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Wholesome or Pestilential? Giovanni Battista Doni (1594-1647) and the Dispute on Roman Air

1. Introduction

In the early modern period, environmental discourse pervaded multiple disciplinary fields, from medicine to literature, from political thought to natural philosophy. It was also fraught with tensions and precarious negotiations between tradition and innovation, as ancient authorities were read and reinterpreted through the lens of new conceptual frameworks. This article draws attention to the divided and divisive nature of early modern environmental discourse by focusing on a specific case study: the dispute over the (alleged) insalubrity of Roman air that took place in Italy from the late sixteenth century to the early eighteenth century, reactivating, as we shall see, ancient controversies on the same topic.

Within a span of about a century and a half, such a dispute generated a number of Latin and vernacular writings, authored by some of the most respected physicians and intellectuals of the time.[1] With the exception of Giovanni Battista Doni (1594-1647), a Florentine nobleman and polymath best known for his musicological studies,[2] all of the authors involved in this dispute were Roman-based physicians, often connected to each other by demonstrable personal ties. For instance, the Veronese Marsilio Cagnati (1543-1612) studied at the Roman school of Alessandro Traiano Petronio (?-1585), and referred to his master's work frequently, though critically, in his treatise of 1599; Tommaso De Neri (c. 1560-?), from Tivoli (near Rome), was a student of Cagnati's ("My teacher, Marsilio Cagnati, a man who can never be praised enough")[3] and was familiar with both his and Petronio's work.[4] Finally, both Domenico Panarolo (1587-1657), who taught anatomy and botany at La Sapienza, and Giovanni Maria Lancisi (1654-1720), who produced groundbreaking epidemiological research at the Papal court, demonstrated a deep knowledge of their predecessors' writings on the properties of the Roman climate and quoted them repeatedly in their own works.[5]

The corpus under examination has a peculiarly Roman flavor, both on account of its topic (the nature of Rome's "airs, waters, and places") and for the geographical provenance of the works that it comprises. Except for Doni's *De restituenda salubritate* (which appeared in Florence, at the newly established "Insegna della Stella," and

later enjoyed an autonomous circulation outside Italy),[6] most of the works produced in the course of this dispute were published in Rome and primarily with a Roman public in mind. Nevertheless, the background and implications of this debate were far from merely local. First of all, the authors involved in this controversy were drawing upon, as well as contributing to, a longstanding, pan-European tradition of medical-environmental inquiry that originated with the Hippocratic school of medicine (5th century BCE) and was then transmitted and systematized throughout the ancient, late-antique, and medieval periods.[7] At the same time, however, these authors were also challenging this tradition and transforming it deeply from within, as they blended received knowledge and empirical observation in order to create a new form of experimental expertise that would operate effectively in local contexts. In this sense, the debate concerning the insalubrity of Roman air may be seen as part of a larger trend in early modern scientific culture that called into question the very foundations of natural-philosophical inquiry and its sources of epistemological legitimacy (Dear 1-8).

This point leads us to the second reason why the dispute over the insalubrity of Roman air bears a more general interest for the intellectual history of early modern Europe. Indeed, this dispute neatly embodies one of the most prominent traits of early modern environmental discourse in general, namely the coexistence between multiple and even contradictory ways of conceptualizing the environment and its influence on human beings.[8] Seeking to understand the different and competing conceptual frameworks that underpin early modern environmental texts, this article poses the following questions: What epistemological status did the authors of these texts attribute to their own works? Within which disciplinary domains and intellectual traditions did they see themselves as fitting, and how did they negotiate such traditions in light of the goals that they pursued and the specific circumstances in which they were writing?

The questions raised here stem, first of all, from a consideration of the multiplicity of disciplinary regimes in which environmental discourse belonged from antiquity until the early modern period. These include natural philosophy *stricto sensu*, but also medicine, geography, and literature (particularly the georgic, bucolic, and didactic genres). The conceptual implications of classical, medieval, and early modern environmental discourse went even further, reverberating upon such diverse fields as political theory, diplomacy, urban planning, moral philosophy, and even theology. Indeed, many of the works to which we now go back in order to reconstruct ancient and Renaissance

environmental ideas challenge clear-cut disciplinary distinctions: for instance, the Hippocratic treatise *Airs, Waters, Places* (5th century BCE) belongs as much in geography and ethnology as in medicine; Vitruvius' *De architectura* (1st century BCE) addresses the relationship between human nature and the physical environment within the context of a work on architecture and urban planning; as for Jean Bodin's theory of climates—in many ways a *summa* of Renaissance environmental wisdom—it is expounded first in a handbook of historical methodology (*Methodus ad facilem historiarum cognitionem*, 1566) and then in a legal-political treatise (*Les Six livres de la République*, 1576).[9]

It is precisely because of its multidisciplinary character that early modern environmental discourse represents an ideal locus from which to examine the destabilizing effects that the rise of a new epistemology of observation and experimentation in the seventeenth century had not just on the natural sciences but on a number of related domains of cultural production.[10] In what follows, I will set out to analyze some of the ways in which this tension between intellectual change and tradition—and between competing understandings of the latter—played out in the relatively limited context of the late-Renaissance dispute over the insalubrity of Roman air. The writings produced in the course of this dispute offer precious insights into how a given "fact" (namely, disease in a given area) could be constructed and confronted in many disparate ways, in constant dialogue with a consolidated set of authorities—which include standard medical and natural-philosophical sources such as Hippocrates, Aristotle, and Galen, as well as a number of Greek and Latin authors (from Strabo to Tacitus) who had written specifically on the properties of the Roman climate.

This article is divided into two parts. After situating the late-Renaissance controversy on Roman air in a longer tradition of environmental inquiry, I will focus more particularly on Giovanni Battista Doni's *De restituenda salubritate agri Romani*, which is perhaps the least known of the writings produced in the course of this debate, although it appears to have exerted considerable influence in the seventeenth and eighteenth centuries.[11] Composed around 1630, but published posthumously in 1667, Doni's treatise occupies a unique position within the textual corpus examined in this article, first and foremost because its author—a high-born Florentine with ties to the powerful Barberini family in Rome—was not a physician, but a musicologist and a man of letters. This fact explains why Doni's sons, in publishing their father's work more than three decades after it was written, felt compelled to justify their father's right to participate in a

debate that had hitherto remained confined to the medical community. They did so in a carefully crafted preface which, as we shall see, represents an important document of the controversy concerning the epistemic status of environmental inquiry in late-Renaissance Italy.

2. What is wrong with Roman air? Origins of a dispute

The early modern dispute over the insalubrity of Roman air began with the publication of Alessandro Traiano Petronio's *De victu Romanorum*, which first appeared in Latin in 1581 and was translated into Italian eleven years later by the Northern-Italian physician Basilio Paravicino.[12] The question raised by Petronio—whether the city of Rome and the surrounding region were or not salubrious—was not entirely new. Ancient authors such as Cicero, Livy, Columella or Strabo had each addressed it in their works from various disciplinary perspectives (politics, history, agriculture, geography), and aside from minor points of disagreement their answer had been unanimous: Rome itself was generally wholesome, but the Roman countryside was indeed peculiarly unhealthy, especially in the summer. According to Cicero, Romulus had built his city in the only wholesome spot within a sickly region ("Locum delegit et fontibus abundantem et in regione pestilenti salubrem"; *De re publica* 2.11). Livy reported that Roman soldiers often contrasted the inhospitable Roman countryside with the *campania felix* around Naples, wondering "whether it was fair that their surrendered subjects should enjoy that fertile and agreeable tract, while they, exhausted with campaigning, wrestled with the arid and noxious soil in the neighbourhood of Rome" 'an aequum esse dediticios suos illa fertilitate atque amoenitate perfrui, se militando fessos in pestilenti atque arida circa urbem solo luctari' (7.38, translated by Foster).

The insalubrity of Latium was rather puzzling for authors steeped in the tradition of classical climate theory. On account of its location in the heart of the temperate zone, Rome was supposed to enjoy the best and healthiest climate of all Italy, if not of all Europe. Tackling this contradiction, Strabo suggested that the unwholesomeness of the Roman countryside might be due to a specific landscape feature—the presence of marshes along its coasts (5.3.12). Columella agreed with Strabo's topographic explanation, although he was personally more inclined to blame the insalubrity of Latium on its proximity to the sea, which caused an excess of moisture in the region ("praestat a mari longo potius intervallo quam brevi refugisse, quia media sunt spatia gravioris halitus"; 1.5.6).

Petronio's *De victu Romanorum* explicitly reconnected with this tradition while at the same time introducing a crucial discursive change. Building on his personal experience as chief physician at the city hospital of Santo Spirito as well as at the Vatican court, Petronio shifted attention from rural to urban areas to advance the provocative thesis that Rome itself was no less unhealthy than the surrounding region. In his treatise, he meticulously listed the numerous ailments—both physical and moral—that tended to affect long-time residents and visitors alike: among these, respiratory illnesses, acute fevers, digestive troubles, deadly headaches, and a general heaviness of mind and spirit. All of these conditions, Petronio argued, were a direct consequence of environmental factors such as the climate, topographic disposition, and architectural layout of the city.

Negative views of Rome as an insalubrious place were becoming more widespread at the time that Petronio was writing. Historians have often explained this fact in light of the objective environmental decay and poor hygienic conditions from which the city was then suffering. From the late Middle Ages onwards, Rome had grown to incorporate peripheral areas (such as the Vatican valley) that the Ancients had left uninhabited, in part precisely because they perceived them as unhealthy.[13] To this factor, we should add a drastic degradation of living conditions in many parts of the ancient urban center—particularly in the Jewish ghetto, created in 1555 in the Rione Sant'Angelo (a riverside neighborhood at high risk of flooding), and in the Ortaccio, the prostitutes' ghetto established by Pope Pius V. The whole city lacked a functioning drain system for the removal of rubbish and human waste. Water management was also a serious issue, with frequent overflowing from the Tiber and pools of stagnant waters forming in low-lying areas of the city on account of "buried springs and streams or damaged drains" (Rinne, "Urban Ablutions" 186). Thus saturated with water, the land became an ideal incubator for malaria, as well as for many other types of illness. Modern scholars agree that such circumstances made Renaissance Rome objectively more prone to disease than it ever was in classical times (Rinne, "Urban Ablutions"; Stow).

Texts such as Petronio's *De victu Romanorum* were written in a period of intensified efforts to restore ancient aqueducts, public fountains, and underground conduits, all for the purpose of ensuring clean water supplies as well as improving sanitary conditions throughout the city (Rinne, *The Waters of Rome*).[14] While such measures may appear to us as a logical and uncontroversial response to an objective problem, they were in fact far from undisputed at a time when water—not just

stagnant water, but water in itself, on account of its humid nature—was viewed by many as a principle of corruption rather than health.[15] Indeed, as Petronio himself recalled, a large number of Roman residents (including many respected physicians) criticized the restoration of ancient fountains and the opening of new ones, on the grounds that all this water within the city walls would do more damage than good—as it would enhance the already excessive humidity of Rome's air.[16] Although Petronio was personally unconvinced by this objection,[17] he too worried that underground conduits might have negative effects on health, especially if imperfectly kept.[18] The disagreement sparked in sixteenth-century Rome by water-engineering works is further proof of the fact that early modern environmental views were not static and homogeneous, but fragmented and constantly changing (Rinne "Between Precedent and Experiment").

Petronio's *De victu Romanorum* thus appeared in a time of heightened concern with the question of Rome's insalubrity. In his book, the renowned physician from Città di Castello argued that Rome was naturally unwholesome, or at least parts of it were, and went into great detail to identify the specific environmental factors that caused such insalubrity. In addition to the proximity of bogs and marshes (already brought into the spotlight by ancient authors such as Strabo), Petronio particularly blamed the muddiness of the Tiber, the exceedingly humid climate, the lack of proper ventilation in many areas of the city (due to both topographical and architectural causes), the violence and diversity of the winds, the excessive strength of the sun (already decried by Martial [4.60] and other Latin authors—but with regard to the region of Ardea rather than the Urbs), and the great variability of the weather. Although Petronio thought that it was possible to protect oneself from these negative influences by means of a healthy diet and lifestyle (which "tempered" the humors in the imbalanced Roman bodies), he also unequivocally stated that Rome was—by its own nature, climate, and site—particularly conducive to disease.

Petronio's conclusions were criticized a few years later by one of his most brilliant students, the Veronese Marsilio Cagnati, who rose to medical fame in Rome in the late 1590s. According to Cagnati, Rome was essentially salubrious, and disease in the city should be blamed on poor personal hygiene and unhealthy lifestyles rather than environmental causes. In his 1599 treatise *De Romani aëris salubritate*, Cagnati recalled the views of Strabo and Vitruvius on Rome's ideal situation in the heart of the temperate zone, arguing that this "golden mean" location could be nothing else than healthful. Without explicitly rejecting Petronio's

Hippocratic assumption of a correlation between environment and health, Cagnati reversed his master's logic to draw the opposite conclusion: if Rome was naturally salubrious, then illness in the city could only have one explanation—the "intemperance" and self-neglect of the diseased.

The appearance of Cagnati's book in 1591 sparked a long controversy within the Roman medical community around the two opposed opinions of the student and his master. Although positions were often rather nuanced, authors such as Giovanni Maria Lancisi tended to agree with Cagnati, whereas Tommaso De Neri, who contrasted Rome with his native city of Tivoli, sided with Petronio. As for Giovanni Battista Doni, his multiple displays of respect and admiration for Cagnati (5-6, 21) did not prevent him from sharing Petronio's thesis in its broad lines, nor from drawing upon his earlier treatise for specific points.[19] Like Petronio, Doni too was convinced that the Roman countryside was fundamentally insalubrious, as was Rome itself (a4*r*, 3, 8, 24). Yet the way in which the Florentine developed his views, and the countermeasures that he proposed, differed markedly from those of Petronio and his other predecessors.

3. "Philologikōs" or "technikōs"? Tradition and innovation in Doni's environmental approach

Doni's *De restituenda salubritate agri Romani* is in many ways the most remarkable of the treatises emerging from the late-Renaissance dispute on Roman air. Composed around the time of the Great Italian Plague of 1629-31, it remained unpublished until twenty years after the author's death.[20] It was first printed in Florence in 1667, with additional preliminary material by Doni's sons (Francesco, Alessandro, and Angelo) and a change in dedicatee: since Pope Urban VIII, to whom the treatise was originally addressed, had died in 1644, Doni's sons dedicated the publication to his three nephews, the powerful Cardinals Barberini (Francesco, Antonio, and Carlo). Of all the works considered in this study, the *De restituenda salubritate* was the only one that also enjoyed an independent editorial afterlife both inside and outside of Italy: it was indeed reprinted twice as a free-standing work, first in The Hague in 1716, and then in Venice in 1735.

Doni's treatise advanced a sophisticated theory of environmental influence in the service of a very pragmatic program of environmental engineering in the Roman region. Drawing upon literary, epigraphic, and archaeological evidence,[21] Doni showed that, if parts of Latium were

already unhealthy in antiquity (74), most of the places that were considered insalubrious in his own time—including Rome itself—were once healthy and populous (15, 40-42).[22] From this, he concluded that the present insalubrity was not a fact of nature, but the result of a process of environmental degradation ("maiorem huius agri partem a veteri salubritate degenerasse"; 78; cf. 128), triggered by essentially human causes and thus probably reversible by artificial means (15, 24, 78).

Doni specifically argued that, following the "barbarian invasions" ("barbarorum vastationes") of late antiquity, a once populous and well-cultivated land was transformed into a "miserable wasteland" 'miseranda vastities,' further spoiled by long neglect (68). For instance, the many swamps and marshes that now bordered the coasts of Latium and Tuscany were already in place in antiquity, yet "their number grew considerably afterwards, partly because of human negligence, partly because the land was abandoned and only few were left to cultivate it."[23] In turn, the degradation of the territory caused even greater depopulation. According to Doni, such a deadlock could only be broken through an extensive program of environmental improvement.

Examples of environmental manipulation suggested by Doni included large-scale deforestation, with a view to improving air circulation (142), but afforestation along the coastline, in order to protect the inland region from the sulphureous vapours coming from the coastal salt-beds (141); land-levelling and drainage (133-41); the construction of dams and dikes along the sandy shoreline of Tuscany and Latium—like many of his contemporaries, Doni saw beaches as a dangerous source of moisture (164); increased settlement, so as to maximize the purifying power of domestic fire (13, 132, 143-46); and intense cultivation of the land.[24] While some of Doni's proposed measures appear surprising if judged by the standards of modern environmental science, they were fully in line with the environmental knowledge of his own time (see Glacken; Grove). Doni's overall vision, however, was still rather uncommon at the time of his writing. In particular, his historicizing approach to the physical landscape and his faith in man's ability to refashion the natural environment by artificial means place him at the forefront of an intellectual movement that would ultimately culminate in the "culture of improvement" of Restoration England.[25]

But these are only two of the many innovative aspects of Doni's *De restituenda salubritate*. For instance, his detailed discussion of links between disease patterns and demographic, professional, and environmental conditions anticipates Bernardino Ramazzini's occupational medicine by seventy years.[26] His study of architectural

design in the Roman countryside (30-32; 65-66) led him to formulate the innovative hypothesis that the close coexistence of men and animals in rural homes may be responsible for the spread of human and animal diseases (32). Throughout his treatise, Doni also elaborated a refined version of Hippocrates' environmental semiotics—which consisted in assessing the habitability of a place based on "signs" ("indicia") such as vegetal and animal presence, air transparency, the presence of moss on walls and trees, and so forth—and systematically adopted this approach in order to determine the properties of the Roman countryside, identify the causes of its progressive degeneration, and devise possible remedies to the latter (96).

Looking back on his work twenty years after his death, Doni's sons took pride in describing their father as a revolutionary environmental thinker. In their preface to the 1667 *editio princeps* of *De restituenda salubritate*, the young Doni particularly highlighted their father's choice to discuss environmental matters not merely in erudite terms ("philologikōs"), but in a more technical and pragmatic fashion ("technikōs"), which they thought was one of the greatest strengths and innovations of the book.

At first sight, this judgment appears rather puzzling, particularly in light of the fact that Doni himself had defined his own writing as digressive ("parekbatikōs") and "interspersed with philological observations" 'ex Philologiae penu aspers[us]' in his original preface of 1631. Upon closer inspection, however, Doni's "philological" approach turns out to be quite different from that of his predecessors. For an example of the latter, we can take De Neri's treatise on the climate of Tivoli (1622). In chapter 7, where he praises the water of Tivoli's river Anio for its outstanding quality, De Neri is forced to solve a difficult problem: in his commentary on Hippocrates' *Epidemics*, Galen had expressed an opposite judgment on the water of the Anio, which he defined as "crudiuscula," that is, "a bit hard to digest" (69). De Neri then dedicates three pages of his work to comparing this passage to other Galenic texts in order to demonstrate that the great Pergamese physician did not mean that the water of the Anio was "absolutely unhealthy" 'perniciosissima,' but only that it was of an intermediate nature ("mediae naturae")—and, in fact, tending towards the good rather than the bad ("tamen magis affirmarem inter bonas, quam inter pravas aquas"; 70). The strategy employed by De Neri in this case is exemplary of the way in which empirical observation and textual exegesis constantly intermingle in late-Renaissance medical texts. Similarly, authors such as Petronio or Cagnati devote lengthy sections of their books to discussing

and reconciling conflicting statements from ancient authorities such as Hippocrates, Aristotle, and Galen.[27]

Doni, on the other hand, never (or hardly ever) does such a thing. Whenever he considers ancient sources, he does so in order to extrapolate evidence in support of his historical claims, not to rely on them as scientific authorities. His brand of philology is that of a seventeenth-century antiquarian,[28] rather than that of a "medical humanist" like De Neri.[29] Doni's environmental stance also differs from that of Petronio and Cagnati, the two "fathers" of the early modern dispute on Roman air. Petronio speaks essentially as a Hippocratic physician, emphasizing the environmental determinants of human health while at the same time acknowledging that diet and lifestyle can go a long way in guaranteeing a long and healthy life. As for Cagnati, he is more inclined to situate medicine in the field of ethics than in that of environmental science, as he downplays the importance of environmental conditions in order to stress the relationship between good health and moral virtue ("continence").

Doni's *De restituenda salubritate* takes a radically different direction. Turning his back on both the commentary style and the moral-dietetic approach typical of much previous literature on the topic,[30] the Florentine combines antiquarian inquiry with empirical environmental knowledge to build a case for a more proactive way of coping with the insalubrity of Roman air—direct environmental change. In this sense, Doni's treatise documents a more general shift in conceptual and practical attitudes to the influence of environmental factors on human health and character. More particularly, it testifies to an increasing reliance on planned environmental change as a means of (re)negotiating environmental influence, as opposed to (or rather in addition to) traditional countermeasures such as diet, regimen, or geographical displacement, all of which were defensive or adaptive in nature. [31] Doni's work is therefore a paradigmatic example of the shifting environmental cultures of seventeenth-century Italy and Europe, as well as of the complex ways in which tradition and innovation, "philology" and "technology" interacted with each other within such cultures.

4. Conclusions

By tracing the evolution of the dispute on Roman air from its classical roots to its seventeenth-century developments, this article has shown not only how conflicting views about a given environmental issue could coexist within a shared theoretical framework, but also how early

modern environmental discourse was made, unmade, and remade at the intersection between an ever-present classical tradition and the changing faces of late-Renaissance scientific culture. The interest of this relatively local dispute for early modern environmental and scientific discourse is even larger. Indeed, it was not just the nature of the Roman climate that was at stake in this controversy: ultimately, the debate raised deeper and more substantial problems concerning the epistemic status of environmental discourse itself, as well as wider issues of scientific verification, authoritativeness, and credibility.[32] What sources and methods were to be employed in environmental inquiry? Under which discipline (or disciplines) did environmental discourse fall, and what specific competences did it involve? What did it take to be (and, more importanty, to be recognized as) a qualified, authoritative voice in environmental discourse? Such were the questions raised, more or less explicitly, by the late-Renaissance controversy on the insalubrity of Roman air, and the very disparate answers that were given to them in the course of the dispute may be taken as indicative of shifting attitudes towards nature and scientific inquiry at a turning point in Western intellectual history.

Sara Miglietti JOHNS HOPKINS UNIVERSITY

NOTES

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[1] See Alessandro Traiano Petronio, *De victu Romanorum et de sanitate tuenda libri quinque* (Rome: Stamperia del popolo romano, 1581), shortly afterwards translated into Italian by Basilio Paravicino, *Del viver delli Romani et di conservar la sanità* (Rome: Domenico Basa, 1592); Marsilio Cagnati, *De Romani aëris salubritate commentarius* (Rome: Luigi Zannetti, 1599); Tommaso De Neri, *De Tyburtini aëris salubritate commentarius* (Rome: Luigi Zannetti, 1622); Domenico Panarolo, *Aerologia, cioè Discorso dell'aria, trattato utile per la sanità* (Rome: Domenico Marciani, 1642) and *L'aria celimontana* (Rome: Domenico Marciani, 1642); Giovanni Battista Doni, *De restituenda salubritate agri Romani* (Florence: Insegna della Stella, 1667); Giovanni Maria Lancisi, *Dissertatio de nativis deque adventitiis Romani coeli qualitatibus* (Rome: Francesco Gonzaga, 1711) and *De noxiis paludum effluviis eorumque remediis libri duo* (Rome: Giovanni Maria Salvioni, 1717).

[2] On Doni, see Formichetti; Bianchi.

[3] "Marsilius Cagnatus praeceptor meus, vir nunquam satis laudatus" (De Neri 9).

[4] See De Neri 49-50, 53.

[5] Lancisi, in his *Dissertatio de nativis deque adventitiis Romani coeli qualitatibus* (first published in 1711; all references below are to the 1718 Geneva edition of Lancisi's collected works), makes ample reference to Petronio's *De victu Romanorum* (e.g. 1: 83, 98, 102, 108), Cagnati's *De Romani aëris salubritate* (e.g. 1: 68, 86, 107-108, 116), and Doni's *De restituenda salubritate* (e.g. 1: 78, 83, 84, 97, 101). Another important source of Lancisi was Raffaello Fabretti's *De aquis et aquaeductibus veteris Romae* (Rome: G. B. Bussotti, 1680), on which see Evans.

[6] For more information on the publishing history of Doni's treatise, see below, section 3.

[7] For an overview of environmental thought and its transmission from antiquity to the early modern period, see Glacken.

[8] This aspect of early modern environmental thought is only just starting to be fully appreciated by scholars (for a good case in point see Hiltner).

[9] Clearly the disciplinary partitions with which we work today are not the same as those operating in past periods of history. Renaissance natural philosophy, for instance, commonly embraced what we would now call anthropology, as well as elements of astrology, medicine, and physico-theology. Furthermore, Renaissance disciplines interacted in ways that might surprise us today, but which were perfectly accepted at the time: for instance, lecturers in theoretical medicine often held joint appointments in fields that might seem unrelated based on our standards, such as logics, metaphysics, and even theology (see Grendler). Disciplinary boundaries, however, did exist in the Renaissance (see Clucas 11), and environmental discourse, as this article suggests, systematically crisscrossed them in various ways.

[10] See, for instance, Richard Yeo's study of note-taking techniques in Restoration England, which shows how traditional scholarly practices were updated and reshaped, rather than abandoned, in light of the new empirical epistemology prevailing in the natural sciences.

[11] New editions came out in The Hague (Du Sauzet, 1716) and Venice (n.p., 1735). In Italy, Doni's treatise appears to have exerted a long-lasting influence: see for instance, Ferdinando Galiani's (1728-87) *Pensieri sulle cause della spopolazione della Maremma Sanese, e su' rimedj*, which contains a discussion of Doni's ideas on land reclamation and environmental restoration (see Carrafiello 225).

[12] Paravicino explains in his dedicatory letter that he undertook the painstaking translation of Petronio's treatise upon explicit request of his patron, Tolomeo Gallio, Cardinal of Como (*Del vivere delli Romani* 3*r*-4*r*). Both Gallio and Paravicino had lived in Rome for many years, and it was probably on this occasion that Gallio became acquainted with Petronio's work.

[13] See Tacitus, *Historiae* 2.93; Petronio, *De victu Romanorum* 14-15.

[14] The first to take an interest in the restoration of ancient water supply systems was Pope Nicholas V, who, in 1453, commanded the restoration of an important aqueduct, the *Acqua Vergine*, as well as of the Trevi fountain (Leon Battista Alberti collaborated on this project). Such efforts continued under his successors, particularly Paul III and Pius IV (Karmon). On Rome's ancient water supply system, see Purcell.

[15] See Hardy 49. Part of the early modern dispute over the insalubrity of Rome specifically revolved around the quality of the Tiber's water (De Neri 102). Petronio had praised it "uti saluberrima" in his *De aqua Tiberina* (Rome: Valerio & Luigi Dorico, 1552), whilst the opposite opinion—already advanced by Girolamo Cardano (1506-76)

in his *Liber de providentia ex anni constitutione* (Bologna: Alessandro Benaccio, 1563)—was upheld by Girolamo Mercuriale (1530-1609) in his *Medicina practica* (a collection of his Paduan lectures published in Frankfurt under the supervision of one of his students, Peter de Spina, in 1601-1602, and then reprinted several times in Lyon) and by Francesco Coluzzi (1570-1624), professor of logic and medicine at La Sapienza, in the third book of his *De querelis nephriticis ex renum calculo quaestiones* (Rome: Bartolomeo Zannetti, 1619). Katherine Rinne ("Between Precedent and Experiment" 102) has studied how such competing views of the quality of the Tiber's water informed conflicting attitudes towards aqueduct planning in sixteenth-century Rome.

[16] "Utrum propter novos fontes a Pio IV inchoatos, a Gregorio XIII perfectos, noxam aliquam apportet, nonnulli dubitant: nam ut Tyberis vaporibus suis loca proxima, per quae fluit, humidiora reddit: ita et ii fontes, ut similes quid efficiant, arbitrantur" (*De victu Romanorum* 11).

[17] "Ab his nihil timendum videtur . . . quoniam antiquitus ubi plena fontibus Urbs erat, nihil mali eorum causa fuisse passa traditur. Et apud fontem Triviae ubi semper scaturit aqua, nihil observatum hactenus est, quod speciatim obsit" (*De victu Romanorum* 11).

[18] "Nisi forte subterranei aquaeductus aliquid afferent mali: quippequi, hoc usque prohiberi non potuerunt, quominus plurimam aquam foris effundant, terramque sibi tum propinquam, tum non parum distantem, subtus quasi stagnantes insigniter humectant . . . cui rei si non provideatur, periculum est, per aestatem ubi nihil pluerit . . . ne fervor cum vapore crasso et denso excitatus, corporibus infensam vigiliam, angustiam cruditatem, deinde capitis dolores et febres non breve excitet" (*De victu Romanorum* 11).

[19] The contrast between the healthiness of the Quirinale hill and the sickly "horti ac vineae" underneath seems to come directly from Petronio, as do the subsequent remarks on the different degrees of salubrity of various areas of the city, the quality of the winds, the relationship between temperature, humidity, and disease, the variability of climate, etc. (Doni 8, 26-27, 78-82, 105-06). Moreover, Doni prudently but explicitly criticizes Cagnati's views on the superiority of modern Rome over ancient Rome (20-22), in a medical readaptation of the classic *topos* of ancient vs modern times (see Black 3).

[20] On Doni's unpublished manuscripts, see Formichetti.

[21] E.g. Doni 19ff. (literary evidence); 37-38, 45-46, 63, 136 (epigraphic evidence); 40-41 (archaeological evidence). Among the classical authors most frequently quoted by Doni are Livy, Martial, Pliny, Seneca, Strabo, and Tacitus.

[22] Doni (58-63), particularly comments on Justus Lipsius' estimate of the population of ancient Rome at four million (see *Admiranda sive de magnitudine Romana libri IV*. Antwerp: Plantin-Moretus, 1598). The question of the size of ancient Rome was addressed again by, among others, Raffaello Fabretti (*De aquis et aquaeductibus veteris Romae*. Rome: G.B Bussotti, 1680), Isaac Vossius (*Variarum observationum liber*. London: Scott, 1685) and De Souligné (*London Bigger than Old Rome*. London: Printed by A. S., and sold by John Nutt, 1701).

[23] "Eorum tamen numerus valde postea excrevit partim hominum incuria, partim desertione terrarum, cultorumque penuria" (Doni 99).

[24] Doni was well aware that such an ambitious campaign of environmental improvement would require considerable expense and labor. He proposed various ways of attracting cheap manpower to a still inhospitable area (132), such as nice and healthy houses (143), light working hours (127), and generous fiscal benefits (190). He considered, but advised against, the possibility of employing the many Moriscos who had found refuge in Rome

after their expulsion from Spain in 1609 (179-80). These people, he argued, were extremely "deceitful" and "obnoxious" ("fallacissimi" and "infestissimi"), and after all their own ancestors (the Saracen pirates) were among those who had contributed to devastating the region. If foreign labor was absolutely necessary, then one should rather call the Dutch, who notoriously were honest and industrious people ("gentem probam, candidamque, et si quae alia, sedulam, atque industriam" [182]). Yet the difference of climate could very well be lethal to them (183). For a number of reasons, it was thus best to avoid long-distance migrations ("hominum *ton makrothen* migrationes"; 183-84) and rely, instead, on local manpower: if many of the first generation would likely die, the survivors would give birth to a stronger race, naturally adapted to the local climate ("nullo iam periculo usurpare poterunt, *Hic domus, haec patria est*"; 186).

[25] On this English "culture of improvement," see the recent studies by Richard Hoyle, Paul Warde, and Paul Slack. In partial contrast to this later tradition, however, Doni places considerable restraints on man's capacity to manipulate nature. He makes it clear for instance that the Roman region can only be made healthy because it used to be such in the past—in other words, man's action in this case is not transformative, but restorative. He particularly writes that "the nature of places and sites cannot be changed by any human power; nor is it possible, for instance, to make this Roman climate more stable and more temperate; I do nevertheless affirm that this region can be brought back to its original state and made absolutely habitable and safe by the hand of man, through hard work and without excessive expense" 'naturam locorum, ac situm nulla humana vi mutari posse; nec effici, exempli gratia, ut coelum hoc Romanum sit constantius, ac magis aequabile; nihilominus affirmo hominum manibus, atque industria, et sumptibus non immodicis ad pristinum statum reduci posse, fierique hanc regionem prorsus habitabilem, ac tutam' (133).

[26] Doni 28ff. Ramazzini's *De morbis artificum* was first printed in Modena in 1700.

[27] On textual exegesis in Renaissance medical commentaries see Siraisi; MacLean 230; Nance. The remark above also applies to many non-medical texts of the same period, including natural histories, travel accounts, and other geographical texts (see Grafton, *New Worlds, Ancient Texts*).

[28] On antiquarianism, and its roots in the sixteenth-century *ars historica*, see Grafton, *What was History*. Like François Baudouin (one of the authors considered by Grafton), Doni too conceives of his historical method as a buttress against disbelief: "ut rudioribus etiam, ac *dyspistoterois* (quorum et habenda ratio fuit) satisfacerem"; a4*r*).

[29] On "medical humanism," see Hirai.

[30] Issues of diet and personal hygiene are only briefly mentioned in the concluding section of the treatise.

[31] These ideas are explored further in a forthcoming collection of essays: *Governing the Environment in the Early Modern World: Theory and Practice*. Edited by John Morgan and Sara Miglietti, Routledge (expected January 2017). See, in particular, the introduction to the volume.

[32] See Shapin, *A Social History*, and "Cordelia's Love."

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