

'The origin story of James Bond's Q Branch.' Charles Cumming

# SPY CRAFT



*Tricks and Tools of the Dangerous Trade  
from Elizabeth I to the Restoration*

NADINE AKKERMAN  
& PETE LANGMAN

*SPYCRAFT*

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## *A NOTE ON DATES, SOURCES AND CURRENCIES*

In 1582, the wildly inaccurate Julian calendar was replaced by a newly calculated version, the Gregorian calendar. As this had been ordered by Pope Gregory, the resolutely Protestant England stuck with the Julian version, ensuring that English dates remained ten days behind those of Europe until 1752. England and her enemies thus occupied different time zones, as 10 September in England was 20 September just across the channel in the Spanish Netherlands. These two systems were referred to at the time as *stilo veteri* (s.v., Old Style: the Julian calendar) and *stilo novo* (s.n., New Style: the Gregorian calendar), and still are. As we mostly deal in the Anglophone world, dates are given in Old Style (although exceptions are made for European dates such as the assassination of William the Silent, whose demise came about on 10 July on mainland Europe – 30 June in England). As with most historians, however, we take the new year to begin on 1 January rather than 25 March (Lady Day, the feast of the Annunciation).

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The principles set out below have been applied to all primary sources, whether in manuscript or in print, including editions such as *The Correspondence of Elizabeth Stuart*.

Original punctuation, which is often non-existent where it does not appear to have been scattered randomly upon the page, has been lightly edited to aid reader comprehension. In similar fashion, we also eradicate unnecessary capitalisation. Seventeenth-century orthographical practice,

spellings and contractions have been silently modernised in favour of readability. There are five exceptions to this rule:

1. When citing from a document that is also shown as an image on the same or following page. In this case, our transcription will be diplomatic, that is, we will write what is there, including contemporary abbreviations such as w<sup>ch</sup> for which, y<sup>t</sup> for that, y<sup>e</sup> for the, and Y<sup>rs</sup> for Yours, etc.
2. When discussing ciphers. Some of the works we discuss have idiosyncrasies that are a part of the cipher themselves, and to modernise these would cause no little confusion. (The English alphabet, for instance, had twenty-four letters, eliding i/j and u/v. Sometimes, the ‘w’ was also left out. Italians saw little use for the letter ‘h’, and in Scots, ‘wh’ was rendered ‘quh’.)
3. When modernising a spelling might give the wrong impression: for instance, we write ‘bisket bread’ instead of ‘biscuit bread’ because, while it may be that the words are related, the actual formulation of ‘bisket bread’ is still a matter of dispute. To render ‘bisket’ in this instance as ‘biscuit’ would provide a false sense of familiarity.
4. When the original spelling is particularly evocative – we keep ‘naughtie inke’, for example.
5. Poetry (even bad poetry) we do not alter.



As for currencies, while we have used the standard £.s.d or pounds, shillings and pence (where 12 pence make a shilling and 20 shillings make a pound), we have, on occasion, inserted a rough idea of how these sums might translate into modern terms – to do so we have used the calculator supplied by The National Archives, Kew (<https://www.nationalarchives.gov.uk/currency-converter/>). Do be aware that these sums are relatively arbitrary, as the things that we value today are very different from those that were valued back then. A horse, for example, is now a luxury; then it was a primary mode of transport.



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Such a work as *Spycraft* is always a collaborative endeavour in so many ways, as its wildly interdisciplinary nature has necessitated that we draw heavily on the expertise of others: it has only been made possible due to those giants on whose shoulders we have stood as we wrote.

Numerous individuals have helped us gain access to collections, told us where manuscripts were loitering with intent, or helped with translations. These include Jackie Eales for confirming that Lady Brilliana's letters as edited by Lewis were still in private hands; Edward and Victoria Harley and the Harley Estate for their generous hospitality; Alexia Grosjean for translations of Mary, Queen of Scots's letter regarding invisible ink; Angham Abdullah for decoding Arabic terms for lemons; Ioanna Iordanou for chasing down waterproof garments and Paolo Sarpi in Venetian archives

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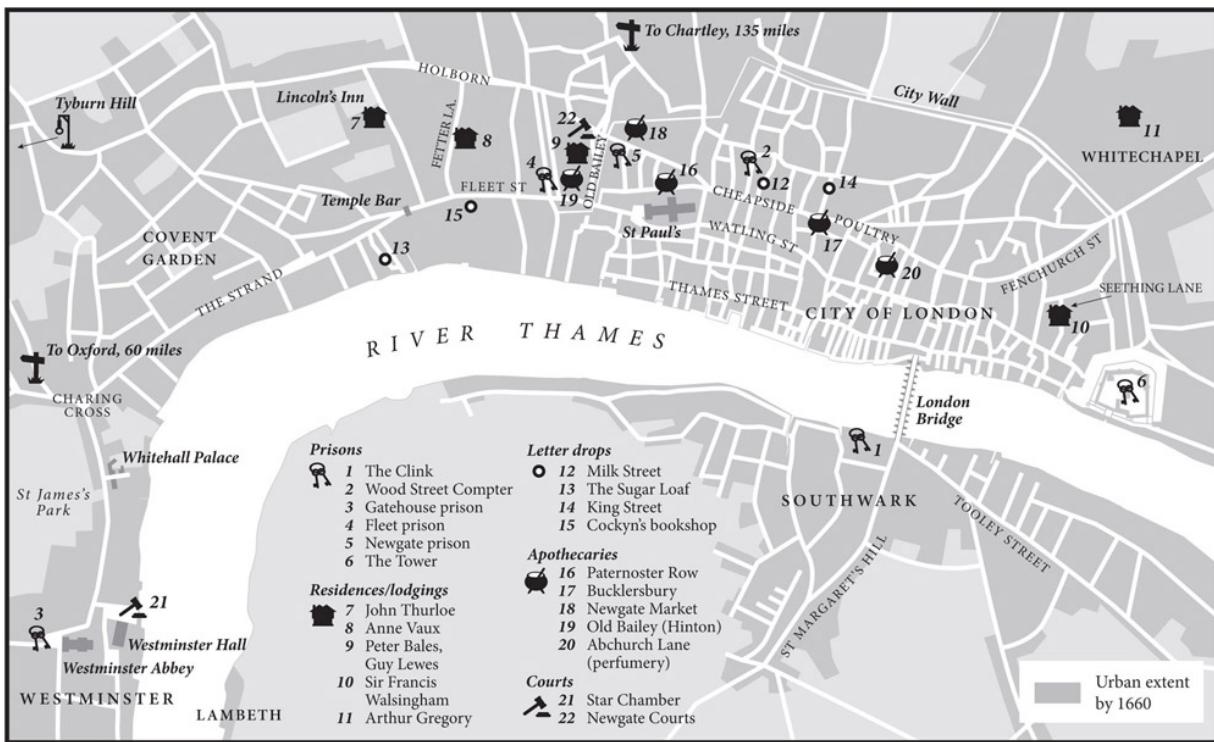
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The list of those to whom we owe a debt is long, and if we have missed anyone, we can only apologise and blame it on those pesky spies who, in league with Titivillus, continually stole our manuscripts, altered our texts, introduced random misspellings and grammatical howlers into previously perfect sentences, and generally hung around invisibly causing mayhem. Finally, we would like to state that if your copy of *Spycraft* should glow in the dark, be assured that no glow-worms were harmed during its production, nor were any toads.

Nadine & Pete  
Leiden and Adderbury / Adderbury and Leiden, 2023



The London Netherworld, 1558–1660



## *PRELUDÉ: THE SKELETON KEY*

A stranger entering Arthur Gregory's Whitechapel home in 1596, or perhaps his workshop in the Tower of London in 1606, would have been forgiven for believing it was occupied by an apothecary or alchemist. On its shelves, sticky with lumps of beeswax and the stumps of long-dead tallow candles, bottles of shellac, turpentine, quicksilver and linseed oil jostled for space with jars of oak galls, dried fish glue, alum and vitriol, while metal boxes sat uneasy atop one another, peeling paper labels marking their contents: verdigris, litharge, ceruse, sal ammoniac. Attached to the desk by a metal frame, a small wooden box containing a crystal lens hovered above a half-written letter. On the letter lay a small pair of spectacles. Quills cut from goose, swan and crow lay beside a penknife, a comb and some signets. A lattice of leather strips tacked onto the dark wood-panelled walls embraced unopened letter-packets and slips of paper covered in symbols; a tangle of horse's hair, ribbon and floss hung expectantly from an exposed nail, waiting their turn to strap, tie and bind. The fireplace was crowded with the kettles, stills and pots that brewed the room's thick atmosphere; in front of it sat a low bench of thick, blackened oak, like those used for the slaughter of pigs. Piles of paper crowded the floor while individual sheets hung like sleeping bats amongst the rafters. A viol, new wire strings draped over its tuning pegs, lay trapped in a thicket of rolled-up maps, plans for fortifications and complex automata. And there were books. His was a world busy with secrets.

You may not recognise many of the objects and substances described here, just as you may not recognise Arthur Gregory, who died 400 years ago

in 1624. This is a book about both: a book about early modern spycraft, the tricks and tools employed by spies and counterspies as they plied their trade, whether that meant smuggling a letter through enemy lines, intercepting ciphered communications, or plotting to assassinate a head of state. These technologies were perfected through long, and often very messy, experience. While his room might suggest otherwise, Gregory was no alchemist, nor was he an apothecary. He was a counter-espionage agent who both used and developed those technologies, not merely a keeper but an inventor of secrets. He worked on and off for various members of the English establishment during the late sixteenth and early seventeenth centuries, seeking – but for a long time failing – to secure permanent employment. In many respects he epitomises those individuals who played vital parts in well-known plots and conspiracies, but who even then lurked in the shadows of a world already shadowy enough, the world of the spy. And there they have remained.

Many of the items in Gregory's room were used for manipulating letters. This was by far his most important skill: the primary job of a spy was (as it still is) to access information which they, or most likely their masters, might use against their enemies. In this period the *only* viable method of transmitting information over distance other than by word of mouth was with pen and paper, and once written down these paper secrets were folded into the packets we know as letters and sent on their way. It was at this point, when they were in transit, that the secrets were at their most vulnerable: like a messenger, a letter could be intercepted and interrogated. A spy's life might depend on their ability to protect the information contained in their letters from the prying eyes of the counterspy: a counterspy's career (and perhaps the life of their employer) might depend on their ability to capture that very same information and thus uncover and frustrate the spy's intentions. Perhaps the greatest asset either possessed was invisibility – it is no surprise that so few portraits exist of those who played this game. Neither side wished the other to be aware of their activities. The stakes were often high. Letters were not always tedious accounts of administrative meanderings; in times of conflict they were all too often a matter of life and death.

Arthur Gregory was not without fame in his lifetime, finding himself lauded in William Camden's famous history of the reign of Queen Elizabeth

I, the *Annales* of 1616. In this book, published a decade after Gregory had retired from the world of espionage in favour of the comforts of suburbia and the office of mayor of Lyme Regis, Camden praised his work for Sir Francis Walsingham, privy councillor and secretary of state. Gregory, he wrote, could open and refold a letter-packet so neatly that ‘it was not to be perceived that they had been unsealed’.<sup>1</sup> In 1662, Thomas Fuller would repeat Camden’s praise, crediting Gregory with ‘the admirable art of forcing the Seal of a Letter; yet so invisibly, that it still appeared a Virgin to the exactest beholder’.<sup>2</sup> This may still not sound all that significant to the modern historian, which goes some way to explaining why Gregory himself has remained relatively invisible ever since, despite his intimate involvement in foiling some of the more iconic plots of the era. Another reason why historians have allowed Gregory to become invisible again is that so much of the texture of his employment is flattened out by the printed page, just as his techniques, when they are discussed at all, are mentioned without consideration of their physical and temporal qualities.

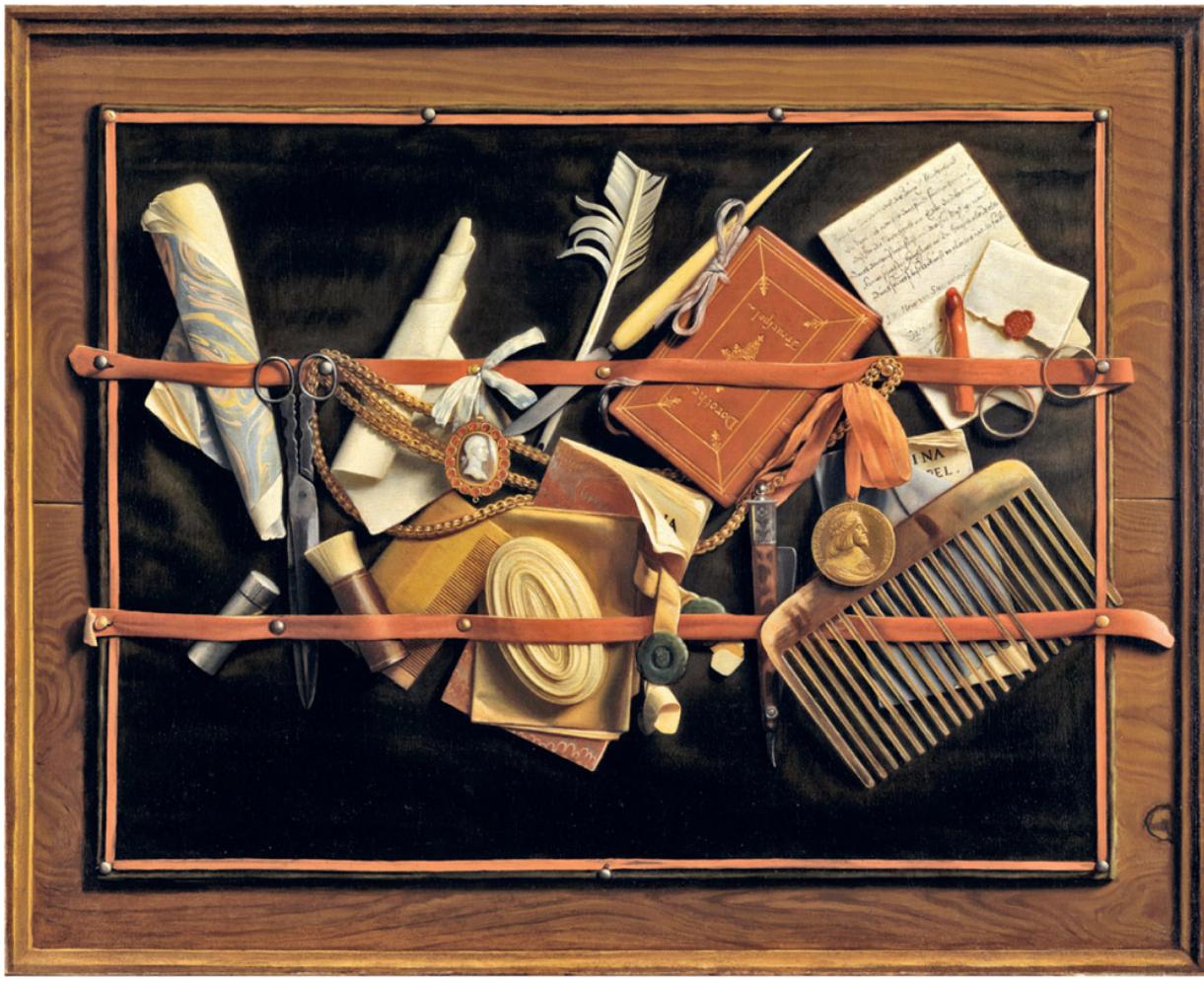


Fig. 1: Next to letters, writing implements such as a penknife, a quill, scissors, a piece of scorched sealing wax and even a comb, are given centre stage on this ‘necessary board’.

The modern eye does not view objects in the same way as the early modern one. This is apparent in the period’s *trompe l’oeil* paintings of so-called necessary boards. Depicting a collection of small objects such as quills, penknives, razors, spectacles, scissors and combs held onto a board by leather straps, these paintings were created in such a way as to give the impression of three dimensions – the phrase ‘*trompe l’oeil*’ means ‘deceive the eye’. While this style of painting deceives the viewer into inferring a dimension that is not present, *Spycraft* aims to peel back the layers of deception and help the reader appreciate that there are dimensions to seemingly ordinary objects that are not at first apparent. Take Hoogstraten’s painting, for example (Fig. 1). While the comb may look out of place amongst the writing implements on display, it was no mere symbol of

earthly vanity as is often assumed – by drawing its tines across the paper, a scribe created a series of barely perceptible but straight and evenly spaced lines that were invaluable for keeping writing orderly.<sup>3</sup> *Spycraft* aims to show the reader how such everyday implements could have other, more shadowy uses than may at first appear. It will show how the ordinary world blended into the world of espionage, and how the boundaries between criminal and counterspy were often as blurred as those between secretary and spy.

The tricks and tools described in *Spycraft* were used by conspirator and criminal, impostor and intelligencer alike. Where successful spies were skilled at keeping their secrets, less committed actors were prone to collapsing under interrogation and all too readily betraying their craft. Where such instances shed light on otherwise invisible techniques, we have not been afraid to give the more peripheral and dubious characters centre stage. The various methods of counterfeiting a signature, for instance, remain the same whether one is forging a receipt to make some cash on the side or a passport needed to create a new identity for a life-or-death mission deep into enemy territory. The very tangibility of these techniques, however, can be the key to understanding some of the more occluded events of history.

## *SPIES AND THE DARK ARTIFICER*

Arthur Gregory was, by any estimation, knee-deep in the surreptitious and secretive world of espionage, but was he a spy in the modern sense? The word ‘spy’ is as slippery as those it aims to describe. In the late medieval world the lines between messengers, diplomats and spies were somewhat blurred, and by the sixteenth century secretaries were considered primarily responsible for ‘secret matters’.<sup>4</sup> As the first resident ambassadors were installed, men whose official mission it was to gather intelligence (that is, secret, confidential information) in the foreign state, diplomacy and intelligence became increasingly synonymous.<sup>5</sup> Many felt it necessary to state that ambassadors, though feeding on intelligence, were ‘honourable spies’, implicitly contrasting them to an ordinary, lowly and dirty version.<sup>6</sup>

Certainly, the word ‘spy’ came with a trunkful of negative connotations. This is perhaps understandable: the very qualities that made for an effective spy – the ability to skulk in the shadows unobserved, to lie undetected and to cheat unsuspected – made the job ‘an office unbecoming a gentleman’, its practitioners ‘treacherous and morally corrupt’ (though this did not mean that the higher echelons of society were not active in espionage).<sup>7</sup> In fact, many of the spy’s everyday tasks were illegal: eavesdropping, counterfeiting, smuggling, bribery, perhaps even murder. Forging documents, for instance, was a dangerous game – since 1563, it had been punishable by means of a fine and by the guilty party being ‘set upon the pillory in some open market town or other open place, and there to have both his ears cut off, and also his nostrils to be slit and cut and seared with a hot iron, so as they may remain for a perpetual note or mark of his falsehood’.<sup>8</sup> It is unsurprising, therefore, that the line in the sand that separated criminal from spy was often so trampled upon as to be invisible. Robert Cecil, secretary of state both for Elizabeth I and James I, recruited from the most insalubrious of venues: some of his spies came with the personal recommendation of Sir William Waad, lieutenant of the Tower.<sup>9</sup> Little wonder that Cecil remarked on ‘how usual it is for buffoons to be used as spies’.<sup>10</sup> Such unfortunate beginnings ensured that intelligencers were criticised by virtually every part of society, and the stain of criminal immorality tainted everyone in the dangerous trade, from dark artificer and spy to secretary of state.<sup>11</sup> No one was exempt.

The poet and playwright Ben Jonson, who was known to have worked in the dangerous trade himself, equated spies with the period’s most common source of artificial light, the tallow candle: ‘Spies, you are lights in state, but of base stuff,/ Who, when you’ve burnt yourselves down to the snuff,/ Stink, and are thrown away. End fair enough.’<sup>12</sup> Made from the rendered fat of cattle or sheep, the tallow candle’s light was accompanied by greasy and malodorous smoke, so the comparison was more than apt. Many of the individuals we examine in *Spycraft* were such as these, men and women who, no matter their skills, were all too often discarded once they had outlived their usefulness. In many cases, the secret techniques they had mastered accompanied them into obscurity – for spy handlers and spies alike, it was best to leave no trace of their presence behind.

A spy was fundamentally an individual who sought to discover and trade confidential information that they hoped would fuel action that either protected or undermined the state. Arthur Gregory slides into this definition somewhat obliquely: he spent most of his time sat behind a desk or in a workshop rather than eavesdropping behind tavern doors. But defining the spy is as difficult as unmasking them: as Bosola, the antihero of John Webster's 1612–13 play *The Duchess of Malfi*, put it, a spy or intelligencer was 'a very quaint invisible devil, in [the] flesh'; it has been suggested, however, that before the 1650s such activities were so amateur that there was no such thing as a spy, merely 'spying', and an awful lot of it.<sup>13</sup>

Definitions notwithstanding, Gregory was, in effect, the early modern equivalent of James Bond's gadget specialist Q. By the 1660s, a different kind of gadget specialist, but one who was also interested in invisible inks, the experimental scientist Robert Boyle, used the word 'artificer' to refer to some of the many assistants he employed. These men were essential: they built the devices Boyle used to demonstrate his ideas at the Royal Society and elsewhere, but they were rarely, if ever, mentioned by those who reported on these proceedings.<sup>14</sup> They were often anonymous, and have remained so. If remaining invisible was a talent to be nurtured amongst those who worked at the sharp end of espionage, those who developed and perfected the methods that allowed them to better carry out their tasks undetected were doubly invisible. Because of the nefarious nature of espionage, and the often dubious legality of the actions carried out by men such as Gregory as they plied their trade, we have adopted and adapted Boyle's terminology, and refer to these men (and the occasional woman) as the *dark artificers*.

## THE MOTHER OF INVENTION

We concentrate our analysis on the development and use of spycraft techniques between 1558 (the year of the accession of Queen Elizabeth I and the publication of the period's most influential 'book of secrets', Giambattista della Porta's *Magiae Naturalis*) and 1660 (the year of the Restoration of King Charles II to the throne of England and the founding of

the Royal Society, the famous academy devoted to the furthering of scientific knowledge), though we will draw on material from the entire early modern period (loosely, 1500–1720). Spying is rightfully characterised as the second-oldest profession, and technologies never develop out of a vacuum or in a linear fashion.<sup>15</sup> It is within this period, however, that we can best trace the evolution of espionage from amateur status to at least some measure of semi-professionalism, an evolution that was mirrored by contemporary technical advances. We cease our investigations around the dawn of the modern period because not only does the Industrial Revolution herald a radical change in available technology, but also because these times are already well-served by works of history.<sup>16</sup>

For the majority of Elizabeth I's reign, Protestant England faced an existential threat in the shape of the Catholic empire of Spain. This was exacerbated by Pope Pius V's 1570 declaration that the English queen was a heretic and Catholic subjects were not bound to obey her. Contrary to the propaganda surrounding the Elizabethan 'Golden Age', England was poor, weak and isolated. It was threatened on all sides (and from within), and unable to make much headway in the European rush to empire (though it would more than make up for this slow start). Catholic Spain, for instance, was still plundering unfeasible quantities of gold from the Americas, and was happy to use this wealth in an attempt to return this upstart island state to the one true faith – the Spanish king, Philip II, had, after all, been married to Elizabeth's half-sister and predecessor on the English throne, Mary I. The imprisonment of Elizabeth's cousin, the widow of a French king and rival for the English crown, Mary, Queen of Scots, ensured that the Catholic threat was felt both within and without. Elizabethan England was thus a hotbed of conspiracy, shot through with spies and traitors, and riddled with Jesuits. Elizabeth's response to Pius's declaration was to strengthen the laws against treason, extending it to include those attempting to convert her subjects to Catholicism, and allowing for the use of torture to extract evidence and confessions. Counter-espionage was the order of the day, and English agents were less responsible for protecting state secrets than they were for protecting the state itself (in the shape of its monarch), often by persecuting individuals considered threatening or even merely suspicious. Elizabethan England, however, lacked a dedicated 'secret

service' in the mould of, to take one example, the Venetian 'Council of Ten', the quasi-autonomous body whose specific remit was counter-espionage and the protection of state secrets such as manufacturing techniques.<sup>17</sup> Even though England had long lagged behind other European states when it came to spycraft, the volatility of the sixteenth century ensured that it rapidly caught up and even overtook its rivals – there was no choice, it was adapt or die. While the use of spies in England diminished during the reign of King James, not least as one of his first acts after coming to the throne of England was to conclude a peace with Spain, they would prove as necessary during his son's reign in the 1640s and under the Commonwealth of Oliver Cromwell in the 1650s as they had in the 1580s.<sup>18</sup> This rapid development of espionage apparatus makes the techniques used by spies more visible than in those countries with more settled and organised secret services.<sup>19</sup> It is for this reason that, while *Spycraft* will consider techniques drawn from across Europe as a whole, and in some cases trace their development back to the Arab, Chinese and classical worlds, it will draw examples of their use primarily from the Anglophone world.

## *SENSORY INSTRUMENTS*

The seventeenth-century edition of an Italian book of emblems, *Iconologia* by Cesare Ripa, included a line drawing of a spy with his tools: 'A man in a noble habit, hides most of his face with his hat; his cloak woven with eyes, ears and tongues; a lantern in one hand; his feet wing'd; a spaniel by him on the ground; his nose in full scent after his game.' His head and face are mostly covered with a hat and his 'noble habit', so that he might 'pass incognito, never discovering his designs' in all social circles. His lantern allows him to 'spy night and day'. His canine assistant symbolises 'their smelling out men's actions, and their inquisitiveness'. His cloak is covered in images of ears and eyes but also tongues, depicting the gathering and dissemination of intelligence. These sensory organs, so the accompanying text explains, 'are the instruments they use to please their patrons'.<sup>20</sup> Ripa knew that those in the dangerous trade could not exist without patrons,

powerful individuals who helped them advance their careers and protected them in return for faithful service, such as acting as the patron's eyes and ears. To get ahead, the Arthur Gregorys of this world used their tongues to both flatter prospective patrons and convince them of their own invaluable skills in hope of gaining favour.

The patronage system defined Gregory's life and core essence in many ways; his cautious nature was a direct result of it. An inventor and innovator, Gregory was capable of rather more than Camden and Fuller had given him credit for. He certainly rated himself more highly, claiming expertise in 'secret employment [in] sundry ways, And also in matters of Architecture, Description, Fortification, Enginery [i.e., engineering], or whatsoever is mechanical, mathematical or martial'.<sup>21</sup> Notes found in the chamber of the imprisoned adventurer Thomas Arundell confirm this as no mere braggadocio:

Arthur Gregory hath a device to make a ship go alone for a mile or two, which striking on any other ship shall take fire & burn both ... & so to burn a whole fleet. He hath also a means to make a ship go much faster than she did & better, by mending her sails &c. He hath a way to make two men able to manage a cannon in a ship ...<sup>22</sup>

Gregory would nevertheless have understood why Camden's portrait was not only brief but touched only upon his manipulation of letters. While he was more than happy to boast of his abilities and his innovative and imaginative inventions in oblique terms, he never committed his secrets to paper and thus never secured them for posterity. Quite the opposite: Gregory deliberately kept their details – the recipes of his potions and pastes, the mechanical workings of his instruments, and suchlike – close to his chest. Gregory had an ageing father and a growing family to support, so could not lose any opportunity for remunerative employment.<sup>23</sup> With so many seeking patronage from government officials, details of his techniques were better left unshared so as not to offer the competition a headstart.

Many of Gregory's letters in the 1580s were direct pleas for patronage, and by 1587 they were beginning to pay off: Walsingham now began to refer to Gregory as 'my servant'. The reciprocity of the client–patron

relationship was not merely expressed in coin – other, often more valued rewards, such as preferment and enhanced social status, were available.<sup>24</sup> Gregory was primarily interested in a secure income, however; in 1599 he was handsomely rewarded for engineering defence works at Upnor Castle, and in 1603 was granted the office of ‘scrutator’ – or investigator – in the port town of Poole, before being called back to espionage work in 1606. He eventually became mayor of Lyme Regis, and was granted a life pension for services rendered.<sup>25</sup>

Finding the right patron was far from easy, especially when it was not apparent whom to single out as in charge. England’s lack of a centralised secret service meant that there was no individual head of intelligence. Walsingham’s involvement in intelligence gathering, for instance, was undertaken in adjunct to his secretarial duties. Walsingham, despite his reputation, only handled half a dozen spies at any given time.<sup>26</sup> Those few individuals he did directly control enjoyed no permanent employment but were attached to him as a function of the client–patron relationship, just as he was attached to his queen. The title so often given to Walsingham, ‘Elizabeth I’s Spymaster’, is as inaccurate as it is anachronistic.<sup>27</sup> The queen’s various advisors and courtiers – the Cecils, Walsingham, Leicester, Essex et al. – collected intelligence both to direct upwards but also, and often primarily, for their own private purposes. They would then effect any state policy passed down to them through their own spy networks when appropriate, but their efforts were rarely co-ordinated. These were the patrons the Gregorys of the dangerous trade appealed to, but they in turn needed to remain in the queen’s good books. They were, in effect, rival spy chiefs.

Elizabeth had no shortage of eyes in her service; Walsingham did not control all of them. In 1586, for example, Elizabeth closed a letter to Robert Dudley, 1st earl of Leicester, with an early modern emoji acknowledging his status: ‘Now will I end, that do imagine I talk still with you, and therefore loathly say farewell, ☺☺’.<sup>28</sup> Leicester used the same symbol to sign off his letters to the queen (see Fig. 2). He was not the only man who drew himself as a vital part of his queen’s sensory equipment: the courtier and later lord chancellor Sir Christopher Hatton referred to himself as her eyelids, begging her in one letter ‘forget not your liddes that are so often

bathed with tears for [your] sake'.<sup>29</sup> While the intelligence she received came from multiple sources, the queen had the final word. Not surprisingly therefore, the top dogs not only competed against one another, but sometimes hated each other to boot. Just as favour was passed down the line, so the opposite was true – if a courtier fell out of favour with the queen, their network of clients followed suit, even to the point of losing their livelihoods. This made choosing one's patron a matter of grave importance, especially for those working in the dangerous trade. This was particularly problematic when it was the protection of the patron that prevented your technically illegal work from being publicly acknowledged as such. Hitching your wagon to the wrong horse could be disastrous, if not fatal, as some of those who relied on Robert Devereux, 2nd earl of Essex, would discover to their cost following his somewhat ill-advised rebellion against Elizabeth I in 1601.

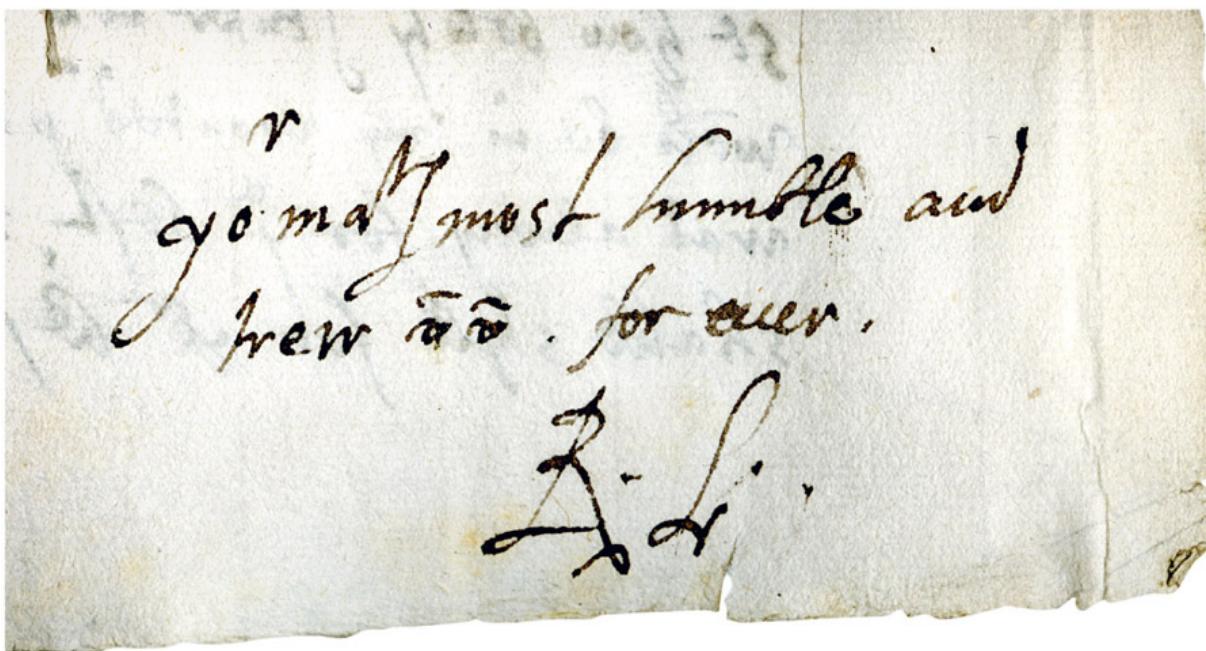


Fig. 2: Leicester's metonymic identification with his monarch's eyes went back at least sixteen years – in 1570 he had signed a letter to his queen with the words 'Yo. r Ma<sup>ts</sup> most humble and trew êê . for euer. R.L.'

In similar fashion, the perfectly natural death of a patron also meant the termination of employment – especially in a business as fickle as espionage. When Walsingham died in 1590, the lord treasurer William Cecil, Lord Burghley, either 'paid off or abandoned' the majority of the late secretary's

spies.<sup>30</sup> One of these spies appears to have been Gregory, as he later wrote to Edward Reynolds, secretary to the earl of Essex, ‘I am worn as far out, of reparation in stuff and instruments … as I am out of knowledge and hope of preferment for my best services’. Nevertheless, he had a plan: ‘I will show you many things the next week to conjure the devil withal.’<sup>31</sup> Luckily for Gregory, Essex was unmoved, so he turned his attentions to another potential patron, Burghley’s son Robert Cecil, reminding him of his ‘secreat services’ and his work to advance spycraft.<sup>32</sup> This time, Gregory was successful, but many were not so fortunate. The other members of the Privy Council – a group of high-ranking and privileged advisors to the queen – had their own networks, so did not necessarily need extra pairs of eyes, and quite possibly did not trust Walsingham’s old client-intelligencers in any case.

Employing intelligencers was not without risk for the patron. Spies were automatically considered of a low, base nature, and though the information they supplied was effectively laundered through their patron, the stains of immoral activities such as ‘dissimulation, simulation, and out-right lying’ were often impervious to erasure, and seeped slowly upwards. The distrust permeating the whole system sometimes narrowed the distance between patron and spy.<sup>33</sup> Libels circulating following the death of Robert Cecil characterised him as an ‘archetypal malignant spider’ and a ‘dissembling smooth-faced dwarf’.<sup>34</sup> Thomas Scott, Parliament’s intelligence chief before John Thurloe, was known to consider brothels and taverns as institutions ripe with intelligence, and thus suitable for close surveillance. This habit rather backfired, and he developed a reputation for having rather too intimate a relationship with the denizens of these tawdry establishments, not least those of a bawdy-house called the Sugar Loaf at Charing Cross.<sup>35</sup>

Their association with the dangerous trade influenced the pet names so often used by monarchs for these secretaries of state. King James referred to Robert Cecil as his ‘little beagle’: like the hunting dog that sniffed out foxes, Cecil worked to root out conspirators. (In this respect, the king might also have been slyly referring to an appellation for Robert’s father William Cecil, ‘the fox’.) This comparison of beagle to spy may have begun with Sir Walter Raleigh, who wrote that any sensible monarch had ‘beagles or listeners in every corner, and all parts of the realm’.<sup>36</sup> Elizabeth had a

crueller streak within her, endorsing one letter to Robert ‘To the Ελφε [Elf]’, having called him ‘pigmy’ before.<sup>37</sup> In doing so, she was perhaps referencing his physical deformities as well as linking him to a certain type of dark magic, a connection which also surfaces in another, more publicly ascribed nickname, ‘the toad’: a piece of paper with the words ‘Here lieth the toad’ was nailed to the doors of both his house in London and his rooms at court by a pastry cook in the service of the earl of Essex.<sup>38</sup>

## *SECRET SERVICES*

Gregory would be employed again and again because he had kept his secrets to himself; no rival could imitate him. Circumspection could be costly, however: when Walsingham needed to counterfeit a postscript on an intercepted letter in 1586, Gregory was passed over in favour of a self-promoting London scrivener, Peter Bales. This unexpected usurpation by a rival taught Gregory the power of advertising, and the need for personal demonstration. By 1594, Gregory would be telling Robert Cecil how he would ‘instruct your honour in the secret use’ of one of his inventions.<sup>39</sup> He would later remind him (somewhat disingenuously) that ‘your Lordship hath had a present trial of that which none but myself hath done before, to write in another man’s hand’.<sup>40</sup> This propensity towards the ‘show, don’t tell’ method of self-promotion also gives us evidence of the height of Gregory’s ambition. When he wrote to Robert’s father William, Lord Burghley, then lord treasurer, recounting his eighteen years of service and requesting a room in the Tower from which to work, he followed his flourishing signature by ‘Commending his own services done to Her Majesty, and his ability to do her more’.<sup>41</sup> Rather than blazon his ‘secret services’ on paper, he wished to demonstrate his skills in person, preferably during an audience with the queen. This reluctance to record his methods led to many of his innovations disappearing into the mists of time, just as his successes with counterfeiting seals and discovering, revealing and ultimately counterfeiting letters written in invisible inks were soon forgotten. It is, perhaps, an enduring irony that some of the techniques he does mention are inferable from a printed book that was available to all.

## *UNNATURAL MAGIC*

Many of Gregory's innovations were at the very least influenced by a pan-European bestselling 'book of secrets' called *Magiae Naturalis*, or *Natural Magick*. It was published in 1558 by the Neopolitan magus Giambattista della Porta, who both dedicated and personally presented it to the Catholic King Philip II of Spain. It included chapters on 'secret writing' and 'opening letters without suspicion', matters close to the heart of any dark artificer.<sup>42</sup> Della Porta also published an influential book on cryptography, *De Furtivis Literarum Notis (On the Secret Symbols of Letters)* in 1563. These works were intended not as dry compendia of theoretical knowledge, but as spurs to demonstration through which the natural magician could learn the secrets of nature.<sup>43</sup> The natural magic that della Porta promoted was in no way akin to witchcraft, which sought power through the manipulation of spirits. Natural magic was the art of exerting power through knowledge of the natural world.<sup>44</sup> Della Porta's publication was also no simple recipe book – purchasing it would not grant the casual reader the immediate power to mix invisible inks, or to open and reseal letters undetected. These 'secrets' may have been in plain sight, but they still required a considerable investment in both time and effort to interpret, and no little skill to put into practice. Gregory knew this from long, and sometimes literally painful, experience.

Whether or not the association of Elizabeth's 'elf' Robert Cecil with the warty amphibian was intended to communicate supernatural connotations, there is no doubt that some felt that some of the arts practised by intelligencers *were* akin to witchcraft. The Chinese first believed invisible ink to be witchery, and when the cipher keys of Philip II were broken he thought it was through black magic.<sup>45</sup> In 1574, della Porta was himself suspected of sorcery, and 'invited' by the Inquisition to visit Rome and explain his views on magic and witchcraft. He was eventually released, on condition that he devote more time to his literary works (della Porta was also a playwright) and dissolve his Accademia dei Segreti, an amorphous collection of natural philosophers (that is, proto-scientists), who met periodically to discuss their investigations into the nature of things and demonstrate their 'discoveries'. In reality, neither the Accademia nor della

Porta's published work concerned themselves with white or dark magic but with what we might call 'stage magic' – their purpose was to investigate nature through demonstration and experimentation.<sup>46</sup> But six years later the accusations resurfaced, as the German physician Johann Wier used della Porta's explanation that 'witch salve' was a hallucinogenic drug that convinced users that they were flying as an argument against the persecution of witches. The French jurist Jean Bodin, Wier's antagonist, was a firm believer in the reality of witches and promptly dubbed della Porta 'Naples's great sorcerer' (see Fig. 3).<sup>47</sup> Della Porta sought to protect himself against spurious accusations of impropriety by acknowledging the dangers of the technologies he described falling into the wrong hands. He wrote in *De Furtivis* that his ciphers were designed to protect the messages of the authorities should they be intercepted by 'bandits, spies or governors, who serve in far-off places'.<sup>48</sup>



Fig. 3: Giambattista della Porta, the 'great sorceror of Naples'.

## *BLACK BOOKS*

That the generation of intelligencers that followed Gregory had to rediscover his skills for themselves is largely the result of the secrecy impelled by his need for patronage and to avoid accusations of impropriety and even witchcraft. When he died intestate in 1624, there was no manuscript *Workes* or *Spycrafte: A Manual* lurking amongst his effects, which is also one of the reasons that, bar a few scholarly speculations on his claims to have improved the ‘sweetness and loudness’ of the viol, if Gregory is remembered at all it is with the words of Camden or Fuller.<sup>49</sup> There is hardly any mention of his spectacular efforts in cleaning up the remnants of the Gunpowder Plot, and none of how, *exactly*, he achieved it.<sup>50</sup> *Spycraft* is the first study to reveal this (see Chapter 4, pp. 184–8). Gregory’s need for patronage, and the precarity and rivalry the patronage system encouraged, meant he did not see the value of co-operative ventures. Gregory may have been granted his room in the Tower, and he may have eventually received the preferment and the pension he believed his talents deserved, but his was a lone victory. It would be another half-century or so before dark artificers like Gregory would work co-operatively, on a daily basis, with regular remuneration, and in the same room. These counter-intelligence units became known as *cabinets noirs* or ‘black chambers’, and those intelligencers who comprised them used many of the very same techniques Gregory had perfected. *Spycraft* follows the movement from lone genius to collaborative, standard intelligence units, the birth of an espionage service that is more recognisable to modern sentiments.

Generations of English spy chiefs complained about there being no tangible structure to the way in which intelligence was done. Such a structure is usually found in institutional archives, but there was no such archive that could tell them how the game was played. They knew full well what was needed.<sup>51</sup> It was not a simple process, however. When Queen Mary I died in 1558, for example, many of her ministers and secretaries also lost their jobs. William Cecil, already chief advisor to the new monarch, Mary’s half-sister Elizabeth Tudor, tried to take possession of those documents and letters the Catholic queen had left behind her. While happy to co-operate, her ex-secretary John Boxall was perhaps a little

embarrassed when forced to admit to the fate of the late queen's documents: 'The letters are in 2 packets, the one of the last year the other of this part. The two kinds whereof I spoke unto you of cannot be found. They were left in the bed chamber of the late Queen's highness to be signed with her hand, and at the ceringe of the corpse (as [Susan] Clarencius sayeth) counted to that use.'<sup>52</sup> ('Ceringe' here refers to the embalming of a corpse and/or shutting or sealing a corpse in a coffin.)<sup>53</sup> The papers that Cecil had hoped would form the basis of an official archive for the new queen had been used to stuff the body of the old one. Perhaps Clarencius, Mary I's favourite lady-in-waiting, had wanted to get rid of sensitive or incriminating evidence.

Later secretary-intelligencers would not fare much better in their attempts to hold onto their employer's documents. Robert Beale recalled the death of Walsingham in 1590 as a dark day, on which the secretary of state's 'papers and books both public and private were seized on and carried away, perhaps by those who would be loath to be used so themselves'. The once-circling vultures could now feed on the state papers with impunity, as no notary protected them: 'those things which were public have been culled out and gathered into private books, whereby no means are left to see what was done before or to give any light of service to young beginners'.<sup>54</sup> Burghley watched and learned. He drew up a will specifying that all of his papers regarding Her Majesty should be 'advisedly perused' by his son Robert.<sup>55</sup> He was to have first pickings. It was Robert who appointed a keeper of records at Whitehall, Thomas Wilson, transferring some of his father's archive to London. After Robert Cecil's own death, a warrant was issued that allowed Wilson, along with another of Cecil's former secretaries Levinus Munck, to take possession of his papers in Whitehall and Salisbury House. The papers now at Hatfield House are those that Wilson and Munck failed to remove from Salisbury House, and their sheer volume pays testament to the difficulty of sifting private papers from public ones.

During his tenure as keeper of records, Wilson complained bitterly to King James about the impossibility of his assignment. Men were reluctant to release papers (and thus their secrets), and 'embezzled & reserved to their own use' documents Wilson was meant to gather for the newly created State Paper Office.<sup>56</sup> He did not abandon the idea of an archive of state

papers, confiscating libraries of ambassadors and private collectors, such as Sir Robert Cotton, who ran state papers to ground with the passion of the huntsman.<sup>57</sup> Despite Wilson's best efforts, the successors of the Cecils would be left largely in the dark when it came to papers concerning 'secret services'. This failure to replicate the almost compulsive archivisation that typified the Venetian intelligence service would frustrate the next generation of English spy chiefs.<sup>58</sup>

We, however, are in the privileged position of being able not only to access the various archives of individual spy chiefs and private collectors, no matter where they are physically located, but also turn them into a meta-archive which we can then search and cross-reference at our leisure. And we can do so largely from the comfort of our own homes on our laptops: the most important collections have been digitised. Where digital access is insufficient for our purposes – and the nature of spycraft is assuredly tangible – we can interrogate the documents themselves for those physical clues to their form and purpose; access to the scattered papers of sixteenth- and seventeenth-century intelligencers is readily obtainable in the south-east of England. The ease of access does not, however, make reading these documents as simple as reading the Sunday papers. Traditional archival skills such as palaeography as well as newer competencies demanded by, for example, the relatively new field of letterlocking (see below, pp. 56–66) are still vital. These letters and documents must still be transcribed, translated and sometimes decoded before they can be put to use. The researcher still has to act as a spy to catch a spy, painstakingly piecing together evidence while paying attention to the whispers in the wind.<sup>59</sup>

*Spycraft* is ultimately scholarship with the gloves off, not least as it often demands that techniques be reproduced so that we can better understand their working and thus their influence. By considering the physical nature of spycraft, we can read beyond the words on the page, and in doing so reach new conclusions regarding often iconic stories from history. It reveals, for example, how it was the three cipher secretaries of Mary, Queen of Scots, men who are often sidelined if mentioned at all in biographies, who were the most important actors in the Babington Plot and the fate of the queen (see below, pp. 91–5, 98, 101–3). It also shows her to have been a more savvy political operator than she is often given credit for.

By showing the actual work involved in undertaking to counterfeit a seal or write a letter in cipher, we can better understand events in history. What is more, by tending to the techniques we render visible those who have largely remained invisible, and thus give voice to these dark artificers (no matter how much they strove to keep themselves hidden from view).

## *SECRETIVE PUZZLES*

The documents and letters on which we have based our study are by nature elusive, cryptic and fragmentary. We cannot hope to be comprehensive, nor do we aim to be. We operate within physical and temporal constraints as much as we do linguistic ones – there are physical as well as semantic differences between how different languages manifest on the page, so we cannot hope to investigate examples from every country. This is why we have chosen to present these techniques as they were employed in specific case studies. There are many excellent overviews of the many and various acts of espionage that took place during this period, but we are interested in the technical details of early modern spycraft that remain unexplained and unexplored in such overviews and even in more detailed studies.<sup>60</sup>

*Spycraft* aims to situate itself in reality rather than in theory. We will only describe a technique if we have evidence of its use in the field, an intention to use it, a claim of having used it, or if it is important to understanding the development of spycraft in general. Cryptological manuals of this era, for example, were often more concerned with the mathematical exploration of ciphers and codes than with their practical application – the gap between theory and practice was often considerable.<sup>61</sup> There are many delightful ‘techniques’ which exist only in theory but were of no practical use, such as Jesuit polymath Athanasius Kircher’s eavesdropping system made of gigantic imitation conch shells embedded in the walls of a courtyard. As this appears only as a two-dimensional image in a book, and there is no indication that anyone even considered building it, it has no place here.<sup>62</sup>

Within these parameters, we must take care not to overread our source materials – sometimes, a comb is just a comb. To take one example, in 1588

a new system of secret writing was brought to light, particularly useful when ‘a man may have occasion to write that which he would not have every one acquainted with, which being set down in these characters, he may have them for his own private use only’.<sup>63</sup> This writing system, now known as shorthand, found its first iteration in Timothy Bright’s book *Characterie, An Arte of shorte, swift and secrete writing by Character*.<sup>64</sup> It seems quite plausible that he conceived of it as a result of his work compiling a manuscript presentation copy of the highlights of della Porta’s *De Furtivis*, which he had crafted at the behest of William Davison (a member of Walsingham’s secretariat) the year before (see Chapter 2, pp. 80–2). Its primary purpose was to allow the user to ‘write as fast as a man speaketh’, or so Peter Bales would soon promise with his alternative system, ‘Brachigraphie’, which involved ‘writing but one letter for a word’.<sup>65</sup> Shorthand could easily be confused with cipher, the secret language of diplomats and spies, however.

In 1589, Jane Seagar, for instance, presented a book of poetry to Elizabeth I in which each verse was accompanied by a string of mysterious symbols on its facing page (Fig. 4). Recently, it was alleged that in doing so she purposely presented herself as an intelligencer to Elizabeth I, as ‘a code-breaker’.<sup>66</sup> Shorthand is not code however, and by extension, Seagar sadly cannot be seen as a ‘code-breaker’. This does not detract from her exquisite mastery of the quill, but she simply used Bright’s system.<sup>67</sup>

Likewise, for over a hundred years, Samuel Pepys’s diary was thought to have been written in cipher. It is still talked about as if this were the case, even though we now know it is written in an adapted version of the shorthand espoused by Thomas Shelton in his books *Tachygraphy* (1641) and its companion *Tutor to Tachygraphy* (1642). It is often said, for instance, that John Smith, a student of Magdalene College, Cambridge, was the first to ‘break’ Pepys’s code. He managed to read it by comparing it with a text that used the same shorthand system for which an English version still existed. He later discovered, doubtless much to his embarrassment, that Shelton’s texts were to be found on the college’s heaving library shelves.

If shorthand had any value within espionage, however, it was probably in allowing the rapid transcription of both documents and speech: during an

interrogation, for instance, a scribe could set down the exact words of a suspect. To our knowledge, however, there are no spy-related shorthand documents loitering in the archives. Shorthand, therefore, seems to have had its secret usage in the realms of the private, for women like Seagar who wanted to convey the mysticism of biblical poetry, or diary writers such as Pepys, who wanted to save time: the opportunity it afforded him to record his many affairs and dalliances in a way that hid them from his wife was presumably an added bonus.

## *A SMORGASBORD OF TECHNIQUES*

Each of *Spycraft*'s chapters takes a separate trick or tool as its focus, providing a general overview of its development, the intentions behind it and its use in the field. The chapters progress more or less logically in that each largely covers the ways in which spies, intelligencers and other secret operatives tried to overcome the weakness of the techniques discussed in the preceding chapter – though this did not, of course, preclude them from using multiple techniques simultaneously, mixing ciphers and invisible ink, for instance.<sup>68</sup> Wherever possible (and where such instructions are not liable to cause bodily harm – though heed our warnings), we provide either instructions on how to reproduce the technique, or refer to experiments that we have conducted or have had conducted to assess their feasibility.

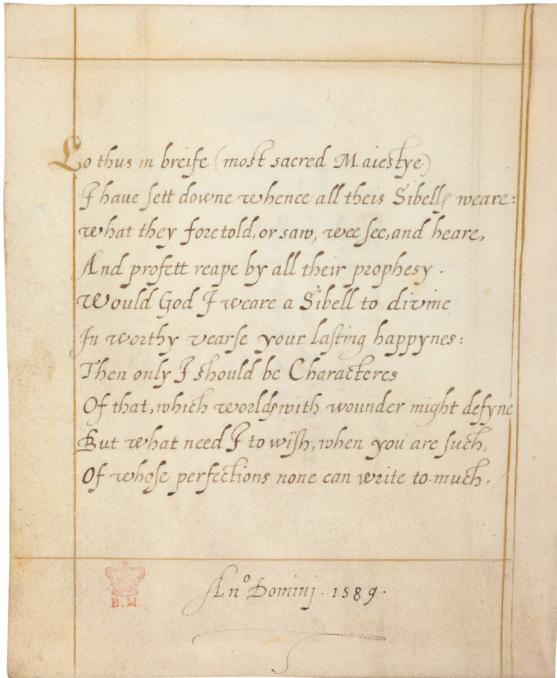
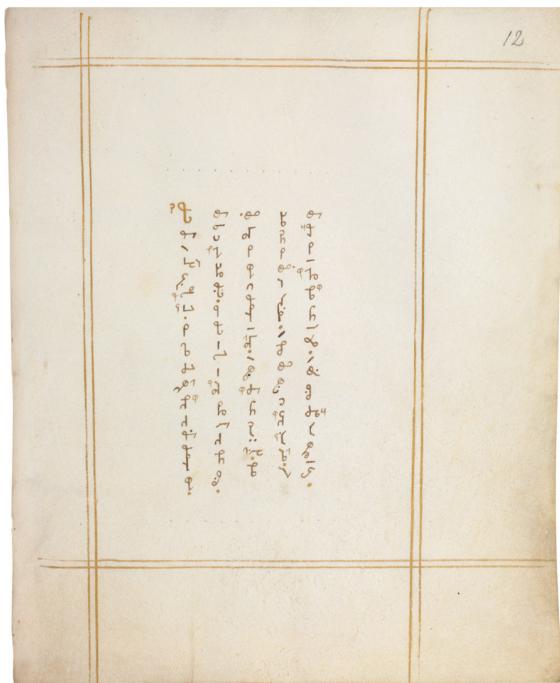


Fig. 4: Facing pages of one of Jane Seagar's poems as presented to Elizabeth I. What looks like cipher is, in fact, the poem rendered into shorthand.

In [Chapter 1](#), ‘Fraud & Forgery’, we detail the ways in which letters were opened, their contents extracted, and then either resealed or remade by spy and counterspy alike. Aware that their letters were liable to interception, spies sought other ways to protect their contents: through cryptography. [Chapter 2](#), ‘Ciphers & Codes’, examines this burgeoning art and the culture that surrounded it. Using the Babington Plot, perhaps the period’s most celebrated instance of a conspiracy fought by desk-bound cryptanalysts, as an indicative example, we explain how ciphers were actually used in the field. Ciphers, however, suffered from the manner in which they advertised their nature: as soon as an interceptor opened a ciphered letter, the symbols that stared back revealed that a secret was hidden within it. In [Chapter 3](#), ‘Disguise & Distraction’, we consider the ways in which spies tried to overcome this problem and sought to hide the fact that their letters were bursting with sensitive information using linguistic and other tricks, how they sought to conceal letters and even the messenger using dead drops, priest-holes and other methods such as cross-dressing. Far better than hiding secret writing was to make it entirely invisible, however, and in [Chapter 4](#), ‘Inks & Invisibility’, we investigate the challenge that the many different invisible inks posed to spy and counterspy alike, showing how

Arthur Gregory used his ability as a counterfeiter and his knowledge of della Porta to develop a way to accurately copy a letter using invisible ink. We do so by considering the aftermath of the Gunpowder Plot, the conspiracy that ‘would become the textual paradigm for all the versions and variants of plot and conspiracy that would follow later in the century’.<sup>69</sup> Fittingly, after a chapter discussing perhaps the most oft-told story of a botched assassination, [Chapter 5](#), ‘Stilettos & Storytelling’, looks at the last resort of the spy, murder. The spy’s primary weapon was stealth, and we look at three ways in which this stealth could kill: the stiletto; the pocket pistol or ‘dag’; and, stealthiest of all, poison. Counter-intelligence used the inventiveness of spies against them: even more effective and deadly than these weapons were the feelings of fear and distrust they promoted. The public foiling by prominent spy chiefs of fictitious assassination plots was a feature of this age of suspicion. We have provided a set of appendices, ‘Lessons: the School of Spycraft’, to explain particularly complicated or technical details, such as the specific differences between a keyword cipher and an autokey cipher, or the various ingredients used to make invisible ink. These are referred to as either ‘Lesson’ or ‘Lessons’ in the endnotes.



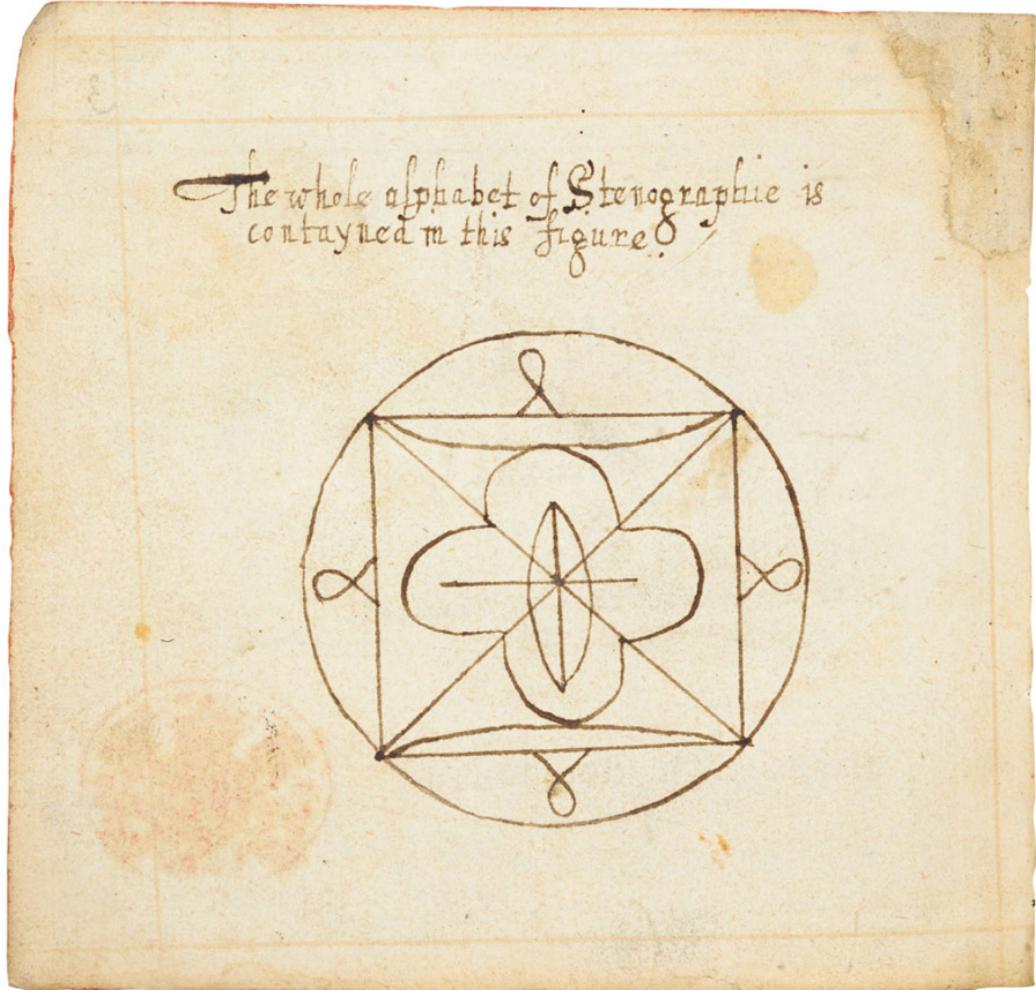


Fig. 5: A reminder that shorthand was designed primarily for utility rather than secrecy is writ large in John Willis's diminutive *The Art of Stenographie*. This image purports to contain every penstroke necessary for writing shorthand.

Finally, in our ‘Coda: The Black Chamber’, we look at how the virtual witchcraft of the lone dark artificer developed into the deskcraft of an intelligence institution, how techniques allowing the rapid counterfeiting of seals sat alongside the use of ingenious devices such as a proposed copying machine, fuelling the most effective technique of all: the black chamber. In the end, we hope that our readers will understand that a spy had to bring more than just petticoats and lemon juice to the table if they were to make their mark.

# 1



## *FRAUD & FORGERY*

In December 1560, King François II of France died from an ear infection, leaving his seventeen-year-old queen consort, Mary Stuart, a widow. While Mary had lived most of her life in France, her husband's death left her with but one title, the sovereign Queen of Scots. In August 1561, Mary returned to the land she had left as a five-year-old in order to assume her throne and take over the reins of power. Within five years, her rule imploded amidst a rash of murders, conspiracies, duplicity, two ill-considered marriages and open rebellion. Mary was imprisoned at Lochleven Castle by a group of rebellious Scottish lords. It was there, in 1567, that she abdicated her throne in favour of the fruit of her second marriage, the infant James. Escaping from her Scottish prison in May 1568, she fled to England, only to find herself placed under house arrest; William Cecil, Queen Elizabeth I's Protestant secretary of state, would neither allow her to return to her Catholic relatives in France, nor to Scotland and possible (though unlikely) restoration. An opportunity to make her house arrest more permanent arose in the shape of the so-called Casket Letters, which had been brought to his attention by Mary's illegitimate half-brother, the Protestant earl of Moray. A bundle of paperwork comprising eight letters, twelve sonnets and two draft marriage contracts, the Casket Letters were – according to Moray, at least – proof both of Mary's infidelity and of her collusion in the murder of Lord Darnley, her second husband.<sup>1</sup>

Moray was anxious to hold onto his position as regent during the minority of James VI, while Cecil was keen to neutralise the threat posed by this Catholic queen who had asserted her claim, albeit unsuccessfully, to

the throne of England in 1558. Elizabeth's secretary of state proposed a tribunal to assess the letters and the case they presented against Mary. In effect, the tribunal was to rule on the authenticity of the letters: if they were deemed authentic, Mary would be guilty as charged. If they were forged, as Elizabeth believed, then her 'sister and cousin' could be exonerated. The case rested largely on whether the letters were in Mary's own hand or not: if they were, she would be convicted not on the evidence of others, but 'by the testimony of her own handwriting'.<sup>2</sup>

The tribunal soon turned into a virtual trial; Cecil had only ever been interested in one result. He concentrated on the hand itself, reporting that the 'manner of writing and fashion of orthography' of the Casket Letters compared favourably with other letters sent by Mary to Elizabeth that were known to be authentic. He had, in effect, declared the letters genuine and Mary guilty in absentia (she had been barred from taking part). It was at this point that Elizabeth, unhappy about the direction being taken, curtailed the proceedings. The tribunal ended with Mary, Queen of Scots left in a legal limbo, declared neither guilty nor innocent.<sup>3</sup>

The tribunal had changed nothing, merely muddied the waters, and Mary remained under house arrest. The original Casket Letters disappeared in 1584, leaving us only with contemporary copies and translations – some bearing Cecil's annotations – from which to draw our conclusions.<sup>4</sup> Nevertheless, modern scholars consider that the letters were forgeries, a mere collage or copy-paste work concocted from some of Mary's actual letters and other sources. It seems highly likely that Cecil knew full well that this was the case.

Though the tribunal proved ultimately inconclusive, the Casket Letters cast a slur on Mary's reputation, while her supporters continued to assert that they were forged. No one denied that they *appeared* to be in Mary's hand – it was merely suggested that her hand was not particularly idiosyncratic. For instance, the Scottish author Adam Blackwood, vice-chancellor of the University of Paris and Mary's apologist, argued that the identity of the writer could not be reliably deduced from the hand alone. 'It is well known', he wrote, 'that the letters of Mary Beaton, one of Her Majesty's ladies of honour, resembled so nearly those of her mistress, that it is not possible to discern the one handwriting from the other'. The letters

may indeed have been written by a Scottish woman called Mary, but not necessarily the Mary her accusers alleged. This differentiation was important, as one's hand was effectively one's voice: a treason written was as damning as a treason uttered.<sup>5</sup> If the letters were in the hand of Mary, Queen of Scots, then they were powerful evidence of her misdemeanours. This made it all the more suspicious that the letters themselves had not been presented as evidence to the public. Mary herself was clear in her assertions that the letters, or, at least, those parts of the letters that were purported to prove her complicity in Darnley's murder, were forgeries.

Blackwood suggested that Cecil's disingenuous use of a set of forged correspondence had led to an increase in speculative forgery: 'you have also at this day by your juggling ... now brought in the realm a most devilish and lewd practice, that many have learned of you to counterfeit men's hands'. Blackwood had a yet more powerful argument up his sleeve, however. 'We know not', he asserted, 'what time they [the Casket Letters] were written, nor by whom, nor where, neither superscribed nor endorsed with the name or person or any person, nor signed, nor sealed, nor the writing known or challenged of any'.<sup>6</sup> That is to say, the letters lacked any identifying or authenticating devices. Quite apart from the discussions over the hand, they bore no superscription (such as an indication of a place of origin), or signature, and lacked the final, authoritative kiss of a wax or wafer seal. It was not as if the recipient had even identified the writer in an endorsement, as was common practice. Blackwood may have been as biased a source as those he railed against, but he did name those material features which were considered necessary to authenticate a letter, and, by extension, what features must be reproduced to create an entirely convincing forgery. This was a lesson taken to heart by those who occupied the less salubrious corridors of power: if you wanted to ensnare a queen with a series of forged letters, they had better be convincing.

That Elizabeth's government employed individuals who could produce counterfeit letters accurate enough to convince the supposed writers themselves, and could do so with all the authenticating features necessary, is the clear message of William Camden's comments on the talents of Arthur Gregory. Opening and resealing a letter without anyone noticing necessitated a facility with seals, for example, that went beyond their

careful removal and reattachment: it required an ability to counterfeit them. In an era when the primary method of transmitting information over distance was the humble letter, the mastery of every facet of their construction was the key ability required to operate as a dark artificer. Much of a spy's work boiled down to this, and so, therefore, did the work of the counterspy. The war between spy and counterspy was often an epistolary one, fought out on battlefields of paper, ink and wax. Whether or not the reported upsurge in counterfeiting was, as Blackwood suggested, merely the result of people taking their cue from governmental activities, there were a certain number of skills that needed to be mastered if one wished to counterfeit a letter convincingly. It is certainly the case that over the next decades many individuals worked hard to master the techniques necessary to fake each and every one of these authenticating devices.

## *THE MAN WITH THE GOLDEN PEN*

If the forging of handwriting was a widespread phenomenon, it was not always done well. In 1596, for example, the hand of Robert Cecil was reported as having been 'grossly counterfeited' a mere month after he had finally succeeded his father as secretary of state.<sup>7</sup> Some years later, in 1602, legal authorities in Essex acquainted Cecil with another such 'fowle practice': 'your Honour hath been abused by a counterfeit letter produced under your name'. The counterfeiter, 'one John Gliberye, a known lewd person', was quickly brought to justice.<sup>8</sup> A true expert in the counterfeiting of hands, however, was one who could make you 'mistake your own handwriting, and approve and allow that for yours which hath been falsified by them, and you never did see with your eyes before'.<sup>9</sup> That is to say, their work was so good it could convince even the individual they imitated. Such men were known to exist, and that same year Cecil was warned of a Frenchman called Arnott, 'a very dangerous person and one that can counterfeit any man's hand. It is dangerous for you to give him a passport under your hand, lest he abuse it to counterfeit your hand'.<sup>10</sup> A skilled counterfeiter was a valuable weapon in the armoury of any spy or spy chief; and while there are no handwriting spy manuals from which we might learn

their techniques, the life and work of one self-proclaimed ‘master of writing’ – and would-be spy – casts invaluable light onto the process by which a hand might be copied. This master of writing was Peter Bales. Bales ran a writing-school-cum-copy-shop, ‘in the Old Bailey, next to the sign of the Dolphin’. There he taught his students and promised to make copies of ‘anything fair written in any kind of hand usual; and Books of Copies; such as you shall bespeak’.<sup>11</sup> The Old Bailey, home of criminal courts and adjacent to Newgate prison, was frequented by individuals from every echelon of society, from lawyers to labourers, prosecutors to poets. This provided Bales with an endless stream of clients.

Bales was not lacking in self-belief. He was willing to take on any scribe or scrivener to prove he had the best hand in the land (or at least in London). The ‘Challenge of the Golden Pen’ of 1596 was the result of a trading dispute between Bales and the owner of another writing school in the vicinity who also claimed pre-eminence at his craft. Bales could not stomach the possibility that people might think that anyone but he was the master scrivener. The challenge took the form of three separate competitions: ‘The first, for best & fairest writing of all kind of hands usual: The second for Secretary & Clerklike writing: The third, for best teaching.’ The prize was a real pen, fashioned by a London goldsmith from £20’s worth of gold, the two belligerents having each put down half that amount as a winner-takes-all wager. Bales’s victory appears to have been something of a foregone conclusion. The second task, for instance, was further defined by him as ‘to write truest, best, and speediest, most Secretary, and Clerklike, from a man’s mouth, reading, or pronouncing either English, or Latin’. As Bales’s challenger knew no Latin, the outcome of this part of the challenge was hardly a surprise, and sure enough, the sign of the Dolphin was soon swimming above the Old Bailey alongside a hand holding a golden pen.<sup>12</sup> Bales would later go to great lengths to justify the competition, its supposed fairness and its importance, possibly because he was accused of having filled the judging panel and audience with his own friends.

Twenty years prior to this somewhat cynical and rather hollow triumph, Bales had been seeking employment in the counter-espionage trade. His letter of application came in the form of a jaw-dropping display of

penmanship presented as a gift to Queen Elizabeth I at Hampton Court in 1575. This was a tour de force of micrographia, or small writing, in which Bales crammed the Lord's Prayer, the Credo, the Decalogue (i.e., the Ten Commandments), two short Latin prayers, his name, motto and the date of presentation 'within the circle of a single penny, encased in a ring and border of gold, and covered with a crystal so accurately wrought, as to be very plainly legible'.<sup>13</sup> It was a masterstroke to include the magnifying lens, or 'crystal', necessary to read his text in the setting of the ring, as it allowed everyone to admire his expertise, preferably when displayed upon the finger of his queen.

Bales's gift attracted Elizabeth's 'great admiration', and she reportedly wore this bejewelled feat of miniaturisation often.<sup>14</sup> Impressive as it was, this demonstration does not appear to have resulted in immediate employment, and it is unclear whether Walsingham saw the potential of micrographia as a spycraft technique. Bales was nothing but tenacious, and while by 1591 he was in the service of the lord chancellor, Sir Christopher Hatton, he craved more esteemed employment. Petitioning William Cecil, now Lord Burghley, for a position in the College of Arms – preferably as York Herald, but, failing that, as Rouge Croix Pursuivant – he not only reminded the queen's chief minister and closest confidant that he had 'been always willing and ready to do Her Majesty service with my pen or otherwise to my power', but could not resist commenting on the unsuitability of his competitors. He had no compunction in asserting that the incumbent Pursuivant, Ralph Brooke, not only 'preposterously seeketh to be preferred' but was 'notoriously detested, and for language or Latin insufficient to be advanced'.<sup>15</sup> Burghley begged to differ: not only was Brooke promoted to Herald, but Bales was passed over for the position of Pursuivant that Brooke's promotion had opened up.<sup>16</sup> Nevertheless, Bales still craved his hard-won expertise being put to legitimate use in the secret services of his queen, and, signing himself as 'Your Honour's most humble Peter Bales, *Cyphery*', he even offered his skills as a New Year's Gift to Burghley.<sup>17</sup> He would later boast that the 'best of this Land' held him in high regard because 'of some special service by him done, both abroad, and at home'.<sup>18</sup>

The opaque nature of his apparent service to his country and his outrageous talent for self-promotion did not detract from the fact that Bales was the possessor of extraordinary technical skills, and this was reflected in the clientele that frequented his scribal emporium: his quill was hard at work producing documents for men such as John Puckering, keeper of the Great Seal, and the translator John Osborne. The fact that one of the playwright Thomas Middleton's characters was required to 'draw any mark with a pen, which should signify as much as the best hand that ever old Peter Bales hung out in the Old Bailey [the sample scripts outside his shop]' shows that Bales's name was well known in London and that Middleton expected his audience to connect Bales with handwriting.<sup>19</sup> Bales was renowned for the clarity and consistency of his hands, with one source even stating that he could imitate printed typefaces convincingly.<sup>20</sup>

Bales's assertion that he was master of every act of the pen attracted characters even less savoury than playwrights to his shop. In 1599 he found himself drawn into the unholy mess that was the late career of Robert Devereux, 2nd earl of Essex. In a statement given on 31 July 1600, Bales recounted how he was approached at the beginning of Lent in 1599 by John Daniel, a ne'er-do-well who had once been described as 'either employed for the queen, or ... a notable knave in no mean matters'.<sup>21</sup>

Daniel was a rather creative freelance intelligencer who worked on a 'spy now, pay later' basis, although the information he peddled seems to have been mostly concocted. In 1581 he wrote to Burghley, volunteering 'to go to Spain to mix with Irish traitors who had sailed there seeking help from Philip II', but his 'want of ability' (that is, lack of cash) prevented him from doing so.<sup>22</sup> Burghley's answer to this shameless request for money is not recorded, but by November 1590 Daniel seems to have gained the earl of Essex as a patron: Essex now lobbied the earl of Derby on Daniel's behalf, referring to Daniel as 'my servant'.<sup>23</sup> Some years later Daniel had successfully infiltrated various Catholic groups of interest in the Spanish Netherlands. He saw assassination plots everywhere. In March 1594, doubtless angling for some reward, Daniel sent Burghley 'a list of names of persons of sundry nations, with every man's mark, age and stature, who should come from parts abroad to kill the queen'. It is an indication of the bogus – or at least highly imaginative – nature of Daniel's information that

the Jesuit and spy-handler Hugh Owen remarked that the list included individuals with ‘no more to do with these doings of killing the queen than the man in the moon’, and that one of its alleged assassins was ‘a sorry fellow’ who ‘would not kill a cat if she looked him in the face’.<sup>24</sup> What Burghley thought of this latest offering is unclear, but in August 1594, Daniel was still in Essex’s good books – not only did Essex lobby the dean of Christ Church, Oxford on his behalf, but Daniel soon married Jeanne van Kethulle, one of the countess of Essex’s Flemish ladies-in-waiting.<sup>25</sup>

When the earl was arrested in 1599 following his unapproved return from campaign in Ireland, the countess, ‘amid fears of the search or seizure of his papers’, gave Daniel and his wife a locked casket containing some of her correspondence with the earl.<sup>26</sup> The trust the countess placed in the pair was entirely misplaced, however, as the moment that Essex was censured in Star Chamber – the court which dealt with the upper echelons of society – Daniel reverted to type and opened the box. After all, there was no reason to hide these letters unless they contained sensitive information, and an intelligencer’s first loyalty was always to himself. Essex’s ‘ragged Roman hand’ (i.e., a non-cursive script with upright letters) was, in the words of Anthony Bacon, elder brother to Francis and a secretary-intelligencer in Essex’s pay, ‘as hard as any cipher to those that are not thoroughly acquainted therewith’.<sup>27</sup> Daniel thus needed an expert to read it. (It is typical of this era that ‘deciphering’ could mean both the reading of apparently illegible handwriting, as it does here, and also a rather more spy-like activity related to cipher codes.)<sup>28</sup> And who better than Peter Bales at the sign of the Golden Pen? His reputation as ‘a most notable and experienced decipherer of old and imperfect writing’ had been enhanced by reading those parts of George Ripley’s alchemical writings which their editor, Ralph Rabbards, could not.<sup>29</sup>

Bales had a straightforward, if time-consuming, method of deciphering difficult hands. In order to understand the words, the scrivener would endeavour ‘first to conceive them himself’. In other words, Bales imitated hands in order to read them. Over the next three weeks, Bales copied the letters repeatedly, with Daniel watching his every move. Daniel paid the scrivener what seems like a very reasonable 1 shilling for each epistle (a mere £8 in modern terms, which perhaps explains Bales’s desire to find

alternative employment).<sup>30</sup> For Bales, deciphering a hand was a process that involved understanding the letterforms of a hand and how they functioned in context, and, of course, a deep appreciation of the mechanics of both pen and ink.

## THE MECHANICS OF PEN AND INK

The type and condition of writing implement and the ink used all contributed to the way in which writing appeared on the page. Peter Bales had not only mastered the physicality of transferring ink onto paper, but he was also keen to share his knowledge. He had even written a textbook, *The Writing Schoolemaster* (1590), which included ‘The Key of Calygraphie: that is, of fair [i.e., aesthetically pleasing] writing’. The first item of business was learning how to choose the correct knife with which to cut your quill, so he helpfully provided his students with a ‘plain English verse’ as an aide-memoire:

Provide a good knife; right Sheffield is best.  
A razor is next, excelling the rest.  
A whetstone likewise of hoane that is white,  
Will make your knife cut your penne well to write.<sup>31</sup>

Different feathers suited different tasks: goose feathers were best for everyday writing, swan feathers suited large lettering, and crow feathers enabled fine lines. The unfortunate bird would generally have its left wing plucked, as those feathers ‘curve outward and away from a right-handed writer’.<sup>32</sup> Cutting one’s quill was a serious business.

It was not merely the quill that influenced the writing. If the paper was too rough it would damage the pen, if too smooth ‘it will be too slipperie, that you cannot write heavily thereon’. Overly smooth paper could be helped by rubbing it with ‘stanchgrain’.<sup>33</sup> While it may seem irrelevant to the spy or counterspy wishing to forge a letter, only by understanding the physical properties of quill and paper and how they affected the finished product could a perfect forgery be made. Indeed, Bales’s technique of

deciphering hands was, in essence, a method of counterfeiting. More practical advice followed: ‘But when any letter seemeth more hard to be made, then it is very good to take a dry pen, and to trace over the same letter so often, until with your wet pen, you can well make the same.’ Bales also provided the counterfeiter with a particularly useful piece of information:

A, B, and M, if rightly you them make,  
 Three quarters of the Alphabet doo take:  
 Then of the rest, but sixe in all remaines,  
 This have I shewen, to ease you of some paines.<sup>34</sup>

‘For the choice of your quills, and the making of your pen’

‘Choose the second or third quill of every wing, being round and hard; you may know them by the narrowness of the feather towards the end thereof, and cleanse them well with the back of your knife.’



‘Turn upright the back of the quill, and give thereon a little cut, and with the end of the quill make the slit thereof very clean without raggedness or teeth.’

‘In the nicking or last cut of your pen, (which is the making or marring thereof) you must be very wary, that you cut not the right side too short: for then your pen will bear too much on the left hand, and so scratch the paper and scatter the ink.’



‘You may harden your soft quills, by putting them into hot ashes, till they be for your purpose.’

Fig. 6: Peter Bales’s recommended method for the making of a suitable quill, as found in *The Writing Schoolemaster* (1590), Q3v.

If so much of the alphabet can be written from just the strokes that make up these three letters, the vigilant counterfeiter could boil down an individual’s hand to its most common features, not only simplifying the task, but also

rendering it more regular, and less liable to error. Bales's final words, perhaps unsurprisingly for a 'schoolemaster', concerned diligence and continuous practice. He drummed his technique of repetition and imitation into his client as he worked, eventually presenting him with the blueprint to mimicry. Bales made his art personally available to any aspiring writer: *The Writing Schoolemaster*'s title page notes that it was 'to be sold at the author's house in the upper end of the Old Bailey, where he teacheth the said arts'. In doing so, though perhaps unwittingly, he also produced a how-to guide for the budding counterfeiter.

What is missing in all of this is the ink. Fortunately, a large number of contemporary recipes have survived. For normal, black ink, few used anything other than iron gall ink, a recipe as old as it was ubiquitous. To make this ink you needed galls – the woody growths that form on the buds, leaves and other fleshy parts of trees and other plants in response to a gall wasp's laying its eggs in them – and some source of iron, usually copperas, the chemical we now call ferrous sulphate but was then commonly known as green vitriol or simply vitriol.<sup>35</sup> First you ground up dried galls and soaked them in rainwater (some recipes recommended using wine), with the length of time they steeped correlating to the strength, and thus darkness, of the resulting ink. Galls are rich in gallotannic acid (galls sourced from different plants created solutions of varying acidity – oak galls were a very common ingredient), which forms gallic acid during the steeping process. The gall-water was then strained and added to the copperas, forming ferrous gallate, which combines with oxygen to form ferrous pyrogallate, the dark pigment seen in the finished ink. Iron gall ink is not water-soluble, but over time its acidic nature can damage the paper on which it is used.<sup>36</sup>

In most recipes, the basic ingredients – gall-water, copperas and gum arabic – were the same; only the quantities and the length of time you were to soak your galls varied:

*To make a perfect black ink to write or limme withall*

Take one pound of galls, one pound of gum arabic, or vitriol an ounce, bruise your galls and vitriol, and put them into a vessel fit for your purpose, fill it with white wine, that all your stuff may be covered above a hand breadth: then set it in the sun and stir it daily.<sup>37</sup>

Gum arabic was added to adjust the viscosity of the resulting liquid to make it more appropriate to the situation: a fast hand suited a runnier formula; more formal documents might suit a thicker, darker ink. If your ink was already too viscous, vinegar was often preferred over water as a thinning agent: too much water led to a dimming of the colour.<sup>38</sup> One correspondent suggested adding sugar to give the ink a glossy finish.<sup>39</sup>

Ink was usually home-made, and could be produced in great quantities, as we can see from a recipe used by Sir Thomas Roe, a diplomat and copious correspondent, which made 3 gallons of ink at once, enough to serve an entire embassy.<sup>40</sup> If you were travelling, it might have been sensible to use ink powder, which could be reconstituted by the simple addition of a suitable and available liquid (often, this liquid appears to have been urine).<sup>41</sup> This powdered ink, which came recommended by the sixteenth-century mathematician, cartographer and alchemist Girolamo Ruscelli (who, like della Porta, had an ‘Academy of Secrets’ in Naples), was made by adding charcoal derived from peach and/or apricot kernels with gum arabic to dried galls and vitriol. This recipe, he suggested, was also particularly good for reviving a bad ink: ‘If you have naughtie inke, put to it a little of said powder, and it will become immediately very black, and have a good gloss.’<sup>42</sup>

While the majority of letters from this period were written in black ink, even if it now has generally faded to various degrees of brown, other colours were available. They were somewhat more exotic than the usual recipes, too:

#### *An Emerald Green*

Take verdigris [copper carbonate], litharge, quicksilver [mercury] brayed [crushed] to powder, and ground with the pisse of a young child.

#### *For to make colour like Gold*

Take saffron dried, beaten into powder, and put to it as much glistering orpiment [arsenic trisulphide] that is scaly and not earthy, then with the gall of an hare or a pike, bray them together, put them in some phial under a dunghill five days, then take it out and have it, for it is the colour of gold.<sup>43</sup>

When confronted with the task of reproducing a convincing facsimile of a particular document, it was essential for spy and counterspy alike to colour-match their ink as they mixed it, while adjusting its viscosity and the cut of their quill to suit the style of hand to be copied. We regularly find letters which have postscripts or signatures that appear in a different shade of brown to the letter's body text. The volatile nature of contemporary ink makes it impossible to tell whether these variations relate to the time at which these additions were made or to their ink – the original writer might, for example, add a postscript to a letter previously composed, and thus end up using a different ink. This fact made it easier for a forger, of course, to add a postscript to a genuine letter, as the colour of the ink at least would not matter so much.

## *IMITATING THE EARL'S Ps AND Qs*

It would not be long before John Daniel began the second part of his plan, doctoring the correspondence between the earl and countess of Essex, the very letters entrusted to him by the latter. One of the earl's letters contained a sentence even Bales thought dangerous: 'The Queen's commandment may break my neck; but my enemies at home shall never break my heart'. Bales later swore he only continued with his work to ascertain whether the letters contained anything more that he ought bring to the attention of a magistrate. Now Daniel wanted Bales to insert that one particular sentence in several of the other letters – in effect, following the method of those who created the more famous Casket Letters by using genuine passages to create a convincing collage. When Bales asked what purpose these letters served, Daniel answered it was at the behest of the countess that 'in the end he might the better gull somebody'. Though now in a state of 'perplexity', Bales did as he was asked. He would later swear that he 'did not imitate so near as I could': he purposely underperformed in his role as counterfeiter in order to prevent the copies from being put to nefarious use (Bales being Bales, this was presumably true, as having his work thought of as substandard would have stuck in his craw).<sup>44</sup>

Daniel left the scrivener at his travails, but possibly having noticed Bales's unease, he did not return to the shop. There was no need. By following Bales's example and taking up the pen himself, he had also learned to reproduce the earl's hand. He employed his new-found counterfeiting skills, adding postscripts to the letters at his own leisure. Daniel's motives were less than savoury: he was intent on blackmailing the countess with these letters written 'in her husband's hand', the contents of which were at best toxic, at worst treason – letters which were at the very least partially fabricated.<sup>45</sup> Since he now could make any number of copies, he purposed to sell these explosive documents again: having blackmailed the countess, why not sell the letters on to the authorities as 'intelligence'? He would later claim to be working as a government spy, explaining that 'the earl's letters were hardly written & not counterfeited but imitated for the Queen's Service': that is to say, the individual characters were copied in order that he might read the text to determine whether the earl spoke badly of the queen, not to counterfeit them for his own purposes.<sup>46</sup>

Bales, meanwhile, had confided in a London friend, a scurrilous individual called Peter Ferryman, who persuaded him to check the accuracy of Daniel's tale with the countess. Bales thought that some good might come of it: the countess might be thankful for his honesty, and he was still hoping that Essex would 'recover his credit, and then obtain an office' for him. The countess persuaded him to set down a declaration, which was countersigned by her secretary and Ferryman in April 1600.<sup>47</sup>

In the end, the countess still paid Daniel £1,750 for the return of the letters, the equivalent of a quarter of a million pounds in today's money. To finance the deal, she had to sell her jewellery, though it is unknown whether her actions were based on Daniel's newly discovered skill as a counterfeiter, or whether the stolen letters were, in themselves, potentially damaging enough. Her revenge was swift and merciless, however, as she promptly had him convicted in Star Chamber, with Bales appearing as a witness for the prosecution. Daniel was eventually fined to the tune of £3,000, imprisoned in the Fleet and punished as a counterfeiter: his ears were nailed to the pillory and he was forced to remain standing there accompanied by a notice reading 'A Wicked Forger and Imposter'.<sup>48</sup> He would remain in prison until the accession of King James to the throne of England.

Bales had nonetheless backed the wrong horse in his alleged loyalty to the earl. Once a royal favourite, Essex had topped off a few years of bad choices by leading a rebellion against his former patron, Elizabeth I, in 1601. A miserable failure, it resulted in the earl's execution and that of several of his circle. Robert Cecil appears to have protected Bales from the worst of the chaos that followed the abortive rebellion, which included the discussion of the letters in Star Chamber. Either Cecil saw the value of having a specialist scrivener beholden to him, or he was careful to keep individuals who had already been engaged in under-the-radar operations onside.<sup>49</sup> The 'small writer' even gained some measure of favour under James I: he was later appointed to the position of writing master to Prince Henry for the grand fee of a crown a day. Luck did not appear to follow Bales, however, and after nine months of tutoring the prince, he wrote to Cecil complaining that he was yet to receive a single penny by way of recompense. Furthermore, he had received no reward for 'writing and presenting to His Majesty his *Basilicon Doron* [James's treatise on government] for the Prince in a small volume to be worn as a tablet book'. He reminded Cecil of the value of his secret services: 'And I shall not only be ready to deliver to His Majesty a most secret Cipher impossible to be deciphered by where the observations are shown; But will also disclose ... the manner of close conveyance of His Majesty's letters of greatest importance, that they shall pass without finding them about the messenger by any search whatsoever.' This time he signed himself as 'Peter Bales, the Small Writer, Writing-School Master to the Prince'.<sup>50</sup>

Of Bales's cipher or his method for secretly conveying letters (which may have involved his gift for micrographia) there remains no trace. Nor, after this date, is there any trace of the master scrivener himself. Perhaps he was altogether too ostentatious and well known a figure to fully trust with state secrets, or perhaps he simply did not know when to shut up. If indeed it was he who wrote in the crown prince's copy book that 'Prince Henry has such a childish hand that he is hardly worthy of even mediocre praise as a writer', then the latter seems likely.<sup>51</sup>

## *PRINTER'S INK AND CANDLE SMOKE*

While John Daniel presented counterfeited letters as written entirely in Essex's own hand, it was common practice amongst those in positions of influence – exactly the kind of person a spy might wish to imitate – to have a secretary or amanuensis write a letter's body text and merely add their signature as authorisation. Other documents that were produced in this way were the kind of receipts and claims for petty cash that governmental departments churned out in their hundreds. In such cases, all that was necessary for those members of society who walked on the darker side of the street was to find someone with good enough secretary hand for the script to look convincingly anonymous and have them re-create the document in question. All the document would lack would be the appropriate signature. Luckily, or unluckily, depending on your position, it was possible to re-create a signature without any calligraphic skill whatsoever. All it took was a signature-stamp, a device not unknown in government circles – in 1569 a warrant was drawn up to allow for a series of Queen Elizabeth's letters to be authorised in this manner.<sup>52</sup>

The way in which these stamps were fashioned and then used is to be found in the examinations of two men, Christopher Porter and Guy Lewes, who were brought in front of two Middlesex justices of the peace in July 1600. Porter was a pursuivant, that is, a messenger ordinary of Her Majesty's Bedchamber. A pursuivant's responsibilities included apprehending recusants and other transgressors, acting as couriers for documents and suchlike, making their activities something akin to modern police work.<sup>53</sup> On 6 June 1600, for example, Porter was issued with a warrant to 'apprehend William Holliday, merchant, of London, and to bring him before their Lordships [i.e., the Privy Council]'.<sup>54</sup> Porter had spied an opportunity, and was intent on using signature-stamps to authorise fake expenses claims which he could then exchange for cold, hard cash. Lewes was the Old Bailey resident he employed to engrave his stamps in brass. He was also the man who reported Porter to the authorities. The three names Porter wished to counterfeit with his brass stamps were not insignificant. The lowliest was Thomas Smythe, customer (collector of customs duties), alderman and soon-to-be sheriff of London.<sup>55</sup> Next came William Waad, clerk of the Privy Council and latterly lieutenant of the Tower of London.<sup>56</sup> The most grand of the trio was without doubt Sir Robert Cecil. The

combined signatures of Waad and Cecil were the authorising marks on expenses forms that messengers such as Porter redeemed at the royal household's chests following a job (Fig. 7).

In his own statement to the justices, the engraver Lewes claimed that Porter had approached him a fortnight before, bearing a piece of paper with a name written upon it in ‘Roman letters’. Porter wished Lewes to ‘engrave that name in a piece of brass … So that the same might imprint upon any paper either with printer’s ink, or the smoake of a candle’.<sup>57</sup> Lewes was to make a small, portable printing press that could only reproduce one thing: a signature.

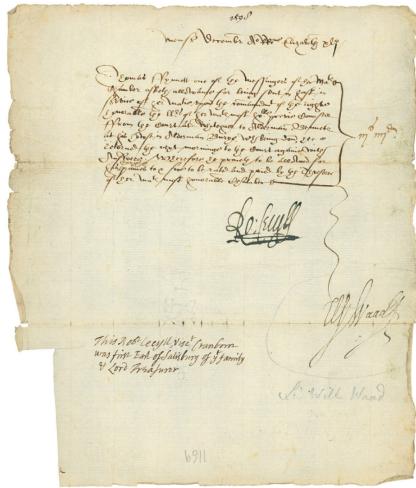


Fig. 7: An invoice for the payment of 3s 4d claimed by the pursuivant Thomas Fynnett ‘for being sent in hast in service of her Majestie’.

The stamp would be engraved much as if it were a piece of moveable type, to enable ‘relief’ printing – that is, where the signature itself stands above the rest of the printing implement, which is then inked and applied to the paper as necessary. (The intaglio method, as used in copperplate engraving, would be totally unsuitable for such a surreptitious device.) The stamp would not work with the sort of ink described earlier in the chapter, the kind that a letter-writer would routinely use to scratch out words with their quill. Indeed, it would only work with printer’s ink, as Porter had insisted. Following a demonstration in a printer’s shop, the pursuivant knew enough about the process of printing to understand that paper was always moistened before it received the kiss of the printer’s press, as this helped flatten out the inconsistencies in the paper’s surface, thus preventing

misprints. Printing on dry paper would cause drop-outs, small areas where no ink had reached the paper, a tell-tale sign that this signature was not written with a quill. Following this part of the process was vital, as the printer had explained to Porter: ‘the wetting of the paper doth make it take their ink without suspect, so that the print will not be seen of the back side’.<sup>58</sup>

Printer’s ink was thick and oleaginous, designed to stick to the metal type used in the printing process rather than drain through the cut nib of a quill.<sup>59</sup> It might have proved a little awkward to use, as on a printing press it was usually applied to typeface with large, leather balls which had a thin layer of ink upon them. These would have been impractical when it came to inking something as small as Porter’s stamp, which would have been roughly the same size as a seal impress, but once applied (perhaps by a small piece of leather), this ink would have worked handsomely. Porter’s stamp, however, was to be usable with both printer’s ink and ‘the smoake of a candle’.

While using a candle may seem strange, even given that a piece of metal held above a candle will rapidly acquire a thin layer of carbon, it makes far more sense when you consider that the majority of candles at this time were made not of wax but of tallow – beef or mutton fat – and thus produced a far more noxious, greasy smoke than modern paraffin wax candles, and that a good source of black pigment used in most printer’s ink was found in ‘lamp black’, the carbon deposits accreted in lamps. This method of ‘inking’ would have been as useful to the spy as to the thief, as tallow candles were the most common producers of artificial light, and so these stamps would not require the counterfeiter to be in constant possession of small quantities of printer’s ink.

Porter’s understanding of how to use a signature-stamp undetected, and perhaps to charge it not with ink but with candle smoke, reminds us that he was up to no good, even if he at first denied it, claiming that he was merely doing his job as a pursuivant. When caught with his counterfeit stamps, therefore, Porter claimed that he was not intent on defrauding the crown, anything but – he was trying to uncover those who, he said, were already using such stamps to counterfeit ‘bills in the pay house’.<sup>60</sup> As part of his plan, he meant first to discover if what he had been told by ‘some of the

ancient pursuivants', namely that such counterfeit stamps had been successfully used in the 1570s, was actually true.<sup>61</sup> In this case Porter was certainly onto something, as records tell us that in 1578 no fewer than eleven pursuivants had been accused of submitting a total of 110 fraudulent claims to the sum of over £400 using the counterfeited signature of secretary of state Walsingham.<sup>62</sup> Porter told his inquisitors that the best way to catch those he suspected of repeating this fraud was to get some stamps made, use them, and from this learn how to distinguish the real signatures from the stamped.



Fig. 8: A reproduction of Porter's signature-stamp with the resulting signature rendered in printer's ink.

Unfortunately for Porter, he was not an accomplished liar, and while the position of pursuivant came with a wage (in 1612 it was set at £4 5s per annum plus another 2s 6d for 'daily board-wages'), it was plainly not so great that it removed the temptation to slip in the odd extra expenses claim for 3 shillings or so. This temptation was presumably rendered all the more enticing every time he returned home to be greeted by his wife and their clamouring brood of eight children.<sup>63</sup> Porter was not going the extra mile in honest service to the crown but had instead overstepped the bounds of legality in the interests of lining his own pockets. Having been left to stew for a few days by the authorities, Porter abandoned his defence of seeking out fraudsters, and admitted that he had been searching 'both to see if he could find any bill so stamped with any stamp like them, whereby he intended to make the like, and to pass into the payhouse for his own private gain'.<sup>64</sup> Porter was committed to prison, where he remained for quite some time.

Porter's scheme did not fail because his stamps failed to work. It failed because the engraver, Lewes, having pocketed the 2 shillings and sixpence Porter paid him for each signature carved out of brass, decided to 'reveal the matter unto Thomas Hicocke the Clerk of Newgate', upon which Porter was arrested. Lewes claimed that he had not recognised the signatures of Smythe, Waad and Cecil when Porter had first brought them to him. Certainly, by his account Porter pretended that the signature which read 'Tho: Smythe' referred not to Thomas Smythe the collector of customs but to a woman 'much given to play at cards [who] was loath to forgo her game to write her name'. He clearly hoped that a charitable soul would conclude that 'Tho:' was a diminutive of Thomasina rather than Thomas. The second signature belonged to Waad, by Porter's account 'the said woman's brother', while Cecil's was needed for the signing of a will.<sup>65</sup> It does not take a great leap of imagination to conclude that Lewes was lying about falling for this story, and that he had turned Porter over to the authorities in the expectation of some small reward on top of the cash he had already earnt. Working on the wrong side of the law was a dangerous game.

Cecil might have kept Porter incarcerated as an act of personal retribution: this messenger had, after all, been passing himself off as the secretary of state himself, and such behaviour must have had some effect on Cecil's authority. The disgraced pursuivant would later describe himself as 'distressed' and 'cast into prison against Her Majesty's injunction' as he petitioned for his freedom.<sup>66</sup> Porter was certainly released at some point (most probably at the accession of James to the English throne), but his propensity for getting into trouble continued – he was listed as a serving messenger of the Chamber in 1611–12, but in 1615 a warrant was issued to the keeper of the Gatehouse, 'to enlarge and set at liberty Christopher Porter, messenger'.<sup>67</sup> No mention is made of Porter's ears, but whatever indiscretion it was that led to this second residence at His Majesty's pleasure did not appear to have had an impact on his employability, as no sooner had he been set free than Porter was once more plying his former trade of pursuivant.<sup>68</sup> It is not beyond the bounds of possibility that he had been sent to prison this second time not as punishment but in order to act as a stool pigeon, 'an informer who elicits secrets in the guise of a friend or fellow inmate and reports that information back to the authorities'.<sup>69</sup>

Whatever way a spy or counterspy chose best and most conveniently to counterfeit a particular hand and signature in their attempt to fool their opposite numbers, there were other authenticating features left to conquer, and the one we turn to next also served to close a letter as well as to identify its author: the humble seal.

## *SEALED WITH A WAXY KISS*

Seals served two purposes, authentication and security. The presence of a seal on a document showed that the document came with the authority of the seal-holder, whether an individual or an office. It could be placed next to a signature or be attached by a ribbon. When used to secure a document shut, however, a seal also served both to identify the sender and act as a visible layer of security – the presence of an intact seal ought to have guaranteed that the contents remained unviewed by third parties.

Seals came in various forms and materials. Sealing wax was a substance that became molten when heated, such that it could be dripped onto a letter, joining together two parts thereof when it solidified. Wafers were baked discs of starch which, if moistened, placed between two pieces of paper and the resulting sandwich pressed together, would join the pieces together. Yet, like many words, ‘seal’ has multiple meanings when used in an early modern context. It is variously, and sometimes simultaneously, the process through which a letter is secured (or sealed); the adhesive with which a letter is closed (wax, wafer); a design unique to an individual that serves to identify them (coat of arms, initials); and the thing that impresses the design into the adhesive (seal-stamp, signet ring).<sup>70</sup>

## *THE SEAL-STAMP*

The seal-stamp is a device which bears a particular seal-design engraved into its surface. This design was chosen by its owner to serve as proof of their physical authority and it was by means of the stamp that it was to be transferred onto the document. Seal-stamps were made of metal, often

brass, and bore the negative image of the desired impression – the image created was thus in relief, that is, it stood proud of the matrix in which it was created. They could be independent pieces or incorporated in a ring, known as a signet. Important seal-stamps such as the Great Seal or the Privy Seal were intended to represent the authority of the monarch and thus were suitably large and the seal-design they bore suitably ornamental. In purely physical terms, the seal-stamp was used to provide sufficient pressure to ensure that the chosen adhesive bonded well to the things to be joined together, and to create the seal-impression.

The seal-impression provided authentication in the form of a recognisable device that demonstrated the identity of the sender. Sometimes this device was playful in nature, or had a metaphorical resonance with its owner, such as Sir Thomas Roe's seal, which featured an image of a small deer, or Sir Nicholas Bacon's seal, which featured a boar.<sup>71</sup> John Donne went a little further, explaining why he replaced his familial sheaf of snakes seal (Fig. 9) with an anchor upon his ordination in 1615 in a poem: 'This seal's a catechism, not a seal alone.'<sup>72</sup> For Donne his new seal was a visual representation of his faith.

The seal-stamp would be used to create one of two types of seal: the exposed-/bare-seal (Fig. 10) or the papered-seal (Fig. 11). In both cases, the adhesive might serve solely to carry the image of the seal-stamp or it might also serve to join two pieces of paper together as a security measure.



Fig. 9: John Donne's 'sheaf of snakes' seal-stamp with the resulting papered- and bare-seals.

Each type of seal had its advantages and disadvantages when it came to deterring counterfeiting. The exposed-seal provided a much sharper image for the counterfeiter to work with, but it also demanded much better reproduction if it was to be successfully forged. The papered-seal was, by its nature, less precise in its outline, making it easier to get away with a less exact copy, but its imprecision made it harder to copy the image it carried. Fig. 12 shows a counterfeit passport in the name of Robert Gray, as forged by Thomas Douglas, aka Robert Gray, bearing King James's signature (Jacobus R[ex]) and further authorised with a papered-seal (both of which were illegally produced).

If one wished to forge a letter or document convincingly, it was necessary to include the seal-design of its supposed author. To create the seal, whether exposed or papered, required a functioning seal-stamp carrying the appropriate design. The options for acquiring this were simple: borrow, steal or counterfeit.<sup>73</sup> Borrowing or stealing perhaps required a proximity to the subject denied to the average spy or even counterspy. In

most cases, therefore, the only viable option was to counterfeit. To counterfeit a seal, one had either to make a new seal-stamp or to cast the new seal directly from a negative impression taken of the exposed-seal.



Fig. 10: The exposed-/ bare-seal: the adhesive (wax) is applied on top of the paper and the seal-impression is borne by the wax.



Fig. 11: The papered-seal: the adhesive (which may be wax or wafer) is placed between two sheets of paper, and the seal-impression is borne by the paper.

Engraving a seal-stamp from scratch to replicate it was a common practice. All stamps in official use were meant to have been engraved by the warden of the Mint, but this requirement had been much neglected. Officials from the shires for whom a trip to the Royal Mint in the Tower of London was perhaps inconvenient were in the habit of re-making their stamps ‘in house’ to save themselves the time and trouble of such a journey. As a result, many such seal-stamps were effectively counterfeited, not by criminals or spies, but by the officials who used them. Around 1595, an order was therefore made that county sheriffs should instruct all officers using seals to present them on a certain day at the Mint in order that they might be checked.<sup>74</sup> The problem was clear. If even government officials were using second-rate – or ‘counterfeit’ – seals ('counterfeit' on account of their not being produced by the Mint), then how could one safely tell if the seal on, for instance, a passport was in fact genuine? Technically counterfeit

they may have been, but they would still have been made in the traditional fashion: engraved by hand directly into metal. This process was time-consuming and highly skilled, and thus of little use to the average spy.

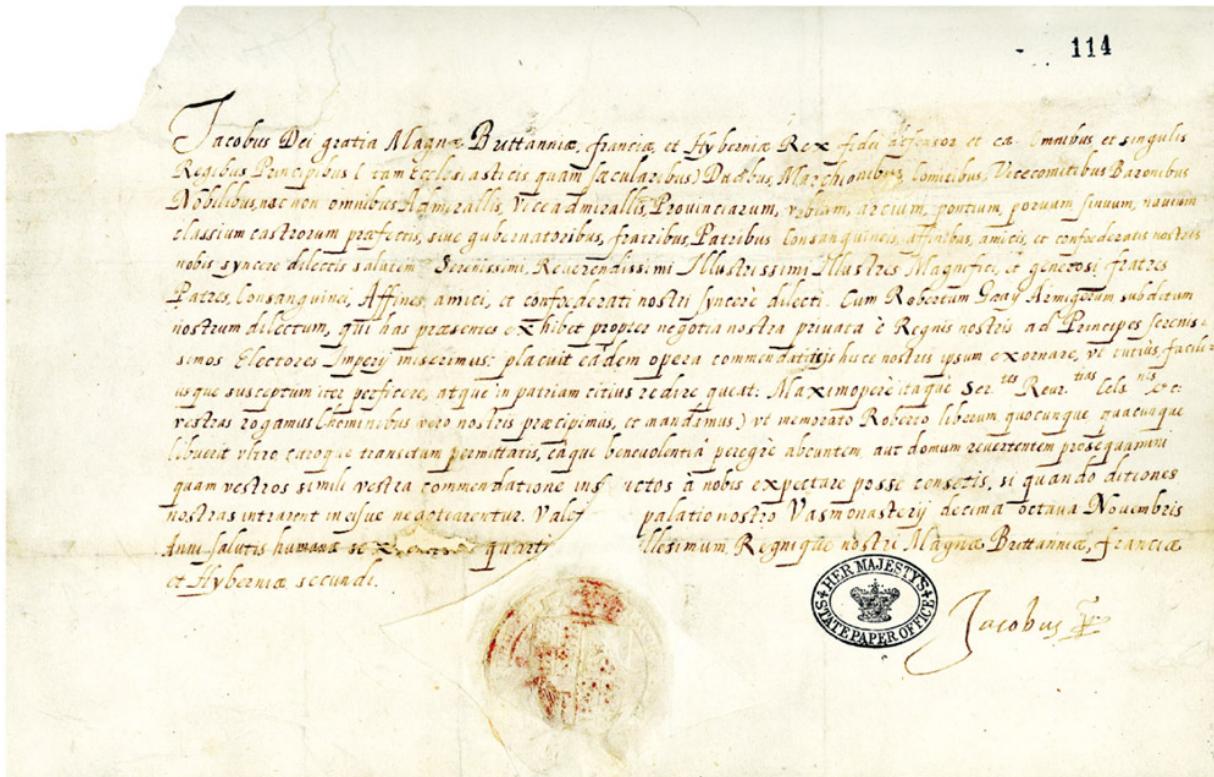


Fig. 12: A forged passport in the name of Robert Gray. The use of a papered-seal allowed the forger greater leeway to get away with inaccuracy.

What both spy and counterspy needed was a way to counterfeit a seal quickly and efficiently, so that they could replicate the seal's two functions – security and authentication – whenever and wherever necessary. For a spy, it might allow them to create a convincing passport or other official document, whereas the counterspy might use the counterfeit seal to replace the one they would likely break in the opening and reading of a letter before sending it on its way. To counterfeit a seal quickly meant working with wax.

## COUNTERFEITING THE SEAL-STAMP

How to bypass the two functions of the bare-seal was not a problem unique to the early modern period, however. As far back as the second century CE, the Hellenic satirist Lucian included a passage on the subject in his treatise *Alexander the False Prophet*. Lucian's Alexander was a priest who acted as an intermediary between the gods and man. One of his particular 'gifts' was the ability to enlist divine assistance that allowed him to know the contents of sealed petitions given him by the people without opening them. Alexander was, of course, cheating. He had simply mastered the art of removing an exposed-seal and replacing it so precisely that his sleight of hand went unnoticed, and this was how he duped his followers. Lucian noted two of Alexander's techniques. The first involved melting the wax of the bare-seal at the point that it made contact with the scroll through deft use of a hot needle, thus preserving it intact while separating it from the document it was designed to protect.<sup>75</sup> Once its contents had been perused, it only took a little care and a naked flame to reattach the seal, thus rendering the document once more 'unread'. The second method was to take a negative impression of the exposed-seal with a substance that would later harden, and use this impression to either cast a new exposed-seal which could then be used to close the letter in question, or to fashion a new seal-stamp. Lucian detailed two formulae suitable for this purpose. The first mixture he described as a 'plaster ... a compound of Bruttian pitch, asphalt, pulverized gypsum, wax, and gum arabic', while the second involved mixing marble dust with the glue used in bookbinding.<sup>76</sup>

A century or so later, Lucian's formulae were repeated by Hippolytus in his *Refutation of All Heresies*, with some additional information regarding quantities and some alternative mixtures: 'they also say that wax with pine resin has a similar effect, as well as a solution of two parts mastic, one part dry bitumen. But sulphur alone is reasonably effective, as well as gypsum powder soaked with water and resin. This especially works wonderfully for sealing molten lead'. Hippolytus did not merely describe how to forge a seal, but also suggested it was a relatively common process. The moulding substance would be made in large quantities and formed into 'the shape of little pellets'. These pellets would then be softened over heat in whatever quantity was required, while the seal-forgers, in order to prevent the resulting goo from sticking to the seal they were intent on counterfeiting

and thus ruining their day, ‘coat their tongues with oil, then use their tongue to smear the seal with oil’. Hippolytus also noted the relative insecurity of sealing wax, which was made primarily from beeswax and turpentine, a combination that created a relatively soft and pliable matrix which was easy to use, but just as easy to abuse.<sup>77</sup> He suggested that mixing ‘pig fat and hair’ with the wax would help to prevent the subsequent bare-seal from being compromised, though it is not entirely obvious how he expected this to help matters.<sup>78</sup> The counterfeiting of seals was something expected and to be prepared for, and any counterfeiter worth his or her salt would have the tools of their trade – from quills to inks to moulding putties and sealing waxes – close to hand at all times.

Fourteen centuries later, these classical texts were still being mined for information on how to defeat exposed-seals. Celio Calcagnini included a character who was virtually channelling Lucian’s Alexander in his 1544 ‘Oraculorum Liber’. In the centuries that separated Calcagnini from Lucian (and Hippolytus), however, advances had been made in the formulation of sealing wax. A typical sixteenth-century sealing-wax formula looked something like this:

Take a pound of fine rosin [i.e., solidified resin], a quarter of a pound of beeswax, a quarter of a pound of red lead [i.e., lead(II) oxide] and two ounces of oil or soft grease, boil the wax and rosin together, and then straw [i.e., sprinkle] the red lead and grease upon it and stir them together, and then put it into some cold water, and after temper it in your hand, and it will be good red wax.<sup>79</sup>

The rosin rendered the final product somewhat brittle – shellac, a resinous substance secreted by lac beetles, was used in many such recipes for the same reason – while the lead oxide produced the deep red colour most often associated with sealing wax of this period. Some recipes recommended a different substance to produce this colour, namely dragon’s blood (not the blood of an actual dragon, but either a type of naturally red gum or cinnabar).<sup>80</sup> A seal made from a brittle substance offered increased security: it was much harder to keep such a seal intact while you persuaded it to relinquish its grip on a letter.

The increasing probability of a bare-seal failing to survive even the most carefully executed of letter-openings merely accentuated the need for the dark artificer to master a sure way of counterfeiting one. The change in wax formulation over the centuries most likely rendered the heated needle technique largely ineffective, even though Calcagnini still included it as one of the techniques Lucian had attributed to Alexander. The two moulding substances Calcagnini lifted from his classical reading may well have proved useful, especially because he adjusted the recipes, or at least the names of some of the ingredients, to suit his audience or perhaps the modern, brittle waxes: the first substance, which he named ‘collyrium’ (or kollurion), was now a mixture of ‘Bruttian pitch, bitumen, ground glass [*lapide perspicuo*, which also translates as ‘translucent stone’, suggesting alabaster, a type of gypsum], wax and mastic [resin from the mastic tree]’. Both this and the putty based on bookbinders’ glue apparently hardened immediately, with the latter ‘becoming more solid than horn or even iron’.<sup>81</sup> Both of these substances thus promised the easy creation of a usable facsimile seal-stamp, and thus the simple re-creation of any seal, at least in terms of shape. Things were not as simple as these writers made out, however, and the process, while effective, could take several days – the dark artificer would still need to be able to mix wax in any colour, and also reproduce any other identifying feature, such as scent.<sup>82</sup>

## *EXPERIMENTAL METALS*

Arthur Gregory spent countless hours in his ‘poor house’ experimenting with various spycraft techniques. One problem he was particularly keen to solve was the thorny question of how reliably to counterfeit a seal. Gregory, like Calcagnini, concentrated on developing a substance that would allow him to take an accurate impression of a bare-seal from which he could either create a convincing if counterfeit seal-stamp, or directly remould a new seal. It appears he found such a substance, but he was unable to demonstrate its efficacy to Walsingham, as he explained in a letter dating from February 1586: ‘I prepared a singular piece of the usual metal with intent to show the same to your Lordship, but a sudden swelling in one of

my eyes did prevent me.’<sup>83</sup> The ingredients with which he hoped to create his moulding substance were anything but inert, and in this instance they had caused one of his own eyes to bulge out of its socket. He thus decided that it was not safe to put his ‘usual metal’ into Walsingham’s hands. This was no doubt a wise decision. Rather than demonstrating the counterfeiting of a seal in person, Gregory instead writes about his experiments concocting invisible inks, amongst other things (this would be the last time he listed actual ingredients in a letter). At this point, it seems that Gregory had not connected his attempts to formulate the perfect moulding putty with his sudden incapacitation, and so continued in his quest, considering the substance useful enough to warrant large-scale production: ‘I am continually employing myself to bring my secret metal to the best perfection in great quantity.’<sup>84</sup>

A decade later, Gregory would write to Walsingham’s successor, Robert Cecil, of his continued metallurgical investigations, admitting that ‘with making of metal this last night I have gotten an unsteadiness in my hand which will not leave me in a few days’. Handling the magical moulding putty, he now realised, was a dangerous enterprise, and he now ‘scarce dare keep it in my hands’.<sup>85</sup> Practice made perfect, however, and Gregory was soon convinced that he had finally solved the problem: ‘That I might be the better able to perform that which I have promised your honour touching the safe making of my sealing metal without danger of hurt, I have so well practised therein that I can assure your honour to show you a way to work it cold in the nature of wax.’<sup>86</sup> Gregory, like many of those actively involved in the espionage business, was reluctant to put the details of his methods into writing, even in his letters to Walsingham and Cecil. This is not particularly surprising – why give away the secrets of your trade in a letter when you can demonstrate them personally and, for preference, remain *the purveyor* of them. Luckily for us, the secrets that Gregory was intent on preserving were not entirely his own.

Lacking the formula for Gregory’s seal-moulding putty, it is difficult to be sure that he derived either the idea or the recipe from Calcagnini or della Porta’s *Magiae Naturalis*, even though we know that the latter was the most common source for many of the spycraft techniques in use during the period. The rather damning, if circumstantial, evidence pointing to della

Porta as his primary source is to be found in Gregory's physical symptoms. Gregory's swollen eye, his tremor and his reported exhaustion all point to his having poisoned himself.

The recipes that della Porta recommends for the counterfeiting of seal-stamps are, on the whole, quite different to those of his ancient forebears.<sup>87</sup> His first is based around sulphur and powder of ceruse (the white lead said to have been used by Queen Elizabeth I as a cosmetic face paint); his second is formulated from vinegar, vitriol and verdigris mixed with quicksilver; and his third consists of steel filings mixed with quicksilver.<sup>88</sup> The fact is that many of the ingredients used in these mixtures are poisonous, and, as with the recipe for sealing wax noted above, they were held in the maker's hand before use. Mercury is a dangerous toxin, especially when present in vapour form, and verdigris, ceruse and the red lead that was used to colour sealing wax are not only toxic but would have been supplied to Gregory in the form of eminently breathable powders. Sometime in February 1595, Gregory wrote to Cecil that 'I find my self utterly unfit to be a sudden counterfeit' on account of his developing an 'unsteadiness in my hand'.<sup>89</sup> Gregory was naturally worried that the result of his continued experimentation had rendered him useless in the short term – counterfeiting handwriting would not be possible with a shaking hand, and he might find his position usurped by another. Tremor is a common symptom of both copper and mercury poisoning. Gregory was quite literally working in a toxic environment, and he had been incapacitated by the ingredients he was using, likely at della Porta's behest, to formulate his 'secret metal'.<sup>90</sup>

While Gregory was sure that he had mastered the art of counterfeiting seal-stamps using his 'secret metal', and could finally do so without poisoning himself (or so he believed), there was still one particular part of the process that remained beyond his control. To make a perfect counterfeit seal-stamp, one needed a perfect seal-impression to work from: 'I am sorry that among so many seals upon the out cover there is no choice of one perfect print. I wish it had been better, nevertheless I will proceed as I may and do my best: But if your honour hath had any other letters that could help it, I humbly desire your honour to send the *bare-seal* for it importeth greatly.'<sup>91</sup> Not all seal-impressions were suitable for counterfeiting, as their

condition could simply be too poor to take a viable impression from. The best seal-impression to work from was a bare-seal or exposed-seal, such as Gregory wished for, as these seals had a greater three-dimensional depth and finer features than papered-seals.

While a simple scroll was, as Lucian explained, extremely vulnerable to being invisibly penetrated, the flattened, folded paper that formed an early modern letter was increasingly likely to have its own, sophisticated, security system built in. This system is letterlocking, and it introduced yet another layer of complexity to the manipulation of letters. Before attaching their remoulded seal(s), the counterfeit letter needed to be folded in exactly the manner that the recipient expected – King Charles I, for one, wrote that he could identify the female author of one letter ‘by the fowldings’.<sup>92</sup> It is to this technique that we turn next.

## *LETTERLOCKING*

To understand letterlocking and the manner in which its use contributed to the security status of a letter, we must first remember that the gummed paper pouch we now call an envelope was not invented until the 1800s. Before this date, letters were folded in such a way that the piece of parchment or paper they were written upon formed its own delivery package. It is this process that is called ‘letterlocking’. There were many ways to ‘lock’ a letter, some simple, some highly complex, and they each tell their own story.<sup>93</sup> Letterlocking was not an elite activity, nor one necessarily connected to espionage or any other nefarious activity. Anyone who wrote a letter would employ letterlocking to close it for delivery, even if that meant folding the letter and simply tucking one end into the other, the ‘tuck and seal’ method. The ‘tuck and seal’ may have been popular, but it offered little in the way of security to spies, diplomats, and others for whom privacy of communications was of greater importance. The more complex styles of letterlocking had security features such as ‘anti-tamper’ mechanisms (or ‘locks’) that were designed to show the recipient whether or not the letter had been opened by an unauthorised third party. Letterlocking could also, in some cases, serve to identify the sender. In this

respect, it could serve the same two purposes as seals: security and authentication.

Charles I was adamant that he recognised letters sent to him by Jane Whorwood, the woman who began as his spy and ended as his lover, from the way in which she folded them; this had the great advantage that she could leave her letters unsigned. Locking a letter involved putting it through a certain amount of manipulations, the type, complexity and number of which bore a direct relationship to its ability to resist tampering. Each one of these manipulations were likely as unique to an individual as their manner of writing.<sup>94</sup> Letterlocking could thus also be used to make a point – receiving a letter from a queen which was not only written in her own hand but folded by it too was a powerful statement of intimacy. Naturally, if it was recognisable, it was also vulnerable to counterfeiting. Within an active secretariat this could be quite a useful feature, as we can deduce from the request by Thomas Lake, the clerk of the signet, that Robert Cecil return a set of letters to the court as Elizabeth I had changed her mind. If these letters were yet to be sent on their outward journey, she wished that Lake might have them ‘folded in a small plait [plait] like those of her own hand and so sealed’, a task he thought ‘may well enough be done’.<sup>95</sup> Though we will see that this particular folding might have been a rather challenging one, it was not for nothing that Lake was nicknamed ‘Swiftsure’, but on account of his prompt and efficient manner of conducting business.<sup>96</sup>

Just as a monarch’s hand, signature and seal were at the mercy of their secretariat, so was their style of letterlocking. And anything that a secretary could do was at the fingertips of a dark artificer. Letterlocking was just one more arena in which spies and their close cousins, the counter-espionage agents, might do battle. In seeking to open and refold letters so that they might be sealed ‘like those of her own hand’, Elizabeth I’s signet clerk Lake was merely re-creating the actions of operatives such as Gregory, an acknowledged master of this particular art.

A badly locked letter was certainly an object of suspicion. In 1630, for example, William Boswell wrote to the Privy Council concerning a letter of recommendation he suspected ‘surreptitiously and unduly gotten’. One of the reasons given for this suspicion of counterfeit was that ‘the fold, and making up of this letter is much narrower than the ordinary manner

observed in the said Office'.<sup>97</sup> Boswell was employed specifically to verify documents, and his success may have contributed to his later appointment as Stuart ambassador in The Hague, where his duties included intercepting the letters of Charles I's sister, Elizabeth of Bohemia. Party to both sides of the espionage coin, Boswell was worthy of the title 'honourable spy'.<sup>98</sup>

The repackaging skills that William Camden attributed to Gregory in the *Annales* are not to be underestimated, as the challenge in reconstituting security-based letterlocking styles was not merely in the foldings per se, but also in the locks that they used. One such style was the 'triangle lock', in which the lock took the form of a large, triangular piece of paper, the pointy end of which was threaded through a slit made in the letter-packet (Fig. 13). The fat end was then folded over the letter-packet, hiding the pointy end, and stuck down with an adhesive. The act of opening the letter destroyed the lock, thus advertising the letter's interception. Naturally, della Porta considered exactly this problem, explaining how one was to 'Open letters, and shut them without suspicion', even when they had locks threading through the paper:

We use to seal letters, putting paper upon them, which goes through the letter on one side, and wax is put on the other side, where it comes forth, and there it is sealed. You shall open the letter thus: Break away that part of the paper, that is put upon the place, where it passeth through the letter, and the hole is, the letter opens presently: read it, and shut it again, and put the paper torn off, in its proper place: first, anointing the crack with gum-tragacanth, dissolved in water, for the paper will be so glued, that it will be stronger there than elsewhere; press it with a small weight, till it grow dry; the fraud cannot be discovered, because the glue is white, and is not known from the colour of the paper.<sup>99</sup>

One might think a reasonably competent interceptor would simply fashion a new lock, counterfeit the seal and reclose the letter, negating the need for della Porta's invisible gummy glue. This would be true if the letter-writer had not locked their letter with a triangle cut from the same piece of paper that the letter had been written upon – in this latter case, the recipient could

try to match the triangular lock with the triangular gap in the letter as if they were two pieces of a puzzle.

The puzzle pieces could be matched because of marks left on the paper's surface by its method of manufacture. Paper in this era was made from linen rather than wood pulp. The linen was placed in a large tub where it was beaten and shredded until it formed a sort of paper soup, and the sheets of paper were made by scooping a thin layer of the waste out of the tub with a rectangular wooden frame containing a wire mesh. The wires running horizontally in the frame were packed close together, only a millimetre or so apart – the indentations they formed are known as 'laid lines'. These wires were held in place by another set of wires, often thicker and spaced 10 to 15 millimetres apart, which ran vertically within the frame and created the indentations known as 'chain lines'. Both laid and chain lines were slightly lighter in colour than the surrounding paper, as at these points the paper was thinner. Watermarks were created in the same fashion, by embroidering the required image onto the paper frame's wire mesh with yet more wire. The resulting paper, called a broadsheet, was then hung up to dry. These lines allowed the recipient of a triangle-lock letter to ask certain questions to check whether the letter had not been tampered with en route. Was the lock made from the same paper as the letter itself? Did the chain lines and laid lines match? If there was a partial watermark on the lock, did the parts match with a watermark on the letter? In similar fashion, writing on the lock itself could also provide such security: if the address was half-written over the attached lock, an interceptor would have trouble replacing it; if the triangular lock was cut from the body text of the letter itself, the text would only make sense by matching lock and letter.<sup>100</sup>

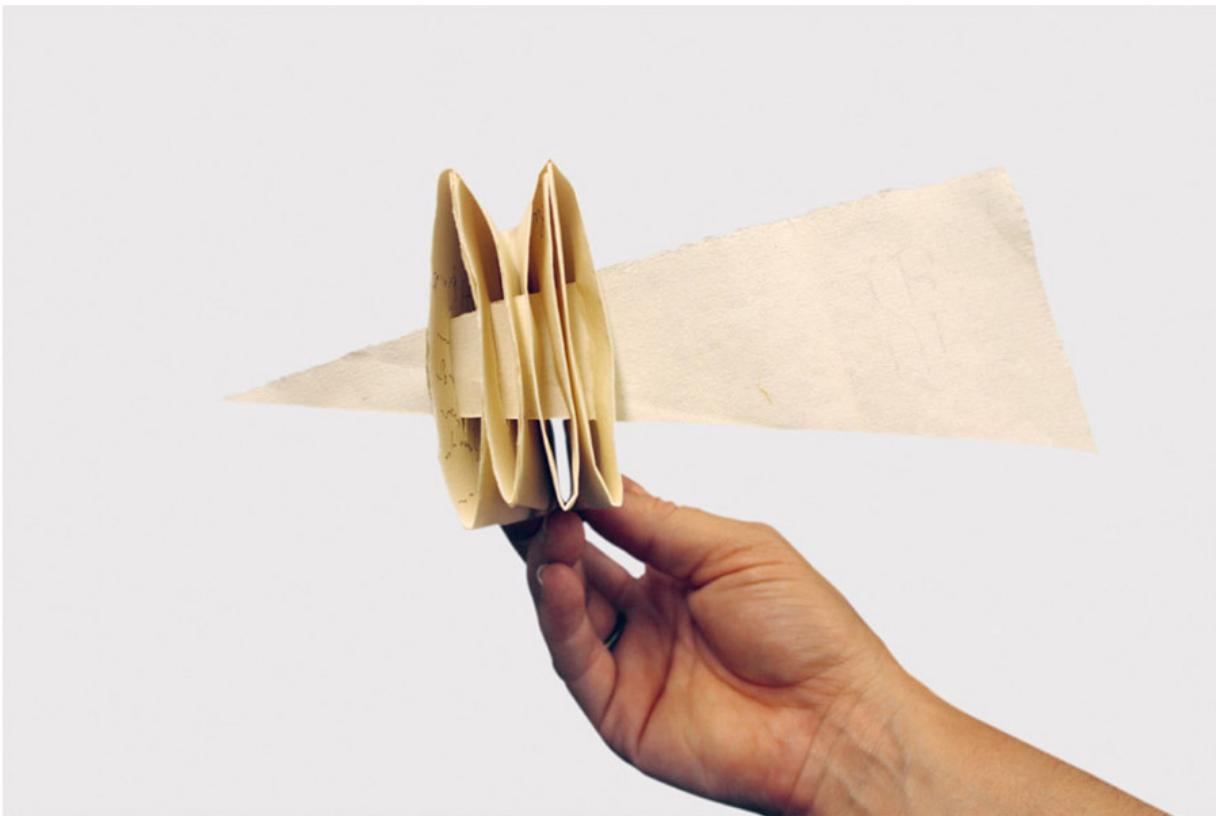


Fig. 13: The security features of the triangle lock made it a very effective style of letterlocking, and it was a favourite of both Walsingham and his cryptanalyst Thomas Phelippes.

There was an extreme iteration of the triangle lock that was not only aesthetically pleasing but one of the most complex, and secure, letterlocking styles yet discovered: the so-called ‘spiral lock’, possibly the ‘small plait’ Lake made for Elizabeth. Different variants of this lock have been found in letters from Elizabeth I, Mary, Queen of Scots and Essex, to name but three.<sup>101</sup> It is a lock that would have taxed even the most nimble-fingered interceptor – even making it from scratch was like navigating a labyrinth. This in itself might persuade some that a queen such as Elizabeth or even Mary would be unlikely to lock their own letters in this manner. This would be to misunderstand the craft that lay behind such a lock – both the skills and the implements needed were similar to that most popular of pastimes for royal woman (especially those, like Mary, who had a lot of time on their hands): embroidery.<sup>102</sup> It is highly likely that Mary was taught the spiral lock at the French court by Catherine de’ Medici, her Italian mother-in-law, before bringing it to Scotland with her in 1561.<sup>103</sup> Even the most difficult technique could be imitated, and while the spiral lock might

have begun its life in the hands of the Italian or French aristocracy, it was soon being manipulated by a Scottish counterfeiter.

Fig. 14 shows a replica of an open spiral lock letter sent in 1604 to Sir Robert Cecil.<sup>104</sup> It clearly shows the lock's primary giveaways, namely the 'beak' of paper cut from the letter itself, and the multiple slits sliced through it. It was sent by James Stewart – a man unwise enough to have been caught counterfeiting his royal namesake's signature and his sign manual, actions that had constituted treason in England since 1554. Stewart's letter was a straightforward plea for clemency, and the fact that he did so with a letter locked in such a complex manner tells us not only that security technology was constantly evolving, but that it was equally constantly being challenged by those who sought to profit from it. Stewart presumably hoped that a beautifully locked letter would increase the chances of a favourable response, or was perhaps hoping to persuade Cecil that he possessed skills too useful to waste on the scaffold – it may just as easily have led Cecil to conclude that Stewart was far too familiar with this format of royal correspondence. Stewart produced his spiral-locked plea for clemency while confined in the Tower. It was quite possibly his final action; impressive as it was, it failed to prevent his execution for treason.<sup>105</sup>

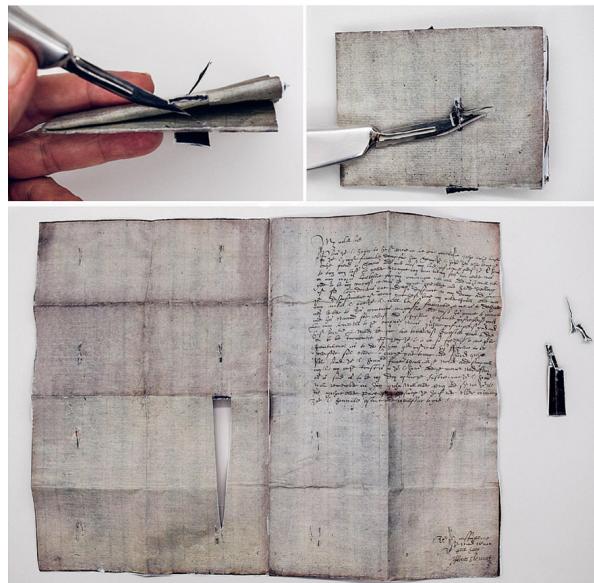


Fig. 14: Opening a spiral lock letter was far simpler than closing it, but it left the dark artificer with something of a problem. Here are the stages of opening such a letter, and the paper detritus that is left behind.

As you can see, the unfolded letter is covered in slits, has a long strip of paper missing from its middle, and there are three scraps of loose paper left over. The scraps are what is left of the long strip of paper, in the shape of a sword or a bird's beak, that has been cut from the middle of the letter. Just to make things extra awkward, this 'beak' only has the two long edges cut, and so remains attached to the paper throughout the letterlocking process (Fig. 15). A series of slits are then cut through the entire letter-packet and the beak is carefully threaded through these slits and through itself before being finally tied shut. An unskilled letterlocker could quite easily tear it while threading it through the packet.

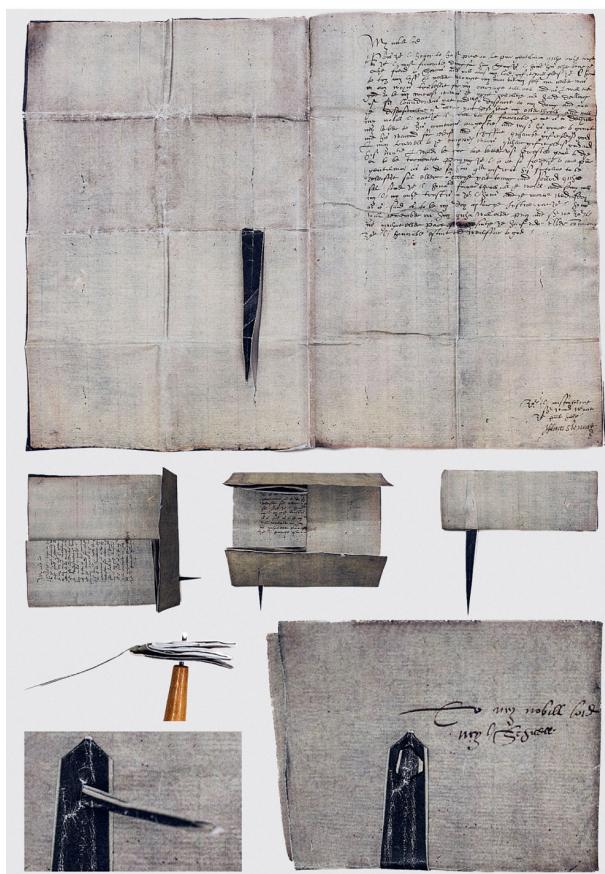


Fig. 15: The various stages of folding the spiral lock.

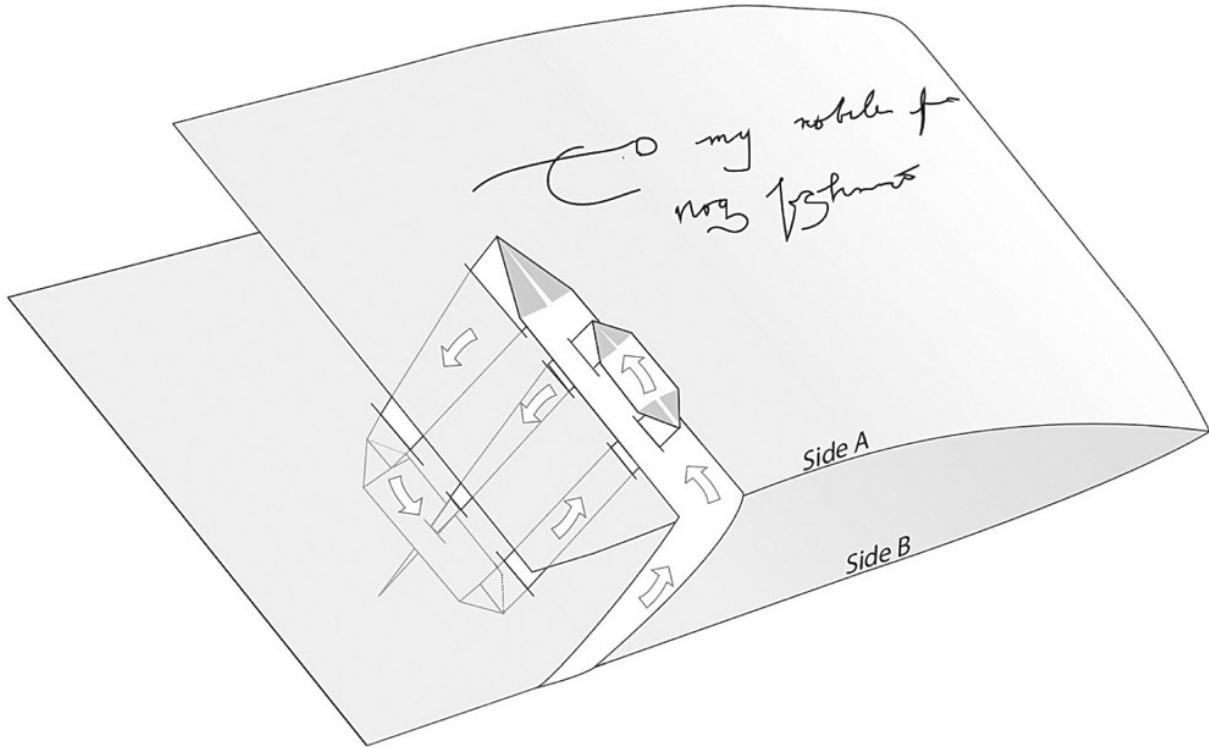


Fig. 16: Another indication of just how complex the finished spiral lock packet was, and just how difficult (if not impossible) it would have been to reconstitute once opened, is given in this exploded view – the arrows indicate the direction of threading; it is also depicted with a single fold of the letter itself for ease of comprehension – in reality, this letter would comprise several layers of paper.

The spiral lock was extremely secure, but the sender could render it yet more so with a couple of simple additions. The first was to make the ‘beak’ even more fragile by wetting its points of entry and exit through the letter-packet with saliva: this would cause the paper to return closer to its original state of a bathful of free-floating linen waste, allowing beak and substrate to melt into one another, making their union all the closer when they dried. A second method was to apply adhesive in the form of wax to the area of the lock. This would seep through the layers of the substrate, making the delicate beak and slit areas not just more prone to tearing but to doing so in unpredictable ways, making the resulting damage even more difficult to mend invisibly.<sup>106</sup>

Creating a spiral lock was a complicated operation, one not to be undertaken lightly. Creating the slits through which the beak was to be threaded necessitated the use of a penknife or bradawl: this reminds us of certain truths that are difficult to comprehend, such as the fact that James

Stewart plainly had a sharp object with him as he lay in prison awaiting execution. The typical penknife was not well-suited to homicide, however (the bradawl even less so), as its blade was short, rounded, and honed only along one edge. This blade was attached to a long, fine bone handle terminating in a point that could be used to punch holes in paper or help with the task of threading floss or paper through the holes cut during the locking process (see Fig. 1). There are a few instances of a prisoner attempting to prove that the penknife was mightier than the sword. One occurred on 8 March 1711, when the French double agent, the marquis de Guiscard, who was being examined by the English Privy Council on a charge of treason, assaulted statesman Robert Harley, 1st earl of Oxford and Mortimer, at a council meeting. Fortunately for Harley, Guiscard's penknife got caught in the ornamentation of Harley's waistcoat (or his collarbone, depending on which story you believe) where it broke. Clutching his now fractured blade, Guiscard managed a second thrust which succeeded in injuring Harley, but not fatally.<sup>107</sup>

Just as we have seen with the problems Arthur Gregory was caused by his experiments with materials to counterfeit seals, spycraft techniques could be dangerous to their user. Stewart's spiral lock variant would, after initial folding, have sixteen layers of paper needing to be penetrated for each slit (not counting the times the beak had to penetrate itself), and that could be a dangerous operation in itself.<sup>108</sup> The merest slip of the blade could spell trouble. Indeed, in 1575, Michel de Castelnau, sieur de la Mauvissière, the French ambassador in London, wrote to Burghley to explain that while he desired to 'kiss the hands of Her Majesty', he could not, as he had accidentally stuck the tip of a penknife into his arm while locking a letter, thereby touching a nerve and causing the arm to swell up.<sup>109</sup> Though it is not clear what kind of letter caused Castelnau to stab himself, it shows the dangers inherent to the epistolary life. We also can see that letterlocking was just another of the ways by which a letter-writer could inconvenience the counter-espionage agent: Gregory reported to Robert Cecil about one particular letter, 'the breaking of the covering & folding it often in other crests caused me to have much trouble'.<sup>110</sup>

## *JACK OF ALL TRADES, MASTER OF LETTERS*

In a period when the letter was the most important mode of information transfer, the mastery of its various components could make all the difference – if the spy failed to fool the counterspy with their manipulation of letters, it might very well be the death of him. Mastery of a single device was simply insufficient. We know that each individual element was important because of the actions and words of the men (and women) who sought to gain advantage through use of a letter. When Charles II revoked the sanctions on religious nonconformity in 1672, a rush of personal letters flooded across the Narrow Seas, spreading the word to the Low Countries. This epistolary campaign was not the result of a groundswell of public opinion, however, but a purposeful act of spamming undertaken by just two men. In an attempt to conceal the common provenance of these letters, one of the counterfeiters wrote that he created them ‘with all the variety of hands as I could write, with several seals; & several ways of folding up’.<sup>111</sup> Even the common people were sensitive to inconsistencies in a letter’s presentation, and every letter had multiple potential red flags that might betray a dishonest nature were the counterfeiter careless or simply unskilled. The suspicions of Ambassador Boswell about the letter of recommendation mentioned above were not triggered by the unfamiliarity of the letterlocking style alone; he also noted that the letter’s layout was incorrect, that it was written in two different hands, and that, while the seal *appeared* to have been made by Charles I’s signet, there were suspicious anomalies: ‘I conjecture by some parts of the wax, somewhat different in colour from other, & by some small rags of paper in it, hath been formerly upon some other letter, or writing. But when; by whom, or with whose notice it was put unto this letter in question, I cannot absolutely determine.’<sup>112</sup>

To be convincing, a counterfeit had to do more than read as though it were written by its apparent author – it had to be written in the correct hand, bear the correct signature and the correct seal, and present the correct method of folding. To create a convincing counterfeit was no mean feat.

Without all these features in place, it could be difficult to trust that the letter in your hand was what it purported to be. Unfortunately for the would-be letter-forgers, there were other ways of guaranteeing that the message in front of you was genuine, ways which also served to secure these messages from prying eyes. One of these was the use of cipher and codes.

## 2

*CIPHERS & CODES*

In March 1597, Thomas Phelippes found himself in the less than salubrious setting of the Fleet prison, in debt to the crown to the tune of £10,000 (something like £1.25 million in today's money). A decade previously, as right-hand man to the secretary of state Sir Francis Walsingham, he had been granted an audience with Queen Elizabeth I where she had thanked him personally for his key role in thwarting the most recent, and serious, conspiracy against her life, the Babington Plot. Walsingham's death had seen the end of Phelippes's permanent employment as an intelligencer, placing him on the road to debtor's prison. Nevertheless, the Cecils and Essex still called upon his talents as a codebreaker, albeit sporadically – he may have been a prisoner, but he was still indispensable. Having shivered his way through one of the coldest winters in recent memory, he once more found himself labouring away deciphering coded messages. No longer did he receive the approbation of the monarch, however, merely complaints that his work was too slow. His health was being slowly ruined by the proximity of his enforced lodgings to the filthy and disease-ridden river Fleet, and he could no longer access his records to assist him in his endeavours: he sent his wife Mary to retrieve papers now and again but, while she was an accomplished intelligencer, she was no cryptanalyst, and found locating the desired information amongst the piles of symbol-dripping sheets next to impossible.<sup>1</sup>

That same month, the queen and her ‘elf’, Robert Cecil, pressed Phelippes to decipher some Spanish papers they had sent him with greater dispatch. Try as he might, he could work no faster. He pointed out that the

great Catholic enemy replaced their codes in ‘such kind as will ask time to tread it out’, reminding them that decoding the letter of the count d’Olivares, by which he uncovered the planned invasion that was the Spanish Armada of 1588, had ‘held [him] twenty days in work’.<sup>2</sup> Their responses were unsympathetic. He was, and would remain, entangled in a mess of debt. More than ever, Phelippe found himself at the mercy of the cryptanalyst’s most fearsome enemy, time. No one, he told himself, his wife, and those of his fellow prisoners who were willing to listen, truly understood his craft.

## *IN THE BEGINNING*

The history of cryptography is the history of the evolution of communication, and as such its traces can be found in the classical writings of Virgil, Polybius and others, in sixth-century runic manifestations, and in early medieval works such as *The Reckoning of Time* by the eighth-century monk the Venerable Bede. Cryptology as an area worthy of study, however, was first developed in the Arab world, in *Kitab al-Muamma* (*Book of Cryptographic Messages*) by al-Khalīl (718–786), now lost, and *Risāla fi Istikhrāj al-Kutub al-Muammāh* (*On Extracting Obscured Correspondence*) by al-Kindī (c. 801–873).<sup>3</sup> While these men and others developed sophisticated methods for both encrypting and decrypting messages, the Western world ploughed its own, rather simplistic furrow. It was not until 1401, for example, that anyone thought to enhance the security of the monoalphabetic ciphers that had been in use since the time of Julius Caesar.<sup>4</sup>

The ‘Caesar cipher’ (aka the ‘shift cipher’) was used by both Julius and Augustus Caesar in the first century BCE, and is in itself perhaps the most famous cipher technique. It was a simple substitution alphabet formed by ‘shifting’ the alphabet by a certain number of degrees in order to find a substitute for each letter, such that with a shift of four degrees, ‘a’ in the original message (the plaintext) would be enciphered as ‘d’ in the crypto- or ciphertext, ‘b’ as ‘e’, ‘c’ as ‘f’, ‘d’ as ‘g’, etc. All the encoder needed was to count the degrees of shift desired, and the message could be enciphered

easily. Naturally, it was vital that both sender and recipient used the same alphabet: to keep things suitably early modern, we will use the twenty-four-character English alphabet (in which ‘i’ and ‘j’ were interchangeable, as were ‘u’ and ‘v’) in all our examples, unless otherwise indicated. If we were to encode the plaintext message ‘we are undone’ with a shift of four degrees, the ciphertext would read ‘zh dvh yqgrqh’.

The art of secret writing and its development in the West was indelibly associated with the diplomatic profession.<sup>5</sup> Ciphers were integral to the Venetian system of government by the sixteenth century, for example, and diplomats were required to write everything, even notes on scraps of paper, in cipher.<sup>6</sup> Official ciphers would be replaced if it appeared that they had been broken. Giovanni Soro had served the Council of Venice as cipher secretary for thirty-three years when he presented them with a treatise on ciphers in 1539, though little remains of it bar a few notes. Between 1546 to 1557, Florence had its own set of cipher experts such as Pirro Musefilo, count della Sassetta, who regularly received ciphers to solve from all over Europe. For some, such as the Argentis in Italy and the Rossignols in France, cryptography was a family business. Giovanni Battista Argenti and his nephew Matteo Argenti were not only employed as cipher secretaries by the Papacy in 1585 and 1591 respectively, but they also innovated: they were the first to use a mnemonic key, a recovery phrase, as a method of formulating and transmitting a cipher alphabet.<sup>7</sup> The Rossignols deciphered important Huguenot messages at the sieges of Réalmont (1626) and La Rochelle (1628) for Louis XIII, while Antoine Rossignol and his son Bonaventure designed an allegedly unbreakable ‘Great Cipher’ for his successor Louis XIV in the mid-seventeenth century.<sup>8</sup> Their office in Versailles in the 1660s was called the *cabinet noir*, its workings soon so notorious that the term ‘black chamber’ came to denote any international, organised espionage agency reliant on the combination of the interception of letters and codebreaking. Information had long been a vital part of diplomacy in peacetime, and was a potent weapon in times of war: ciphers promised a measure of control over it.

The English appear to have been a somewhat late arrival to the cryptographers’ ball, as the first political dispatch using cipher in an English source dates from 1499.<sup>9</sup> In a world dominated by men, it is

perhaps surprising that the dissemination of the art of secret writing in the British Isles was greatly assisted by those royal women of Europe who found themselves married to English monarchs. Katherine of Aragon is a case in point. As dowager princess of Wales, Katherine was officially appointed as her father King Ferdinand of Spain's ambassador to England in 1507, and as such was provided with a cipher key.<sup>10</sup> While the expectation may have been that she would have a cipher secretary to take care of such matters, Katherine had other ideas. In March 1507, Ferdinand sent his daughter a packet of letters. One of the letters contained within this packet was for King Henry VII of England (Katherine's once and future father-in-law), 'in answer to that which he wrote to me', in which Ferdinand referred him to a further message. This further message was contained in the body text of his letter to Katherine, and was written in cipher. Ferdinand instructed his daughter to 'have it separately deciphered by a trustworthy person' and to present it with his letter to Henry.<sup>11</sup> She was, after all, ambassador to the English court. Katherine later told her father's secretary, Miguel Perez de Almazán, that she had deciphered it 'without any assistance',<sup>12</sup> and her father that she had given his letter to the king, 'explained to him the cipher', and that he 'expressed himself much gratified'.<sup>13</sup> She also confessed to Almazán that she wished she were able to write in cipher as well. By that September, she had fulfilled this desire.<sup>14</sup> This was how far England was behind the rest of Europe: a year after the Council of Venice had appointed Soro to the position of cipher secretary, the king of Spain's daughter was explaining how ciphers worked to the king of England. Katherine was not the only royal woman to personally wield ciphers: Mary of Guise used them with various French correspondents while she was regent of Scotland and her daughter, Mary Stuart, famously followed in her footsteps.<sup>15</sup>

The influx of Jesuit priests onto English soil in the 1570s and their machinations had forced Sir Francis Walsingham to catch up with this new technology – technology in which enemies of the state, Mary Stuart for one, were already well versed.<sup>16</sup> He thus recruited the cryptanalyst John Somer, who in the early 1560s had been involved in breaking the ciphers of Scottish regents while working for Sir Nicholas Throckmorton, the English ambassador in France.<sup>17</sup> In 1576, Walsingham also began to co-operate

with a Dutch writer, statesman and codebreaker, Philips of Marnix, lord of Saint-Aldegonde, whom he met during the latter's embassy to England.<sup>18</sup> In 1577, Saint-Aldegonde shared a cipher used by Don Juan of Austria, half-brother of Philip II and governor of the Spanish Netherlands, with Walsingham; following the assassination of his father William the Silent in July 1584, Maurice of Nassau, the new stadtholder of Holland and Zeeland, also sent Walsingham several Spanish letters decrypted by Saint-Aldegonde.<sup>19</sup>

By 1578, despite this Anglo-Dutch codebreaking alliance (which would extend well into the seventeenth century), Walsingham had found himself in need of a new cryptographer. While Somer was still decrypting letters as late as 1584, he had climbed the diplomatic ladder and was often away on embassy.<sup>20</sup> Saint-Aldegonde had returned to the Netherlands, and was no longer close at hand. Walsingham's colleague, the other principal secretary, Thomas Wilson, identified an alternative: 'This afternoon I do send ... a letter written in cipher, as you may see, wherein may be matter of great moment, being well deciphered. If Saint-Aldegonde cannot do it, nor Master Somer, then I would you did send the same to your servant young [Thomas] Phelippes'.<sup>21</sup> Phelippes had already mastered Latin, Italian, French, Spanish and German.<sup>22</sup> He was perfect for the job.

## *CHASING THE CODE*

Cryptanalysts such as Somer, Saint-Aldegonde and Phelippes approached their work armed with a set of mathematical and analytical tools and a natural predisposition towards pattern recognition, often enhanced by a facility for speaking and writing multiple languages. They were aware, for example, that while a message enciphered using a simple substitution alphabet might appear impenetrable at first glance, the characters it used retained the exact same relationships that existed between the letters of the plaintext message. Primary amongst these relationships was the frequency with which each letter of the alphabet tended to appear in any particular language, and this meant that the first, and most powerful, of the tools a cryptanalyst employed was frequency analysis. This technique was both

simple and effective, and it dealt a devastating blow to the security of the monoalphabetic cipher. When presented with a ciphertext, a cryptanalyst would first count the number of times each character occurred, and then compare the results with their knowledge of the presumed plaintext language.<sup>23</sup> The most common cryptotext symbol was likely to match the most common letter in the plaintext language. Once this basic operation had been completed – that is, the characters in the cryptotext message had been counted and placed in order of frequency – the cryptanalyst could start to work on recognising other features.

The power of frequency analysis had been noted by the Arab scholar al-Kindī in the ninth century, but Western Europe had to wait until 1466 for it to be described, in the manuscript treatise *De Componendis Cifris (On Devising of Ciphers)* by the Genoese polymath Leon Battista Alberti.<sup>24</sup> *De Cifris* in its original Latin was perhaps read only by devotees of the art, but it nevertheless has foundational status in European cryptography. Alberti did not merely explain how to employ frequency analysis to break a cipher, but suggested various methods of frustrating its use. Amongst his recommendations for increasing the security of a cryptotext were new features such as ‘nulls’ (characters that represent nothing), homophones (using several different characters to represent the same letter), avoiding common letter sequences, using words without vowels, and including fake words and other red herrings.

Alberti’s observations regarding frequency of letters and the various other patterns the cryptanalyst was to look for would later find themselves in one of the many books dedicated to the art of codebreaking, John Falconer’s 1692 *Rules for Explaining and Decyphering all Manner of Secret Writing*, which summed up the manuals that had appeared over the previous 250 years.<sup>25</sup> Falconer’s text sought to demystify the process of codebreaking for the layman, and provided a veritable checklist of features to look out for. Having identified the most frequent symbols in the cryptotext, and thus the probable symbols for the most common letters in the presumed plaintext message, the next task was to identify consecutive letters, with a view to distinguishing between vowels and consonants: isolated letters must be vowels, Falconer suggested; letters doubled at the beginning of a word are generally vowels (except, as he notes, in some

English proper names such as ‘Llandaff, Lloyd’); the frequency of characters in two-letter monosyllables is instructive; three-letter words beginning and ending with the same letter are probably consonant-vowel-consonant; the vowel ‘e’ is often to be found at the end of words; doubled letters in the middle of four letter words are usually vowels; doubled letters in polysyllabic words are usually consonants; and ‘i’, ‘a’ and ‘u’ are rarely used at the end of words, but often at the beginning. Other recurring groups of characters might occur in certain words, such as ‘ion’, ‘ight’, ‘ck’, and so forth.

Patterns represented weakness, and were a gateway for the cryptanalyst, but they also occurred at levels above individual letters and groups thereof. Correspondents often included standard formulae at the beginning and end of their letters, even when enciphering them (use of a cipher did not excuse bad manners). Many cryptanalysts, therefore, began their work by looking for information such as the date, or rhetorical flourishes in standard greetings or sign-offs such as ‘I pray this finds you well’ or ‘your humble servant’. They might also use their knowledge of the message’s context such as the suspected sender and recipient, and perhaps an idea of what they were liable to be talking about, to help give them an edge. All they needed was for the smallest crack in the cipher’s defences to open up; frequency analysis, pattern recognition and hard work would take care of the rest. In this way, the cryptanalyst could methodically dismantle the cryptotext, exposing the message beneath. It was a laborious process, but it worked.

Alberti may have explained the use of pattern recognition and frequency analysis as tools for breaking ciphers, but his great innovation was an enciphering method designed to frustrate the use of these tools: the polyalphabetic cipher.<sup>26</sup> This was a different beast from the homophonic cipher, a cipher which gave several options for some if not all of the plaintext letters, as it used multiple substitution alphabets in the same message. Alberti had simply realised that with this technique, using a new substitution alphabet for every word or even character in the plaintext message, a cipher could be rendered virtually, or at least practically, unbreakable, making the job of the cryptanalyst hair-rendingly frustrating. He also realised that enciphering a letter in such a manner was something of

a chore for the writer (as was deciphering it for the recipient). His solution was as elegant as it was simple: the cipher wheel.

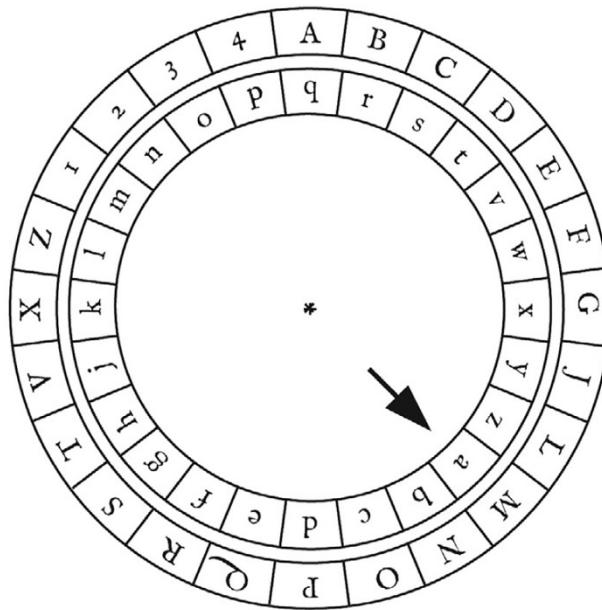


Fig. 17: A representation of Alberti's cipher wheel with adjusted alphabet on index wheel and pointer added for ease of comprehension.

Alberti's cipher wheel comprised two concentric dials (or 'volvelles'), each of which had letters inscribed around its circumference. All one need do to encipher a word is to turn the index (here the lower-case 'a' on the inner wheel) to a previously agreed or otherwise indicated position (here the upper-case 'M' on the outer wheel). We refer to this as 'index set at "M"'') and then trace the letters of the message on the outer wheel – the adjacent letters on the inner wheel would indicate the enciphered letters, making up the cryptotext. The cipher wheel was a paper technology (though they could also be rendered in brass), and is easiest to understand in use; the inner wheel was intended to be drawn on a piece of paper, cut out and stitched to the outer wheel, which remained static on another piece.<sup>27</sup> The cipher wheel depicted in Fig. 17 is based on Alberti's, and has a truncated alphabet on the outer volvelle, along with the numbers 1, 2, 3 and 4 – some letters seem to be omitted because they do not appear in the Latin or Italian alphabet, while the numbers allow for a second method of enciphering, superencryption or superencipherment.<sup>28</sup> Alberti is clear that the characters on the inner wheel can be placed in any order (his 1568 editor chose a zigzag configuration),

but we have rendered the alphabet in standard order for ease of comprehension.<sup>29</sup> It only remained for the sender to communicate the manner in which the recipient must calibrate their wheel to allow them to decode the message.

While the cipher was the beating heart of cryptographic technology, few relied on it alone – most combined it with a code, also called a nomenclator. The difference between a cipher and a code is as follows:

*A cipher* is the method by which each individual letter of a message is replaced by a letter, number or symbol – this procedure (also known as an algorithm) may be a highly complex mathematical computation or as simple as  $a = 1$ ;  $b = 2$ ; etc.

*A code or nomenclator* is a system in which whole words or units of meaning are represented according to a predetermined convention: King = \*; Queen = ?; Prince = spaniel; and so forth.<sup>30</sup>

The early modern mind was quite happy to confuse the issue by conflating these two meanings, however, as the philosopher and statesman Francis Bacon noted: ‘For CYPHARS; they are commonly in Letters or Alphabets, but may be in Words’.<sup>31</sup> The cipher and the nomenclator would often be combined into a ‘cipher key’ which supplied the user with the particular substitution alphabet to be used and a separate list of code words, which could include any amount of substitutes, from a mere handful to hundreds. Both cipher and nomenclator alike could be alphabetic, numerical or symbolic, so several combinations were possible, such as alpha-numeric, alpha-symbolic, numeric-symbolic, and so forth. A spy might also choose to give all their correspondents the same cipher alphabet but a personal nomenclator, or vice versa.

## *SPREADING THE CODE WORD*

Alberti’s Latin work, while groundbreaking, was disseminated very carefully in manuscript, and perhaps only amongst the true devotees of the mathematical and cryptographical arts at the most important courts in

Europe.<sup>32</sup> *De Cifris* would not see print until 1568, long after Alberti's death, in an incomplete version translated into Italian.<sup>33</sup> The first printed exploration of polyalphabetic ciphers was in the posthumous *Polygraphiae Libri Sex* by Johannes Trithemius, printed in 1518: this was a revised edition of his unpublished manuscript *Steganographia* (composed c. 1499) which had caused a minor scandal due to a mistaken belief that it relied upon supernatural forces such as angels.<sup>34</sup> It may be for this reason that the magus and mathematician John Dee made a manuscript copy of *Steganographia* in 1564 which he sent to William Cecil.<sup>35</sup> In *Polygraphia*, which lacked any reference to supernatural entities, angelic or otherwise, Trithemius favoured a more consistent, progressive encryption model than Alberti's, and devised a set of tables to aid both encryption and decryption which allowed for the reader to scroll easily through the twenty-four iterations of the Caesar cipher. (Dee may also have acquired a 1561 French edition of *Polygraphia*.)<sup>36</sup> As can be seen in Fig. 19, it is easy enough to use. To encode the letter 'e', first find the plaintext character in the table's left-hand, blue column (alphabet 'A'), and trace horizontally until the row intersects with the column that equates to the shift alphabet in use (alphabet 'm', for example; here rendered in green), and the character found at this intersection is the cipher letter, 'q'. To give an example, using substitution alphabet 'b', the pronoun 'we' in the phrase 'we are undone' enciphers as 'xf'.<sup>37</sup>



Fig. 18: This typical alpha-numeric cipher key has three substitution alphabets ( $\beta$ ,  $\pi$ , and  $\phi$ ), and a numerical nomenclator (numbers 83-207 are found on the verso).

Trithemius also included a series of functioning cipher wheels in his book that imitated the workings of his tables, though they rather sacrificed usability at the altar of aesthetics.<sup>38</sup> The Trithemian table was perhaps more reliable if less straightforward to use than an Albertine cipher wheel, which was very easy to accidentally read backwards, confusing the entire process.

Trithemius's polyalphabetic enciphering procedure entailed advancing through the possible iterations of the Caesar cipher one at a time, as each character was enciphered. Alberti favoured a more random approach. One of his suggestions regarding how to indicate which substitution alphabet was being used was to include an upper-case indicator: a 'B' in the text indicated that the substitution alphabet now in use was the one beginning with the letter 'b'.<sup>39</sup> He also had another, more sophisticated idea that would not be published in print until Giovan Battista Bellaso's *La cifra del sig: Giovan* of 1553, and is often attributed to the French cryptographer Blaise de Vigenère: the keyword. The keyword was a simple way of

demonstrating to the recipient which alphabet was in use at any one time. Say, for example, we pick ‘SPYCRAFT’ as our keyword. This means that the first alphabet we use from the Trithemian table (or from our Albertine cipher wheel) is alphabet ‘s’, the second alphabet ‘p’, the third alphabet ‘y’, the fourth ‘c’, the fifth ‘r’, the sixth ‘a’, the seventh ‘f’ and the eighth ‘t’. After the eighth letter the sequence is simply repeated.<sup>41</sup>

A	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z
B	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a
C	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b
D	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c
E	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d
F	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e
G	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f
H	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g
J	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h
K	l	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i
L	m	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k
M	n	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l
N	o	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m
O	p	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n
P	q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o
Q	r	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p
R	s	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q
S	t	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r
T	v	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s
V	w	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t
W	x	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v
X	y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w
Y	z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x
Z	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y
A	b	c	d	e	f	g	h	i	k	l	m	n	o	p	q	r	s	t	v	w	x	y	z

Fig. 19: A Trithemian table.<sup>40</sup> In this table: blue (vertical): plaintext; blue (horizontal): first letters of the substitution alphabets; green: the cipher alphabets: alphabet ‘b’, alphabet ‘d’, alphabet ‘m’; orange: finding the ciphertext for ‘w’ and ‘e’.

Keyword ciphers had one weakness, however: they were repetitive. Because they simply reused the same combination of substitution alphabets over and over again, keyword ciphers tended to repeat particular combinations of cryptotext, especially when enciphering short words such as articles or conjunctions. These repetitions could present an observant cryptanalyst with a way to deduce the keyword from what would otherwise appear to be nothing more than a thick cipher soup, and thus allow them to render the message in plaintext. Vigenère may not have invented or even introduced the keyword cipher into the sixteenth century’s pantheon of techniques, but he did fix this one weakness in his *Traicté des chiffres, ou*

*secrètes manières d'écrire* of 1586, and in the process devised what is now considered its apogee: the autokey cipher.

The autokey cipher still needed a keyword, but it only used it once: after the keyword had enciphered the first few characters, *the message itself* then became the key. In this way, if your cryptanalyst was unable to crack the cipher used by the first eight letters of the message (assuming the keyword is still ‘SPYCRAFT’), the rest of the message would remain secret, too – and decoding eight characters, each of which has been enciphered using a different substitution alphabet, is practically impossible using pen and paper alone.<sup>42</sup>

A mathematical way to break Vigenère’s autokey cipher was not proposed until two centuries later, but despite its first-rate security score, there is no evidence that it was ever used in the field during the sixteenth or seventeenth centuries. There were perhaps two reasons for this: first, it is extremely time-consuming to both encipher and decipher; and second, if even a single letter is either enciphered or deciphered incorrectly, the cipher rapidly becomes unreadable. Vigenère’s autokey cipher was as unworkable as it was unbreakable. It is the perfect example of how theory and practice were not always comfortable bedfellows.

There was another way of presenting a cipher alphabet that made life more complicated for all concerned. While polyalphabetical ciphers using letter substitutions were highly effective, it was also possible to use symbols rather than letters.

## *WHEELS WITHIN WHEELS*

In 1563, della Porta’s *De Furtivis* introduced the symbolic cipher wheel. Aware that cryptography was far harder in practice than it appeared in theory, he followed Trithemius’s lead in giving his readers the opportunity to fashion a working wheel by having three versions of the outer, static volvelle printed in the book’s body text and a set of inner – or index – wheels printed on the endpapers.<sup>43</sup> They were not only simpler than Trithemius’s coloured wheels, and thus far easier to use, but they were also cheaper, being monochrome woodblocks the reader was able to cut out and

assemble themselves. Della Porta included some important updates to Alberti's original design. He placed numbers alongside the letters of the alphabet on the outer volvelle, used a symbolic rather than alphabetic cipher on his index wheel, and included nulls. His most complex wheel, for example, had an alphabet of twenty-one characters (omitting 'k', 'w' and 'y'), with a further seven blank characters for use as nulls (see Fig. 20). He also included a handy pointer, or manicule, to make orienting his wheel more straightforward. Quite apart from the utility of this 'cut-out-and-keep' piece of cipher technology, its use of symbols rather than an instantly recognisable alphabet was of particular importance. Not only would this at the very least compromise a cryptanalyst's pattern recognition skills, as the symbols were unlikely to be instantly memorable, but it also allowed for a seamless transition between cipher and code. Instead of an alphabetic cipher and a numerical nomenclator, which were easily distinguishable on the page, the two could be blended into one by the production of a symbolic nomenclator (Alberti's numerical superencryption was also designed for this purpose). The resulting symbolic stew would be liable to give even the hardiest cryptanalysts indigestion.

It is perhaps the hallmark of a true innovation that those who follow it augment rather than simply copy. And so it was with the cipher wheel. In 1587, the physician Timothy Bright produced a manuscript containing selected highlights of *De Furtivis* on behalf of William Davison, one of Queen Elizabeth's secretaries.<sup>44</sup> Davison then presented the manuscript to either Elizabeth or Walsingham, possibly in a bid to regain favour following his unfortunate part in the execution of Mary, Queen of Scots (Elizabeth blamed Davison for the death of her Scottish cousin, asserting that he had not held onto the signed warrant of execution as ordered, but passed it on to Burghley instead).<sup>45</sup> Bright did not merely copy parts of della Porta's text, however, but also improved and commented upon it, including four cipher wheels, one more than della Porta. The manuscript now held in the Bodleian Libraries is a work of rare beauty, and some of Bright's innovations may have been encouraged by aesthetic considerations. He places his cipher wheels on recto and verso of the same leaf, thus avoiding obscuring or simply destroying text on the other side of the wheel with the

string needed to hold it in place. Bright's final wheel takes della Porta's most complex wheel and adds new features (see Fig. 20).

Bright changes things markedly: his wheel's inner volvelle uses a twenty-character alphabet and eight nulls, while its outer volvelle has twenty symbols, one null and what he calls *otiosa litera*, 'idle letters': 'I', 'S', 'H', 'R', 'A', 'V' and 'C'. Setting the wheel to the appropriate position could be achieved either numerically, 'index set at XI', or symbolically, 'index set at '. Bright was well aware of the final destination of his work, and his copy thus presumably represents an attempt to improve the mechanics of enciphering and deciphering, though whether his extended wheel would have created better or worse ciphers than the unextended wheel is debatable.<sup>46</sup> The gift, astonishingly beautiful as it was, might have been of more use to the authorities had Davison presented it a year earlier.

## *FROM TEXTBOOK TO CASTLE*

In 1587, the year that Bright presented his handcrafted *De Clandestino scripto* at court and Vigenère published his *Traicté des chiffres*, one of the most famous cipher-driven episodes in history had only just drawn to a close. While the ciphers employed in what was an existential struggle between Sir Francis Walsingham and Mary, Queen of Scots were far more sophisticated than is generally accepted – they were primarily symbolic substitution alphabets with symbolic nomenclators – they were superseded in terms of security by Vigenère's autokey system. The irony of Mary's downfall is that even if she and her secretariat had known of Vigenère's cipher, it would not have made the least bit of difference.

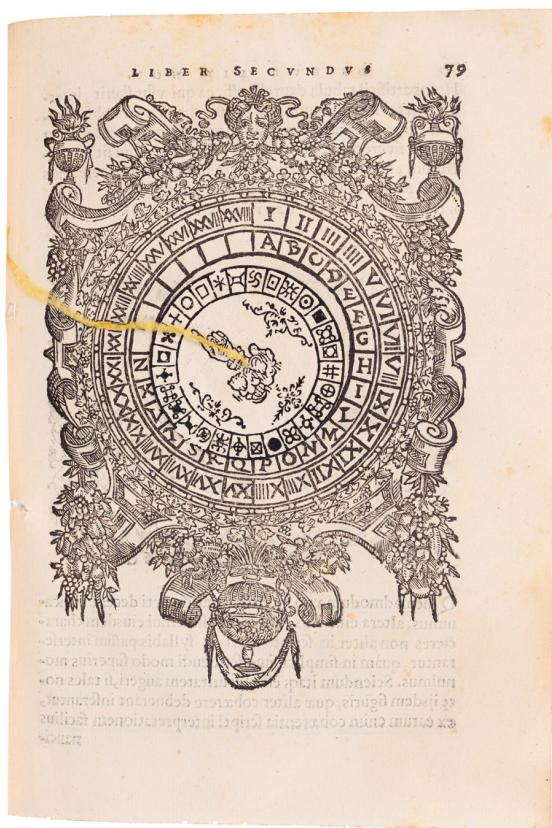
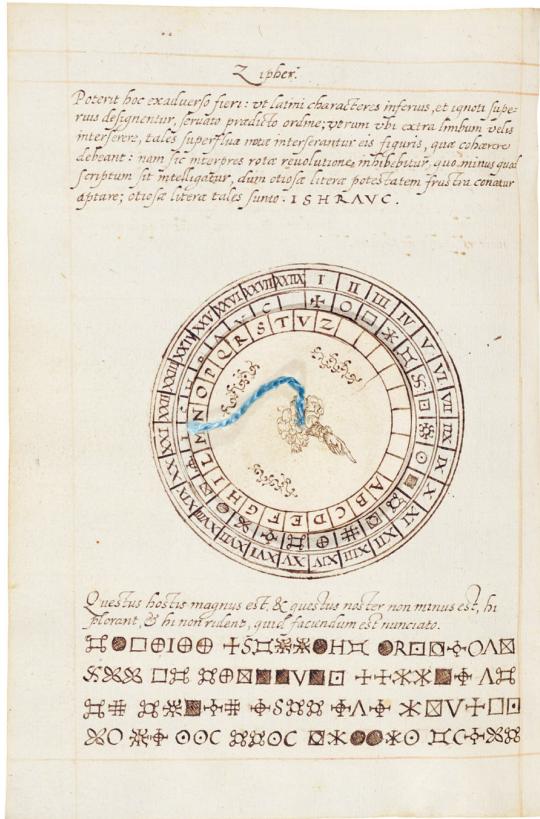


Fig. 20: Left: della Porta's second cipher wheel at page 79 of *De Furtivis*, which Bright also copied at fo. 19r.



Right: Bright's updated version at fo. 19v. Bright's other wheels, at fo. 13r and 13v, are almost exact copies of della Porta's wheels as found at pages 73 and 83 of *De Furtivis*.

In their battle for control of the information bridleway, Mary and her foot soldiers (her secretaries and her many supporters amongst the English noble classes, for example) placed their faith in the security afforded by their (actually rather sophisticated) manipulation of networks, postal services and ciphers. Their faith was not rewarded, however, but would instead be their undoing; Walsingham had measures in place which frustrated them at every turn – and silently to boot. It is through considering this battle that we will look at how cryptography was actually *used* in this period: knowing how to make and break a cipher or code was one thing, but putting this knowledge into practice on the front line was quite another.

## *THE UNSTITCHING OF MARY, QUEEN OF SCOTS*