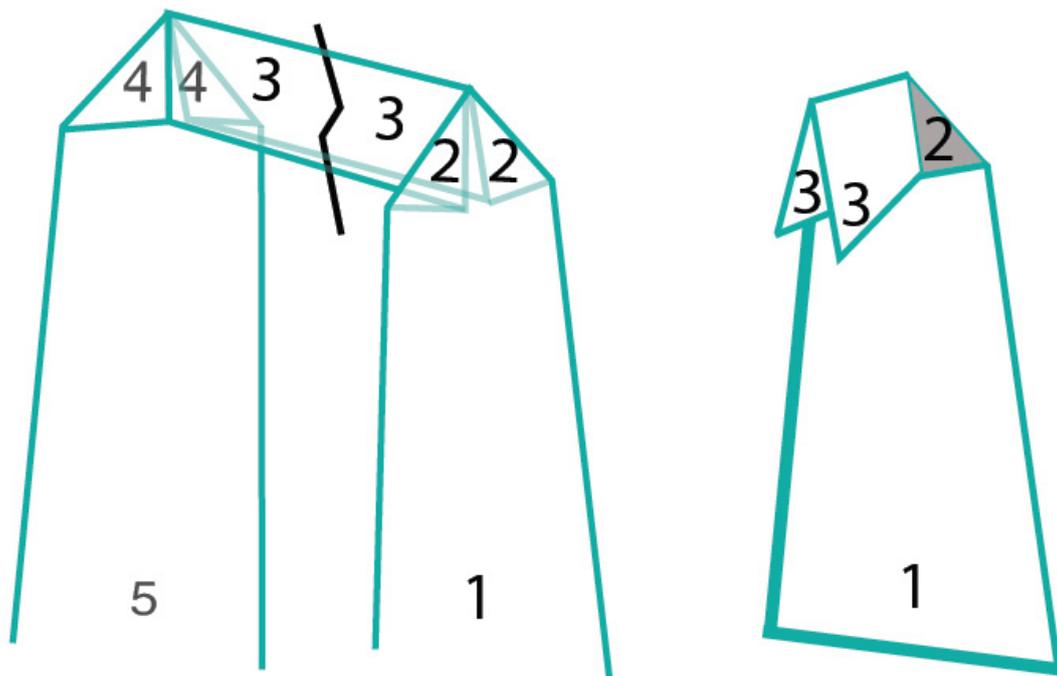


Fig. 24. Detail of lock folded into a ‘penguin head’ passing through slit.

The same type of tiny flaps are formed when sections 7 and 11 are broken, often remaining lodged in the slits, even when the letter is in a fully open manifestation. When this letter is turned over, these small lock fragments can be found sticking out of the slits, as shown in figure 25.

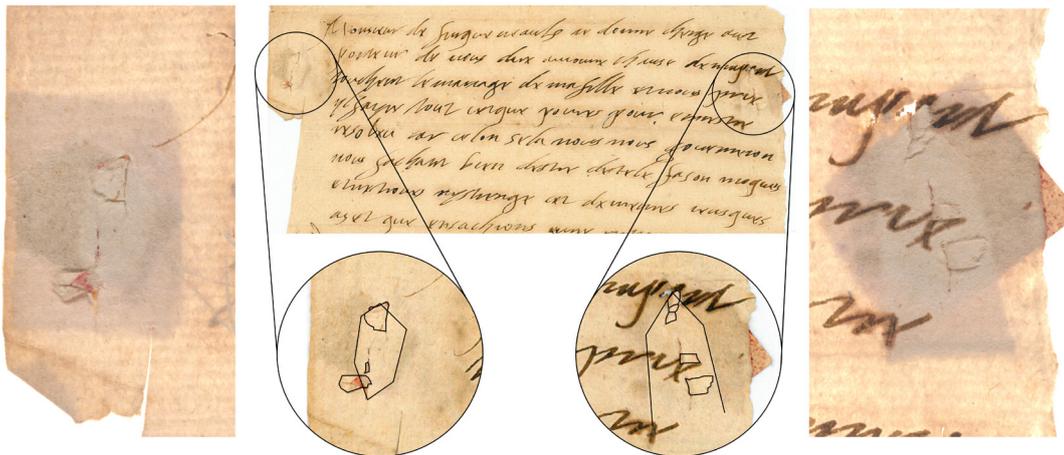


Fig. 25. UH224, details of lock remnants.

We can understand what these images show by highlighting each piece of evidence and showing how it matches the numbering on our diagram. An important feature of these images to notice is the lighter patches set against darker patches (one hexagonal, the other pentagonal): these show us the shape of the lock-fragment on the other side of the paper. The darker patch is caused by the sealing wax; the lock fragment survives sandwiched between the adhesive and the writing substrate that we can see. This evidence makes it easier to match up the tiny fragments to the rest of the lock.

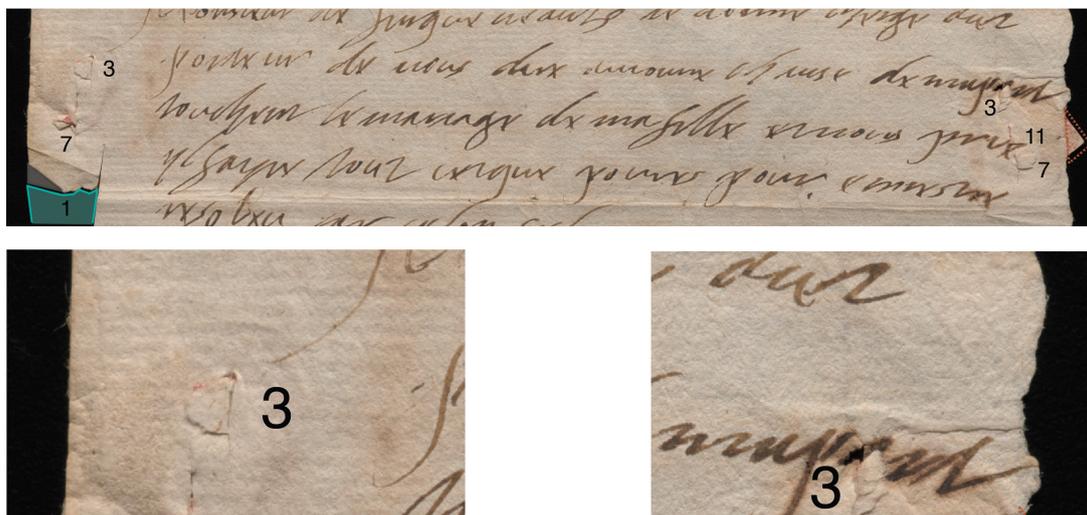


Fig. 26. UH224, details of lock remnants, highlighting lock sections 1, 3, 7, and 11.

One final question remains. Are the two pieces of paper on top of the sealing wax contemporary to the letter, or later additions? If we turn this image upside down and shine a light at an angle – ‘raking light’ – across the paper this brings up details consistent with Catherine’s coat of arms, confirming that the paper was applied over the wax while it was still warm, and her seal stamp or signet ring impressed into the paper to create a ‘papered seal’ (as opposed to an ‘exposed seal’, when a seal stamp is impressed directly into the sealing wax).

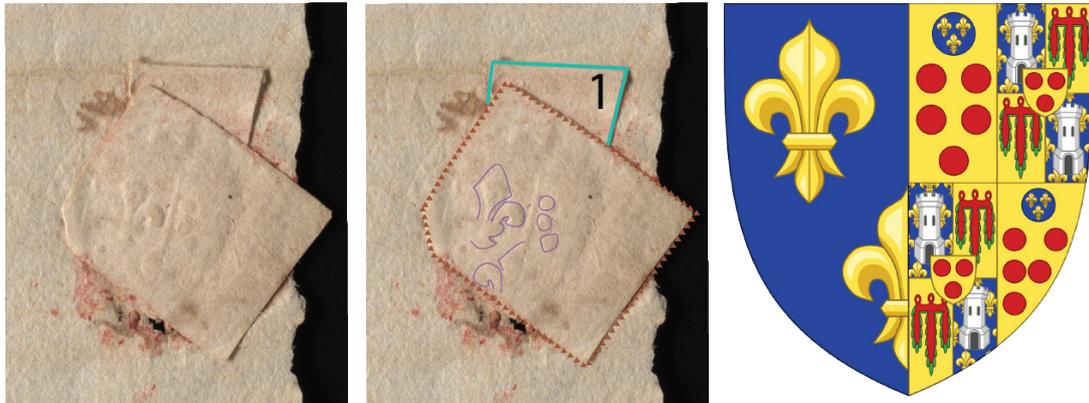


Fig. 27. Left: Detail of papered seal under raking light. *Centre:* Same detail of papered seal with patterns highlighted. *Right:* Catherine de' Medici's arms, featuring fleurs de lys and boules visible on the papered seal. Image from Wikimedia Commons.

Returning now to figure 16 above, you can hopefully now see where all the different pieces of evidence survive, and understand how they all fit together. Figure 28 below shows a diagram of the letter unfolded.

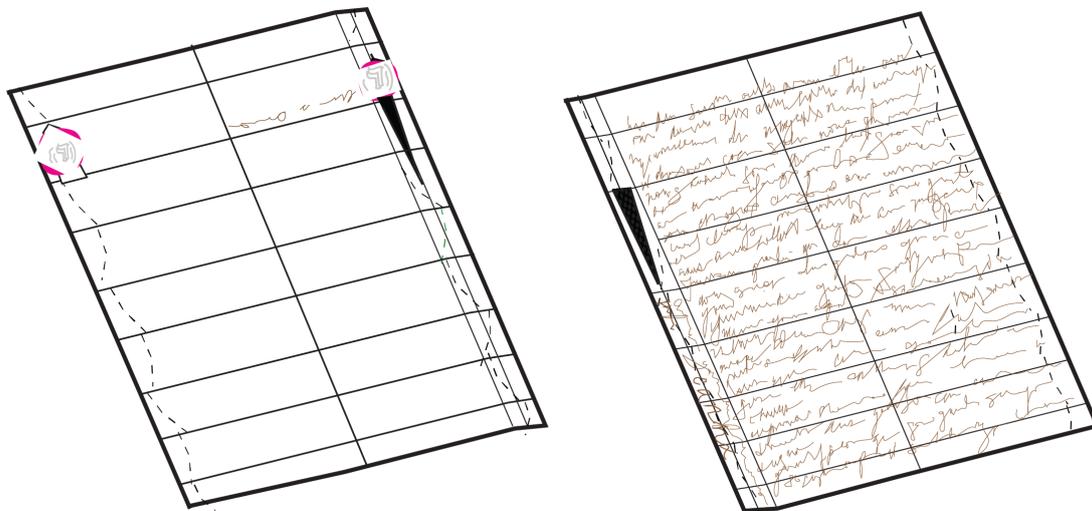


Fig. 28. Representation of UH224 in open manifestation, emphasizing hole where lock-SA has been torn off during opening. Note differences from fig. 13.

Equipped with this knowledge of how spiral locking works, you are now ready to encounter a less revealing example.

Example 3, UH390: unidentified author, 1633

Our third letter, written on a deckle-edged bifolium measuring 308mm high x 383mm wide, was sent from an unknown sender to an unknown recipient (we cannot make out the name of either). Dambrogio and Smith found this letter for sale online, and purchased it for MIT Libraries, where it is now held in the Unlocking History Research Group archive, box 31. Discoloration and tidelines indicate water damage to the substrate, and the corners and edges

On its own, this example does not retain enough evidence to confirm how its locking mechanism worked. Thanks to surviving examples with substantial amounts of locking evidence intact, such as those shown above, we can infer how the existing evidence on UH390 fits into broader categorization patterns. We propose that this letter used folds, slits, and a lock-SA, although probably not adhesive, and that it is therefore likely to be a letterlocking category 27. Like all spiral-locked letters, it has high security. We can therefore identify this letter as LC27H, despite the fact we have had to infer some of its evidence.

This letter is important to the present study for two reasons. First, it represents the state in which most spiral-locked letters are now found, i.e. missing their locks, which naturally tend to be torn off during the opening process. Secondly, the letter has never been conserved, meaning that we can see very clearly all the different kinds of evidence. As demonstrated elsewhere in this article, other examples of this lock have received conservation treatment. In and of itself, this is no bad thing: conservation is often required to stabilize a document, strengthening it so that readers can turn pages without tearing pages or otherwise damaging sensitive or weaker areas. Many spiral locks (like the ones below) can be identified even after conservation intervention – but untreated letters offer extremely valuable evidence about the locking process.

The striking hole in UH390 is unmissable, and drives home the point that the packet's lock-SA is designed to be destroyed on opening as a special kind of tamper-evident device. Anyone breaking into this kind of letterpacket is likely to tear the lock in multiple places, making it all but impossible to reconstruct in order to cover their traces. If the recipient was monitoring their correspondence for interception they would soon realize that their letter had been tampered with: too late to protect the contents of this letter, perhaps, but a warning that the communication network had been compromised.

Examples 4, 5, and 6, UH78-80: Lock remnants in situ, 1580s–1620s

Further confirmation of our reconstructions of spiral locking mechanisms is supplied by lock remnants found in situ on various surviving examples, including letters to the Elizabethan spymaster Sir Francis Walsingham and the Jacobean court favourite George Villiers, Duke of Buckingham, and one sent from the scholar Joseph Scaliger (see fig. 30). These fragments match the appearance of Unlocking History's models, lending confidence to our reconstructions.



Fig. 30. Left (two images): Detail, UH78, Joseph Scaliger to Francisco Donzà (c.1593–1606), Bod., MS. Bywater 63, f. 52. **Centre:** UH80, French ambassador to the Duke of Buckingham (17/27 February 1625), Bod., MS. Add. D 111, f. 321. **Right (two images):** UH79, unidentified writer to Sir Francis Walsingham (11 August 1588), Bod., MS. Add. D. 109, ff. 49–50.

The Walsingham images in figure 30 show a particularly compelling example of a lock in situ, demonstrating very clearly the appearance of the lock on one side (sections 1 and 9) and, on the other, remnants of lock sections 3, 7, and 11. These remnants, flattened to the page, are all that is holding sections 1 and 9 fast to the page.

The spiral locks of Elizabeth I and Mary, Queen of Scots

We have already encountered one famous user of the spiral lock in this article: Catherine de' Medici (1519–1589), queen consort of France 1547–59. Our next examples focus on two other European queens, Mary, Queen of Scots (letters of 1568 and 1587) and Elizabeth I (a letter of 1573). Beginning with Elizabeth, we show that the spiral lock was being used at the highest level of European diplomatic negotiations and that this letter took the locking technique to the next level by adding an extra turn to the spiral action of the lock. We then examine two letters by the Scottish Queen to establish not only that Mary used the same techniques, but that important differences can be revealed by comparing them at a minute level.

Example 7, UH131: Elizabeth I, 1573

This letter, on a particularly large and thin sheet of paper – measuring 284mm high x 205mm wide, and trimmed – was written in Elizabeth's own hand and sent to her 'dear brother and cousin' Henri III, King of France, in 1573. The letter responds to Henri's suggestion about a possible marriage of the Queen to the King's younger brother François (1555–1584), Duc d'Alençon. Elizabeth expresses her surprise at the revisited prospect of a French marriage, as this is an old offer, and she has not forgotten the polemical reactions that met the proposal. She seems to end all further discussion of this match, calling it an 'abandoned cause'.

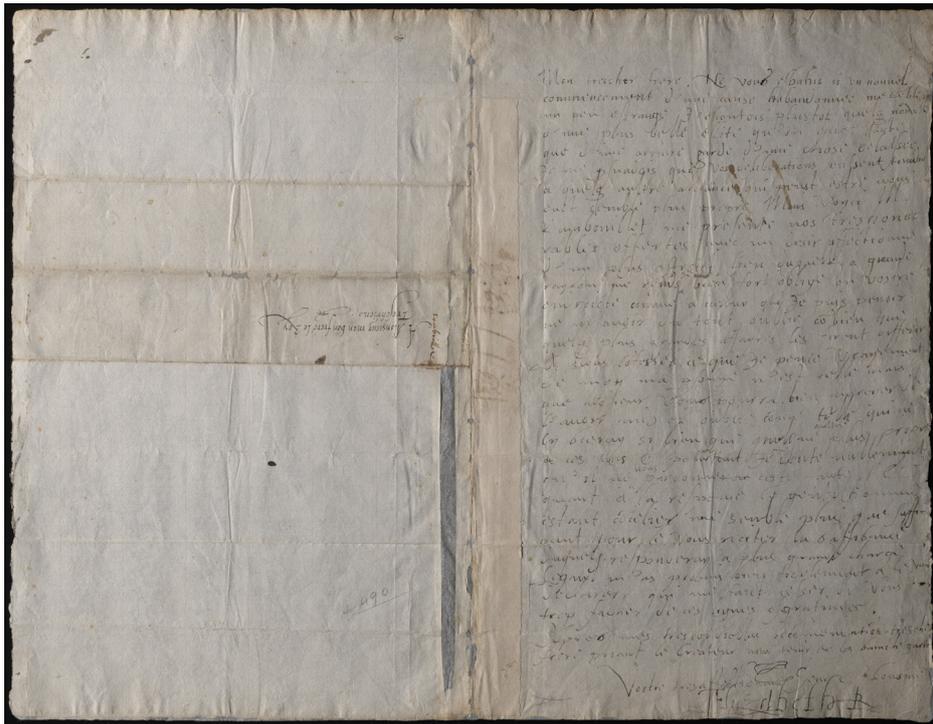


Fig. 31. UH131, Harry Ransom Center, Medieval and Early Modern Manuscript Collection, Letters of British Royalty, HR 57, normal view (top) and backlit (bottom).

The letter is now held at the Harry Ransom Center, Medieval and Early Modern Manuscript Collection, Letters of British Royalty, HR 57, and has the Unlocking History number UH131. Some letterlocking manipulations are visible: folds, repeating slit patterns in some panels,

and a hole indicating a particularly long, thin, sword-shaped lock (160mm long x 6mm wide). Although the lock itself is missing, we estimate that approximately 30% of the locking manipulation evidence survives. There appears to be no evidence of adhesive, unless sealing wax was carefully dropped onto the surface of the lock only and torn away when the letter was opened. The letter's category is LC27H and its format LF4RW. Figure 32 shows surviving manipulation evidence, including mountain and valley creases, the lock-SA, slits, and the two outer sides when folded for sending (see Key above).



Fig. 32. UH131, with overlay to show letterlocking manipulations.

The letter has received conservation treatment, probably in two different stages. The slits through which the lock would have passed have been covered by a mend onlaid onto the recto side of the first leaf of the opened bifolium. This was probably done with paper thought to be a good match to the letter substrate; however, the treatment paper has aged in a different way to the artefact in the years since the repair, creating a visible contrast between these materials. The full letter has been lined, in its opened manifestation, with a single sheet of tissue thin enough to show the crease pattern, wrinkles, the prior repair, and, crucially, the area of the blank margin from which the substrate was cut. The true revelation in this letter – from a letterlocking perspective at least – can be found in the slits. By this point in the article, we are used to seeing a series of three slits (X, Y, Z in previous diagrams), made so that the lock can pass through them. Elizabeth's letter uses *five* slits, distinguishable in figure 33 as V–Z – or possibly even six.

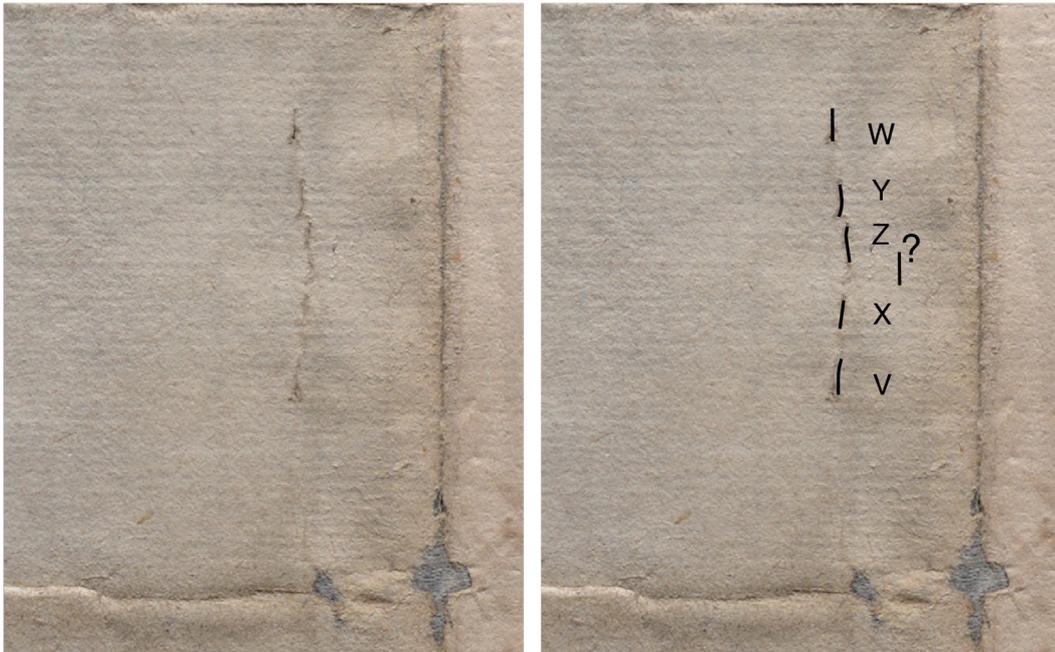


Fig. 33. UH131, details of slits marked to show the order through which the lock passed.

The larger sheet of paper used meant that Elizabeth or her secretaries could cut from it an especially long and narrow lock-SA. This meant that even in a thicker (32-layer) folded letterpacket, they could make multiple piercings and spiral turns. Additional spirals and a longer lock do not make the packet any more secure – a broken lock-SA is evidence of tampering however long it is – but the effect would have been spectacularly beautiful. Figure 34 shows a recreation of this locking style by Unlocking History.

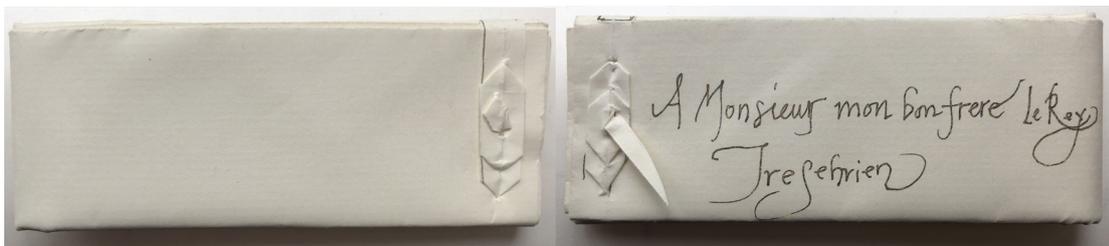


Fig. 34. UH131, model of locked letterpacket.

Figure 35 shows the mechanism in stretched cross-section; the additional spirals produce more complex crease patterns on the lock itself, and a more decorated appearance on the outside.

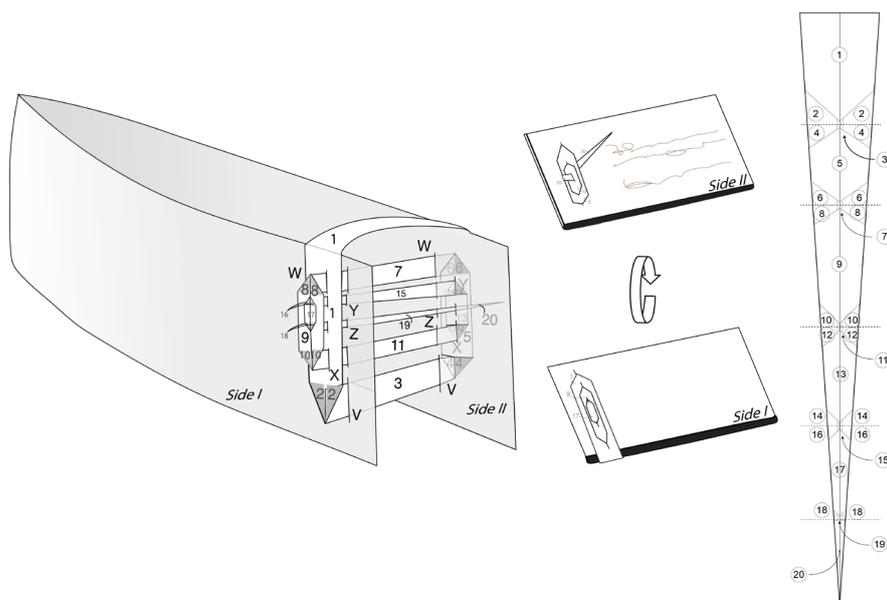


Fig. 35. The workings of the five-slit spiral-lock locking mechanism. **Left:** Model of the locking mechanism showing the threading sequence taken by the lock-SA. **Centre (top and bottom):** Model of a closed packet using this lock (front and back). **Right:** Diagram of the lock indicating different folded sections; numbers on the lock correspond to the image on the left. Compare fig. 11.

Further research could investigate how unusual this technique was, and by extension just how much of an impression its novelty or rarity might have made to the recipient. UH131 has proved so intriguing that we made two instructional videos for it, one indicating a likely possible locking method and the other suggesting an alternative ending.⁹

Although UH131 is unique among examples we have studied to date, the slit pattern does bear intriguing similarities to two letters to Elizabeth from her court favourite Robert Devereux (1565–1601), Earl of Essex, now British Library, Add. MS. 74286, ff. 6r-7v and 108r-109v (in our classification system they are UH94 and UH321). This letter also features six slits per panel, but there is no evidence that a lock-SA was ever cut from the substrate. Therefore, either a paper lock was cut from another source and used to thread through the locks, or another substance such as floss or ribbon was used; in either case, this would be a lock-O. It is just possible that a thin strip of paper was cut from along one edge of Essex's letter to be used as a lock, which would make it a lock-SU, but we have no evidence to indicate this. An instructional video demonstrates some possible ways Essex's letter may have been locked.¹⁰

⁹ Jana Dambrogio, Daniel Starza Smith, and the Unlocking History Research Group, 'Queen Elizabeth I's Holograph Spiral-Locked Letter to Henry III, King of France, England (c.1574–1589s)', *Letterlocking Instructional Videos*. Letterlocking Unique Video number: 0131. Date filmed: November 2017. Duration: 8:49. Date posted: November 2017. Video URL: <<https://www.youtube.com/watch?v=bNK3hZe3-9c>> [Accessed 3 August 2021].

Jana Dambrogio, Daniel Starza Smith, and the Unlocking History Research Group, 'Alternate Ending: Queen Elizabeth I's Holograph Spiral-Locked Letter to Henry III, King of France, England (1570s)', *Letterlocking Instructional Videos*. Unlocking History number 131/Letterlocking Unique Video number: 180. Date filmed: November 2017. Duration: 10:49. Date posted: December 2017. Video URL: <<https://www.youtube.com/watch?v=6ZyjuLRc62I>> [Accessed 17 August 2021].

¹⁰ Jana Dambrogio and the Unlocking History Research Group, 'Letterlocking: Robert Devereux's Spiral-Locked Letter to Queen Elizabeth I, England (c.1590)', *Letterlocking Instructional Videos*. Unlocking History number 94/Letterlocking Unique Video number: 94. Date filmed: October 2016. Duration: 15.01. Date posted: October 2016. Video URL: <<https://www.youtube.com/watch?v=wKcQk7aYuZ8&t=162s>> [Accessed 7 August 2021].

Example 8, UH874: Mary, Queen of Scots, 1568

This letter, written in Mary's own hand on a single sheet of trimmed paper measuring 306mm high x 200mm wide, was sent on 1 September 1568 to Sir Francis Knollys, one of the earliest courtiers entrusted with Mary's custody after she fled Scotland and sought refuge in England in May that year. As one of Mary's earliest letters sent from England,¹¹ the letter took a prominent place in the British Library's *Elizabeth and Mary* exhibition (see Response 2 by Andrea Clarke and Alan Bryson below).

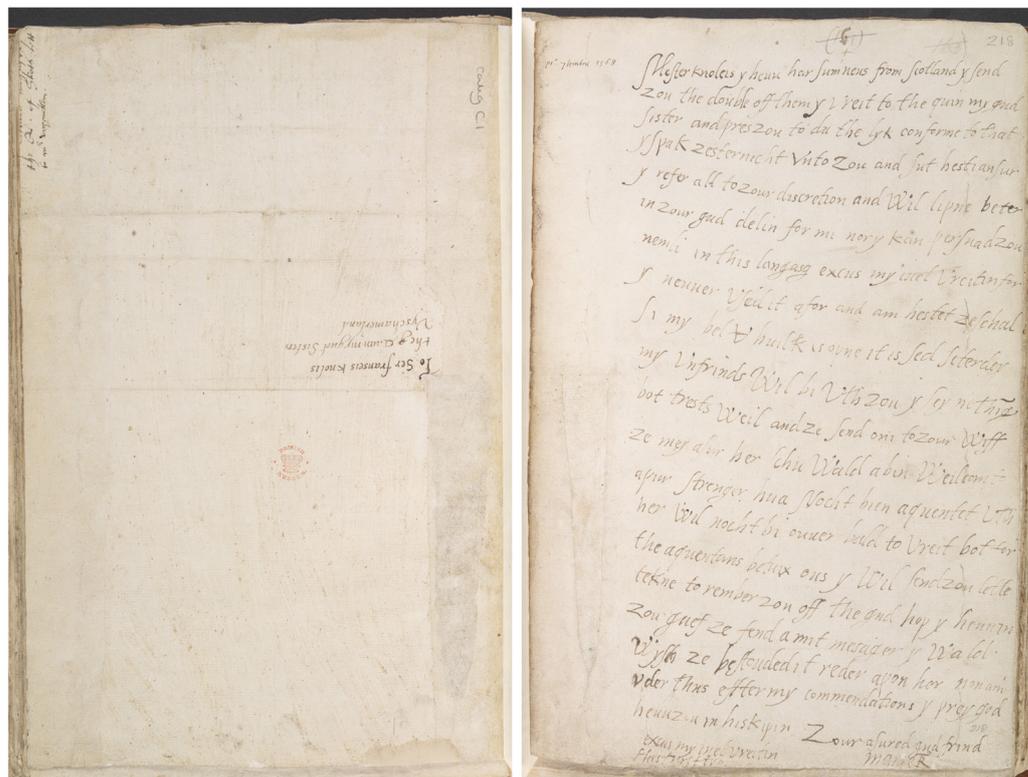


Fig. 36. UH874, Mary, Queen of Scots to Sir Francis Knollys (1 September 1568), British Library, Cotton MS. Caligula C. I., f. 217v (left) and f. 218r (right).

UH874 has been tipped into a letter book, a common collections practice prior to the twenty-first century, and its edges have been trimmed to the size of the book block. Stains on the substrate indicate the introduction of moisture during past treatment intervention. The letter may have been resized. A strip of repair paper has been applied to the verso, obscuring the slits; on the recto, the hole left by slitting out the lock appears to have been both filled in and papered over.

The letter is now British Library, Cotton MS. Caligula C. I., f. 218rv.¹² Some of its letterlocking manipulations are visible: folds, repeating slit patterns in some panels, and (identifiable through its absence) a long, sword-shaped lock (125mm long x 20mm wide at the base), but there is no evidence of adhesive. It is LC27H and LF4RW, and in the Unlocking History numbering system it is identified as UH874. The letter has been repaired and the hole indicating the spiral lock-SA filled in: although it can be seen by a trained eye

¹¹ The very first letter sent by Mary from England, on 17 May 1568, is now BL, Cotton MS. Caligula C. I., ff. 92r-94v.

¹² The British Library manuscript catalogue lists this letter as item 96 and as appearing on f. 161. Old foliation numbers '161' and '163' appear on the manuscript, but are both crossed out.

(you might now be able to spot it in figure 36), it is not immediately obvious. Backlighting shows that the letter has in fact been lined along both long edges (see fig. 37); because those strips have been carefully colour-matched, they are very difficult to see without this lighting.

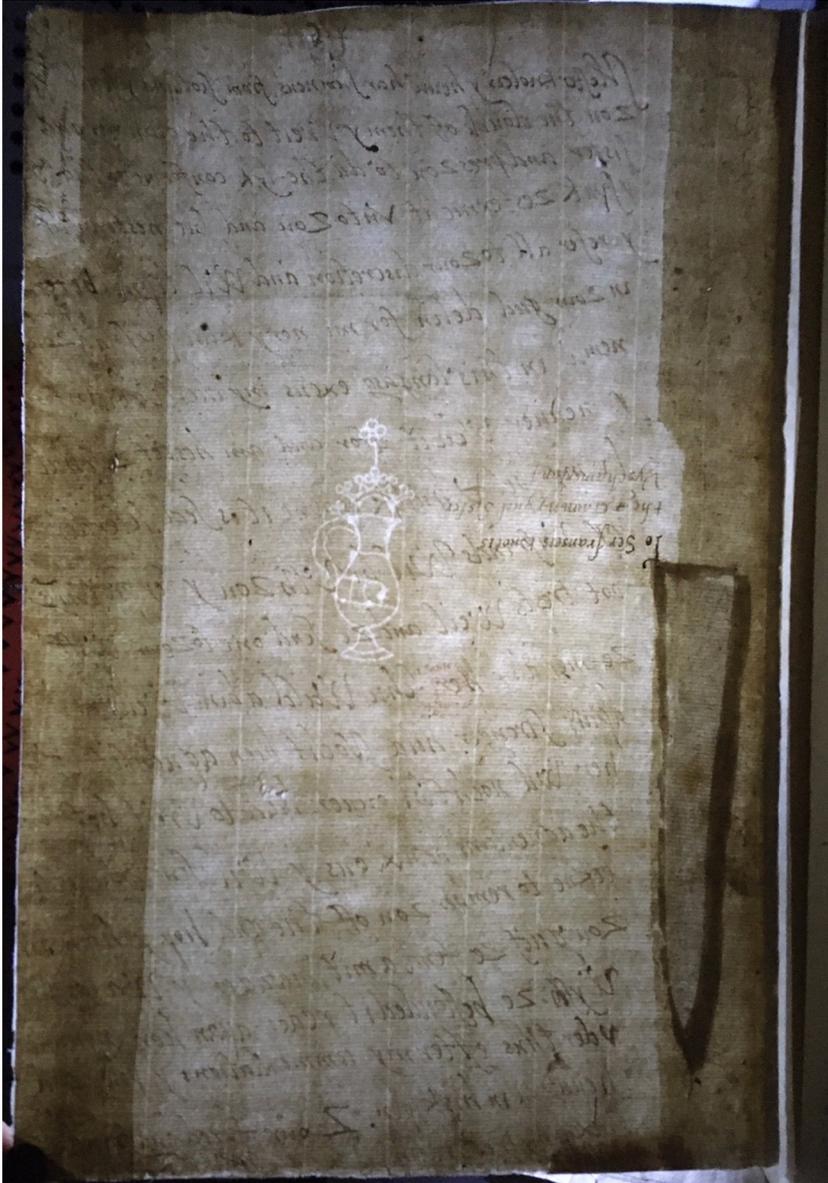


Fig. 37. UH874, backlit to show repairs.

Although we cannot be certain whether the letter was locked by Mary or one of her secretaries, this document establishes that Mary's letters were sometimes secured using the spiral lock method, and illustrates something of her usual technique. After folding into a packet, the letter was stabbed through with three tiny slits (made in the order X, Y, Z as the lock was threaded in a spiral motion, as in fig. 11A above), as figure 38 shows.

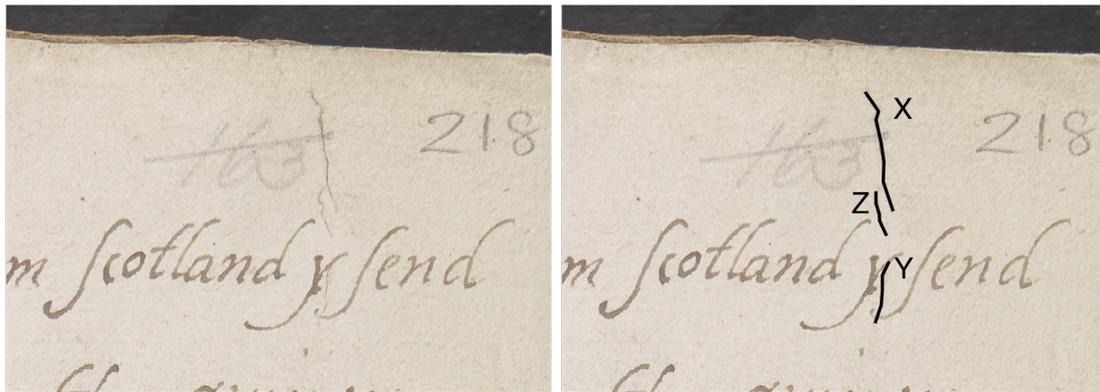


Fig. 38. UH874, detail of slits.

In other places on the letter, these could be confused for one long, continuous slit, as in figure 39.

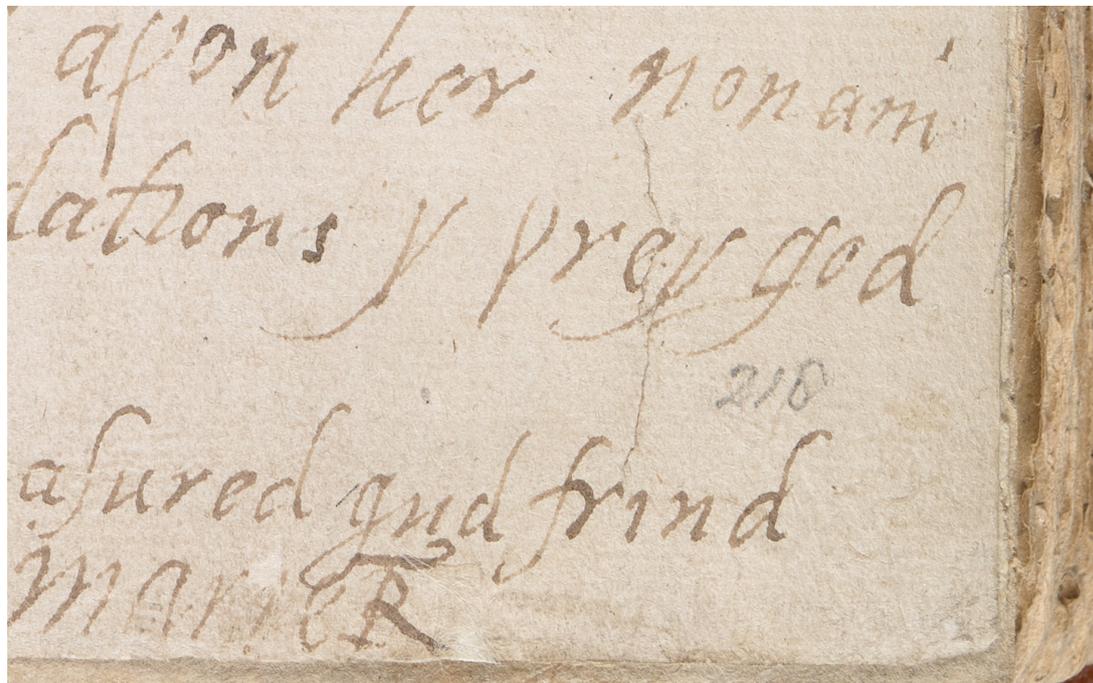


Fig. 39. UH874, detail of slits.

Example 10 below will show why it is important to make this distinction and demonstrates that a series of small piercings were certainly used in the 1568 letter.

Example 9, UH1034: Mary Queen of Scots's spiral-locked letter on two bifolium sheets, 1574

We find an interesting variant of the spiral lock among Mary's letters at the Harry Ransom Center, in HR56, a letter to Bertrand de Salignac de la Mothe-Fénelon of 20 February 1574. A bifolium sheet of paper covered in her writing, measuring 310mm high x 410mm wide, features slits (three per panel) but no lock or hole, lock remnants, or address panel. In this case, it is likely that the letter was written over two sheets, and they were folded with one quired inside the other, as figure 40 shows.

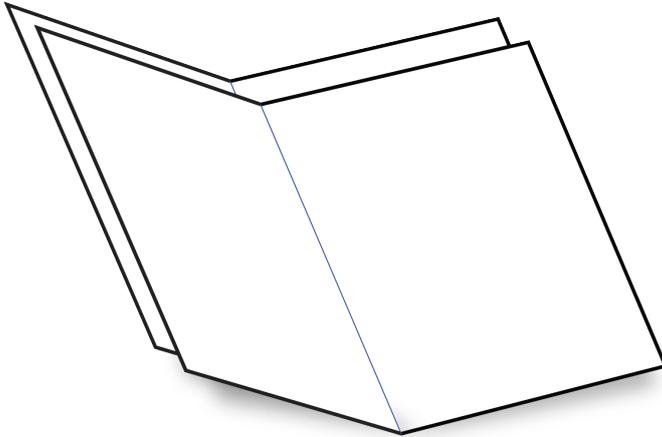


Fig. 40. UH1034, showing how two sheets were quired before the locking process began.

The lock was cut from the outer sheet, then both were folded in tandem into a packet, and the lock passed through all sixty-four layers of paper. Repeated modelling by Unlocking History – including a great many unsuccessful attempts – indicates that this is not an easy action to perform without destroying the lock in the process of *locking* the letter, and requires considerable skill and experience. In the case of UH1034, the slit patterns on both sheets match, and about one-third of the lock survives.

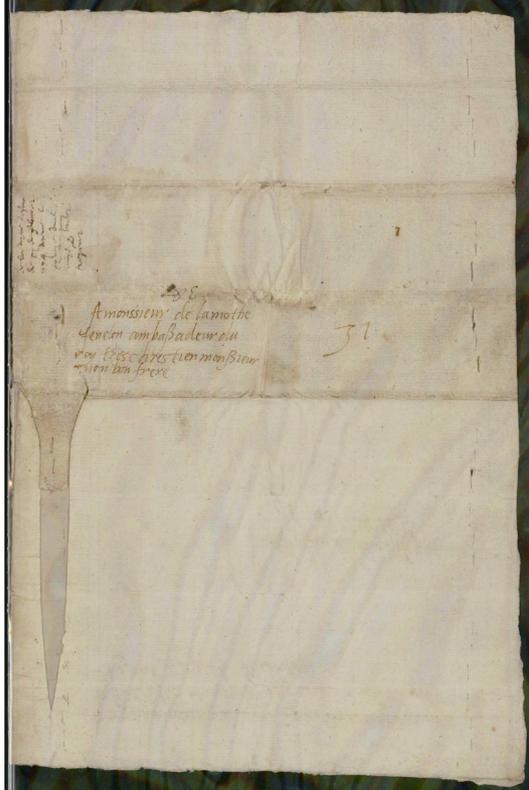


Fig. 41. UH1034. Outer sheet of a locked letter consisting of two bifolium sheets.

This example shows us that a letter featuring slits but no lock, lock-remnant, or hole *may* still attest to use of the spiral lock. At the same time, we should not be hasty to draw this conclusion. The letter from the Earl of Essex to Elizabeth above (UH94 and UH321) also features slits but no lock, and in that case we think it more likely that a separate lock was used to tie it shut. We hope that as more examples of this lock are found we can become more confident in proposing how they were secured for delivery.

Example 10, UH135: Mary Queen of Scots’s last letter, 1587

This letter, written in Mary’s own hand on a deckle-edged bifolium measuring 312mm high x 200mm wide, was sent on 8 February 1587 to Henry III, King of France. The letter is now held at the National Library of Scotland, Adv. MS. 54.1.1. Its category is LC27H and we have assigned it the code UH135. It has been conserved in some places: the hole which indicates the lock-SA has been filled in; some, but not all, of the slits made along the margins have been papered over. The letter is stored flat and mounted to a rigid support for display. This letter was written and locked just hours before Mary was executed for treason. Because it is written in Mary’s own hand from her prison cell, we have reasonable grounds to believe she locked it herself.

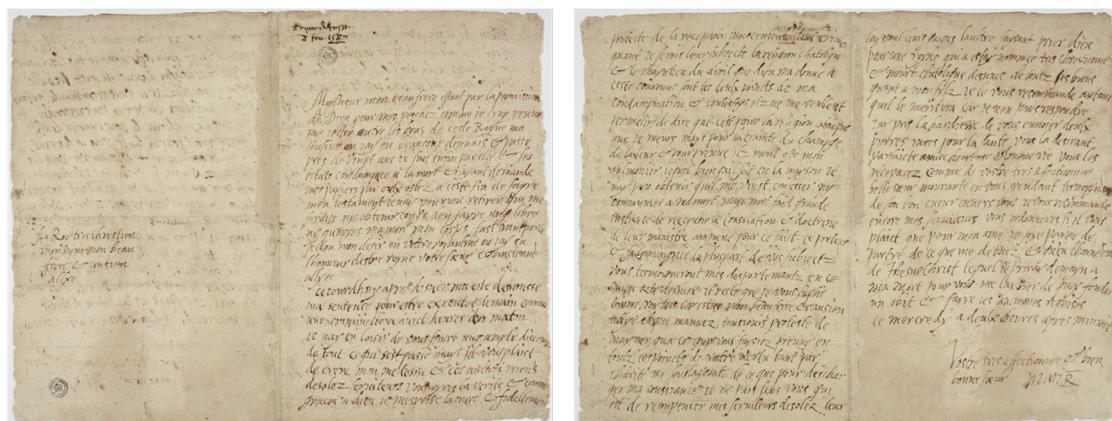


Fig. 42. UH135. National Library of Scotland, Adv. MS. 54.1.1, Mary, Queen of Scots to Henry III of France (8 February 1587).

The letter folds into a packet 50mm high x 102mm wide; its format is LF4RW.

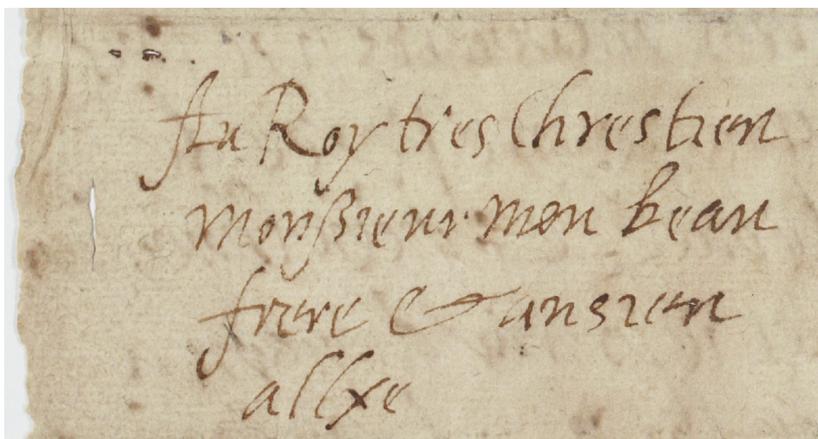


Fig. 43. UH135, detail of address panel.

Using information from the rest of his article, you can probably detect a tell-tale strip in one inner margin which appears in a different colour from the rest of the writing substrate. Backlighting shows more clearly how the letter has been repaired, and how the repair obscures evidence indicating a lock-SA (see fig. 1 above). Figure 44 indicates the letterlocking manipulations that can be detected on the document today.

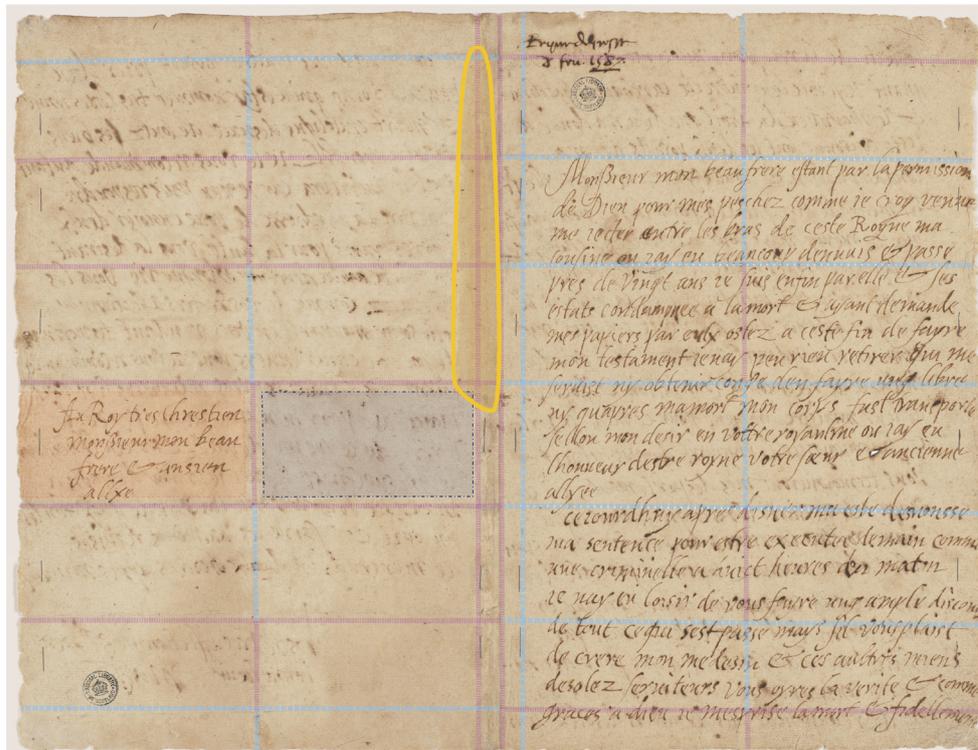


Fig. 44. UH135, marked up to show manipulation evidence.

The sheet of writing paper was turned into a letterpacket with a protruding lock in the typical fashion, as demonstrated in figures 2–10 above. However, there is a curious distinction when it comes to the slits made for the lock-SA to travel through. At this point, three slits are usually made in the packet, enabling the lock to thread through the packet and itself in a spiral motion. Mary's last letter is notable for containing only one slit per panel (approximately 8mm–10mm long) through which the lock was laced.

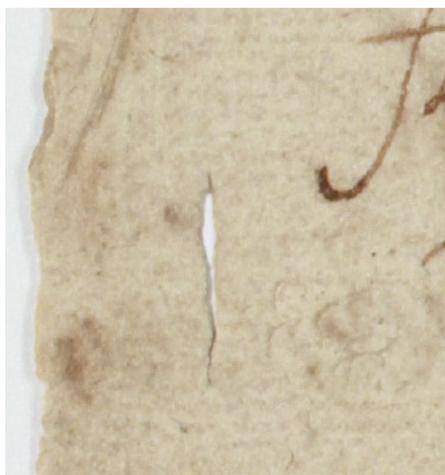


Fig. 45. UH135, detail of slit.

The lock-SA cannot therefore have passed through itself. In fact, we cannot be sure how this lock worked. Based on multiple attempts to model the letter based on surviving evidence, we suggest three possibilities for the final packet shape, with one more likely than the others. In the first of these (fig. 46), the lock threads through the slit three times in the same direction, creating an elegant locking mechanism, but one which does not explain why the slit needs to be so wide. A small application of sealing wax would also have been required, dropped only on the slit since there is no evidence of adhesive elsewhere.

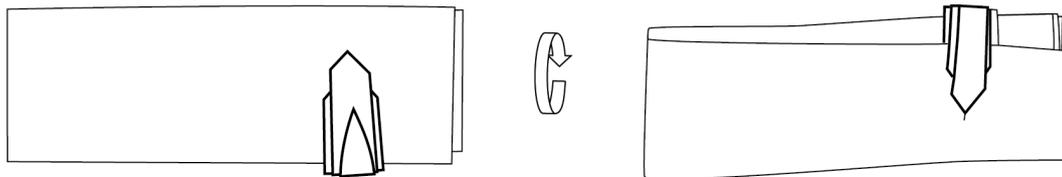


Fig. 46. Possible locking action 1 for UH135.

In the second option (fig. 47), the lock passes through the slit once in the usual way, but on the second pass wraps around the fore-edge of the letterpacket. In this reconstruction, the width of the slit makes more sense, although the method could still work with a shorter slit.

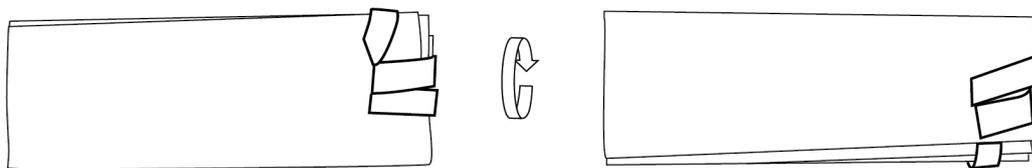


Fig. 47. Possible locking action 2 for UH135.

Finally, the lock may have passed through the letter in a figure-of-eight motion, as in figure 48 before being secured shut.

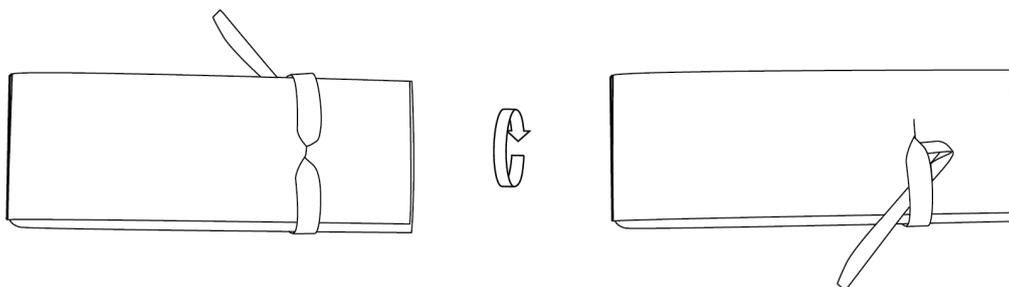


Fig. 48. Possible locking action 3 for UH135.

This motion would make more sense of the width of the slit, and we think this latter possibility is most likely. If so, the following step-by-step instructions reconstruct how it might have worked (fig. 49). It is worth noting that in this variation, the lock wraps around the edges of the thick, 32-layer packet as well as lacing through the single slit: it is an extremely difficult kind of lock to make.

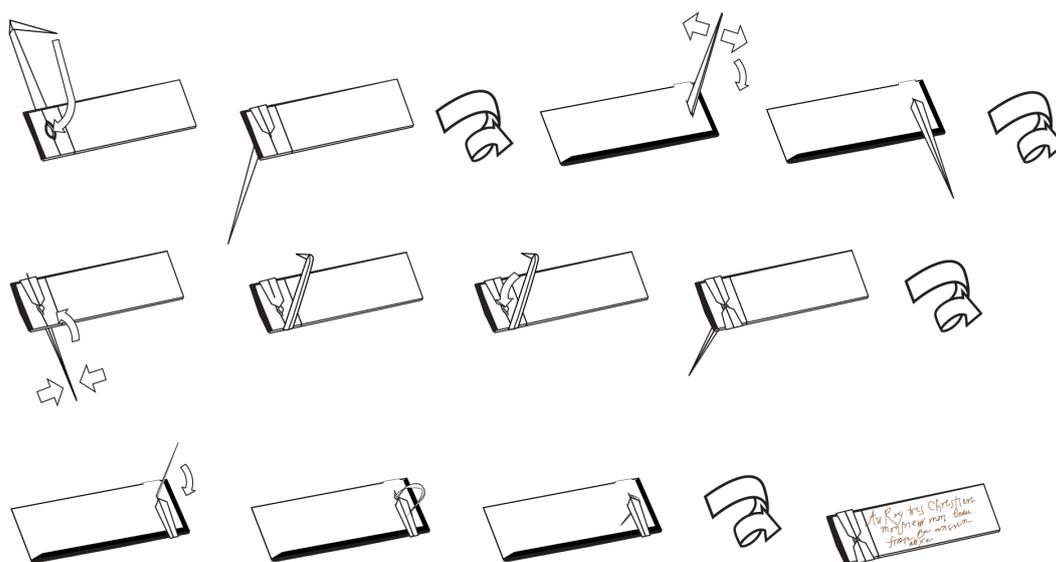


Fig. 49. Step-by-step instructions for the proposed locking method of Mary's last letter, UH0135.

Unfortunately, no evidence survives to confirm this conjecture, for example discoloration on the outer panels of the letterpacket where the lock once lay. There is no evidence of adhesive on the letter, but it remains a high-security letter. The paper fibres on the lock and the slits would have meshed through the addition of saliva or water applied into the locking mechanism's slit and overlapping areas would have further swelled the fibres, knitting them closer to each other, making the lock even harder to unlace without them breaking before reaching the King.

In our research to date (August 2021) we have only seen Mary using this single-slit version of the locking technique.¹³ Possibly she was a pioneer; possibly other users will be found in the archive and we can begin to trace the use of this method through Europe. What we do know is that in her prison cell Mary was deprived of many of her belongings: she herself states 'I have been unable to recover anything of use to me' (see also Response 1 by Alison Wiggins below). It seems likely therefore that her usual letter-writing tools were not available to her. Without a bradawl, she may have used a knife to stab a single hole through the letter, creating a single slit and forming the locking mechanism accordingly. This notion may be supported by the fact that the slits which have not received conservation treatment appear to be wider at one end than another, suggesting that she used a knife blade with one thicker edge and one thinner cutting edge (see fig. 50) as opposed to a bradawl. It is also possible that the wider part of the slit is evidence of a blade being inserted and twisted slightly to make more room for the lock to pass through for a second or third time.

¹³ Mary may have used a method like this before in a letter of 10 March 1574 (UH6151), which features only one slit per panel. However, this letter does not feature any evidence of a lock-SA, so it seems likely that it was sent in a wrapper, now lost, from which the lock-SA was cut as in UH1034. The difference between these two packets is that UH1034 used multiple slits per panel, and UH1034 just one.

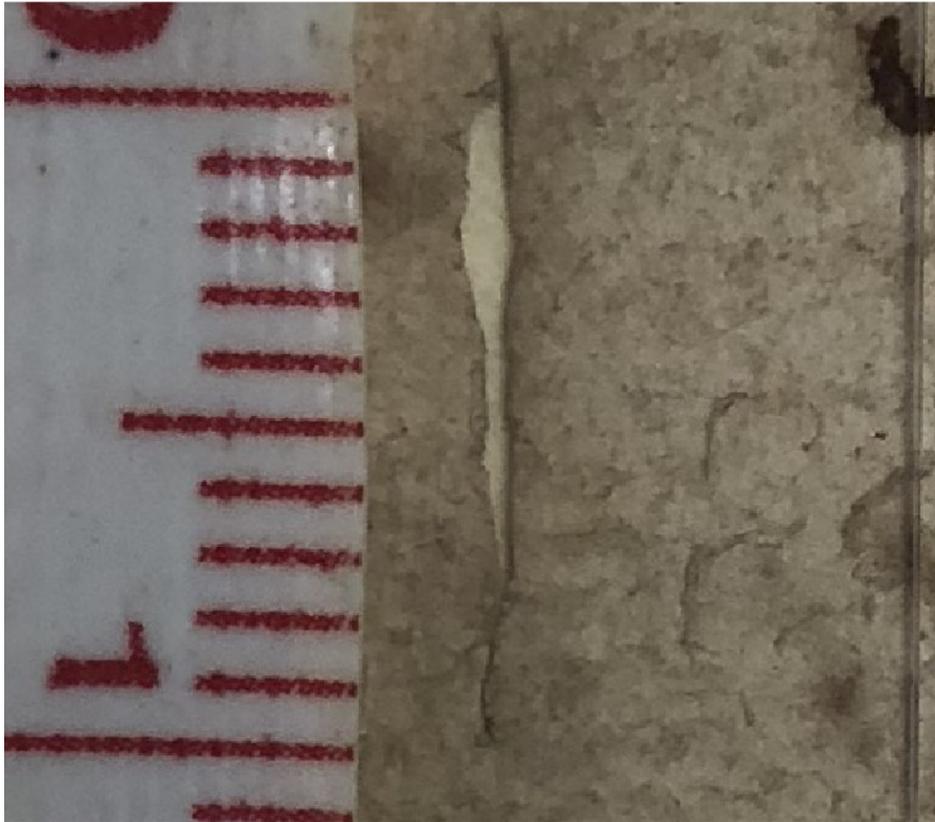


Fig. 50. UH135, detail of 10mm-long slit showing its uneven shape.

Conclusions

In this article we have presented a dozen key examples of letters utilizing the spiral lock, pointing to a number of other examples along the way. It is clear that this locking method was well known in sixteenth- and seventeenth-century Europe, although in surviving examples known to us it is relatively rare. We have proposed a ‘generic’ version of this lock using three slits, from which we see a number of variations and deviations. Lockers may or may not have used adhesive when employing this method. They could use five or more slits if their lock was long enough to weave through them all, or they could use the same slitting patterns with a lock taken from another source, such as a ribbon, thread, or separate sheet of paper. A spiral-locked letter could be formed from more than one sheet.

The spiral-lock mechanism requires further patient research, both in the search for new examples and for the understanding of some current known artefacts. One of Mary’s letters at the Harry Ransom Center, HRC56 (15 April 1574), features a lock-SA, but no slits; instead, a small, round hole is visible on one panel, with no corresponding holes on the other panels (fig. 51).



Fig. 51. UH1035. Detail of lock-SA and small hole.

Perhaps there is evidence missing on this packet, since one panel seems to be longer than the other (fig. 52).

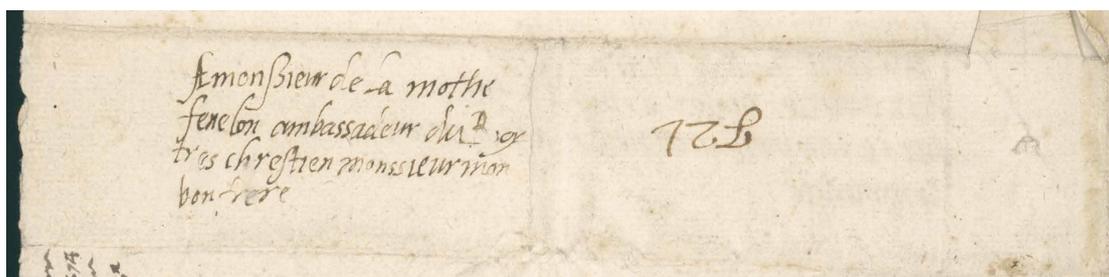


Fig. 52. UH1035. Detail of address panel; note how the panel on the right is longer than the panel on the left.

It seems to be yet another variation of this versatile locking system: might this lock-SA have simply wrapped around the packet? Might the packet have been tucked somehow? Patient, detailed analysis of the original letter alongside the creation of letterlocking models should cast further light on it.

Future discoveries may emerge from the discovery of intact versions of these locking styles; in our experience, though, it is more likely that the answers will come from minute details on packets which retain only partial evidence of their locking mechanisms. Future research may establish more securely who performed the locking function: was it the writer or, say, a secretary?¹⁴ It may be that once a large enough mass of evidence has been accumulated – so long as tiny details are carefully recorded – we will be able to detect evidence of ‘signature’ locking styles, enabling us to distinguish between different lockers using similar methods. Perhaps social signals or genres of letters are communicated by the area in the paper from which a lock was cut. Certainly a close material reading of Mary’s last letter seems to supply evidence about both her lack of access to tools (a bradawl) and her mental and emotional state (controlled enough to carry out an exacting and complex task). Letterlocking thus offers new, evidence-based directions for the study of even extremely well-known historical figures and episodes.

Our article takes its place alongside other foundational publications in letterlocking which establish central concepts and language, and propose metadata terms that would allow information to be captured at a larger scale. We hope this article, especially our use of illustrations and diagrams, can be a model for future technical studies in this newly emergent field.

¹⁴ Nadine Akkerman’s FEATHERS project is pursuing the question of co-authored documents between monarchs and their secretarial staff.

Response 1: Spiral-locked letters and the material history of Mary Queen of Scots

Alison Wiggins

The Unlocking History project's discovery of the spiral lock has a direct impact upon scholarship associated with Mary, Queen of Scots and her circle. Their findings have emerged at the same time as a cross-disciplinary team at the University of Glasgow has been developing research on Mary with a view to creating a digital connected catalogue of objects associated with her life and afterlife.¹⁵ The opportunity to incorporate Unlocking History's new methods and findings into our research has implications for the ways we describe her letters and their historical reinterpretation. The seven spiral-locked letters from Mary (which were all sent letters, rather than administrative copies or drafts) identified so far are:

- 19 May 1567, to Sir William Cecil (later Lord Burghley), holograph, French, from Edinburgh¹⁶
- 1 September 1568, to Sir Francis Knollys, holograph, Scots, from Bolton Castle¹⁷
- 20 February 1574, to Mothe-Fénelon, holograph, French, from Sheffield Castle¹⁸
- 10 March 1574, to Mothe-Fénelon, holograph, French, from Sheffield Castle¹⁹
- 15 April 1574, to Mothe-Fénelon, holograph, French, from Sheffield Castle²⁰
- 20 January 1585, to William Cecil, Lord Burghley, holograph, French, from Tutbury Castle²¹
- 8 February 1587, to Henry III of France, holograph, French, from Fotheringhay.²²

These letters are already known to scholarship from the nineteenth-century printed catalogues, calendars, and editions.²³ But while their textual content is mostly familiar from these Victorian reference works, their material features, including their locks, go unnoticed and unrecorded there. The discovery of traces of their spiral locks is thus a reminder of the material features that escape the printed record of calendars and editions, which are the basis of all the modern biographies and historical accounts. Research resources such as *State Papers Online* and *Cecil Papers Online*, which combine the Victorian calendars with colour

¹⁵ The project is under development with Steven Reid and Paul Gooding (University of Glasgow) and Anna Groundwater (National Museums Scotland). It builds on the findings of the RSE project *'In the End is my Beginning': The Memorialisation and Cultural Afterlife of Mary Queen of Scots, 1567-2019* (Steven Reid and Anne Dulau-Beveridge, 2019-21 <<https://mqs.glasgow.ac.uk>>, and one strand of the AHRC Fellowship *Archives and Writing Lives* (Alison Wiggins with Jade Scott, 2017-19). I am grateful to these collaborators for discussions during the preparation of this article.

¹⁶ Hertfordshire, Hatfield House Cecil Papers, 133.62 [UH 711]. Prince Alexandre Labanoff (ed.), *Lettres, instructions et mémoires de Marie Stuart, reine d'Écosse*, 7 vols (London, 1844), vol. ii, p. 52.

¹⁷ London, BL, Cotton Caligula C. I., f. 218rv [UH 874]. Labanoff, vol. ii, pp. 173-4. Agnes Strickland (ed.), *Letters of Mary, Queen of Scots, and Documents Connected with her Personal History*, 3 vols (London, 1842, 1843, 1845), vol. i, p. 78.

¹⁸ HRC 56 [UH1034], Labanoff, vol. iv, p. 106.

¹⁹ HRC 56 [UH 6151], Labanoff, vol. iv, p. 116.

²⁰ HRC 56 [UH1035].

²¹ Kew, TNA SP 53/15 [UH 6152]. Labanoff, vol. iv, p. 88. Transcribed and translated by Jade Scott (forthcoming).

²² Edinburgh, NLS, Adv. MS. 54.1.1 [UH135], Labanoff, vol. iv, p. 491. Images are provided above and openly available, along with a transcription and translation, via the NLS Digital Gallery <<http://digital.nls.uk/mqs/>>.

²³ *Cecil Papers Online*, available by subscription from ProQuest <https://www.proquest.com/products-services/cecil_papers.html>; *State Papers Online, 1509-1714*, available by subscription from Gale-Cengage <<https://www.gale.com/intl/primary-sources/state-papers-online-early-modern>>.

images in a digital interface, can now be revisited with new questions and fresh eyes. There will undoubtedly be more spiral-locked letters identified, as users scrutinize archival sources and their digital companions for traces of manipulation evidence. Unlocking History's methods for capturing and recording letterlocking metadata builds on previous and ongoing projects, as scholars dealing with a variety of materials seek ways to provide robust, shareable data that is not siloed.²⁴ Beyond these implications for archival research and the capture of metadata, the discovery of the spiral lock enriches the socio-pragmatic context for interpretation of letters. Contextualizing these intriguing locking methods within epistolary culture and political history will enable more precise and accurate analyses and deeper scrutiny of the meanings of materiality. The remainder of this discussion considers the seven newly discovered spiral locks on letters from the Scottish Queen in the context of her life and correspondence, the questions they raise, and the possible relationships they suggest between locking form and function.

Mary, Queen of Scots sent thousands of letters during her lifetime that took a range of material forms, of which the spiral lock was just one type.²⁵ Most of her extant letters come from the eighteen-year period of her extended captivity in England, 1569–87, and, for present purposes, can be considered in two parallel groups:

(1) There were the letters Mary sent secretly that were intended to slide under the radar unseen by Elizabeth I and the State. They included letters with dangerous content, such as one that ultimately resulted in Mary's sentencing in 1586 and execution by beheading in 1587.²⁶ Many letters were intercepted, opened, read, copied, and filed away by Elizabeth's spies and administrators, as they watched and waited over the years for written evidence to be used against Mary. Her secret letters were typically unsigned and sent surreptitiously via clandestine routes, often hidden in small spaces. Famously, 'little letters', no more than scraps of paper with opaque scribal notes and codes, were stuffed into walking sticks, shoe heels, and beer barrels, folded into laundry, or threaded between the sheets of other letters, where the delivery receptacle would inform the size of the letter and its mode of closing.²⁷

(2) By contrast with these contraband letters, there were the letters Mary was permitted by her captors to send. These included her letters to Elizabeth I and her ministers, as well as to her own family in France and to the French embassy in London. Mary frequently complained that she was required to send permitted letters 'open' (that is, unlocked) and that they would

²⁴ The 1585 letter was identified from *State Papers Online* while researching this article. *State Papers Online* and *Cecil Papers Online* are based on the Victorian calendars by Robert Lemon and Mary Anne Everett Green, to which have been added images and the digital interface for researchers to access via institutional subscription. The importance of access for researchers to these subscription-based resources, and awareness of methods that show us their utility, is exemplified by the example of this substantive finding, made more imperative during the closure of reading rooms due to the COVID-19 pandemic.

²⁵ *Bess of Hardwick's Letters: The Complete Correspondence, c.1550-1608*, ed. by Alison Wiggins, Alan Bryson, Daniel Starza Smith, Anke Timmermann, and Graham Williams, University of Glasgow, web development by Katherine Rogers, University of Sheffield Humanities Research Institute (April 2013), <<http://www.bessofhardwick.org>>. Dagmar Freist (PI), *The Prize Papers Project* <<https://www.prizepapers.de/>>. Howard Hotson (PI), *Cultures of Knowledge: Networking the Republic of Letters, 1550-1750*, <<http://www.culturesofknowledge.org/>>.

²⁶ John Guy estimates Mary must have sent two or three thousand letters during her life: *My Heart is My Own: The Life of Mary Queen of Scots* (London, 2004), p. 500. Discussions of Mary's letter-writing during her English captivity are discussed by Guy, *My Heart*, pp. 451, 471, 474, and 479–83.

²⁷ The Babington plot is discussed by Stephen Alford, 'Some Elizabethan Spies in the Office of Sir Francis Walsingham', in Robyn Adams and Rosanna Cox (eds.), *Diplomacy and Early Modern Culture*, *Early Modern Literature in History* (Basingstoke, 2011), pp. 46–62 (50–9).

be checked by her gaolers.²⁸ Where there are remaining traces of locks, especially on letters penned by her secretaries Gilbert Curle and Claude Nau, these were often formed by a triangular strip of paper passing through a slit – either the lock-O, cut from another paper source, or the lock-SU, cut off from the writing substrate.²⁹ Among the letters in her own hand, we find evidence of these locks alongside traces of letters folded in a similar way to the spiral lock but with no sign of its characteristic attached dagger-shaped lock.³⁰

To summarize from this overview, the choice of lock was influenced to some extent by the nature of the letter and the circumstances of its production and delivery. More specifically, for letters sent during Mary's captivity, the presence, absence, or selection of a lock was decided by a conflux of factors that included whether a letter was sent surreptitiously, or was sent with permission and 'open', and whether secretaries were involved. These factors informed a letter's material structure, but also shaped its textual content, rhetorical framing, and linguistic form. Repeatedly, we find Mary saying that she cannot speak freely because she knows the letter will be sent unlocked or suspects it will be intercepted by her enemies. There was a direct relationship between a letter's linguistic and material forms, the choice of each being tied to production, intended purpose, and anticipated reception.

We must consider the spiral locking of these seven letters within this larger context for epistolary communication, and an environment of both overt and covert surveillance. Spiral locks appear (based on current data) to have been a rare and a distinctive choice in Mary's letters, which is perhaps not surprising given they are more technically difficult to make than many other letterlocking methods, requiring considerable skill and time. But why select this lock at all rather than a simpler form? The seven spiral-locked letters identified from Mary offer us a working hypothesis. These letters may at first glance give an impression of diversity, being written at different times ranging from both before and after her English captivity and addressed to various recipients. Yet, there are important similarities shared between them. None were secret letters. None dealt with dangerous topics or included risky information that could be regarded as treasonous. They were all letters Mary was permitted to send: four being letters to her former brother-in-law the French King and his ambassador in London Fénelon, and the other three being to members of the Elizabethan State, including

²⁸ The 'little letter' discussed by Strickland (vol. iii, p. 97) is referred to by Fénelon in an undated letter to Henry of France.

²⁹ In 1570, she stated that she was 'obliged to leave all my latters open' (letter to the Archbishop of Glasgow; Strickland, vol. i, p. 117). During her captivity, Mary exchanged letters with the French ambassador in London Fénelon, monitored by her temporary custodian at Sheffield Castle Ralph Sadler (11 January 1572, CP, vol. vii, Sadler's report to Burghley). In his detailed logistical reconstruction, Sadler described how he had opened and read a letter from Fénelon to Mary, then Mary had given him her return letter to Fénelon, which Sadler then enclosed for Burghley 'to be used as shall seem best to your lordship' (quotation from the CP calendar). Mary's letter to Fénelon that Sadler sent on to Burghley was, it seems, locked at that point, as Sadler does not say he had opened it only that he had passed it to Burghley and that Mary was aware it would go to Burghley. In later letters, to the French ambassador and to her family in France, Mary stated that she knew her letters were not private and had written them accordingly. She was aware 'all that I have written have passed through the hands of Walsingham', that her deliveries were all closely searched, the 'thickness of my packets checked', and her letters opened and not always sent to their intended recipients (letters from 1578 and 1582 in Strickland, vol. i, p. 226; vol. ii, pp. 13, 38).

³⁰ These letterlocking styles have also been referred to collectively as 'slit and band' methods. For example, her scribal letters to Sir William Cecil (later Lord Burghley), from 25 May 1562, SP 52/7, f. 42, and from 9 September 1571, BL, Cotton Caligula C. III., f. 171rv; and those to which she adds postscripts, in 1582, to Fénelon's successor Michel de Castelnau-Mauvassier in BL, Cotton Caligula C. VII.

those which accompanied letters to Elizabeth herself.³¹ That is, while we know that Mary did send and receive letters intended to avoid the eyes of Elizabeth and her ministers, these seven letters were not among them. What we have here are letters where she was not seeking to hide information from her enemies. Quite the opposite, in these letters she was often writing to her captors themselves. We find her petitioning and supplicating, seeking to win trust and build relationships and support, and we must deduce there was a perceived advantage to using a spiral lock for these purposes. The spiral lock was evidently regarded as having value for interpersonal and diplomatic relations.

It is important to be clear about this point as it requires that we distinguish between possible functions for the spiral lock. The spiral lock had the rare capacity to provide a recipient with assurance of end-to-end security by signalling if the letter had (or had not) been previously opened: this is one of the key findings of the Unlocking History study. Finding a secure route to a recipient was something with which we know that Mary was concerned, as it meant a direct and demonstrable line of exclusive person-to-person access.³² It is no coincidence that all seven letters were written in Mary's own handwriting and signed by her. Mary reserved use of her handwriting for times when she wished to strengthen the authenticity and veracity of a letter's content and remove any doubt that she was directly responsible for the words.³³ For early modern letter-writers, one's own hand functioned as authentication but also as a marker of personalization, sincerity, or equitable friendship and was therefore important in diplomatic and interpersonal relations.³⁴ It was a sign of special trouble taken, of taking pains to produce a letter, and of intimacy through a direct connection with the sender. This point is strengthened by the case of the 1568 Bolton letter, where Mary twice repeated that she had taken the trouble to switch from her preferred language of French into

Scots ('this langasg' *this language*) 'thes furst tym' (*this first time*), which, she says, was

³¹ For example, with similar folds and slits to those found in spiral-locked letters but without any trace of a dagger-shaped tab, is her letter to Sir William Cecil, holograph, from Tutbury, January 1570, TNA, SP 53/5, f. 1.

³² Her spiral-locked letter to Cecil from 19 May 1567 was a covering note (asking him to solicit the English Queen on her behalf) to her letter of request to Elizabeth (SP, Royal Letters, Scotland, vol. ii, 18 May 1567). Her spiral-locked letter to her gaoler Knollys from 1 September 1568 was also a covering note (to some newsletters from Scotland and to her letter to Elizabeth I dated the same day, BL, Cotton Caligula C. I., f. 142), in which she asked Knolly to write to the English Queen enclosing these other letters and with his own letter of support.

³³ We find her sending 'blanks', that is, testing delivery by sending a blank piece of paper, to check for secure routes of transmission (for example, 19 November 1571, Earl of Shrewsbury to Lord Burghley, CP, vol. vii).

³⁴ Cathy Shrank has shown that the captive Queen Mary's own hand had special importance and Elizabeth's ministers spent many years seeking autograph writing that was potentially treasonous; 'Manuscript, Authenticity and "Evident Proofs": Against the Scottish Queen', in A. S. G. Edwards (ed.), *Tudor Manuscripts 1485–1603, English Manuscript Studies 1100–1700*, 15 (London, 2009), pp. 198–218. The theme is taken up in Alison Wiggins, 'The Handwritten Fictions of the Archive: Handwriting as Authentication, Encryption, and Forensic Evidence in Elizabethan Letters', in Michael Moss and David Thomas (eds.), *Post-Truth in the Archives* (Oxford, in press for 2021).

³⁵ Further examples of the uses of autograph writing, which include individuals from Mary's own circle, are: Alison Wiggins, *Bess of Hardwick's Letters: Language, Materiality and Early Modern Epistolary Culture*, Material Readings in Early Modern Culture (London and New York, 2017), especially pp. 106–41; and Graham Williams, "'My Evil Favoured Writing": Uglyography, Disease and the Epistolary Networks of George Talbot, Sixth Earl of Shrewsbury', *Huntington Library Quarterly*, lxxix:3 (2016), pp. 287–409.

difficult and laborious for her to do. This novel language choice (as she frames it), added to the use of her own handwriting and the spiral lock, combined to provide a material package aimed at winning over her gaoler Knollys. Evidently, she did gain some ground with him, much to the surprise of her biographers given his loyalties and reputation.³⁶

To receive a letter from Mary, Queen of Scots was to receive a text that communicated not only through its syntax and grammar, but through its material forms, spelling, handwriting, visual appearance, enclosures, and context of delivery. The choice of the spiral lock for these seven letters evidently had a cachet that enhanced their interpersonal value, although this observation does not preclude or diminish other functions for the spiral lock. Its unique construction may have served as a deterrent against tampering although, paradoxically, its presence might flag sensitive or secret information, making it more suitable for authentication than for transmission of dangerous information, unless combined with other security measures.³⁷ These are matters which require considerable further study, once a larger dataset has been collected. In these seven letters, the pairing of Mary's own handwriting and signature and this secure lock provided a means by which Mary tried to build bonds of affinity and kinship and assurances of authenticity by giving her recipient a direct line to herself, the Scottish Queen.

We might envisage that an association with Mary herself, as the person who fashioned the spiral locks with her own hands and in her own closet, could have enhanced their interpersonal value. There are several reasons to suppose that Mary did manually make these spiral locks herself.³⁸ We can expect Mary to have had the knowledge of how to produce the intricate spiral form of lock. She had gained her epistolary literacy during her formative years at the French court, having spent her early life from age five in France up to 1561 when she came to Scotland aged 18. We know the spiral lock was in use in France (as we have seen from the Vivarez example already discussed in this article) and can be placed at the French court. The lock was used by Catherine de' Medici, who was Mary's mother-in-law, and thus had a key role in her training and upbringing and a power at the French court. Their regular correspondence when Mary was in Scotland and England confirms the epistolary connection.³⁹ Given that we know the spiral lock was used by Catherine, Mary's son James, and Elizabeth I, as well as more widely, it is difficult to imagine she did not know how to make it herself. Furthermore, we can be confident Mary had the manual skills suitable for execution of a delicate and subtle lock, based on her fine needlework embroideries produced

³⁶ Discussed by Antonia Fraser, *Mary Queen of Scots* (first published 1969; London, 2009), pp. 471–4.

³⁷ Scholarship on early modern letter-writing has shown us that each of these parts of the letter had a communicative function; James Daybell, *The Material Letter in Early Modern England: Manuscript Letters and the Culture and Practices of Letter-Writing, 1512–1635*, *Early Modern Literature in History* (Basingstoke, 2012). Discussions of letter-writing technologies that focus upon early modern cultures of privacy and security include those by Nadine Akkerman, 'Enigmatic Cultures of Cryptography', in James Daybell and Andrew Gordon (eds.), *Cultures of Correspondence in Early Modern Britain* (Philadelphia, 2016), pp. 69–84; and James Daybell, 'Secret Letters in Elizabethan England', in Daybell and Peter Hinds (eds.), *Material Readings in Early Modern Culture: Text and Social Practices, 1580–1730*, *Early Modern Literature in History* (Basingstoke, 2010), pp. 47–64.

³⁸ We cannot automatically assume that she locked them, even if she penned them. Early modern letters were often collaboratively produced and the individual stages of letter production could be executed by different personnel. From studies of other letter-writers, we know of workflows whereby drafting, penning, signing, locking, and delivery were each distinct stages delegated to different persons, based on their skillset, or for reasons of security or privacy, or to share the labour and effort involved in manually making a handwritten letter; Christopher Burlinson and Andrew Zurcher, "'Secretary to the Lord Grey Deputie Here': Edmund Spenser's Irish Papers", *The Library*, 7th series, vi:1 (2005), pp. 30–75; Wiggins, *Bess of Hardwick's Letters*, pp. 120–9.

³⁹ Labanoff, vols i-iii, vi-vii.

during her captivity, which attest to manual dexterity with blades, bradawls, and needles.⁴⁰

Another reason to suspect that these letters were locked by Mary's own hands is that, at the locations where they were written, she did not always have secretaries available to her.⁴¹ Her most reduced circumstances were at Fotheringhay Castle where, early on the morning of her execution, on 8 February 1587, she wrote to her former brother-in-law, Henry III of France, her 'last letter', which we now know was locked with a spiral lock. Even her steward and her priest had been excluded from her presence, although the detailed accounts of that dramatic evening show that her women were there in her closet with her. If we accept that the 'last letter' was locked that night, then we must picture its spiral lock being made by Mary herself – or, plausibly, with the help of her women Jane Kennedy and Elizabeth Curle. We know that Mary's women always had with them tools for sewing and for hairdressing: their final inventories included decorated scissors ('garney de ciseaux'), writing desks (two 'escriptoire[s] d'argent'), a gold bodkin for the hair, pieces of silk, along with many other items of small value from the Scottish Queen's closet ('diverse aultres meubles communs et de peu de valleur').⁴² Her women were educated and lived with her for years with access to her closet and most intimate spaces. We know of other elite women using letter-locking methods and assisted in letter production by their 'women' or 'girls'.⁴³ So we should not be surprised if they assisted her or locked letters, nor should we forget their presence when we imagine the production of Mary's letters. The repeated creation of the spiral lock in circumstances where Mary was accompanied only by her women suggests it was a lock produced either by herself or with their help, who were her most intimate circle with access to her closet.⁴⁴

We might wonder about John Guy's reading of the blotches on the front of the 'last letter', which he suggests were made by Mary's tears falling onto the page.⁴⁵ His reading of the materiality is an example of the long afterlife of responses to the material history of objects associated with Mary. Perhaps the blotched ink was caused by her falling tears. But the spiral lock keeps in check any temptation to imagine her 'last letter' dashed off in a haze of weeping. Instead, this intricate lock adds to a picture of an expert letter-writer trained at the court of France who had a composed and steady hand and a dedicated inner circle of women.

⁴⁰ Mary's needlework is analysed within a gendered conceptualization of its textuality by Susan Frye, *Pens and Needles: Women's Textualities in Early Modern England*, Material Texts (Philadelphia, 2013); the locations of her embroideries are discussed by Fraser, *Mary Queen of Scots*, pp. 512–13.

⁴¹ The letters from Bolton Castle and Fotheringhay Castle were written before, and then after, Mary's secretaries were with her.

⁴² Labanoff, vol. vii, pp. 242-9, Inventory taken at Chartley, August 1586; vol. vii, pp. 254-72, Inventory taken at Fotheringhay, 20 February 1587, which concludes with the note that 'there remaineth in the sayd late Quenes cabinet and other places, a great number of bookes, drinking glasses, and other small things not mentioned'.

⁴³ Discussed, for example, by Daybell, *Women Letter-Writers*, pp. 72-4; Wiggins, *Bess of Hardwick's Letters*, pp. 123-5; and Heather Wolfe, 'Letter Writing and Paper Connoisseurship in Elite Households in Early Modern England', in Carla Bittel, Elaine Leong, and Christine von Oertzen (eds.), *Working With Paper: Gendered Practices in the History of Knowledge* (Pittsburgh, 2019), pp. 17-31.

⁴⁴ The presence of collaborators may, for one thing, help to explain why the form of the spiral lock differs between the letters. These differences in number and size of slits (such as between the Bolton and Fotheringhay spiral locks) may be the result of the type or size of tools available at each venue and possible need to improvise and adapt the form of the lock to the size of the point or blade. Another possibility is that such variations in form reflect different personnel and their own preferred style of fashioning a spiral lock. She sometimes complained in her letters of her physical decrepitude that made letter production difficult. While a rhetorical convention, in Mary's case it may also have been a physical reality that required her to call for assistance.

⁴⁵ Guy, *My Heart*, p. 501.

We know that Mary had been writing ‘farewell letters’ for several months before her execution, and there is no doubt, from these, that she was aware of the potential power of what would be her final act and its memory. She knew there would be a moment when she would be writing this ‘last letter’.⁴⁶ Every part of the letter is precise and speaks of preparedness: its wording, style of handwriting, enclosed gifts of precious stones, instructions to the bearer, and the lock, were all deliberately chosen to produce a coherent and fluent letter encased in layers of materiality. Mary’s execution sent shockwaves around Europe and was a trigger in the chain of events that led up to the Spanish Armada.⁴⁷ The ‘last letter’ has a unique place in both Anglo-Scottish and European history. The spiral lock gives us a letter prepared with precision and an awareness of its anticipated reception and future place in posterity.

Response 2: Using the spiral lock in the British Library exhibition *Elizabeth and Mary: Royal Cousins, Rival Queens*

Andrea Clarke and Alan Bryson

Elizabeth and Mary: Royal Cousins, Rival Queens is the first major exhibition to consider Elizabeth I and Mary, Queen of Scots together. Using original documents and objects, it takes a fresh and revealing look at the story of the two iconic sovereign queens. Elizabeth and Mary were bound together by their shared Tudor inheritance and experience as fellow sovereign queens, but divided by their opposing Protestant and Catholic faiths and their rivalry for the English and Irish thrones. Their turbulent relationship dominated and defined English and Scottish politics for thirty years. But despite their fates being intertwined, the two Queens never actually met in person; instead their relationship was played out at a distance, much of it by letter. A selection of these letters, and other documents, written in the Queens’ own hands, or recording their speeches, conversations and commandments, form the narrative backbone of the exhibition. They enable visitors to step back into Elizabeth and Mary’s world and to understand how, from amicable beginnings and sisterly affection, their relationship turned into one of suspicion, distrust, and betrayal. The exhibition also explores how Elizabeth and Mary’s complex relationship reflected a much broader story, revealing that their struggle for dynastic pre-eminence within the British Isles became inseparable from the national religious struggles of their respective kingdoms. Their rivalry over the throne also profoundly shaped England and Scotland’s relations, both with each other and with France and Spain.

Elizabeth and Mary: Royal Cousins, Rival Queens is divided into five sections, each dealing with a period of their lives and drawing out themes – their kinship and gender, the impact of the reformation, national identity – that are developed over the course of the exhibition narrative. The first section covers the early years, from Elizabeth’s birth and the English and Scottish reformations to Mary’s first marriage. It is followed by ‘Two Queens in One Isle’, one of the two dramatic high points of the story, which focuses on Mary’s personal reign during the 1560s, when she returned from France to Scotland and tried to forge a direct connection with Elizabeth, proposing to meet and cement their amity.⁴⁸ Following her

⁴⁶ She had been writing final letters to correspondents including Elizabeth I and other relatives for some time; Guy, *My Heart*, p. 500. We can be confident the ‘last letter’ was written that night because of the specificity of the content.

⁴⁷ Guy, *My Heart*, p. 10. Alford, ‘Some Elizabethan Spies’; and *The Watchers: A Secret History of the Reign of Elizabeth I* (London, 2012), chapter 16 ‘An Axe and an Armada’.

⁴⁸ The section title is taken from Mary’s remarkable conversation in August 1560 with the English ambassador to France, Sir Nicholas Throckmorton: TNA, SP 70/17, f. 81v; cf. SP 70/31, f. 12v.

disastrous second and third marriages, to her cousin, Henry Stuart, Lord Darnley, then to James Hepburn, Earl of Bothwell, Mary was deposed in 1567. The year after she escaped Scotland, fleeing to England to seek refuge with Elizabeth. Instead, for reasons of state, Elizabeth felt compelled to hold her Catholic cousin Mary prisoner, a tense political situation explored in section three of the exhibition.

The crisis years of the 1580s, which saw an embattled, Protestant England threatened with foreign invasion in support of the Catholic Mary, form the exhibition's penultimate, climactic section. Faced with such grave threats, Elizabeth's chief adviser, William Cecil, Lord Burghley, and her Principal Secretary, Sir Francis Walsingham, decided that the effective use of intelligence networks was critical to ensuring the Queen's safety. Consequently, they greatly expanded the Elizabethan secret service, often resorting to underhand and brutal methods. Exhibits used to illustrate this period, including ciphered and deciphered documents and letters describing intelligence gathering and encryption techniques, demonstrate how Elizabeth's government thwarted the 1583 Throckmorton Plot and the 1585 Parry Plot. But the exhibition focuses here on the most famous Elizabethan surveillance operation of them all – uncovering the 1586 Babington Plot, which entrapped Mary and brought her to trial and execution in 1587. The exhibition concludes with a brief overview of Elizabeth's final years, when by turns she nurtured and castigated Mary's son, King James VI of Scotland, who succeeded Elizabeth in 1603 and unified the crowns of England, Scotland, and Ireland as James I.

Throughout, the exhibition focuses on original letters and documents – both for their content, but also for their material form – and in particular in the context of intelligence gathering and espionage. It is in this regard especially that new research into letterlocking techniques offers a fascinating and welcome addition to curation. Letterlocking reshapes how we think about the objects on display, both in terms of the exhibition narrative, and as tools which offer novel and innovative interpretations of original form and purpose. Curating an exhibition that includes a large number of historical documents can present significant challenges. These individual pieces of paper each have a story to tell: they can illustrate key moments in the lives of historical figures, giving us ring-side seats to some of the great events in history; and they provide fascinating glimpses into the character of famous individuals, as these men and women express themselves in their own words. However, at first glance, the historical documents under our curation – the state papers, rather than the beautiful illuminated manuscripts of our medieval colleagues – can appear deceptively underwhelming to the general public, written, as they often are, in indecipherable hands in ink that has faded to a brown tone, on unadorned, beige paper. Moreover, when letters and state papers ceased to be day-to-day working documents, instead becoming part of archive and library collections, they have often been bound into volumes for ease of storage and consultation. While it is usually possible to remove items from these volumes to exhibit them as individual documents, conservation issues sometimes prevent this, meaning they have to be displayed in book form. Either way, state papers, and letters in particular, that were once folded, secured and sealed, carried from sender to recipient, and opened, read and re-read, can lose their sense of vitality and connection with the past once in a display case.

Elizabeth and Mary: Royal Cousins, Rival Queens employs several different methods of interpretation – in addition to traditional panel texts and labels – to enable a wide public audience to engage with the exhibits and connect with the people behind them, but also to elucidate for visitors how these flat objects would once have looked and functioned, letters in particular. For example, to help with the difficulties presented by sixteenth-century palaeography, complex language, and labyrinthine grammatical constructions, audio recordings of key passages from selected letters and documents help to bring the historical figures in the exhibition to life. Highly visible graphic wall quotes are used to further unlock content and enhance the visitor journey. And letters written in the hands of Elizabeth and Mary have been animated on iPads, with key passages picked out, so that the audience can

locate and identify the words on the original document in front of them, words that otherwise most would be unable to read.

As we have already seen, however, letters are more than mere collections of words, for they also have a palpable story to tell – indeed, a story that is quite literally tangible. The physical appearance and structure of a letter can often add another dimension to our understanding, which is precisely why the ground-breaking research into letterlocking techniques is so transformative. For the first time in a British Library exhibition, visitors to *Elizabeth and Mary: Royal Cousins, Rival Queens* will be able to see models of two locked, sealed letters displayed alongside the originals, helping them to see and understand the now flat, conserved originals as the three-dimensional, carefully engineered objects they once were.

The first model is of a letter written by Mary, Queen of Scots to Sir Francis Knollys on 1 September 1568, three months after arriving in England to seek asylum from her enemies in Scotland.⁴⁹ Instead of being welcomed to court by Elizabeth, as Mary had expected, she was placed under the temporary custodianship of Knollys at the secure location of Bolton Castle in Yorkshire. In the letter, Mary entreats Knollys to intercede with Elizabeth on her behalf and employs the highly secure spiral-locking mechanism. This is the same locking method used to secure the letter that Mary penned to her brother-in-law, Henry III, King of France, in the early hours of the morning of her execution. It is tantalizing to think, as conjectured here, that Mary might have actually locked the last letter she ever wrote herself.⁵⁰

Despite her precautions, not all Mary's correspondence was secure (see Alison Wiggins's response above). The *Elizabeth and Mary* exhibition displays a number of examples of intercepted letters, one of which, the 'Gallows Letter', was famously copied, deciphered and doctored by Elizabeth's spies, before being sent on to its intended recipient – with fatal consequences.⁵¹ Letterlocking presents new and vital evidence of historical communication security methods – by reconstructing exactly how secret documents could be locked securely – which further enhances our understanding of espionage techniques and intelligence networks.

The second letter selected for modelling, to be displayed in the exhibition, was sent by Elizabeth to Sir Ralph Sadler on 3 December 1584, informing him that he was to replace George Talbot, sixth Earl of Shrewsbury, as Mary's keeper during her English imprisonment, and warning him to 'use but old trust and new diligence'.⁵² This letter was secured using a triangle lock. A video filmed especially for the exhibition by Unlocking History introduces visitors to this letterlocking process, revealing step by step the cuts, folds, manipulations and locking mechanism that were used – in a fascinating feat of engineering – to transform a flat sheet of paper into a locked letter packet.

Letterlocking studies also have several potential practical applications for custodians of epistolary heritage. Perhaps most significantly, they require us to read and understand letters in a more holistic sense, no longer simply as two-dimensional carriers of text but as structures that once worked as engineered objects. Once recognized, standardized terminology, language and metadata will provide the tools to describe material evidence of internal security mechanisms, new conceptual information that might inform how we catalogue and present letters in the future, just as it informs scholarship in the field today. In the past vital clues and evidence of letterlocking have been incorrectly identified as damage and either obscured or destroyed by historic treatment methods. Letters have been flattened and lined and slits and tears have been infilled. This new ground-breaking work provides us with the knowledge and tools to look at historical documents in a new light and to recognize folds, slits, and tears as vital evidence. Modern conservation principles and non-invasive treatments, such as that applied to British Library, Loan MS. 128 [4], combined with a growing

⁴⁹ British Library, Cotton MS. Caligula C. I., f. 218rv.

⁵⁰ National Library of Scotland, Adv. MS. 54.1.1.

⁵¹ The National Archives, SP 53/18/53.

⁵² British Library, Loan MS. 128 [4].

awareness of letterlocking studies, are key to recognizing and taking as much care to preserve folds, slits, and tears as we do the written word.

Appendix: Glossary of letterlocking terms

The following definitions of letterlocking technical terms are derived from the Dictionary of Letterlocking (DoLL), <<http://letterlocking.org/dictionary>> a resource available online and in preparation for print.

Assigned crease pattern

An **assigned crease pattern**, also known as an assigned mountain–valley crease pattern, is a designation of how each **crease** in a **letter** was created. It maps out the direction of each crease, in order to facilitate **reverse-engineering**. It is determined by combining a **crease pattern** with **crease assignment**. A crease pattern is the crisscross pattern of creases left in an unfolded writing **substrate**, indicating where **folds** were made. A crease assignment recognizes the direction of any individual original fold, either **mountain** or **valley**. If a substrate is turned over, crease assignment reverses.

Letterlocking

1. The act of folding and securing an epistolary writing **substrate** (such as papyrus, parchment, or paper) to function as its **envelope** or sending device. As distinct from the use of a **wrapper** or gummed envelope, and from **paper-folding traditions** such as origami.
2. A sub-category of a 10,000-year **document security** tradition, pertaining to epistolary materials.
3. The discipline which studies the materially engineered security and privacy of letters, both as a technology and a historically evolving tradition.

Letterlocking category (LC)

A letterlocking category is a distinct class of locked letters defined by the unique combination of physical **manipulations** used to transform a writing substrate into a **letterpacket**. Letterlocking category numbers (LC#s) are assigned based on which manipulations appear to have been applied to the letterpacket. The letterlocking categories chart shows the sixty-four categories, based on all possible manipulation combinations. Unlocking History has assigned a category number to each historic letterpacket we have encountered, but we have not encountered examples of all categories. In the chart, block numbers indicate that historic examples have been encountered, while outline numbers represent hypotheticals. Categories record only the *presence* of a manipulation, rather than dictating the order by which they are applied, or whether they are applied singularly or in multiples. A single category can encompass many category variations. Category information is used to help determine **security score**.

Letterlocking configuration

The unique manifestation of any single locked letter.

Letterlocking format (LF)

A letterlocking format is a distinct class of locked letters defined by the number of **edges** on the two-dimensional silhouette of a **letterpacket**. Format is a product of a letterpacket's **internal engineering**, and can be determined by studying an opened letter's **assigned crease pattern**. Letterlocking format numbers (LF#s) are assigned based on edge-number and, in some cases, features of orientation or shape. This is especially important for packets with four edges, which are the most common; these are sub-divided into squares, diamonds, and

rectangles. Rectangles are further defined as wide or tall depending on how they must be held in order to read the address. Extra-wide and extra-tall formats also exist.

The letterlocking formats chart shows eighteen formats. This number is representative rather than exhaustive, since a letterpacket could conceivably have dozens or hundreds of edges depending on the intricacy of folding. Some letters can be rolled into scrolls or spheres, shapes without edges; these are counted as having infinite edges. Unlocking History has assigned a format number to each historic letterpacket we have encountered, but we have not encountered formats with eleven edges or more than twelve edges.

Letterlocking manipulations

A physical alteration performed on a writing **substrate** in order to turn it into a **letterpacket** and secure it shut. **Manipulations** include:

- **fold/roll**
- **tuck**
- **adhere**
- **slit/hole**
- **lock** – further subdivided into **lock-O**, **lock-SA**, and **lock-SU**.

Every letterlocking category is characterized by a specific combination of manipulations: the more manipulations used, the higher the **letterlocking category** assigned to the letterpacket.

1. *Fold*. The doubling or bending of a substrate over itself. Most locked paper **letters** are folded into flat packets, but rolled packets also exist. A fold usually leaves a **crease** in the substrate (see **mountain crease** and **valley crease**).
2. *Slit/hole*. A slit is a linear piercing made in a substrate by a flat blade. A hole is a puncture made by an **awl**, a needle, or similar boring tool. Both provide space for **locks** to travel through a **substrate**, and are therefore treated as serving the same function, however a slit/hole that is not a part of the **locking mechanism** may be observed.
3. *Tuck*. The insertion of a flap into a pocket made by **folding** the **substrate**. The flap may consist of single or multiple layers. One of the principal **manipulations of letterlocking**.
4. *Adhere*. The application of an **adhesive** substance, such as **sealing wax** or a starch **wafer**, to affix substrates and/or lock surfaces to one another. One of the principal **manipulations of letterlocking**.
5. *Lock*. A material appendage to the main writing **substrate**, used to fasten or secure a **letterpacket** shut. As part of the **locking mechanism**, locks often (though not always) work in combination with **slits/holes** and/or **adhesive**. One of the principal manipulations of **letterlocking**. Locks are subdivided into three kinds: **Lock–Other** (lock-O), **Lock–Same Substrate, Attached** (lock-SA), and **Lock–Same Substrate, Unattached** (lock-SU).
 - a. *Lock–Other (lock-O)*. A **lock** formed from a source other than the writing **substrate** of the **letter**. O signifies ‘Other’. Lock-O materials could include **floss, parchment, paper**, wire, or even hair.
 - b. *Lock–Same Substrate, Attached (lock-SA)*. A **lock cut into or sliced** internally from the writing **substrate** of the **letter**, but not detached entirely before it is used to **secure** the **letterpacket** shut. SA signifies ‘Same substrate, Attached’.
 - c. *Lock–Same Substrate, Unattached (lock-SU)*. A **lock cut off or sliced** from the writing **substrate** of the **letter**, and detached entirely before it is used to **secure** the packet shut. SU signifies ‘Same substrate, Unattached’.

Letterpacket

A locked letter in its unopened, partially opened, or closed state. Letterpackets almost always have two **sides**, front (often bearing the delivery address or instructions) and back (the reverse side). Sides can be made up of one or more panels.

Security score

A score assigned to indicate how difficult a **letterpacket** would be to open and reclose undetected, based on which **letterlocking category** it falls into. Security is assigned as zero (Z), low (L), or high (H). Most categories receive only one security score, but some have multiple security scores. Security score is recorded on the letterlocking category chart.

We cannot know a historic letterlocker's intentions, so security scores are always based on the surviving material evidence alone. Security scores can be assigned to:

- an opened, partially opened, or closed letterpacket that preserves its locking evidence;
- an unopened letterpacket, by the locker themselves;
- an unopened letterpacket, by someone who observed the **manipulations** as they were made;
- an unopened letterpacket, scanned and digitally unfolded.

Security scores can also be inferred for unopened letterpackets not yet scanned or for opened letters missing some of their evidence.

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