

The Metamorphosis of Ajax, jakes, and early modern urban sanitation

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Abstract: This article examines Sir John Harington's *A New Discourse of a Stale Subject, Called The Metamorphosis of Ajax* through the lens of urban environmental history, examining the everyday context of Harington's discourse. It argues that although Harington may have used the work for the political and social commentary discussed by other scholars, he also puts forward a vision of a new physical urban sanitation system to address concerns about disease transmission from exposure to waste. His proposal includes both individually-owned improved flushed privies and government-sponsored sewage systems, a hitherto overlooked element of his program.



To keepe your houses sweete, clense privie vaultes.

To keepe your soules as sweete, mend privie faults.

(John Harington, *The Metamorphosis of Ajax*, 186)ⁱ

Sir John Harington concludes the main text of his *A New Discourse of a Stale Subject, Called The Metamorphosis of Ajax* published in 1596 with a two-line verse that extols his readers to better themselves by cleaning their household privy latrines and correcting personal shortcomings. These twin concerns capture the gist of Harington's text, a rather complicated work mixing sociopolitical commentary with sanitary improvement suggestions. The title of the work plays on "a jakes," the colloquial name for a privy in early modern England, and the legend of Ajax's blood turning into a flower from Ovid's *Metamorphoses*. The

play on words is fitting for Harington's text which proposes the design for a new and improved – a metamorphosed – jakes.ⁱⁱ

The *Metamorphosis of Ajax* was first published in 1596 as one work with three parts: *A New Discourse of a Stale Subject, Called the Metamorphosis of Ajax*; *An Anatomie of the Metamorpho-sed Ajax*; and *An Apologie*. The first two parts were also issued separately as trade publications at the same time. Although published under the pen name Misacmos, Harington was unequivocally the author of the first and third parts; *An Anatomie* is attributed to Thomas Combe, Harington's personal servant and fellow poet-translator. In addition to the regular pamphlets, Harington presented his friends with large-paper presentation copies with annotations.ⁱⁱⁱ

Harington begins *The Metamorphosis of Ajax* with an exchange of letters between Philostilpnos (a lover of cleanliness; identified as Harington's cousin Edward Sheldon) and his cousin Misacmos (a hater of filth; Harington). In the opening letter, Philostilpnos exhorts Misacmos to make his invention, a jakes with a water flushing mechanism, public. With this new jakes, Harington would not only help the great houses of the nobility and the Queen but also “be a great benefactor to the Citie of London, and all other populous townes, who stand in great neede of such convayances.”^{iv} In Misacmos' reply, he acknowledges that the invention would be beneficial to “townes and Cities” as much as his private friends.^v In this way, Harington places his work in a much broader framework than scholars have previously realized: his invention might benefit the urban population writ large, in addition to the highest class. This hints at Harington's larger program of urban sanitation reform that I explore in this article.

I argue that because Harington was concerned about unsanitary jakes causing disease, an individual solution – a new flush toilet design – was only one aspect of Harington's plan as outlined in *Metamorphosis of Ajax*; his proposal also extended to rethinking England's entire urban sanitation infrastructure and the role of government in providing it. It is the materiality of jakes that I assert Harington is responding to in *The Metamorphosis of Ajax*. Susan Signe Morrison has strongly advocated investigations in the field of waste studies, which “does not deal with signs or signified; it deals with materiality and the outcomes of that materiality.”^{vi} By re-reading Harington with an eye on the historical sanitary

condition of the early modern England Harington lived in, we can see his work as proposing a broad new vision for urban sanitation.

In keeping with the ending poetic line and its overt didactic message, *The Metamorphosis of Ajax* has attracted scholarly attention primarily for its insights about Elizabethan court society because of Harington's position as courtier-cousin to the queen and role within the Inns of Court.^{vii} Another line of inquiry has stressed Harington's choice of subject matter. Recent analysis of late medieval and early modern English scatological literature has revealed the multifaceted social and cultural significance of excrement.^{viii} Gail Kern Pastor has argued that Harington wrote the piece as "elaborate attempt to reconstruct his audience's orientation to dung and excretion in general" and places it at the intersection of Norbert Elias's discourse on the civility of manners and Henri Lefebvre's notion of social space, particularly through a gendered reading of the body.^{ix} Julian Yates has likewise concentrated on the tension between visual and olfactory senses in the plumbing and the mechanism of Harington's flush toilet. In his reading, the privy occupies a crucial position "as mediator between parlor and sewer that which exists upon and within the relation between sewer and parlor, between 'clean' and 'dirty,' 'proper' and 'improper.'"^x

While all of these perspectives are valuable analysis of Harington's work, it strikes me that all of them consider *The Metamorphosis of Ajax* as speaking only about the mental condition of the courtier class, rather than the reality of early modern urban life. While the social and political aspects of *The Metamorphosis of Ajax* have been examined, its environmental program has not been.^{xi} I contend that the closing poem's penultimate line about cleaning privy vaults should be taken as seriously as the final metaphorical one.

The urban environment has been an expanding subset of environmental historical studies over the last 15 years, and it provides a valuable perspective for analyzing Harington's work. Martin Melosi, Christine Meiser Rosen and Joel Tarr have all convincingly argued for the inclusion of urban areas in environmental narratives.^{xii} The urban environment as home to humans is no less important in environmental history than wilderness areas or agricultural production. The sanitary condition of cities has been a primary strand of analysis within this

context. Melosi is the most renowned scholar in the field with his books, *Garbage in the Cities* and *The Sanitary City*. In these studies of sanitation in American cities, he stresses the influence of public health and ecological theory in decision-making, the role of professionals (engineers, physicians, politicians) in service implementation, and the environmental effects of those choices.^{xiii} Dale Porter and Donald Reid have written marvelous studies of London and Paris, respectively, focusing on the interplay of sanitary ideas, technical infrastructure, and the urban environmental condition in the nineteenth century. Both works point out how cultural constructions of cleanliness factor into the decision-making process and highlight the role of the state in sanitation projects.^{xiv} Recent work has even looked back to the medieval and early modern periods to examine urban conditions and governmental provisions for sanitary services.^{xv} Following the example of urban environmental history, I analyze *The Metamorphosis of Ajax* within its physical urban context and the sanitary problems of the day.

Recent early modern English literary analysis has revealed the fruitfulness of examining the urban environmental condition within which writers produced their work and how it influenced their political and social programs. For example, Mark Jenner has shown in his analysis of John Evelyn's *Fumifugium*, which deals with London's air pollution, that philosophical and political commentary and reforming environmental proposals can co-exist and build upon one another in early modern pamphlets.^{xvi} Rebecca Totaro has likewise explored the role of outbreaks of bubonic plague from 1348 to 1666 in English literature. She aptly characterizes the disease's influence:

All lives – including those of the most imaginative of English writers – had a conceptual place for plague. And if all lives had a conceptual place for plague, then its influence reached beyond the politics and the cash flow of production. It crept into church sermons, into medical treatises, into royal proclamations, and into literary lives, cities, and worlds – the fabric of characters and plot and setting.^{xvii}

Totaro shows how Thomas More's personal experience with the bubonic plague, including service as Commissioner of the Sewers,

influenced the hygienic practices such as the disposal of butchery offal outside of town and the provision of clean drinking water he ascribes to Utopia: “He combined his religious, legal, medical, and experimental knowledge to depict an island on all levels less susceptible to bubonic plague than England had been.”^{xviii} Such a contextual reading of More’s text portrays *Utopia* as a call for improved city infrastructure to fight a feared disease. Totaro’s work suggests that a new reading of *The Metamorphosis of Ajax* within the framework of urban environmental history will allow us to grasp Harington’s multifaceted sanitary vision for England – a vision that included individuals and the government contributing to sanitary improvements.

Metamorphosing a jakes

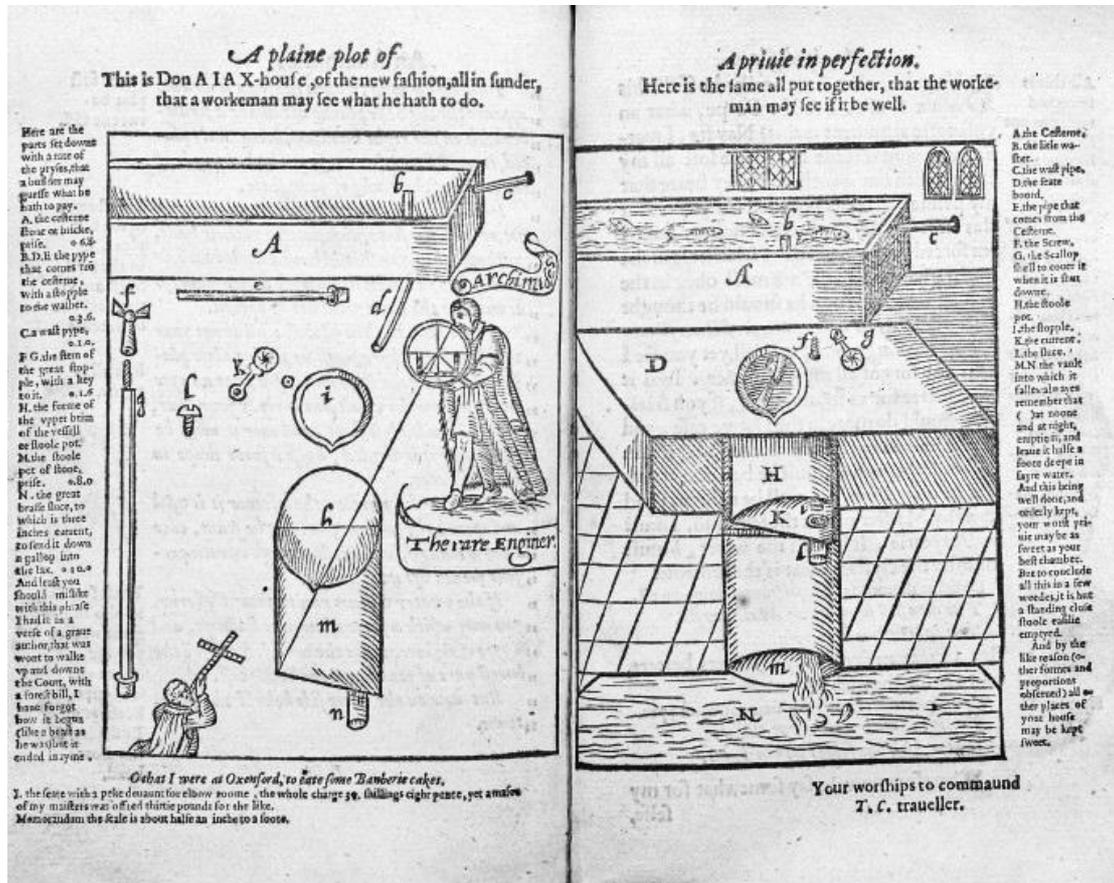
The Prologue begins with Ovid’s tale of Ajax, whose blood after his death turned into hyacinths, thus literally recording the metamorphosis of Ajax. But more importantly, Harington ties this metamorphosis to the privy, or jakes. He tells the a story of a French gentleman who cleaned himself at his privy with some grass cut from Ajax’s transformed site and was afterward stricken with disease. After a penitential trip during which he was cured, the man “built a sumptuous privie, and in the most conspicuous place thereof, namely just over the doore; he erected a statue of AJAX... and further, to honour him he chaunged the name of the house.”^{xix} According to Harington, the accent of the word Ajax was changed so that now it is called “a Jakes.”^{xx} Harington also gives two other etymological roots of the word, being partial to a contraction of the proverb “age breedes aches” to “age aches” and thus to “A Jax.”^{xxi}

After the Prologue, the text proper presents a discourse in three parts:

- 1 The first justifies the use of the homelyest wordes.
- 2 The second prooves the matter not to be contemptible.
- 3 The third shews the forme, and how it may be reformed.^{xxii}

The third section culminates in a suggested new privy design, which is described in the text and shown pictorially in the attached *An Anatomie*. While the text has been rightly characterized as “a

satire of contemporary persons and practices," it also clearly presents a revolutionary toilet, a practical solution to a long-standing problem.^{xxiii}



Diagrams of Harington's new privy from *An anatomie of the metamorpho-sed Ajax*. Wellcome Images, Wellcome Library, London. Reproduced under Creative Commons Attribution-Non-Commercial version 2.0 licence for England & Wales.

Placing *Ajax* in the urban environment

Harington understands filth from privies as a particularly urban phenomenon and one with health consequences. He traces the roots of the problem to early urbanization:

when companies of men began first to increase, and make of families townes, and of townes cities; they quickly found not onely offence, but infection, to grow out of great concourse of people, if speciall care were not had to avoyd it. And because they could not remove houses, as they do tents, from place to place, they were driven to find the best meanes that their wits did then serve them, to cover, rather then to avoyd these annoyances: either by digging pits in the earth, or placing the common houses over rivers...^{xxiv}

In this way, Harington links urban population first with an increased concentration of feces and then with infection.

Throughout his text, Harington is particularly concerned with the bad odors emanating from privies. It is the “breath” of *Ajax* that makes those using a privy “glad to stop their noses.”^{xxv} Some try to use perfumes to cover up the smell, but the fecal odor is still there.^{xxvi} After all, the letter from Philostilpnos had specifically encouraged his cousin to share his invention because it could make his privy “as sweet as my parlor.”^{xxvii}

Harington’s concern, however, is not simple vanity. He is rather basing his interest in eliminating privy odors on contemporary medical theory. The miasmatic theory, which attributed disease to the visible (like a fog) or invisible corruption of air, was the prevalent theory about disease transmission in early modern England.^{xxviii} Infection could stem from wastes like human excrement with strong odors: “that many Physitions doe hold, that the plague, the measels, the hemorhoids, the small poxe, & perhaps the great ones too, with the *fistula in ano*, and many of those inward diseases, are no way sooner gotten, then by the savour of others excrements, upon unwholsome privies.”^{xxix} In this passage, Harington cites contemporary medical theory that linked the transmission of many diseases (and other conditions like hemorrhoids) to the strong smell emanating from privies.

Harington, a man fluent in Greek, Latin, and Italian, was quite familiar with contemporary medical theory on the role of air and smells on health. In fact, he published an English verse version of the medieval medical text *Regimen Sanitatis Salernitanum* in 1608. In one passage, he reiterated his position about the linkage between disease and smells from privies:

Though all ill savours do not breed infection,
 Yet sure infection commeth most by smelling,
 Who smelleth still perfumed, his complexion
 Is not perfum'd by Poet Martials telling,
 Yet for your lodging roomes giue this direction,
 In houses where you mind to make your dwelling,
 That neere the same there be no evill sents,
 Of puddle-waters, or of excrements,
 Let aire be cleere and light, and free from faults,
 That come of secret passages and vaults.^{xxx}

The Latin version of *Regimen Sanitatis Salernitanum* actually only has two lines about air and Harington quotes these in *The Metamorphosis of Ajax*: “Aer sit mundus, habitabilis ac luminosus, / Infectus neque sit, nec olens foetore cloacae.”^{xxx} A literal translation of this Latin would be “Let the air be pure, habitable, and bright, / and let it be neither contaminated nor odorous with the stink of the sewer.”^{xxxii} We see that Harington expands his verse version of the passage to stress that houses in particular should be constructed to avoid the smell of excrement from privy cisterns (the “secret passages and vaults”) in order to ward off infection. Within the scholarly context of this medical text, Harington shows the same concern about foul air attributed to excrement and privies causing infection as he does in his satirical *The Metamorphosis of Ajax*. He clearly had a medical basis for advocating a new type of jakes that did not smell.

Harington’s line of thinking is consistent with others in sixteenth century. For example, Thomas More’s Utopians did not “suffer any thing that is foul or unclean to be bought within their towns, lest the air should be infected by ill smells which might prejudice their health.”^{xxxiii} Such a belief extended beyond literary tracts to governmental actions. In 1544, Coventry’s council forbade the inhabitants of Coventry’s Cross Cheaping district to deposit

dung and other waste at the cross in the market because the waste was a “great incommoditie of the marketh-place” and caused “great daunger of infection of the plague.”^{xxxiv} The town council of Norwich likewise heard a complaint in 1579 about foreigners who kept untidy “necessaries” and dumped their wash water into the gutter, which bred “greate infeccion” in the river and street gutters. These actions poisoned the water and bred “corrupte humours” within their bodies. The council ordered the foreign residents to keep their latrines dry; cleanse their houses, clothes, and bodies; and use perfumes and preservatives prescribed by physicians to ward off pestilences. The council’s sanitary mandates were directly connected with a recent outbreak of a “the plague” in two parishes of the city.^{xxxv} These governmental actions show the contemporary belief that disease was linked to wastes, particularly privy wastes and wastewater.

The governments of the major metropolitan areas like London and Florence made significant efforts to clean up stench that were believed to bring disease. Mark Jenner has shown that the mayor and aldermen of the late sixteenth and seventeenth centuries ordered the streets cleaned in order to reduce the smells and minimize infection from the plague several times.^{xxxvi} Carlo Cipolla’s study of the Florentine health officers established by an ordinance of 1622 shows without a doubt that the linkage between waste, smell, and disease was clearly in force in Italy by the early seventeenth century. Doctors who investigated disease outbreaks made this connection frequently in their reports. The ordinance itself says,

Since experience has often shown that contagions and sicknesses are caused mainly by the fact that in their houses ... men are surrounded by dirt and by such quantities of filth...; since this rubbish tends to give off smells and stench which are so damaging to health...everyone should remove and have removed from before their houses all the filth and rubbish which are to be found there, including manure and other things which can and do cause smells and stench.^{xxxvii}

Through the miasmatic theory, people believed that the smells of waste caused disease. Human excrement and its odors thus

needed to be contained and controlled to avoid infection. Harington, as a man of learning, was up-to-date on the physicians' theories and framed his modified jakes within this context.

The problem of jakes

Harington recognized that the removal of excrement from urban spaces has been a long-standing concern. In *The Metamorphosis of Ajax*, Harington cites Deuteronomy 23: 12-14, which required the Israelites to leave camp to relieve themselves, dig a hole for the excrement and cover it up, giving his own English translation of the passage:

12 Thou shalt have a place without thy tents, to which thou shalt go to do the necessities of nature.

13 Carying a spade staffe in thy hand, and when thou wilt ease thee, thou shalt cut a round turfe, and thou shalt cover thy excrements therewith, in the place where thou didst ease thy selfe.

14 For the Lord they God walketh in the midst of thy tents to deliver thee, and to give thy enemies into thy hands, that thy tents may be holy, and that there appeare no filthinesse in them, lest he forsake thee.^{xxxviii}

As a follow-up to this quote, he writes that "here at home, that it is an unreverent thing, for Churches ordained for prayer, and church-yardes appointed for buriall, to be polluted and filed as if they were kennels & dunghills."^{xxxix} While there may be some political commentary here about the religious turbulence of the period, Harington may also be referring to real urban sanitation problems. In 1471, for example, the Coventry town council issued an order saying that none should throw muck, straw, or other filth into the parish churchyards; the injunction was repeated twice in the 1540s for St. Michael's and Trinity churchyards indicating that waste disposal there must have been habitual.^{xl} How to deal with urban waste was a tangible problem.

Harington noted that the common urban response to human waste had been to dig cesspits or place privies over running water. Both types of arrangements are well documented from archeological and written sources in London and elsewhere.^{xli} The

intent was to confine or remove excrement as efficiently as possible. The historian Ernst Sabine classified London's medieval privies into eight types: within the thickness of walls; within towers; within turrets; within chimneys; within chambers extending out over water; within chambers on arches over the water; with pipe drains; and with cesspools.^{xlii} He observed that the city government tried to curb construction of latrines built over running water because of watercourse blockages, they financed the privies on London Bridge, and they expected residents to use the public facilities rather than throwing excrement and urine in the streets.^{xliii}

Jakes were an integral part of the early modern urban environment and thus became sources of much consternation. Owners and tenants alike needed access to privies on a daily basis. In spite of anthropological literature such as Elias' *Civilizing Process*, Duby's *A History of Private Life*, and LaPorte's *A History of Shit* that stress the late medieval development of privacy and shame associated with biological functions, privies as property were very much a public matter.^{xliv} The public conflict over latrines becomes extremely clear by looking at the records of the London viewers. The viewers, who were master masons, carpenters, and tilers, visited sites of alleged encroachment or nuisance and submitted a report back to the mayor and aldermen. London viewers had been involved in settling nuisance disputes since at least the beginning of the fourteenth century. The problems documented by the viewers in the sixteenth century are things we would expect from a crowded urban metropolis: people who built structures on neighboring property, blocked up windows, reduced property access, and stopped up gutters. The maintenance of jakes and vaults provided "an unending source of litigation," according to the editor of the viewers' certificates.^{xlv}

People commonly shared a cistern among one or two homes, but each home had one or more privy seats, creating a situation rife for controversy. Individuals had the right to have the tunnels (or wooden pipes) emptying into the common cistern, even if the tunnels had to pass through others' property. The jakes were often located under inhabited structures. For example, John Tocke, a skinner, was given the right to have his kitchen and other structures built over the jakes as long as he did not interrupt the use of the party jakes by the defendant.^{xlvi} In another case, we

know that a brick-lined jakes was located under the floor of the plaintiff's home.^{xlvi} The placement of these structures was often contested. In 1550, the viewers discovered that Thomas Ellys, merchant tailor, had removed a tunnel of boards for a jakes used by the fishmonger William Hollingworth and ordered Ellys to rebuild it. Modern readers might sympathize with Ellys' action since the wooden tunnel to the cistern went through his kitchen. Nevertheless, Ellys had no right to remove the infrastructure.^{xlviii} In a case in 1552, Thomas Lytton, salter, had removed a jakes tunnel belonging to a new house of James Leonard, fruiterer.^{xliv} These cases expose the constant conflict over urban sanitation infrastructure - one man's blessing was another man's curse.

The most common issue was the allocation of maintenance costs among users of shared jakes. The viewers turned to how many privy seats (or tunnel) emptied into a given cistern to allocate the costs.¹ For example, in the case of Jane Hawt versus James Josken from 18 April 1547, the viewers said that since Hawt had only one "stool of easement" emptying into the cistern, whereas Josskyn had three, Josskyn should pay three times as much as Hawt toward the cleaning of the cistern.^{li} Likewise, the maintenance of a jakes shared by three tenants, each with their own tunnel, had to be split evenly among the three parties.^{lii} Keeping such infrastructures in working order required coordination and shared responsibility, something not easy to come by in many social settings.

The numerous cases brought before the viewers indicate that we must consider *The Metamorphosis of Ajax* within a larger urban context. Owning semi-private jakes was common among the merchant and craft classes. The plaintiffs and defendants in these cases come from the merchant and craft classes, including grocers, tailors, butchers, goldsmiths, salters, fishmongers, merchants, drapers, and widows of such men. The crowded urban spaces required that cisterns were placed under structures and thus emptying them out was certainly a smelly affair for those living in the building. Wooden tunnels conveyed solid and liquid wastes from stools to cistern and must have become rancid quite quickly. These issues were not entirely private matters: conflicts between neighbors forced them into the public with viewings conducted by specialists and written reports read by the city officials. The problems with jakes would have been well-known to the public.

Even though Harington does not talk directly about nuisance litigation, this urban context had a direct effect on his chosen sanitary solutions. As we will see in the sections below, he proposes both a new improved personal jakes to limit the smells within the houses as well as a new role for government in providing sewage systems.

The individual solution

Harington acknowledges that many had recognized the problems of “a stinking privie” but little had been done to correct it: “And for reformation of this, manie I doubt not, have ere this beaten their braines and strained verie hard, to have found out some remedie, but yet still I find all my good friendes houses greatly annoyed with it.”^{liii} The two most common options to reduce smells from jakes – closed cesspools and placement in chimneys – both have downsides. While Harington admits that the closed ground vault, which can be sealed to keep out water and air, is a good idea, he notes that in practice, holes in the walls which let in air and a high groundwater table often belie the best efforts. In addition, in houses with many guests, closed vaults fill quickly.^{liv} According to Harington, privies placed within chimneys are much better at controlling the smell, yet they are “not safe from all infection or annoyance” because the weather can force winds down the chimneys.^{lv} Thus neither of the two solutions commonly implemented were effective.

Harington notes that the problem of dealing with excrement extended to everyone, “even in the goodliest & stateliest pallaces of this realme, notwithstanding all our provisions of vaults, of sluces, of grates, of paines of poore folkes in sweeping and scouring, yet still this same whorson sawcie stinke.”^{lvi} In spite of the best efforts to use covered sewage drains, necessary vents often led to annoying smells, especially when multiple waste sources, such as wash water, fishwater from the kitchens and excrement, mixed together with rain. This concern is also apparent in Harington’s “Orders for Household Servantes” from 1592 which includes a rule “that no man make water within either of the courts, upon paine of, every tyme it shalbe proved, 1d.”^{lvii}

Harington proposes a water conveyance that could address these shortcomings, “all the annoyances that can be imagined, the

sight, the savor, the cold: which last, to weake bodies, is oft more hurtfull then both the other, where the houses stand over brookes, or vaults daily cleansed with water."^{lviii} In his proposed design, the privy has a false bottom with a brass sluice to let out the filth when rinsed with water, which should happen at a minimum at noon and at night. As an advantage, little volume of water was required during the rinsing process. Harington admits that his contraption would require the user to operate a flushing mechanism, which they would not at first be accustomed to, but he calls on them to "follow the example of the Cat of the house, to make your entries, your staires, your chambers, & your whole house, the lesse soure."^{lix} In other words, performing the little act of flushing the vessel, just as a cat covers up his excrement with sand, would go a long way.

According to autograph marginalia in the copy of the work belonging to Lord Lumley, the "devise was first thought of and discoursed of, with as brode termes as any belongs to it, in presence of sixe persons": the Earl of Southampton, Sir Matthew Arundel, Thomas Arundel, Lady Mary Arundel, Sir Henry Davers, and Harington himself at Wardour Castle.^{lx} Afterward Harington appears to have installed a prototype in his manor house at Kelston, which Philostilpnos refers to in the opening letter.^{lxi}

Harington intended his device to be installed – it was not just a rhetorical construct. Three sources of internal and external evidence support this conclusion: Harington aimed a portion of his publication at the building industry, he actively encouraged friends to install the device, and he actually installed several jakes with his new design.

First, it would appear that Harington directly targeted the construction industry with his publication as well as court society. He included a verse "as a principall lesson, to be learned by builders":

A builder that will follow wise direction,
Must first foresee before his house he makes,
That th' aire be cleare, and free from all infection,
And not annoyd with stinch of any Jakes.^{lxii}

This verse is based loosely on two verses from *Regimen Sanitatis Salernitanum* he cites just before it, but in Harington's English

version, he modifies the text to aim it squarely at the building industry, giving it a much more practical application. Drawings and a description of Harington's device were appended to *The Metamorphosis of Ajax* as *An Anatomie of the Metamorpho-sed Ajax* to make it easy for builders to understand the device's construction. In addition, *An Anatomie* was issued separately as a trade publication.^{lxiii} The appendix purports to show "by pen, plot, and precept, how unsaverie places may be made sweet, noysome places made wholesome, filthie places made cleanly. Published for the common benefite of builders, housekeepers, and house-owners."^{lxiv} *An Anatomie* describes the contraption with several parts: a cistern to hold wash water, an oval-shaped vessel of brick, stone, or lead that sits under the stool seat, a brass sluice on the bottom of the vessel, and a screw to open the sluice. The sluice is normally in the closed position and the vessel filled with a half foot of clean water to prevent smells from entering back through the pipe. The text even provides a list of the current market prices for each of the parts required in the design, indicating that we should consider it a plan targeted at builders.^{lxv} Two diagrams of the device with each part clearly labeled are included so that "a workeman may see what he hath to do."^{lxvi} Although Yates reads much significance into the drawing not showing the user on the privy seat, interpreting it as showing the "incommensurability between bodies and spaces," the inclusion of the user should not be expected for a workman's drawing that is intended to show how the apparatus is constructed.^{lxvii}

Second, Harington urged his courtier friends to install his new water-closets. In a letter sent immediately after the publication of *The Metamorphosis of Ajax* to Lady Elizabeth Russell, Harington urged her to commend his device to the Lord Treasurer, William Cecil, Lord of Burghley. Harington offers "to doe his Lordship service, I will ryde thether [Theobalds, Burghley's house], and enstruct his workemen to doe yt for lesse then a thowsand pence."^{lxviii} Harington here makes a contrast between the social value of the device which he listed as £1000 for great houses in *The Metamorphosis of Ajax* and the price it will cost for installation (1000 pence = £83.3).^{lxix} Harington likewise encouraged Sir Robert Cecil to install the device in his "pryvat lodgings, as for all the family, the use of yt commodyows and necessary, and above all in tyme of infeccion most holsome."^{lxx} Here again

Harington stresses the health benefits of his device through its ability to reduce infection.

Third, Harington's devices were actually installed in several homes. According to the letter to Sir Cecil, several of devices had been installed by 1602, although installation errors had limited its effectiveness: "The errors of some dull workmen have made that in some places yt hath not done so well as yt might, but Master Basyll and my selfe will geve that dyrection for yowrs as neyther fayr nor fowl wether shall annoy."^{lxxi} The letter appears to have been sent along with a metal part for Cecil's new jakes, which Harington muses that although "neyther gold nor sylver ... will bee worth gold and sylver to yowr howse."^{lxxii} In another letter dated 1602 to the Earl of Shrewsbury, Harington says that he recently did an inspection of the Earl's house and planned to use the existing lead cisterns for "new uses," presumably as the cisterns for flushing privies.^{lxxiii} In an epigram addressed to his mother-in-law, Harington says that he had "made good convayance / to vse each ease, and to shun all anoyance" in her newly constructed house in Bath and specifically mentions the privy vaults, hinting that his devise may have been installed there.^{lxxiv}

Harington even installed new privies in some of the royal palaces, indicating the conviction Harington must have had in the design. One of Harington's epigrams, which is addressed "To the Ladyes of the Queens privye Chamber at the making of their perfumde privy at Ritchmond," indicates that in spite of the political controversy caused by his book, one of his devices was installed at Richmond Palace and was working well:

but deign to this devise new commendacion
sith heer you see, feele, smell that his convayance
hath freed this noysom place from all annoyance
Now Iudge yow that the work mock envy tawnt
whose service in this place may I make most vawnt.^{lxxv}

According to a later autograph draft letter, Harington met with King James in 1611 and the king asked him ("spake to mee ~~him~~ selfe in myne ear") to alter the existing devices at Theobalds and Hampton Court that "annoys him often" and install an additional one.^{lxxvi} In this letter, Harington again contrasted the value of the

devices with the actual cost: "I shall doe 1000^{li} worth of good to his ma^{tie} pallaces and not coste his ma^{tie} 1000^{li} neyther shall yt bee longe in doinge."^{lxxvii} It would appear then that Harington took the urban sanitation situation quite seriously and actually installed the design that he felt addressed the biggest flaw of current jakes: the odor that caused disease.

The problem would be, of course, that this individual solution did not address one of the major problems with jakes – how to get rid of the excrement after it has passed down the tunnel. Harington's design provided for a flush mechanism that used a little extra water. If his idea was simply to have this empty into a cistern, he must have realized that the extra liquid would only make the cistern fill faster and require more frequent emptying. What would be needed instead is a drainage system that would take the waste through ditches to a water body like a river for disposal. Did he perhaps intend wider changes to the urban sanitation system?

The governmental solution

Although Harington had a private solution in mind for the privy problem, he also proposes in *The Metamorphosis of Ajax* that good governments provide centralized sanitation services, which is a part of his program hitherto unexplored. At the beginning of the second section, Harington argues that although he has proved that talking about privies is not obscene in the first section, some might still take offence at his discussion: "but now for the place, where these necessaries are to be done, perhaps some will object, that it was never of that importaunce, but that it was left to each mans owne care to provide, for that which concerned his owne peculiar necessitie."^{lxxviii} Here it is not simply that privies are a private (secret) matter, but that they are a matter of private property, i.e. each man needs to provide his own privy. To this objection he replies: "It is not so, for I can bring very autenticall proofes out of auncient recordes, and histories; that the greatest magistrates that ever were, have employed their wits, their care, and their cost, about these places; as also have made diverse good lawes, proclamations, and decrees about the same: & all thereto belonging."^{lxxix} From Harington's perspective the best governments are those that have worked to improve sanitation

through physical adjustments and legislation. This sentiment perhaps echoes the ideal government promoted by Thomas More 80 years before.

Harington gives the reader several examples of governmental intervention in privies, extolling the works of Roman sanitation. His first is Tarquinius Priscus who Livy reported “made two provisions for his citie, one for warre, the other for peace, both verie commendable: for warre a stone wall about the towne, to defend them from outward invasions; and for peace, a goodly Jakes within the towne, with a vault to convey all the filth into Tyber, to preserve them from inward infection.”^{lxxx} Then he praises Tarquinius the Proud for his construction of the Rome’s Cloaca Maxima, “a costly Jakes ... a mightie great vault to receive all the filth of the citie.”^{lxxxi} Later in the text, Harington commends Trajan for building a new conveyance system for the public privies out of his own funds.^{lxxxii} In these cases, Harington has identified alternatives to the common jakes in England that use a local cesspit or must be directly placed over the water. The Roman rulers had created a centralized sewer system that conveyed all of the filthy material away from the population, and these are the exemplars Harington brings forward.

Harington cites legislative provisions under the Roman Emperors as a model for urban sanitation control. He notes that in addition to officers that protected the people in times of war, the Romans had officers who made inquiries into aqueducts, watercourses, common sewers, and repair of houses.^{lxxxiii} When Vespasian had held one such office, *Aedilis*, he had been remiss at his duties of keeping the streets “sweete” by having the filth carried off to appointed disposal places. However, when Vespasian became Emperor, he installed public urinals to stop persons from urinating against walls and in temples.^{lxxxiv}

Harington contrasted Roman law to current English practice. He notes that one Roman law specified that “no man might make a new Jakes, but he that had license of the wardens of high ways,” which he links explicitly to the English Commissions of Sewers, which had been established in 1427 by Henry VI.^{lxxxv} The Commissions had been established after a significant flooding episode to make inquiries about annoyances to water conveyance structures such as walls, ditches, and gutters.^{lxxxvi} In its early years, the Commissions were most active in extensive reclamation of the

fenlands around Cambridge and Ely. Harington makes a strong case for extending the power of the Commission from beyond the rural riverscapes into the urban landscape:

which commission, though in our country it is chiefly intended to keep open the chanel of rivers in the deepe countrey, that the water may have free passage. Yet the very name imports, that therein is comprised the subject of my present Discourse, which in populous townes had as much neede to be looked to, as the other, infection being fit to be avoided aswell as inundation.^{lxxxvii}

In Harington's opinion, the Commission should be managing the urban sewers (per its name) to limit outbreaks of disease. Harington's pleas would go unanswered: the same case would be made in the 1800s by the physician Henry Jephson who berated the Commissions for not making a drainage survey of London and having no grand plan for sewage handling.^{lxxxviii}

Harington points out that the Romans maintained their urban ditches to control infection, a task particularly pressing in Harington's day. He cites a letter by Caius Plinis to Trajan asking the Emperor to provide a cover for an open sewer that was "foule & most uncleanly to behold, so it is infectious with the horrible vile savour."^{lxxxix} In Trajan's reply, the Emperor says that the channel should be covered "if the want of covering may breed infection."^{xc} Such an example had immediate pertinence in sixteenth century London. The Fleet River was notorious for silting up and being filled with rubbish. In 1589, the London Common Council collected a thousand marks for scouring the Fleet and making a wellhead at Hampstead Heath. In 1606, flood-gates were erected to allow for better periodic scouring.^{xc} Harington's text stresses that such interventions could reduce infection in the urban areas, reiterating his primary concern about controlling human wastes to reduce infection.

The Roman examples focus on centralized large systems to improve the urban environment – covering ditches, making public latrines and urinals, and building main sewers – and thus public health. In so doing, Harington would appear to be making a call to the Elizabethan government to do the same. Paul Slack has argued that early modern English governments were often guided by two

main interests: to remove decay, whether in the form of decayed rents, decaying waste, or decaying bodies, from the common weal and to support civic godliness, particularly the need for a reformation of manners to show a fear of God.^{xcii} Within this context, both local and national governments responded particularly strongly to threats of disease, instituting quarantine measures and poor relief.^{xciii}

Early modern English city governments had in fact been providing sanitary services to residents for hundreds of years, so Harington's call for increased involvement would be simply an extension of existing services. Street sweepers and weekly muck carts were paid out of city-collected taxes in Coventry, Norwich, and York by the early fifteenth century.^{xciv} In the fifteenth and sixteenth centuries, city governments installed, maintained, and monitored drinking water conduit systems; others provided regular ditch and river scouring services to remove any accumulated filth. I have previously used this evidence to argue that as early modern governments became more involved with providing these types of services, they established specialization in permanent positions for conduit keepers, street cleaners, waste carters, and river overseers and invested financially in the services.^{xcv} In London, the Chamberlain records show weekly workmen wages paid for mending conduit pipes and cleaning sewers, among other services.^{xcvi} Although London's formal city cleaning regulations were not enacted until the beginning of the seventeenth century, the city provided regular street cleaning serves as early as the thirteenth century and by the fifteenth century had a sergeant of the channels who inspected the sanitary condition of the streets.^{xcvii} The City of London, likewise, was heavily involved in providing drinking water to residence both through guaranteeing access to the Thames and piping water into conduits.^{xcviii} Sanitation had become a central governmental concern by the sixteenth century.

Harington shows particular concern for the environment of Bath, the town closest to his manor.^{xcix} In *The Metamorphosis of Ajax*, he incorporates the text of a letter he wrote urging improvements in Bath. Rather than being the text of a letter Harington actually sent to someone, it appears to be a letter that he would like to send: "And I have thought sometime with my selfe, that if I were but halfe so great an officer under our most gracious

Emperesse... I would write for the mending of such a lothsome fault in my neighbour town of Bath (where many noble persons are oft annoyed with it)...”^c In the letter, Harington comments on two problems in Bath: the Abbey Church needs renovations and “their common sewer, which before stood in an ill place, stands now in no place, for they have not any at all. Which for a towne so plentifully served of water ... me thinke seemeth an unworthie and dishonorable thing...”^{ci} He asks for permission to use money gathered under the Queen’s orders “of a ruinate church to make a reverent church, and of a unsavorie town a most sweet town.”^{cii} This text reveals that Harington’s interest in the city sanitation extended to concrete problems with discrete solutions: he wanted to use earmarked monies to create a common sewer in Bath in order to improve the urban environment.

By reading Harington’s exaltation of Roman governmental leaders who provided sanitation infrastructure within the larger context of early modern sanitation concerns, we see that Harington is proposing a new sanitation paradigm. Harington surely realized that while his reformed jakes might temporarily reduce smells for one individual, more systematic reform was necessary. He urges the English government to act in a central and coordinated way to improve sanitation in both his examples of the Commissions of Sewers and the City of Bath. He envisions providing centralized sewage systems such as those of the Romans, “the greatest magistrates that ever were,” as a natural extension of the common early modern English city services already in place by the end of the sixteenth century.^{ciii}

A more “sweete” sanitary vision

As a narrative, *The Metamorphosis of Ajax* builds up to section 3, in which Harington finally presents his flush privy design. But instead of reading the individual solution as the only aspect of Harington’s new jakes, we should recognize that Harington prefaces its discussion with many examples of historical involvement by the good governments of Rome in creating sewage systems. Harington did not actually have in mind a stand-alone solution to the smells that caused disease but rather envisioned a more sanitary city through infrastructure provided by the central government. Although Harington may have used wit, satire, and

offense in *The Metamorphosis of Ajax* to make social commentary about the courtly class, the text also speaks to the real problem of urban sanitation in early modern England and proposes a program to address the shortcomings that plagued it.

By examining *The Metamorphosis of Ajax* within an urban environmental context, we see that Harington's sanitary reform proposal attempted to address shortcomings of the lived urban experience of the sixteenth century. Although he uses a sociopolitical commentary as the vehicle for his sanitary reform ideas, the seriousness of his plan should not be underestimated. Such a conclusion aligns with previous studies of works by Thomas More and John Evelyn, which identified mixed goals of political commentary and environmental reform within the same text.^{civ} This should encourage scholars to read other courtly satires within their environmental context to identify contemporary thought about urban life and commonplace issues such as sanitation.

Harington's text gained widespread notoriety but had little practical effect. A tract critical of Harington's approach, *Ulysses upon Ajax*, was published the same year under the pseudonym Misodiaboles. Misodiaboles has been convincingly identified as Hugh Plat, the well-known inventor and target of several of Harington's jests about patenting.^{cv} Rather than addressing Harington's invention itself, Misodiaboles complains that Harington's text is "indecent, unreasonable, stupid, below the station of a courtier such as Harington, and 'contrarie to all rules of science.'"^{cvi} It appears that Harington was also threatened with a Star Chamber suit because of critical remarks he made about the Earl of Leicester, but this did not come to pass.^{cvi} The criticisms do not appear targeted at Harington's reformed privy design, yet they may have distracted from his sanitary program.

Although Harington installed several flush toilets, similar devices were not patented until the late eighteenth century, with early filings by Alexander Cummings (1775), Samuel Prosser (1777) and Joseph Bramah (1778).^{cvi} When flushed privies (known as water-closets) finally came into wider use in the mid-1800s, they caused an intensification of the excrement program rather than solving it. With the water closet, sewage could be transported away from its domestic home via drains to a downstream discharge or collection point, but only if those structures were in

place; otherwise, the water-supplemented discharge simply backed up in cisterns and closed ditches. The governmental piece of the sanitary revolution that Harington had proposed was missing.

In 1847, Sir Edwin Chadwick took control of the Metropolitan Sanitary Commission and in 1849 implemented a policy to create new sewer lines to flush domestic sewage into the Thames River. Because of this move, the Thames became increasingly polluted because of the replacement of the cesspool by the water closet and the rapid population growth accompanied with a disproportionate increase in water consumption. The Great Stink of 1858, an incident in which the stench from the Thames was especially strong because of the heat, served as the political driver to do something about the growing river pollution problem. This then prompted significant infrastructural modification to the Thames and the creation of the Thames Embankment.^{cix} Harington's proposed metamorphosis of jakes into piped sewage for a cleaner urban environment finally became a reality 300 years after *The Metamorphosis of Ajax* suggested it.

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ⁱ John Harington, *A New Discourse of a Stale Subject, Called the Metamorphosis of Ajax*, ed. Elizabeth Story Donno (New York: Columbia University Press, 1962). All page references are to this edition. Because the work is commonly known by the second half of the title – *The Metamorphosis of Ajax* – I refer to it this way throughout.

ⁱⁱ According to the *Oxford English Dictionary*, the word “jakes” first appears in the 1530s. The word is used in both the singular “a jakes” and the plural “jakes”. The play on words of Ajax / a jakes became very popular in early modern English literature after the publication of *The Metamorphosis of Ajax*, appearing in Shakespeare’s *Love’s Labour’s Lost* and epigrams and verses into the sixteenth century. See D. H. Craig, *Sir John Harington* (Boston: Twayne Publishers, 1985), 82 for examples. Craig says that the pun appeared first in *Love’s Labour’s Lost*, but since the work was written around the same time as Harington’s publication (c.1595–1596) and was published in 1598, the inclusion of the pun likely means it should be dated after Harington.

ⁱⁱⁱ Donno, introduction to *The Metamorphosis of Ajax*, 11–14. Because Harington is undoubtedly Misacmos and inventor of the devise, I call Harington by his real name throughout this article and attribute all of Misacmos’ opinions to him.

^{iv} Harington, *The Metamorphosis of Ajax*, 57.

^v Harington, *The Metamorphosis of Ajax*, 61.

^{vi} Susan Signe Morrison, *Excrement in the Late Middle Ages: Sacred Filth and Caucer’s Fecopoetics* (New York: Palgrave Macmillan, 2008), 156. Morrison has affinities with eco-criticism analysis, advocating a focused study of excrement as part of investigations into the relationship between man and environment.

^{vii} Jason Scott-Warren has investigated Harington’s work in the context of early modern book gift-giving culture in *Sir John Harington and the Book as Gift* (Oxford: Oxford University Press, 2001) and the politics of being an Elizabethan writer in “The Privy Politics of Sir John Harington’s *New Discourse of a Stale Subject, Called the Metamorphosis of Ajax*,” *Studies in Philology* 93 (1996): 412–42. Rick Bowers and Paul Smith have examined Harington’s use of wit and humor in the *Metamorphosis of Ajax* as an indicator of active coping strategies for a courtier under stress: “Wit, humor, and Elizabethan coping: Sir John Harington and *The Metamorphosis*

of Ajax," *Humor - International Journal of Humor Research* 17, no. 3 (2004): 181-218. Samuel Juni has likewise examined Harrington's personality as revealed through the text in "The Wrath of Ajax: A Psychoanalytic Study of Elizabeth Discourse - The Case of Harrington's *Metamorphosis*," *Current Psychology* 16 (1997): 99-114. John Leland has looked at the spiritual message contained within the satire: "A Joyful Noise: *The Metamorphosis of Ajax* as Spiritual Tract," *South Atlantic Review* 47, no. 2 (1982): 53-62.

^{viii} For example, Jeff Persels and Russell Ganim, eds., *Fecal Matters in Early Modern Literature and Art: Studies in Scatology* (Hampshire: Ashgate, 2004) and Morrison, *Excrement in the Late Middle Ages*.

^{ix} Gail Kern Paster, "The Epistemology of the Water Closet: John Harrington's *Metamorphosis of Ajax* and Elizabethan Technologies of Shame," in *Material Culture and Cultural Materialism in the Middle Ages and Renaissance*, ed. Curtis Perry, 139-58 (Turnhout, Belgium: Brepols, 2001), 146.

^x Julian Yates, *Error, Misuse, Failure: Object Lessons from the English Renaissance* (Minneapolis: University of Minnesota Press, 2003), 87.

^{xi} Craig offers three pages of discussion of "The Reformed Privy as an Invention," in which he considers Harrington's jakes proposal as a serious device in *Sir John Harrington*, 68-70.

^{xii} Martin Melosi, "The Place of the City in Environmental History," *Environmental History Review* 17, no. 1 (1993): 1-23; Christine Meisner Rosen and Joel Tarr, "The Importance of an Urban Perspective in Environmental History," *Journal of Urban History* 20, no. 3 (1994): 299-310.

^{xiii} Martin Melosi, *Garbage in the Cities: Refuse, Reform, and the Environment, 1880-1980* (College Station: Texas A&M University Press, 1981) and *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present* (Baltimore: Johns Hopkins University Press, 1999).

^{xiv} Dale H. Porter, *The Thames Embankment. Environment, Technology, and Society in Victorian London* (Akron, OH: University of Akron Press, 1998); Donald Reid, *Paris Sewers and Sewermen: Realities and Representations* (Cambridge, MA: Harvard University Press, 1991).

^{xv} Michael Kucher, "The Use of Water and Its Regulation in Medieval Siena," *Journal of Urban History* 31 (2005): 504-36; Roberta Magnusson, "Water and Wastes in Medieval London," in *A*

History of Water, volume 1: Water Control and River Biographies, ed. T. Tvedt and E. Jakobsson, (London: I.B. Tauris, 2006), 299-313; Dolly Jørgensen, "Cooperative Sanitation. Managing Streets and Gutters in Late Medieval England and Scandinavia," *Technology and Culture* 49 (2008): 547-67 and "'All Good Rule of the Citee': Sanitation and Civic Government in England, 1400-1600," *Journal of Urban History* 36 (2010): 300-15.

^{xvi} Mark Jenner, "The Politics of London Air: John Evelyn's *Fumifugium* and the Restoration," *The Historical Journal* 38, no. 3 (1995): 535-51. Ken Hiltner has likewise explored the role of air pollution in Milton's work: "'Belch'd fire and rowling smoke': Air Pollution in *Paradise Lost*," in *Milton, Rights and Liberties: Essays from the Eighth International Milton Conference*, ed. Christophe Tournu and Neil Forsyth, 293-302 (Bern: Peter Lang, 2007).

^{xvii} Rebecca Totaro, *Suffering in Paradise: The Bubonic Plague in English Literature from More to Milton* (Pittsburgh: Duquesne University Press, 2005), 8.

^{xviii} *Ibid.*, 23.

^{xix} Harington, *The Metamorphosis of Ajax*, 71.

^{xx} *Ibid.*

^{xxi} *Ibid.*, 77-78. The etymological root is unknown, so Harington's suppositions may be as good as any others. *OED* suggests that it may come from the proper name Jaques (Jack), which might have particular literary significance in this case since Harington was known affectionately as "Boye Jacke" by Queen Elizabeth (Donno, introduction to *The Metamorphosis of Ajax*, 2).

^{xxii} Harington, *The Metamorphosis of Ajax*, 81. The modern reader notes that Harington is not consistent with his spelling, writing a jax, a jakes, Ajax, and A JAX, AJAX. It is possible that the choice in certain places has political meaning, but these have been hitherto unexplored.

^{xxiii} Donno, introduction to *The Metamorphosis of Ajax*, 20.

^{xxiv} Harington, *The Metamorphosis of Ajax*, 112.

^{xxv} *Ibid.*, 78.

^{xxvi} *Ibid.*, 79.

^{xxvii} *Ibid.*, 56.

^{xxviii} Gail Kern Paster has discussed the importance of Galen's humors medical theory in early English drama in *The Body Embarrassed: Drama and the Disciplines of Shame in Early Modern*

England (Ithaca: Cornell UP, 1993). She notes that, “besides being open and fungible in its internal workings, the humoral body was also porous and thus able to be influenced by the immediate environment” (9). This bodily porosity allowed a reconciliation of miasmatic theories of disease transmission with the four humors paradigm. To my knowledge, no one has explored the influence of miasmatic theory in early English literature as Paster has for the humoral body.

^{xxix} Harington, *The Metamorphosis of Ajax*, 159.

^{xxx} Sir John Harington, *The Englishmans Doctor. Or, The Schoole of Salerne. Or, Physicall observations for the perfect preseruing of the body of Man in continuall health* (London: John Helme and John Busby Junior, 1608) reprinted in *The School of Salernum, Regimen Sanitatis Salernitanum* (New York: Paul B. Hoeber, 1920), 87.

^{xxxi} Harington, *The Metamorphosis of Ajax*, 158. Various versions of the *Regimen Sanitatis Salernitanum* abounded in medieval and early modern Europe. For a standard Latin text, see <http://www.accademiajr.it/bibvirt/regimen.html>. For a modern English translation of a French version, see Patricia Willet Cummins, *A Critical Edition of Le Regime Tresutile et Tresproufitable pour Conserver et Garder la Santé du Corps Humain* (Chapel Hill: North Carolina Studies in the Romance Languages and Literatures, 1976).

^{xxxii} Thanks to Gregory Hays, University of Virginia, for help with the wording of this translation.

^{xxxiii} Thomas More, *Utopia*, ed. Alexander Young (Boston: Hilliard, Gray and Co., 1834), 88.

^{xxxiv} *The Coventry Leet Book: or Mayor's Register, Containing the Records of the City Court Leet or View of Frankpledge, A.D. 1420–1555, with Divers Other Matters*, 4 parts, ed. Mary Dormer Harris (London: Kegan Paul, Trench, Trübner & Co, 1907–1913), 3: 775.

^{xxxv} *The Records of the City of Norwich*, 2 vols., ed. W. Hudson and J.C. Tingey (London: Jarrold & Sons, 1906 and 1910), 2: 335–37. Ernst Sabine observed similar complaints against London's butchers when there were outbreaks of plague in the city. It appears that citizens and church authorities both made connections between disease outbreaks and filthy, smelly activities such as these. Sabine concludes that each modification of the butchers' practices was a direct result of desires to improve public health. In Sabine's assessment, although the final arrangement in

which butchers took their waste cut up into small pieces in boats out to the middle of the Thames at ebb tide for disposal was not ideal, it minimized the impact and nuisance of the butchers. See Ernst Sabine, "Butchering in Mediaeval London." *Speculum* 8, no. 3 (1933): 335–53. According to Paul Slack, *The Impact of Plague in Tudor and Stuart England* (Oxford: Clarendon Press, 1985), foreigners, vagabonds, and the poor were often identified as plague carriers and cities sometimes implemented strict quarantine measures to control the movement of these types of people.

^{xxxvi} Mark S. R. Jenner, "Civilization and Deodorization? Smell in Early Modern English Culture," in *Civil Histories: Essays Presented to Keith Thomas*, ed. Peter Burke, Brian Harrison, and Paul Slack, 127–44 (Oxford: Oxford University Press, 2000), 131–32.

^{xxxvii} Carlo Cipolla, *Miasmas and Disease: Public Health and the Environment in the Pre-Industrial Age*, trans. Elizabeth Potter (New Haven: Yale University Press, 1992), Appendix.

^{xxxviii} Harington, *The Metamorphosis of Ajax*, 139.

^{xxxix} *Ibid.*, 141.

^{xl} *Coventry Leet Book*, 2: 372; 3: 759–60, 792.

^{xli} Ernst Sabine, "Latrines and Cesspools of Mediaeval London," *Speculum* 9 (1934): 303–21; Magnusson, "Water and Wastes in Medieval London"; Dolly Jørgensen, "Medieval Latrines and the Law," *Medium Aevum Quotidianum* 53 (2006): 5–16.

^{xlii} Sabine, "Latrines and Cesspools," 305.

^{xliii} *Ibid.*, 306–11. Sabine counted at least thirteen public London latrines in the fourteenth century records.

^{xliv} Norbert Elias, *The Civilizing Process: The History of Manners*, trans. Edmund Jephcott (New York: Urizen Books, 1978); Georges Duby, ed., *A History of Private Life: Revelations of the Medieval World*, trans. Arthur Goldhammer (Cambridge, MA: Harvard University Press, 1988); Dominique LaPorte, *The History of Shit*, trans. Nadia Benabid and Rodolphe el-Khoury (Cambridge, MA: MIT Press, 2000).

^{xlv} *London viewers and their certificates, 1508-1558: Certificates of the sworn viewers of the City of London*, ed. Janet Senderowitz Loengard (London: London Record Society, 1989). <http://www.british-history.ac.uk/report.aspx?compid=36052>

^{xlvi} *Ibid.*, No. 295.

^{xlvi} Ibid., No. 325.

^{xlvi} Ibid., No. 288.

^{xlvi} Ibid., No. 320.

¹ In one certificate, the viewers explicitly stated that “the party with more tunnels or stools falling into the same to bear charges after that rate indifferently” (Ibid., No. 323).

^{li} Ibid., No. 209.

^{lii} Ibid., No. 267.

^{liii} Harington, *The Metamorphosis of Ajax*, 155.

^{liv} Ibid., 161-162.

^{lv} Ibid., 163-164.

^{lvi} Ibid., 160.

^{lvii} Sir John Harington, “Orders for Household Servantes” in *Nugæ Antiquæ: Being a Miscellaneous Collection of Original Papers, in Prose and Verse; Written during the Reigns of Henry VIII, Edward VI, Queen Mary, Elizabeth, and King James by Sir John Harington and others who lived in those Times*, vol. 1, ed. Henry Harington, 105–108 (London: J. Wright, 1804).

^{lviii} Harington, *The Metamorphosis of Ajax*, 172.

^{lix} Ibid., 176.

^{lx} Gerard Kilroy, *The Epigrams of Sir John Harington* (Farnham: Ashgate, 2009), 8. The conversation must have been before October 1594 when Sir Henry Danvers fled the country, according to Donno, introduction to *The Metamorphosis of Ajax*, 18.

^{lxi} Harington, *The Metamorphosis of Ajax*, 56.

^{lxii} Ibid., 158.

^{lxiii} Donno, introduction to *The Metamorphosis of Ajax*, 11.

^{lxiv} Harington, *The Metamorphosis of Ajax*, 187.

^{lxv} Ibid., 193-194.

^{lxvi} Ibid., 195.

^{lxvii} Yates, *Error, Misuse, Failure*, 86. For comparison, modern toilet installation guides also never show a user on the seat.

^{lxviii} Harington to Lady Elizabeth Russell, 14 August 1596, *The Letters and Epigrams of Sir John Harington*, ed. Norman Egbert McClure (Philadelphia: University of Pennsylvania Press, 1930), 65.

^{lxix} Harington, *The Metamorphosis of Ajax*, 178.

^{lxx} Harington to Sir Robert Cecil, 22 June 1602, *The Letters and Epigrams of Sir John Harington*, 93.

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- ^{lxxi} Ibid.
- ^{lxxii} Ibid. This was probably the brass sluice, which was the key component to block off the smell from below.
- ^{lxxiii} Harington to Gilbert Talbot, Earl of Shrewsbury, July 1602, *The Letters and Epigrams of Sir John Harington*, 94.
- ^{lxxiv} Sir John Harington, Epigram I.14 in Kilroy, *The Epigrams of Sir John Harington*.
- ^{lxxv} Sir John Harington, Epigram I.86 in Kilroy, *The Epigrams of Sir John Harington*.
- ^{lxxvi} Harington to a lord (1611 or 1612), draft letter, printed in Hugh Craig, "Sir John Harington: Six Letters, a Postscript, and a Case in Chancery," in *English Manuscript Studies 1100-1700*, vol. 5, ed. Peter Beal and Jeremy Griffiths, 43–62 (London: The British Library, 1995), 55.
- ^{lxxvii} Ibid.
- ^{lxxviii} Harington, *The Metamorphosis of Ajax*, 111.
- ^{lxxix} Ibid., 111.
- ^{lxxx} Ibid., 114.
- ^{lxxxi} Ibid., 115.
- ^{lxxxii} Ibid., 132.
- ^{lxxxiii} Ibid., 120.
- ^{lxxxiv} Ibid., 126-27. He notes that the collected urine was sold to dyers. Part of the pre-modern dyeing process relied on urine to fix the dyes, so urine (often from horses) was a necessary ingredient.
- ^{lxxxv} Ibid., 121.
- ^{lxxxvi} 6 Henry VI c5, *The Statutes of the Realm*, vol. 2 (London: Dawsons of Pall Mall, 1963 [1816]). When the statute was renewed in 18 Henry VI c10, the threat of "great rising of Water of the Sea" which would drown towns was the reiterated as the motivation for the commission.
- ^{lxxxvii} Harington, *The Metamorphosis of Ajax*, 121.
- ^{lxxxviii} Jamie Benidickson, *The Culture of Flushing: A Social and Legal History of Sewage* (Vancouver: University of British Columbia Press, 2007), 83.
- ^{lxxxix} Harington, *The Metamorphosis of Ajax*, 133.
- ^{xc} Ibid., 134.
- ^{xci} Walter Thornbury, *Old and New London: Volume 2* (London: Cassell, Petter, & Galpin, 1878), 416–26, <http://www.british-history.ac.uk/report.aspx?compid=45112>.

- ^{xcii} Paul Slack, *From Reformation to Improvement: Public Welfare in Early Modern England* (Oxford: Clarendon Press, 1999).
- ^{xciii} Slack, *The Impact of Plague in Tudor and Stuart England*.
- ^{xciv} *Coventry Leet Book*, 1: 21; 2: 273, 361, 552–53; *Records of the City of Norwich*, 2: 110; *York Civic Records*, vols. 2–5, ed. Angelo Raine (York: Yorkshire Archeological Society, 1940–1946), 2:165.
- ^{xcv} Jørgensen, “‘All Good Rule of the Citee’.”
- ^{xcvi} *Chamber accounts of the sixteenth century*, ed. Betty R. Masters (London: London Record Society, 1984), 63–87, <http://www.british-history.ac.uk/report.aspx?compid=64548>, no. 176.
- ^{xcvii} Ernst Sabine, “City Cleaning in Mediaeval London,” *Speculum* 12 (1937); 19–43.
- ^{xcviii} Mark S. R. Jenner, “From Conduit Community to Commercial Network? Water in London, 1500–1725,” in *Londinopolis: Essays in the Cultural and Social History of Early Modern London*, ed. Paul Griffiths and Mark S. R. Jenner, 250–72 (Manchester: Manchester University Press, 2000), 252–55.
- ^{xcix} Donno notes that he was almost elected Steward of Bath in 1593 and was heavily involved in lobbying for renovations for the church (*The Metamorphosis of Ajax*, 143, fn 203).
- ^c Harington, *The Metamorphosis of Ajax*, 141.
- ^{ci} *Ibid.*, 142–43.
- ^{cii} *Ibid.*, 143.
- ^{ciii} *Ibid.*, 111.
- ^{civ} See Totaro, *Suffering in Paradise*; Jenner, “The Politics of London Air”.
- ^{cv} Rick Bowers and Paul S. Smith, “Sir John Harington, Hugh Plat, and Ulysses upon Ajax,” *Notes and Queries* (2007): 255–59.
- ^{cvi} As quoted in Bowers and Smith, “Sir John Harington, Hugh Plat, and Ulysses upon Ajax” 258.
- ^{cvi} John Harington, Epigram I.87 in *The Epigrams of Sir John Harington*, ed. Kilroy, talks about the Star Chamber suit.
- ^{cviii} Benidickson, *The Culture of Flushing*, 78.
- ^{cix} For discussions of the nineteenth century developments, see Bill Luckin, *Pollution and Control: A Social History of the Thames in the Nineteenth Century* (1986); Christopher Hamlin, *Public Health and Social Justice in the Age of Chadwick: Britain, 1800–1854* (Cambridge: Cambridge University Press, 1998); and Porter, *Thames Embankment*.