Mastering the Climate:
Theories of Environmental Influence
in the Long Seventeenth Century

by

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Declaration

This dissertation is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. It has been composed by myself and has not been submitted in any previous application for any degree. The research presented was carried out entirely by myself, except for part of section 4.5.1 (pp. 295-98, on J. J. Scheuchzer), which is the result of collaborative work with William Barton (Ludwig Boltzmann Institute for Neo-Latin Studies, Innsbruck).

The following publications contain materials that partly arise from work on this dissertation:

> Barton, William, and Sara Miglietti. 'An Eighteenth-Century Thought Experiment on Climate Warming: Johann Jakob Scheuchzer's *De ignis seu caloris certa portione Heluetiae adsignata* (1708)', *Lias* (42/2). Forthcoming.
>
> Miglietti, Sara. 'Debating Greatness from Machiavelli to Burton', in Cecilia Muratori and Gianni Paganini (eds), *Early Modern Philosophers and the Renaissance Legacy* (Dordrecht: Springer). Forthcoming.
>
> Miglietti, Sara. 'Wholesome or Pestilential? The Dispute on the Insalubrity of Roman Air in Late Renaissance Italy', in Roberta Ricci and Simona Wright (eds), *The Renaissance Dialogue*, special issue of *NeMLA Italian Studies* (38). Forthcoming.

Summary

The present dissertation discusses the relationship between cultural constructions of climate and practical attempts at regulating the latter's perceived influence on human beings in the 'long' seventeenth century—a time of crucial historical and intellectual changes. Drawing upon a broad range of printed and manuscript sources written in various languages (including travel accounts, missionary letters, scientific papers, political treatises, and medical writings), the research presented here reconstructs the long-term success of classical 'climate theories' and the concrete behaviours that these theories inspired in early modern Europe and the American colonies.

By investigating the various strategies that were used to cope with, and capitalize on, the perceived influence of climate, the dissertation challenges common characterizations of climate theory as a form of determinism. After a preliminary chapter about the origins, transmission, and circulation of climate theory in its multiple and conflicting forms, the following chapters each explore a different way of negotiating climatic influence in the 'long' seventeenth century, notably diet and lifestyle (Chapter 2), geographical displacement (Chapter 3), and environmental engineering (Chapter 4). The 'Epilogue' then briefly looks at post-seventeenth-century developments before drawing some general conclusions about the historical evolution and cultural significance of early-modern climate theories.

Situating itself at the intersection of several disciplinary fields (including intellectual history, reception studies, and the history of medicine and science), this dissertation examines, on the one hand, the interplay of environmental ideas and practices in specific historical contexts; and, on the other hand, the acquisition, transmission, and circulation of environmental knowledge at, and across, different socio-cultural levels. It thus raises questions of tradition and innovation, consistency and diversity, 'learned' and 'popular' culture, investigating the ways in which epistemic paradigms are formed and transformed across time and space.

Note on texts

For quotations from primary sources in English, I have retained original spellings but modernized capitalization, eliminating capital letters except in proper names, titles, and at the beginning of a sentence. Quotations in languages other than English are translated in the main text, with the original provided in footnotes. When modern, easily available translations exist, I have generally followed them, checking them against the original and occasionally modifying them as seemed necessary (modified translations are signalled in footnotes). For quotations from primary sources and studies that have not been translated into modern English, I have provided my own translation.

All references in footnotes follow the MHRA author/date system, with the exception of forthcoming publications and work in progress, for which I give an abbreviated title in the footnotes and full details in section 3 of the Bibliography. References to classical sources include the abbreviated author's name and title of work (see below, Abbreviations), followed by information on the precise chapter, section, or lines of the work referred to; when quoting from a modern edition or translation, I also provide the year of the edition used and the relevant page number.

For pre-1752 English documents, New-Style dates are used throughout the text.

Abbreviations

The titles of classical works and the names of their authors are abbreviated as per *Oxford Classical Dictionary*, 4th edition (Oxford: Oxford University Press, 2012), with the exception of *Airs, Waters, Places*, which is abbreviated *AWP*.

The following abbreviations are also used throughout the dissertation:

DBI: Dizionario Biografico degli Italiani (see Bibliography, section 4)
DNB: Oxford Dictionary of National Biography (see Bibliography, section 4)
FRS: Fellow of the Royal Society
KVK: Karlsruher Virtueller Katalog (see Bibliography, section 4)
L&S: Lewis & Short Latin Dictionary (see Bibliography, section 4)
LSJ: Liddel-Scott-Jones Greek-English Lexicon (see Bibliography, section 4)
OED: Oxford English Dictionary (see Bibliography, section 4)
S.J.: Society of Jesus
TLL: Thesaurus Linguae Latinae (see Bibliography, section 4)

INTRODUCTION

Humankind and nature make their own history together,
but neither can make it as they please.

—John R. McNeill[1]

The world in which we live today bears constant witness to our ambivalent relationship with the physical environment. Everywhere we look, we can see the effects of our transformative activity on nature and appreciate our capacity to control, negotiate, and reshape our living milieus. But we also see clear signs of a global environmental crisis which is, to a large extent, the result of this very activity, and whose consequences for human life are already deeply felt in parts of the planet.[2] Current projects for 'climate-proof' cities, floating shelters, and artificial environments of various kinds signal fears of an impending climatic apocalypse that might radically modify our lifestyles, perhaps even threaten the future of human life on Earth.[3] The term 'Anthropocene', introduced in 2000 by Paul Crutzer and Eugene Stoermer to designate the present geological age,[4] aptly captures the fact that over the last few centuries man's technological power has escalated to such a point that mankind (or at least part of it) has turned into a geological and climatological agent in its own right.[5] But as our capacity to transform nature continues to

[1] McNeill 2010: 6.
[2] The unequal effects of the current environmental crisis on different regions of earth are feeding the ever-growing phenomenon of climate migration, on which see the recent report by the International Organization for Migration (Laczko and Aghazarm 2009). For an historical perspective, see Lübken 2012.
[3] See, e.g., the 'Climate Proof Cities' scheme in the Netherlands (see Bibliography, section 4); Vincent Callebaut's amphibious ecopolis, 'Lilypad' (see Bibliography, section 4); and recent plans to create artificial glaciers in the Indian Himalayas, a region increasingly hit by severe drought (see Lakin 2015).
[4] Crutzer and Stoermer 2000. For the history of this notion, see Hamilton and Grinevald 2015.
[5] Man's ecological footprint varies greatly across higher- and lower-income countries: according to Crutzer (2002), our current environmental crisis is to a large extent the product of only 25% of the world population.

grow, we are also becoming more aware that the changes that we bring to our climate and ecosystems inevitably affect us in return—not always in desirable ways.[6]

Man's influence on nature and nature's influence on man are two sides of the same coin, both inscribed in the essence of the human condition; they are, in a sense, universal and perennial facts of life.[7] Man's understanding of this mutual relationship, however, is a cultural construct, changing constantly across space and time. As such, this understanding has a history (and a geography) that have captured the attention of a growing number of scholars over the past fifty years.[8] Clarence Glacken's monumental study of environmental attitudes from Antiquity to the Enlightenment, first published in 1967, prepared the ground for all future work in the field by weaving together two central research questions: first, how has man, 'in his long tenure of the earth, […] changed it from its hypothetical pristine condition'? Second, how have past societies conceptualized the influence of climates and landscapes on 'the moral and social nature of individuals', as well as on 'the character and nature of human culture'?[9] By jointly addressing these two questions, Glacken was among the first to acknowledge that 'climate theories' (that is, theories of climatic and environmental influence) inspired actual environmental practice throughout Western history—from Sumerian times to the eighteenth-century Industrial Revolution.

The present dissertation situates itself firmly in Glacken's footsteps by investigating shifting attitudes to man's 'embeddedness in nature' across the early modern world.[10] Moving from the well-established assumption that the recognition of man's

[6] See Jonas 1983: 6-7; Fressoz 2012: 10; Larrère 2012: 153-54; Larrère and Larrère 2015.
[7] Boia 2005: 8; Lowenthal 2003: xxxiv.
[8] See, for instance, Ehrard 1963 (particularly vol. 2, Chapter 11); Lenoble 1969; Thomas 1983; Boia 2005; Hulme 2008; Fressoz 2012.
[9] Glacken 1967: vii.
[10] 'Embeddedness in nature' is Jeremy Shapiro's proposed translation (1976) of Karl Marx's concept of *Naturwüchsigkeit* (literally, 'the state of being naturally derived'), also adopted by Martin Jay (2009), but recently contested by Steven Vogel (2015: 247, n. 19). I use it here in a different sense from the Marxian

exposure to environmental influences (the 'airs, waters, and places' of the Hippocratic tradition) was central to early modern culture,[11] the research presented here explores various ways of coping with man's perceived vulnerability to the natural world, and climate in particular. The aim is not to offer a comprehensive history of early-modern climatological ideas, nor to provide an exhaustive survey of authors adhering to, or hinting at, the doctrine of climatic influence (a daunting task indeed, given the extraordinary popularity of this doctrine throughout early modernity). Rather, my purpose has been to understand how men and women who believed in the powerful influence of climate set out to resist, counteract, or correct such influence, and how in so doing they more or less consciously transformed themselves and the places in which they lived. In this sense, my work is also different from that of historical climatologists and cultural historians of climate such as Wolfgang Behringer, Emmanuel Le Roy Ladurie, Franz Mauelshagen or Christian Pfister.[12] While these scholars ask to what extent climate (and particularly climate change) can actually be said to affect human societies and their historical evolution,[13] my stance is that of an intellectual historian, seeking to understand how individuals and societies *perceived* and *conceptualized* climate's influence on them—and how they governed themselves (or were governed) accordingly.

This dissertation, then, represents the first in-depth attempt to examine the interplay between cultural constructions of climatic influence and practical attempts at coping with it from the Renaissance to the early Enlightenment.[14] In drawing attention to this particular

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tradition, namely to denote the web of mutual influences between man and nature—each shaping the other in an endless system of action and reaction.

[11] See, e.g., Glacken 1967; Pinna 1988 and 1989; Wear 1992; Floyd Wilson 2003; Wey Gómez 2008.

[12] Behringer 2007; Le Roy Ladurie 1967; Pfister 1984; Pfister et al. 1999; Le Roy Ladurie 2005; Le Roy Ladurie 2006; Le Roy Ladurie 2009; Mauelshagen 2009.

[13] See, among others, Rotberg and Rabb 1981; Wigley et al. 1985; Fagan 2000; Fagan 2008; Parker 2013.

[14] Throughout this study, the term 'early modernity' will be used to denote the period roughly comprised between these chronological extremes—the late sixteenth century on the one hand, and the mid-eighteenth century on the other—a period that has thus far attracted little attention from historians of climate theories.

dynamic, I pursue two main goals. The first is to foster further dialogue between historians of environmental ideas on the one hand, and social and environmental historians on the other, thus perpetuating a tradition initiated by Glacken and more recently continued by William Cronon, Richard Grove, David Arnold, Vladimir Jankovic, Jean-Baptiste Fressoz, and others.[15] As these scholars have shown, each from his own perspective, the joint analysis of theories and practices allows one to gain a clearer understanding of the role that social and historical circumstances had in spurring intellectual change and reorienting environmental discourse—and vice versa.[16] Building on this principle—and taking up Annabel Brett's call for a new type of intellectual history that is not only *intertextual* and *contextual* (in the spirit of the so-called Cambridge School), but also sensitive to 'the mutual involvement of the conceptual and the material dimensions of human being [*sic*]'[17]—I shall propose an account of how early-modern climate theories shaped (and were shaped by) individual and collective conduct in its various forms, including dietary choices, geographical mobility, and the planning of natural and built environments. In so doing, I intend to shed new light on how climate theories evolved throughout the early modern period against the backdrop of broader cultural and historical changes.

Investigating the relationship between notions of climatic influence and the practical behaviours that they inspired is also essential for rectifying common characterizations of classic climate theories as 'deterministic'. In the words of Mike Hulme, 'climatic determinism' occurs when 'climate is elevated to become a—if not the—universal predictor (and cause) of individual physiology and psychology and of collective

[15] Glacken 1967; Cronon 1983; Grove 1995; Arnold 1996b; Jankovic 2010; Fressoz 2012. See also the recent collection of essays by Le Roy Ladurie et al. (2007). With the exception of Glacken and Grove, a majority of studies in this vein has focused on post-Enlightenment developments.
[16] See, for instance, Cronon 1983; Leslie and Raylor 1992a; Grove 1995; Fressoz 2012; Slack 2014.
[17] Brett 2002: 127. For a discussion of the Cambridge School's contextualist approach, see Tully 1989.

social organization and behavior'.[18] Hulme himself identifies prominent examples of climatic determinism not only in the 'environmentalistic geography' of Friedrich Ratzel, Ellen Churchill Semple, and Ellsworth Huntington (all of whom wrote between the end of the nineteenth and the first half of the twentieth century), but also in the 'philosophers of the Grecian Empire (such as Herodotus and Hippocrates)' and the 'rationalists of the European Enlightenment (such as Montesquieu and Hume)'.[19] Similar remarks are often extended to the Renaissance climate theories of Jean Bodin (1529-1596), Juan Huarte de San Juan (1529-1588), Giovanni Botero (1544-1617), and others who mediated between the ancient Greek tradition and its eighteenth-century developments.

Upon closer inspection, however, the label of climatic 'determinism' fails to convey an adequate understanding of the early modern tradition of climate theory.[20] Certainly people living in this period did widely recognize climate as a direct determinant of their physical and moral character—this is indeed a central tenet of what we usually mean by 'climate theory'.[21] Nonetheless, the causal vocabulary often used to explain climate's influence on man should not mislead us into thinking that this influence was seen as a crushing and inescapable force.[22] First of all, climate was only one among many elements (such as food, religion, education, and political government) that were equally thought to contribute to the development of different qualities and inclinations in human

[18] Hulme 2011: 246.
[19] Hulme 2011: 250. The term 'environmentalistic geography' is in Keighren 2010, who takes it from Livingstone's use of the label 'environmentalism' as a synonym of 'environmental determinism' (Livingstone 2011).
[20] Recent attempts at redefining the meaning of 'determinism' seem to complicate rather than clarify the picture: see, e.g., Judkins et al. 2008, whose use of the term 'refers to the attribution of significant influence to general attributes of the human–environment relationship and should not be construed as an assertion of absolute or complete influence' (19).
[21] See Bergevin 1992: 68-76; Boia 2005. For a discussion of the term 'climate theory', see below, section 1.2.2.
[22] See Courtois 2002: 150-51.

beings.[23] Even though climate often took pride of place among such factors,[24] the sheer recognition of a much larger web of influences moulding human identity led early-modern climate theory in the opposite direction than the crude monocausal determinism supposed by some scholars.

Furthermore, climatic influence was never seen as insurmountable. A favourite formulation, drawn from the field of natural astrology, was that climate 'conditioned without necessitating'.[25] Music, diet, customs, and enlightened law-making were only some of the ways in which early-modern climate theorists (often building upon classical precedents) suggested that environmentally-induced behaviours could be resisted and reformed.[26] Far from sanctioning a fatalistic submission to climate's power, climate theory thus encouraged human beings to assert their autonomy in the face of external forces and to fashion themselves as self-determining moral subjects through a range of individual and collective practices.

Early-modern climate theories thus upheld a 'possibilistic' view of the relationship between man and climate that marks them off from later doctrines of geographical determinism.[27] The reasons for this difference lie deep in the cultural traditions within which these theories were rooted. Different ways of conceptualizing human nature, in particular, entailed divergent understandings of climatic influence: while nineteenth- and

[23] See Glacken 1967: 443; Staszak and Couzinet 1998: 14; Boia 2005: 27; Earle 2012; Larrère 2012: 155.
[24] I shall say more in Chapter 2 on the pre-eminence of 'air' over the other six 'non-naturals' of the Galenic tradition.
[25] Compare Bodin 2013: 223 (5.4). The same formulation is also echoed in early modern writings on physiognomy: see, for instance, Della Porta 1586: 3. For the complex relationship between astrology and climate theory in the early modern period, see the remarks in 1.2.3.b below. I plan to develop this aspect further in a separate project.
[26] See Staszak 1996.
[27] Hulme defines climate 'possibilism' (as opposed to both 'determinism' and 'indeterminism') as a theoretical position that accepts the 'explanatory power' of climatic influence and thus appreciates the profound impact of climate on human beings, without however denying the 'openness, contingency and multiple possibilities of the future' (2011: 249). The term 'possibilism' was first introduced into the debate on environmental influence by the French historian Pierre Vidal de La Blache (1845-1918), in reaction to the 'determinism' of the German school of human geography: see Bergevin 1992.

twentieth-century geographical determinists espoused a notion of biologically fixed races that left little room for self-improvement, early-modern climate theorists were working with the 'geo-humoural' concept of a flexible temperament, which made it possible (at least in principle) to negotiate the effects of environmental influence.[28] This view of flexible bodies and minds (explored at length in chapters 2 and 3 below) remained largely dominant throughout the period under consideration here. Indeed, even though signs of a paradigm shift from humouralism to racialism are detectable as early as in the 1670s,[29] race did not begin to 'feature in medico-climatic discourses' until 'early in the nineteenth century'—and even then only 'gradually' and 'never wholly supplanting the more flexible categories' of earlier 'environmentalists'.[30]

Early-modern climate theory was, in more than one sense, an essentially pan-European (if not global) intellectual phenomenon,[31] which cannot be properly understood by limiting one's attention to single countries. For this reason, the geographical scope of this research is deliberately ambitious, covering and comparing developments across various European countries and the American colonies.[32] Each of the four chapters into which this dissertation is divided is based upon a broad range of sources (including health-care books, political treatises, cosmographies, natural histories, travel accounts, colonial and missionary records, scientific papers, personal correspondence, as well as visual materials such as maps and city plans), written in various languages and drawn from

[28] The notion of 'geo-humouralism' has been widely adopted in scholarship since Mary Floyd-Wilson first introduced it in 2003.
[29] Malcolmson 2013. The emergence of skin-colour-based conceptions of racial difference in the seventeenth century is also at the centre of another recent study by Jean Feerick (2010).
[30] Harrison 1999: 18. For a genealogy of the concept of race, see, among others, Jouanna 1976; Hannaford 1996; Bernasconi 2010.
[31] Lestringant 1982a; Grove 1995; Dainotto 2007.
[32] I have limited my attention to the American colonies for two main reasons: first, ease of access to primary sources, including manuscript and archival materials held in European and North-American libraries; second, the particular interest of the American context for the purposes of this study, as will become apparent in Chapter 3. For various examples of climate theories in the African and Asian colonies, see Grove 1995; Harrison 1995; Jennings 2006; Hill 2013.

numerous European and North-American libraries and archives. Understanding how these materials circulated across geographical, confessional, and linguistic boundaries has been a major aim of this research. Indeed, one of my main goals has been to reconstruct how a climatological *koiné* (common culture) came into being in the early modern period through the transmission of bookish knowledge and the construction of a well-defined (though by no means undisputed) corpus of authoritative texts. Reprints and translations on the one hand, scholarly correspondence and mutual exchanges between scientific journals and gazettes on the other, account for much of this global circulation of knowledge on climates throughout the early modern period. Yet this common background did not inhibit the emergence of fundamental discrepancies in the way of conceptualizing the dynamic relationship between climate and human beings. More 'a climate of thought' than 'a system of thought'—to borrow James Hankins' felicitous expression[33]—, early-modern climate theory was a flexible conceptual framework that could be taken in different directions and put to different uses. Another central concern of this study will be to delineate (and, wherever possible, to explain) this fruitful tension between shared assumptions and divergent theoretical and practical outcomes.

With the exception of Chapter 1, which offers a long-term perspective on climate theories and their transmission from Antiquity to the Renaissance, this dissertation focuses on that 'long' seventeenth century which has thus far failed to attract extended interest from historians of climate theory.[34] When compared to the wealth of studies available on such landmark works as Bodin's *Methodus ad facilem historiarum cognitionem* (1566) and

[33] Hankins 1996: 118.
[34] The concept of a 'long seventeenth century', first introduced by Le Roy Ladurie for early modern France (1987), is now widely used in scholarship, although its exact boundaries vary depending on geographical context.

Montesquieu's *Esprit des lois* (1748),[35] seventeenth-century climate theories still appear as largely uncharted territory.[36] In drawing attention to uses and transformations of climate theory occurring in the timespan *between* Bodin and Montesquieu, I seek not only to fill a gap in scholarship and to rectify common misconceptions of the seventeenth century as a time of reduced interest in climate theory, but also to make a larger point about the goals, methods, and assumptions of intellectual-historical research in general. Such widespread neglect of seventeenth-century environmentalistic ideas indeed seems to result from a certain approach to intellectual history that emphasizes 'canonical' figures at the expense of 'minor'—and thus supposedly negligible—ones.

It is commonly assumed that the age of Milton, Descartes, and Galileo did not produce climate theorists of the same calibre of Bodin or Montesquieu. Celebrated authors who did discuss or use climate theories in their works—from Robert Burton (1577-1640) to John Milton himself—are either dismissed as derivative of earlier writers or described as isolated exceptions;[37] in both cases, very little attention (if any) is paid to the broader intellectual climates in which these authors formed their worldviews.[38] When set against prevailing narratives of the seventeenth century as an age of scientific renewal and incipient 'modernity', such scholarship invites the conclusion that climate theory survived in this period as a remnant of older conceptual paradigms, confined within a small literary

[35] Climate theory occupies the entirety of Chapter 5 of Bodin's *Methodus*, as well as Book 5, Chapter 1 of his later *République* (first published in 1576). Montesquieu's views on climatic influences are articulated in Books 14-19 of his *Esprit des lois*. On Bodin as a 'predecessor' of Montesquieu (still a common view among intellectual historians, and one that the present research partly challenges), see Fournol 1972. I shall say more on Montesquieu's climate theory in the 'Epilogue'.

[36] Most historical surveys of climate theory jump directly from Bodin to Montesquieu (see, e.g., Boia 2005) or only cursorily mention seventeenth-century developments (see Glacken 1967: 451-60).

[37] See, for instance, Fink 1941; Shackleton 1948.

[38] For two laudable exceptions, see Floyd-Wilson 2003; Leerssen 2006. Both studies devote ample attention to seventeenth-century climate theory.

elite and incapable of any fruitful dialogue with the new epistemologies that were developing in scientific circles and academies all over Europe.[39]

Recent studies, however, suggest a very different picture. In the seventeenth century, climate theory was not only still widely regarded as an authoritative framework for making sense of the relationship between human beings and their living environments; it was also perfectly integrated in emerging knowledge systems (themselves arguably less 'new' and 'modern' than is often assumed), and it acted as a driving force in some of the most significant developments of this period. For instance, Rebecca Earle has shown how geo-humoural conceptions of the South-American environment shaped Iberian colonial practices in the long seventeenth century, whereas Richard Grove has identified the origins of environmental conservationism in early modern anxieties over climatic deterioration and its repercussions on human beings.[40] Such studies show that, throughout the seventeenth century, climate theory was shared across different socio-cultural groups and pervaded environmental thought both on the level of doctrinal conceptions and on that of actual practices.

Very few of the sources upon which Earle and Grove base their conclusions would find a place in canonical histories of early modern thought. Alongside Columbus and Oviedo, Earle resurrects a legion of obscure, and sometimes anonymous, travellers and settlers to reconstruct what climate theory concretely meant for 'ordinary' early modern Europeans. Grove draws upon an impressive array of scientific papers, colonial records, and private correspondence to document the making of new environmental knowledge in island colonies and other geographically marginal places. The profoundly revised image of seventeenth-century climate theory that Earle and Grove offer in their works is in large

[39] For a classic instance, see Febvre 1922: 6.
[40] Earle 2012; Grove 1995. Earle's work has a precedent in Kupperman's fundamental studies on climate in the Anglo-American colonial experience (1982, 1984).

part the result of this shift of emphasis from intellectual elites and canonical authors to a much broader range of sources usually kept at the periphery of intellectual-historical research.

The case of climate theory neatly shows the limits of an intellectual history that focuses exclusively on 'great texts' and 'key figures'.[41] The dangers of such an approach are manifold. One is that we artificially isolate authors from their contexts, thus losing track of the broader cultural climates that made their ideas possible (and meaningful) at a given time in history. For instance, Bodin's status as a 'major' Renaissance author has led many to mistake his climate theory as an original creation, while it is in fact a sophisticated systematization of traditional doctrines that circulated widely in Bodin's time.[42]

Originality itself, for that matter, is a notion that warrants some scrutiny. Often taken as the touchstone of an author's 'greatness', it may not be the most helpful category for thinking about past mentalities and their historical evolution. Placing too much emphasis on doctrinal content, this notion perpetuates a view of thought as disembodied from practice and hinders, rather than advances, our understanding of intellectual change. Any attempt to measure the originality of an author (or an idea) also gives rise to the danger of simplified and teleological readings, as one seeks to determine what, in the cultural production of a given period, was 'progressive', and what was 'conservative'. Such a method ultimately obscures the fact that thought is always (as Donald Worster nicely puts it) a 'conglomeration of all its pasts', that 'old' and 'new' are often difficult to disentangle, and that conceptual changes tend to follow more winding paths than the linear narratives sometimes privileged by historians of ideas.[43]

[41] Brett 2002: 127; Worster 1994: xii; see also Dainville 1969: x; Duchet 1995: 20. Despite recent debates, such an approach appears to retain much of its pristine vigour.
[42] See Tooley 1953: 64.
[43] Worster 1994: xiii.

Originality is also a rather poor parameter for evaluating the historical importance of a thinker. Authors who seem to us today to have been pivotal in pushing the limits of science and culture were often in their own day less influential than relatively unoriginal thinkers. Therefore, even if we accept that intellectual historians should aim for the 'influential' and 'progressive' thinkers (which is itself debatable), how we should define who the 'influential and progressive thinkers' were at any given time in history is not self-evident.[44]

The traditional categories with which intellectual historians tend to work thus appear doubly inadequate to make sense of the dynamics of cultural change. On the one hand, the reliance on the concept of originality for constructing a canon of influential thinkers is fraught with difficulties and dangers. On the other hand, it is the very notion of a canon of 'great' texts and authors that turns out to be problematic, as it detaches intellectual elites (often retrospectively defined on the basis of current epistemological and aesthetic standards) from their cultural contexts, while also overlooking the essential interconnection between ideas and practices.

The present thesis is the outcome of an altogether different methodology. Instead of working with pre-established canons, I have adopted a 'bottom-up' approach that derives hierarchies of influence and relevance directly from the sources, using both textual and physical evidence to reconstruct patterns of reception, reuse, and debate.[45] One of the results of this approach has particularly been to shed light on the crucial importance of transient polemics and local struggles as a context for (and vehicle of) climatological

[44] This point is made most clearly in Reinert 2011: 1-12.
[45] For a similar approach, see Reinert 2011. For examples of use of physical evidence in reception studies, see Burke 2013: 27.

ideas.[46] More generally, by examining how climate theories were mobilized, appropriated, and reshaped in specific contexts, I have sought to emphasize two aspects that are structural to seventeenth-century environmental thought: the tension between tradition and innovation, and the simultaneous coexistence of competing ways of conceptualizing man, nature, and their mutual relationship.

Throughout the dissertation, I have eschewed rigid distinctions between 'major' and 'minor' thinkers, and paid as much attention to world-renowned intellectuals as to obscure figures with no great literary or scientific ambitions. Extending the focus from the world of 'authors' to those who turned to writing for mostly practical purposes is helpful in at least three different ways: first, because it shows how climatic influence, far from being the concern of a privileged few with too much time on their hands,[47] was an important presence in the lives of everyone, including 'ordinary' people; second, because it allows us to trace the circulation and reception of climatological knowledge across different socio-cultural levels; and finally, because it helps bridge the gap between the history of ideas and that of practices, documenting applications of climate theory that might otherwise have been cast into oblivion.

Early-modern environmental discourse was, by its own essence, an interdisciplinary endeavour, spread across various fields of intellectual production: from geography and medicine to architecture and political thought. This multidisciplinary character is reflected in the sources consulted for this research, as well as in the scholarship with which I engage. This dissertation is primarily meant as a contribution to early-modern

[46] Examples from this dissertation include the controversy on the insalubrity of Roman air (Chapter 2), the discussion on the relocation of Jamestown and other colonial cities (Chapter 3), and debates about engineering projects in various parts of Europe (Chapter 4).

[47] I think here of King Charles II's mocking remark that Royal Society scientists spent their time 'in weighing of air and doing nothing else since they sat' (Pepys 1970-1983, vol. 5: 33). For studies of air and climate in the Royal Society, see below, Chapter 4.

intellectual history, here intended as a history of both ideas *and* practices; in this respect, some of my most important sources of guidance and inspiration were the above-mentioned studies of Glacken, Cronon, Grove, and Fressoz, which have shaped my way of understanding the relationship between environmental theories and the conducts that they inspired.

At the same time, this research also builds upon recent work in other fields, including eco-criticism,[48] environmental ethics,[49] food studies,[50] medical history,[51] and Foucauldian studies. In fact, the original spur for this dissertation came from Foucault's hypothesis (formulated in his 1977-1978 course on 'Security, territory, population') that the 'mutual relationship between population and milieu' began to be exploited in the seventeenth century as a new form of 'political rationality'.[52] The research presented here is, in many ways, an attempt to put Foucault's hypothesis to test, and to corroborate it with further textual and historical evidence. Throughout this process, the recent wave of studies on 'eco-governmentality' and 'environmentality' emerging from Foucault's own work has been a source of crucial inspiration and guidance.[53] Margo Huxley, for instance, has investigated the geographical 'rationalities that underpin programmes and practices of government, focusing on logics that attribute causal effects to space and environment and that seek to manipulate these towards governmental ends'.[54] Describing nineteenth-century schemes of urban regulation and sanitary reform as 'attempts to create conditions for the

[48] MacKenzie 2010; Hiltner 2011.
[49] Jonas 1984; Larrère and Larrère 1997; Larrère and Larrère 2015.
[50] Albala 2002; Earle 2012.
[51] Wear 1992; Mikkeli 1999.
[52] See particularly the lectures of 11 and 18 January 1978 (Foucault 2004a). Foucault also addresses problems directly relevant to this research in the lecture 'The Political Technology of Individuals' (held at the University of Vermont in 1982, first published in 1988, and later translated into French in Foucault 1994).
[53] Arun Agrawal is currently one of the most significant representatives of this trend (see Agrawal 2005). On eco-governmentality, see Irrera 2015. For Foucault's work on space and power, see Elden and Crampton 2007.
[54] Huxley 2007: 185.

production and maintenance of appropriate comportments and behaviour', Huxley has argued that 'governmental thought that postulates spatial and environmental causes shaping comportments and moral states of individuals, and influencing the bio-social conditions of populations, underpins diverse programmes and practices of the conduct of conducts'. [55] A similar perspective is adopted in Fressoz's recent study of environmentalism, technological 'reflexivity', and social engineering in eighteenth- and nineteenth-century France.[56] My own work builds upon these precedents to explore a period that is often overlooked in eco-governmental studies but that truly marked, as Foucault himself suggested, the starting point of a long-term process of 'governmentalization' of the environment.[57]

Indeed, the relationship between environment and government lies at the heart of this research in more than one sense. How was the environment thought to 'govern' human beings? How did human beings come to claim for themselves the power to 'govern' the environment in turn? Finally, how did they begin to conceptualize this power as a means of governing humans *through* the environment? These are the central questions that guide and link together this dissertation's four chapters and the concluding epilogue.

Chapter 1 ('A Climate of Thought: Theories of Environmental Influence from Antiquity to the Renaissance') provides an introductory overview of climate theories from their origins in ancient Greece to the great systematizations of the mid-sixteenth century, with a view to answering three sets of questions: 1) What exactly is 'climate theory'? Is this label methodologically sound? How did the word 'climate' evolve over time, and are we justified in using it with reference to ancient and early modern thought? What other concepts were available in the past to make sense of the environmental determinants of

[55] Huxley 2007: 186, 196.
[56] Fressoz 2012.
[57] Foucault 1994: 822, 826-27.

human life? 2) Was the tradition of 'climate theory' internally coherent, or was it fraught with instability and conflict? Were there competing ways of conceptualizing climate and its influence on human beings? If so, what were the causes and consequences of this conceptual disagreement? 3) To what extent did climate theories have concrete repercussions on individual and social life? To what uses did they lend themselves, and what practical conducts did they inspire? Did ancient and Renaissance climate theorists conceive of climatic influence as an insurmountable force, or did they envision ways in which it could possibly be resisted?

Building on the groundwork in Chapter 1, Chapters 2 through 4 consider in greater detail some uses and developments of climate theories in seventeenth-century Europe and the colonies overseas. In the sixteenth century, climate theory was rekindled and popularized through the work of physicians, natural philosophers, political theorists, travel writers, compilers, and commentators of ancient texts; yet it was only in the seventeenth century that this wealth of knowledge was fully digested and came to inform actual practices and policies on an unprecedented scale. In an age of growing concern of nation states with the strength and prosperity of their populations, climate theory provided the single most authoritative body of conceptual tools to think about national improvement, in both quantitative (e.g. demographic growth, increased productivity) and qualitative terms (e.g. physical health, military prowess, moral and civil conduct, intellectual skills).[58] From Herodotus to Bodin, climate was traditionally understood as a major component of both individual and collective identity: it was primarily because of their different climates—these theorists argued—that Italians were vengeful, Frenchmen fickle, Germans gluttonous, and so forth.[59] Knowing the environmental determinants of 'national character'

[58] See Slack 1999; Glimp 2003; Slack 2014.
[59] See Glacken 1967 (Chapters 1.2, 2.2, 3.2); Lestringant 1982a: 218-21; Floyd-Wilson 2003; Boia 2005: 23.

was thus of the utmost importance for understanding why certain peoples behaved in certain ways, how they should be governed (or how they could be conquered), and what was needed to reform their character and behaviour.

In light of this alleged link between national character and environmental conditions, climate theory prompted the idea that by controlling not only *space* but *place*—namely, the physical landscape of a country and its peculiar climate—one could also control those who inhabited it. Climate, in other words, could be conceived at once as a fundamental constraint for political activity and as an extraordinary device for collective 'governmentality'.[60] Such a mounting interest in the national implications of climate helps explain why, starting in the sixteenth century, the search for ways to cope with climatic influence became an increasingly pressing concern for European thinkers and policy-makers.

This is the story reconstructed in Chapters 2 to 4. Each of these chapters explores a different way of coping with climatic influence: corrective regimen (Chapter 2); temporary and permanent relocation (Chapter 3); and environmental engineering (Chapter 4). By drawing attention to this multiplicity of coping strategies, I aim to lay bare the anti-deterministic core of early-modern climate theory as well as the great diversity of attitudes that people living in this period developed in reaction to their perceived 'embeddedness in nature'.

[60] The term 'governmentality' is one of a small number of concepts that I have taken from Michel Foucault's 'toolbox' and actively used to frame my research. Governmentality, for Foucault, embraces a range of techniques and procedures that are designed to govern the conduct of both individuals and populations (see O'Farrell 2005: 107). Although the term may also refer to the way in which states exercise control over their populations, the concept of governmentality (as opposed to the traditional notion of 'government') shifts the emphasis from classic agents of power, such as central authorities, states or institutions, to a much wider range of actors involved in the process of 'governing' people (that is, for Foucault, of 'conducting conduct'). Foucault's concept of governmentality, first introduced in his 1978-1979 course on bio-politics at the Collège de France (Foucault 2004b; compare Foucault 1991), has inspired a whole wave of studies (often called 'governmentality studies'): for a representative example, see Rose 1999.

A first way to negotiate climatic influence, explored in Chapter 2 ('Tempering Temperament: The Medico-Moral Economy of Environmental Influence'), was 'corrective regimen': a regulated manner of living, covering all aspects of a person's lifestyle (from diet and exercise to sleep and personal hygiene), that aimed specifically at correcting the temperamental 'imbalances' due to climate.[61] Drawing upon a wide range of medical and dietetic texts published across all Europe, the chapter elucidates the intellectual background, social contexts, and ethical implications of early modern regimen as a way of coping with climatic influence. After identifying the origins of 'corrective regimen' in the ancient tradition of dietetics (of which Hippocrates, Galen, and Plutarch are significant representatives), this chapter sheds light on the diverse, and sometimes contradictory, forms of climate-related dietetic advice in early modern Europe. At once prescriptive and protreptic, early modern books of health-care were usually constructed in such a way as to emphasize the readers' personal responsibility in taking care of their own health.[62] This rhetoric of self-care was, on the one hand, intimately connected to the individualistic character of early modern dietetics; on the other hand, it also performed a more subtle ethical function, turning the essentially *heteronomous* discourse of climate theory (which subordinated human character to external forces) into the *autonomous* discourse of self-discipline (which described human character as the product of free ethical choices).[63] Such a discourse, as the chapter highlights, was profoundly tangled up with ethnic, social, and gender issues: by targeting—in practice if not in theory—a public of upper-class, educated, and predominantly (though not exclusively) male readers, health-care books accentuated the divide between the privileged few who could refashion themselves in conformity with

[61] See Vigarello 1993: 54-86.
[62] See Richards 2012.
[63] My discussion of dietetic self-discipline is indebted to Foucault's understanding of ethics as autonomous 'subjectivation'—that is, as an intentional activity performed by individuals in order to constitute themselves as free moral subjects. See Foucault 1997; Foucault 2001.

an ideal of 'temperance and temperateness',[64] and the much larger number of those condemned to remaining under the sway of climate.[65]

Chapter 3 ('"Make Choise of a Fitt Place": Climate Theory and Human Mobility in the Early Colonial Age') turns to individual and collective resettlement as a second possible strategy for coping with climatic influence. Scholars have long drawn attention to the deep implications of climate theory for early modern conceptions of travel and mobility. Notions of climatic influence particularly shaped the way in which geographical displacement was theorized and practiced in early colonial contexts:[66] since bodily and moral health were thought to consist in a 'state of ecological harmony' between one's complexion and the surrounding environment, 'changes of air' understandably elicited fears of physical disease, identity loss, and moral degeneration among the colonists.[67] Scholars, however, have tended to overlook the existence of a different, and equally influential, early modern perspective on geographical displacement—one that emphasized its potentially beneficial effects on human health and character. According to this competing discourse, the transformative effects of relocation were less a threat to defuse than a resource to exploit for positively re-engineering human nature. After tracing back the origins of this alternative viewpoint to ancient authors such as Hippocrates, Livy, and Galen, Chapter 3 examines some examples of positive attitudes to (and uses of) mobility and resettlement in the early colonial period. Drawing upon colonial records, travel accounts, promotional literature, missionary letters, and other sources, it shows that climate theory shaped colonial practices on many levels: by orienting the choice of prospective sites for settlement; by persuading Europeans to abandon their 'native airs' in

[64] Hill 2013. See also Courtois 2007: 160.
[65] Floyd-Wilson 2003; Feerick 2010.
[66] Kupperman 1982; Kupperman 1984; Feerick 2010; Earle 2012.
[67] Kupperman 1984: 213; Neill 1994; Merians 2001; Earle 2012; Hill 2013.

favour of supposedly ideal environments; and by inspiring plans for the forced resettlement of subjugated populations.

The fourth and final chapter of the dissertation ('Engineering Environmental Influence: Place-Making, Climate Change, and Human Improvement') discusses direct human intervention on nature as a third major way of coping with climatic influence. Over the course of the seventeenth century, traditional views of climate as fixed and unchangeable gradually gave way to a new understanding of climatic influence as itself shaped by various forms of human agency on the physical environment (including gardening, husbandry, forestry, hydraulic engineering, and urban planning). The chapter argues that in the second half of the seventeenth century—in the wake of technological advances, changes in the way of producing and sharing knowledge, and ever-closer ties between science and power—climate theory became instrumental to ambitious plans of environmental 'improvement' with the ultimate purpose of human engineering and social reform.

While it did not promise (nor even imply) that man could be free from the 'imperious law of climate' (as one eighteenth-century theorist vividly called it),[68] the ideology of environmental 'improvement' allowed man an unprecedented degree of self-determination vis-à-vis of climatic influence. In so doing, it continued, and indeed strengthened, a trend already seen in Chapter 3, towards a more optimistic view of climatic influence as a resource to exploit rather than (merely) a force to resist. Not unlike geographical displacement, environmental engineering sought to take advantage of the transformative powers of climate instead of attempting to minimize them. But while the paradigm of geographical displacement was essentially adaptive in character, the ideology

[68] Moheau 1778: 191 ('la loi impérieuse du climat'). The expression echoes Montesquieu's famous definition of climate as 'le premier de tous les empires' in *Esprit des lois*, 19.14 (Montesquieu 1951, vol. 2: 565).

of environmental improvement theorized a more proactive attitude towards the management of climatic influence, as it suggested that the transformative powers of climate could not simply be exploited, but also positively re-engineered.

Two caveats, however, are in order. First of all, the new ideology of environmental 'improvement' was by no means universally accepted in early modern Europe—not even within those very milieus (such as the Royal Society of London) that were at the forefront in its formulation. The contrast of opinions between advocates and opponents of 'improvement'—examined in Chapter 4 through select case-studies of theoretical and practical resistances to anthropogenic environmental change—neatly captures the flexibility of climate theory as a rhetorical tool within early-modern environmental discourse, as both sides appealed to the argument of climatic influence in order to support their competing claims.

The second caveat relates to the historical development of corrective regimen, resettlement, and environmental change as ways of coping with climatic influence. While the latter gained a certain prominence over the course of the seventeenth century, it did not, by any means, lessen the importance of regimen and resettlement, both of which continued to be influential in theory and practice throughout early modernity (and beyond).[69] The three attitudes to climatic influence considered in this study—the *reactive*, the *adaptive*, and the *proactive*—were always, to some extent, simultaneously present in the period under examination; speaking of an actual 'shift' from one to another may therefore be an undue exaggeration. It is perhaps more appropriate to consider how each of these attitudes, and the coping strategies that they inspired, evolved during this period in accordance with specific historical circumstances, and how each of them interacted with

[69] This is especially true of regimen, as recent studies on nineteenth-century tropical medicine have shown (see Arnold 1996a; Bhattacharya 2012). It is less true of resettlement, since concepts of climatic adaptation changed deeply with the advent of racial biology in the nineteenth century (see Harrison 1999).

the others and was modified in the process. Regimen, for instance, became increasingly bound up with displacement during the early colonial period, insofar as diet and hygiene were elevated to key aspects of the prescribed conduct of European travellers and colonial elites.[70] Resettlement and environmental change were also tightly connected: indeed, judgements of suitability of prospective colonial sites were based as much on projections of future improvements as on an evaluation of their present, 'natural' state.[71]

The extraordinary pervasiveness of climate theory in early modern sources of all kinds has often lured scholars into thinking that belief in climatic influence was universal in this period—that it worked as a sort of Kuhnian 'paradigm' or Foucauldian 'episteme',[72] and that those who did not write about it simply failed to spell it out, either because they never had a reason or a chance to do so, or because they took it for self-evident.[73] The point is methodologically sensitive: reading silences as tacit endorsements may indeed engender a concrete risk of over-interpreting or misinterpreting our sources.

What is true, however—and the concluding 'Epilogue' will make this point clear—is that the notion of climatic influence does not seem to have been openly challenged until the mid-eighteenth century, when the first articulated rebuttals appeared with Hume's essay 'Of National Characters', published in the same year as Montesquieu's *Esprit des lois* (1748), and the work of other French Enlightenment thinkers such as Holbach and Helvétius.[74] Before then, controversies and disagreements had for the most part taken place *within* the tradition of climate theory itself.[75] Thus the Italian-born scholar Julius Caesar

[70] Kupperman 1984; Earle 2012; Hill 2013.
[71] Kupperman 1982: 1287.
[72] For a helpful clarification of these concepts and their mutual differences, see Maclean 1999.
[73] See, e.g., Floyd-Wilson 2003, where climatic influence is described as 'an unquestioned commonplace' of sixteenth-century thought (35).
[74] See Ehrard 1963 (vol. 2, Chapter 11); Benrekassa 1983; Larrère 1992; Larrère 2012.
[75] This is already true of ancient debates on environmental influence: see, e.g., Staszak and Couzinet 1998: 19-21, on the Posidonius-Strabo controversy. An important point that I have not been able to address in detail in this dissertation concerns religious critiques of climate theory—or, rather, the lack thereof (see Dainville

Scaliger (1484-1558) and his younger compatriot Girolamo Cardano (1501-1576) diverged on almost every aspect of their climate theories, bar the principle of climatic influence itself.[76] In a similar way, the English physician and polymath Thomas Browne (1605-1682) criticized his contemporaries for believing in the 'influence of the starrs' and the 'action of the sunne', but confirmed that 'the propriety of clime', the 'condition of soyle', and other 'principles of the place' had a proven influence on all living beings, not excepting humans.[77] Even Michel de Montaigne, who said of himself: 'To me all climates are the same' in a proud assertion of self-mastery,[78] acknowledged 'by experience' that 'the very form of our being—not only our colour, build, complexion and behaviour but our mental faculties as well—depends upon our native air, climate and soil'.[79] Similar discussions were also taking place outside traditional intellectual arenas, as the seventeenth-century disputes on the insalubrity of Roman air, the draining of the English Fens, and the reforestation of degraded colonial environments abundantly testify.[80]

By delving deeper into such places of controversy and debate, this dissertation offers an intellectual history of early-modern climate theories that takes into full account the relationship between tradition and innovation, the interplay between ideas and practices (and their historical contexts), the interactions of 'high' and 'popular' culture, and the extraordinary degree of conceptual diversity, dissension, and contradiction that the early-

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1969: 141-44; Staszak and Couzinet 1998: 26-27). I have briefly touched upon this aspect in a separate, forthcoming study ('The Censor as Reader': see Bibliography, section 3).

[76] See below, 1.3.2.b.

[77] Browne 1981, vol. 1: 353 (4.13), 364 (4.13), 487 (6.7).

[78] Montaigne 1993: 1102 (3.9, 'De la vanité': 'La mutation d'air et de climat ne me touche point. Tout ciel m'est un').

[79] Montaigne 1993: 648 (2.12, 'Apologie de Raimond Sebond': 'Par experience nous touchons à la main que la forme de nostre estre despend de l'air, du climat et du terroir où nous naissons, non seulement le tainct, la taille, la complexion et les contenances, mais encore les facultez de l'ame'). Further evidence of Montaigne's environmentalistic ideas can be found in his *Journal du voyage en Italie par la Suisse et l'Allemagne en 1580 & 1581*, of which Élisabeth Schneickert and Lucien Vendrame have recently published a critical edition (2012).

[80] On the Fens, see Darby 1968; Hiltner 2011. On colonial reforestation, see Grove 1995. On Roman air, see below, 2.3.1 and 4.5.2. The issue is also at the centre of my forthcoming study, 'Wholesome or Pestilential?' (see Bibliography, section 3).

modern climatological *koiné* was able to accommodate. Focused primarily on the 'long' seventeenth century, it proposes to reappraise this period as a crucial chapter in the 'genealogy' of that 'shared space' in-between nature and culture in which the history of our planet and that of mankind itself were, and still are, jointly made.[81]

[81] For climate theory as an 'espace commun' between nature and culture, see Benrekassa 1983; Bergevin 1992: 74; Larrère 2012: 153. I borrow the term 'genealogy' from Foucault (who in turns derives it from Nietzsche): 'genealogy', as Foucault defines it, is a form of historical enterprise that seeks to 'maintain passing events in their proper dispersion', 'to identify the accidents, the minute deviations—or conversely, the complete reversals—the errors, the false appraisals, and the faulty calculations that gave birth to those things that continue to exist and have value for us' (Foucault 1984: 81). Original French version in Foucault 2004: 'maintenir ce qui s'est passé dans la dispersion qui lui est propre […] repérer les accidents, les infimes deviations—ou au contraire les retournements complets, les erreurs, les fautes d'appréciation, les mauvais calculs qui ont donné naissance à ce qui existe et vaut pour nous' (400).

CHAPTER 1

A Climate of Thought:

Theories of Environmental Influence

from Antiquity to the Renaissance

What is found at the historical beginning of things
is not the inviolable identity of their origin;
it is the dissension of other things. It is disparity.

—Michel Foucault[1]

1.1. Introduction

The Renaissance is often described as the 'golden age' of climate theory. It certainly was; yet rather than invent this doctrine, it largely inherited it from much earlier times. Climate theory was born in classical Greece, where it was first expounded by authors such as Herodotus, Plato, Hippocrates, and Aristotle. Further developed in the Hellenistic period, it reached the Latin world during the time of Rome's eastward expansion and continued to grow throughout the early centuries of the Christian era, making its way into late-antique and early-medieval encyclopedic compilations and thus becoming part of a widespread standard education. Throughout the Middle Ages, the tradition of climate theory was kept alive partly through Latin and Arabic commentaries on ancient texts, partly through original works, such as Albert the Great's *De natura loci* (composed in the mid-thirteenth century) and Thomas Aquinas's *De regimine principum* (left unfinished around 1267, and subsequently completed by Tolomeo of Lucca). When Renaissance authors set out to

[1] Foucault 1984: 79. Original French version in Foucault 2004c: 'Ce qu'on trouve, au commencement historique des choses, ce n'est pas l'identité encore préservée de leur origine—c'est la discorde des autres choses, c'est le disparate' (396).

'reinvent' climate theory in an age of geographical discoveries, colonial expansion, and nation-building, they did so with constant reference to this broad range of pre-existing sources, including some—such as the fundamental Hippocratic treatise *Airs, Waters, Places*—that had been almost entirely forgotten for several centuries.[2] It is therefore impossible to understand early-modern climate theories and their various implications and uses without considering, however briefly, the ancient climatological tradition from which they emerged and with which they never ceased to entertain a lively and fruitful dialogue.

This chapter intends to provide a concise, and by no means exhaustive, overview of climate theory from its earliest formulations in ancient Greece to the great systematizations of the mid-sixteenth century, including those of Levinus Lemnius (1505-1568), Girolamo Cardano (1501-1576), Juan Huarte (1529-1588), and Jean Bodin (1529-1596). My chief goal will be to show how the theory of climatic influence never came to be synthesized into a single, internally consistent, and historically static doctrine. The capacity of climate theory to accommodate competing ways of conceptualizing climate and its influence on human beings was one of the main reasons of its long-lasting success; it also had concrete repercussions on individual and social life, as different versions of the theory lent themselves to different uses and inspired different kinds of behaviour in the face of environmental influence. Drawing attention to the mutual implication of ideas and practices, this chapter specifically isolates three major 'coping strategies' or practical responses to ancient and modern doctrines of climatic influence—namely, corrective discipline, geographical mobility, and planned environmental change. Each of these will be examined in greater detail in the following chapters.

[2] See below, section 1.3.1.

1.2. Ancient Climate Theories: Birth of a Tradition

The relationship between mankind and the natural world was a critical concern in classical times. In a time when, as Mary Floyd Wilson has noted, 'the demarcation between human and environment was only faintly drawn',[3] nature—broadly defined—was worthy of attention not only because of the resources it could yield or its strategic value, but also, and perhaps most importantly, because of the influence that it was thought to exert on all living beings, humans included. From it came the air that man breathed, and that turned into *pneuma*—the 'vital spirit'. From it came the food that man ate, and that turned into flesh and bones. Thus, the natural environment was seen not only as the stage and context of all human action, but also, quite concretely, as the raw material of which humans themselves were thought to be made.

From Plato to Galen, countless authors from different periods, regions, and disciplinary fields concurred to craft a vision of mankind as deeply embedded in, and shaped by, the surrounding environment. What these thinkers created was more than a philosophical doctrine; rather, it was an epistemic paradigm—a whole way of making sense of the world and of all human experience within it—and one that was bound to orient Western thought and practice for centuries to come.

Climate theory, to put it in a nutshell, proposes that environmental factors are responsible not only for differences in the outward appearance and physical constitution of human beings, but also for variations in their character, lifestyle, and moral behaviour. Both bodies and minds, in other words, are deemed to fall under the influence of place and climate. Moreover, such an influence supposedly operates at both an individual and a

[3] Floyd-Wilson 2003: 29 (with specific reference to *Airs, Waters, Places*, henceforth quoted in footnotes as *AWP*).

collective level, as it crucially contributes to determining the ethos of human groups living together in the same place. Pushed to its extreme consequences, the notion of environmentally determined national characters enabled classical authors such as Hippocrates (or, to be more exact, the Hippocratic author of *Airs, Waters, Places*) and Aristotle to develop sophisticated geo-ethnological justifications of Greece's superiority over the rest of the known world.[4] Midway between the soft, effeminate peoples of Africa and Persia and the uncouth 'Scythians' roaming the frozen steppes of northeastern Europe, the Greeks were indeed blessed with perfect climatic conditions to develop a civilized and temperate life. Possibly initiated by the Greek historian Herodotus (484?-420? BC), this type of geo-ethnological inquiry was later embraced and revised by Hellenistic and Latin authors such as the Roman architect Vitruvius (90?-20? BC) and the Alexandrian mathematician and astrologer Ptolemy (AD 100?-170?), each of whom considered his own native country as having the best possible climate—and therefore as the cradle of civilization.[5] Thus constantly readapted in response to shifting contexts and purposes, geo-ethnology was bound to remain one of the most important areas of attention for climate theorists of all times, mostly on account of its critical implications for historiography and political theory.[6]

1.2.1. CONSENSUS AND DISAGREEMENT

The extraordinary and long-lasting success of climate theory should not lure us into treating the latter as a monolithic and unchallenged tradition of thought. Despite

[4] For the debate on authorship of *AWP* and of the Hippocratic corpus in general, see Van der Eijk 1991; Jouanna 1992: 85-105.
[5] Ptolemy, *Tetrabiblos*, 2.2.56-58 (Ptolemy 1940: 121-27).
[6] For this geo-ethnological tradition, see in particular Floyd-Wilson 2003.

widespread consensus over its basic tenets, climate theory was, since its earliest origins and throughout its centuries-long history, subject to a considerable degree of debate and controversy on both points of detail and major issues.

Ancient climate theorists, much like their early modern followers, disagreed not only about which natural factors most influenced human beings, but also about how their influence operated concretely. Did the environment shape the human body directly by altering the balance of qualities (cold, moist, hot, dry) and humours (phlegm, blood, yellow bile, black bile) which constituted the 'temperament' of all living beings, as Hippocrates and his school were the first to suggest? Or was it all a matter of adaptive responses that humans more or less consciously developed in response to challenging local conditions, as Herodotus seemed to suggest when he explained the Persians' extraordinary endurance to physical labour in light of the 'ruggedness' and 'barrenness' of their native soil?[7] Did cold places produce cold temperaments, and hot places hot temperaments, as a Hippocratic tradition partly followed by Galen authoritatively stated, or was Aristotle right in arguing that a process of *antiperistasis* (reaction roused by an opposite principle) caused cold temperaments to arise from hot places, and vice versa?[8] Larger questions also came to be raised in this context, about nature in general but also, more particularly, about its relationship with man's role as a geological agent. For instance, is nature stable and unchanging, or is it subject to processes of alteration, degradation, and decay?[9] And if it

[7] Hdt., 9.122 (Herodotus 1920-1925, vol. 4: 301).
[8] Although the concept of *antiperistasis* can be traced back to the pre-Socratic philosopher Empedocles and to Plato's *Timaeus* (79e10-80a6), it was Aristotle who gave it full explanatory value in the natural sciences by applying it extensively to his physical, meteorological, and biological research (see Meyer 1904; Mulsow 1998: 47-102). While remaining largely faithful to the Hippocratic standpoint, Galen partly incorporated the concept of *antiperistasis* (with an explicit acknowledgement of its Aristotelian origins) into his discussion of climate and temperament in Book 2 of *De temperamentis*.
[9] See, for instance, Lucretius on the ageing earth (2.1157-1174), Aristotle on changing sea levels (*Mete.*, 1.14, 351a19-353a26), and Strabo's numerous examples of environmental alteration, both natural and man-made (1.3).

does indeed undergo such processes, what role—if any—does human agency play in this picture?

Since the ancients proposed different answers to such questions, classical climate theory is best described as a very diverse body of knowledge fraught with conflicting views and outright contradictions, rather than a coherent whole. Although this relative inconsistency can sometimes prove frustrating for the modern scholar, who risks getting lost in a maze of incompatible claims, it is also what endowed ancient climate theory with a flexibility and resilience that were ultimately crucial for its enduring success. Indeed, as we shall see later in greater detail, this open-ended character of climate theory allowed for its appropriation by authors working within different, and sometimes plainly conflicting, theoretical frameworks: Aristotelians and anti-Aristotelians, Galenists and anti-Galenists, proponents and adversaries of astrology, and so forth.

1.2.2. WHAT IS 'CLIMATE'?

An additional difficulty in dealing with ancient climate theory is related to terminology. The very meaning of the word 'climate' has changed so deeply over time that speaking of ancient *climate* theory may itself be seen as highly controversial. According to some scholars, using the word 'climate' with reference to ancient natural-philosophical thought is doubly inappropriate: first of all because the Greek term 'klima' carried quite a different meaning from that of its modern equivalent; secondly, and perhaps more importantly, because ancient Greek seems to lack a single word capable of encompassing all of the aspects covered by the modern term 'climate'.

When the Greek word 'klima' (literally: 'slope', 'inclination') made its way into geography-related discussions, thanks to mathematicians and astronomers such as Eratosthenes of Cyrene (284-192? BC) and Hipparchus of Nicaea (190?-120? BC), it first only served to designate each of the seven 'bands of latitude' into which the *oikoumenē*, or inhabited world, could be divided based on differences in the length of the solstitial day. As such, the concept had a purely cosmographical function and bore no relation whatsoever to what we now understand by climate—namely the 'prevalent pattern of weather in a region'.[10] Not only did this technical use remain dominant for centuries to come; it also affected the meaning of the (very rare) Latin word 'clima', which is still paraphrased as 'inclinatio coeli' in Du Cange's late seventeenth-century *Glossarium mediae et infimae latinitatis*, later reprinted several times in augmented versions.[11] Modern vernacular words modelled after the Latin 'clima' (such as the Italian 'clima' and the French 'climat') likewise retained this technical meaning well into the eighteenth century.[12] Even though a different, temperature-related use of the word was already common by then, several sixteenth-century maps and portolans still identified bands of latitude as 'climi', as attested for instance in Paolo Forlani's *Universale descrittione di tutta la terra conosciuta fin qui*, printed in Venice by Donato Bertelli in 1565 (see Figures 1 and 2).

[10] See OED, article 'Climate'.
[11] See Du Cange, *Glossarium mediae et infimae latinitatis*, article 'Clima'. For a classical example of this use, see Vitr., *De arch*., 1.1.10. The Latin word *clima* was apparently never used with reference to weather before the late fourth century AD: see L&S, article 'Clima'. Robert Estienne's *Dictionarium latinogallicum* (1552) has a short entry 'Clima' ('Un climat et certaine division du ciel') in which he references Vitruvius and Columella.
[12] See, for instance, the first meaning listed for 'Clima' in Battaglia's historical dictionary of Italian (1961-2004, vol. 3: 227); see also the entry 'Climat' in the fourth volume of the *Encyclopédie méthodique* (1792). In his *Tableau du climat et du sol des États-Unis* (1803), Volney offers an illuminating comment on the semantic evolution of the French word 'climat': he writes that the 'literal signification of the word' is 'the degree of latitude of a country: but since, generally speaking, countries are hot or cold according to their latitude, the secondary idea has become so intimately associated with the primitive, that the term *climate* is now synonymous with that of the *habitual temperature* of the air' (Volney 1806: 124-25).

Figure 1 (above). Paolo Forlani, *Universale descrittione di tutta la terra conosciuta fin qui* (Venice: Donato Bertelli, 1565). © Library of Congress, Washington D.C.

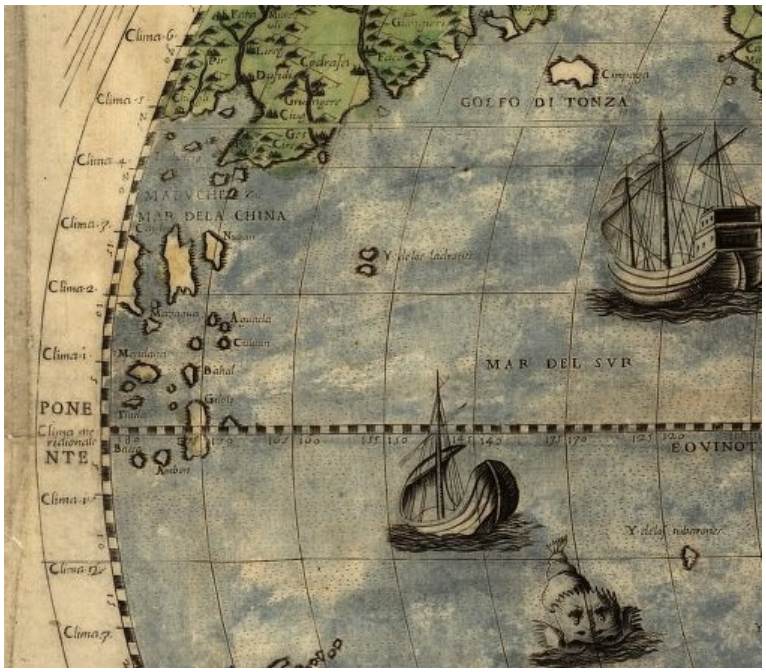

Figure 2 (above). Latitudinal bands as 'climi'. Forlani, *Universale descrittione*, detail. © Library of Congress, Washington D.C.

Does this mean that speaking of 'climate' theory in ancient, medieval, and early modern contexts ought to be avoided as a gross anachronism? Several considerations authorize us to draw the opposite conclusion. First of all, there is some evidence of a weather-related (and thus 'modern') use of the term 'klima' within the Greek-speaking world during the period of Roman domination. In the first century BC, the Syrian polymath Posidonius of Apamea was apparently the first to observe that differences in latitude ('klima') consistently translated into differences in temperature. He thus proceeded to combine the old mathematical model of Eratosthenes and Hipparchus, which divided the *oikoumenē* into seven bands of latitude, with Aristotle's theory of a tripartite world, comprised of hot, cold, and temperate zones. By doing so, Posidonius actively modified the meaning of the word 'klima', which thereafter came to identify 'the parts of the earth located between two parallels' insofar as they are 'distinguished by the nature of their flora, fauna, and the human races living there'.[13] Although this new meaning did not immediately replace the older one,[14] Posidonius's understanding of 'klima' comes close to one of the current meanings of the word 'climate', which is indeed 'a region considered with regard to its prevailing weather conditions', especially 'as these affect human, animal, or plant life'.[15]

As for the argument that ancient Greek lacks a single word capable of encompassing all of the aspects covered by the modern term 'climate', this is, upon closer inspection, only partially accurate. It is true that the Greeks tended to focus on individual features of the 'prevalent pattern of weather in a region', instead of conceptualizing

[13] Altmann 2005: 222-23. Other early uses of 'klima' in its temperature-related sense are attested in Dion. Hal., *Ant. Rom.*, 1.9; Plut., *Mar.*, 11; Plut., *Aem. Paul.*, 5; Polyb., 7.6.1; Polyb., 10.1.3; Ath., 12, 523c.; Ptol., *Tetr.*, 2.2.55.

[14] The earlier, cosmographical meaning of *klima* and the new, climatological one coexisted throughout Antiquity and are sometimes found side by side in the same text. Strabo's *Geography*, written in the early decades of the first century AD and deeply influenced (in complex ways) by the thought of Posidonius, is a good case in point: see, for instance, 1.1.12 and 2.5.34 for the 'old' meaning of 'klima'; 2.3.7 for the 'new' meaning.

[15] OED, article 'Climate', 1c and 2a.

climate as a whole: they spoke, for instance, of regions that were either cold or hot ('psychroi' vs. 'thermoi'), wintry or warm ('cheimerinoi' vs. 'aleeinoi'),[16] dry or damp ('xēroi' vs. 'hygroi' or 'notioi'), waterless or well-watered ('anydroi' vs. 'enydroi' or 'hydateinoi'); they also contrasted 'places with a good flow of air' ('eupnooi topoi') to 'hollow and marshy places' ('koiloi kai helōdeis topoi'),[17] and carefully studied the position ('thesis') of each place 'with respect to the winds and to the risings of the sun'.[18] Often, where modern translators have recourse to the word 'climate', the original Greek text is actually referring either to something more specific, such as the 'nature' or 'temperament of the seasons' ('hē physis' / 'hē krēsis tōn hōreōn'),[19] or to something more general—for instance the 'state of the air' ('hē tou aeros katastasis') or the totality of 'surrounding conditions' ('ta tou periechontos katastēmata', literally 'the state of what is all around').[20] Yet as these examples themselves make clear, even assuming that the Greek language may have lacked a single word capable of expressing the concept 'climate', the notion itself was not foreign to Greek culture. Besides, it is not infrequent to see generic words such as 'nature' ('physis') or 'air' ('aēr') invested by their context with a meaning very close to that of the modern word 'climate', just as happens with the word 'caelum' (or 'coelum') in classical and post-classical Latin.[21]

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[16] Arist., *[Pr.],* 14.13.5-6 (2011, vol. 1: 445 [Mayhew ed.]). For the revised Oxford translation, see Aristotle 1984, vol. 2: 1414.
[17] Arist., *[Pr.],* 14.7.41-2 (2011, vol. 1: 441 [Mayhew ed.]). For the revised Oxford translation, see Aristotle 1984, vol. 2: 1413.
[18] *AWP*, 1.14-15 (Hippocrates 1923: 71).
[19] *AWP*, 12.39-40; 12.14 (Hippocrates 1923: 107). Jones translates 'the character of the seasons' in the former case and 'the temperate climate' in the latter.
[20] Ptol., *Tetr.*, 2.8.84 (1940: 180, translated 'weather' by Robbins); 2.2.58 (1940: 127).
[21] See, for instance, *AWP*, 13.21 ('en toiautēi physei') and Ptol., *Tetr.*, 2.2.56 ('to periechon autous tou aeros katastēma' and 'ho tou periechontos autous aeros cheimōn', which Robbins translates 'their climate' and 'the wintry character of their climate' respectively). Robert Mayhew, who authored the most recent translation of the pseudo-Aristotelian *Problemata*, argues that the Greek word 'krasis' (ion. 'krēsis') at 14.1.4 ought to be translated 'climate' (Aristotle 2011, vol. 1: 439, footnote). However, most translators (including E.S. Forster, whose version of the *Problemata* is included in the standard English translation of Aristotle's works [Aristotle 1984, vol. 2: 1413]) prefer to keep to its most common meaning ('mix', thus 'temperament'), I

In conclusion, it seems fully legitimate to speak of ancient 'climate' theory, as long as we are aware that the ancients did not necessarily conceptualize 'climate' as we do today, and that the word itself has a long and complicated history. It is especially important to keep in mind that ancient theories of climatic influence, just like their medieval and early modern counterparts, had a broad and varied understanding of the physical factors allegedly affecting human bodies and minds; climate in its modern sense ('prevalent pattern of weather', with a particular attention to temperature) was, indeed, only one among such factors, and not necessarily the most significant one. For many authors, both ancient and modern, specific landscape features such as the presence of running or standing waters, the quality of the soil, the hilly or flat nature of the land were just as critical as temperature and weather in determining individual temperament and national character. Others, such as Strabo and Ptolemy, believed that the sun and other heavenly bodies co-operated with climate and landscape in defining the nature of a given locale; consequently, they recommended that each place be identified not only by its relative position on earth (latitude and longitude), but also with respect to the 'vault of heaven'.[22] Throughout history, authors have understood and applied the notion of 'climate' in many different ways—and this is something crucial to keep in mind in studying climate theories and their disparate uses over time.

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believe with good reason. For uses of 'caelum'/'coelum' as synonymous with 'aër' in classical and late-antique Latin, see article 'Caelum', TLL, 3.0.91.45-60.

[22] Strab., 1.1.14 (Strabo 1917: 27); Ptol., *Tetr.*, 2.1.55 (Ptolemy 1940: 121) and 2.2.58 (127).

1.2.3. Classifying Climate Theories

a) The Taxonomies of Altmann and Glacken

Scholars who have studied climate theory closely enough to acknowledge the vast diversity of its individual expressions have also suggested that such a multiplicity may be made more manageable by identifying a few overarching types. Among the most convincing taxonomies to date are those of the Austro-Hungarian rabbi and intellectual historian Alexander Altmann (1906-1987) and the American historian of geography Clarence Glacken (1909-1989).

According to Altmann, ancient climatology originally comprised three main strands, namely 'geographical climatology', 'causal climatology', and 'astrological climatology'. Geographical climatology was nothing but the theory of the seven *klimata* in its earliest, purely 'cosmographical' version, formulated by Eratosthenes of Cyrene in the third century BC. This theory, as we have seen, was merely descriptive and did not aim at establishing any causal correlation between a given place and the nature of its inhabitants.

Proponents of 'causal climatology', on the other hand, explicitly posited such a correlation. Altmann particularly regards the Hippocratic treatise *Airs, Waters, Places* as the first example of this line of thought, traces of which, he argues, 'can be found in the writings of Plato and Aristotle'.[23] At its initial stage, causal climatology proposed a simplified tripartite scheme: the Boreal hemisphere (which encompassed all of the known inhabited world at the time) was roughly divided into a cold, a hot, and a temperate zone in the middle, where civilization was thought to flourish; on the other hand, part of the cold

[23] Altmann 2005: 223. Altmann's article was originally composed in 1944 and published in Hebrew in the short-lived periodical *Melilah* (1 [1944], 1-17). I refer here to its more recent translation and reprint with a prefatory note by Lenn J. Schramm (2005).

zone (above the Arctic circle), as well as part of the hot zone (below the Tropic of Cancer), were considered plainly uninhabitable. This scheme, as Altmann himself acknowledges, would become more sophisticated after Posidonius brought together the theory of the three zones and that of the seven climates, thus merging 'geographical and causal climatology into a single doctrine'.[24]

From the second century BC onwards, Altmann argues, Posidonius's combined model had but one major competitor: 'astrological climatology', which differed from the former insofar as it 'held that the seven climates correspond to the seven planets'. In other words, astrological climatology 'replaced the natural factors—air, water, soil, and the like—with the influence of the stars'.[25] While Altmann fails to name any prominent thinker from this strand, he does however mention the Syrian gnostic Bardesan, or Bardaisan (154-222), who formulated a critique of astrological climatology in his *Book of the Laws of the Countries*. We may therefore assume that the Jewish scholar had the late-Hellenistic tradition in mind, as the latter was Bardesan's chief polemical target.[26]

Although Altmann is not explicit on this point, his taxonomy seems to imply a hierarchy between different causal tiers. Pre-Posidonius geographical climatology, which is purely descriptive and makes no causal claims, occupies tier 0. Causal climatology,

[24] Altmann 2005: 222.
[25] Altmann 2005: 224.
[26] In his *Book of the Laws of the Countries*, Bardesan states: 'The astrologers say that the earth is divided into seven portions, which are called Zones; and that over the said portions those seven stars have authority, each of them over one; and that in each one of the said portions the will of its own Potentate prevails; and that this is called its law. […] The astrologers have invented this statement as a device for the promotion of error. For, although the earth be divided into seven portions, yet in every one of the seven portions many laws are to be found differing from one another. For there are not seven kinds of laws only found in the world, according to the number of the seven stars; nor yet twelve, according to the number of the signs of the zodiac; nor yet thirty-six, according to the number of the Decani. But there are many kinds of laws to be seen as you go from kingdom to kingdom, from country to country, from district to district, and in every abode of man, differing one from another' (in Roberts and Donaldson 1951, vol. 8: 732). Much of the material on which Bardesan builds bears close resemblance to the analogous discussion of astrology in the pseudo-Clementine *Recognitions*, especially 9.17-27 (in Roberts and Donaldson 1951, vol. 8: 187-89), where the 'doctrine of climates' is explicitly rejected (see in particular Chapter 27 [Roberts and Donaldson 1951, vol. 8: 189]).

including Posidonius's combined model, occupies tier 1, as it envisions a set of causal correlations between earthly natural conditions and ethnic characters. Astrological climatology, finally, occupies tier 2, as it deems those earthly natural conditions to be themselves determined by a more remote cause: 'the familiarity of the signs of the zodiac and also of the stars with the several climes'.[27]

Such a distinction between multiple causal tiers is a fundamental strength of Altmann's taxonomy, even though it remains insufficiently developed in his own account. On the other hand, a major flaw of Altmann's classification is that it groups too many different varieties of climate theory under the single umbrella term 'causal climatology'. While Altmann is aware of the critical difference between terrestrial and heavenly causality, he does not seem to consider the fact that terrestrial causality was itself thought to function in very different ways, depending for instance on whether landscape or weather was regarded as the primary determining factor, whether the human body was explicitly conceptualized in humoural terms, and so forth.

In this respect, Clarence Glacken's taxonomy appears at first glance to be more accurate. Glacken divides ancient climate theories into three strands: a 'physiological theory', inaugurated by Hippocrates; a group of 'theories of location and position', of which Plato, Aristotle, and numerous Latin authors may be taken as representatives; and, finally, the 'astrological ethnology' of Posidonius and Ptolemy. The latter category clearly resembles Altmann's 'astrological climatology', with the key difference that Glacken includes Posidonius in this group.[28] Glacken is also more sensitive than Altmann to the decisive contribution that Hippocratic humouralism brought to climate theory: hence his

[27] Ptol., *Tetr.*, 2.1.55 (Ptolemy 1940: 121).
[28] Altmann (2005: 225, n. 22), however, concedes that 'Posidonius's climatology does reveal astrological influences'.

distinction between a 'physiological', an 'astrological', and a broader 'geographical' strand.

Elsewhere in his text, however, Glacken brings physiological theory and astrological ethnology together under the name 'theories of environmental causation', which, he argues, 'cluster around Hippocrates and Posidonius'.[29] Cleary his chief concern is to distinguish such 'theories of environmental causation' from the less ambitious 'theories of location and position', which stop short of postulating any causal correlation between environmental conditions and human behaviour. In Glacken's view, authors working from the latter perspective may very well establish parallels between the great diversity of races, customs, and characters noticeable across the globe and the similarly great diversity of landscapes and climates; they will not, however, venture into drawing further implications from this comparison. For instance, the Roman historian Livy (59 or 64 BC–AD 17) observes in his *Ab urbe condita* that the inhabitants of Macedonia—'an extremely cold region, difficult to cultivate, and harsh'—have 'a temperament like their land'.[30] A correlation is established here between national character and environmental conditions, in line with the spirit of climate theory; yet nothing in the text indicates a direct causal link between the two—indeed, one might even suspect that Livy's intentions are to some extent metaphorical. A similar, non-causal approach to geo-ethnology can be found in other Latin works of this period, such as Caesar's *De bello gallico* and Tacitus's *Germania* and *Agricola*.[31] Theories of location and position thus represent a weaker form of climate theory that is less theoretically charged but also holds less explanatory power

[29] Glacken 1967: 100.
[30] Liv., 45.30.7 (Livy 1951: 353; 'Frigida haec omnis duraque cultu et aspera plaga est; cultorum quoque ingenia terrae similia habet'). I give here a revised version of Alfred C. Schlesinger's translation.
[31] See discussion in Glacken 1967: 103.

than the stronger theories of environmental causation—in both their physiological and astrological versions.

A weakness in Glacken's category of 'theories of location and position' becomes apparent when he includes under this heading authors such as Plato and Aristotle. In doing so, Glacken fails to see that both philosophers actually advanced explicit causal claims concerning the relationship between environmental factors and human character. Plato, for instance, argues in the *Laws*:

> Some districts are naturally superior to others for the breeding of men of a good or bad type; and we must not conflict with this natural difference in our legislation. Some districts are ill-conditioned or well-conditioned owing to a variety of winds or to sunshine, others owing to their waters, others owing simply to the produce of the soil, which offers produce either good or bad for their bodies, and equally able to effect similar results in their souls as well.[32]

As for Aristotle, the causal correlation admittedly remains unspoken in Book 7 of the *Politics*, where the Stagirite famously opposes the inhabitants of cold places, 'full of spirit, but wanting in intelligence and skill', to the clever yet fearful people of Asia; at the same time, Aristotle portrays 'the Hellenic race, which is situated between them', as 'likewise intermediate in character, being high-spirited and also intelligent'.[33] Elsewhere, however, Aristotle sketches out the relationship between climate and living beings in explicitly causal terms (e.g., in Book 8 of the *History of Animals*, where he provides ample physiological evidence of the influence of climate on animals and humans). Moreover, if we are willing to regard the spurious *Problemata* as a valid testimonial of an Aristotelian approach to climate theory,[34] Books 14 and 30 of this collection of natural-philosophical

[32] Pl., *Leg.*, 5, 747d-e (Plato 1984, vol. 1: 389). Further elements of causal climatology can be found in Plato's *Timaeus*.
[33] Arist., *Pol.*, 7.7, 1327b23-33 (Aristotle 1984, vol. 2: 2107).
[34] While this is highly questionable in principle, it should be noted that medieval and Renaissance authors almost unanimously regarded (and treated) the *Problemata* as a genuinely Aristotelian work. For early modern discussions on the authorship of the *Problemata*, see Blair 1999: 192-95. For more on the *Problemata* and its reception in sixteenth-century Europe, see below, 1.3.2.a.

inquiries examine various instances of a causal correlation between nature of a place and nature of its inhabitants, against the backdrop of a loosely humoural conception of the human body.

Neither Plato nor Aristotle thus truly seems to fit in Glacken's 'theories of position and location' subgroup, which is characterized by a non-causal understanding of the relationship between place and character. In fact, such doctrines hardly belong among climate theories at all, at least if we accept the working definition of climate theory proposed above—a diverse body of assumptions regarding the influence that climatic and environmental factors exert on human beings. Causality, in this view, is an essential component of the relationship between humans and their living environments. Technically, then, what Glacken terms 'theories of position and location' lie outside the realm of climate theories—and thus also outside the scope of the present research.

For different reasons, and despite their unquestionable merits, neither Altmann nor Glacken's taxonomy of climate theories proves entirely satisfactory. In what follows, I shall therefore propose a new classification that pays more attention to actual divergences among ancient sources, and is also more suitable for the analysis of Renaissance and early-modern climate theorists relying on them.

b) Cosmological, Meteorological, Chorological Climate Theories

Climate theories generally fall into three major categories, each characterized by a different understanding of the environmental factors involved, of the type of causality at work, and of man's role as an environmental agent in his own right.

For the first of these strands, which I propose to call 'cosmological',[35] the transformative powers of a place depend primarily on the location's latitude and on a series of supposedly related factors, such as average temperature, degree of seasonal change, exposure to specific astral influences, and so forth. Aristotle's tripartite zonal theory and Posidonius's doctrine of the seven *klimata* may both be taken as early examples of this model, which was further developed in late-antique Rome thanks to authors such as Macrobius and subsequently imposed itself as the standard way of teaching cosmography in the Latin West.[36]

Following Macrobius's *Commentarii in somnium Scipionis*, the world was divided into five zones, two of which—comprised between the Poles and the polar circles—were called 'frigidae' (extremely cold) and considered uninhabitable; those between the polar circles and the tropics were regarded as temperate and fully habitable; whereas the vast zone across the Equator, comprised between the two Tropics, was labelled as 'perusta' (scorched) or 'torrida' (extremely hot) and likewise deemed unsuitable for any kind of human presence. The temperate zone itself could be divided further into smaller latitudinal bands characterized by different climates: thus Asia, for instance, was seen as occupying a middle position between hot Africa and perfectly temperate Europe (see Figure 3).

[35] I have chosen the adjective 'cosmological' by analogy with the word 'cosmography'. The origins of the latter term can be traced as far back as to Ptolemy's *Almagest*; another work by Ptolemy, the *Geography*, was itself known as *Cosmographia* in the Renaissance. Cosmography particularly flourished as a genre in the sixteenth century, when it was regarded as a specific kind of geographical inquiry based on a 'mathematical description of both the cosmos and the earth' (Fiorani 2005: 99). According to one of the most prominent early modern cosmographers, Peter Apian, 'cosmography describes the earth by the circles of the heavens, beneath which it is, and not by mountains, seas, rivers nor other particulars, as does geography' (thus in his *Cosmographicus liber* of 1524, quoted in Fiorani 2005: 100).

[36] See, e.g., Macrobius's *Commentarius in somnium Scipionis* (2.5), Martianus Capella's *De nuptiis Mercurii et Philologiae* (6.602-608), and Isidore of Seville's *De rerum natura* (10) and *Etymologiae* (13.6.1-7), all of which works were composed between the early fifth and late sixth centuries. See Wey Gomez 2008: 71-77.

This model, which continued to shape the visual imagination of the world into the early age of explorations (see Figures 4 and 5),[37] worked in keeping with two fundamental (and equally incorrect) assumptions: first, that the single most important factor in determing the climate of a place is the sun's heat, which in turn depends closely on latitude; secondly, that places located within the same band of latitude should present similar climates—and thus also similar ecosystems.

Figure 3 (left). Zonal *mappamundi*. Macrobius, *Commentarii in somnium Scipionis*. Real Biblioteca del Monasterio de El Escorial, MS S.III.5 (twelfth century).

Figure 4 (left). Zonal *mappamundi*. Macrobius, *Commentarii in somnium Scipionis* (Florence: F. Giunta, 1515), fol. 71^{v}.

[37] See Wey Gomez 2008: 71-92.

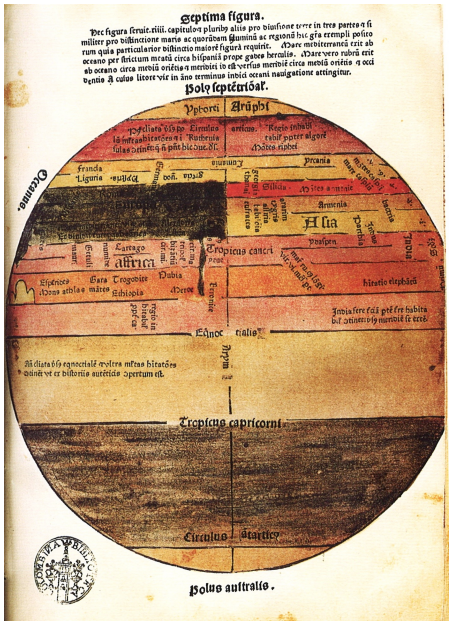

Figure 5 (left). Zonal *mappamundi*. Pierre d'Ailly and Jean Gerson, *Tractatus de ymagine mundi* (Louvain : Johannes de Westfalia, 1480-1483). This was the first printed edition of D'Ailly's treatise, originally composed around 1410.

Ptolemy's astroethnology, as outlined in the second book of his *Tetrabiblos*, can be accommodated without great difficulty within this cosmological strand of climate theory. Ptolemy too singled out latitude as the single most important determinant of the properties and influences of a given place. Yet, unlike many other representatives of cosmological climate theory, he related latitude less to the intensity of the sun's heat than to the different astral influences to which each locale, depending on its position on the grid map of Earth, is exposed. He accordingly divided the *oikoumenē* not into three latitudinal bands, with respect to the inclination of the sun, but rather into four quarters, each of which he placed under the rule of three planets and the relative 'triplicity' (a group of three zodiacal signs). For instance, Europe, which corresponded to the northwestern quarter of Ptolemy's map, was assigned to a triplicity comprised of Aries, Leo, and Sagittarius, and governed by Jupiter, Mars, and the sun. Ptolemy concluded that, 'by reason of the predominance of the triangle and the stars which join in its government', those born in Europe were naturally

'independent, liberty-loving, fond of arms, industrious, very warlike, with qualities of leadership, cleanly, and magnanimous'.[38] Moreover,

> because of the occidental aspect of Jupiter and Mars, and furthermore because the first parts of the aforesaid triangle are masculine and the latter parts feminine, they are without passion for women and look down upon the pleasures of love, but are better satisfied with and more desirous of association with men. And they do not regard the act as a disgrace to the paramour, nor indeed do they actually become effeminate and soft thereby, because their disposition is not perverted, but they retain in their souls manliness, helpfulness, good faith, love of kinsmen, and benevolence.[39]

Ptolemy also established a direct correlation between certain heavenly bodies and the four essential qualities that operate changes in all living beings: thus Jupiter, Venus, and the moon, for instance, are deemed 'beneficent because of their tempered nature and because they abound in the hot and the moist', whereas Saturn and Mars produce 'effects of the opposite nature, one because of his excessive cold and the other for his excessive dryness'.[40] In so doing, the Greco-Egyptian scholar consciously adopted the most authoritative explanation then available of how climatic factors such as cold and heat act upon human beings: first offered as an explanation of climatic influence in Hippocratic treatises such as *Aphorisms* and *Airs, Waters, Places*, the theory of the four qualities was later invoked for the same purpose by Posidonius and by the author of the pseudo-Aristotelian *Problemata*, as well as by countless other writers.

These various types of cosmological climate theory—Posidonius's doctrine of the seven *klimata*, Aristotle's tripartite zonal theory, Macrobius's theory of the five zones, and Ptolemy's 'astroethnology'—have one fundamental thing in common. Because they all posit that places essentially owe their influence on human beings to their position on the grid map of Earth—a feature that is obviously fixed and unchangeable—these models tend

[38] Ptol., *Tetr.*, 2.3 (Ptolemy 1940: 135).
[39] Ptol., *Tetr.*, 2.3 (Ptolemy 1940: 135).
[40] Ptol., *Tetr.*, 1.5 (Ptolemy 1940: 39).

to imply that local influences are also, for the most part, stable and unalterable. Thus, for cosmological climate theorists like Ptolemy, humans may very well strive to develop 'defensive practices' and other 'deterrent measures' as a way 'of averting or warding off or remedying' the terrestrial and heavenly influences acting upon them;[41] but they can neither make the latter disappear nor manipulate them to their own advantage.

A second strand of climate theory, which I shall label 'meteorological',[42] argues that the influence of place on humans and other living beings is chiefly due to atmospheric conditions such as precipitation, winds, and moisture, all of which are at the same time responsible for, and dependent on, specific landscape features. Unlike cold and heat (at least inasmuch as the latter were commonly assumed to depend primarily on latitude),[43] meteorological phenomena are not directly related to the position of a place on the grid map of Earth: places located within the same band of latitude may indeed present different atmospheric conditions (and thus effects on man) depending on height, aspect,[44] presence of rivers and mountains,[45] and so forth. Moreover, extreme phenomena such as droughts or inundations may sometimes occur outside the regular pattern of weather conditions of a particular place, thus adding a further layer of complexity to the underlying climate theory.

Occasionally, ancient authors also express an awareness of long-term geologic and environmental changes altering the physical makeup of a place to such a point that regions formerly characterized by unfavourable climate conditions 'come to be in good condition

[41] Ptol., *Tetr.*, 1.3 (Ptolemy 1940: 27).
[42] For an overview of ancient and early modern meteorology, see Martin 2012.
[43] This assumption will be increasingly challenged in the early modern period: see Kupperman 1982.
[44] Physical geography defines aspect as the horizontal direction that a mountain slope or coastline faces: for example, the north face of a mountain is described as having a northerly aspect. Aspect is a crucial component of a place's climate, as already acknowldeged in many ancient climatological texts, including *AWP* (see especially sections 3 to 9 on correlations between aspect, moisture, and winds; and 10.61-67 on aspect, winds, and water quality).
[45] Something akin to what is now known as the hydrologic cycle is theorized in Aristotle's *Meteorology* (1.13, 350a3-13), where it is argued that mountains cause precipitation by condensing vapours at low temperatures and therefore turning them into rain. Aristotle also observes a positive correlation between abundance of mountains and abundance of rivers (see *Mete.*, 1.13, 350a3-350b21).

while the places that were formerly well-tempered ["eukraeis"] some day grow excessively dry and deteriorate'.[46] Aristotle, for instance, speaks of periodical variations in the distribution of water and dry land on the Earth's surface:

> The same parts of the earth are not always moist or dry, but they change according as rivers come into existence and dry up. And so the relation of land to sea changes too and a place does not always remain land or sea throughout all time, but where there was dry land there comes to be sea, and where there is now sea, there one day comes to be dry land.[47]

As a consequence of this phenomenon, Aristotle notes, both landscape and weather undergo significant alterations.

Because atmospheric conditions can vary greatly with time and location, meteorological climate theory, unlike its cosmological version, cannot work on an entirely *a priori* basis; rather, it requires some direct knowledge of the territory and an attention to empirical circumstances to support its causal inferences. In particular, if the nature of a place does indeed change over time, then climate theory cannot be divorced from an historical study of the environment, as the same place will exert different influences at different times.

Since meteorological climate theory views the properties and influences of a particular place as unstable and ever-changing, its outlook also opens up unexpected possibilities for man to renegotiate his relationship with the surrounding environment. Theophrastus, Aristotle's successor at the head of the Peripatetic School in the late fourth century BC, was apparently among the first to collect several examples of anthropogenic climatic changes, due, in particular, to drainage and deforestation.[48] Theophrastus's

[46] Arist., *Mete.*, 1.14, 352a7-9 (Aristotle 1984, vol. 1: 573).
[47] Arist., *Mete*., 1.14, 351a19-25 (Aristotle 1984, vol. 1: 572). According to Aristotle, the 'originating cause' of this 'orderly cycle' is 'that the interior parts of the earth, like the bodies of plants and animals, have their maturity and age', but 'different parts of the earth' grow old at different times, depending on their position with respect to the sun (*Mete*., 1.14, 351a25-351b7 [Aristotle 1984, vol. 1: 572-73]).
[48] See Hughes 1985: 302.

inquiries in the district of Larissa, in Thessaly, led him to speculate that man's activity could go so far in transforming the properties of a place as to alter its very temperature:

> Formerly, when there was much standing water and the plain was a lake, the air was thicker and the country warmer; but now that the water has been drained away and prevented from collecting, the country has become colder and freezing more common. In proof the fact is cited that formerly there were fine tall olive trees in the city itself and elsewhere in the country, whereas now they are found nowhere, and that the vines were never frozen before but often freeze now.[49]

While Theophrastus clearly viewed such phenomena in a negative light, his ground-breaking research on artificial microclimates was proof of a larger truth: men could shape their environment just as much as their environment shaped them.[50]

Such a view of the physical environment as the result of ongoing interactions between natural and human agents also underlies the third and last strand of climate theory, which I propose to qualify as 'chorological'.[51] Chorological climate theory primarily focuses on specific landscape features, including mountains, plains, woods, deserts, rivers, lakes, and marshes. Authors working from this standpoint do not deny that more general conditions such as air temperature, prevailing winds, and average amount of rainfall play an important role in determining the nature of a site and its influence on human beings. However, they tend to see such causes as further removed, and thus less powerful, than more proximate causes such as the food people eat, the water they drink,

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[49] Theophr., *Caus. pl.*, 5.14.2-3 (quoted and translated in Hughes 1985: 302).

[50] Theophrastus's ideas on deforestation and climate change—later echoed by Pliny the Elder and Albert the Great among others—proved particularly influential during the early colonial period, when they apparently inspired Christopher Columbus's stance against 'the dangers of forest clearance on West Indian islands' (see Grove 1997: 5-6, 46). For a possible linkage between these ideas and early conservationist measures in land use and forest clearing (further explored in Chapter 4 below), see Glacken 1967: 484-94.

[51] My choice of the term 'chorological' rests on two considerations. First, the word 'chorography' was often used in Antiquity to designate close study of small-scale places ('chōra' = 'region', 'district'), as opposed to geography, which consisted in a study of macroregions, if not of the entire world ('gē' = earth). By analogy, chorological climate theory is primarily concerned with specific landscape features, whereas meteorological and cosmological climate theories tend to work on a larger scale. Furthermore, 'chorology' was the term chosen by nineteenth-century geographers such as Alfred Hettner to indicate a study of the territory that 'incorporates both physical as well as human aspects' (Dikshit 1997: 77-78). Similarly, chorological climate theory conceives of the land essentially as the result of continuous interactions between natural and human agents.

the air they breathe—all factors which are ultimately controlled by place-specific characteristics. The nature of the soil, for instance, determines the types of crops that can grow in it, while waters have different properties (and degrees of healthiness) depending on whether they spring from underground, flow down from the mountains, melt from snow, or gather from rainfall.[52]

Food and drink occupy an important place in this variety of climate theory, but chorologically-minded authors also recognize a more direct influence of land and water on man besides their nutritive power. According to *Airs, Waters, Places*, for instance,

> where the land is rich, soft, and well-watered […] the inhabitants are fleshy, ill-articulated, moist, lazy, and generally cowardly in character. […] But where the land is bare, waterless, rough […] there you will see men who are hard, lean, well-articulated, well-braced, and hairy; such natures will be found energetic, vigilant, stubborn and independent in character and in temper, wild rather than tame, of more than average sharpness and intelligence in the arts, and in war of more than average courage.[53]

Similarly, this Hippocratic treatise argues that dry and rarefied air produces 'sharpness of wit above the average', while people breathing denser air tend to be 'phlegmatic', or 'stout and sturdy'.[54] Thus whereas Aristotle attributed the industrious and warlike nature of the Europeans to cold temperature, and the weak and timid nature of the Asians to the great heat of their native country, *Airs, Waters, Places* identifies factors other than temperature (e.g. soil fertility, air density, and so forth) as the most important causes of ethnic difference.

Overall, two points are worthy of notice: first, chorological climate theory tends to be more closely and systematically related to humouralism than the other types of climate

[52] See discussion in *AWP*, 7-9. See also Arist., *Mete.*, 2.3, 359b5-22, on how the qualities of the soil affect those of spring waters.
[53] *AWP*, 24.45-63 (Hippocrates 1923: 137).
[54] Cic., *Rep.*, 2.4-6 (quoted and translated in Glacken 1967: 102). Chorological climate theory conceptualizes 'air' in quite a different way than meteorological climate theory: for the latter, 'air' is synonymous with 'atmosphere', and indicates the medium in which meteorological phenomena take place; for the former, 'air' is a fluid which enters, nourishes (or corrupts), and then finally exits the human body—not unlike water or food.

theory; second, it allows man a greater degree of self-determination. Even though not all the physical characteristics of a site can be modified through human agency, most of them do indeed leave some room for intervention and improvement. A sterile land can be made more fertile;[55] alien crops can be acclimatized and grown;[56] swamps can be drained, air purified; canals can be dug and rivers deviated from their natural courses;[57] headlands can be turned into islands, and islands can be joined to the mainland.[58] The case of the Nile, examined by authors such as Herodotus, Aristotle, and Strabo, proves it without a doubt: 'diligence' can 'conquer nature' and 'rectify' its 'deficiency'.[59]

However, man's power to create a 'second nature' that better suits his needs also has limits.[60] In the first place, environmental features 'resulting from human design' remain essentially different from those 'due to nature': while these are 'permanent', man-made features are 'adventitious attributes' that require ongoing maintenance.[61] Secondly, the fact that humans *can* alter their environment raises the question whether they *should* do it, and what the consequences might be of their doing so. Herodotus, for instance, recalls what had happened in Egypt under Sesostris: when channels were dug 'in all directions' to provide 'those of the Egyptians who had their cities not on the river but in the middle of the country' with fresh water, the side effect of this was that '*having no such purpose*, they caused Egypt, which before was all fit for riding and driving, to be no longer fit for this from thenceforth'.[62] In other words, environmental change called for prudence. According to Aristotle, a project for a canal linking the Nile to the Red Sea was proposed under

[55] See Glacken 1967: 135-37 (with particular reference to Columella's *De re rustica*).
[56] See Hughes 1985 and Glacken 1967: 123-35.
[57] See bibliography in Glacken 1967: 123-34.
[58] Several examples can be found in Strab., 1.3.
[59] Strab., 17.1 (Strabo 1932: 11; modified translation). For a different perspective on natural and man-made features in the valley of the Nile, see Arist., *Mete.*, 1.14, 352b20-23.
[60] For the expression 'second nature' (*natura altera*), with reference to the cultural landscape created through man's environmental agency, see Cic., *Nat. D.*, 2.152.
[61] Strab., 2.5 (Strabo 1917: 465).
[62] Hdt., 2.108 (Herodotus 1920-1925, vol. 1: 162). My emphasis.

Sesostris but given up by Darius 'lest the sea should mix with the river water and spoil it'.[63]

In other cases, objections to diversions of rivers were based both on practical concerns and on ideological appeals to the design argument. The idea that nature orders all things with inscrutable wisdom and must not be altered lightheartedly is reflected in a discussion that took place in Italy under Emperor Tiberius. When it was suggested that the risk of flooding in Rome could be reduced 'through a series of engineering projects along the Tiber's tributaries',[64] the population of Rieti protested that damming the river Velino in order to prevent the outflow of its waters into the river Nera might cause it to flood out and destroy the surrounding countryside. After all, they said, Nature 'had done her best to serve the interests of mortals, giving rivers their own mouths and channels, as well as their sources and limits'.[65] Thirteen centuries later, the Italian polymath Leon Battista Alberti (1404-1472) would express a similar position in his *De re aedificatoria*, in many other respects a glowing hymn to human ingenuity:

> Nothing should be attempted that lies beyond human capacity, nor anything undertaken that might immediately come into conflict with Nature. For so great is Nature's strength that, although on some occasion some huge obstacle may obstruct her, or some barrier divert her, she will always overcome and destroy any opposition or impediment; and any stubborness, as it were, displayed against her, will eventually be overthrown and destroyed by her continual and persistent onslaught. How many examples are there to be seen or read about of the failure of mankind's work to survive, simply because it has come into conflict with Nature?[66]

[63] Arist., *Mete.*, 1.14, 352b30-31 (Aristotle 1984, vol. 1: 574). Different versions of the anecdote are in Hdt., 2.158; Strab., 12.25; Diod. Sic., 1.33; Plin., *HN*, 6.33.
[64] Aldrete 2006: 185. The account given by Glacken (1974: 135) is not entirely accurate.
[65] Tac., *Ann.*, 1.79 (Tacitus 2008: 48): 'Optume rebus mortalium consuluisse naturam, quae sua ora fluminibus, suos cursus utque originem, ita finis dederit'. Although the practical concerns of the inhabitants of Rieti were probably well-grounded, their appeal to the design argument was actually flawed, since the Marmore Falls, which allowed (and still allow) the outflow of the Velino into the Nera, were themselves the result of an earlier engineering project, commissioned in 271 BC by the Roman censor M. Curius Dentatus. Even then, there had been much resistance to the project, and disputes were still frequent in the first century BC: see Cic., *Scaur.*, 27; *Att.*, 4, 15.
[66] Alberti 1988: 35 (original text in Alberti 1512: 18^{v}-19^{r} [2.2]: 'Neve quid suscipias quod cum rerum natura protinus depugnaturum sit. Naturae enim vis tametsi interdum mole obiecta interpelletur: aut innixu aliquo detorqueant, eiusmodi tamen est, ut siverit ea quidem nunquam non superare ac profligare quicquid obversetur: atque impediat. Et omnem quidem contra se expositam rerum (ut ita loquar) pervicaciam diuturna

In this treatise, arguably one of the earliest and finest examples of Renaissance climate theory,[67] Alberti recalls the many great engineering works of the past—among others the port of Ostia, dating back to Emperor Claudius, and that of Terracina, built under Emperor Hadrian—that were designed to last forever and yet ultimately were reduced to ruins by the overwhelming power of nature. These and other examples, Alberti argues, clearly prove that it is unwise for man to attempt anything that 'is not in complete accordance with the laws of Nature'.[68]

Alberti's world, like that of many Renaissance climate theorists, is one in which human beings struggle heroically against a hostile environment that constantly threatens to overpower them. Even their most impressive undertakings are nothing better than ephemeral bulwarks against the sovereignty of natural forces.[69] Throughout *De re aedificatoria*, as elsewhere in his writings, Alberti's praise of man's industriousness is systematically balanced by a keen sense of the precariousness of all human achievements. In this respect, his stance reminds us of Niccolò Machiavelli's famous lines on *virtù* and *fortuna* in chapter 25 of the *Prince* (1513), where human prowess is likened to the building of 'banks and shields' ('argini e ripari') against the impetuous river of fortune.[70] For both Machiavelli and Alberti, success is essentially impermanent and comes from adapting to existing circumstances, while any aggressive attempt to change the world is destined to

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et assidua oppugnandi perseverantia tempore, fecunditate labefactat atque persternit: quam multa hominum manufacta et legimus et videmus nullam praesertim ob rem non durasse, nisi quod cum natura rerum contenderint').

[67] Composed between 1443 and 1452, Alberti's *De re aedificatoria* was first published in Latin in 1486, quickly translated into several languages (including French, Italian, Spanish and English), and reprinted multiple times over the following three centuries. On Alberti's climate theory, see Glacken 1967: 430-31; Hardy 2006.

[68] Alberti 1988: 35-36. Original Latin in Alberti 1512: 'Quae cum ita sint advertisse oportet ne quid eiusmodi aggrediamur quod ipsum non recte cum rerum natura conveniat' (19^{r} [2.2]).

[69] See Glacken 1967: 290-91. What Glacken says about the 'precarious nature' of environmental changes and the need to guard landscape improvements jealously 'against the powerful recuperative power of nature' in the Middle Ages applies just as well to the early Renaissance.

[70] Machiavelli 1994: 110-11.

certain failure. We shall see in the following chapters (particularly in Chapter 4) how such ideas, still largely dominant throughout the sixteenth century, gradually gave way to a new, bolder, and more optimistic understanding of man's environmental agency, thus ultimately leading to a pan-European culture of planned environmental intervention as a means of coping with climatic influence.

c) Flexibility and Complexity

The proposed partition of climate theories into a cosmological, a meteorological, and a chorological strand has drawn attention to the coexistence, within the very same intellectual tradition, of different ways of conceptualizing the natural environment and man's relationship with it. While this is a crucial point to keep in mind, it would be misleading to treat these three strands as if they stood in complete opposition to one another. Any classification of climate theories schematizes, and thus inevitably simplifies, a conceptual landscape characterized by extreme complexity, flexibility, and porosity, where different approaches could be espoused by the same author in distinct works or blended together within the very same text.

A good example of how the cosmological strand may coexist with the chorological strand is offered by Ptolemy, who alternates the former (in his *Tetrabiblos*) with the latter (in his *Geography*), as he sensibly points out that different analytical scales require different methods: the 'first and more universal' discourse concerning 'whole races' and 'entire countries'[71] is best tackled from the standpoint of cosmological climate theory, but it may well be that

[71] Ptol., *Tetr.*, 2.1 (Ptolemy 1940: 117-19).

> in each of these general regions certain special conditions of character and customs naturally ensue. For […] in the case of the climate, even within the regions that in general are reckoned as hot, cold, or temperate, certain localities and countries have special peculiarities of excess or deficiency by reason of their situation, height, lowness, or adjacency.[72]

Ptolemy is also fully aware that meteorological phenomena and their natural consequences play an important role in determining human nature.[73] However, he remains convinced that the cosmological approach should take pride of place in matters of climatic influence, since 'such matters are naturally swayed by greater and more powerful causes than are particular events […] weaker natures always yield to the stronger, and the particular always falls under the general'.[74]

Cosmological, meteorological, and chorological climate theory may also come together nicely within the very same work. Strabo, for instance, sets out to merge astronomy, meteorology, and terrestrial history in the very incipit of his *Geography*, whereas the author of *Airs, Waters, Places* is fully cognizant of the many critical connections between medicine, meteorology, and astronomy.[75] Ultimately, however, choices tend to be made: Strabo's climate theory turns out to be predominantly cosmological, whereas the Hippocratic treatise mainly tackles the issue of environmental influence from a chorological standpoint.[76] Behind an author's preference for one type of explanation or another we often find a complex combination of theoretical reasons and practical motives, especially when the theory of climatic influence is articulated within an explicitly political or governmental context, as is so often the case.

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[72] Ptol., *Tetr.*, 2.2 (Ptolemy 1940: 127).
[73] For instance, Ptolemy mentions 'greater and more periodic conditions such as wars, famines, pestilences, earthquakes, deluges', as well as micro-scale phenomena such as 'variations of the intensity of storms, heat, and winds, or of good and bad crops, and so on' (*Tetr.*, 2.1 [Ptolemy 1940: 119]).
[74] Ptol., *Tetr.*, 2.1 (Ptolemy 1940: 119).
[75] See *AWP*, 2.20-26.
[76] A more holistic approach is attested in the Hippocratic treatise *De regimine* (not to be confused with the more widely known *De regimine acutorum*), especially 2.37.1-3.

From Plato to Montesquieu, the idea that knowledge of climatological conditions and their influence on man is key to successful law-giving and policy-making takes pride of place in many prominent formulations of climate theory, with important implications for political theory as a whole. Indeed, if each people is characterized by its own distinct, and environmentally determined, national character, then a universally valid recipe for political success cannot exist. Policies that worked well in a particular country might prove disastrous in another that has a different climate, as different peoples ought to be governed in different ways. Thus Aristotle reckons that a constitution based on political freedom and active citizenship, though theoretically the best one possible, would wreak havoc among the weak and submissive Asian nations, whose nature is unfit for self-government.[77]

By prescribing adaptation to pre-existing environmental conditions, climate theory introduces the idea that the general principles of political theory need specification in order to be suitable for practical use. Yet it is all too clear that this intimate and long-lasting connection between climate theory and political thought can also act in the reverse direction, as particular governmental agendas often inflect an author's understanding of climate theory and his (or her) use of it. In all such cases, it is often difficult to establish which comes first and determines the other, whether 'pure' ideas or ideology. Put in these terms, the problem is not only undecidable, it is also ill-posed: as social historians of science have long noted, the real question that should be asked is not so much whether practice conditions theory, but in what specific ways and for what specific reasons theory and practice mutually influence each other at a given point in history and in a given socio-cultural context.[78]

[77] Arist., *Pol.*, 7.7, 1327b27-29, b36-38.
[78] For an overview of this issue, see Dear and Jasanoff 2010.

1.3. From Ancient to Renaissance Climate Theories

1.3.1. The Medieval Transition

The idea that climate theory was suddenly recovered in the Renaissance after centuries of almost total oblivion is still surprisingly widespread among scholars, even though many important studies have provided compelling evidence of the contrary. Studies such as those of Ernst Honigmann, Warren E. Gates, and, more recently, Nicolas Wey Gomez show that the tradition of climate theory continued almost uninterrupted throughout late Antiquity and the Middle Ages. The latter in particular, far from being a time of oblivion for climate theory, played a crucial role in keeping this tradition alive and preparing the ground for its future developments.[79] In the eleventh and twelfth centuries, Arab philosophers and physicians such as Avicenna and Averroes wrote important commentaries on the climatological texts of Aristotle, Galen, and Ptolemy; they also composed original works (particularly Avicenna's *Canon* and Averroes' *Kulliyat*, best known as *Colliget* in the Latin West) that would later influence many climate theorists, including the sixteenth-century authors Girolamo Cardano and Jean Bodin.

One major vehicle of climatological knowledge in the Middle Ages was the genre of the *summae*, or encyclopedias, which also marked a crucial step towards the 'Christianization' of climate theory.[80] Elements of climate theory are found, for instance, in Isidore of Seville's *Etymologiae* (compiled in the early seventh century), Bede's *De*

[79] Honigmann 1929; Gates 1967; Wey Gomez 2008.

[80] The incompatibility of climate theory with Christian dogma has been grossly exaggerated, especially for what concerns the early modern period (I have briefly considered the issue in a forthcoming article, 'The Censor as Reader'; see Bibliography, section 3). It is true, however, that the inclusion of pre-Christian doctrines of climatic influence into a Christian world view initially required some effort and a general reworking of the theory. Unfortunately very few studies have directly addressed this question; some general yet useful remarks can be found in Glacken 1967: 254-87.

rerum natura (eight century), the *De mundi celestis terrestrisque constitutione* (falsely attributed to Bede, though probably composed around the eleventh or twelfth century),[81] Roger Bacon's *Opus majus* (1267), the *De natura loci* of Albert the Great (unquestionably the most important text on climate theory of the Latin Middle Ages),[82] Thomas Aquinas's *De regimine principum*,[83] and Pierre d'Ailly's *Ymago Mundi*, which famously shaped Christopher Columbus's geographical views.[84]

Many ancient texts on climate theory also enjoyed a direct and relatively wide manuscript circulation in the Middle Ages, often complemented by solid commentary traditions.[85] Aristotle's *Politics* was mostly read in William of Moerbeke's Latin translation of around 1260; Nicole Oresme's French translation of the same text, completed by 1374 and accompanied by a commentary, seems to have had a limited diffusion until (and for some time after) its appearance in print in 1489.[86] Around 1360 Guillaume Oresme translated Ptolemy's *Tetrabiblos* into French,[87] while several Latin translations of the work, some of which based on Proclus's paraphrase, had been available since at least 1138.[88] The wildly popular collection of natural-philosophical questions

[81] See Hine 1988.
[82] See Glacken 1967: 265-71.
[83] See Glacken 1967: 273-85. Thomas Aquinas only authored Book 1 and part of Book 2 of *De regimine principum*; the remainder of the work was completed by Tolomeo of Lucca. The relevant parts for climate theory (Book 2, Chapters 1 and 2) belong to Thomas Aquinas (see Dyson 2004: xix).
[84] See Wey Gomez 2008.
[85] It would be interesting to ascertain to what extent the parts regarding climate theory, in this and other works, received specific attention in the medieval period. Since the focus of this dissertation is on Renaissance and early modern appropriations of climate theory, it has not been possible to pursue this additional line of research here, but others will hopefully address this issue in the future.
[86] See Dunbabin 1965; Renna 1978: 309; Dod 1982. Nicole Oresme's translation and commentary was subsequently printed in Paris in 1489, and followed in 1568 by Louis Le Roy's more famous translation, which included a short introductory essay *De la politique et des legislateurs plus renommez qui l'ont prattiquee*, also rich in climatological ideas. For the sixteenth-century French reception of Aristotle's *Politics*, see De Smet 2013.
[87] Only one copy of this translation is known to survive: it is the beautifully illustrated Paris BN MS Fr. 1348. See Lejbowicz 1983.
[88] 1138 is the year of Plato de Tivoli's Latin translation, based on an Arabic translation of Ptolemy's text; a new translation, by Egidio Tebaldi, appeared in the thirteenth century. An on-going project based at the Universities of Munich and Würzburg is currently studying the manuscript circulation of Ptolemy in Arabic

known as *Problemata*, whose Aristotelian authorship was seldom questioned in the Middle Ages, was also available in numerous translations and had a robust commentary tradition, both Latin (e.g., Pietro d'Abano) and vernacular (e.g., Evrart de Conty),[89] not to mention the countless compendia, paraphrases, and partially original works that it inspired.[90]

The medical works of Galen also had a long-standing history of vernacularizations, Latin translations (sometimes mediated by Arabic sources), and commentaries, which particularly contributed to the diffusion of climate theory in the new academic contexts.[91] Starting from the second half of the thirteenth century, commentaries on various Galenic works were incorporated into the curriculum at the University of Paris, while Galen's own *Ars medica* (also known as *Tegni*), which systematized the humoural theory of complexions,[92] rapidly became a standard text at most medical faculties.[93] On the other hand, the case of another important medical text on climate theory, the Hippocratic treatise *Airs, Waters, Places*, seems to be entirely different: the apparent lack of commentaries or translations before the sixteenth century, along with the fact that well-informed authors such as Roger Bacon and Albert the Great fail to mention this work in their erudite discussions of climate theory, invites the conclusion that this crucial text was little known

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and Latin: see the 'Astronomical and astrological manuscripts of Claudius Ptolemy' project website, <http://warburg.sas.ac.uk/research/projects/ ptolemy/> [accessed 4 January 2016].

[89] See Ducos 2006; Dumas 2006; Ventura 2008.

[90] See Blair 1999; De Leemans and Goyens 2006; and Gentili 2010. Some of these texts are indeed of great interest for mapping the circulation of climate theory between the late Middle Ages and the early Renaissance: see, for instance, Girolamo Manfredi's *Libro intitulato il perché*, first printed in Bologna in 1474. Manfredi's book was subsequently reprinted in Italian in 1478 and 1497, and had eleven more editions in the sixteenth and seventeenth centuries, the last of which in Venice, 1678. It was also translated into Catalan (1499) and Spanish (1581). For further examples, see the 'Vernacular Aristotelianism in Renaissance Italy' database, resulting from a three-year project (2010-2013) based at the University of Warwick and the Warburg Institute in London: <http://www2.warwick.ac.uk/fac/arts/ren/projects/vernaculararistotelianism/ database/> [accessed 4 January 2016]. The database is currently being moved to the TLIon platform (<http://tlion.it/>).

[91] See Temkin 1973 (Chapter 3).

[92] See Ottosson 1984: 131-32.

[93] See O'Boyle 1998 (Chapter 4). For further details on the diffusion of Galenic texts on climate and complexion, see below, Chapter 2.

in the Latin Middle Ages—a fact that stands in striking contrast with its tremendous fortune in the Renaissance. [94]

These are only a few, but well representative, examples of the extraordinary proliferation of translations, commentaries, and compendia that helped to keep classical climate theory alive throughout the Middle Ages and ultimately transmitted it, in a new and more systematic form, to Renaissance Europe. Unfortunately, none of these texts has yet been studied in any depth with specific attention to the climatological ideas it contains. It is therefore difficult to establish in greater detail to what extent they tended to repeat received notions or actively contributed to reworking the classical traditions in original ways. While this is clearly not the place to attempt such an ambitious undertaking, it is certainly desirable that future studies should examine these texts more closely and take notice of their value for a long-term study of climate theory across the centuries.

On the other hand, the point to retain for the present discussion is that the Renaissance, far from autonomously rediscovering a forgotten ancient tradition, inherited the latter from the Middle Ages, in a much more mediated form than is often thought. Yet the continuity between medieval and Renaissance climate theories, though unquestionably strong, should not be overstated. Several facts invite a certain caution. First of all, the recovery of *Airs, Waters, Places* in the sixteenth century significantly altered the conceptual landscape of climate theory, since its author, as we shall see later in this chapter, advanced several views that Aristotle later revised or reversed.[95] Besides, the greater availability and affordability of printed texts versus manuscripts contributed to

[94] See Siraisi 1981. On the other hand, Galen's commentary on *AWP* aroused interest in the Arab world: see Angeletti 1990.

[95] The first Greek edition of Hippocrates's *Opera omnia*, which also included *AWP*, was published by Aldus Manutius in 1526. The German physician Janus Cornarius (1495-1555), professor of Greek at Wittenberg, published a separate edition of the treatise in 1529 (Basel: Froben), containing a newly edited Greek text and a Latin translation. This remained the standard edition of *AWP* until 1595, when Joannes Wechel printed Anuce Foës's Greek-Latin *Opera omnia* in Frankfurt.

spreading climatological ideas among a much larger audience than in the Middle Ages, thus also stimulating further debate.

Changes in the disciplinary fields in which climate theory was discussed also contributed to setting Renaissance climate theory apart from its medieval counterpart, notwithstanding the many continuities between the two. If commentaries and encyclopedic texts on natural philosophy were the principal vehicles of climate theory in the Middle Ages, the same holds true, to a large extent, for Renaissance climate theory. However, new genres (and revived old genres) played an increasingly important role in spreading climatological ideas in the sixteenth century. Among the most common were travel accounts,[96] 'histories' (also known as 'descriptions' or 'characters') of particular countries and nations,[97] cosmographies,[98] political treatises,[99] and self-care handbooks or regimens of health.[100] Not unreasonably, then, historians of Renaissance climate theory have for the most part focused on these genres as sources for their investigations. Works on natural philosophy and commentaries on ancient texts, on the other hand, have received comparatively modest attention from scholars. In the following sections I shall therefore offer a few comments on each, without aiming to be exhaustive.

[96] For examples of these sources, see below, Chapter 3. See also Cline 1964; Lestringant 1982a; Lestringant 1982b; Gerbi 1985; Lestringant 1990; Fuller 1995; Sweet 1999; Rubiès 2000a; Rubies 2000b; Fuller 2008a; Fuller 2008b; Wey Gomez 2008; Holtz 2011.
[97] For examples of these sources, see below, Chapter 3. See also Gliozzi 1977; Gerbi 1985; Floyd Wilson 2003.
[98] For examples of these sources, see below, Chapter 3. See also Lestringant 1991; Lestringant 1993.
[99] See, e.g., Bodin's *République* (5.1) and Botero's *Della ragion di Stato* (2.4-2.5). For a discussion of these and other sources, see Descendre 2009.
[100] For examples of these sources, see below, Chapter 2. See also Mikkeli 1999; Albala 2002; Floyd Wilson 2003.

1.3.2. Reinventing Tradition: Climate Theory in Renaissance Europe

a) The Early Modern Commentary Tradition

The sixteenth and seventeenth centuries inherited and perpetuated the medieval commentary tradition both in manuscript and in print.[101] Old commentaries still circulated widely, while at the same time new, up-to-date commentaries were being produced: for instance Pietro d'Abano's early-fourteenth-century commentary on the pseudo-Aristotelian *Problemata* was still in use,[102] when the new monumental commentary of Ludovico Settala (1552-1633), a renowned physician and professor of moral and political philosophy in Milan, appeared in Frankfurt in two separate volumes, respectively published in 1602 and 1607.[103] In the same years, the philosopher and man of letters Giulio Guastavino (best known for his annotations on Torquato Tasso's *Gerusalemme kiberata*) undertook an analogous project—but he died before completing the task.[104]

Competition between booksellers, the 'snowball effect' typical of so many scholarly disputes, and genuine demand from the public (especially for those texts that formed part of the academic curriculum) may help explain the remarkable proportions often reached by this literature. Between 1535 and 1710 no fewer than ten different commentaries or annotated editions of Galen's *De temperamentis* were produced across

[101] For continuities and discontinuities between the medieval and Renaissance commentary tradition, see the questions raised by Skoie 2006.
[102] See Wollock 1997: 88.
[103] The two volumes were published together in the final edition of 1632 (Lyon: Claude Landry), to which I shall refer throughout this study. On Settala, see Rota Ghibaudi 1959; Ventura 2008.
[104] Very little is known of Guastavino's life, including the date of his death. His unfinished commentary on the *Problemata*, published in 1608 (Lyon: Horace Cardon), only covers the first ten problems: the two *quaestiones* most directly concerned with climate theory (14 on climate and 30 on melancholy) are therefore not included in Guastavino's commentary.

Europe;[105] the *De inaequali intemperie*, which often appeared alongside the *De temperamentis* in sixteenth-century editions of Thomas Linacre's translation, was also repeatedly commented upon,[106] while the pseudo-Galenic *De humoribus* attracted the interest of the Ferrarese Arcangelo Piccolomini (1525-1586), who was professor of medicine in Bordeaux and later *protomedico generale* (chief physician) in Rome under Pope Pius IV.[107] Similarly, the Hippocratic treatise *Airs, Waters, Places* appeared in at least ten different commented editions over the course of a single century,[108] while another Hippocratic text broadly related to climate theory, the *De alimento*, was studied by five different authors.[109] Sometimes, particularly authoritative commentaries exercised a sort of monopoly on the market: such is the case with Girolamo Cardano's exegesis of Ptolemy's *Tetrabiblos* (1554), which fixed the standard for centuries to come.[110] Indeed, the appearance, in 1581, of an expanded edition of Francesco Giuntini's *Speculum astrologiae*,

[105] By Jérémie de Dryvere (Lyon : Godefroy et Marcel Bering, 1535 [reprinted 1547]); by Jacques Dubois (Paris: Christian Wechel, 1537); by Eustache Duchesne (Basel: Johannes Oporinus, 1549); by Leonard Fuchs (Paris: Jacques Dupuys, 1549-1554); by Johannes Crato and Giovanni Battista Monti (Venice: Vincenzo Valgrisi, 1560 [reprinted Hannover: Wilhelm Anton, 1595); by Gaspar Lopez Canario (Alcalà: Pedro de Robles and Francisco de Cormellas, 1565); by Francisco Vallès (Cologne: Francesco de Francheschi and G.B. Ciotti, 1592 [reprinted 1594; Frankfurt: Johann Beyer, 1645); by Felice Accoramboni (Rome: Santi, 1590). Two further commentaries, one by Jaume Solà with additional annotations by Tomàs Mollet and another one by Josep Mollet i Balaguer, were produced in Barcelona around 1680 and 1710 respectively; both however remained unpublished (they are now MS 1210 and MS 1208/2 at the Biblioteca de Catalunya, Barcelona). These data (as those in n. 108 below) have been gathered by searching multiple online catalogues such as Worldcat and the KVK, and are by no means to be taken as exhaustive.

[106] See Novo 2012.

[107] See Piccolomini's *In librum Galeni de humoribus commentarii* (Paris: Bernard Turrisan, 1556). On the *De humoribus* and its debated authorship, see Marra 1966. For other Renaissance commentaries on Galen, see Durling 1961; Durling 1989.

[108] By Adrien L'Alemant (Paris: Gilles Gourbin, 1557); by Girolamo Cardano (Basel: Henricus Petrus, 1570 [later included in his *Opera omnia*, Lyon: Huguetan and Ravaud, 1663]); by Antonio Pasini (Brescia: Heirs of Damiano Turlini, 1574); by Baccio Baldini (Florence: Bartolomeo Sermartelli, 1586); by Ludovico Settala (Cologne: Giovanni Battista Ciotti, 1590 [reprinted Frankfurt: Johann Beyer, 1645); by Camillo Flavio (Venice: Roberto Meietti, 1596); by Baldo Baldi (Rome: Ludovico Grignani, 1637); by Jean Martin (Paris: Guillemot, 1646 [reprinted 1655, 1660, 1661, 1662]); by Anuce Foës (Leiden: Jean Elsevir, 1658).

[109] Francisco Vallès (Alcalà: Andreas de Angulo, 1561 [reprinted Cologne: Giovanni Battista Ciotti, 1589]); Antonio Fracanzano (Venice: Marco De Maria, 1566); Estienne Gourmelen (Paris: Nicolas Chesneau, 1572); Girolamo Cardano (Rome: Antonio Bladio, 1574 [reprinted Basel: Henricus Petrus, 1582]); Estevam Rodrigues de Castro (Florence: Bartolomeo Sermatelli, 1635). Cardano refers explicitly to Fracanzano's earlier commentary several times in the text. For the *De alimento*, see Martin 2004.

[110] The *editio princeps* of Basel (Henricus Petrus, 1554) was reprinted in Lyon the next year, and in Basel again in 1578. The work was also reprinted in the *Opera omnia* published in Lyon in 1663.

now including a commentary of Books 3 and 4 of the *Tetrabiblos*, did not seem to affect Cardano's preeminence in any significant way.[111]

A large majority of these commentaries was the work of practising physicians and/or professors of medicine. The fact itself is hardly surprising, when one considers how closely tied medicine and climatology had been since Antiquity; but it did have remarkable implications for the destiny of climate theory as a whole, as it was indeed in this period that the idea of a single and totally coherent theory of climates first arose (naturally, this does not mean that such a coherence existed in reality—as we shall see shortly, the opposite is true in fact). For the first time, the doctrine of climatic influence was now being studied and discussed by a cohesive network of readers, who decisively contributed to its reworking (without of course being its exclusive keepers). Such readers not only shared a profession, and all that came along with it—essential issues, references and sources, interpretive methods, key concepts and the vocabulary used to express them; they also often knew each other personally and/or established a direct dialogue through their works: either a friendly one, as in the case of Ludovico Settala and Federico Bonaventura, who thought highly of each other;[112] or a polemical one, as in the case of Antonio Fracanzano

[111] The *editio princeps* of the *Speculum astrologiae*, which appeared in 1573 (reprinted 1575 and 1578), did not include the commentary on Ptolemy. This was first added to the 1581 edition (reprinted 1583). All editions of the *Speculum* came out in Lyon, but for different printers. Cardano's commentary on Ptolemy remained a standard reference for later authors long after Giuntini's commentary was published (Settala, for instance, used Cardano's commentary for his own work on the *Problemata*: see Settala 1632: vol. 2, 270 [*ad* Arist., *[Pr.]*, 14.1]). Besides, Giuntini only commented on Books 3 and 4 of the *Tetrabiblos*, whereas the most relevant part for climate theory is Book 2.

[112] Federico Bonaventura (1555-1602), an Italian polymath based in Urbino, formulated his climatological views in the unfinished political treatise *Della ragion di Stato* (published posthumously in 1623; see the recent edition by Nicola Panichi: Bonaventura 2007) as well as in the medical and natural-historical work *De natura octomestris partus* (1600). The latter is frequently and praisingly mentioned in Settala's commentary on the *Problemata*. Settala's friendly relationship with Bonaventura is further documented in their correspondence, part of which is printed in Rota Ghibaudi 1959.

and Girolamo Cardano, who had a brief academic skirmish in Bologna around 1563,[113] and later offered competing interpretations of the *De alimento*.[114]

This continuing dialogue, which often took the form of erudite commentaries cross-referencing each other, did much to create a standard corpus of essential works on climate theory, something that in turn proved crucial for the conceptualization of climate theory as a coherent whole. To be sure, one should not expect these texts to be especially original: indeed, issues, arguments, textual parallels, and the underlying thought-processes tend to resemble each other quite closely. But this repetitiveness is not so much a sign of a lack of creativity, as a proof of acquaintance with an increasingly codified disciplinary field, which commanded adherence to a set of well-defined rules: for instance, starting with the second half of the sixteenth century no serious author would have tackled the issue of longevity without duly mentioning the conflicting opinions of Hippocrates, Aristotle, Galen, and Pliny on the subject.[115]

The constitution of an exhaustive and universally acknowledged corpus of relevant texts was also promoted by the practice, followed by several writers, of commenting on climatological works by different authors: for instance, Ludovico Settala commented on both Hippocratic and Aristotelian works (*Airs, Waters, Places* and the *Problemata*), as did the Spanish physician Francisco Vallès (1524-1592), who commented on the *De alimento* and on Aristotle's *Meteorology*,[116] as well as on several works by Galen; Girolamo Cardano, on the other hand, commented on *Airs, Waters, Places*, the *De alimento*, and

[113] See Siraisi 1997: 101. We do not know much about Antonio Fracanzano, except that he was born in Vicenza, taught logic in Padua in 1529-1530 and practical medicine in Bologna between 1562 and 1564, and died in 1567. He wrote a famous book on syphilis, *De morbo gallico* (Padua: Cristoforo Griffio, 1564), resulting from a series of lectures held in Bologna in 1563.
[114] Cardano, whose commentary was published in 1574 (though it derived from a series of lectures held in 1568), frequently critiques Fracanzano's earlier commentary (1566).
[115] See, for instance, Bodin's *Methodus*, trying to reconcile Hippocrates, (pseudo)Aristotle, Pliny, and Galen on climate and longevity (Bodin 2013: 264-66 [5.71-73]).
[116] See Martin 2002; Martin 2008.

Ptolemy's *Tetrabiblos*.[117] This practice encouraged the identification of common themes and notions across disparate ancient writings, and thus promoted the recognition (or, rather, the imagination) of these texts as belonging to a consistent tradition of thought.

But in order to transform a collection of scattered ideas inherited from multiple ancient sources into a single systematic theory, it was also necessary to reconcile discrepancies and contradictions. This was no easy task, since ancient climate theorists had never really reached a consensus over the most fundamental issues (see above, section 1.2). For instance, the Aristotelian theory of climates rested on a concept, that of *antiperistasis*, which, if not completely foreign to the Hippocratic corpus as a whole, was absent from *Airs, Waters, Places* and played an ill-defined role within Galen's framework.[118] Consequently, Hippocrates, Aristotle, and Galen presented conflicting views of how the cold and hot zones affected physical development, health, longevity, and mental skills;[119] they also disagreed as to whether the temperate zone was an absolute or a relative *optimum* (namely, whether it generated moderately well-rounded individuals or rather people who excelled at one set of skills while lacking other qualities—not unlike the inhabitants of cold and hot countries), and whether physical health and intellectual excellence were directly or inversely proportional.[120] Further discrepancies could be spotted within the corpus of each single author, a fact that deeply troubled early modern readers for whom the authenticity of these works was never in doubt.[121] For instance, how

[117] On Cardano's commentaries, see Siraisi 1997 (Chapter 6).
[118] On *antiperistasis*, see above, 1.2.1. One of Hippocrates's *Aphorisms* (1.15) does offer an example of *antiperistasis*, but the climatological physiology expounded in *Airs, Waters, Places* interestingly contradicts this principle.
[119] See Baldini 1586: 86; Settala 1632, vol. 2: 283-89 (*ad* Arist., *[Pr.]*, 14.8-9).
[120] See Baldini 1586: 188; Settala 1632, vol. 2 : 273-74 (*ad* Arist., *[Pr.]*, 14.1).
[121] Interpolation by ancient commentators was sometimes held responsible for contradictions within a text: see Baldini 1586: 189. Baldini is a conscientious philologist: on p. 51, he clarifies that he is comparing the Greek-Latin text edited by Janus Cornarius with quotations from Hippocrates reported in the margins of the latest Venetian edition of Galen, and with a set of textual emendations sent by a colleague in Padua, based on

could Hippocrates indicate climatic variability in Europe as a source of intellectual and physical preeminence, when he was also the first to point out that sudden changes of air were dangerous and had to be avoided at all costs?[122]

Almost every commentator bravely confronted these puzzles, but some authors were ultimately better at solving them than others. While Baccio Baldini's attempt to explain a difficult point in *Airs, Waters, Places* by appealing to the non-Hippocratic concept of *antiperistasis* fails miserably,[123] Ludovico Settala showcases his famous talent for philosophical controversies by finding elegant solutions for the most perplexing conundrums.[124] For instance, he addresses contradictions between authors by arguing that differences in the scale of the analysis may be responsible for such conflicting views. More specifically, the discrepancy between Hippocrates and Aristotle concerning longevity can be solved by pointing out that Aristotle's reasoning rests on a rough sketch of large climatic regions (cold / temperate / hot), as that suffices for his purposes in the *Politics*; Hippocrates, on the other hand, sets out to describe individual features of specific sites ('aliquam loci proprietatem'), since he seeks to explain how winds and aspect cooperate

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a not-better-specified manuscript ('codice quodam qui impressus non est sed scriptus, cuius diversae lectiones ab iis que in impressis leguntur Patavio ad me missae sunt').

[122] See Settala 1632, vol. 2: 274 (*ad* Arist., *[Pr.]*, 14.1).

[123] In *AWP*, 4, it is stated that northerners are big eaters, rather than big drinkers, as their cold and moist bodies have a natural desire for hot and dry food, not drinks. But the received opinion, recalled by Baldini (1586: 82), is that northerners are in fact great drinkers ('bibacissimos esse'). Baldini uses the concept of *antiperistasis* to show that it makes perfect sense for northerners to be big eaters, as their 'hot bellies' ('ventres calidissimi') rapidly consume whatever nourishment they receive, and immediately want more: now, food provides longer-lasting nourishment than drinks ('solidiore alimento indigent quam illud sit quod potus praestat'). Besides, moist bodies have no natural desire for moist substances ('ventres eorum qui has regiones habitant naturali calido calidi sunt quod in substantia humida fundatur. Quamobrem non multam sitim concitat'). Thus northerners are big eaters to satisfy a natural need, and big drinkers 'out of habit […], not because of the climate in which they live' ('a quadam consuetudine […] non a qualitate coeli sub quo ipsi degunt'). Here *antiperistasis* is used to explain how northern bodies can reach a functional equilibrium with the environment outside. However, Baldini's Hippocratic framework soon comes into conflict with the adventitious concept of *antiperistasis*, as evidenced on p. 86, where Baldini argues that cold temperaments are better suited than hot temperaments for life in cold environments.

[124] Settala had been trained in philosophy since his young age, under the guidance of the Aristotelian Ottaviano Ferrari (1518-1586), and soon became known for his argumentative skills. In 1605 he started teaching moral and political philosophy at the recently founded Canobian Schools in Milan. See Rota Ghibaudi 1959: 18, 28.

with latitude in determining the climate of a place.[125] Settala is then able to conclude that there is no real contradiction between these two authors ('Nulla igitur est inter Hippocratem et Aristotelem hac in re dissensio'), but simply different levels of detail: climate theory is one and internally consistent, though it may be broken down into multiple strands.

Clearly, Settala's conclusions were too optimistic. Not only was ancient climate theory still far from being reduced to a coherent whole; Renaissance climate theory was hardly more homogeneous either, as the following example will show. A controversy with far-reaching consequences on both short- and long-distance travel (for more on this, see Chapter 3) was spurred by the (pseudo)Aristotelian *problema* on changes of water and air. While Hippocrates had argued that a change of air is more dangerous for health than a change of water, the exact opposite was stated in the *Problemata* (1.13), where three possible explanations were also offered:

> Is it because water becomes nourishment, with the result that it gets into one's system and has an effect upon one, which is not the case with air? Further there are many kinds of water differing intrinsically from one another, but not of air; this then, may also be a reason. For even when we change our place of dwelling, we continue to breathe practically the same air, but we drink different waters. It is, therefore, probably a right opinion that change of drinking-water is unhealthy.[126]

Opinions varied. Settala agreed with the idea that a change of water tends to be more dangerous, but he set out a few caveats, the most important of which revolved once again around a consideration of scale. In solving this *problema*, he argued, Aristotle was clearly thinking of short-distance travels—the kind of travels that 'men would frequently

[125] 'Sic etiam Aristotelis locus septimo politicorum est intelligendus, cum non secus quam Hippocrates de locis loquatur ad Septentrionem positis, id est, flatus Aquilonios excipientibus, etiamsi in temperatissima regione, aut etiam calida essent' (Settala 1586, vol. 2: 291 [*ad* Arist., *[Pr.]*, 14.9]). The issue of scale is raised again in commenting upon Arist., *[Pr.]*, 14.15 (Settala 1586, vol. 2: 297): here Settala remarks that Aristotle speaks of the Asians as a whole, without making any sort of distinction, whereas Hippocrates emphasizes that different Asian nations have different characteristics, some being better and others worse ('a seipsis differentes, meliores alios, alios vitiosiores').

[126] Arist., *[Pr.]*, 1.13, 860b26-34 (Aristotle 1984, vol. 2: 1322).

undertake in their ordinary lives'. Now, travelling to a nearby place unquestionably involves a change of water ('mutatio aquarum'), which may indeed be dangerous; it does not, however, involve a significant change of air, as the climate may be expected to be more or less the same in both places. Settala, an eager reader of recent travel literature,[127] allowed that the situation would be different if one were to travel to distant latitudes, but even then the risks involved by the change of air would not be greater than those involved by the associated change of water.[128] The only case in which air poses a greater threat to health than water is when it is 'corrupted' by the plague or otherwise 'polluted by putrid vapours'.[129]

Baldini, on the other hand, took a strong stand against the (pseudo)Aristotelian position.[130] Baldini, who served as personal physician to the Medici and lecturer in medicine at the Pisan *studio*, had no doubts: a change of air was more dangerous than any change of water, as Tuscan travellers to Rome and shepherds moving seasonally between inland and coastline knew only too well.[131] Clearly it was a mistake to think that air should

[127] See, e.g., Settala 1632, vol. 2: 128 (*ad* Arist., *[Pr.]*, 10.41 [= 10.45 in modern editions]), where Settala mentions Ludovico di Varthema, who had travelled to Arabia and South-Eastern Asia in the early sixteenth century, and left a highly popular account of his travels: *Itinerario de Ludovico de Varthema Bolognese*, first printed in Rome in 1510 and frequently translated and reprinted during the sixteenth century). See also Settala 1632, vol. 2: 291 (*ad* Arist., *[Pr.]*, 14.9), where Settala refers to Francisco Alvarez and Leo Africanus on longevity in Africa.

[128] 'Quod autem Aponensis [*Pietro d'Abano*] adiungit ex Avicenna [...] multo deterius esse et insalubrius, si quis ab Indis ad Germanos transmutetur, quam si mutatio aquarum fiat, nullius est momenti: nulla enim est paritas, nulla proportio: data enim mutatione aequali, et aliquanto etiam maiori in aëre, semper quae in aqua fit, insalubrior erit, etsi aliquanto minor quam in aëre. At hic extremi caliditatis cum extremo frigidatis in aëre comparatio fit, de qua re non agit in praesentia Aristoteles. Hic enim proponit ea quemadmodum dicebamus, quae in hominum quotidiana consuetudine frequenter accidunt, ut de loco vicino ad propinquum alium transeat, vel etiam de provincia ad aliam non omnino contrariam' (Settala 1632, vol. 1: 27).

[129] 'Aër adeo substantia sit corruptus, vaporibusque putridis adeo inquinatus, ut et homines passim in consensum trahat, et quasi depascatur, ut in pestilentiis contingit' (Settala 1632, vol. 1: 27).

[130] 'Haec Aristotelis sententia mihi valde suspecta est, et primo de problematibus ipso dubito an verum sit aquarum mutationem gravem aëris vero non gravem esse, nam longe gravior videtur esse aëris mutatio quam aquae' (Baldini 1586: 39). Little is known of Baldini's personal biography; for the few available details, and for an overview of Baldini's work, see Siraisi 2007: 94-102.

[131] 'Videmus enim illos qui ex salubri loco in gravem vel ex gravi in salubrem transeunt gravissimis morbis corripi et saepissime mori, ut iis accidit qui ex marittimis locis Senarum in interiorem Aethruriae partem transeunt, et illis qui ex Aethruriae aestate Romam vel Neapolim proficiscuntur vel ex praedictis locis eo tempore in Aethruriam transeunt' (Baldini 1586: 39); 'Nos videmus multos qui a montanis locis ad marittima

everywhere be the same: there exist in fact many more types of air than water, and different parts of the same region—even parts of the very same building—may vary greatly in this respect, depending on height, aspect, and season of the year.[132] Undoubtedly, changes of water ought to be avoided as well, since any modification of a deep-seated routine is extremely dangerous ('periculosissimum [...] consuetudinem mutare');[133] still, Baldini argued, 'a change of air and residence is far more serious and disease-producing than a change of water'.[134]

For Baldini, as for most of his contemporaries (see below, Chapter 3), travel was a major cause of disease, and relocation to one's native climate the only sure remedy against it—a principle that people of a certain status, duly advised by their personal physicians, took seriously enough to modify their travel plans and even career choices. Thus Vincenzo Alamanni (1536-1590), the Tuscan ambassador in Madrid, begged Grand Duke Ferdinando I for permission to return to Florence, as doctors kept warning him that the Spanish climate was incompatible with his temperament.[135] By contrast, Agnolo di Matteo Niccolini (1502-1567), the ambassador of Duke Cosimo I in Siena, was reluctant to accept the archbishopric of Pisa: he argued that moving away from a climate to which he had grown accustomed ('this thin and dry air, so different from that of Pisa, its exact opposite

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proficiscuntur mori vel magnis morbis corripi ut pastoribus accidit qui a montanis locis Tusciae ad marittima loca eius regionis peregrinantur' (47).

[132] Baldini 1586: 40-41.

[133] Baldini 1586: 155.

[134] 'Videtur igitur aëris mutatio et habitatio etiam longe gravior et magis morbosa esse quam aquae' (Baldini 1586: 39).

[135] Vincenzo Alamanni (Madrid) to Ferdinando I de' Medici (Florence), 17 September 1588. Florence, Archivio di Stato, Mediceo del Principato 4919, fol. 476^{r} (BIA: The Medici Archive Project, Doc ID# 2709): '[P]er la qualità di questo cielo giudicato tanto contrario alla mia complessione per comun parere di questi medici, che mi fa ardito a supplicare V[ostra] A[ltezza], sì come io fo humilissimamente, che si voglia degnare di farmi grazia del mio ritorno'. Alamanni's request to return to Florence was turned down. The ambassador was thus forced to remain in Madrid, where he died two years later—not from the hostile climate, though, but from a fall from his horse (see Rotondi 1960; on Alamanni, see also DBI, article 'Alamanni, Vincenzo' [by Clementina Rotondi]).

indeed') might wreak havoc with his health[136]—all the more so because the climate of Pisa, just like that of nearby Livorno,[137] was notoriously unhealthy.[138]

These few instances remind us that the importance of climate theories went far beyond erudite disputes: it was a widely shared concern, orienting actual life choices and everyday behaviours. Commentaries such as that of Baldini bear clearer traces than others of this practical utility of climate theory, possibly because of the author's close ties with Tuscany's rulers. Baldini's interest in *Airs, Waters, Places* is clearly not just academic: his commentary, published in 1586 and dedicated to Grand Duke Francesco I, contains detailed descriptions of the Tuscan environment, often in direct comparison to the neighbouring papal territories of present-day Emilia Romagna and Lazio. The Hippocratic framework is actively used to 'scan' the landscape and draw a medico-environmental map of the Tuscan state based on temperature, winds, and water types.[139] Baldini's text includes a long discussion of the effects of the rivers Arno and Tiber on human health,[140] an examination of micro-climates and their influence on human beings,[141] as well as a survey

[136] Agnolo Niccolini (Siena) to Francesco de' Medici (Florence), 15 July 1564. Florence, Archivio di Stato, Mediceo del Principato 1870, fol. 48^{r} (BIA: The Medici Archive Project, Doc ID# 9277): '[E]ssendo già per otto anni che io corro di questo governo, avvezzo in questa aria sottile, et asciutta, et così non solamente diversa ma contraria a quella di Pisa […]'.

[137] Baldini (1586: 155) found the climate of Livorno to be even worse than that of Pisa, although those who were born there or had lived there for a very long time did not seem to suffer from it.

[138] Thus Belisario Vinta (1542-1613), secretary of State under Grand Duke Francesco I de' Medici and one of Galilei's correspondents, strongly discouraged Eleonora de' Medici, Duchess of Mantua, from sending her nineteen-year-old son Ferdinando Gonzaga to study in Pisa: 'Andai anch'io allo Studio di Pisa di sedici anni, et il secondo anno de' miei studii m'empiei in quell'aria di una gran rogna, et feci purghe et rimedii per liberarmene, ma finalmente non mi riuscì mai se non partendomi di quell'aria alla primavera. Et tutti i medici mi dissono sempre che l'aria di Pisa era generativa, et nutritiva della rogna per sua natura'. Belisario Vinta (Poggio a Caiano, Florence) to Eleonora de' Medici (Mantua), 8 November 1606. Florence, Archivio di Stato, Mediceo del Principato 2948, unnumbered folio (BIA: The Medici Archive Project, Doc ID# 5855).

[139] Baldini 1586: 76, 91, 235 (on water types, winds, and temperature respectively).

[140] Baldini 1586: 147-55.

[141] Notably Florence and Bologna, both of which lie partly in a plain and partly on the hills: 'cum igitur partium unius et eiusdem urbis situs inter se multum dissident, nil mirum si corpora eorum qui unam et eandem urbem incolunt magnitudine et figura ab invicem [*sic*] differunt, sicuti inter se corpora eorum hominum dissidet qui provincias habitant quae diverso modo sitae sunt et a variis et diversis morbis qui longe inter se differunt affliguntur' (Baldini 1586: 235). Jean Bodin makes a similar remark about Athens in his *République* (5.1; Bodin 1986, vol. 3: 8).

of stagnant waters and advice on how to deal with them.[142] The latter in particular was a critical issue at the time, for not only was excessive humidity thought to endanger human health by spreading 'pestilential vapours'; it was also viewed as a direct cause of bad characters and evil customs.[143]

Given the vital importance of ambient air for human health, Baldini recommends that much effort be invested into preserving or improving air quality by artificial means, notably by properly disposing of human waste, draining stagnant waters, cultivating the land, planting fragrant trees, and preventing large armies from stationing too long in the same place.[144] A similar concern with air quality is visible in the works of Settala, who particularly examined its correlations with vegetation, water, and putridity, and worried about its effects on human health.[145] Settala's ideas on the matter were shaped not only by his study of ancient texts (particularly, as we have seen, *Airs, Waters, Places* and the *Problemata*), but also by his personal experience of the plague at Milan, which he confronted twice: first in 1576 as a recent graduate, and again in 1630 in his capacity as *protomedico* of the Duchy. In his treatises on the plague (1622) and on reason of State (1627),[146] Settala puts ancient climate theories in the service of modern governmentality, drawing on them to craft cutting-edge public-health plans in a time when public hygiene was becoming a major area of concern for most European states.[147]

As this brief and inevitably selective overview has shown, commentaries on ancient climatological texts could serve different purposes and be addressed to diverse publics, not

[142] Baldini specifically recalls a pool of stagnant water formed by the Arno at Pian di Ripoli, on the outskirts of Florence, which Duke Cosimo was able to drain by planting trees (Baldini 1586: 245).
[143] Baldini 1586: 248.
[144] Baldini 1586: 34-35.
[145] Settala 1632, vol. 2: 281-82 (*ad* Arist., *[Pr.]*,14.7).
[146] On these works, see Rota Ghibaudi 1959. On Settala's treatise on reason of State in the larger context of Italian, and particularly Milanese, political thought, see Pissavino 2003.
[147] See Latronico 1938: 273-92; Cipolla 1976; Cipolla 1986; Cipolla 1992; Pratilli and Zanghieri 1995; Mucciarelli et al. 2000; Sansa 2006.

necessarily erudite and academic—although the use of Latin for most of them certainly limited the audience to the well-educated. While some commentaries, such as those of Fracanzano and Cardano on the *De alimento*, were solidly rooted in academic contexts, either because they were the result of university lectures or because they were used as study aids, others seem to have had different origins and a larger scope. Texts such as *Airs, Waters, Places* never really formed part of the standard medical curriculum at most European universities:[148] personal interest in the topic was usually responsible for an author's choice to comment on them.[149] A close examination of *Airs, Waters, Places* provided Cardano and Settala with essential groundwork for composing new treatises on related topics (see below, 1.3.2.b on Cardano, and Chapter 3 on Settala); in other cases, interpretation and free-standing textual materials were mixed together in the same work, as in the case of Girolamo Manfredi's *Libro del perché*—an incredibly popular collection of natural-philosophical questions in the pseudo-Aristotelian fashion, which went through at least twenty-five editions since its first appearance in Bologna in 1474[150]—and in the recently discovered *Miroir des melancholicques*, another vernacular text inspired by the tradition of the *problemata*.[151] Finally, Baldini's commentary on *Airs, Waters, Places* and

[148] See Siraisi 1997: 128-29. There are exceptions: in France, for instance, *AWP* was incorporated into the medical curriculum during the second half of the seventeenth century, at a time when the medical faculty at Paris was dominated by 'traditionalists' committed to 'uncovering the works of those who, during the course of the previous century, had most passionately defended the Hippocratic-Galenic doctrines' (Martin 1969: 228). Hugely popular texts such as the *Praelectiones in librum Hippocratis de aëre, aquis et locis* of Jean Martin, personal physician to Queen Marie de' Medici and regius professor of medicine at Paris, belong to the same intellectual climate. Martin's work first appeared in 1646 and was reprinted at least four times in less than fifteen years (1655, 1660, 1661, 1662).

[149] Siraisi (1997: 128-29) notes that 'alone among the Hippocratic works on which he commented, *Airs Waters Places* offered Cardano the possibility of fully integrating medicine, astrology, and philosophy of nature' and, for this reason, it 'gave scope to his historical and anthropological interests and, indeed, his random curiosity'.

[150] See Carré and Cifuentes 2010.

[151] Meury Riflant, *Le Miroir des melancholicques* (Rouen: Nicolas de Burges, 1543). Little is known about this rare text, which has been recently discovered by Nancy Frelick. The only known copies of this work are held at the Bibliothèque Nationale in Paris, the Bodleian Library at Oxford, and the University Libraries at Edinburgh, Grenoble, and Chicago. I would like to thank professor Frelick for letting me read a draft of her essay on the *Miroir* before it was published along with a facsimile of the Bodleian copy of Riflant's text (see

Settala's commentary on the *Problemata* testify to a larger, practical relevance of these texts for state administration and the management of public health. In all such cases, early modern commentaries offer an ideal vantage point to see how climate theory was being reworked at an erudite level in preparation for its future uses in 'real-life' contexts.

b) Natural Philosophy and Climate Theory in the Sixteenth Century

Treatises of natural philosophy—a vastly popular genre in the sixteenth century, intersecting and encompassing several distinct subfields[152]—usually included one or more sections devoted to the effects of place and climate on all living beings, humans included. In these works, climate theory was often invoked to justify diversity of appearance and behaviour within the same species, the human species being no exception in this respect.[153] A reasonably complete survey of natural-philosophical treatises discussing climatic influence would require an entirely separate study; in this section, I shall narrow my focus to four authors who made significant contributions to Renaissance climate theory: the Dutchman Levinus Lemnius, the Spaniard Juan Huarte de San Juan, the Italian Girolamo Cardano, and his fellow countryman and critic Julius Caesar Scaliger. In choosing these

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Frelick 2015). In Frelick's words, the *Miroir* 'claims to be a translation from the Greek of Aristotle and appears to have been considered a medical text at the time. It presents a translation and commentary on the (Pseudo-)Aristotelian *Problem* 30.1, followed by a discussion on the relation between climate and temperament inspired by Aristotle, Galen, and Alexander of Aphrodisias, and includes cautionary poems admonishing readers to avoid wine and the pleasures of Venus, which lead to melancholy' (Frelick 2015: 120).

[152] See Wallace 1988; Blair 1997; Grafton and Siraisi 2000.

[153] See, for instance, Charles d'Arcussia's treatise on falconry (*La fauconnerie* [Aix-en-Provence: Jean Tholosan, 1598]): 'Just as horses derive through their breeding the natural characteristics of their country of origin, whether it be Barbary, Turkey, Italy, Spain, Friesland, or anywhere else, so also do Falcons. Although you may find many differences in their limbs and size, or in their plumage, they are all encompassed in the one species. There is nothing strange in this. It applies not to Falcons alone but to men also, for you may find them just as variable in their proportions, complexions, or natures, as were the places of their birth and what they were fed on' (D'Arcussia 2004: 12). D'Arcussia apparently follows in the footsteps of Frederick II's much earlier treatise on falconry, which also made use of 'the ancient doctrine of the seven klimata' (Glacken 1967: 224-26).

particular thinkers, my aim is first and foremost to show how four authors writing in the same period (the mid-sixteenth century) and sharing a similar background (all four were practising physicians) could end up developing very distinctive models of climate theory, on account not only of different geographical and cultural contexts, but also of different intended publics and of the various ways in which climate theory fitted into the their overarching philosophies. I shall also make passing reference to the French jurist and political thinker Jean Bodin—unquestionably the best known of all sixteenth-century climate theorists. Precisely because Bodin's climatological doctrines have been so accurately studied, however, I shall be content here with a few cursory remarks.[154]

Levinus Lemnius (1505-1568)

Born in Zierikzee, a small town on the Eastern estuary of the Scheldt, Lemnius studied theology and medicine at the *Collegium trilingue* in Leuven (where he befriended Andreas Vesalius) before becoming a practising physician and a prolific author. Among his most successful works were *De occultis naturae miraculis* (1559) and *De habitu et constitutione corporis* (1561), both originally published in Antwerp and subsequently reprinted and translated several times across Europe.[155] While these two works are the best

[154] See, in particular, Shackleton 1948; Tooley 1953; Glacken 1967; Lestringant 1982a; Couzinet 1996 (Chapter 7, section 2).

[155] According to data gathered from online catalogues (including Worldcat and the KVK), the *De occultis naturae miraculis* was reprinted at least twenty times over the course of the following century, in Antwerp, Cologne, Jena, Frankfurt, Heidelberg, and Leiden. It was also translated into Italian (by Lodovico degli Avanzi, in 1560), French (one anonymous translation appeared in Lyon in 1566; another one, by Jacques Gohory, was published in Paris the following year; a third, anonymous translation came out in Orléans in 1568), German (translated in 1579 by Jakob Horst Sr, and reprinted several times), and English (anonymous translation, 1658). The *De habitu et constitutione corporis* was reprinted at least six times, in Erfurt, Jena, and Frankfurt; it was also translated into Italian (anonymous translation, 1564) and English (one translation by Thomas Newton appeared in London in 1576 under the title *The Touchstone of Complexions*, and was reprinted in 1581 and 1633; another translation by Henry Kinder appeared in London s.d. around 1592 under the title *The Sanctuarie of Salvation*). There is some evidence that Jean Bodin may have used Lemnius's works as a source for his own climatological chapters in the *Methodus* (1566) and the *République* (1576).

representatives of Lemnius's climate theory, climatological elements also feature prominently in his *De astrologiae usu*, a short tract on astrology and medicine published in 1554 as a part of a miscellaneous collection.[156]

Lemnius's principal aim is to investigate, in a perfectly Galenic fashion, how human temperament results from a combination of innate ('congenita') and external ('adventitia') factors that jointly shape body, mind, and behaviour by acting upon the four humours.[157] Among the external factors, known as 'non-naturals' in the Galenic tradition, Lemnius lists diet and nourishment, lifestyle and physical exercise, sexual activity, the passions of the mind, and 'the condition of the air and state of the region' ('aëris ac regionis conditio').[158] This last factor is particularly important, as latitude, temperature, quality of the air, winds and moisture play a critical role in fashioning human temperament.[159] Thus, 'those who are exposed to the northern winds and inhabit cold regions' have 'thicker blood and dense spirits' that make them 'bold, inhumane, formidable, rough, fierce', unhesitatingly facing danger 'with unbroken spirit'; on the contrary, 'the people of Asia' are 'weak and effeminate', easily 'discouraged by the smallest difficulty' and incapable of enduring any degree of physical pain, all of which is due to their 'thin blood'.[160] On the other hand, those who live in the South are also blessed

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This is suggested by close resemblances in the treatment of many subjects by the two authors: for instance, Bodin's use of Livy's portrait of Hannibal in the *Methodus* (Bodin 2013: 266 [5.73]) is markedly similar to that of Lemnius in *De occultis naturae miraculis* (Lemnius 1574: 104 [1.16]; all quotations from this work are taken from the 1574 Latin edition, henceforth *ONM*). Bodin appears familiar with Lemnius's discussion of the geographical-climatological distribution of demons in the third chapter of the *De habitu et constitutione corporis* (see Bodin 2013: 308 [5.138]); in the *République*, he also follows Lemnius's ideas on the demonic origins of folly and the different forms of madness in relation to climate (Bodin 1986, vol. 3: 30-32 [5.1]).

[156] The *Libelli tres*, containing the *De astrologiae usu*, were reprinted in Leiden in 1639.

[157] For the body-soul connection (via humours), see, in particular, Lemnius 1574: 102 (1.16).

[158] Lemnius 1561: 12^{r} (1.2). All quotations from this work are taken from the 1561 Latin *editio princeps* (henceforth *HCC*). A discussion of the six non-naturals in relation to the humours can be found throughout the text. See also Lemnius 1574: 98 (1.16).

[159] Lemnius 1561: 14^{v} (1.2).

[160] Lemnius 1561: 12^{r}-12^{v} (1.2): 'Sic qui Aquiloni sunt expositi, tractusque frigidos occupant, ob sanguinem crassiorem, densosque spiritus, animosi conspiciuntur, inhumani, formidabiles, truces, feroces, et qui vultu

with keen and smart minds, as a result not so much of the greater heat, but of the closer proximity of the sun.[161]

Although Lemnius fully accepts the common notion of a national character,[162] his endorsement comes with a few caveats. First, latitude ought not to be taken as the single most important factor in determining national 'temperaments' ('constitutiones') and 'dispositions' ('habitus'). Within the same country one can find a range of different characters: drawing examples from his native Low Countries, Lemnius points out that continental Dutchmen ('Hollandi') are 'forgetful', 'sleepy', 'dull-witted' and 'unfit to learn', because their environment is too humid;[163] the inhabitants of the islands of Zeeland ('maritimi Belgae', such as Lemnius himself), whose natural humidity is tempered by a greater heat, turn out 'strong', 'accustomed to labour', 'sharp-witted', 'prudent and industrious', although in these open plains, constantly lashed by violent winds, people are often 'stubborn', 'short-tempered', and 'unmannerly'.[164] The 'rest of the Belgians' live in wooded valleys that are 'well-shaded and shielded from the winds', and thus enjoy a 'healthier climate' that makes their character 'milder and not so rough'.[165]

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voceque minaci hominibus terrore incutiunt. Quod vero ad pericula adeunda attinet, intrepide se omnibus obiiciunt, vitaeque discrimina alacri atque infracto animo subeunt. Quae naturae conditio in Asianis desideratur: illi enim molles atque effoeminati, ingruente vel levissimo incommodo labascunt, illatoque minimo doloris sensu ingemiscunt, ac metu exalbescunt […] qui vero subtenui sunt sanguine, exiles habent spiritus, citoque evanidos'.

[161] In *De astrologiae usu* (henceforth quoted as *DAU*), Lemnius explains that just like plants and trees, human minds too benefit from the generative effects of the sun: 'nam magna ex parte sagaciora existunt, minusque obstupescunt, quae huic sideri vicina sunt' (Lemnius 1554: 12^{r}).

[162] See also Chapter 7 of *HCC*, where Lemnius argues that different nations within the same band of latitude tend to have similar temperaments.

[163] 'Itaque obliviosi sunt, somnolenti, artibus discendis inepti, ingenio stupido, minimeque sagaci, et quum corpore obeso sint atque humido, memoria minus valent' (Lemnius 1561: 15^{r} [1.2]).

[164] 'Quod si humiditas modico calore tepescat, ut iis qui loca incolunt plana, aprica, patentia, paucisque arboribus consita, quales sunt maritimi Belgae, qui hibernis mensibus frigore, aestivis ardore plerunque infestantur, ut corpora sortiuntur robusta, laboribus assueta, membra articulata, cutem hispidam: ita animum pertinacem obtinent, obstinatum, iracundum, magisque ferocem quam benignum: caeterum acri sunt iudicio, prudentique industria, ac negotiandi peritia mire instructi, et qui rebus delectum adhibeant' (Lemnius 1561: 15^{v} [1.2]).

[165] 'Caeteri Belgae, quibus arbores praebent umbracula, ac ventos arcent, quique coelum habent salubrius, terram fluminibus scatentem, agros aquarum dulcium ductu atque irrigatione foecundos, mitiori sunt ingenio,

Furthermore, national characters are not written in stone: a well-chosen diet, moral discipline, and a liberal education can do much to refashion the natural dispositions of a people. For instance, Lemnius observes that the English, though less inclined towards 'the liberal studies' and 'fine literature' by virtue of their natural temperament, have been able to achieve surprising results by applying themselves with persistence.[166] The same is true of the Swedes, who have 'huge and strong bodies' but are naturally unfit for any intellectual endeavour; yet they were recently 'educated' and 'tempered' thanks to the exceptional efforts of King Eric XIV.[167] This praise of Eric Vasa may appear suspicious, since Eric was crowned king of Sweden in that very year 1561, and could not have done much as yet to 'temper' and 'educate' his nation. The circumstantial and rhetorical nature of Lemnius's praise seems confirmed by yet another fact: internal evidence suggests that these lines were written just as Lemnius's son Willem was entering service as personal physician to Eric of Sweden, after two years spent practising in England.[168]

Yet Lemnius's persuasion that natural character can be improved was sincere. Throughout his works, he stresses repeatedly that human nature is like 'soft wax' and can be 'fashioned and framed' with relative ease, so that no room is left for despair: to put it in

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minusque aspero […]' (Lemnius 1561: 15^{v}-16^{r} [1.2]). On the Low Countries, see also *DAU* (Lemnius 1554: 31^{r}-34^{r}).

[166] 'Verum humanitatis studiis minus dediti, ac politioribus literis minus exculti, qui tamen si animum ut coeptum est, praeclaris rebus applicare pergant, ad res gerendas efficiuntur apti, ad perdiscendas artes appositi' (Lemnius 1561: 16^{v} [1.2]). According to Lemnius, the English temperament is similar to the Italian one, which is described as hot and dry, thus creating men who are 'alert, sharp, industrious' ('vigiles, acres, industrii'), remarkable for their 'shrewdness, keenness of mind, erudition, eloquence and fluency of speech' ('sagacitate, acumine ingenii, naturae solertia, praestantia doctrinae, dicendi peritia atque ubertate'), but also stubborn and vindictive (Lemnius 1561: 16^{r} [1.2]). The English temperament is not so intensely hot ('languidior calor, minusque fervidus'), as it is tempered and overcome by moistness ('ab humiditate superetur'; Lemnius 1561: 16^{v} [1.2]). This produces a human type that is less proficient in intellectual activities, but healthy, handsome, and well-mannered. A healthy diet, pure air, and fertile, well-watered fields further contribute to make the English nation happy and thriving (Lemnius 1561: 44^{r} [1.7]).

[167] '[…] qui ad polum Arcticum, ac mare glaciale devergunt, quorum potissima pars vasto validoque corpore existunt, at nullo acumine ingenii aut praestanti doctrina, quanquam haec natio singulari prudentia Sereniss[imi] Sueciae Regis Erici, humanitate exculta, mitigati animi indicia nunc proferat' (Lemnius 1561: 14^{v} [1.2]).

[168] On Willem Lemnius, see Van Hoorn 1971.

Lemnius's own words, 'nobody is of so poor a constitution and so unbalanced a temperament that a healthy diet of good, juicy foods and appropriate physical exercise cannot bring a corrupted body to a more convenient disposition'.[169] But the reverse is also true: given that human temperament is so malleable, nothing less than constant attention can prevent a good temperament from turning bad. It is therefore of the utmost importance to 'examine oneself to see what contributes best to one's health, and avoid those things that might cause one harm or offend one's physical and spiritual health'.[170] Lemnius places this burden entirely on the single individual: so varied are human constitutions and the moral and physical qualities that come with them, that this painstaking 'survey and investigation of oneself' must be carried out on a strictly individual basis.[171] In keeping with the Galenic notion of a 'latitude of health' (see below, Chapter 2), Lemnius argues that the ideal state of health varies according to an array of circumstances that make it difficult, if not impossible, to prescribe a set of fixed rules valid for all cases. But while the means may vary, the goal is ultimately the same for everyone: thus Lemnius provides specific advice on how each temperament can be brought to that temperate, mean state ('temperies ac moderatio') that ensures constancy, peace of mind, and moral temperance.[172] To this end, every aspect of human life—from diet and sleep down to the temperature of the water in which one bathes—ought to be carefully regulated, and the regimen should be chosen carefully so as to agree with one's temperament while at the same time correcting its imbalances.

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[169] 'Caeterum nemo tam est infoelici constitutione corporis, nec tam inaequali intemperie, quin salubri alimentorum usu, et laudabilis succi cibis, appositisque exercitiis depravatum corporis habitum ad commodiorem possit reducere' (Lemnius 1554: 27^{r}).

[170] 'Quum itaque spirituum diversitas, atque ingeniorum morumque discrimina ex loci, aëris, regionis, alimentorum conditione ac natura oriantur, quisque secum ipse expendat, qua re incolumitati prospicere optime possit, eaque declinet quibus aliquid subest vitii, et quae quum valetudini, tum spiritibus officere, atque aliquid labis aut contagii adferre possint' (Lemnius 1561: 17^{v}).

[171] See Lemnius 1561: 95^{v}.

[172] See Lemnius 1574: 95 (1.16). Lemnius's goal is to moderate, not eradicate the passions: Stoic *apatheia* is clearly not a viable goal for him ('Nemo prorsus *apathēs*, atque ab affectibus alienus'; Lemnius 1574: 96).

Admittedly, such meticulous care of the self remains far beyond reach for a large majority of people. In Lemnius, 'education, institution, and discipline' become the cornerstones of an ethics for the rich élites ('mos gentilitius'):[173] while 'statesmen and noblemen' are in a privileged position to free themselves from the yoke of environmental influence by 'altering their diet and lifestyle', 'the common people' ('populares') with their 'uncultivated manners' are abandoned to their destiny, which is to 'follow the nature and habits of their region' and thus confirm the stereotypical doctrine of national characters.[174] There is little doubt that Lemnius was addressing an audience of male, wealthy, and well-educated readers who lacked neither the material means to take care of themselves, nor the motivation to 'become worthy members, stayes and ornamentes in theyr countrey'—an aspect astutely stressed in Thomas Newton's contemporary translation.[175]

Overall, Lemnius's works present a rather conventional mix of cosmological and chorological climate theory, based essentially on Galen,[176] and combined with a medico-moral doctrine which emphasizes diet, lifestyle, and education as the most appropriate means to correct the effects of place and climate. Environmental intervention, on the other hand, plays no significant role in this picture. At various times throughout his production, Lemnius does establish a powerful analogy between the cultivation of the self and the cultivation of the land:

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[173] Lemnius 1574: 98 (1.16).

[174] 'Verum cuiusque regionis conditionem ac naturam, quam imitari populares solent, immutat educatio, institutio, disciplina, sic ut promiscua multitudo incultis moribus conspiciatur, quum viri politici, et qui ex patriciis sunt prognati, immutata victus ratione, relictaque veteri, atque inolita consuetudine optimum vivendi institutum asciscant, ac se suosque ad laudabiles mores componant' (Lemnius 1561: 17^{v} [1.2].

[175] The Latin original simply states that a bad disposition can be 'brought to bear fruit' through careful education ('alii vitiosam naturam nacti educationis ac doctrinae beneficio ad frugem perducuntur'; Lemnius 1561: 3^{r} [1.1]). Thomas Newton's translation (*The Touchstone of Complexions*), first published in London in 1576 and reprinted in 1581 (I quote here from this later edition), freely expands on this passage in order further to stress the social and political significance of Lemnius's instructions (Lemnius 1581: 4^{r} [1.1]).

[176] Lemnius refers to Aristotle just once in relation to climatological issues, in a passage from Book 2 of *HCC* (Lemnius 1561: 139^{r} [2.6]), where he quotes from Arist., *[Pr.]*, 30.13.

> Just as we make barren trees bear fruit by means of painstaking pruning, and dung the weary soil, depleted by continuous tilling and seeding, in order to restore its fertility… so too can barren bodies that tend to dryness be put straight by choosing the appropriate foods to assist their nature.[177]

Yet this favourite agricultural simile (which recurs multiple times in his writings) operates as a mere rhetorical device in Lemnius's works. Unlike the environmental 'improvers' whom I shall discuss in Chapter 4, Lemnius never went so far as to argue that environmental manipulation could literally bring about the improvement of human nature.

Juan Huarte (1529-1588)

Just like Lemnius's works, Huarte's *Examen de ingenios para las ciencias* (1575) was a major bestseller in early modern times, with approximately sixty reprints, translations and new editions between 1575 and 1770,[178] notwithstanding the fact that the work did not satisfy the standards of Catholic orthodoxy.[179] Its author, born around 1529, grew up in the small Andalusian town of Baeza and studied philosophy at the local university (founded in 1538), before moving to Alcalá to pursue medical studies. Traces of this two-fold education, at once scholastic and Galenic, are clearly visible throughout the *Examen*,

[177] 'Ut arbores infoecundas, cultu atque industria feraces reddimus, atque agros steriles, longoque arandi serendique usu exhaustos, stercorando instauramus, ac restibili foecunditate post liminio sementi messique reddimus idoneos: ita quoque corpora arida atque ad siccitatem inclinata alimentis naturae fovendae accommodis erigimus atque ad destinatum praefixumque vitae terminum, tanquam ad optatum portum provehimus' (Lemnius 1561: 127^{r}-27^{v} [2.6]). See also Lemnius 1561: 3^{r}-3^{v} (1.1); Lemnius 1554: 28^{r}; Lemnius 1574: 110-11 (1.17).

[178] By the end of the eighteenth century, the *Examen* had been translated into Latin, French, Italian, English, Dutch, and German. For a complete list of editions and translations, including a study of the early modern circulation and reception of the *Examen*, see Pérouse 1970. More specifically on the Italian reception of the *Examen*, see García García and Miguel 2004.

[179] The *editio princeps* of 1575 was included in the Spanish Index of 1583 *donec corrigatur*, and although an expurgated version (in which Cardinal Bellarmino seems to have been involved) was published in Baeza after the author's death (1594), even this expurgated edition was banned from Catholic countries in 1605. In any case, the Roman prohibition did not hinder the popularity of the *Examen*. Most translations were apparently carried out on the basis of the expurgated text. According to Gabriel Pérouse (1970: 51-53), what aroused the suspicions of the Holy Office was not Huarte's climatology, but rather his stance on the organic nature of the intellect, on the rationality of the animal soul, and on the temperament of Jesus Christ.

published at Huarte's own expense in Baeza, where he had returned in 1571 to practise the medical profession after ten years spent teaching at Salamanca and Tarançon.[180]

Despite a common Galenic background, Huarte's ideas and goals differed markedly from those of his Dutch contemporary Lemnius. Compared to the latter, who had intended his *De habitu et constitutione corporis* primarily as a self-care handbook for wealthy, educated, upper-class readers, Huarte's choice of Castilian to address a national public that, as he himself remarked, was oddly impervious to Latin seems to indicate that he had a different purpose in mind.[181] In those years, the Spanish medical world was divided by a conflict between Latin-literate, academically trained physicians (known as 'Latinistas') and non-university trained practitioners who could not read Latin (the so-called 'Romancistas'), and the language of medicine was a hotly debated issue on which even Philip II's personal physicians had mixed views.[182] Once set in this context, Huarte's strong stance in favour of Castilian, as well as his polemics against the undeserved privileges of noble birth,[183] may be interpreted as more than simple rhetorical commonplaces, so widespread in the vernacular literature of this period.[184] As we shall see, the hypothesis that the *Examen* was meant as a manifesto for an intellectual and social reform of Spain is further strengthened by textual evidence suggesting that the Spanish physician viewed climate theory and the humoural doctrine of temperaments as valuable tools in the service of a programme of national regeneration.

[180] See Pérouse 1970: 23-25. On the scholastic and Galenic imprint, see pp. 34-42, where the influences of Spanish humanism on Huarte are also discussed.
[181] Chapter 8 of the *Examen* contains several pages of polemics against the use of Latin, and a discussion of why 'Latin is so repugnant to the Spanish capacities, and so natural to the French, Italians, Germans, English, and the other Northern nations' (Huarte 1581: 145). A climatogical explanation of talent for foreign languages and other disciplines follows (148-50). All quotations are taken from the 1581 Huesca edition (unexpurgated).
[182] Clouse 2011: 99-101.
[183] See Huarte 1581: 280-81.
[184] See Bianchi 2012.

In his dedication letter to King Philip II, Huarte expresses an enthusiastic endorsement of the Platonic principle of specialization of labour. Human nature, he believes, is too limited to do more than one thing well: thus a natural born lawyer will never make a good doctor, and vice versa.[185] For the sake of a well-functioning state, the king should therefore appoint 'men of great wisdom and knowledge, who are to discover each individual's skills at a tender age and make him (or her) study that science for which he is suited, not permitting him to make his own choice'.[186]

In and of itself, Huarte's doctrine of temperaments is not particularly original. Following Galen, he begins by positing that from 'the mixture of the four qualities (hot, cold, moist, and dry)' stem 'all the abilities of man, all his virtues and vices, and this great variety of skills which we behold'.[187] Individuals owe their temperament to several factors: in addition to their country of origin, diet, and ambient air,[188] the Spaniard also mentions the complexion and diet of one's parents.[189] Like Lemnius, moreover, Huarte subscribes to the Galenic notion of a 'latitude of health', even though acknowledging the infinite variety of human temperament inevitably complicates his project of reducing individual character to a set of well-defined talents.[190] His elegant solution consists in arguing that

[185] 'Naturaleza es la que haze al hombre habil para una sciencia, y para otra incapaz' (Huarte 1581: 6).
[186] '[…] hombres de gran prudencia y saber, que en la tierna edad descubriessen a cada uno su ingenio, haziendole estudiar por fuerça, la sciencia que le convenia, y no dexarlo a su election' (Huarte 1581: 5). The *Examen* also has a second preface encouraging each reader to examine himself and choose a profession that fits in with his 'natural ability', lest he waste his entire life on fruitless labours (Huarte 1581: 10).
[187] 'El temperamento de las quatro calidades primeras (calor, frialdad, humidad y sequedad) se ha de llamar naturaleza: porque desta nacen todas las habilidades del hombre, todas las virtudes y vicios, y esta gran variedad que vemos de ingenios' (Huarte 1581: 40).
[188] Huarte 1581: 41, 230-31.
[189] This is the topic of Chapter 15, known among scholars as the 'eugenetic' chapter. The unconventionality of this chapter has been greatly overstated: this is perhaps where Huarte is at his least original, echoing common medical knowledge in his recommendations that prospective parents follow a proper diet and lifestyle before conceiving, as well as in his advice on what to eat and how to perform the sexual act in order to attain the desired temperament for the baby-to-be. Much more innovative is Huarte's polemic against the widely accepted Aristotelian idea that the mother's imagination during the sexual act can shape the physical appearance of the baby. This issue is discussed on pp. 373-76, where Huarte argues the opposite of what Lemnius had stated in the *HCC* (Lemnius 1561: 36^{v}-37^{r} [1.7]).
[190] Huarte 1581: 218-19.

temperamental diversity is a blessing for the state, as it allows the nation to cater for most of its needs without importing goods or manpower from abroad. With this in mind, it is clear why Huarte considers regional differences as an asset to preserve, rather than as a weakness to eradicate: a richer, stronger Spain can only grow out of a multiplicity of local identities rooted in different environments.[191]

Such an emphasis on variety leads Huarte to relativize the concept of an 'optimal' complexion to an unprecedented extent. In this perspective, there are neither 'better' nor 'worse' complexions—only different complexions that are naturally suited for different activities, and all of which are equally valuable to a well-ordered State. In his *Methodus* (1566), Jean Bodin had similarly argued that God had endowed each nation with limited talents so that they would have to cooperate with each other for their own sustenance.[192] Like Huarte, Bodin also challenged the notion of a climatic golden mean by denying that temperate countries naturally produce virtuous souls, whereas distemperate countries foster vice and savagery.[193] Nevertheless, he had still not completely abandoned the idea of a physical and moral 'optimum', which he predictably identified with his native France, placed by him at the very heart of the middle temperate region.[194]

Huarte, on the other hand, freely acknowledged that the Spanish character was far from perfect: dry and hot by nature, the average Spaniard was 'extremely prudent' and sharp of intellect, but had a poor memory, a weak body, and could become very wicked if the heat overpowered the dryness in the humoural balance.[195] Unlike Lemnius, however,

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[191] Huarte 1581: 41-42.
[192] Bodin 2013: 280 (5.95-96). This idea is reiterated in *République*, 5.1 (Bodin 1986, vol. 3: 41-42).
[193] Bodin 2013: 262-64 (5.67), 266-68 (5.73-75), 302 (5.127). Bodin also rejects the idea that the middle region is the best for health and longevity (264 [5.69]).
[194] See *République*, 5.1 (Bodin 1986, vol. 3: 18-19) and *Methodus*, 5.113 (2013: 292-94). For a traditional view of the 'golden mean' ('aurea quaedam mediocritas'), see *Methodus*, 5.126 (2013: 302).
[195] On mental skills, see Huarte 1581: 148-49; for the inverse proportionality of keen minds and strong bodies, see Huarte 1581: 306. In Chapter 9, Huarte explains that 'cuando predomina el entendimiento, ordinariamente se inclina el hombre a virtud', but when the heat overcomes the dryness, then 'tres malas

Huarte was not especially interested in developing ways to correct such shortcomings and improve the Spanish character. Not because he deemed temperament to be unalterable: on the contrary, he strongly believed in the pliability of human nature and clearly stated that a change of place, lifestyle, water or diet could quickly alter one's natural constitution and behaviour: 'The nature of men, just like that of any animal or plant, is such as to partake of the qualities of the land where they live, and to lose those previously received elsewhere. And whatever you make them do, they soon learn to do it within a few days, without contradiction'.[196]

The question for Huarte was not so much whether such changes were possible, but whether they were desirable. Adopting the same agricultural simile already used by Lemnius, but turning it to an entirely different purpose, the Spaniard explained that human minds are like plots of land, each having its own distinctive quality of soil. And while careful cultivation is certainly useful for bringing one's natural qualities to perfection,[197] insisting on planting the wrong seed in the wrong soil will never produce any meaningful results. Similarly, men learn quickly and most effectively when they choose a path that agrees with their natural inclinations; to do otherwise is to condemn oneself to failure. In conclusion, Huarte recommends that men follow their natural temperament and capitalize on it, rather than strive to change themselves in order to become something they are not: the stronger call of inborn nature will always ultimately prevail upon any acquired

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inclinaciones' take root: 'Sovervia, Gula, y Luxuria' (180-82). Incidentally, the fact that the Spanish are described as 'hot and dry' confirms Huarte's Galenic orthodoxy: although he knows and discusses the concept of *antiperistasis* (see, for instance, Huarte 1581: 149; *antiperistasis* is translated as 'counterposition' in Richard Carew's contemporary translation [Huarte 1594: 117]), Huarte ultimately follows Hippocrates and Galen in his geo-humoural doctrine of temperaments.

[196] 'Esto tiene la naturaleza del hombre, y de qualquier animal y planta, que luego toma las costumbres de la tierra donde vive, y pierde las que traya de otra. Y en qualquiera cosa que le pongan, en pocas dias la haze sin contradiction' (Huarte 1581: 242). See also p. 367 on the importance of water and air respectively. A lengthy section of Chapter 12 (230-43) discusses how the Jewish temperament was altered by the Jews' sojourn in Egypt, their subsequent march through the Sinai desert, and, much later, their settling down in Spain.

[197] Huarte 1581: 301.

dispositions. Thus the Spaniard was provocatively placing his *Examen*, and his entire climate theory, at the opposite end of a widely shared rhetoric of discipline and self-improvement.

Girolamo Cardano (1501-1576) and Julius Caesar Scaliger (1484-1558)

It has been suggested that Huarte may have drawn some of his climatological ideas from the works of the Italian philosopher and physician Girolamo Cardano.[198] While a demonstrable connection between the two authors is yet to be established, the least that we can say is that some of Huarte's hobbyhorses (notably that nature should be followed rather than countered) do find precise parallels in Cardano's treatises on natural philosophy, namely the *De subtilitate*, first published in 1550, and the *De rerum varietate*, which appeared in the same year (1557) as Julius Caesar Scaliger's *Exercitationes*—a systematic critique of Cardano's *De subtilitate*, authored by one of the leading scholars of the time.[199]

Upon closer inspection, however, Cardano's climate theory differs deeply from that of Huarte.[200] While the latter espouses a rather conventional view of climates and temperaments, though he turns it towards novel purposes, Cardano develops a theory that

[198] See Pérouse 1970: 13.

[199] Cardano subsequently wrote a self-defense that appeared after Scaliger's death: it is the *Actio prima in calumniatorem*, published as an appendix to the 1560 edition of the *De subtilitate.* Although *De subtilitate* was reedited in 1554 with several additions, Scaliger appears to have based his critique on the first edition (see Baldi and Canziani 2001). On the Cardano-Scaliger polemic, which involved Cardano's entire philosophy of nature and not just his views on climatic influence, see Maclean 2008; Giglioni 2015. In the sixteenth century, this famous controversy attracted the interest of many European scholars. Jean Bodin, for one, specifically referred to it several times in the fifth chapter of his *Methodus*, with particular reference to the climatological issues at stake.

[200] The following discussion of Cardano's climate theory is entirely based on the *De subtilitate* (and its critique by Scaliger) and the *De rerum varietate*. The correlation between climate, diet, and temperament in Cardano's medical works (*Contradicentium medicorum libri*, *De methodo medendi*, *Theonoston*, *De usu ciborum*, etc.) has been carefully studied by Nancy Siraisi (1997).

innovates substantially on earlier models, as a result of his own reworking of Aristotle's doctrine of elements and of Galenic humouralism.[201] According to Cardano, only three, not four, elementary qualities exist in the sublunar world: cold, dry, and moist, while heat—responsible for all the processes of generation and corruption that take place on earth—is said to come entirely from the stars. Alfonso Ingegno has observed that Cardano's 'abandonment of the theory of the four elements implies the disappearance of the two traditional couples of opposites, hot-cold, dry-moist',[202] thereby upsetting one of the cornerstones of Galenic humouralism. As a direct consequence, Cardano's climate theory presents a fascinating mix of old ideas reshaped to fit a new philosophy of nature.

According to Cardano, human beings are affected by everything that surrounds them: laws, customs, and a wide range of natural determinants such as stars, weather, landscape, and so forth.[203] The work of both the natural philosopher and the physician consists in isolating the factors that most contribute to a specific phenomenon—a daunting task, given the astonishing number of variables to take into account (around 3,000 in Cardano's own estimate).[204] For a physician such as Cardano, choosing at each particular time the appropriate analytical scale thus becomes, quite literally, a matter of life or death.[205]

On a cosmological level, planetary influences and the varying intensity of solar heat radiation at different latitudes produce multiple human types (strong and unwise in the

[201] On Cardano's reworking of Aristotle and Galen, see Siraisi 1997: 43, 138-42; Ingegno 1980: 220.
[202] Ingegno 1980: 225.
[203] In *De rerum varietate*, Cardano argues that 'Natura enim humana a corpore afficitur, et a legibus et consuetudinibus, et ab eo quod exterius advenit' (Cardano 1557: 293 [40]). All quotations from the *De rerum varietate* are taken from the *editio princeps* of 1557.
[204] See Siraisi 1997: 131, with reference to Cardano's commentary on *AWP*.
[205] Ingegno (1980: 53-55) convincingly argues that Cardano's natural philosophy revolves around the issue of how general causes relate to particular causes. This is reflected in his climate theory as well.

North, weak and clever in the South, agile and prudent in the temperate zone),[206] and once latitude and longitude are known, 'it is possible to speculate about the nature and healthiness of a place'.[207] However, in most cases this broad partition based on latitude needs to be further qualified: first, because the nature of a place changes over time, and thus its location on the grid map of the earth says little about the actual features of the surrounding environment;[208] secondly, because 'in the same latitudes, people live in different ways', and the specific site ('situs') contributes just as much as the climatic zone ('regio') to this 'variety of human conditions'.[209] Therefore, Scaliger's accusation that Cardano attaches too much importance to latitude and disregards environmental variety 'in the same latitude' ('sub eodem coelo') seems to be inaccurate and unfair.[210] As a matter of fact, Cardano offers an entire list of climatologically relevant chorological features;[211] these include altitude, geographical aspect, properties of soil and water, and proximity to the sea. To these he adds a meteorological factor, namely the frequency and direction of

[206] Cardano argues this both in *De subtilitate* (Cardano 1559: 415 [10], 454-55 [11]; all quotations from the *De subtilitate* are taken from the 1559 expanded edition) and in *De rerum varietate* (Cardano 1557: 8-9 [1], 18-19 [4], 26 [5], 285 [40]). See also Cardano's description of national talents in *De rerum varietate*: 'Indi occidentales qui Peru incolunt, manuum opere [excellunt]: qui novam Hispaniam, agilitate corporis: orientales, ingenio: Turcae, robore: Europaei, agilitate: Aegyptii olim mathematicis: Graeci, philosophia' (Cardano 1557: 313 [40]). For Cardano's partition of the world into five zones (in accordance with the classic model analysed in section 1.2.3.a above), see Cardano 1557: 7-9 (1), 22 (5), 445-46 (60).

[207] '[…] coniectari possit de locorum natura ac salubritate' (Cardano 1557: 443 [60]).

[208] In *De subtilitate*, Cardano observes that the same place ('locus') where Alexander the Great once sat, inside a palace in Babylon, now lies 'perhaps in the open countryside, but more likely underground' ('nunc autem forsan in agro, atque etiam sub terra'; Cardano 1559: 34 [1]). In *De rerum varietate*, he links the discourse on environmental change to the rhetoric of vicissitude: 'Labente tempore, non eadem apud omnes manent […] loco vero horum alia subeunt, legibus leges, mari mare, montes montibus, flumina fluminibus, libri libris, alia aliis. Mors enim unius, vita alterius. Britannia olim australi parte floruit, nunc senescit […]' (Cardano 1557: 9 [1]).

[209] 'Sub eisdem parallelis, diversis modis vivitur' (Cardano 1557: 22 [5]); 'Non solum regio, sed situs multum facit […] ad varietatem conditionis hominum' (Cardano 1559: 336 [6]).

[210] Scaliger 1557: 547 (177.4), 761-62 (264), 788 (274). All quotations from the *Exercitationes* are taken from the *editio princeps* of 1557.

[211] See Cardano 1557: 443 (60): '[…] oppida, urbes, arces, emporia, sylvae, nemora, colles, rupes, montes, lacus, stagna, flumina, torrentia, paludes, mare, rivuli etiam, et loca aspera, campique […] herbae mortiferae, fertilitas'. An additional meteorological factor, rainfall, is discussed in *De rerum varietate*, 6 (33).

the winds.[212] Each of these factors plays a role in affecting air quality, which Cardano singles out as the ultimate determinant of human health.

As we have seen, Cardano no longer conceives of heat as an elementary quality that is naturally present in earthly substances, but as a property of celestial bodies that is merely communicated to the sublunar world. Celestial heat has powerful generative effects: for instance, the reason why the East produces all things—from plants to metals—more perfect and more plentiful than the West is that it receives the solar rays in the morning, when they still retain their full power (an explanation that will elicit Scaliger's pungent irony).[213] But the same celestial heat is also responsible for processes of destruction and putrefaction, by either consuming or corrupting the moistness that is essential for all forms of life. Consequently, Cardano regards hot places as generally inhospitable to life, unless their heat is attenuated by the moistening presence of water;[214] but in this case, care must be taken to avoid stagnant waters, as these make the air extremely unhealthy.[215]

Cardano's golden principle, bluntly rejected by Scaliger, is that 'stagnant air corrupts', whereas 'when the air keeps moving, it preserves things by making them drier and much cooler due to such movement'.[216] Thus, although an absolutely ideal site does

[212] On height, see Cardano 1557: 23-25 (5); on aspect, see Cardano 1559: 226 (6); on waters, see Cardano 1557: 29 (5) and 213 (21), with a further passage on slow-flowing vs. fast-flowing rivers on p. 25 (5); on soil, see Cardano 1557: 30-34 (3), 125 (23); on winds, see Cardano 1559: 89 (2).

[213] Cardano 1559: 226 (6). Scaliger mocks Cardano's infatuation with the East, arguing that there is no fixed geographical watershed between East and West ('si spectes orbem totum, et ubique et nusquam est et occidens et oriens'; Scaliger 1557: 320 [98]) and thus there can be no significant difference between the two; but even if there were one, the West proves superior to the East for the perfection of the things and human types that it generates (323-25 [99]). Britain, in particular, is blessed with an ideal climate, neither too cold in the winter nor too hot in the summer, and is therefore 'tam ferax ut a continente nihil praeter vinum petat' (613 [200]). Cardano's views on the English climate are very different: it has a bad climate with negative effects on customs, although the proximity of the sea makes bodies healthier than they would typically be in that latitude (Cardano 1557: 286 [40]).

[214] See Cardano 1559: 455 (11), 191 (4).

[215] Cardano 1559: 456 (11).

[216] 'Aër immotus corrumpit […] dum autem movetur conservat, exiccans ob motum et vehementer refrigerans' (Cardano 1559: 81 [2]). Scaliger opposes this principle and brings several counterexamples in

not really exist,[217] a close approximation would be a location on the sea, with mountains nearby and eastern winds blowing gently to sanitize the air without making the local inhabitants 'treacherous and inconstant'.[218] Cardano observes that winds tend to blow more strongly in high or narrow places: this is one of the reasons why mountains are healthier than plains and open valleys.[219] However, artificial means can be used to ventilate hot, hollow, windless places: modern Egyptians, for instance, know how to build special towers that work like natural air-conditioning systems.[220] On the other hand, it is possible to design 'buildings that greatly heat up the air even during the winter'.[221]

Cardano, who was notoriously fascinated with technology and engineering, provides several other examples of how men can alter the natural order of things to have it suit their purposes. Water can be purified or brought where there is none;[222] an earlier maturation of crops can be achieved by artificial means;[223] alien species of plants or animals can be transplanted and adapted to climates other than their own.[224] Yet Cardano,

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Exercitationes, 31 (Scaliger 1557: 128). In general, Scaliger does not regard the stillness or mobility of the air as a relevant factor in determining the nature of a place and its effects on health (131).

[217] Like Bodin and Huarte after him, Cardano relativizes the idea of an absolute best, first by pointing out that different things may be equally good, though for different purposes or in different circumstances ('non solum quod optimum est, sed et cui considerandum [est], et in quo'; Cardano 1557: 111 [20]), then by endorsing the idea of a latitude of health (see Cardano 1557: 73 [6]; see Siraisi 1997: 131), and finally by stressing that all things are good in some respects but disappointing in others. This applies to climates and places as well: for instance, 'ubi vero montes, meliora omnia, sed necesse est locum esse sterilem' (Cardano 1557: 29 [5]).

[218] That violent winds make human minds 'infida et inconstantia', as well as 'mobilia et levia', is stated in *De rerum varietate*, 6 (Cardano 1559: 333, with reference to Hispaniola, current Haiti and Dominican Republic) and promptly rejected by Scaliger, who argues that foolish, inconstant men can be found in windless places such as Lombardy (possibly a personal attack on Cardano, who was born in Pavia), India, and Epirus, while very windy places such as Java are inhabited by 'homines optimae spectatissimaeque fidei' (Scaliger 1557: 524-25 [167]). On the ideal site, see Scaliger 1557: 454-56 (11) and Cardano 1557: 31 (5), 667-68 (50). I shall return to this point in Chapter 3.

[219] This is another point that Scaliger challenges (1557: 320 [98]). Cardano thinks that cold places are naturally healthier than hot ones: this is why plagues occur rarely in Germany, even when the land is neglected, which usually leads to putrefaction and unhealthy vapours (1559: 101 [2]).

[220] Cardano 1559: 89 (2).

[221] 'Liquet autem ex his, aedificia posse fieri quae etiam hyeme non parum aërem excalefaci[u]nt' (Cardano 1559: 179 [4]).

[222] See Cardano 1557: 41-43 (6).

[223] See Cardano 1559: 179 (4).

[224] This point is made both in *De subtilitate*, 6 (Cardano 1559: 293, 306-08, 326, 348) and 12 (510), and in *De rerum varietate*, 20 (Cardano 1557: 106-07) and 27 (144-45).

as Alberti before him, calls for prudence in tampering with the laws of nature. For instance, he stresses that displacement of vegetal or animal species is often dangerous: 'nature generates things appropriate to a particular place',[225] and the outcomes of a change of location are unpredictable:

> Of the trees that are transplanted, some do not survive, such as the agarwood brought to Italy from India; others live, but fail to bear fruit, such as the palm trees at Genoa; others do bear fruit, though of inferior quality, such as the pepper plant in our region; and some produce perfect fruits, since they can tolerate both climates, such as the grapevines that were transferred to the Indies from Spain.[226]

The same goes for animals: Indian ducks merely become smaller when they are brought to Europe, but other species, such as the rhinoceros, cannot adapt to the new climate and food, and die.[227] Indeed, Cardano believes that whenever living beings survive a change of climate, it is not because they have adapted to the new habitat, but because the new habitat was not all that new in the first place. Genuine acclimatization, on the other hand, would require a temperamental transmutation that Cardano deems unlikely and at any rate extremely inadvisable: the dispositions acquired at birth are lost only with great difficulty,

[225] 'Natura gignit ea quae loco conveniunt' (Cardano 1557: 209 [33]).

[226] 'Arbores quae transferuntur, aliae non vivunt, ut in Italia ex India lignum aloes: aliae vivunt, sed non edunt fructum, ut Genuae palmae: aliae edunt fructum, sed oblaesum, ut piper apud nos: et quaedam fructum reddunt perfectum, quod utriusque coeli sunt patientes, ut vites ex Hispania in Indiam translatae' (Cardano 1559: 326 [6]). See also Cardano 1557: 106-07 (20). Cardano has a very interesting passage on the Spanish attempt to plant wheat and vines in the West Indies: 'Maizum enim in India occidentali, non solum melius provenit quam in nostris regionibus, sed Indis ipsis utilius est quam triticum: cum et ob consuetudinem melius alata eos et ex eo vinum conficere soleant, magisque multiplicetur, minorique periculo seratur, indigeatque leviori cura laboreque: cum unus homo sufficiat maizo serendo: tritico cum omine iuga bovum sint necessaria. Itaque non solum quod optimum est, sed et cui considerandum, et in quo' (Cardano 1557: 111 [20]). On the other hand, Cardano thinks that grapes successfully adapted – a point that is challenged by Scaliger in *Exercitationes*, 159 (1557: 506-07). Scaliger is even more opposed than Cardano to displacement, and states bluntly that 'locus non proprius non conservat' (15 [5.5]).

[227] Others survive but cannot procreate (e.g., the elephant); others procreate with great difficulty (e.g., lions and tigers); only few species adapt beautifully and 'proveniunt laeta […] quoniam nihil est quod naturae eorum repugnet, neque ex aëre, neque ex cibis' (Cardano 1557: 144 [27]).

and the process of change is traumatic and often dangerous.[228] It comes as no surprise that Cardano, alone among all the authors I have considered, mentions the famous case of the Macrocephali ('Longheads')—a legendary ancient people who, according to Hippocrates, fashioned the heads of their babies by wrapping them with swaddling bands soon after birth—not as an instance of how an improved second nature can be superimposed to the one received at birth, but as a negative example of unnatural behaviour: 'whatever happens against the laws of nature causes harm', he argues; 'midwives should bring [babies] back to their natural state, not draw them away from it'.[229] He makes the same point with regard to those English and French shepherds who try cross-breeding to enhance the fertility of their animals, with rather disappointing results.[230]

Nevertheless, Cardano does not go as far as Huarte in his reverence for the natural order. While he recommends that the biological constitution of living beings remains untouched, he readily encourages the individual to improve his moral self and to strive for a long, healthy life—a goal described as inappropriate by Scaliger, who thinks that men should aim at a good life rather than a long one.[231] Cardano argues that climate and location, though powerful determinants of both human health and character, are not insurmountable influences: by following an appropriate medico-moral discipline, based on diet and lifestyle but also on education and religion,[232] anyone can correct his or her behaviour, achieve better health, and prolong his or her life span.[233]

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[228] This explains why people living in the same latitude and in similar climates do not all have the same skin colour: cf. the case of the inhabitants of Sevilla, of the Rio de la Plata, of Cape of Good Hope, and of Mexico (Cardano 1557: 27 [5]); the same example is in Bodin's *République* (1986, vol. 3: 54-55 [5.1]).

[229] 'Quicquid fit adversus naturae decreta, noxam affert […] obstetrix ad naturalem statum retrahere debet, non abstrahere' (Cardano 1557: 318 [43]). For the Macrocephali, see *AWP*, 24.

[230] 'Culti isti ac civiles, reipsa improbi, vitia permiscendo tollunt, et optima, lucri causa, dum copiam augere student, corrumpunt' (Cardano 1557: 117 [31]).

[231] 'Hoc autem non est optimum in Natura, diutissime vivere, sed sapientissime. Hominis enim vita non haec est, sed via ad vitam quae aeterna est' (Scaliger 1557: 625 [204]).

[232] According to Cardano, there are three ways to 'mutare animos' and 'mores corrigere': one is 'human', and consists in education; the second is 'medical', and consists in bloodletting, purging, and regulating diet

c) By way of conclusion

What emerges from this brief overview is not only the tremendous popularity of climate theories in sixteenth-century Europe, but also their remarkable diversity and flexibility. The four authors discussed above all concur on one point, namely the reality and importance of climatic influence: even Scaliger's fierce critique of Cardano leaves this central idea unscathed: it rejects Cardano's application of the principle while restating the principle itself.[234] Almost every other point, however, is a matter of discussion and sometimes bitter disagreement. How climatic influence operates, how it can be counteracted, and whether in fact it should be counteracted at all—these are just some of the questions that underlie this debate, and on which each of the authors examined expresses strikingly different views. What is worth noting, however, is that none of these writers appears to envision man-made environmental change as a viable way of coping with climatic influence. In these sixteenth-century works, Nature is largely an untouchable given, either because man lacks the means to change it or because it is deemed unwise to tamper with it. We shall see in Chapter 4 that the gradual erosion of this assumption in the seventeenth century will have a dramatic impact on climate theory, at both a doctrinal and

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and lifestyle; the third is 'divine' and consists in prayer and the constant reading of the Holy Scriptures (Cardano 1557: 338 [43]). In line with the medical knowledge of his time, Cardano believes that any change—of diet, of place, of sleep cycle, of sexual activity—must happen gradually, because (as he states in his commentary on Hippocrates's *De alimento*) 'too great and too sudden a change of habits causes one to fall ill more easily' ('facilius aegrotabit qui magno motu et repente mutat consuetudinem'; Cardano 1574: 27^{r}).

[233] Cardano 1557: 9 (1); 285, 287, 296 (40). See also Cardano 1559: 460 (11). Cardano explicitly states that customs are more easily changed than physical constitutions (1557: 287 [40]). Longevity is discussed in Book 12 of the *De subtilitate*: here Cardano recommends a conventional regimen which includes 'victus moderatus, expers crapulae, vini potentioris, Venerisque effoetae, mens laeta et somnus prolixus, cum exercitatione' (1559: 474 [12]). See Siraisi 1997, Chapter 4.

[234] See Scaliger 1557: 525 (167): '[…] terras edere, habereque sibi similia hominum ingenia'. Similarly, Scaliger does not oppose the idea that temperament influences customs: he simply thinks that the specific correlations established by Cardano are wrong (see Scaliger 1557: 788 [274]).

a practical level. For now, let us move on to consider how the relationship between a medical care of the body and an ethical care of the self—most clearly formulated in the sixteenth century by Levinius Lemnius—is received and reworked by seventeenth-century climate theorists.

CHAPTER 2

Tempering Temperament:

The Medico-Moral Economy of Environmental Influence

It behoveth every man
to be cunning in his own constitution.

—Phillip Barrough[1]

2.1. Introduction: Three Ways of Coping with Environmental Influence

In 1600, a young Welshman named William Vaughan (1575-1641) published a short handbook of personal hygiene, entitled *Naturall and Artificiall Directions for Health*. The treatise, printed in London by Richard Bradocke and dedicated to William's sister Margaret, had no other avowed ambition but to explain in concise and accessible terms how to keep healthy in both body and mind. A recent graduate in civil law from Jesus College, Oxford, Vaughan made it clear from the outset that he had never received any formal medical training. His advice was entirely based on personal experience, gained during a difficult period of his life, 'when sorrow and discontentment had almost dryed and stifled up my vitall spirites'.[2] Instead of resorting to professional care, Vaughan chose to engage in a process of self-analysis in order to establish what was good and what was harmful for his health. As he revealed to his sister, 'the necessarie regard of mine owne health' eventually paid off: Vaughan's self-made regimen not only allowed him to restore his health in due course, but also ensured its preservation thereafter.

[1] Barrough 1583: 7[r].
[2] Vaughan 1600: A3[v].

Most importantly, though, the young Welshman felt that he had learnt several lessons in the process: first and foremost, that the 'chusing of a good aire must (for the preservation of health) obtaine the chief place'.[3] Air, indeed, exerts a powerful influence not only on 'the bodies qualities' but also on 'the soules affections', so that its quality can determine the physical, mental, and moral well-being of a person.[4] According to Vaughan, the best air is fresh, clean, and temperate, without any 'extremetie of cold, heat, and moysture'.[5] But 'what shall a man doe', he wondered, 'if the aire be either too hot or too cold?' Vaughan's answer to this question was three-fold. First of all, a person can 'use cold things to keep away the heat, and hot things to expel the cold. He must adde dry things to moyst, and moyst to dry'. Alternatively, one can 'depart thence into another place', where the air is better or at any rate more suited to one's body. The third and last remedy, to be used 'if the aire be corrupt, and that a man cannot remove thence very quickly', is to 'artificially rectify it'.[6]

Vaughan's tripartite solution neatly summarizes early modern attitudes to environmental influence. The latter was often viewed as a double-edged sword: just as a salubrious and pleasant site could guarantee good health and enhance positive moral qualities in its inhabitants, so a flawed environment would wreak enormous havoc in human life. Vaughan's proposed remedies to evil environmental influences—corrective regimen, relocation, and direct environmental change—were among the most commonly theorized and practiced throughout the early-modern period. They belonged in fact to an even larger, centuries-long tradition, which, as we saw in the previous chapter, first took

[3] Vaughan 1600: 2.
[4] Vaughan 1600: 52.
[5] Vaughan 1600: 2-3.
[6] Vaughan 1600: 3.

shape in classical Greece and continued virtually uninterrupted for over two thousand years.

What early modern authors inherited from this tradition was, among other things, a special preference for regimen as a privileged counter-measure against environmental influence. Regimen (a regulated manner of living covering all aspects of a person's lifestyle, from diet and exercise to sleep and personal hygiene) was by far the most widely recommended way of coping with the influence of climate—and for a number of reasons. First of all, it was thought to be very effective. As this chapter will amply demonstrate, both classical and Renaissance medicine pictured the human body as a flexible entity, easily moulded by an array of external determinants—also called 'non-naturals' so as to emphasise that they were not inscribed within one's innate constitution.[7] Air, as Vaughan's example indicates, topped the list of such non-natural things altering human health for better or for worse, but other elements needed to be factored in as well. Diet, exercise, sleep, evacuation, and the so-called passions of the mind were all viewed as important aspects of a person's lifestyle that could, if properly administered, balance and defuse the negative effects of a hostile environment.

The second reason for preferring regimen to other ways of coping with environmental influence lay in its alleged ease and accessibility. Compared to geographical displacement and environmental change, regimen required relatively little effort and was promptly available to anyone wanting to improve his or her health and character in spite of an unfavourable environment. Environmental change, on the other hand, called for resources beyond the reach of isolated individuals, especially when implemented on a large scale. And while changing one's place of residence offered the speediest way of

[7] Temkin 1973; Garcia-Ballester 2002b.

escaping the effects of a bad climate, relocation was only an option for a restricted number of people who were at liberty to choose where to live. Regimen too obviously required some means (enough to decide, for instance, what should be on the table for dinner, or how many hours to spend in bed every day), but on the whole early modern authors concurred in presenting it as a much more universal remedy to environmental influence than the other two.

Behind such an emphasis on ease and affordability undoubtedly lay astute book-marketing strategies: in actual practice, following a regimen was far less straightforward than this popular dietetic literature wanted readers to believe. The fundamental premise of regimen—namely the great flexibility of the human body—was also its main weakness. If humans are so easily changed by what they eat and how they live, the slightest negligence can often have catastrophic consequences. Especially in the case of corrective regimens—that is, regimens adopted in order to counteract unwanted environmental influence—persistence and effectiveness went hand in hand.[8]

Following a loosely Aristotelian tradition describing custom (*hexis*, *habitus*) as some sort of 'second nature', regimen was thought to acquire its transformative powers by constant repetition.[9] Failure to live by its rules inevitably caused the weaker disposition to yield to the inclinations of inborn nature and thus ultimately to the sway of place and climate. According to Jean Bodin, one of the most prominent representatives of sixteenth-century climate theory, not even the best corrective regimen could ever go so far as to 'completely eradicate every trace of the prior nature' of a person.[10] A century later, the English physician Humphrey Brooke echoed Bodin's views by describing custom as an

[8] See, e.g., Lemnius 1561: 15^{v}-17^{v}.
[9] See particularly Book 2 of Aristotle's *Nicomachean Ethics*. In *Metaph*., 5.1022b, Aristotle specifically used health as an example of *hexis*. See also Cic., *Fin.*, 5.25.74.
[10] Bodin 2013: 336 (5.183): 'Vix fieri potest, ut naturae prioris vestigia omnino tollantur'. On Bodin's climate theory, see above, 1.3.2.

'adventitious […] second nature', 'arriving in time to a power somewhat resembling nature, but never acquiring such an identity, as to become nature her self'.[11] Corrective regimen thus had to entertain a daily struggle against innate disposition, lest the latter prevail. As Bodin states, nothing less than 'God's help or incessant discipline' ('diuturna disciplina') could overcome the 'power of place and stars' and the natural inclinations that these engendered.[12] Elsewhere the Frenchman provides a famous example taken from Polybius's *Histories*: when the Cynaetheans, an ancient Arcadian tribe, stopped practising the strict musical discipline that other Arcadian nations scrupulously observed, they quickly reverted to the beastlike character ('agriotēs') that the harsh local environment naturally elicited in natives of that region.[13]

Regimen was therefore only effective through an active, persistent, and meticulous care of the self. In its positive dimension, the 'dietetic way' of contrasting environmental influence was much more than a type of medical therapy: it was a way of life, 'a whole manner of forming oneself as a subject' to put it in Michel Foucault's terms, promoting an enhanced sense of self-awareness and self-responsibility in those who practiced it.[14] The deep ethical connotations of regimen, already prominent (as we shall see) in ancient dietary theories, were likewise stressed by early modern writers, who often explicitly emphasized the double virtues—at once medical and moral—of a 'temperate' lifestyle. At the very same time, however, the more commitment regimen required, the less likely people were to embrace it. The more it promised physical and moral perfection to a select few, the less it appealed to a vast majority of ordinary people. Some of the authors

[11] Brooke 1650: 34-35.
[12] Bodin 2013: 222 (5.4): 'Sed imprimis illud statuo, nullam esse locorum aut coelestium syderum tantam vim, quae necessitatem sit allatura (quod ne cogitare quidem fas est) ab iis tamen homines sic affici, ut naturae legem nisi ope divina, aut diuturna disciplina superare non possint'.
[13] The original story is in Polyb., 4.21.1-12; compare Bodin 1986, vol. 5: 48 (5.1).
[14] Foucault 1987: 108. See also Temkin 1973: 38.

considered in this chapter acutely sensed the danger and attempted to make their proposed regimens as easy and attractive as possible, for instance by avoiding rigid precepts and by leaving abundant leeway for their readers to adjust their own lifestyles as they wished.

While this solution ensured the continued commercial success of books of medical advice throughout the early modern period, it did not, however, eliminate the underlying problem. Corrective regimen was an effective remedy to environmental influence only insofar as individuals voluntarily adopted and constantly practiced it. In theory, it may have been the simplest and most readily accessible means of contrasting the power of place and climate; in actual fact, its demanding nature made it an elitist practice unsuitable for the masses. It is then unsurprising that, despite overwhelming medical consensus on the efficacity of regimen, early-modern climate theorists seeking ways to improve national character on a large scale kept looking at other instruments of public reform—including legislation, religion, public education, but also, as we shall see in the next chapters, forced resettlement and environmental engineering.[15] The further we advance into the seventeenth century, the stronger these alternative ways of coping with environmental influence grow with respect to classic corrective regimen. Yet the latter, far from disappearing from the picture, lived on well into the nineteenth century as a useful preventive practice to be performed at a private level, and corroborating, rather than competing with, such larger governmental plans.[16]

This chapter reconstructs the story of corrective regimen from its classical roots to the early eighteenth century, following its evolution through time and space, and focusing specifically on the lively international dialogue that took place in early modern Europe around the topics of diet, lifestyle, and climate. A first part will trace Renaissance dietetic

[15] On legislation and public education as means of countering climatic influence, see, for instance, Floyd-Wilson 2003: 117-18.
[16] See Mikkeli 1999: 165.

ideas back to their ancient sources, focusing on the thought of two late-antique authors, Plutarch and Galen, whose works were particularly important for Renaissance theories of hygiene. I shall then move on to analyse the ways in which corrective regimen was described in early modern books of medical advice, outlining a few major points of consensus and disagreement within this literature. Here I suggest that the great diversity of professional backgrounds, aims and motives, and intended audiences that characterizes authors of early modern dietaries is partly responsible for theoretical disagreement in this field. I shall then conclude with a few thoughts on the documented decrease in publishing output for health regimens from the seventeenth century onwards—a phenomenon that may be related to the decline of corrective regimen as a remedy to environmental influence in this period and to the search for more effective ways of contrasting the power of climate on a wider scale.

2.2. Ancient Dietetic Doctrines and Their Transmission

2.2.1. Climate and Temperament in the Ancient Medical Tradition

Regimen was already an important point of discussion in the medical literature of classical Greece. The works of Hippocrates, for instance, give strong attention to the topic. In addition to *Airs, Waters, Places*, which has been analysed at length in the previous chapter, other texts in the Hippocratic corpus address the complex relationship between diet, environment, and health, proposing a humoural explanation of how climate, air, and place perform their effects on man.[17] Some of these texts present regimen (‘diaita’ in Greek, a

[17] See Jouanna 2012 (Chapters 8 and 9).

word that has a larger meaning than its modern equivalent 'diet') as a crucial aid to the preservation of health: *Epidemics*, for instance, describes 'diet, living conditions, effort, sleep, sexual relations and mental activity' as 'the things on which our health is based',[18] while *Aphorisms*, *On Regimen*, and *On Regimen in Health* all argue in various ways that regimen should be varied depending on, and in response to, time of the year and specific weather conditions.[19]

In the second century AD, these ideas were appropriated and thoroughly reworked by the Pergamese physician Galen, who built on Hippocratic foundations to develop a new medical outlook. It was Galen, for instance, who transformed Hippocrates's humouralism into the extremely influential and long-lived doctrine of the four temperaments (sanguine, choleric, melancholic, and phlegmatic).[20] He was also the one who established dietetics as one of the two main branches of medicine alongside therapeutics, and who offered a systematic overview of hygienic principles that would define the field for centuries to come.

More particularly, Galen was the first to explicitly propose regimen as a counter-measure to undesirable environmental influence. He did so in works such as *De sanitate tuenda*, where he explained how air, food, and various other aspects of a person's lifestyle constantly intervene to modify inborn temperament. Among such aspects, Galen attributed a particular importance to ambient air ('ho periechōn aēr')[21] and the environment in general ('to periechon hēmas', literally 'what surrounds us'),[22] which he thought had

[18] Hippoc., *Epid.*, 5.352.L, quoted and translated in Garcia-Ballester 2002b: 139. According to Garcia-Ballester, Galen's doctrine of the six non-naturals might have been directly inspired by this passage.
[19] Dong 2011.
[20] See Gal., *De sanitate tuenda*, 1.15 (Galen 1951: 47); *Ars medica*, 23 (Galen 1821a: 367). See Klibansky et al. 1964: 12, 55.
[21] Gal., *De sanitate tuenda*, 1.4 (Galen 1951: 11); *Ars medica*, 1.23 (Galen 1821a: 367).
[22] Gal., *Methodus medendi*, 11.1, 736K 1-2 (Galen 2011, vol. 2: 114-15).

crucial implications for a person's well-being.[23] Indeed, while other external influences are 'occasional, irregular, and not inevitable', the air in which one is immersed 'is inseparable and, as one might say, essential' to one's own existence. The effects of air are thus immediate and inescapable. For instance, if the atmosphere is 'unduly warm or cold, dry or moist', it will 'warm, chill, moisten or dry' the body to an excessive degree, thereby causing dangerous constitutional imbalances.[24]

The issue of environmental influence was even more pressing for Galen in light of his view of body and mind as two interconnected and mutually influencing entities. In his treatise *Quod animi mores corporis temperamenta sequuntur*, the Pergamese physician argued that temperament—which he defined as a certain balance of elementary qualities (hot, cold, dry, and moist) and bodily humours (blood, phlegm, melancholy, and choler)—determines not only physical health, but also mental skills and moral character.[25] For instance, dry and cold constitutions tend to be dominated by melancholy, or black bile, which makes people 'firm' if not plainly 'stubborn'. Choler (also known as yellow or red bile), on the other hand, is the prevailing humour in hot and dry complexions, making them witty, inconstant, and easily excitable.[26] Everyone, in sum, is essentially what their temperament inclines them to be: if healthy bodies go hand in hand with healthy minds, imbalanced constitutions inevitably fall prey to excessive passions and irrational behaviours.[27]

Since temperament itself was largely thought to depend on external factors such as air and climate, it is easy to see why Galen placed such great importance on mastering the

[23] See Temkin 1973: 154-56; Jouanna 2012: 131.
[24] Gal., *De sanitate tuenda*, 1.4 (Galen 1951: 11).
[25] See Garcia-Ballester 2002a; Temkin 1973: 82-89; Klibansky et al. 1964: 57.
[26] See Klibansky et al. 1964: 62-63.
[27] Gal., *De sanitate tuenda*, 1.15 (Galen 1951: 47); Gal., *Ars medica*, 23 (Galen 1821a: 367). See Klibansky et al. 1964: 12, 55.

influence of the surrounding environment. This, he explained, could be done most effectively by rectifying any temperamental imbalance 'by means of the opposite excess':[28] for instance, a period of excessive heat demanded a proper cooling regimen, whereas a diet of 'moistening foods and baths, and abstention from strenuous and prolonged exercise' was a helpful corrective in exceedingly dry conditions.[29] Galen, however, was reluctant to formulate abstract principles. In order to devise an adequate corrective regimen, a number of variables needed to be taken into account, from the specific type of distemper to the age, gender, profession, and clinical history of the patient.[30] Different persons, he thought, were necessarily affected differently by the same causes: in particular, '[the] diversity of air which arises from heat, cold, dryness, and moisture is not the same to all people'.[31] Thus dry air would hurt dry constitutions but not moist ones: whilst the temperamental imbalances of the former would be aggravated even further by such weather, the latter would actually benefit from the balancing effects of the surrounding atmosphere.

2.2.2. Two Competing Models of Regimen: Galen and Plutarch

Galen conceived of human bodies as entities in flux, permeable to an array of external influences and in constant danger of falling prey to temperamental imbalances. On such a view, the preservation of health was an incessant undertaking, requiring constant attention from an experienced dietician as well as full cooperation on the part of the patient. Indeed, as Galen was keen to underline, keeping oneself 'free from disease' was ultimately a

[28] Gal., *De sanitate tuenda*, 5.3, 6.3 (Galen 1951: 195, 242).
[29] Gal., *De sanitate tuenda*, 6.3 (Galen 1951: 243-44).
[30] Gal., *De sanitate tuenda*, 5.2 (Galen 1951: 192).
[31] Gal., *De sanitate tuenda*, 1.11 (Galen 1951: 35-36).

personal responsibility. Physicians were there to help, of course, but results could only be achieved if the patient took an active interest in his own health and followed their guidelines on a daily basis. 'It is possible for anyone to guard his own health, who has a free life', Galen insisted, defining it 'shameful' for a man to suffer from physical impairments which could have been avoided if he had taken better care of himself.[32] In this context, Galen's mention of freedom plays a double role. On the one hand, freedom is an essential prerequisite for the practice of regimen, since only men of a free condition are in a position to take care of their health. At the same time, freedom is also a result of regimen, insofar as true freedom can be said to coincide with autonomous, self-determined behaviour. By liberating man from physical disease, inordinate passions, and the sway of environmental influences, the practice of regimen thus fulfills an essential ethical function in human life.

Galen's position testifies to the moral dimension of Greek dietetics, and more particularly to the strong ties between ancient dietary practices and a philosophical care of the self inspired by the values of self-awareness, self-mastery, and self-sufficiency.[33] Among the many late-antique authors who, like Galen, understood and emphasized the ethical potential of regimen, the first-century Greek philosopher Plutarch deserves a special mention. In his *De tuenda sanitate*, a short dialogue composed around AD 80 and deeply influential in the Renaissance (see below, section 2.2.3), the preservation of health emerges as an essentially philosophical rather than medical undertaking. What mattered for Plutarch was not so much the avoidance of disease by means of specific dietary prescriptions, as the heightened self-awareness that could be gained through a constant practice of regimen. Not by chance, the Greek philosopher harshly criticized those who let

[32] Gal., *De sanitate tuenda*, 5.1 (Galen 1951: 189).
[33] Temkin 1973: 85; Foucault 1987: 108; Mikkeli 1999: 18.

themselves 'be enslaved or bound to one formula of life', as happens so often with diets; instead, he privileged flexible regimens based on self-observation and individual judgement.[34] A worthy man, he stated, was to keep constant 'watch of his own body', learn to decipher its signs ('heightened temperatures', 'fits of drowsiness'), and thus successfully 'forestall any trouble'.[35]

Flexible regimens such as the one theorized by Plutarch aimed first and foremost at fostering a process of ethical growth through an 'enhanced care of the self'.[36] Plutarch's emphasis on the moral dimension of regimen suggests a fundamental difference between his 'diet-ethics'[37] and Galenic hygiene. Even though it requires full and active cooperation on the part of the patient, Galenic hygiene basically consists of a set of definite, if individualized, precepts established by a trained physician; it thus presupposes a fundamental distinction between patient and therapist, as well as a hierarchical relationship between the two. Plutarch's dietetics, on the other hand, is essentially a non-prescriptive and unsupervised form of self-care. For Plutarch, the full ethical potential of regimen is only unlocked when one learns to take care of oneself in complete autonomy, since any form of external guidance or intervention would defeat the very purpose for which the process is undertaken.

[34] Plut., *De tuenda sanitate*, 135a-b (Plutarch 1928: 279-81).
[35] Plut., *De tuenda sanitate*, 129a, 128f, 129e (Plutarch 1928: 251-55).
[36] Van Hoof 2011: 118.
[37] Van Hoof 2011.

2.2.3. Ancient Dietetic Theories in Medieval and Renaissance Europe

Galen and Plutarch's competing models of regimen were both bound to enjoy a long afterlife and to exert a powerful influence on Renaissance dietetic theories.[38] Rediscovered in the fifteenth century along with other treatises of the *Moralia* collection, Plutarch's *De sanitate tuenda* remained extremely popular throughout the early modern period, with numerous reprints and translations into Latin as well as into various vernacular languages.[39] Its contribution to Renaissance handbooks on regimen, recently studied by Sorana Corneanu and Jennifer Richards among others, will be discussed in greater detail below.[40]

Galenic hygiene, on the other hand, was kept alive almost without interruption throughout late Antiquity and the Middle Ages in the form of Arabic and Latin translations, commentaries, and compilations, some of which continued to circulate well into the sixteenth century.[41] Avicenna's *Canon*, composed around 1025 and translated in the twelfth century by Gerard of Cremona, specifically contained a section on regimen as a remedy to environmental influence that was often referenced in early-modern climatological discussions.[42] Galenic hygiene also offered the blueprint for many original works on preventative medicine composed in the late Middle Ages, such as Aldobrandino of Siena's *Régime du corps* (written in the thirteenth century, and almost immediately

[38] See Mikkeli 1999.
[39] See Schurink 2008; Richards 2012. I have examined the reception of Plutarch's *De tuenda sanitate* in a separate, yet unpublished paper presented at the symposium 'Reading and Health in Early Modern Europe 1500-1800' (University of Newcastle, 5-6 July 2013).
[40] Corneanu 2012; Richards 2012.
[41] See Gil-Sotres 1990; Nicoud 2007. See also Durling 1961 for further details on Renaissance editions and translations of Galen's works, including those on hygiene.
[42] Avicenna, *Canon*, 2.2.1.305-32, 3.678-901 (1973: 183-95, 357-432). See Cavallo and Storey 2013: 3. On the medieval and early modern reception of Avicenna's *Canon*, see Siraisi 1985; Siraisi 1987.

translated from the original French into Latin),[43] and the wildly popular *Regimen sanitatis salernitanum*, traditionally (but questionably) attributed to the prestigious medical school that flourished in the southern-Italian city of Salerno between the tenth and thirteenth centuries.[44]

Around the mid-sixteenth century, that is shortly after the momentous publication of Hippocrates's and Galen's *Opera omnia* in the original Greek by Aldus Manutius's heirs (in 1525 and 1526 respectively), the first vernacular translations of Galen's hygienic works were sent to the press. An Italian vernacularization of *De sanitate tuenda* by the professional translator Giovanni Tarcagnota was published in Venice by Michele Tramezzino in 1549, and many more editions of the same treatise followed in other European languages.[45] As a number of scholars have pointed out, the golden age of Galenic medicine was also more particularly the golden age of Galenic dietetics. In the Renaissance, Galen's hygiene was not only taught at most European universities as one of the five parts of the standard medical curriculum;[46] it also provided the 'overarching theoretical framework of all dietary works' written in this period,[47] many of which, as Paul Slack and others have shown, were specifically tailored to a non-specialized public.[48] Throughout the late Middle Ages and the early modern period, Galenism thus challenged established boundaries between 'learned' and 'popular' medicine by forming the mainstay of a 'unified medical culture' that circulated well beyond the university walls and at disparate levels of education.[49]

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[43] Mikkeli 1999: 19-20; Nicoud 2007. For Latin and vernacular versions of Aldobrandino's *Régime du corps*, see Bisson 2002; Féry-Hue 1987.
[44] Weiss Adamson 2005: 438; Albala 2002: 24.
[45] See Durling 1961. On Tarcagnota, see Tallini 2012.
[46] Siraisi 1987: 101; Mikkeli 1999: 29.
[47] Albala 2002: 4.
[48] Slack 1979. Although regimens were usually conceived for elite publics (see Shapin 2003a), the readership of early-modern dietary books was in fact quite varied: see section 2.3.2 below.
[49] Wear 2000: 6-7; Evenden 1988: 53.

The socio-cultural pervasiveness of Galenism may help explain why early-modern dietetic literature features such a remarkable degree of homogeneity regardless of the place, time, and context of each publication. No matter where, when, and for whom they were written, Renaissance and early-modern health regimens usually follow a common layout based on Galen's six non-naturals, tackle the same topics in the same order, and, as Jennifer Richards has acutely noted, address their readers in similar ways.[50] Underneath these important commonalities, however, lie equally significant discrepancies that have thus far escaped extended scholarly attention. In what follows, I shall draw attention to some of the most important areas of consensus and disagreement in order to analyse shifting attitudes to corrective regimen as a remedy to environmental influence in the early modern period.

2.3. Air, Food, and Lifestyle in Early-Modern Health Regimens

William Vaughan's *Naturall and Artificiall Directions for Health*, briefly examined in the introduction to this chapter, was only one of the innumerable books of medical advice to appear on the European market between the sixteenth and seventeenth centuries.[51] The extraordinary success of regimen books throughout the early-modern period played a key role in disseminating 'time-honoured medical knowledge previously only accessible to the learned and the powerful' among a large and very diverse readership.[52] Additionally, these works actively promoted 'the transformation of this knowledge into everyday practices of

[50] Richards 2012.
[51] On the popularity of regimen books, see Slack 1979; Smith 1979; Tierney 1999; Mikkeli 1999; Albala 2002; Furdell 2002; Solomon 2010; Richards 2012; Cavallo 2013.
[52] Cavallo 2011: 200.

healthy living, to be followed by ordinary readers', thus helping bridge the gap between dietary theories and practices.[53]

The following discussion is based on a selection of works published between the mid-sixteenth and early-eighteenth centuries in various European countries, including Italy, France, England, Switzerland, and the Low Countries. Many of the texts under examination were Europe-wide bestsellers, frequently reprinted and translated into several languages. By moving across linguistic, religious, and political boundaries, these books crucially contributed to establishing a unified European outlook on issues related to environmental influence. But as their authors wrote from distinct standpoints, pursuing different objectives and targeting different audiences, these texts also bear witness to the existence of multiple competing views on both specific points and matters of substance. In re-examining these writings from the uncommon vantage point of climate theory, I shall particularly build on recent work by scholars such as Ken Albala, Mary Floyd-Wilson, Rebecca Earle, and Emma C. Spary, who have shed much welcome light on the cultural significance of Renaissance dietetics and on the crucial relationship between food and personal identity in the early-modern period.[54]

2.3.1. Corrective Regimen: A Pan-European Debate

One point on which early modern dieticians unanimously concurred was the powerful influence of air on man. In their writings, ambient air was almost invariably recognized as the single most important factor among the six external determinants of human health pinpointed by Galen, first because humans are immersed in it throughout their lives,

[53] Cavallo 2013: 200.
[54] See Albala 2002; Floyd-Wilson 2003; Earle 2012; Spary 2012.

secondly because they cannot prevent it from entering their bodies,[55] and thus from modifying the humoural balance on which temperament ultimately depends. Following Galenic doctrine, early modern authors usually identified eight major temperamental types resulting from various blends of the four primary qualities (hot, cold, dry, and moist).[56] Each temperament was identified by the predominance of certain bodily humours and behavioural traits: for instance, a hot and dry complexion was believed to stimulate an exceptional production of choler, which in turn would make people witty and nimble, but also irascible and fickle.[57]

Underlying this widespread view was the assumption, once again of Galenic origins, that body and mind are inextricably connected to each other, so that any alteration in bodily makeup also inevitably reflects on character and behaviour. In keeping with this principle, ambient air was thought to influence not only physical states, but also mental and moral dispositions. As the English naturalist and physician Thomas Muffet (1553-1604) put it in his posthumous bestseller *Health's Improvement*:

> Like aire, like spirits: for hence cometh it that in pure, clear, and temperate aire, our spirits are as jocund, pleasant, active, and ready as butterflies in Summer; but in thick, dark, cloudy, and unseasonable weather, they are dul, drowsie, idle, and as heavy as lead, working neither perfectly what they ought, nor chearfully what they would.[58]

For Muffet, as for the French royal physicians Joseph Du Chesne (1544-1609) and Nicolas Abraham de La Framboisière (1560-1636), air exerted its influence on the mind both indirectly, through the mediation of the humours, and directly, by nourishing the 'spiritual'

[55] See, e.g., La Framboisière 1600: 34-36; Du Chesne 1620: 158-59; Venner 1637: 6.
[56] See, for instance, Zara 1615 (Chapter 8).
[57] For an exemplary discussion, see La Framboisière 1600: 176-96.
[58] Muffet 1746: 12. The first edition of Muffet's work was published in 1655, long after the author's death. For a similar perspective, see La Framboisière 1600: 34-36.

part of our body in the same way as food and drink do with its 'animal' part.[59] Consequently, as the Piedmontese physician Giovanni Ludovico Bertaldi (?-1625) explained in lengthy annotations to Ugo Benzi's *Tractato utilissimo circa la conservatione de la sanitate* (first published in Milan in 1481), wherever air is pure and salubrious the local inhabitants are 'healthy of body and keen of mind' ('sani di corpo, et acuti d'ingegno'), whereas unwholesome air makes people 'sickly of body, slow in their deeds, and rough and coarse of wits' ('mal sani ne i corpi, tardi nelle operationi, rozzi et grossi d'ingegno').[60]

Clearly, such an intimate connection between body and mind could not fail to pose some disquieting moral problems. The theologian Antonio Zara (?-1621), bishop of Pedena (now Pićan, Croatia) and author of a bulky work on complexions and wits, was one of many writers who sensed the difficulty and attempted to demonstrate that the doctrine of the temperaments was by no means incompatible with free will.[61] A recurrent argument consisted in specifying that the bodily makeup of a person did not 'necessitate' but only 'inclined' the mind.[62] Thus the London physician Humphrey Brooke (1617-1693) unequivocally stated that human beings, though predisposed by their temperament to think and act in certain ways, always retained the power to oppose such inclinations by means of a moral effort. He also pointed out that the body-mind connection worked both ways, involving a 'mutual' influence 'from the body upon the mind, and from the mind upon the body'.[63] After all, Galen himself had included the 'passions of the mind' among the six non-natural factors affecting human health. Following his illustrious example, early

[59] Muffet 1746: 10. See also La Framboisière 1600: 33; Du Chesne 1620: 159, 185-87. A simpler, analogic explanation is in Vaughan 1600: 52. On Du Chesne and La Framboisière, see Brockliss and Jones 1997, *passim*.
[60] Benzi and Bertaldi 1618: 12.
[61] See particularly Zara 1615 (Chapter 5).
[62] Brooke 1650: 224-25. See also Cornaro 1620: 49.
[63] Brooke 1650: 224-25.

modern authors speculated that just as bodily temperament can excite certain passions, so a careful management of one's emotional life can have positive effects on physical health. As Brooke warned his readers, 'that therefore thou mayest be vertuous, keep thyself in good health; that thou mayst be in good health, keep thyself vertuous, and regulate thy passions'.[64] Temperamental theory, therefore, did not amount to a sort of biological determinism, but left ample room for self-determination; and it is precisely within this space that early modern authors conceived of corrective regimen as a remedy to environmental influence.

While everyone agreed that the influence of ambient air was to some extent inescapable, only few seemed to doubt that diet and lifestyle could go a long way in protecting human beings from its effects. According to Tobias Venner (1557-1660), a physician from Somerset, 'the evilnesse of the aire being knowne, and the alteration which it maketh in our bodies considered, it may be easie in our meat, drink, exercise, etc. to object the contrary, which may much hinder, infringe, and attemper the action and power of the aire'.[65] The Venetian nobleman Alvise Cornaro (1475-1566), who authored one of the most successful and enduring health regimens of this period, was personally convinced that, once made healthy ('fatti buoni') by a sober diet, men would easily tolerate such discomforts as 'cold and heat, intense fatigue, waking, and the like, unless they are really extreme' ('patir freddo e caldo, e soverchia fatica, vigilie, et altri, se non sono estremissimi').[66] Almost half a century later, the Flemish Jesuit Leonard Lessius (1554-1623) expressed similar views in his *Hygiasticon* (first published in Antwerp in 1613),

[64] Brooke 1650: 224-5. On passions, see Benzi and Bertaldi 1618: 708.
[65] Venner 1637: 6.
[66] Cornaro 1620: 52.

another extremely popular book on diet largely inspired by, and often printed with, Cornaro's *Treatise*.[67]

Climate, then, is no excuse for our faults and misbehaviours. Citing Cornaro and Lessius, and following directly in their footsteps, Humphrey Brooke noted that blaming 'one while the aire, another while the place we live in, as unwholsome' is simply a way of avoiding 'the true cause' of our misconduct, namely 'our intemperance'.[68] Despite the powerful effects that the surrounding environment has on us, we can still be masters of our own lives as long as we pay the necessary attention to our regimen. Indeed, just as air alters our temperament, so do the other five 'non-naturals' listed by Galen: food and drink, exercise, evacuation, sleep and waking, and the passions of the mind. Through careful administration of these five aspects, temperamental imbalances can thus be redressed and environmental influence kept in check.

Galenic dietetics, once again, provided a helpful rationale for anticipating the effects of specific hygienic practices. For instance, waking and studying tended to dry up the body, while sleeping and resting had the opposite consequences: the former were therefore recommended to both phlegmatic and sanguine complexions, the latter to the melancholic and the choleric. Overall, physical exercise was appropriate for warming and drying up the body, fasting for cooling it down. As for eating and drinking, their effects differed case by case, depending on the specific substances taken. Music too was thought to affect both body and mind deeply, with the nature of its influence varying from soothing to exciting depending on rhythm, tone, and melody, as well as on the temperament and

[67] See Lessius 1614: 52-68. Lessius's treatise, originally written in Latin, was reprinted many times and translated into French, English, Spanish, and German during the seventeenth century: see Albala 2002: 44.
[68] Brooke 1650: 98-99. Brooke seems to be implicitly quoting from Plutarch's *De tuenda sanitate*, 126e: 'But when we find ourselves in this plight we try hard to stifle the thought of our wrongdoings, setting ourselves against their remembrance, and, as is the way of most people who object to this or that air or this or that locality as insalubrious when they say that they dread travelling, we exclude our intemperance and self-indulgence from the cause of our illness' (Plutarch 1928: 238-39). For Brooke's praise of Cornaro and Lessius, see Brooke 1650: 13.

mental state of the listener. An attention to detail was therefore essential for laying down an effective regimen. Standardized health precepts of the kind that are common nowadays, such as 'follow a varied diet', 'never skip a meal', or 'set aside thirty minutes for physical exercise every day', would have made little sense for early modern dieticians: for them, what was healthy in some cases could be harmful in others, and vice versa.

Thus La Framboisière explained that certain foods that were usually to be avoided or eaten sparingly became helpful remedies under given climatic conditions. During a very hot summer, it was acceptable and even advisable to eat 'watermelon, cucumber, and other foods containing evil juices' ('melons, de concombres et autres viandes de mauvais suc') before each meal, 'in order to cool down and moisten the body, tormented at that time by heat and dryness' ('pour raffraichir et humecter le corps travaillé alors de chaleur et secheresse').[69] According to this logic, the same food that could be highly recommended to people living 'in northern countries and cold climates' should be strictly forbidden in the South and other hot places. Take garlic, an example discussed at length by Muffet. While it is perfectly reasonable that the Thracians, given 'the coldness of their country and their phlematick constitution', 'eat it every morning to breakfast and carry it with them in warfare as their chiefest meat', it is difficult to see how such a dry and warm food could benefit 'a hot nation' like the Spanish. Yet Spaniards, who eat garlic 'more often then our labouring men do here in England', do not seem to suffer from this puzzling habit. For Muffet, the secret lies in the fact that they first soak the garlic in water, 'whereby it is made sweet and pleasant, and hath lost more than half of his heat and dryness'.[70]

[69] La Framboisière 1600: 42.
[70] Muffet 1746: 220. According to Du Chesne (1620: 380), boiled garlic makes men 'stronger and more vigourous' ('plus forts et vigoureux'), which is why it is often given to slaves on galleys in preparation for a prolonged effort. On garlic, see Albala 2002: 266.

Other authors, however, were of an altogether different opinion on this matter. For instance, the sixteenth-century French physician Jean-Baptiste Bruyerin-Champier (exact dates unknown) deemed the Spanish reckless in their dietary choices: their temperament being choleric like that of the Portuguese, they should avoid foods that might exacerbate their dryness and thus make them even more 'sly and vain' ('astuti et iactabundi') than they already were on account of their climate. For the very same reason, the inhabitants of Gascony, a region of south-west France close to the Spanish border (and thus partaking of the Spanish climate), should not abuse choler-inducing foods such as 'onions, radishes, and very strong wines' ('caepae, raphani, et vina vehementissima'), all of which, unfortunately, happened to be staples of their regional diet. For Bruyerin-Champier, the reprehensible habit of adding 'a wicked diet to an unfavourable climate' ('iniquitati coeli improbissimum adiiciunt victum') may indeed explain why most Gascons are so 'irascible and furious' ('iracundi et furibondi').[71]

Quantity, too, ought to be adapted with respect to climate and temperament: according to Muffet, 'in these northern parts of the world, where inward heat being multiplyed by outward coldness, our radical moisture would be soon consumed, if it were not restored by a double meal at the least'.[72] Though Muffet was just as harsh as Cornaro, Lessius, and their English follower Brooke towards intemperate eaters,[73] his point was that 'temperate' is itself a relative concept, as a universal measure for determining how much is enough does not exist. 'To prescribe to all men (or to one man at all times) one certain quantity of meat', he argues, 'were to make a coat for the moon': indeed, just as the moon

[71] Bruyerin-Champier 1560: 66-68, 70.
[72] Muffet 1746: 290.
[73] See Muffet 1746: 280.

changes shape, 'encreasing or decreasing every moment', so do human needs, depending on place, age, complexion, and time of the year.[74]

Diet, therefore, should be varied not only on a regional basis, but also according to individual peculiarities. Different people have different temperaments, each reacting differently to the same environmental circumstances.[75] For instance, the Scottish physician George Cheyne (1671-1743)—an expert in nervous disorders as well as a staunch defender of meatless diets—observed that 'studious, sedentary, and sickly persons' seemed to suffer more than anybody else from the cold and moist air so typical of the British winter. During the cold season, Cheyne explained, 'the absence of that material divinity the sun' brought about all sorts of noxious consequences: 'nitrous effluvia', 'sulphurous smoak', 'the falling of the dews, and vapours of the night'.[76] Cheyne's advice was clear: for as long as 'the dark, dull, foggy weather lasts at London in winter',[77] inactive people and 'those of weak nerves' should watch carefully what they 'eat, drink or breathe', go to bed early, and put great care into improving their 'perspiration' and blood circulation.[78] Indeed, if they failed to 'cautiously and carefully fence' their bodies against the inclement weather, an array of 'hypochondriack, hysterick, nervous and vapourish disorders' would inevitably ensue.[79]

Scrupulously observing Galen's principle of a latitude of health, early modern authors of health regimens often went into great detail to tailor their advice to individual circumstances. For instance, La Framboisière recommended hot, dry foods such as garlic, onions, leeks, and honey to the phlegmatic, but forbad them to the choleric.[80] As for the melancholic, he gave them the sensible advice of eating plenty of broths and soups,

[74] Muffet 1746: 281.
[75] See Muffet 1746: 20-21.
[76] Cheyne 1725: 11. On Cheyne, see Shapin 2003b.
[77] Cheyne 1725: 17.
[78] Cheyne 1725: 15.
[79] Cheyne 1725: 15-16.
[80] La Framboisière 1600: 86-87, 104.

enjoying pleasant smells and beautiful music, and taking long walks in 'woods, prairies, gardens, orchards, places rich in fountains or streams' ('bois, prairies, iardins, vergers, où il y ait plusieurs fontaines, ou quelque riviere').[81]

Few authors, however, went so far as Humphrey Brooke in drawing all the consequences from the principle that different temperaments react differently to the same thing. The London physician begins by positing that the 'goodness of the aire' can be considered 'either as it is in itself, or with relation to this or that body'.[82] Now, there is little doubt that the best air in ideal terms is one 'which is pure and serene, not mingled with any noisome smell', far from 'dung, standing and corrupted waters, thick foggs and vapors'. But if 'considered with relation to this or that body', then 'that is best, which by its similitude is most proper to preserve health, or by its contrariety most efficacious to expel diseases'. It is therefore 'a mistake to think the clearest and sharpest aire is best for every body: since distempered and depraved constitutions do as necessarily require a contrariety in aire (and consequently sometimes moist and thick aires) as in meats and drinks'.[83] In order to corroborate his point, Brooke even mentions the case of two people who lost their health upon moving from polluted air into a healthier environment to which they were not accustomed.[84]

Brooke's argument, though not unique, was far from common.[85] Tobias Venner, for instance, took an opposite viewpoint when he stated that 'a pure, cleare, and temperate ayre is good for every age and constitution', while 'impure, grosse, cloudy and intemperate

[81] La Framboisière 1600: 181, 195-96.
[82] Brooke 1650: 55.
[83] Brooke 1650: 56-57.
[84] Brooke 1650: 57.
[85] A similar point is made in Cagnati's *De Romani aëris salubritate* (1599: 51). For more on Cagnati, see below in this section.

ayre is to every age and constitution hurtfull'.[86] Venner was also convinced that 'ayre temperately hot' is 'very comfortable and agreeable to every constitution', while 'aire too moiste, such as is commonly in marish and low places, is to all bodies most hurtfull'.[87] Between the two opposite extremes of Brooke and Venner, a majority of authors tended to express more nuanced views. Taking the middle way, La Framboisière operated a distinction between two sets of air properties: what he called the 'primary qualities' ('qualitez premieres') of air—namely its temperature (cold or hot) and degree of humidity (moist or dry); and what he called its 'secondary qualities' ('qualitez secondaires'), which included 'its substance, whether thick or thin, pure or murky, bright or dark' ('sa substance grossiere ou subtile, pure ou broüillée, lumineuse ou obscure'), as well as its 'state, whether constant or inconstant, equal or unequal' ('estat constant ou inconstant, egal ou inegal').[88] Now, while the secondary qualities of air exerted identical effects on everyone (impurity and inequality of air being universally dangerous), its primary qualities could be either beneficial or harmful depending on a person's temperament.

Many authors, including La Framboisière, explicitly addressed their advice to people living in places known for their nasty weather. According to the royal physician, residents of intemperate regions should always rigorously follow a balancing regimen: cooling and moistening in Italy, temperate to cool in the Iberian Peninsula, decidedly warm in Germany and the British Isles.[89] La Framboisière's native France, on the other hand, was blessed with 'the most temperate' climate of all European countries, as it stood at the very centre of the temperate zone, halfway between North and South, East and

[86] Venner 1637: 2.
[87] Venner 1637: 3-4.
[88] La Framboisière 1600: 34. On the genealogy of the primary/secondary qualities distinction—traditionally associated with later works such as René Descartes's *Meditationes metaphysicae* and John Locke's *Essay Concerning Human Understanding*—see the recent edited volume by Lawrence Nolan (2011), and particularly Pasnau 2011 on uses of this distinction in scholastic Aristotelian philosophy. La Framboisière's understanding of primary and secondary qualities features an interesting mix of old and new ideas.
[89] La Framboisière 1600: 314-16.

West.[90] Thus Frenchmen, particularly those residing in the middle regions of Champagne, Bourbonnais, and Île-de-France, could just as well do without diet: 'a nice size, a good spirit, a strong body' ('la taille belle, l'esprit bon, le corps robuste') were in them the effortless product of inborn nature, favoured by a mild and wholesome climate. 'Jolly', 'good-humoured', and 'of gentle manners' ('gaillards', 'de bonne humeur', 'de mœurs douces'),[91] La Framboisière's Frenchmen—not unlike those of Jean Bodin—concentrated in themselves all the virtues that one could possibly imagine.[92]

Such climatological parochialism was by no means limited to France, however. In his 1599 treatise *De Romani aëris salubritate*, the Veronese physician Marsilio Cagnati (1543-1612) portrayed his adopted city of Rome in a similar way as La Framboisière did with France, locating it right at the centre of the temperate zone and praising it for its wholesome climate (see Figures 6 and 7).[93]

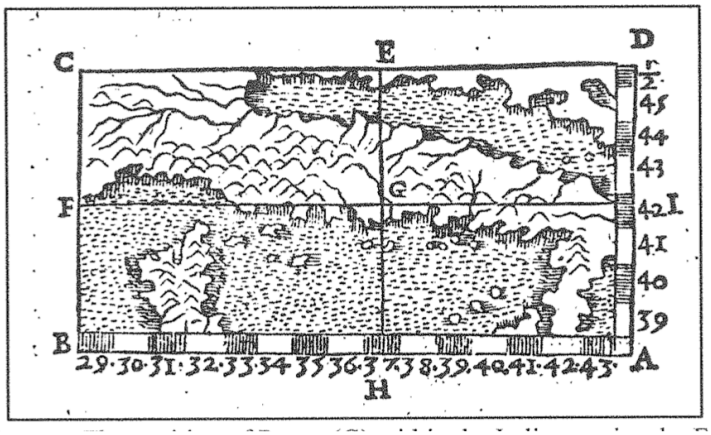

Figure 6 (above). Map of Italy highlighting Rome's 'golden mean' position at the centre of the temperate zone. Marsilio Cagnati, *De Romani aëris salubritate* (Rome: Luigi Zanetti, 1599), 16.

[90] La Framboisière 1600: 311.
[91] La Framboisière 1600: 300-01.
[92] See La Framboisière 1600: 311-13. Compare Bodin 1986, vol. 5: 18-19 (5.1); Bodin 2013: 292-94 (5.113). See above, 1.3.2.b ('Huarte').
[93] Cagnati 1599: 16-17. Cagnati explicitly recalls ancient authorities such as Strabo and Vitruvius in support of his view of Rome as sited in a 'golden mean' location.

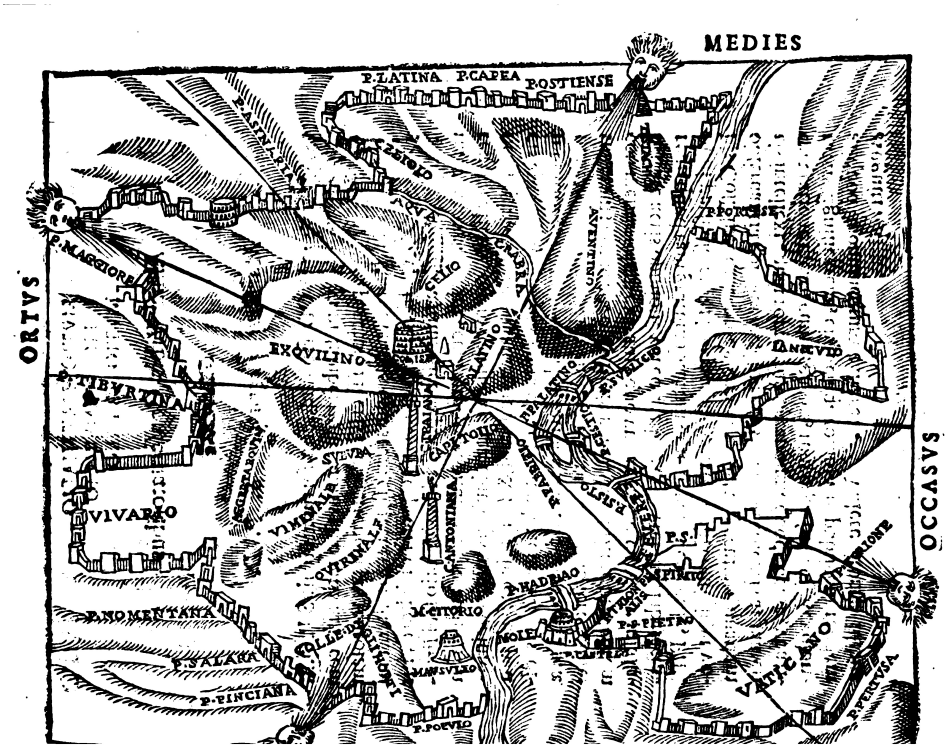

Figure 7 (above). Map of Rome emphasizing landscape features. Marsilio Cagnati, *De Romani aëris salubritate* (Rome: Luigi Zanetti, 1599), 55.

In asserting the natural wholesomeness of Rome, Cagnati was consciously moving a critique against his former master, the papal *archiater* (first physician) Alessandro Trajano Petronio (?-1585). Eighteen years earlier, in 1581, Petronio had published a treatise *De victu Romanorum* in which he described the Roman climate in appalling terms, particularly denouncing its humidity, sudden seasonal variations, strong winds, and exposure to pestilential diseases. For all of these reasons, Petronio was convinced that the inhabitants of modern Rome, more than anybody else, needed to attend carefully to their diet and lifestyle.

With part of the city standing on top of the hills and another part lying in the Tiber's plain, Petronio acknowledged that the Roman climate was in fact a patchwork of microclimates defined by multiple factors. At the time of Petronio's writing, the west bank of the river Tiber was densely populated, while the opposite bank was still predominantly

open countryside, except for two larger settlements between the Vatican and the Gianicolo, and scattered houses in Trastevere.[94] Such different demographic patterns, as Petronio acutely observed, were not without consequences for air quality, ventilation, and the spread of epidemic diseases. Not all areas of the city were therefore equally subject to negative environmental influences; rather, the quality of Roman air varied greatly from place to place, depending on elevation, aspect, proximity to the river, and exposure to the winds. For instance, it was significantly healthier on the hills than in the lower plain, where it was often too hot and moist, with thick vapours arising from the river and very little ventilation available.[95] Low-lying areas crammed at the foot of the hills, such as the neighbourhood of Santo Spirito (where Petronio's hospital was located) and the Ortaccio (the ghetto of the prostitutes by the Lungotevere Marzio, in central Rome), were considered especially noxious because of their lack of air circulation and unbearable humidity.[96] The vineyards to the north-east of the city were similarly unwholesome, while the coastal settlements of Ostia and Civitavecchia, salubrious throughout the rest of the year, were often mortally dangerous in the summer.[97]

Topographical features also determined variations in the effects of air currents. The same wind that purified the air when blowing free and unhindered could turn into a major threat if trapped in a closed space where it 'decay[ed] like stagnant water' ('modo aquae immotae putrescit').[98] This, Petronio argued, was one of the reasons why people living in the lower plain usually had poorer health and weaker wits than those living on the hills: the

[94] Petronio 1581: 6.
[95] Petronio 1581: 8-9, 167, 243.
[96] Petronio 1581: 245.
[97] Petronio 1581: 246.
[98] Petronio 1581: 14.

foul air they breathed all day long stimulated an excess of phlegm that slowed down their minds and made their bodies subject to internal putrefaction and disease.[99]

Yet even those residing in the plain could do much to improve their unfortunate condition. To begin with, they could avoid eating and drinking as much as they did. True, most food in Rome was watery and scarcely nutritious because of the exceptionally humid local climate; consumption of larger portions than normal—up to twice as much as other people would normally eat, according to Petronio's own estimate—was therefore justified to some extent.[100] But when they exceeded this measure and stuffed their bellies with excessive amounts of food and strong wines, even Romans suffered from the typical consequences of repletion, including what Petronio called 'capiplenium'—a heaviness of the head, due to the concentration of thick digestive vapours in the brain, that proved particularly dangerous during the summer, when the stifling heat and unbearable humidity of the city engendered all sorts of fevers, articular and pulmonary diseases, and lethal headaches.[101]

Especially in such foul weather, and even more so if they were overweight, the people of Rome needed to watch their diet, empty their bowels as frequently as possible (up to three or four times a day), avoid strong smells aggravating the *capiplenium*, and abstain from all activities that might hinder a proper digestion, such as oversleeping, heavy exercise, direct exposure to the sun, heated discussions, and all sorts of extreme mental effort.[102] It was also advisable to avoid walking along the banks of the Tiber, whose 'thick and dense' vapours were sworn enemies of phlegmatic constitutions—usually the first

[99] Petronio 1581: 11-14, 170-71.
[100] Petronio 1581: 167, based on ideas derived from Book 2 of Hippocrates's *De regimine*.
[101] Petronio 1581: 168, 172.
[102] Petronio 1581: 174-79. Chapters 4.15-17 and 4.22 in particular offer detailed dietary advice.

victims of *capiplenium*.[103] On the other hand, when the weather was nice and temperate, phlegmatic people were encouraged to spend as much time as possible outdoors and to exercise till they broke a sweat. Climbing up one of the hills every morning before the first meal, Petronio suggested, was an excellent way to boost metabolism, purge the body from excess fluids, and take in some thin, fresh air.[104]

Petronio thought that the people of Rome needed a corrective regimen more urgently than others because of the exceptional foulness of the local climate. For the Huguenot physician Joseph Du Chesne, on the other hand, imbalance and unwholesomeness were by no means peculiar to the air of Rome: they were in fact characteristic of every place on earth as a consequence of the Fall. In the Garden of Eden, Adam had enjoyed a perfectly balanced complexion ('symmetrie et temperature'), but in the aftermath of his disobedience his constitution had become so 'intemperate' ('intemperé') that he was constantly 'tormented by heat, cold, thirst, and hunger' ('assailly du chaud, du froid, de la soif, de la faim').[105] The surrounding environment, too, had lost much of its original innocence. The air, which had been created to be 'always serene' ('tousiours serain') and to cleanse and nourish 'man's spirits' ('les esprits de l'homme') by its exquisite 'purity' ('pureté'), had become 'murky, cloudy, and most of the time infected and pestilential' ('trouble, nebuleux et le plus souvent infect et pestilent'). The land, once 'blessed with all sorts of plants' ('beniste et en toutes sortes plantureuse'), was thereafter invaded by a generation of 'noxious, rough, earthly fruits, full of sourness, filth, and dregs' ('fruict pernicieux, fruict grossiers, fruicts terrestres, pleins de tarter, d'ordure, de lies').

[103] Petronio 1581: 174.
[104] Petronio 1581: 249 and Chapter 4.22.
[105] Du Chesne 1620: 8.

Nothing, not even food and drink, was ultimately spared from such 'impurities and corruptions' ('impuretez et corruptions').[106]

No wonder, then, that modern society should be tormented by so many diseases, both physical and moral. This decayed postlapsarian state could, however, be corrected or at least countered through constant effort.[107] Du Chesne expertly argued that many common diseases and temperamental imbalances were in fact the consequence of bad diet, idleness, and other unhealthy habits; as such, they could be easily avoided by adopting a more regulated lifestyle.[108] Corrective regimen, for Du Chesne, was not merely a matter of regaining health and preventing disease; it was an exercise in self-government with deep moral and religious overtones, as well as a way to expiate the sin of the forefathers (if not to recover the lost integrity of the prelapsarian state) by fighting the temperamental imbalances resulting from the Fall. Yet regimen had its limits, as Du Chesne himself candidly acknowledged. In cases of extreme corruption, where the air could not be rectified ('ne se peut amender') nor its effects corrected by means of diet, the only way to escape the grip of environmental influence was 'to go live in a better place' ('de changer et s'habiter en quelque meilleur lieu'), far away from marshes, lakes, and the dark bottom of narrow valleys.[109]

Other authors were decidedly more optimistic about the scope and efficacy of corrective regimen. Some indeed went so far as to ensure their readers that a well-chosen regimen would not only keep them in good health, but also hone their character, sharpen their wits, and appease their souls, thus making them excellent in every respect. More or less mild plans of 'human engineering', as it were, can be detected in numerous health

[106] Du Chesne 1620: 8.
[107] Du Chesne 1620: 9.
[108] Du Chesne 1620: 9; see also 260-61 (on sleep) and 292, 322, 331, 338 (on exercise).
[109] Du Chesne 1620: 180.

regimens as well as in other medico-pedagogical works of this period, such as the various 'Culturae' or 'Anatomiae ingeniorum' mushrooming all over Europe from the late sixteenth century onwards.[110]

A majority of writers, however, stopped short of such drastic promises and chose to adopt a lower profile. Among the most cautious was the aforementioned Cagnati, whose *De sanitate tuenda*, first published in 1605, long remained one of the most authoritative works in the field.[111] On the question at hand, the Veronese physician was adamant: while an appropriate regimen could certainly restore one's health and preserve from disease, it could never go so far as to transform inborn temperament outright.[112] Cagnati's argument revolved around a distinction between 'bonus habitus' and 'sanitas', the former defined as a condition of physical fitness above average (typical of athletes), the latter as a neutral state between bodily excellence and disease (typical of ordinary people enjoying a normal health).[113] 'Sanitas', according to Cagnati, was within everybody's reach, and could be maintained or restored through regimen; 'bonus habitus', on the other hand, was an innate disposition that constant exercise could bring to perfection in those who had it from birth, but not produce from scratch in those who lacked it. For Cagnati, in other words, improvement was only ever possible within a certain range, itself demarcated by innate, and therefore unchangeable, characteristics. Moving from a different standpoint, the Puritan and Leveller Humphrey Brooke came to the same conclusion: for him, human temperament is so inherently 'depraved' that regimen can at best guarantee a 'more equal

[110] For examples of mental and moral improvement in health regimens, see Bruyerin-Champier 1560: 63-64, 67-68; Brooke 1650: 224-25, 247-49; Lessius 1614: 68-82. 'Human engineering' plays an important role in Trueulx 1580, Huarte 1581, and Zara 1615, though in different ways; for a contemporary critique of Huarte, see Possevino 1610.

[111] The first of the two books of which the work is comprised was printed as early as in 1591 under the title *De continentia, sive de sanitate tuenda* (Rome: Ascanio and Gerolamo Donangeli). The first complete edition, which included a book on gymnastics, came out in Padua for Francesco Bolzetta.

[112] Cagnati 1605 (Chapter 2).

[113] Cagnati 1605: 112. Cagnati's distinction between 'sanitas' and 'bonus habitus' seems to suggest a critical reading of Arist., *Metaph.*, 5.1022b.

and orderly constitution'—never the full recovery of man's lost health and spirits.[114] Just like Cagnati, Brooke too saw the avoidance of disease as the only goal to which most men can reasonably aspire: not excellence—of body, character, mind—but plain normality.

By stressing norm above excellence, Cagnati and Brooke confirmed their intention to address their advice not to a restricted elite, but to as broad and varied an audience as possible. A similar ambition was shared by many other medical authors of this period. A book 'useful to all sexes, all ages, and people of all sorts, the powerful and the lowly, the rich and the poor': this is what Du Chesne claims he had in mind in publishing his *Pourtraict de la santé* (1606), and this is also allegedly why he chose to give precedence to the French version of his work over the Latin translation that he had himself prepared.[115] Like Du Chesne, a great number of early-modern medical authors expressed a similar desire to write for everyone rather than for a privileged few. Were such expressions of intent sincere? Each case differs, and as the next section will show, it is often difficult to answer this question with absolute certainty. Before turning to this issue, however, I shall briefly consider the controversial value of regimen as a countermeasure to environmental influence.

[114] Brooke 1650: 33-34. On the interplay of medicine, religion, and politics in this period, see, among others, Webster 1975; Elmer 1989.

[115] In his preface 'Au lecteur debonnaire', which follows a dedicatory letter to King Henry IV, Du Chesne explains that he had initially wanted to 'donner ce mien Pourtraict de la Santé, en François et en Latin, en un mesme temps: mais l'imprimeur qui n'a peu fournir que d'une presse, ayant d'autres œuvres à imprimer, n'en a eu le temps et le loisir' (Du Chesne 1620: a6^{r}). Forced to choose between the French and the Latin version, he opted for the former in light of his desire to be useful 'à la France ma patrie: afin qu'on l'entende, et que iusques aux moindres on s'en puisse servir' (2). The Latin version, on the other hand, was primarily intended 'pour les nations estrangeres' (3). A few months after the appearance of the French *Pourtraict*, the Latin version (entitled *Diaeteticon polyhistoricum*) indeed came out for the same publisher, the Parisian printer Claude Morel. I plan to examine these two works in greater detail in a forthcoming study on Renaissance self-translations.

2.3.2. PATTERNS OF CHANGE

At first glance, the early modern literature on regimen appears remarkably cohesive and homogeneous. Shared intellectual references, standardized patterns of style and structure, and similar methodological approaches betray the fact that much of this literature tapped into the 'unified medical culture' of Galenism,[116] the prestigious tradition that dominated Western medicine until the mid-seventeenth century and continued to exert its influence even longer in the field of hygiene.[117] As we have seen, the idea of a corrective regimen specifically designed as a countermeasure to environmental influence gradually imposed itself in the sixteenth and seventeenth centuries thanks to the pan-European popularity of this medico-dietetic production. Yet behind an overwhelming consensus on the value and efficacy of regimen hid a few cracks, as it were, or competing understandings of how corrective regimen worked as a whole. How and why did such disagreement originate within the relatively unified culture of Galenic hygiene?

Several aspects are worthy of note. First of all, while many writers of health regimens were university-trained, practising physicians, others came from altogether different backgrounds: among the authors considered above, one finds for instance theologians and men of letters (Zara, Lessius), jurists (Bodin, Vaughan), architects and engineers (Cornaro). Though generally well-versed in the basics of Galenic hygiene, these authors wrote outside and at the periphery of this tradition, which helps explain why their works often stand out from others in the field. Vaughan's manual, for instance, contains several idiosyncracies in the presentation and discussion of the six non-naturals;[118]

[116] Wear 2000: 6-7.
[117] Temkin 1973 (Chapter 4); Mikkeli 1999: 98-174.
[118] See, e.g., Vaughan 1600: 1-2, where air becomes 'aire, fire and water', sleep and waking 'moderate sleepe and early rising', and among the passions of the mind only 'mirth temperately used' is mentioned.

Cornaro's treatise on temperance takes a unique autobiographical form and scorns all references to external authorities;[119] for his part, Lessius proudly claims to have written his *Hygiasticon* in a deliberately non-medical style ('so that I would not seem to write as a physician rather than as a theologian'),[120] as a way of emphasizing the moral nature of the topic at hand—that 'sacred temperance' which benefits 'not only the body, but the mind as well'.[121]

While none of these authors explicitly rejected Galen's authority on hygienic matters, some of them let the focus shift towards other authorities, thus steering their works in slightly uncommon directions. Hippocratic environmental medicine, admittedly an important source of inspiration for Galen himself, took pride of place in the outlook of Petronio and Cagnati, both of whom were involved in the establishment of a Hippocratic school of medicine in late sixteenth-century Rome; Plutarch, the other great master of ancient hygiene, was a fundamental reference for many northern European writers, from the French Du Chesne and La Framboisière, to the Flemish Jesuit Lessius and the English physicians Muffet and Brooke.[122] Biblical sources, on the other hand, feature prominently not only in the writings of theologians such as Zara, but also in professional physicians such as Du Chesne, whose medical outlook is deeply shaped by his Huguenot beliefs.[123] Others sought to update their discussions of climate and regimen by mentioning recent dietetic bestsellers, including the *De triplici vita* by the Italian physician and Neo-Platonic

[119] Reference to first-hand experience is also important for other authors, such as Lessius, Vaughan, and Cheyne; what is unique about Cornaro's treatise is that it takes the form of a continued autobiographical narrative instead of following the traditional template of early-modern health-care books (usually based on Galen's six non-naturals).
[120] Lessius 1614: 3 ('Ne viderer medicum potius quam theologum agere').
[121] Lessius 1614: 5 ('sanctam sobrietatem, quae maximorum bonorum non solum corpori, sed etiam animo est conciliatrix').
[122] See particularly Brooke 1650: 98-99 and Muffet 1746: 5-6, containing both hidden and explicit allusions to Plutarch's *De tuenda sanitate*.
[123] See Brockliss and Jones 1997: 124-26. The use of biblical sources in this medical-dietetic literature is an interesting aspect that would deserve further investigation.

philosopher Marsilio Ficino (1433-1499),[124] and by taking a stance on classic controversies such as the one that had taken place in the 1550s between Cardano and Scaliger.[125]

Competing authorities may simply indicate personal preferences, sometimes related to the professional background of a particular author; but they may also signal broader cultural changes, including shifts in scientific method, epistemological attitudes, and religious controversies. Moving on to the seventeenth century, health regimens reflected such wider trends in multiple ways. In Italy, for example, increased censorial control in the early part of the century translated in a stronger emphasis on free will against possible misunderstandings of humoural theory as deterministic.[126] In mid-seventeenth-century England, the debate on climate theory was profoundly reshaped by a generation of experimental scientists who kept investigating old problems with new methods of inquiry (see below, Chapter 4). Combinations of old and new were also common in the medical field, where conventional Galenic hygiene still persisted alongside innovative views on physiology, pathology, and therapeutics. An early eighteenth-century author such as Cheyne could thus structure his dietetic treatise following the usual template based on Galen's six non-naturals, while at the same time adopting a new physiological outlook, as well as the vocabulary and methods of experimental science.[127]

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[124] Ficino's *De vita*, a treatise entirely dedicated to the health of scholars and the means of its preservation, was first published in 1489 and enjoyed an extraordinary editorial fortune throughout the sixteenth and early seventeenth centuries (see Tarabochia Canavero 1977). They were mentioned approvingly by Du Chesne 1620: 416-17, and Zara 1615: n.p. (Dedicatory letter).

[125] For details on this dispute, see above, 1.3.2.b. Cardano's revision of the doctrine of the four qualities was rejected by Zara 1615: 41, but embraced (without acknowledgment) by La Framboisière (1600: 32), who gave a description of physical decay and aging substantially inspired by Cardano's views on innate heat and radical moisture. Cardano is also quoted approvingly by Muffet (1746: 12). Besides discussing diet and climate in his treatises of natural philosophy (see above, 1.3.2.b), Cardano wrote two works specifically on diet and hygiene: *Theonoston* (1560) and *De tuenda sanitate* (published posthumously in 1580), both of which were later re-edited in his collected works (Lyon: Huguetan and Ravaud, 1663). On these and other medical works by Cardano, see Siraisi 2007.

[126] See Possevino 1610; Zara 1615 (Chapter 5); Bertaldi in Benzi and Bertaldi 1618: 9.

[127] A good case in point is his analysis of the nerves (Cheyne 1725: 186-89) and of blood, both of which are clearly based on microscopic observations (Cheyne 1725: 224).

Throughout the course of the seventeenth century, dietetics was also forced to come to grips with new evidence emerging from the great explorations and the colonial experience overseas. Although scattered mentions of exotic foods and their properties can already be found in Bruyerin-Champier's *De re cibaria* (1560), it was not until much later that substantial discussions of West- and East-Indian products made their way into European health-care books. Writing in 1618, the Piedmontese physician Giovanni Ludovico Bertaldi conscientiously added a long section on New World foods to Benzi's earlier treatise on nourishment, which was clearly outdated in this respect.[128] In order to understand what was at stake in these debates beyond sheer nutritional knowledge, we have to keep in mind that, throughout the early modern period and well into the Enlightenment, food remained a powerful vehicle of collective identity, demarcating civilization from savagery and defining boundaries that did not necessarily coincide with those drawn by geopolitics.[129]

The period that interests us here was one in which such boundaries changed at an unprecedented pace. Foods that still appeared alien and disturbing to mid-sixteenth-century authors, including chocolate and potatoes, were an ordinary sight on European dining tables by the end of the following century. In the long run, attitudes to exotic foods changed from Bruyerin-Champier's distrust ('for why do we seek foods from the Indians, if not in the hope of being infected by them?')[130] to mild curiosity and plain enthusiasm for certain products, such as coffee and potatoes, which rapidly became staple foods and

[128] Bruyerin-Champier 1560: 240; Muffet 1746: 226, 238; Cheyne 1725: 46, 61-66; Bertaldi in Benzi and Bertaldi 1618: 589-679.
[129] See Albala 2002; Floyd-Wilson 2003; Earle 2012.
[130] 'Quid enim ab Indis petimus cibos, nisi et contagionem ab iis speremus?' (Bruyerin-Champier 1560: 69). The author particularly advises against the Meso-American tortilla ('panem ex Maiso', 129). On distrust of New World foods, see Albala 2001; Albala 2002; Earle 2012.

drinks in some European regions.[131] Yet the boundaries themselves remained, and the complex relation between climate, food, and collective identity is one that always needs to be kept in mind in interpreting disagreement between early modern dieticians. Just as the notion of a 'good' climate would mean different things to authors coming from different regions, so foods were often deemed healthy or noxious, adequate or unnatural depending on local eating habits.[132] While a Frenchman would have found nothing strange in a dish of snails—a type of nourishment considered filthy and unbefitting in most parts of Europe—he would have scoffed at the Mediterranean habit of consuming raw salad for a meal.[133] As seen above, climatic explanations were often provided to explain why certain foods were naturally eaten in some countries but not in others. Thus snails, being cold and moist, helped balance the choleric nature of the French, while salads were ideal to cool down the overheated bodies of the Italian.

The context-specific nature of dietary advice was only one of many causes of disagreement among early modern authors of health-care books. At least some of these treatises were explicitly tailored to particular audiences: Lessius, for instance, wrote specifically for members of the clergy and religious orders, and for scholars more in general; the northern Italian physician Guglielmo Grataroli (1516-1568) composed two different regimens for travellers and scholars;[134] Petronio had in mind residents of, or frequent travellers to, the city of Rome; the Piedmontese Bertaldi refashioned an older treatise by the Tuscan Benzi with a well-defined readership in mind, namely the ducal court of Savoy; while Cheyne, as we have seen, purported to write primarily for 'the sickly and the aged, the studious and the sedentary, persons of weak nerves, and the gentlemen of

[131] On potatoes, see Muffet 1746: 226; on coffee, see Cheyne 1725: 62-64.
[132] See multiple examples in Nuñez 1646 and Sebitz 1650. See also Albala 2001; Albala 2002.
[133] But see Albala 2002: 165-66 for a notorious counter-example—the French poet Pierre de Ronsard (1524-1585), who wrote an entire poem in praise of salads ('La salade').
[134] Grataroli 1561; Grataroli 1566. See Chapter 3 for more details on the former.

the learned professions'.[135] Vaughan's *Directions*, though dedicated to a woman (Vaughan's own sister Margaret), did not contain anything specifically relevant to a female public; Brooke's *Hygieinē*, on the other hand, included a lengthy section providing detailed advice to women, a choice that suggests the author's intention to expand his audience by including a significant female component.[136]

Other regimens were purportedly addressed to a yet broader audience, in both social and geographical terms. La Framboisière dedicated his regimen to King Henry IV, the man who pacified France after almost forty years of civil wars, and hoped for it to be read by all French subjects 'regardless of their state and condition' ('de quelque estat et condition qu'elles soyent'), so that they could stay healthy and bring glory to their country.[137] This is why he had written his regimen in French, the national idiom; but he also wished for his book to be translated into other vernacular languages, and to circulate more widely among all European nations.[138] La Framboisière's compatriot, Joseph Du Chesne, had similarly intended his regimen to be useful to as many fellow countrymen (and women) as possible. He, too, had written his book in French with this purpose in mind; but in order to reach a larger European public, he also personally translated it into Latin, the scholarly *lingua franca* of the time.[139] In order to speak to the widest possible public, the Paracelsian doctor made the conscious choice of avoiding any mention of

[135] Cheyne 1725: xiv (Preface).
[136] Brooke 1650: 356.
[137] 'Il m'a prins envie de descrire en François la maniere de vivre long temps sainement, afin que mon labour puisse en la Gaule server à toutes personnes de quelque estat et condition qu'elles soyent' (La Framboisière 1600: 5).
[138] 'Il sera bien aisé aux Italiens, Espagnols, Anglois, Allemans, et autres estrangers qui ont esté nourris en France, de luy faire parler le langage de leur pays, pous le communiquer aux gens de leur nation' (La Framboisière 1600: 5-6). See Brockliss and Jones 1997: 99. While La Framboisière's *Gouvernement de la santé* does not seem to have been translated into any other European language at the time, a much simplified, five-page summary of it was published in 1640 (without indication of place nor printer) under the title *An Easy Method to Know the Causes and Signs of the Humour Most Ruleth in the Body and to Avoid Thereby Things Hurtful.*
[139] Du Chesne 1620: a6^{r}-a6^{v}; 2-3; 517-18. For further details on the French and Latin versions of this work, see above, 2.3.1.

metallic and chemical remedies, a still controversial aspect of the new medicine that he feared might drag the book and its readers into a pointless polemic.[140]

In most cases, however, such claims of catholicity should not be taken too literally. Du Chesne himself was ostensibly aware of writing for a small fraction of the public addressed in his preface: as he confessed later on in the text, his anticipated readership was one of wealthy gentlemen conducting a carefree life in the countryside.[141] None of the guidelines contained in his book, he admitted, was meant for the poor working classes;[142] and many precepts would make little sense to merchants, politicians, courtiers, and other categories of people whose profession imposed particular constraints on diet and lifestyle.[143] Readers of the *Pourtraict* were thus necessarily limited not only in number, but also in their actual uses of the book. Even assuming that a poor wageworker would ever buy (not to mention read) Du Chesne's 600-page tome, what benefit would he ever get from reading it? [144] Du Chesne's answer was remarkably blunt:

> Regimen is not meant for the poor working classes, because they do not have the means to put it into practice. They must be content to live as they can, and not as they would, and that is, poorly and sordidly, instead of well and according to medicine.[145]

Yet, with all its limits and failures, regimen remained for many the single most accessible remedy to environmental influence—much more so than relocating to another country,

[140] Du Chesne 1620: 571. On Paracelsian iatrochemistry and its position within the broader medical culture of early modernity, see, among others, Debus 1977; Debus 1991; Wear 2000.
[141] Du Chesne 1620: 359.
[142] Du Chesne 1620: 333.
[143] Du Chesne 1620: 359.
[144] It should also be kept in mind that a substantial portion of the French population at the time was illiterate and communicated in local dialects, or *patois*, rather than French: see Chaunu 1972.
[145] Du Chesne 1620: 359 ('aux pauvres et mechaniques, ausquels telles regimes ne sont propres, pour n'avoir moyen de les executer: contains de vivre comme ils peuvent, et non comme ils veulent, et ce fort mal et mechaniquement, en lieu de bien et medicalement'). Du Chesne does, however, expect the better-off to lend a hand to the less fortunate. This is why his treatise contains extended advice on how to prepare cheap and effective medicinal remedies: 'ceux qui tiennent aux champs, eslognez de secours [...] pourront tenir prests en leur maison partie desdits remedes: pour en secourir les pauvres, et autres personnes qui n'ont tousiours le moyen d'aller au medecin, où l'apoticaire' (549).

building one's home in a certain way, or improving the surrounding environment by means of engineering works.[146] Absolutely speaking, the best way of getting rid of evil environmental influences was probably to find a climate suited to one's complexion and settle there for life. This, as Humphrey Brook observed, was by far the most rapid, effective, and permanent way of avoiding the negative effects of a bad climate.[147] But as Brooke himself went on to consider, relocation required a liberty of movement that most people simply lacked. Regimen, then, was 'all the help that remains' when 'want of means and conveniency necessitates any to those aires that are most repugnant to their healths'.[148]

As for the poor, those who could not even afford to choose what to eat and how to live, the Leveller Brooke somewhat dismissively excused them from following any particular diet: they had indeed 'this recompense to their poverty, that their necessitated labors keeps [*sic*] them much in health, and without the need, trouble, and charge of physick'.[149] Thanks to their simple diet, salubrious whereabouts, and 'active and stirring life',[150] Brooke argued, the rural poor were free from a number of diseases that tormented the wealthy urban population, as a consequence of unhealthy habits as much as of air pollution in pre-industrial cities.[151] As unsatisfactory as this answer might seem,[152] it points to important trends in seventeenth-century English attitudes to the environment: a growing discontent with urban life, an increasing tendency to idealize rural landscapes,[153]

[146] For examples of relocation, see below, Chapter 3; more on environmental engineering in Chapter 4. Advice on climatologically savvy architecture can be found in many works of this period, following the example set by the Roman writer Vitruvius and his humanist admirer, Leon Battista Alberti (see above, 1.2.3.b). See also Hardy 2006.
[147] Brooke 1650: 58.
[148] Brooke 1650: 58.
[149] Brooke 1650: 146.
[150] Brooke 1650: 155.
[151] Brooke 1650: 68, where he recalls the 'thick fumes and sulphurious vapours' of the city of London. On air pollution in early modern London, see Jenner 1995; Hiltner 2011; Knight 2014: 37-62.
[152] The attitude of Levellers like Brooke towards the poor was characteristically ambiguous, shifting, as Geoff Kennedy has shown, between sympathy, paternalism, and outright fear (Kennedy 2008, Chapter 4).
[153] See Williams 1973.

and a shift of emphasis from climatic extremes to poor air quality as the chief determinant of environmental diseases. Three generations later, George Cheyne corroborated Brooke's defence of rural air by mentioning the case of a Henry Jenkins, a fisherman in Allerton upon Swale (Yorkshire), who 'lived 169 years' thanks simply to his 'plain and cooling' diet and the 'sharp and clear' air in which he lived.[154] Another fellow named Parr, he wrote, had died 'at the age of 152 years' but 'might have lived a while longer, if he had not changed his diet and air, coming out of a clear, thin, free air, into the thick air of London'.[155]

Early-modern health regimens were not only written for different audiences; the motives for their composition could also vary greatly depending on the status, profession, and ambitions of their authors. Cagnati, for instance, wrote his two books *De sanitate tuenda* with hopes of being admitted into the College of Physicians in Padua: his essentially scholarly intentions help explain the thorny Latin style, the fastidious referencing apparatus, and the wealth of erudition displayed throughout the text—all characteristics that contributed to establishing the book as an authoritative reference work in the field, but prevented it from achieving larger commercial success. Fifty years after Cagnati, Humphrey Brooke similarly dedicated his *Hygieinē* to the President and Fellows of the London College of Physicians, to which he was seeking admission. What better way to prove himself worthy of such a prestigious institution than to take a complex topic—the preservation of health through diet—and make it accessible to 'every man'?[156] Throughout the work, Brooke chose to emphasize clarity over erudition, a move that reflects

[154] Cheyne 1725: 32.
[155] Cheyne 1725: 32. Like Brooke, Cheyne also blames many diseases on the 'nitrous and sulphurous smoak that covers London, particularly in the winter' (11).
[156] Brooke 1650: A5^{r}.

contemporary ideas on learning and method, as well as Brooke's own convictions about the social responsibilities of intellectuals.[157]

While one might think that health regimens, unlike other literary genres, would all have been meant for one and the same use, their authors actually had very different ideas as to how their books should be properly employed, and often tried to shape their own reception in more or less subtle ways. Thus we see authors advising their readers to follow meticulously the rules and recipes provided, while others content themselves with laying out some general guidelines and actively encourage their readers to integrate the author's advice with personal experience or further guidance from their doctors.[158] Not infrequently, such attempts at orienting readerly practices were justified through an appeal to public interest. Writers of regimen books often had a clear sense of the social and practical needs that their work could help satisfy, and were eager to make sure that potential readers know how to take full advantage of their books. In early modern Europe, professional health-care was often costly and considerably less available in rural than urban areas, a fact that left a great number of people without easy access to competent medical help.[159] Denouncing such a worrying state of affairs, Humphrey Brooke (like many other authors of regimen books) claimed that keeping his 'manuall […] alwaies ready at hand, to which recourse may be had upon any occasion' would allow 'every man […] to be a physician' and 'a guide to himself' in hygienic matters, thus ensuring that everyone, no matter how poor or 'ignorant', may have access to proper preventative health-care.[160]

[157] See DNB, article 'Brooke, Humphrey (*bap.* 1618, *d.* 1693)' (by Michael f and P. R. S. Baker).
[158] For two good cases in point, see Muffet 1746: 291 and La Framboisière 1600: 376 respectively. On active reading of early-modern health regimens, see Richards 2012.
[159] See Slack 1979; Evenden 1988; Wear 2000.
[160] Brooke 1650: A3^{v}-A5^{r}. The Plutarchean inspiration behind these words is evident; indeed, Brooke (98-99) explicitly quotes a passage from Plutarch's *De tuenda sanitate* (126e).

Spreading medical knowledge among the untrained could, however, raise concerns about possible abuses. Justifying his choice of writing his treatise on health-care in French, rather than Latin,[161] La Framboisière stressed that his intention was not to divulge 'the secrets of our art' ('les mysteres de nostre art'), but simply to inform the larger public about 'the regimen of life' ('le regime de vivre') that one should follow in order to keep healthy. Proceeding with the utmost prudence, he had also left out any 'prescriptions that could be harmful, unless properly applied' ('les ordonnances qui pourroient nuire, faut d'en bien user'), as well as 'those recipes which could be wrongly used' ('les receptes desquelles on pourroit abuser').[162] Brooke similarly stressed that his book only dealt with prevention, to which anyone can safely attend, and said nothing about therapy, 'in which each one must expect advice from his physician'.[163] An analogous distinction was made by Cornaro, who put everyone in charge with the preservation of their own health 'since one can have no better physician than oneself' ('non havendo l'huomo miglior medico di se stesso'), and yet reserved the 'knowledge and treatment of disease' ('cognitione et curatione delle malatie') to the trained physician.[164]

On the whole, early modern authors of health regimens were often keenly aware of how their books would and should be used (or not), as well as of the constraints placed on their readership by social status, profession, and financial means. Although their motives and aims in writing varied just as much as the historical and geographical contexts in which they composed their works, most of these authors shared a common awareness of the urgency of their message, and a more or less genuine belief in its public usefulness.

[161] La Framboisière 1600: 6 ('quelques medecins plus curieux de leur profit que du commun trouveront mauvais que i'aye traicté ce subiect en langue vulgaire').
[162] La Framboisière 1600: 6.
[163] Brooke 1650: A5^{v}. In matters of therapy, Brooke specifically told his reader, ''tis better thou remain ignorant' and resort to professional care (A6^{r}).
[164] Cornaro 1620: 27. Despite such rigid distinctions in the sources, it is important to keep in mind hat the 'boundaries between hygiene (the preservation of health) and therapeutics' remained 'porous' throughout the early modern period (Wear 2000: 166).

Environmental influence, in particular, emerges from their pages as a powerful and to some extent inescapable force that deeply shapes human existence in all of its aspects. Of all the possible ways of coping with the influence of climate, regimen, though perhaps not the most effective, was almost systematically described in this literature as the most easily accessible, often in the face of practical and theoretical circumstances that seemed to suggest the opposite.

2.4. Conclusions

For almost two hundred years, early modern readers adhered to this message enthusiastically, as testified by the persistent commercial success of health regimens until the late seventeenth century. After this date, scholars agree that the genre lost much of its prestige, and observe a considerable decline in the number of new publications produced in this field.[165] The 'death of regimen' has been explained in several ways: the progressive abandonment of humouralism, a foundational element of ancient and early modern hygiene, and the concomitant emergence of a biological concept of race;[166] the fading of the 'preventive paradigm' of medicine;[167] the discovery of new infective diseases that could not be successfully treated by means of diet.[168] Another possible explanation, I suggest, has to do with the shifting value accorded to regimen as a corrective against environmental influence.

As this chapter has shown, dietetics, since its earliest origins, took the form of a medical knowledge with profound ethical overtones. Two masters of ancient hygiene,

[165] Slack 1979.
[166] See, for instance, Harrison 1999. On the genesis of modern racialism, see above, 'Introduction'.
[167] See discussion in Cavallo 2011.
[168] See discussion in Pelling 1997.

Galen and Plutarch, first created and fixed an image of regimen as a medico-moral exercise enhancing self-awareness and self-mastery in those who practised it. This ethical dimension of regimen persisted in the early modern period, when medicine and moral philosophy were often intertwined in complex ways.[169] Far from operating as mere repositories of medical precepts, health regimens set out to teach their readers how to become better persons on various levels. By adopting a regulated lifestyle, the reader-patient could hope to achieve not only a long and healthy life, but also better moral and intellectual dispositions, as well as freedom from all the external influences that haunted the intemperate.[170]

Perhaps the greatest strength of regimen as a way of coping with environmental influence consisted precisely in its capacity to empower the individual and to make everyone the master of his or her life. Its message was simple and appealing: those wishing to escape the negative effects of climate needed to change nothing else but themselves. Where other countermeasures required wealth, liberty of movement, and organized effort, all that regimen apparently demanded was a willingness to change a few aspects of one's routine. In exchange for this effort, it additionally offered a more intimate self-knowledge, as well as a new capacity to govern oneself autonomously without depending on the help of others. This process of empowerment began with the very act of reading, which, as demonstrated by Richards, had to be performed in a certain way—individually, actively, and critically—for the regimen to gain its full efficacy.[171] It continued, as we have seen, with a sustained and meticulous attention to every aspect of one's own diet and lifestyle, up to a point where the reader would know himself (or herself) better than any professional physician ever could.

[169] See Schmidt 2007: 45-46.
[170] See Lessius 1614: 58.
[171] See Richards 2012.

The practice of regimen was thus a highly demanding (though also highly rewarding) exercise of moral self-care. While most sixteenth- and early seventeenth-century dietaries openly emphasized and praised this ethical dimension of regimen, later works feature an evident discursive shift. Cheyne's *Essay on Health and Long Life*, published in 1724, emblematically captures this transition from one conceptual paradigm to another, while also simultaneously partaking of both. On the one hand, Cheyne still subscribes to the idea that practising regimen is not only the most appropriate way of coping with environmental influence, but also, as it were, the touchstone of an individual's ethical development: 'Every man past forty is either a fool or a physician', he writes echoing Plutarch, and meaning by this that a fully mature human being should be able to take personal responsibility for his or her health.[172] At the same time, however, Cheyne senses that the morally exacting nature of regimen makes the latter unpopular and thus ultimately unsuitable as a collective countermeasure to environmental influence.

This is nowhere as clear as in Cheyne's discussion of dietary remedies against scurvy—the most 'universal', 'obstinate', and 'fatal' chronic disease in Britain.[173] Writing less than thirty years before James Lind experimentally linked scurvy to a deficiency of vitamin C, Cheyne suggested that this 'endemick distemper' resulted from a combination of environmental and lifestyle conditions 'mostly special and particular to this island': 'the indulging so much in animal food, and strong fermenting liquors, in contemplative studies, and sedentary professions and employments, together with the nitrous moisture of an island and the inconstancy and inclemency of the seasons thence arising'.[174] Scurvy, in other words, came from a two-fold set of causes: 'the customs of the people' on the one

[172] Cheyne 1725: 1, echoing Plutarch's *De tuenda sanitate*, 136d.
[173] Cheyne 1725: 178.
[174] Cheyne 1725: 178-79. A more detailed physiological explanation follows that relates scurvy to an obstruction of the vessels and decay in the 'springiness and elasticity of the fibres', due to 'the serous part of the blood' becoming 'too thick and glewy' (180).

hand, and the 'nature of the climate' on the other.[175] Deeming the latter unchangeable, Cheyne argued that scurvy could only be eradicated in England by modifying the nation's eating and living habits. Yet this was easier said than done. Preventing scurvy required 'a regimen and conduct so intirely contrary to the natural habits and customs, and the universal bent and appetites of this island, that it becomes a kind of perpetual self-denial to them'. If 'nothing else than a total abstinence from animal foods, and strong fermented liquors' could 'totally extirpate' scurvy from England, then England would probably never free itself from the disease.[176]

Cheyne's point was not that regimen was ineffective against environmental influence—in fact he marveled at 'how much a proper regimen of diet and due exercise' can do to cure even the worst 'chronical distempers';[177] rather, the difficulty with regimen was that it could only prove effective if people were willing to accept painful limitations to their freedom. While earlier authors had occasionally appeared aware of this difficulty, visibly expecting some degree of resistance from readers vis-à-vis their harshest precepts, they still showed themselves confident that the strictest preventive measures would always ultimately be preferred to the slavery of disease. Cheyne's lack of illusions in this regard points to an important shift in moral outlook as well as in theoretical and practical attitudes to environmental influence.

As the next two chapters will demonstrate in greater detail, from the second half of the seventeenth century onwards the battle against environmental influence shifted from being a predominantly individual matter to an increasingly collective and governmentalized undertaking. Nation-wide campaigns to improve the health and 'natural character' of local populations were launched in several European countries, as well as in

[175] Cheyne 1725: 180.
[176] Cheyne 1725: 182.
[177] Cheyne 1725: 185.

the colonies overseas. Towards the end of the early modern period, climate and the environment, still seen as crucial determinants of human identity, were turned into an object of organized policy-making. They were now studied by pools of scientists, physicians, statisticians, urban planners, and land improvers, often working for, and funded by, their local or national governments.

Within this context, the appeal of regimen as a remedy to environmental influence plummeted. Regimen, as we have seen, required personal initiative, relentless willpower, and a readiness to sacrifice a certain type of freedom in the name of another. It was therefore difficult, if not impossible, to force regimen upon people—and yet a certain degree of coercion was necessary if one was to turn regimen from an individual into a collective practice. Even though a few authors did suggest that healthier lifestyles should be imposed by law,[178] the practice of regimen was essentially, and would always remain, a matter of free choice. It is therefore unsurprising that seventeenth- and eighteenth-century policy-makers should turn elsewhere for their grand schemes of collective improvement.

Resettlement and environmental change were two preferred strategies, and I shall say more about each in the next two chapters. Public hygiene was another, and one on which scholars have already shed abundant light, also with specific reference to the issue of environmental influence.[179] The rapid growth in importance of public hygiene throughout this period is an important indicator that the alleged 'death of regimen' in the late seventeenth century was less of a death and more of a metamorphosis: far from disappearing, hygiene was transformed from a predominantly individual into a predominantly collective praxis—something that only became possible by shifting focus from diet and lifestyle to sanitation and propriety as its chief components. As for

[178] Lemnius 1554: 33^{v}-34^{r}.
[179] See Latronico 1938: 273-92; Cipolla 1976; Cipolla 1986; Cipolla 1992; Pratilli and Zanghieri 1995; Mucciarelli et al. 2000; Sansa 2006; Rosen 2015: 37-67.

traditional dietetics, it survived as an increasingly elitist practice of self-care, perhaps more useful for reinforcing the beneficial effects of salubrious environments than for correcting the noxious influences of unhealthy ones. Although fewer and fewer health regimens were composed from scratch from the late seventeenth century onwards,[180] reprints and new translations of earlier texts continued to be published as late as the nineteenth century, thus testifying to the longevity of a genre that for almost two millennia had taught how to achieve longevity.

[180] With a few remarkable exceptions, including *The Code of Health and Longevity, or, A General View of the Rules and Principles Calculated for the Preservation of Health, and the Attainment of Long Life*. This treatise, published in 1809 by the Scottish politician John Sinclair (1754-1835) and then reprinted several times, still follows the traditional format of early modern regimens, with subsections for each of Galen's six non-naturals and detailed advice on how to counter environmental influence through diet and lifestyle.

CHAPTER 3

'MAKE CHOISE OF A FITT PLACE':

CLIMATE THEORY AND HUMAN MOBILITY

IN THE EARLY COLONIAL AGE

We see that men as well as plants
change their nature little by little
when they change soil.

—Jean Bodin[1]

3.1. Introduction: Climate and Migration

The previous chapters have shown that ancient and early-modern climate theories, far from imposing a fatalistic belief in geographical determinism, stimulated the search for active ways of coping with environmental influences. One such way, explored at length in Chapter 2, was corrective regimen: a well-chosen combination of diet and lifestyle aimed at redressing any temperamental shortcomings supposedly due to the influence of climate. In what follows, I shall consider a second way of handling environmental influence that acquired a remarkable importance in the early modern period, namely geographical displacement.

The relationship between climate and migration has attracted a considerable amount of attention among early modern historians in the last four decades. Scholarship has mostly focused on two separate research strands. In the 1970s, the American historian Alfred W. Crosby was among the first to examine the ecological impact of European colonial expansion overseas, an area subsequently explored by other scholars working at

[1] 'Videmus homines aeque ac stirpes mutato solo paulatim degenerare' (Bodin 2013: 226 [5.11]).

the crossroads between environmental and colonial history, including William Cronon and Richard Grove.[2] Another important line of research has brought together colonial, medical, and cultural history in order to investigate how the mental universe of early modern travellers shaped and oriented colonial experiences throughout this period. Two studies published by Karen Kupperman in the early 1980s paved the way by showing that common assumptions about climate and its influence on human beings profoundly conditioned seventeenth-century English perceptions of North-American environments, thus also determining settlement strategies in the Atlantic region.[3] Working in the same vein as Kupperman, numerous scholars in recent years have addressed the complex nexus between travel, climate, and human identity from various perspectives, including epidemiology (David Arnold, Philip D. Curtin, John McNeill), food history and geo-humouralism (Rebecca Earle, Michael Hill), and the genealogy of racial theories (Jean Feerick, Mark Harrison).[4]

What generally emerges from these studies is, first of all, the existence of a close relationship between early modern attitudes to human mobility and the dominant medical paradigm of the time, namely humoural theory. Sixteenth- and seventeenth-century views of man, as Chapter 2 has shown, differed greatly from those of modern biology. While nineteenth-century anthropology revolved around notions of inherited and unchangeable racial characteristics, earlier humoural medicine conceptualized the human body as an entity in flux, constantly remodelled by an array of agents that included air and other environmental factors.[5] In this perspective, travelling meant something more than simply moving from one place to another; it was tantamount to breaking—if only temporarily—

[2] Crosby 1972; Cronon 1983; Crosby 1986; Grove 1995.
[3] Kupperman 1982; Kupperman 1984.
[4] Curtin 1961; Arnold 1996a; Harrison 1999; Curtin 2002; Jennings 2006; Feerick 2010; McNeill 2010; Earle 2012; Hill 2013.
[5] See Harrison 1999: 1-24; Floyd-Wilson 2003: 23-47; Jennings 2006: 9-14; Feerick 2010: 6-7.

that 'state of ecological harmony' between oneself and one's habitual surroundings upon which human health entirely rested according to medical consensus at the time.[6]

In a cultural context dominated by humoural conceptions of human nature, geographical displacement was a transformative experience investing the person as a whole. An Englishman in Jamaica, for instance, was expected to undergo 'a drastic change in physiology and psychology' as his body learned to adjust to the unfamiliar 'heats and damps' of the Caribbean climate.[7] Similarly, early modern reports of travels to India stressed how 'Europeans could lose in the tropics the very characteristics that distinguished them from the peoples of other latitudes, allowing them to become fully acclimatized to their new surroundings'.[8] The discourse on 'seasoning', as gradual adaptation to foreign (particularly tropical) climates was then called, was therefore fraught with tensions. While temperamental flexibility ensured the possibility of surviving a change of climate, it also implied that survival was only possible at the cost of 'going native'—that is, of losing one's original identity in favour of environmentally-acquired characteristics. Acclimatization was thus closely related in early modern imagination to fears of physical, moral, and cultural degeneration: when travel did not kill, it transformed, to such an extent that any anthropological distinction between colonizers and colonized—necessary for legitimizing colonialism in the first place—was at risk of fading away.[9] In the seventeenth century, such widespread anxieties gave birth, among other things, to a wealth of medical literature specifically intended to teach travellers and prospective settlers how to protect

[6] Kupperman 1984: 213.
[7] Kupperman 1984: 214; see also Hill 2013: 7.
[8] Harrison 1999: 25.
[9] See, e.g., Neill 1994: 9; Merians 2001: 22, 100; Earle 2012: 3-5.

themselves from the transformative effects of acclimatization, mostly by means of diet, lifestyle, and personal hygiene.[10]

In drawing attention to these aspects of early modern colonialism, scholars have often pointed out that the process of European expansion overseas was, since its very early stages, 'an anxious pursuit'.[11] While there is certainly considerable truth to this claim, perhaps too much emphasis has been placed on fear and distrust as defining elements of early modern attitudes towards human mobility in its various forms.[12] Indeed, early modern culture was also home to a different and more positive discourse on relocation. This alternative discourse proposed to view the transformative effects of acclimatization less as a threat to defuse than as a resource to exploit: because acclimatization triggered a process of deep physiological and psychological change, resettlement, if carefully planned, could operate as an extraordinary tool for individual and collective improvement.

The earliest examples of such a positive discourse on relocation can be found, once again, in classical medicine. Both Hippocrates and Galen theorized 'changes of air' as an effective therapeutic practice. As the first part of this chapter shows, early modern medicine did not depart from their ideas in this respect; indeed, medical migration—that is, temporary relocation for curative purposes—remained in use well into the nineteenth century, as a number of recent studies have shown.[13] At the same time, the practice of relocation was also taken in new directions during the early modern period, finding particularly fertile ground in colonial contexts.

[10] Harrison 1999; Earle 2012; Hill 2013.
[11] Earle 2012: 3
[12] Kupperman 1982; Kupperman 1984; Harrison 1999; Curtin 2002; Bauer and Mazzotti 2009; Feerick 2010; Harrison 2010; Earle 2012; Hill 2013. More generally on early modern attitudes to travel, see Warneke 1995.
[13] See, for instance, Eric Jennings's study of French colonial spas in Asia and Africa (Jennings 2006), and James Beattie's examination of medical migration in nineteenth-century Australasian colonies (Beattie 2015).

From the mid-sixteenth to the early eighteenth century, European explorers, traders, and colonial undertakers established hundreds of new settlements in the Americas, as well as in Africa and Asia. Evidence from travel accounts and colonial records shows that environmental concerns were often just as important as commercial and strategic reasons in driving the choice of a suitable site for founding a colony: in a majority of cases, great care was put into selecting a locality that not only would not pose threats to the health and wellbeing of prospective settlers, but would in fact foster positive dispositions in the future population. We shall see, however, that insufficient information about local conditions, as well as a lack of agreement about environmental *optima*, sometimes forced the colonists to abandon existing settlements and relocate elsewhere, since the original site had proved unwholesome or otherwise harmful for the local community. Among the many instances of relocated settlements, Jamestown (est. 1607), in present-day Virginia, and French Biloxi (est. 1699), on the coasts of Louisiana, hold a special interest, insofar as they gave rise to well-documented (though relatively little studied) controversies that afford a unique window into the conflicted nature of early-modern environmental culture. These two case studies will therefore be at the centre of my analysis of colonial resettlement in the second half of this chapter.

Colonial America also witnessed the reactivation of the ancient Roman practice of relocating indigenous populations with the purported goal of ameliorating their character and behaviour.[14] The so-called 'General Resettlement of Indians' ('Reducción General de Indios'), launched in 1569 under the authority of the Spanish Viceroy Francisco de Toledo in the provinces of Quito, Lima, and Charcas (present-day Chile and Bolivia), is a particularly significant example. Within a decade, it caused over one million Andeans to

[14] Broadhead 2002; Pina Polo 2009.

be forcibly resettled from their native highland villages into new towns founded after a Spanish model.[15] Toledo's programme, which continued into the following century,[16] had important parallels in analogous schemes developed by religious missionaries (particularly Franciscans and Jesuits) in other areas of Central and South America.[17] While the specific strategies deployed, and the ideological arguments invoked in their support, varied considerably depending on time, place, and actors involved, such resettlement programmes displayed important commonalities: they not only pursued similar goals—transforming the idolatrous, lazy, uncivilized Indians into good Christians and hard-working subjects—but did so in similar ways, namely by capitalizing on the transformative powers of place and climate. As we shall see, this important (and surprisingly understudied) aspect of early-modern resettlement schemes was particularly prominent in missionary letters and 'relations' (reports), many of which appeared in the Jesuit journal *Mémoires des Trévoux* (published from 1701 to 1782) and in the immensely popular series *Lettres édifiantes et curieuses* printed in Paris between 1702 and 1776.

By bringing into focus the relationship between competing views of relocation and the practices they inspired during the early colonial age, this chapter pursues two main goals. First, it shows how the emergence of a positive discourse on relocation created another possible space of liberty for human beings to renegotiate the relationship between place and temperament at both an individual and a collective level. In a time of increased human mobility, deliberate geographical displacement often served as a second way of coping with environmental influences besides corrective regimen (examined in the previous chapter) and environmental engineering (which will be the object of Chapter 4).

[15] Scott 2004: 886; Zimmerer 1996: 50. For more on the 'General Resettlement', see section 3.3.3 below. Secular attempts at concentrating native populations had already been made before Toledo: see Gerhard 1977.
[16] See Cline 1949; Martin 1996: 195.
[17] Martin 1996; Gómez 2001.

However, the sources analysed in this chapter betray a keen awareness that playing with the transformative effects of climate could be a risky (if highly rewarding) game: as we shall see, the line between success and failure was thin, unstable, and not always clear.

A second aim of this chapter, which closely relates to the former, is to draw attention to climate theories as genuine historical agents that thoroughly shaped early-modern colonial practices. With this goal in mind, I deliberately take into account a range of disparate sources—from political writings and travel accounts to colonial records and missionary letters—that shed light on the pervasiveness of the climatological 'paradigm' as well as on its manifold uses. These materials vary greatly in nature, origins, and intended purposes. Some of them, such as John Smith's description of early Virginia, were published immediately (or shortly after) their composition, reprinted several times for promotional purposes, and have been the object of extended study; others, such as the anonymous *Account of Louisiana* held in the manuscript collections of the Newberry Library in Chicago, have thus far remained virtually unknown to scholars and are examined here for the first time (see section 3.3.2.b below).

In examining these writings together as testimonies of a shared environmental culture, the analysis presented here yields fresh insights into some well-known 'classics' of early colonial literature. At the same time, it challenges us to rethink the very category of 'classic' versus 'non-canonical' texts, showing that other distinctions—for instance, between academically-trained or otherwise educated writers on the one hand, and semi-literate figures who used writing for immediately practical purposes—may be more relevant when seeking to establish the ways in which environmental knowledge was transmitted, comprehended, and put to practice in a specific historical context. The writers considered in this chapter range from classically-trained Jesuit missionaries and Protestant

noblemen to indentured servants without any formal education; such different social and cultural backgrounds, as we shall see, are clearly reflected in the ways that authors engaged with the tradition of climate theory and used it in their writings. In more than one case, the materials that will guide my analysis are either anonymous or the work of largely obscure figures. In the absence of any extra-textual information that can help us reconstruct the intellectual background of these authors, identifying the sources from which they may be deriving their environmental ideas is often an arduous if not desperate task. Still, these writings remain important testimonies of the circulation of climate theories across different social and cultural levels, and of the deep influence that they had outside the limited world of intellectual elites.

Overall, this chapter suggests that climate theory can (and should) be interpreted not only as a theory of travel, but as itself a 'travelling theory', in Edward Said's memorable expression: in other words, as a theory that was appropriated, transformed, and translated into many different doctrinal and practical contexts as it circulated across physical and cultural spaces.[18] How, why, and by whom was climate theory mobilized in the early colonial world, and what changes did the theory itself undergo in the process? The challenge, as Mark Harrison rightly observes, consists in moving beyond 'simple or unidirectional' ways of understanding the relationship between theories and practices, in order to grasp the mutually constitutive nature of intellectual and historical processes, each shaping the other in complex and always idiosyncratic ways.[19]

[18] Said 1983: 226.
[19] Harrison 1999: 2. Harrison notes that one such 'simple or unidirectional' way of conceptualizing the relationship between climate theory and colonial practice consists in treating European discourses on climate and race as mere 'attempts to rationalize colonial relationships'.

3.2. Threat or Resource? Competing Views of Geographical Displacement

In order to grasp the distant roots of early modern views of geographical displacement, it is helpful to take a step back in time to the beginning of the second century BC. Around that time, the Roman Republic—still fresh from its victories over Carthage and eager to expand further into the Mediterranean—became involved in a long war with King Antiochus III of Syria. The conflict seemed to take a turn for the worst around 190 BC, when Antiochus allied himself with the Galatians, a nation of central Anatolia that was thought to descend from the very same Gauls who had invaded Rome in 387 BC. Two hundred years later, the Romans were still terrified by the Gauls' reputation as fearless warriors—and were thus understandably reluctant to engage their descendants in battle in the plains of Magnesia. According to the Roman historian Livy, who gave a detailed account of the Syrian war in his books *Ab urbe condita* (first century AD), the Roman legions could not be persuaded to fight until their leader, Consul Manlius Vulso, pointed out that the Galatians were not 'true Gauls, born in their own land', but only distant relatives bearing very little resemblance to their ancient progenitors. Comparing humans to 'plants and animals', the consul explained that whenever living beings are 'transplanted to an alien soil', their 'natural character' changes and 'degenerates towards that in which it is nurtured' by virtue of the power of 'soil and climate'.[20] Countless examples proved it:

> The Macedonians who hold Alexandria in Egypt, who hold Seleucia and Babylonia and other colonies scattered throughout the world, have degenerated into Syrians, Parthans, Egyptians; Massilia, situated among the Gauls, has acquired something of the disposition of its neighbours; what have the Tarentines retained of that stern and dreadful Spartan discipline?[21]

[20] Liv., 38.17.10-13 (Livy 1983: 59; 'sicut in frugibus pecudibusque non tantum semina ad servandam indolem valent, quantum terrae proprietas caelique sub quo aluntur mutat […] Est generosius, in sua quidquid sede gignitur; insitum alienae terrae in id quo alitur, natura vertente se, degenerat'). I give here a revised version of Evan T. Sage's translation.

[21] Liv., 38.17.11-12 (Livy 1983: 59; 'Macedones, qui Alexandriam in Aegypto, qui Seleuciam ac Babyloniam, quique alias sparsas per orbem terrarum colonias habent, in Syros Parthos Aegyptios

Something similar, Vulso argued, had happened to the Gauls when they settled down in the mollifying Asian climate: from fearless Gauls, they rapidly 'degenerated' into a nation incapable of martial valour. Vulso's speech, if we are to trust Livy, yielded the desired effect: delivered from all fear, the Roman legions proceeded to attack the Galatians and defeated them in a battle that decided the war against Antiochus.

Consul Vulso may very well never have spoken the words that Livy has him utter;[22] whether genuine or not, however, this Livian anecdote is interesting in at least two ways. In mobilizing the doctrine of environmental influence in a military-strategic context, Vulso's speech provides a good example of practical uses of climate theory in the classical period.[23] Moreover, it brilliantly captures the ambivalence of ancient ideas on geographical displacement.[24] On the one hand, the migration from northwestern Europe to Asia had turned a once valiant people into a nation unworthy of its forefathers. On the other hand, this process proved favourable to the Romans, taming their enemies before battle. So, what Livy's anecdote suggested to its readers was not only that a change of climate transformed human beings deeply, but also that such a transformation could be seen as a curse or a blessing depending on the perspective adopted.

A second anecdote from Livy's histories makes this point even more clearly. Recalling the Romans' long-standing struggle against the Ligurians, a northern Italian tribe

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degenerarunt; Massilia, inter Gallos sita, traxit aliquantum ab accolis animorum; Tarentinis quid ex Spartana dura illa et horrida disciplina mansit?'). The Macedonian empire, built upon the conquests of Alexander the Great, was split after Alexander's death into four independent kingdoms (Macedonia and Greece; Egypt; Syria; Anatolia). Massilia, the future Marseille, was a Greek colony established by the Phocaeans on the southern coast of France in the early sixth century BC. Taras or Tarentum (now Taranto), founded in 706 BC in south-eastern Italy, was the only colony ever established by the Spartans.

[22] On Livy's use of dramatic speech (a technique also employed by numerous other historians, both ancient and modern), see Forsythe 1999 (Chapter 5).

[23] For a similar use at around the same time that Livy was writing, see Strab., 2.5, on Britain.

[24] For a similar perspective, see Hdt., 9.122 (Herodotus 1920-1925, vol. 4: 301), where the Persian king Cyrus warns his subjects that moving from their rugged native country into fertile Babylon will cause them to lose their strength and valour, since 'soft lands breed soft men'.

unwilling to give up its political freedom, Livy explains that the early decades of the second century BC witnessed the deportation of hundreds of thousands of Ligurians from their native mountains to the lowlands of Samnium and Cisalpine Gaul, in a desperate attempt to break their resistance and turn them into peaceable subjects.[25] Referring to this Livian passage twice in his influential *Methodus* (1566) and *République* (1576), the French climate theorist Jean Bodin would present it as ultimate proof of the fact that the transformative effects of a change of climate can be a powerful tool if used by the right people and in the right ways.[26] At the same time, however, Bodin was also acutely aware that geographical displacement could have disastrous outcomes if practiced lightheartedly or without a precise knowledge of its effects.[27] As the following sections will show, such an ambivalent attitude towards travel and migration was anything but exceptional in the cultural landscape of the period.

3.2.1. The Theory and Practice of Medical Migration

Early modern Europeans conceptualized geographical displacement in accordance with a long-standing medical tradition that accommodated competing views on the matter. Medical interest in relocation and its effects may be traced as far back as Hippocrates's *Aphorisms* (fifth century BC), one of the few treatises in the Hippocratic corpus to be later incorporated into the standard curriculum of Renaissance medical faculties.[28] Hippocratic doctors often prescribed 'changes of air' to their patients, especially in the case of diseases

[25] Livy records several waves in the deportation of the Ligurians to the plains north of the river Po (187-172 BC): see 39.2.9, 42.22.5-6. Another 47,000 *Ligures Apuani* (settled in the modern Italian provinces of La Spezia, Massa-Carrara, and Lucca) were moved to the heart of Samnium in 180 BC: see Liv., 40.38.1-9, 41.1-6. See Broadhead 2002: 15; Pina Polo 2009: 281.
[26] See Bodin 2013: 332 (5.178) and Bodin 1986, vol. 3: 48-49 (5.1).
[27] See Bodin 2013: 234 (5.24-25).
[28] See Siraisi 1997: 126.

that were reputed to have environmental origins. For instance, when one of his clients developed an ulcer in his throat that no drug seemed able to treat, the great Pergamese physician Galen sent him away from Rome, where he had fallen ill, to Stabia, a small town in the gulf of Naples that was known for its dry and healthy climate.[29]

Hippocrates himself saw relocation as a most effective remedy to epilepsy, a condition that he attributed to an excess of phlegm in the body.[30] Yet the father of medicine never concealed the fact that changes of air were extremely stressful for the body—including, indeed especially, the sick body. To 'heal, cool, or otherwise move the body in any way much and suddenly is dangerous', he stated repeatedly—a maxim that would penetrate deeply into the medical conscience, and indeed the general worldview, of later generations.[31] Thus for Hippocrates, as well as for his followers, relocation was at once an effective medical therapy and a highly risky practice.

Such complex views of geographical displacement persisted into the early modern period. In a time of increased human mobility, the consequences of a change of climate were unsurprisingly at the centre of widespread debate. Anxieties over the potentially negative effects of displacement haunted not only long-distance travellers heading to other continents, but also those who more modestly moved to a neighbouring country or within the very same region. Europe was seen, with good reason, as a patchwork of different microclimates featuring an extraordinary environmental variety. In a relatively short time, one could go from frigid mountain landscapes in Switzerland to rolling hills in sunny Italy, from marshy plains in Languedoc to the parched wastelands of Castile. Indeed, when

[29] Gal., *Methodus medendi*, 5.12, 361K-366K (Galen 2011, vol. 2: 85-91).
[30] Hippoc., *Aph.*, 2.45 (Hippocrates 1931: 119). See Avicenna, *Canon*, 268 (Avicenna 1973: 184), on epilepsy as a disease typical of the phlegmatic complexion.
[31] Hippoc., *Aph.*, 2.51 (Hippocrates 1931: 121; revised translation). For examples of early modern authors echoing this maxim, see Vaughan 1600: 72; La Framboisière 1600: 35. On the manifold dimensions of Hippocrates's stance on change and habit, see Jouanna 2012 (Chapter 2).

simply moving across one's native country one was likely to experience dramatic variations not only in the temperature, thickness, moistness, and overall quality of the air, but also in the properties of local food and water—as these, too, rested upon environmental factors.[32] Thus even the shortest travel—'from one place to another nearby, or from one province to another which is not entirely opposite in nature', to borrow the words of the Milanese physician Ludovico Settala—could expose the traveller to considerable temperamental alterations.[33]

Against this backdrop, a new strand of medical literature flourished that was specifically tailored to the needs of travellers concerned with the preservation of their physical and mental health. Some of these books were extremely popular—for instance, Guglielmo Grataroli's *De regimine iter agentium* (1561), one of the earliest examples of the genre, went through at least six editions in thirty years.[34] Taken as a whole, this corpus of texts generally revolved around two central and interrelated ideas: the universal habitability of the world, and the possibility for Europeans of successfully adapting to any climate, provided that they follow certain basic rules of hygiene and behaviour.[35] The climatological discourse on temperateness and the moral discourse on temperance were therefore intimately related in this medical literature, which tended to represent disease not

[32] See Wear 1992: 129.
[33] Settala 1632, vol. 1: 27 ('de loco vicino ad propinquum alium […] vel etiam de provincia ad aliam non omnino contrariam'). On Settala, see above, 1.3.2.a.
[34] First published in Basel by Brylinger, the *De regimine iter agentium* was printed three times in stand-alone editions (Strasburg: Wendelin II Rihel, 1563; Cologne: Peter Horst, 1571, under the title *Proficiscentium seu magnis itineribus diversas terras obeuntium medicina* [Nuremberg: Katharina Gerlach, 1591]) and was included twice in larger miscellanies on medicine and travel: *De arte peregrinandi libri II variis exemplis* (Nuremberg: Katharina Gerlach, 1591) and *De conservanda valetudine* (Frankfurt: Wechel and Wischer, 1591). The north-Italian physician and Protestant émigré Guglielmo Grataroli (1516-1568) was also the author of a regimen for scholars and magistrates (*De literatorum et eorum qui magistratibus funguntur conservanda praeservandaque valetudine*), first printed in Basel in 1555 by Henricus Petrus, and of several works on alchemy, physiognomy, and medical astrology.
[35] See Earle 2012; Hill 2013 (Chapters 2 and 3).

as an inevitable consequence of geographical displacement, but rather as 'a moral failure that could only be laid at the feet of the sick person himself'.[36]

Other authors, however, were more sceptical with regard to the possibility of successfully adapting to a climate different than one's own. For the Welsh jurist William Vaughan, whose 1600 treatise *Naturall and Artificiall Directions for Health* (see above, Chapter 2) contains several remarks on relocation, the philosophical principle that 'every mans naturall place preserveth him, which is placed in it' provided a very strong argument against the convenience of displacement. 'A mans native and countries aire is the best', Vaughan wrote, thus echoing a leitmotiv of early-modern medical culture that, as Andrew Wear and others have noted, also played an important role in orienting actual therapeutic practice.[37] Indeed, sick travellers were often instructed to go back to their birthplace or habitual abode in order to recover their health—a piece of advice that patients cherished even when they were not in a position to put it into practice.[38]

Vaughan's eulogy of 'native airs' points to the complex understanding that early modern Europeans had of birthplace as a locus of physical as well as cultural and social belonging.[39] From a medical viewpoint, the notion that 'native airs' are inherently more salubrious than unfamiliar ones stems from the assumption (explored at length in the previous chapter) that health consists in a delicate balance between one's natural temperament and the surrounding environment. In this perspective, changing place, by modifying one of the elements in this relation, inevitably triggers changes in the other as well, with consequences on a person's overall well-being. Yet for the very same reason

[36] Hill 2013: 90-91. Gillies 1986 and Evans 2012 make similar points.
[37] Vaughan 1600: 2; compare Brooke 1650: 68. See Wear 1992: 126.
[38] The story of Vincenzo Alamanni, which I mentioned earlier (see 1.3.2.a), is a good case in point.
[39] A similar dynamic is reflected in the works of many sixteenth- and seventeenth-century physicians and natural historians, who invoked culturally constructed oppositions between 'indigenous' plants and foods and the 'exotic' species coming from abroad in order to advocate the higher efficacy of native substances for both nutritional and medicinal purposes. See Wear 1992: 127-29; Wear 1999; Elmer and Grell 2004; Cooper 2007.

that displacement was considered dangerous for well-functioning individuals, it was also generally deemed beneficial for those who already suffered from some sort of temperamental ailment. In that case, travel could prove instrumental in restoring a healthy balance between complexion and environment, thus operating in favour of, rather than against, someone's bodily and spiritual equilibrium. Hippocrates had said it, experience proved it: as even a staunch proponent of 'native airs' such as William Vaughan was forced to admit, 'oftentimes […] sick folks do recover their former health onely by chaunge of aire'.[40]

While we lack a full examination of early-modern 'medical migration', recent studies suggest that relocation for health reasons was a remarkably widespread phenomenon in the early colonial period, one that mobilized large numbers of people and positively contributed to directing their movement and settlement around the world. In her analysis of medical migration in the British Atlantic, Katherine Johnston has particularly shown that eighteenth-century Britons took medical migration seriously enough to move far from home and away from their loved ones in an anxious (and often frustrating) 'search for a place where the climate fit their bodies'.[41] As Johnston rightly points out, the task of identifying a suitable destination was itself far from easy, not only because conceptions of environmental *optima* occasionally diverged, but also because individual constitutions were thought to react to the same environment in different, and largely unpredictable, ways. Consequently, there was no other means than first-hand experience 'for travellers or potential colonists to know which types of air might suit their particular bodies'.[42]

Medical migration could take different forms. It could be a temporary measure, lasting only for as long as was required for the patient's full recovery. Thus early modern

[40] Vaughan 1600: 3.
[41] Johnston 2013: 458.
[42] Johnston 2013: 459. I shall develop this point further in section 3.2.2 below.

physicians routinely prescribed brief 'changes of air' as a remedy against light temperamental imbalances, while English gentlemen, according to the slightly amused testimony of a contemporary, used to send their sons abroad for short stays in warmer countries, in the hope that those 'bolder climates' would help 'correct their flegm'.[43]

More serious cases, on the other hand, required a longer if not a permanent change of residence. For the eighteenth-century Scottish physician George Cheyne, one possible way of fighting scurvy (a disease particularly common in Britain at the time) was to migrate to 'warmer climates, which, by a freer perspiration and lighter diet […] universally cure those who are afflicted with it'.[44] Relocation to warmer climates was advisable against other forms of disease besides scurvy: the 'fragrant' tropical air would supposedly help persistent coughs and other ailments typical of old age and phlegmatic constitutions,[45] while closer to Europe, the climate of Cyprus was said to cure 'any ulcers of the lungs'.[46] For the therapy to be effective, however, it was essential that the change of air take place, in Cheyne's words, 'before nature be quite worn out', namely at a relatively young age, lest the illness be too advanced to be treated by means of simple relocation.

Not all types of medical relocation required travelling long distances. For instance, urban residents might find it enough to leave the city grounds for a few hours and enjoy the invigorating effects of pure air in the surrounding countryside. According to the French royal physician La Framboisière, all those engaged in stressful mental activities, such as scholars and magistrates, should 'frequently go amuse themselves in the countryside or other open spaces, where there is abundance of air which can offset the considerable loss

[43] These are words of Edward Hyde, first Earl of Clarendon (1609-1674), as reported in Warneke 1995: 244. Phlegmatic complexions, frequent in cold and humid climates, were typically regarded as the least disposed towards intellectual activity.
[44] Cheyne 1725: 180. On Cheyne, see above, 2.3.1 and 2.3.2.
[45] Letters of Samuel Martin to Samuel Martin, Esq., 10 June 1774 and 20 February 1775, both quoted in Johnston 2013: 455.
[46] Muffet 1746: 14. On Muffet, see above, 2.3.1 and 2.3.2.

of spirits and brace their weary mind'. La Framboisière promised that 'after deeply inhaling the fresh air' they would immediately feel 'lighter and full of energies'.[47] In a similar vein, the Italian political writer Giovanni Botero (1544-1617) praised the French King Francis I for creating a public park on the outskirts of Paris (perhaps the Bois de Boulogne, whose grounds were partially open to the public), so that the students enrolled at the local university would 'have commodity and means to take the air and to recreate themselves with honest exercises'.[48] Nothing, indeed, is 'more important for life than air', or more 'apt to delight and cheer up the spirits and mind of students' than 'wholesome air', 'rivers, fountains, springs and woods'.[49]

The existence of microclimates within the same region—a fact commonly acknowledged by chorological climate theorists[50]—could also easily be exploited for medical purposes. As we have seen in the previous chapter, Alessandro Petronio's late sixteenth-century treatise on the medical topography of Rome included perceptive remarks in this sense. Petronio observed that certain diseases, such as the dreaded *capiplenium*, tended to affect residents of the humid Tiber valley while sparing those who lived on the well-ventilated hilltops.[51] He thus not only concluded that *capiplenium* was essentially an environmental disease due to an excess of moistness in the air; he also posited that those

[47] La Framboisière 1600: 36-37 ('ceux qui sont assidus à l'estude ou ordinairement occupez aux affairez publiques'; 'aller souvent s'égayer aux champs, ou en quelque place spacieuse, où il y ait beaucoup d'air, pour reparer la grande dissipation de leurs esprits, et fortifier leur cerveau affoibli de travail'; 'plus dispos et gaillards, apres avoir tres-bien humé l'air frais'). On La Framboisière, see above, 2.3.1 and 2.3.2.
[48] Botero 1956b: 252 (2.4), modified translation ('Francesco Primo Re di Francia, accioche gli scolari dell'Università di Parigi, ch'erano al suo tempo quasi infiniti, havessero commodità di pigliar aria, e di ricrearsi honestamente, assegnò loro un gran prato vicino alla Città, et al fiume; dove, senza disturbo, potessero a lor modo diportarsi' [Botero 1990b: 340]).
[49] Botero 1956b: 267 (2.11), 252 (2.4), modified translations ('l'aere, del quale non è cosa nessuna, che più importi alla vita' [Botero 1990b: 358]; 'importa assai, che la città, dove tu vuoi fondar Studio, sia d'aria salubre, e di sito allegro, e vago, dove siano, e fiumi, e fonti, e boschi' [Botero 1990b: 340]).
[50] For a definition of 'chorological' climate theory, see above, 1.2.3.b.
[51] On Petronio and the 'capiplenium', see above, 2.3.1.

who suffered from it should be moved from the valley to 'the hills, or some other place than Rome',[52] where the drier climate would ensure a speedier recovery.

Many climate theorists explicitly theorized 'changing air' as a last resort against harmful environmental influence. The French physician Joseph Du Chesne stated for instance that, whenever regimen could not help nor the local air 'be rectified' by artificial means, 'the only way to remediate' was 'to change place and go live somewhere better'.[53] His younger colleague La Framboisière similarly reckoned that the most important thing to do 'in order to enjoy a long and healthy life' was to 'choose a good air, and avoid the bad ones'.[54] La Framboisière was certainly not alone in giving such advice; all over Europe, early-modern medical authors concurred that the 'chusing of a good aire' (as Vaughan put it), was of the utmost importance not only for enjoying good health, but also for achieving intellectual and moral excellence.[55] But what exactly was 'good air', and how could one determine whether a place had it? On what grounds should one choose a 'better place' worth moving to? As the next section will show, the absence of a clearcut answer to such questions was what made geographical displacement possible and yet, at the very same time, inherently problematic.

3.2.2. Good for Whom? Humouralism and 'Ideal' Climates

According to the British historian of medicine Andrew Wear, early modern culture featured a general 'consensus as to the topography of health and illness'. 'What constituted

[52] Petronio 1581: 10 ('non in convalle, sed in montibus, aut alibi, quam in Urbe continendi sunt').
[53] Du Chesne 1620: 180 ('tel air ne se peut amender, et le vray remede de le corriger, c'est de changer et s'habiter en quelque meilleur lieu'). On Du Chesne, see above, sections 2.3.1 and 2.3.2. On artificial rectification of air, see below, Chapter 4.
[54] La Framboisière 1600: 34 ('C'est pourquoy il faut, pour vivre longuement et sainement, avoir soing sur toutes choses se choisir un bon air, et de fuyr le mauvais').
[55] Vaughan 1600: 3.

healthy places, airs, and waters', Wear writes, 'was generally agreed upon, and everyone believed that healthy places meant healthy bodies'.[56] Wear's conclusions may hold true for the English context on which he largely bases his remarks, but a broader look at the early-modern European scene reveals a different picture. While the existence of a positive connection between 'healthy places' and 'healthy bodies' was, without a shadow of a doubt, a widely shared view in the early modern period, what exactly constituted such 'healthy places' appears to have been more of a divisive issue at the time than is often assumed. The difficulty of deciding the question, I suggest, stemmed from at least three separate sets of factors.

First of all, air—recognized by many as the single most important aspect in determining the relationship between place and temperament—was typically conceptualized as a plastic element without a fixed nature. It was common to think of the air of a place as varying significantly depending on season, time of the day, and specific meteorological phenomena. La Framboisière exemplifies well this type of reasoning when he posits that 'high places are healthier in the morning', yet towards the end of the day, once the air of the lowlands has been purified by many hours of sunshine, it is preferable 'to walk or sit […] in valleys and on green lawns'.[57] La Framboisière also adds—once again echoing standard ideas of the time—that a shift in wind currents or a long period of heavy rain is often all it takes to turn even the healthiest spot into a cradle of disease.

One difficulty, then, came from the inherent variability of air. A second set of problems related to a different kind of variability—that of environmental language and the shifting meanings it conveyed. In his recent study of early-modern English conceptions of temperance and temperateness, Michael Hill has rightly called attention to the 'multiple

[56] Wear 1992: 133.
[57] La Framboisière 1600: 40 ('les lieux hauts sont plus sains au matin […] sur le soir, il vaut mieux se pourmener et s'assoir […] aux vallons et verds prez').

connotations' of the term 'temperate' in early colonial promotional literature, showing how the word could mean different things for different authors—or for the same author at different times.[58] A similar point is made by Mary Floyd-Wilson, who notes how certain 'unquestioned commonplaces' concerning the influence of environmental factors on 'the appearance, complexion, temperament, and potential of all people' were nevertheless framed in profoundly different ways depending on the 'spatial perspective' and ethnic bias of those who appropriated them.[59] The same language, in other words, could be taken to mean different and sometimes outright contradictory things. In part, such linguistic variability was due to the complex entanglements between environmental discourse and other conceptual regimes—'historiographical and political' for Floyd-Wilson, rhetorical and moral for Hill. Early-modern environmental discourse was indeed rarely about the environment alone; rather, it almost systematically operated as a locus or medium for other types of discourse—sometimes in oblique and metaphorical ways. Hence a stratification and proliferation of meaning that may partly account for the existence of significant differences in the early modern use of key concepts such as 'temperateness' or 'healthiness'.

A third, and more fundamental, difficulty stemmed as a logical consequence from the medical paradigm underpinning climate theory, namely humouralism. As Chapters 1 and 2 have shown in detail, a central tenet of humoural theory, in both its ancient and early modern versions, was the existence of a broad and diverse range of temperaments, each of which was expected to agree with a different type of air. Thus people of a dry complexion 'laugh and sing when rain approaches', whereas the very same weather enervates the sanguine and the phlegmatic; and while 'some like to new wax are dissolved with the least

[58] Hill 2013: 48.
[59] Floyd-Wilson 2003: 36, 33.

heat, and frozen with the least cold, others with salamanders think nothing hot enough, others like to silk worms cannot abide no cold'.[60] From a humoural perspective, then, the notion of a universally ideal climate, good for each and all human beings, is fundamentally flawed: in principle at least, there are just as many 'ideal' climates as temperaments. Whether a place is healthy or not is therefore undecidable in general terms, for the simple reason that healthiness within the humoural universe is inherently *relative*—that is, the result of a unique *relationship* between one specific temperament and a given locality.

In a sense, it was precisely this diversity of possible combinations between temperament and climate that made geographical displacement useful, and indeed necessary, for medical purposes. As the previous section has shown, the whole practice of medical migration rested upon the assumption that unbalanced complexions could be corrected and made healthy by relocating into a well-chosen environment. In this perspective, what made a climate 'good' was not so much a fixed set of properties, but its ability to compensate an existing state of humoural imbalance—thus dry climates, for instance, would be 'good' for phlegmatic disorders, which resulted from an excess of moistness in the body.

On the other hand, the extreme distinctiveness and, to some extent, unpredictability of this nexus between climate and complexion could pose considerable challenges when it came to other, less deliberate types of geographical displacement. Colonial ventures offer a particularly interesting case in point. As emerges from recent estimates, when seventeenth-century white Europeans left the Old World for the colonies, they mostly did so as the result of a personal choice.[61] According to David Eltis, 'free migrants and indentured servants could choose whether to migrate at all, and having made that decision, could

[60] Muffet 1746: 20-21.
[61] See Eltis 2002b: 67; Walsh 2002; Greene 1988: 32-33; Games 1999, 51.

decide where to go'—for instance, they could choose to 'avoid the severe work conditions and shortened life expectancies associated with sugar cultivation and extracting precious metals'.[62] African slaves, who made up for more than sixty percent of the total volume of seventeenth-century migrants to the Americas according to Eltis's estimate, obviously moved under very different circumstances, with crucial implications on the social and demographic makeup of the new colonial communities.[63]

Even voluntary migrants, however, often had limited freedom in selecting an exact place of destination. How much freedom they had exactly depended on several factors, including the circumstances and nature of the venture in which they took part. Some expeditions—such as the famous Mayflower expedition that set sail from Plymouth in 1620 and went on to establish the first Puritan settlement in present-day Massachusetts—were conceived from the outset as collective endeavours in which all decisions were 'publike and coming to the scanning of all'.[64] Others were capitalistic undertakings in which isolated individuals would casually join for the most disparate reasons—some looking for adventure, others for gold, yet others for ways to evade justice, poverty, or religious persecution.[65] In a vast majority of cases, the bulk of the planning was done by trading companies and professional 'adventurers and planters' who tended to 'set the conditions of plantation' singlehandedly.[66] Migrants, in other words, only very rarely dictated the rules of their own mobility.

Under these circumstances, the relationship between temperament and climate did not lose importance, but rather became more pressing an issue than ever. Colonial planners themselves were keenly aware of the effects that a change of climate would have on the

[62] Eltis 2002a: 29.
[63] Eltis 2002a: 25; Eltis 2002b: 67.
[64] Bradford 1997: 181.
[65] For a comparative overview of recruitment strategies for emigration, see Altman and Horn 1991.
[66] Porterfield 2006: 13.

planters' complexions. This aspect, which could jeopardize a colony's prospects of success, was often taken into careful account in setting up a venture. Recalling preparatory discussions to the Mayflower expedition, William Bradford, one of the expedition's leaders and later first governor of Plymouth Colony, wrote in his retrospective journal *Of Plymouth Plantation*:

> The place they had thoughts on was some of those vast and unpeopled countries of America […]. This proposition […] raised many variable opinions […] the miseries of the land which they should be exposed unto, would be to[o] hard to borne […]. The change of air, diet, and drinking of water, would infecte their bodies with sore sickneses, and greevous diseases […]. They consulted what particular place to pitch upon, and prepare for. Some (and none of the meanest) had thoughts and were ernest for Guiana, or some of those fertill places in these hot climates. Others were for some parts of Virginia, where the English had all ready made entrance, and beginning. Those for Guiana alleged that the countrie was rich, fruitfull, and blessed with a perpetuall spring, and a florishing greenness; where vigorous nature brought forth all things in abundance and plenty without any labour or art of man […]. But to this it was answered, that […] hott countries are subject to greevous diseases, and many noysome impediments, which other more temperate places are freer from, and would not so well agree with our English bodys.[67]

Bradford's text provides a good example of the impact that climate theory had on early colonial undertakings. European settlers moving to the West Indies and other supposedly 'torrid' regions such as Florida and Virginia were deeply concerned about the temperamental transformations that they would undergo in those 'intemperate' climates.[68] As Karen Kupperman has shown, 'people considering or promoting emigration feared […] that in leaving England they might be leaving their Englishness also, running the risk of becoming more like the Spaniard, whom they perceived as choleric and untrustworthy'.[69]

Colder climates were usually viewed more sympathetically, on account of the alleged invigorating effects of lower temperatures. But not everyone was convinced that

[67] Bradford 1997: 181-82. Composed between 1630 and 1651, Bradford's journal was not published until 1856. On this text, see Gomez-Galisteo 2013.
[68] On Virginia as a 'torrid' climate, see Hill 2013: 9.
[69] Kupperman 1984: 215.

well-ordered, European-like societies could be established in the northernmost stretches of New England or New France (as modern Québec was then known), given that cold climates notoriously brought 'forth a dull inflexible people, obstinately affecting barbarous liberty and jelous of an aucthority'.[70] 'Concerns of climatic suitability' particularly affected late seventeenth-century French discussions about the possible introduction of black slavery in New France.[71] While a substantial slave presence might have boosted the economic development of the French Canadian settlements, doubts remained as to the Africans' capacity to survive, let alone thrive, in such a different climate. Taking a stance on the issue in 1689, King Louis XIV in person recommended that the plan be abandoned on climatic grounds. While he personally liked the idea of bringing black manpower to New France, he also reckoned that 'these Negroes, coming from such a different climate, could perish in Canada, and render the entire project a failure'.[72] By bringing together issues of climate, colonialism, and slavery, the Canadian debate represents a paradigmatic, though by no means isolated, example of the pervasive interplay between ideas of climate and temperament in the early colonial world.[73]

Things became even more problematic if one wanted to take the humoural principle of the individuality of temperament into serious account. In that case, generic considerations of 'national character' needed to be qualified on a case-by-case basis by factoring in a number of variables—from age and gender to medical history and family background; yet even then it remained virtually impossible to determine *a priori* how a given individual would react to a change of climate. Thus Paul du Poisson, a Jesuit

[70] Late sixteenth-century English source, quoted in Quinn 1979, vol. 3: 173. See Kupperman 1984: 216.
[71] Elgersman 1999: 11.
[72] Quoted in Elgersman 1999: 11.
[73] At the same time that the Canadian debate was raging in France, similar discussions were taking place in the English and Spanish areas of influence: two projects in progress, at Columbia University (Katherine Johnston, 'The Experience of Hot Climates: Health, Race, and the Body in the British Atlantic World') and at Johns Hopkins University (Joseph Clark, 'Port Cities, African Diaspora, and the Regional History of Mexico and the Caribbean, 1571-1700'), are shedding new light on these parallel debates.

missionary among the Arkansas Indians in the early 1720s, reported that he was the only Frenchman in his group 'to have been preserved from illness' upon landing in the colonies—and this despite the fact that there had been complaints about his 'weak complexion' when he first left France. The same could not be said of another French missionary on the same expedition, Father Souel, 'about whose health no one had ever had any complaints, and yet he has fallen sick three times since he is in this country'.[74] Similarly, the Jesuit missionary Jean-Baptiste Margat de Tilly (1689-1747), wrote that the climate of Saint-Domingue, which he along with most people found difficult to bear, suited others extremely well: 'We have here a few missionaries,' he stated, 'who came to this island far advanced in age. They felt reborn, as it were, and to this day they still withstand the burden of labour more bravely and more vigourously than the younger ones among us'.[75]

Ultimately then, the colonial experience greatly helped in laying bare the ambivalence inherent in geo-humoural views of geographical displacement. On the one hand, a humoural understanding of the relationship between place and temperament elicited widespread concerns about relocation and its degenerative effects. On the other hand, humouralism was key in downplaying such fears, as it could be invoked to show how relocation, if carefully handled, would improve rather than endanger individual temperament.

Nowhere does the paradoxical relationship between colonialism and geo-humouralism emerge as clearly as in regard to the issue of 'ideal' climates. Earlier in this

[74] 'Je suis le seul des François qui ait été préservé de la maladie depuis que je suis ici; on me plaignoit cependant sur la foiblesse de la complexion, lorsque je quittai la France; l'on ne plaignait pas, par la raison contraire, le Pere Souel, qui a déjà été trois fois malade depuis qu'il est dans le pays' (Père Poisson ['Aux Akensas'] to Père Patouillet [Amiens?], s.d. [*c.* 1720]; Poisson 1781a: 385).

[75] 'Nous en avons quelques-uns qui sont venus fort ages dans cette isle. Ils s'y sont sentis comme renaitre, et ils soutiennent encore aujourd'hui tout le poids du travail avec plus de courage et de vigueur que les plus jeunes d'entre nous' (Père Margat [Notre Dame de la Petite Anse, Saint-Domingue] to an unnamed Jesuit addressee, 27 February 1725; in Margat 1781: 124).

section we saw that the very notion of idiosyncratic temperaments around which humouralism revolved entirely clashed with the concept of a universally ideal climate. And yet, such a concept is anything but absent from early-modern colonial texts. Describing the New World as an 'ideal climate' in order to garner consensus and attract prospective settlers was indeed a common rhetorical strategy in the promotional literature of the period. By making ample use of such a strategy, early colonial writings such as Christopher Columbus's journal (composed in 1492-1493, but reworked and published in the 1530s by the Spanish Dominican Bartolomé de Las Casas), Hernán Cortés's letters to Charles V (1520-1526), Peter Martyr's *Decades de orbe novo* (1530),[76] and Fernando de Oviedo's *Historia general de las Indias* (1535) created and enforced an image of America as 'delightful of climate and bursting with prodigious riches' that was to exert an extraordinary impact on the early-modern European imagination.[77]

Columbus, for instance, famously depicted the West Indies as an earthly paradise, blessed with a climate 'so healthy that not a single member of the expedition suffered so much as a headache or had to spend a day in bed'.[78] The newly discovered land appeared to him more beautiful than anything he had ever laid eyes on, yet not so strange or unfamiliar as to scare or disorient him: 'close to the peninsula there are gardens of the most beautiful trees I ever saw, and with leaves as green as those of Castille in the month of April and May, and much water'.[79] 'Flat', 'bright' and lush, the island of Haiti was described as exceptionally mild and devoid of all asperity; and for such a firm believer in

[76] This is the date of the first complete Latin edition, comprising all of the eight *Decades*, and published in Alcalá de Henares. Parts of the text (either in Latin or in Italian) had already appeared before 1530 in various Spanish and Italian editions, and were later translated into all the main European languages. A complete English translation, overseen by Richard Hakluyt, was published in London in 1612.
[77] Gerbi 1985: 14.
[78] From Columbus's journal (entry of 27 November 1492), quoted in Gerbi 1985: 18. On the seminal nature of Columbus's description of the New Indies, see Wey Gomez 2008; Headley 1997; Hill 2013: 13-14.
[79] Columbus 1893: 42 (entry of 14 October 1492).

climate theory as Columbus,[80] such properties of the land immediately translated into the natural character of the natives: 'The people are very docile'; 'They are very well made, with very handsome bodies, and very good countenances'; 'In all the forehead is broad, more so than in any other people I have hitherto seen'; 'They should be good servants and intelligent'.[81]

Clearly such portrayals of the New World should not be taken as 'innocent' or objective.[82] Their aim was less to describe the land as it was, than to present the American environment in a way that would help secure funding for further exploratory missions and—at a later stage—populate the colonies by attracting high numbers of settlers from Europe. This is true of many travel narratives and reports from the newly discovered lands, including those that found a place in larger collections such as Giovanni Battista Ramusio's *Delle navigationi et viaggi* (1550-1559, partially translated into English by Richard Eden in 1555), Richard Hakluyt's *Principal Navigations, Voyages, Traffiques and Discoveries of the English Nation* (1589), and Samuel Purchas's *Hakluytus Posthumus* (1625). Such texts not only enjoyed great editorial success that fed on (and further alimented) widespread European interest in the New World; they also contributed to a promotional agenda that ultimately aimed at justifying the imperial enterprise, encouraging migration to the colonies, and shaping actual colonial policy.[83]

The ideology of colonization with which these works are imbued is inseparable from the works themselves and should be taken into careful account in analysing any aspect of them. Descriptions of the American environment, and of native and settler

[80] See Wey Gomez 2008.
[81] Columbus 1893: 38-40 (entries of 11-13 October 1492).
[82] See Gerbi 1985: 14, 18.
[83] On the readership and impact of Hakluyt's collection, see Payne 2008. On promotional literature and colonial policy, see Cave 1985; Schmidt Horning 1993. More generally on promotional literature and its agendas, see Armitage 2000 (Chapter 3); Sayre 2002; Fuller 2008b; Hill 2013 (Chapter 1).

populations within it, are a particularly good case in point. In the early days of European exploration and expansion in the New World, such descriptions were, on the one hand, the expression of a certain literary sensibility, built through a long-standing tradition and now refashioned into a subgenre in its own right—the 'American georgics' recently studied by Timothy Sweet.[84] On the other hand, they were also powerful instruments of public persuasion, specifically intended at creating an image of America as 'a welcoming and familiar dwelling-place, where acclimatization is no problem and where one can live as in the mother country'.[85]

Conceived in response to contemporary portraits of the American environment as hostile to any form of European presence, these promotional texts provide an ideal vantage point to examine the controversies that characterize early-modern environmental thought and investigate the complex motivations underlying such disagreement. In describing the American climate as safe and delightful, colonial writers were using climate theory to anticipate and quell fears of degeneration that climate theory itself, as we have seen, could legimately inspire. In so doing, however, they also adopted a rhetoric, that of the 'ideal' climate, which directly contradicted the humoural foundations of climate theory itself. In the remainder of this chapter, I shall examine how such contradictions were acknowledged and confronted in a later phase of European expansion in the Americas, and how climate theory and colonial practice came to mutually reshape each other as a consequence.

More particularly, the following analysis will be based on texts relating to four main areas of European colonial expansion in the Americas: Florida, a region at the centre of competing French and Spanish interests in the mid-sixteenth century; Virginia and Maryland, both English colonies founded in the first half of the seventeenth century;

[84] Sweet 2013.
[85] Gerbi 1985: 18.

Louisiana, where the French established several settlements between the late 1690s and the first decades of the following century; and, finally, Paraguay and other South-American regions where Jesuit missionaries of various nationalities worked side by side (and often in competition) with Spanish colonial authorities to 'reduce' the native Indios to peaceful, hard-working, civilized subjects. While each of these contexts has received extended individual attention from colonial historians, the analysis presented here provides a new perspective on them in at least two ways: first, because it considers them specifically from the standpoint of environmental ideas and their impact on colonial practices; second, because it proposes to study them comparatively—an angle that, as Carmen Gomez-Galisteo has recently observed, is still rare in a field that has traditionally privileged national (if not nationalistic) approaches.[86] Here, the comparative examination of national colonial experiences will be central for understanding how imperial policies that had their roots in a shared tradition of environmental thought ultimately evolved in different ways in response to specific local circumstances.

3.3. Free and Forced Relocation in Early Colonial America

3.3.1. A Home Away from Home? The Virginia Debate

In 1656, the English-born Virginian planter John Henry Hammond (?-1663) published a short tract entitled *Leah and Rachel, or the Two Fruitfull Sisters Virginia and Maryland*.[87]

[86] Gomez-Galisteo 2013: ix-xiii.
[87] On this text, see Arner 1973 (where Hammond's peculiar choice of title is also explained). Hammond had moved to Virginia from his native England in 1633 or 1634, settling in Isle of Wight County. In the 1650s he relocated to Newtown, in the county of St Mary's, Maryland. *Leah and Rachel* was published in London during Hammond's short stay of 1655-1656 (see Shackelford 2006).

'One of the ablest promoters of seventeenth-century America' according to one modern critic,[88] Hammond began by acknowledging that Virginia, his abode of many years, had a reputation as 'an unhealthy place, a nest of rogues, whores, desolute and rooking persons; a place of intolerable labour, bad usage and hard diet'.[89] Such 'calumnies', Hammond observed, had 'hindred and kept off many from going thither, who rather cast their eyes on the barren and freezing soyle of New England, than to joyn with such an indigent and sottish people, as were reported to be in Virginia'.[90] But according to Hammond, such accusations were completely unfair. In point of fact, Virginia was 'wholesome, healthy and fruitfull, and a modell on which industry may as much improve itself in, as in any habitable part of the world';[91] most importantly, he pointed out, the colony's climate made it possible to reproduce a traditional English diet of fish, pork, and beer at thousands of miles from home.[92]

Hammond's key point, constantly stressed throughout the tract, was that life in Virginia was exactly the same as in England—only better. Everything there was 'not only plentifull but pleasant and profitable': among other things, Hammond praised the 'brightness of the weather, the many delightfull rivers', the 'extraordinary good neighbourhood and loving conversation' that the inhabitants 'have one with the other', the 'stocks and flockes of cattle, hoggs, and poultry, grazing, whisking and skipping in their sights'; even the modest, one-storied wooden buildings seemed to him 'so delightfull that your ordinary houses in England are not so handsome'. Hammond also noticed how 'pleasant' it was for the settlers to have 'all things of their own, growing or breeding

[88] Lemay 1972: 28.
[89] Hammond 1910: 284.
[90] Hammond 1910: 286.
[91] Hammond 1910: 287.
[92] Hammond 1910: 291 ('The country is fruitfull, apt for all and more then England can or does produce. The usuall diet is such as in England').

without drawing the peny to send for this and that, without which, in England they cannot be supplied'.[93] Writing for an English audience that he hoped to win entirely to the Virginian cause, Hammond clearly spared no efforts in painting a lively image of the New World 'as a place evoking a dream of a better life'[94]—and his descriptions of daily life in the Chesapeake Bay were in every detail instrumental to this attempt.

Blending together two classic strategies vis-à-vis 'Otherness'—exoticism and domestication—*Leah and Rachel* neatly exemplifies a dynamic typical of most promotional writings, which aimed to both intrigue and reassure prospective settlers by representing the colonies at once as idyllic places and as a 'home away from home'.[95] Such a strategy is particularly apparent in Hammond's description of the Virginian climate. While he admitted that it could take some time for a newcomer to adjust to the new surroundings ('change of ayre does much alter the state of our bodies'),[96] Hammond was quick to reassure his readers that 'seldom (if ever) any that hath continued in Virginia any time, will or do desire to live in England'.[97] In particular, there was no reason to fear that the English character would degenerate in the colony. If anything, it could only be expected to improve. Though rich and fertile, Virginia was 'not such a Lubberland as the fiction of the land of ease is reported to be, nor such a Utopia as Sir Thomas Moore hath related to be found out'.[98] If that had been the case—Hammond mused following a long-standing tradition of climatological thinking—European settlers might have grown

[93] Hammond 1910: 297.
[94] Shackleford 2006: 177.
[95] On these two different, though sometimes overlapping, strategies, see Campbell 1991; Welch 2011 (Introduction).
[96] Hammond 1910: 288.
[97] Hammond 1910: 290.
[98] Hammond 1910: 287.

dissolute and idle there on account of the excessively easy life.[99] But since the Virginian soil required incessant work in order to bear fruit, Englishmen tended in fact to become more industrious, 'sober', and 'modest' in the colony than they had ever been in their homeland—with the exception of some exceedingly 'wicked natures' who could 'never be reformed'.[100]

Hammond's tract belongs in a long tradition of promotional literature about Virginia, one that indeed preceded steady English settlement in the region. In his highly popular *Brief and True Report of the New Found Land of Virginia* (1588), written on Sir Walter Raleigh's request in order to promote further explorations in the Roanoke area, the English mathematician Thomas Harriot (*c.* 1560-1621) had praised Virginia for its lovely landscape, 'fertile soyle',[101] and 'excellent temperature of the aire there at all season, much warmer then in England, and never so vehemently hot, as sometimes is under and between the Tropikes, or neere them'.[102] That Virginia was 'temperate and holsome'[103] was not only proven by the presence of a numerous and 'ingenious' native population, showing 'excellencie of wit' and a friendly disposition towards the Europeans;[104] Harriot also pointed out that despite their questionable regimen—feeding on 'very strange' sorts of

[99] The idea that fertile lands breed weak and lazy people can be traced back to ancient Greece (see, e.g., Hdt., 9.122); *AWP*, 12.40-45, 24.43-63; it remained influential throughout the Renaissance and the early modern period (see, e.g., Machiavelli 1984: 62 [1.1.14-16]).
[100] Hammond 1910: 295. Hammond's point was later restated by William Byrd (1674-1744), a native Virginian who wrote in his *History of the Dividing Line* (composed between 1728 and 1736): 'Surely there is no place in the world where the inhabitants live with less labor than in North Carolina. It approaches nearer to the description of Lubberland than any other, by the great felicity of the climate, the easiness of raising provisions, and the slothfulness of the people [...]. To speak the truth, it is a thorough aversion to labor that makes people file off to North Carolina, where plenty and a warm sun confirm them in their disposition to laziness for their whole lives' (Byrd 1928: 76-77). Virginians, on the other hand, were 'healthy and strong, with constitutions untainted by lewdness, and not enfeebled by luxury' (13), for the simple reason that the soil there required incessant work. The same author expresses similar views about Carolina in his *Journey to the Land of Eden* (composed in 1733, now also in Byrd 1928). On Byrd, see Speake 2003: 155-56.
[101] Harriot 1997: 89.
[102] Harriot 1997: 88.
[103] Harriot 1997: 89.
[104] Harriot 1997: 88.

food and sleeping 'in the open aire upon the ground' in the middle of the winter—he and his companions had enjoyed surprisingly good health:

> For all this, there were but foure of our whole company (being one hundred and eight) that died all the yeere, and […] all foure, especially three, were feeble, weake, and sickly persons before ever they came thither, and those that knew them, much marveled that they lived so long being in that case, or had adventured to travaile.[105]

Much like Hammond, Harriot made deliberate efforts to characterize Virginia as a hospitable environment in which English settlers could expect to pursue their native lifestyles as if they had never abandoned the homeland. At the same time, he also stressed certain differences which he thought would make Virginia even more appealing in the eyes of their readers: a warmer climate, an exceptionally fertile soil, plentiful opportunities for personal betterment. Virginia thus emerged from his pages as a truly 'ideal' destination, one in which everything English—from 'graine' and 'cattell' to human beings—would grow 'bigger', 'more beautifull', and 'fuller of courage', as another Virginian planter, Edward Waterhouse, wrote in 1622.[106]

Such idyllic descriptions, however, clashed with an often brutal reality.[107] In its first fifty years of existence, the young Virginia colony was afflicted by staggeringly high death rates: partly due to heavy work, scant food, and inadequate dwellings, many early settlers did not live past their first months on the eastern shores of the Atlantic. In their letters home, the few survivors depicted a rather different scenario than was advertised in contemporary promotional literature. Writing to his mother from a plantation ten miles south of Jamestown, the first and largest English settlement in Virginia at the time, a certain Richard Frethorn reported in 1623:

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[105] Harriot 1997: 88-89.
[106] Waterhouse 1997: 132.
[107] Earle 1979; Kupperman 1979; Kupperman 2009.

> I your child am in a most heavy case by reason of the nature of the country, [which] is such that it causeth much sickness, as the scurvy and the bloody flux and divers other diseases, which maketh the body very poor and weak. And when we are sick, there is nothing to comfort us; for since I came out of the ship I never ate anything but peas and loblollie (that is, water gruel). As for deer or venison, I never saw any since I came into this land […] I am not half a quarter so strong as I was in England.[108]

Like Frethorn, many early settlers and travellers complained about the terrible living conditions and deadly climate of Virginia. After visiting Jamestown in 1622, the English privateer and former governor of Bermuda Nathaniel Butler (1577-*c*. 1639) reported on the state of the colony to the Privy Council in London. Among other things, he noted that the Virginian plantations were 'generally seated upon meere salt marishes full of infectious boggs and muddy creekes and lakes, and therby subjected to all those inconveniences and diseases which are soe commonly found in the moste unsounde and most unhealthy parts of England'.[109] In a sense, Virginia truly did resemble England—but at its worst.

Butler's tract elicited prompt reactions from the colony. In 1623, a group of Virginian planters published an *Answer to Captain Butler* that replied point by point to the governor's accusations. Virginia, they insisted, was 'all verie healthfull' and 'pleasant', nor was there any 'place inhabited but is conveniently habitable'. All the plantations were 'free from salt marishes being all on the fresh river'; moreover, they all stood on 'high land', where the air was supposed to be thinner and better.[110] The only exception to the rule was 'James Citty', Virginia's capital as well as the first permanent English settlement in the area, which had been founded sixteen years earlier on a swampy peninsula stretching into the James River.[111]

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[108] Frethorn 1997: 123-24.
[109] Butler's report was published in 1622 under the title *The Unmasked Face of our Collny in Virginia, As It Was in the Winter of the Yeare 1622.* The quotation is taken from *The Virginia Planters' answer to Captain Butler*, published the following year: see *Virginia Planters* 1910: 412.
[110] *Virginia Planters* 1910: 412.
[111] *Virginia Planters* 1910: 413.

As will become apparent in the next section, the dispute between Nathaniel Butler and the Virginian planters was only an episode in a much longer history of polemics about the healthiness of Virginia and of its capital city, Jamestown. The Virginia debate, like other similar controversies from this period, provides an exceptional observatory to explore the contested status and ideological implications of early-modern environmental discourse; in particular, it sheds light on the pivotal role that notions of 'familiar' and 'ideal' climates played in such discussions throughout the early colonial period. While the concept of an 'ideal' climate, as we have seen, was hardly compatible with geo-humoural orthodoxy (see section 3.2.2 above), it nevertheless remained central to the rhetoric of European expansion overseas. Indeed, while the very same site could appear optimal to some and pernicious to others, the reasons invoked to promote or condemn a given location invariably stemmed from some assumption of what an 'ideal' environment should look like. In the next section, we shall see the complex ways in which such well-defined, though continuously shifting, conceptions of environmental *optima* interacted with ideological motives and local circumstances in orienting early modern practices of colonial (re)settlement.

3.3.2. Resettling the Settlers: Success and Failure in the Colonies

When Leonard Calvert (1606-1647), the future founder of Maryland, set sail to America in November 1633, he carried with him a set of *Instructions* by his older brother Cecil (1605-1675), second Lord Baltimore. Touching in particular on the location where the prospective colony should be sited, Baltimore insisted 'that where they intend to settle the plantacon, they first make choise of a fitt place, and a competent quantity of ground for a fort', 'a church or a chappel', and 'a convenient house […] for the seate of his Lordship or

his Governor or other Commissioners'. He also recommended that the colonists 'make choise of a fitt place neere unto it to seate a towne'.[112]

Although Baltimore's instructions were rather vague and uninformative, Leonard's choice did not leave him disappointed. St Mary's, the first permanent settlement in Maryland, was established on level, elevated ground upon the Potomac estuary—'a very commodious situation', as Baltimore himself commented approvingly. 'The land is good', we read in his *Relation* of 1635, 'the ayre wholsome and pleasant, the river affords a safe harbour for ships of any burthen, and a very bould shoare; fresh water, and wood there is great plenty, and the place so naturally fortified, as with little difficulty, it will be defended from any enemie'.[113] Although Baltimore's *Relation* was based entirely on second-hand information (Maryland's Lord Proprietor, indeed, never visited the colony in person), later residents of St Mary's unanimously confirmed these claims. As the seaside settlement grew in the following decades from a tiny outpost into Maryland's capital (until 1695) and one of its most flourishing towns, its inhabitants continued to cite its situation, at once 'most pleasant and healthful' and 'naturally commodious in all respects', as a quality that set it apart from other English settlements in North America.[114]

The care that Cecil and Leonard Calvert put into selecting a suitable site for their prospective colony was anything but exceptional in this early phase of European expansion in the Americas. Indeed, Baltimore's *Instructions to the Colonists* find direct parallels in a number of analogous documents from earlier and later periods, including King Philip II's *Ordenanzas de descubrimiento, nueva población y pacificación* (1573)—a collection of royal guidelines for the Spanish colonization of South and Central America, compiled

[112] Calvert 1910a: 21-22.
[113] Calvert 1910b: 73.
[114] Riley 1887: 59, quoting a petition drafted in 1695 by the people of St Mary's to dissuade Maryland's governor Francis Nicholson from moving the seat of the government to Anne Arundel Town (future Annapolis). See Reps 1972: 118.

under the direction of Juan de Ovando (1515-1575)[115]—and James Oglethorpe's *Rationale for Founding the Georgia Colony* of 1733. Besides testifying to the importance that colonial undertakers (whether private or public) attributed to choosing 'a fitt place' for settlement, such documents also shed light on the specific factors that expedition leaders were expected to take into account in making their decision. Among the most important aspects were a salubrious and agreeable climate ('ayre wholsome and pleasant'); the availability of abundant natural resources (including 'fresh water', food, and timber); military security ('the place so naturally fortified'); and potential for trade ('a safe harbour for ships', 'a very bould shoare').[116]

St Mary's, if one is to trust its seventeenth-century residents, was a fortunate example of a single location that satisfied all of these requirements at once. Most prospective sites, however, scored well in some respects but appeared defective in others. For instance, a place could be healthful and conveniently located for trade, but difficult to defend from military aggressions. Such was the case with Roanoke Colony, the English settlement founded in 1587 in a 'most plentifull, sweete, fruitfull and wholesome' spot of present-day North Carolina,[117] and yet abandoned within three years, likely because of continued clashes with the local native tribes.[118] Hard choices often had to be made in selecting a site for settlement, and in the absence of a clear scale of priorities between the four aforementioned aspects, such choices had to be negotiated on a case-by-case basis.

A notorious episode from the history of French colonial expansion in Florida illustrates this point particularly well. The first French expedition reached the coasts of

[115] On Ovando, see Poole 2004. For more on the *Ordenanzas*, see below, section 3.3.3.
[116] Calvert 1910b: 73. Specifically on the criteria guiding the selection of prospective sites in colonial Latin America, see Socolow 1986: 4.
[117] Barlowe 1898: 7. Arthur Barlowe (*c.* 1550-1620) was a member of the first exploratory mission sent by Sir Walter Raleigh to the northeastern coast of America, which reached the Roanoke area in the spring of 1584. Upon his return to England in September 1584, Barlowe submitted a report of his travels to Raleigh, which was first published in Hakluyt's *Principall navigations* in 1589.
[118] See Mallios 2006; Kupperman 2007.

Florida in 1562, under the leadership of the Huguenot explorer Jean Ribault. Two years later, a second mission led by René Goulaine de Laudonnière (*c*. 1529-1574), formerly Ribault's second-in-command, returned to the area with the purpose of establishing a permanent settlement.[119] Having conducted some preliminary exploration in the region, the settlers stopped and gathered 'to consult together of the place whereof we should make choice to plant our habitation', as Laudonnière himself recalled many years later in his *Histoire notable de la Floride* (first published in 1586 and immediately translated into English by Richard Hakluyt).[120]

Various ideas were put forward, including Laudonnière's own view that neither the 'marsh country' around Cape Florida, further south, nor the Port Royal Sound, further north in modern South Carolina, would be suitable for their purposes. If Cape Florida was notoriously unwholesome and 'unprofitable for our inhabitation', Port Royal certainly looked inviting, not only for its 'wonderful fertility', 'good climate', and 'good air', but also because its natural harbour was considered 'one of the fairest of the West Indies'.[121] Yet neither a lovely climate nor a beautiful harbour were among the expedition's most urgent priorities. They should, first of all, think of ways to ensure that the future settlement would be quickly self-sufficient. It was therefore more advisable 'to plant in places plentiful of victuals than in goodly havens, fair and deep, and pleasant to the view'.[122]

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[119] On these expeditions, see McGrath 2000.

[120] Laudonnière 1869: 234-35 ('je ne tardai pas à faire assembler les hommes de ma compagnie avec les maîtres et pilotes de mes navires, pour déliberer avec eux sur l'endroit où nous devions nous établir'; Laudonnière 1990: 53). On Laudonnière's *Histoire*, see Lestringant 1982b: 7-11; Lestringant 1990: 163-82.

[121] Laudonnière 1869: 235 ('l'un des plus beaux de toute l'Inde Occidentale'; Laudonnière 1990: 53). Jean Ribault's narrative of the first French visit in the area of Port Royal Sound confirms this view (Ribault 1875: 180, 181, 186). Upon that first visit, the French founded a fort (probably on Parris Island, as has been recently established based on archaeological evidence: see South 2005, Chapter 15) which they named Charlesfort. But the settlement was short-lived: starvation, mutiny, hostile native tribes and, ultimately, Spanish competition led to its demise in 1563 (see McGrath 2000).

[122] Laudonnière 1869: 235 ('Il n'était par tant question de la beauté que des choses nécessaires à soutenir la vie, et pendant les premières années il nous était beaucoup plus nécessaire d'habiter des lieux abondants en vivres que des ports beaux, profonds, et plaisants à voir'; Laudonnière 1990: 53).

Laudonnière's viewpoint found ample consensus among his comrades. After some discussion, the company decided to settle somewhere along the course of the River May (now the St Johns River in Florida), in lands that they had previously found 'only among all the rest to abound in maize and corn'.[123] They soon set eyes on a spot slightly removed from the river: 'a large plain, covered with high pine trees, distant a little from the other, under which we perceived an infinite number of stags'.[124] In the middle of the plain stood 'a little hill adjoining unto a great vale, very green, and, in form, flat'. The place combined all the advantages of abundant natural resources with the joys of a delightful landscape: 'the fairest meadows of the world, and grass to feed cattle'; 'a great number of brooks of fresh water, and high woods, which make the vale more delectable to the eye'. It was exactly in this spot, where the city of Jacksonville now stands, that the foundations of Fort Caroline were laid on 29 June 1564.[125]

Years later, as he evoked his first visit to the vale, Laudonnière recalled the particular fascination that the place had immediately exerted on him. Climbing up the hill that overlooked the vale, the explorer was spellbound by the beauty of the surrounding environment: a forest of 'cedar, palm, and bay trees, of so sovereign odor, that balm smelleth nothing in comparison', interlocked with a more familiar landscape of 'vines, bearing grapes in such quantity, that the number would suffice to make the place

[123] Laudonnière 1869: 235 ('Nous l'avions trouvée seule entre toutes pourvue abondamment de mil et de farines'; Laudonnière 1990: 53).
[124] Laudonnière 1869: 236 ('une campagne spacieuse, couverte de hauts sapins éloignés quelque peu les uns des autres, sous lesquels nous aperçûmes une infinité de cerfs qui bondissaient dans la plaine que nous traversions'; Laudonnière 1990: 54).
[125] See Laudonnière 1869: 237-38 ('une petite montagne aboutissant à un grand val verdoyant, de forme plate, où se trouvaient les plus belles prairies du monde entier et des herbages fort propres au pâturage des bestiaux. Elle est environnée au reste d'une infinité de petits ruisseaux d'eau douce et de hautes forêts, ce qui rend le val plus délectable à l'œil'; Laudonnière 1990: 54).

habitable'.[126] From the hilltop, one could see all the way over to the sea, 'and more than six great leagues off, near the *River Belle*, a man may behold the meadows divided asunder into isles and islets, interlacing one another'. So pleasant and uplifting was the view that, in Laudonnière's own words, 'those which are melancholic would be enforced to change their humor'—an idea that found abundant confirmation in the medical literature of the time.[127]

Beautiful, sheltered, and rich in natural resources, the site on which Laudonnière and his brigade had chosen to found their colony appeared most suitable for long-term habitation. Experience was to prove them wrong. Within a few months, the situation at Fort Caroline deteriorated to the point that the settlement had to be abandoned in haste at the end of the summer of 1565. First, a disastrous fire produced 'such an excessive heat' and 'putrefaction in the air' that a great number of colonists 'fell sick' of 'many dangerous diseases'.[128] Then, 'a hideous famine' struck the settlement when the colonists ran out of food before their wheat was ripe for harvest. 'The very river had not such plenty of fish as it was wont', Laudonnière would later recall, 'and it seemed that the land and water did fight against us'.[129] To make things worse, around the same period the settlers came under

[126] Laudonnière 1869: 230 ('que des cèdres, des palmiers et des lauriers d'une si suave odeur qu'aucun baume ne serait rien à côté. Les arbres étaient de toutes parts entourés de ceps de vigne portant des grappes en telle quantité que leur nombre suffit à rendre le lieu habitable'; Laudonnière 1990: 51)

[127] Laudonnière 1869: 231 ('Quant au charme de cet endroit, la mer s'y voit tout à découvert et sur plus de six grandes lieues environ, la rivière Belle, entrecoupée de prairies et d'îles qui s'entrelacent les unes les autres. Bref, le lieu est si plaisant que les mélancoliques seraient contraints d'y changer leur naturel'; Laudonnière 1990: 51). Compare, e.g., La Framboisière 1600: 34-37. Although little is known of Laudonnière's family background and early years, his status as a well-off French nobleman and member of the Protestant élite suggests that he likely received a meticulous education, encompassing key texts of the classical climatological tradition. As a merchant and explorer, furthermore, he would have been familiar with modern geographical and cosmographical texts that also tapped into the same tradition.

[128] Laudonnière 1869: 259 ('les deux jours suivant survint dans l'air une chaleur si intense qu'[…] il en résulta un empoisonnement de l'air qui nous valut force maladies contagieuses, à tel point que la plupart des mes hommes tombèrent malades et furent près de mourir'; Laudonnière 1990: 66).

[129] Laudonnière 1869: 304 ('Les effets de cette hideuse famine se firent incontinent sentir parmi nous […]. La rivière meme n'était plus aussi abondante que de coutume en poisons, et il semblait que la terre et l'eau combattaient contre nous'; Laudonnière 1990: 91).

attack from both their Spanish neighbours and the Utina Indians, who had hitherto been their loyal friends.[130]

Environmental disaster, scarcity, and war quickly transformed what once was an earthly paradise into a living nightmare. Still, when the French ultimately resolved to abandon the settlement and 'began to beat down all the houses' to make coal out of the timber, they did so with mixed feelings, haunted by a sense of missed opportunity: 'there was none of us to whom it was not an extreme grief to leave a country wherein we had endured so great travails and necessities […] a place abounding in riches […] a plentiful treasure of all our hearts desire'.[131] Laudonnière's words perfectly capture the gap between expectations and reality that characterized the French experience at Fort Caroline. Confronted with an unforeseen failure, the explorer was no less surprised than disappointed. How could such a carefully selected location turn out to be unsuitable? Why did Fort Caroline fail despite its encouraging beginnings?

Laudonnière was not alone in asking such questions. Indeed, Fort Caroline was only one of dozens of failed settlements in the early stages of European colonial expansion in the Americas. Most historians tend to ascribe such failures to inadequate sponsorship, corrupt or divided leadership, and sheer incompetence.[132] Yet while these factors alone could certainly doom the most promising settlement to disaster, it seems that other aspects should be taken into account as well in order to determine what could 'make or break' a colony's chances of success. In particular, insufficient attention has been given to the fact that explorers and settlers landed in the New World with a typically European perception of the physical world, one that left them ill-equipped to meet the challenges posed by

[130] See French 1875: xii-xiii.
[131] Laudonnière 1869: 316-17 ('Cependant il n'y en avait aucun de nous qui ne regrettât d'abandonner un pays où nous avions enduré tant de souffrances et de misères […] un lieu abondant en richesses […] comme au comble de tous nos souhaits'; Laudonnière 1990: 98).
[132] See, for instance, Kupperman 1993; Kupperman 2007; Pickett and Pickett 2011: 223.

markedly different natural environments. The strategies that early modern colonists deployed in choosing and developing settlement sites are particularly revealing in this respect. According to the historian of urban planning John Williams Reps, the inability of so many 'planned communities' of the early colonial period to thrive was usually due to the fact that 'in devising these early plans the colonists relied heavily on tradition, although the physical environment of the New World and the roles that towns were expected to play differed substantially from those of the mother country'.[133]

The colonists' insistence on a town-based type of settlement was related partly to their dream of reproducing a European lifestyle in the colonies, and partly to the unparalleled prospects for urban development that the American landscape seemed to offer. The New World appeared to European eyes as a breathtakingly vast and underpopulated space—a *tabula rasa* that could be filled at pleasure with 'ideal cities' conceived from scratch. Experiments in this sense were already being carried out in Europe, with new or renewed urban centres such as Pienza (1460s), Sabbioneta (second half of the sixteenth century), and Palmanova (1593) in Italy, Vitry-le-François (1545) and Richelieu (1630s-1640s) in France, Coevorden in the Netherlands (1597), and La Valletta on the island of Malta (1560s-1570s).[134] However, the freedom to experiment that the New World was able to offer remained unmatched in Europe. Thus, instead of encouraging the Europeans to think differently, the 'empty' spaces of America reinforced them in their conviction that a town-based lifestyle was the only one worth pursuing, and lured them into a season of enthusiastic urban planning.[135]

In some cases, such feverish activity was crowned with success: within less than two centuries, Portuguese establishments such as Salvador de Bahia (founded by the

[133] Reps 1972: ix.
[134] See Kruft 1989.
[135] See Reps 1972; Jefferson and Lokken 2011: 156-57.

Jesuits in 1549) and Spanish colonial towns such as Mexico City (erected in the 1520s on the ruins of the Aztec capital Tenochtitlan), Lima, and Havana (both built from the ground up in the early sixteenth century) grew into substantial cities that embodied the triumph of a new, 'rational' style of urban planning.[136] Elsewhere matters turned out to be much more complicated. On the jagged shores of the Chesapeake Bay as well as in the wetlands of Florida and Louisiana, settlers struggled 'to establish towns in the face of economic, topographic and cultural forces that offered the strongest resistance to such endeavours'.[137] Because colonial officials 'obstinately persevered in their attempts' to impose European schemes onto an unsuitable landscape, instead of adapting their plans to pre-existing environmental conditions, 'successes were limited, and with few exceptions the towns that survived remained small and unimportant'.[138]

The way in which colonists tended to make sense of such failures is itself noteworthy. The most frequent explanation involved some form of external sabotaging by hostile forces—be it unfriendly natives, antagonistic European powers, or an adverse climate. While military force was thought to be the appropriate response in the first two cases, the typical way of coping with a 'bad' climate consisted in moving the entire settlement to a (supposedly) healthier site.[139] The early history of colonial America abounds in examples of such relocated settlements. One of the earliest instances is Caparra, the first capital of Puerto Rico, founded by the Spanish in 1509 and abandoned for environmental reasons in 1521, in favour of a new establishment along the coast (Puerto Rico, now San Juan).[140] Several other cases followed in the next two centuries of

[136] See Messmacher 1987; Solano 1987; Aguilera Rojas 1994; Eakin 2007; Jefferson and Lokken 2011.
[137] Reps 1972: 65.
[138] Reps 1972: 65.
[139] Reps 1972: 11, shows that the same tension between military and geospatial strategies is attested in English colonial attempts in Ireland.
[140] See Aguilera Rojas 1994: 153-54.

European expansion in the Americas, some of which have been the object of recent and ongoing studies, while many others still await to be uncovered.[141]

In what follows, I shall first reconstruct (sections a and b) and then compare (section c) the debates that surrounded the relocation of two important North-American settlements in the late seventeenth and early eighteenth centuries: Jamestown, the capital of English Virginia since its establishment in 1607; and Biloxi (est. 1699), the first in a long series of temporary French outposts in present-day Louisiana before the foundation of New Orleans in 1718. What I present here is the first comparative study, based on both published and unpublished sources, of two paradigmatic cases of English and French adaptive strategies in the New World. My analysis will especially dwell on aspects that have rarely attracted specific scholarly attention. In particular, I will show that in each of these cases the relocation controversy tapped into a long-standing tradition of medical, topographical, and environmental knowledge, bringing to the forefront issues such as the salubriousness of the original site and that of the intended destination, the respective properties of local 'airs, waters, and places', and the expected effects of relocation on the health and character of local residents. In doing so, the settlers were exploiting old tools to develop new and more effective ways of coping with what could be regarded with some reason as a perennial problem—the interaction between natural conditions and social development. Hence, these early colonial debates not only provide further proof of the vital role that geographical and climatic considerations played in locating (and relocating) a colony; they also reveal the extent to which European settlers were forced to reinvent

[141] For more seventeenth- and eighteenth-century examples, see Katherine Johnston's work on South Carolina and Jamaica (partly published in Johnston 2013) and Joseph Clark's on-going investigation of relocated settlements in colonial Mexico ('Port Cities, African Diaspora, and the Regional History of Mexico and the Caribbean, 1571-1700').

tradition in order to make sense of, and be successful in, a markedly different physical environment.

a) English Virginia: From Jamestown to Williamsburg

'We are to plant upon the mouthes of the great navigable rivers', Richard Hakluyt stated in his influential *Discourse of Western Planting* of 1584, 'and there to plant our colonies'.[142] Forty years later, the tide had changed. In his equally influential essay *On Plantations* (1625), the philosopher, scientist, and former Lord Chancellor Francis Bacon (1561-1626) considered how 'it hath been a great endangering to the health of some plantations that they have built along the sea and rivers, in marish and unwholesome grounds'. Hence, Bacon's advice was that colonial settlements should be 'built still rather upwards from the streams than along'.[143]

In the four decades separating Hakluyt's *Discourse* from Bacon's essay, something crucial had happened: in 1607, the English had established their first permanent settlement on the Atlantic shores of North America. Jamestown, as its founders called it after King James I, was built on the westernmost tip of a swampy peninsula in the estuary of the James River, some fifty miles south-east of modern Richmond, Virginia. Explaining his choice of this particular location, Captain John Smith (1580-1631), leader of the Jamestown's founding expedition, would later describe James Island as 'a verie fit place for the erecting of a great citti', and one which fulfilled the conditions set by the Council for Virginia of the London Company.[144] The first of these conditions was precisely that the colony should be sited on a navigable river providing access to the inner country, just as

[142] Hakluyt 1993: 71 (15).
[143] Bacon 1985: 164.
[144] Quoted in Kupperman 2009: 283.

Hakluyt had theorized in his *Discourse* of 1584. The Company, however, had also urged the settlers to choose 'the strongest, most wholesome and fertile place', and, more importantly, to avoid 'low or moist' areas that would certainly 'prove unhealthful'.[145] Whether the James Island location would satisfy all of these requirements was far from clear. According to Smith's own testimony, the founding members were split between the conflicting opinions of Edward Maria Wingfield (1550-1631) and Bartholomew Gosnold (1571-1607), both of whom had been prime movers of the Virginia enterprise. Wingfield, who would later become Jamestown's first governor, supported Smith's choice of James Island, whilst Gosnold—an experienced sea captain with years of service in the Cape Cod area, and a close friend of Richard Hakluyt and Sir Walter Raleigh—opposed it on account of the perceived insalubrity of the place.[146]

Figure 8: (After John Smith), *Nova Virginiæ Tabula* (Amsterdam: Henricus Hondius, 1630).

[145] Quoted in Reps 1972: 31.
[146] Smith 1946a: 33. Gosnold had already been once in Virginia: see his letter of 7 September 1602 (where he also discusses the Virginian climate), published in Gosnold 1964.

Though defeated at the time, Gosnold (who died within a few months of Jamestown's founding) would eventually be proven right. Soon enough, Smith's choice of James Island fell under increasing criticism from both local settlers and metropolitan authorities. Jamestown's first residents, in particular, decried the 'barrennesse and defect of the country' as well as the extremity of its climate—frigid in the winter and stiflingly hot in the summer.[147] Their complaints cast serious doubts on the habitability not merely of James Island, but of Virginia in general, so much so that in 1612 Smith felt compelled to reassure his English readers that 'the temperature of this countrie doth agree well with English constitutions being once seasoned to the country'; in fact, it seemed to him that 'heaven and earth never agreed better to frame a place for mans habitation being of our constitutions'.[148] All in all, the local climate was not so different from that of Europe: 'The sommer is hot as in Spaine; the winter colde as in Fraunce or England'.[149] If anything, as Smith stressed in a letter of 1624 to the Royal Commissioners, Virginia was better than England, since it was 'free from any inundations, or large fenny unwholsome marshes'. In the same letter, Smith also restated that 'Nature in few places affords any so convenient' location as James Island 'for the building of cities, townes, and wharfage'.[150]

Yet colonists and travellers visiting Jamestown in the years following its establishment hardly shared Smith's enthusiasm. Regarding James Island as 'a very noysome and unholsome place', Sir Thomas West, twelfth Baron De la Warr (best known as Lord Delaware) and first governor of Virginia, made swift dispositions to 'cleanse the town' so as to prevent 'the whole fort' from being 'choaked, and poisoned with ill aires,

[147] Smith 2006b: 201.
[148] Smith 1946b: 80-81.
[149] Smith 1946b: 80.
[150] Smith 1946c: 395. On Smith's defence of Jamestown, see Kupperman 1988: 14-17.

and so corrupt'.[151] Yet many thought that Jamestown's 'unwholesome and sickly air' could not be rectified simply by implementing stricter sanitation measures. William Strachey (1572-1621), who lived in the colony for a year, observed in his *True Reportory* of 1610 that the settlers at Jamestown were 'strangely afflicted with fluxes and agues', whereas of the several hundred persons who had established themselves further south, 'there did not so much as one man miscarry, and but very few or none fall sicke'. For Strachey, then, Jamestown's chief problem was its location 'in a marish ground, low, flat to the river', and without any 'fresh water springs serving the towne'.[152]

In light of these facts, the Virginia Company began to consider the possibility of relocating Jamestown. In instructions given to Delaware's successor, Thomas Gates, the Board recommended that Jamestown should 'continue' as a prosperous tobacco plantation and a commodious port for trading, 'but not as yor situacion or citty, because the place is unwholsome and but in the marish of Virginia'.[153] In May 1611, Gates's deputy governor Thomas Dale was sent on a mission to 'search further up' the James River 'for a convenient new seat to rayse a principall towne'.[154] Dale identified a narrow peninsula formed by the James River some fifteen miles below present-day Richmond, and there he built a fort (Kecoughtan or Kiccotan) and two towns (Henrico and Bermuda City, later rebaptized Charles City), none of which ever managed to develop into major urban centres.

[151] Quoted in Reps 1972: 39.
[152] Strachey 2014: 58. Lord Delaware himself eventually changed his mind regarding the causes of Jamestown's unhealthiness. In his *Relation* of 1611 (published in the fourth volume of Purchas's *Pilgrimes*), he wrote that 'presently after my arrival in James Towne, I was welcommed by a hote and violent ague', followed by 'other greevous sicknesses, which successively and severally assailed me': the 'flux', the 'crampe', the 'gout', and finally the 'scurvy', which hit him so hard that he 'was upon the point to leave the world'. Delaware ultimately resolved to head back to England, preferring 'a hopefull recovery' in 'the natural ayre of my countrey' to the 'assured ruine, which must necessarily have ensued, had I lived, but twenty dayes longer, in Virginia' (West 1946: 210-11).
[153] Quoted in Reps 1972: 47.
[154] Quoted in Reps 1972: 39-40.

Meanwhile, Jamestown kept expanding in order to accommodate hundreds of new arrivals attracted by the developing tobacco cultivation. Among the newcomers were 'groups of unmarried women', sent from Europe in the firm belief 'that the plantacon can never flourish till families be planted, and the respect of wives and children fix the people on the soyle'.[155] Jamestown's growth progressed steadily throughout the seventeenth century, despite constant reminders from London that the city should be moved to a healthier location as quickly as possible.

In 1642 the newly appointed governor of Virginia, William Berkeley (1605-1677), was instructed 'to choose such other seate for your chiefe town and residence of the governor as by them shall be judged most convenient, retaining the ancient name of James Town', since the original site was so evidently 'unhealthy and inconvenient'.[156] Yet Berkeley—who, among other things, was an agricultural improver with invested interests in the Jamestown plantations—did not do much in this sense.[157] Twenty years later, when King Charles II personally wrote to solicit the development of sites other than Jamestown, the General Assembly passed an *Act for Building a Towne*; this included detailed plans for increased settlement along the rivers York, Rappahannock, and Potomac, as well as on the Chesapeake coastline; but, once again, no concrete steps were taken towards abandoning Jamestown or relocating the capital elsewhere.[158]

It took two disastrous fires, in 1676 and 1698, to impart a sudden acceleration to the relocation debate. With Jamestown's statehouse burnt to the ground, the first meeting of the General Assembly of Virginia for 1677 was held in Captain Otho Thorpe's private

[155] Virginia Company to the Governor and Council of Virginia, 12 August 1621 (quoted in Reps 1972: 46).
[156] Quoted in Reps 1972: 52.
[157] See Billings 2004 on Berkeley's efforts to diversify production in Virginia—not only because of his personal hostility to tobacco, but also because the intensive tobacco cultivation had dragged the colony into overproduction and economic depression, all of which were aggravated by restrictions on colonial trade imposed by the Navigation Act of 1651. On agricultural 'improvement', see Slack 2014.
[158] See Reps 1972: 52-53.

mansion in nearby Middle Plantation, an enclosed agricultural area in the narrow neck of land between the rivers James and York. Situated on high ground, the open fields of Middle Plantation formed a stark contrast to the insalubrious capital within a mere few miles of distance. In the years following the fire of 1676, the area between the James and York Rivers became the object of substantial development, largely thanks to an experienced army officer and colonial administrator from Yorkshire, Francis Nicholson (1655-1728). Having moved down from New England in the Spring of 1690, Nicholson's first major act as lieutenant governor of Virginia was to lobby for the establishment of a college at Middle Plantation. Chartered in 1693, the College of William and Mary (the second oldest university in the nation) was rapidly erected in the mid-1690s based on a project by Christopher Wren (1632-1723)—the man who redesigned London after the Great Fire, and a Fellow of the Royal Society like Nicholson himself.[159]

After a short stint as Maryland's governor—during which he oversaw the relocation of the capital from Catholic St Mary's to Puritan Arundelton, a 'healthy and pleasant' rural area in the northern Chesapeake Bay subsequently transformed into the elegant town of Annapolis[160]—Nicholson returned to Jamestown at the end of 1698, just weeks after a second fire had destroyed its recently rebuilt statehouse. As Virginia's new governor-in-chief, Nicholson was able to achieve what had eluded all of his predecessors: he relocated Jamestown from unhealthy James Island to a more salubrious site. As the mastermind behind the foundation of William and Mary, Nicholson was naturally drawn to the idea of moving the capital to Middle Plantation. Fully supportive of Nicholson's plan,

[159] McNeese 2007: 48.
[160] See Shackel et al. 1998: xvii. Reps (1972: 138) observes that Nicholson's town plan for Annapolis closely follows the style 'used by Wren in rebuilding London' after the Great Fire of 1665, as well as the designs submitted for the same purpose by another Fellow of the Royal Society, John Evelyn (1620-1706). Both Wren and Evelyn were personal friends of Nicholson's (see Reps 1972: 125-8). On Evelyn, see also section 4.4 below.

the local college community gathered before the House of Burgesses on 1 May 1699 to illustrate why Middle Plantation would indeed make a perfect location for Virginia's new capital city. Speaking for the whole community, one student particularly explained:

> Here is a good, wholsome, and pleasant situation […] perhaps not any to be found that is at once so near the heart of the country, so high, so dry, so free from the plague of moskitoes and the noisom stinks and thick fogs of fenny, marshy, and swampy grounds, and so well supplied with a wonderfull plenty of incomparable sweet fresh water springs, and natural valleys to drain away all the filth and nastiness of a city, all which do extremely contribute to the healthyness of the place, which ought to be a principal consideration in the situation of a great town.[161]

In addition to its remarkable environmental qualities, Middle Plantation also satisfied the other criteria whereby prospective sites for settlement were usually assessed: 'conveniency of easy access',[162] abundance of 'materials for building' and other natural resources,[163] and 'natural security' from enemy attacks.[164] Assuredly, Middle Plantation was unlikely to develop into a major port city, situated as it was midway between two shallow creeks rather than along a 'great navigable river'. But it was easy to see how this sheltered inland location could ultimately prove an asset rather than a weakness. Both ancient tradition and modern experience proved that port cities were generally less healthy, less secure, and more prone to all sorts of corrupting influences than those situated away from the sea.[165]

There is little doubt that the primary motivation of the William and Mary community in lobbying for the relocation of the capital to Middle Plantation came from the recognition that urban development in the area would greatly benefit their College. Nevertheless, in arguing that a location 'by a great river' was not suitable for 'a chief city or town', they were also making an important point about the ideal geographical conditions

[161] *Speeches* 1930: 330.
[162] *Speeches* 1930: 330.
[163] *Speeches* 1930: 332.
[164] *Speeches* 1930: 331.
[165] See, for instance, Pl., *Leg.*, 4.705a-b; Cic., *Rep*., 2.5-11.

for urban growth. In this respect, their views tacitly but radically subverted a consolidated ideology of colonization, well embodied in Hakluyt's aforementioned statement that colonies should be placed 'upon the mouthes of the great navigable rivers'—and further reflected in the original choice of James Island as the site of Virginia's main settlement.

Figure 9 (above). Robert Ball, *A Part of Virginia Showing Jamestown, Williamsburg and Yorktown, with Historical Events from 1585 to 1781* (Williamsburg, VA: Williamsburg Restoration Inc.,1939).

One generation later, the open fields of Middle Plantation had been replaced by the brand new capital of Williamsburg. Visitors passing through the city found it 'delightful' and 'thriving', 'much more commodious and healthful than if built upon a river', and resembling in all respects the towns of the homeland.[166] Hugh Jones (1691-1760), an Oxford-educated professor of mathematics who taught at William and Mary for four years in the late 1710s, observed that people in Williamsburg tended to 'live in the same neat

[166] Quoted in Reps 1972: 183.

manner' and 'behave themselves exactly as the gentry in London'.[167] More than a hundred years after the foundation of Jamestown, Williamsburg had succeeded where the former capital had failed, namely in the ability to reproduce a typically European milieu and lifestyle—the ultimate touchstone of colonial success.

b) French Louisiana: From Biloxi to New Orleans

'The history of the French colonization of the Mississippi Gulf Coast', it has been said, 'is one of forced immigration, personal ambition, altered landscapes, economic collapse'.[168] It is also, more particularly, the history of four decades of restless relocation, culminating in the erection of a city, New Orleans, that rapidly 'gained a reputation as a wild town and a colonial failure'—a reputation that indeed partially endures to this day.[169]

When, in the late seventeenth century, the French began considering expansion in the Lower Mississippi Valley and along the northern coast of the Gulf of Mexico, their possessions in North America far exceeded those of any other European power in terms of sheer geographical extension. At the time, the English controlled most of the Atlantic coast, with the exception of modern Québec (French) and Florida (Spanish). Present-day Texas, New Mexico, and Arizona were solidly in Spanish hands. The French area of influence, on the other hand, spread all the way from the northernmost stretches of Canada and the Hudson Bay (sold to the British in 1713) to the Ohio River to the south, and particularly included the Great Lakes as well as an ill-defined region then known as

[167] Quoted in Reps 1972: 184.
[168] Funkhouser 2014: 1.
[169] Dawdy 2008: 2. The so-called 'Should we rebuild New Orleans' debate sparked by a newspaper article (Jacob 2005) in the wake of the devastations of Hurricane Katrina (29 August 2005) echoes some of the issues discussed in this section, about the suitability of coastal Louisiana for human settlement.

'Louisiana' (in honour of King Louis XIV), which approximately coincided with the Mississippi River basin.

How far exactly the Mississippi River (then known as Colbert) extended down south remained a matter of debate until 1682, when the French explorer René-Robert Cavelier de La Salle (1643-1687), followed its course from present-day Illinois all the way down to the Gulf of Mexico, thus becoming the first European ever to lay eyes on the Mississippi Delta.

Figure 10 (above). (Claude Bernou?), 'Carte de l'Amérique septentrionale et partie de la méridionale depuis l'embouchure de la rivière St Laurens jusqu'à l'isle de Cayenne avec les nouvelles découvertes de la rivière de Mississipi ou Colbert' (s.l., s.n., *c.* 1681). The author of this map was a close friend of La Salle and one of his most enthusiastic supporters. The map, which precedes La Salle's discovery of the mouth of the Mississippi by one year, does not show the Mississippi Delta.

When the news of La Salle's discovery reached France, the amazement was great.[170] Up to that point, no one sailing along the coasts of modern Louisiana had even suspected the existence of a river in that 'liquid landscape' of 'low islands overlapping one another' in a 'vast watery spread'.[171] Sailing from the north, however, La Salle was able to pinpoint, mark, and record the exact location where the river discharged into the gulf, thus making it possible for future seafarers to access it from the coast. According to La Salle's notary, Jacques de La Metairie, La Salle planted a small cross in 'a dry place beyond the reach of inundation', 'a little above [the river's] confluence with the sea' (near present-day Venice, Louisiana), and declared the whole Mississippi basin to be a possession of the king of France.[172] Suddenly, the French had more than doubled the size of their (already considerable) North-American empire, irrupting into a region hitherto dominated solely by the Spanish. Whether this was good or bad news was not entirely clear, though, and the future of the newly acquired territories immediately became the object of a heated controversy that wove together environmental, strategic, and economic concerns in complex ways.

La Salle himself participated in the debate to advocate the establishment of a settler colony in the area. Ever since its first explorations in the Lower Mississippi in the late 1670s, he had become convinced that the French stood much better chances of developing a strong colony there than in the distant north. In Canada, where the French had first settled in the early seventeenth century, a harsh environment forced the colonists to live like Indians, seeking their livelihood 'in the woods under great fatigues, in hunting for peltries, which are their principal resource'. Now, for La Salle, 'these vagrant courses,

[170] In some cases, the amazement became utter disbelief, witness a series of letters written in July and August 1684 by a certain Machaut-Rougemont, in which La Salle's discoveries were called into question (see Margry 1876-1886, vol. 2: 455-57).
[171] Muhlstein 1994: 190.
[172] La Metairie 1875: 24.

common in New France' could be 'easily prevented' by relocating further south. In the lower Midwest, even the Indians were 'docile and settled nations'.[173] The mild climate and fertile soil promoted a sedentary lifestyle (a hallmark of civilization for early modern Europeans) and made it possible to grow 'everything that we cultivate in France, and in the very same way'.[174] A colony in Louisiana would therefore develop easily and almost effortlessly, because 'the goodness of the country' and the opportunity to live in a European fashion would attract great numbers of settlers and 'induce [them] to remain there willingly'.[175] Overall, La Salle's portrait of Louisiana aimed at presenting it as the 'home away from home' that the French had been so desperate to find in the New World.

The king, however, saw things differently. Deeming it 'necessary to multiply the population of Canada before thinking about other lands'—a viewpoint shared by the then Navy Secretary, Jean-Baptiste Colbert (1651-1690)—Louis XIV had already turned down previous requests to establish settlements in present-day Illinois.[176] La Salle's claims that a colony in the Lower Mississippi would develop better and faster than that of New France thus struck a raw nerve at court. It took over fifteen years of incessant negotiations, a change in government, and a looming war to turn the situation around.[177] When Antoine-Alexandre de Rémonville, a former member of La Salle's expedition of 1682, relaunched the idea of a 'new colony by the Mississippi' in a report presented in December 1697 to the new Navy Secretary, Louis Phélipeaux, Comte de Maurepas, the project was

[173] La Salle 1875: 11-12. I have been unable to locate the original French version of this text.
[174] 'La terre y peut produire tout ce que l'on cultive en France et de la mesme manière' (La Salle 1876: 331).
[175] La Salle 1875: 11-12. I have been unable to locate the original French version of this text.
[176] 'Il faut multiplier les habitans du Canada avant que de penser à d'autres terres' (Jean-Baptiste Colbert to M. Du Chesneau, 28 April 1677 [in Margry 1876-1886, vol. 1: 329]). The request that Louis XIV turned down came from Louis Jolliet (1645-1700), who in 1673 had discovered the Mississippi River on a mission to the Great Lakes region with the Jesuit Father Jacques Marquette (1637-1675).
[177] Emile Lauvrière's classic study on colonial Louisiana clarifies the ties between the Louisiana enterprise and French-Spanish relationship in the late seventeenth century (Lauvrière 1940; see also Giraud 1953; Pritchard 2004). After the death of King Charles II of Spain, the question of the Spanish succession (and thus of the destiny of the immense Spanish empire) would lead to the outbreak of a pan-European, thirteen-year-long war.

enthusiastically received and the Canadian explorer Pierre Le Moyne d'Iberville (1661-1706?) entrusted with its realization.[178]

In March 1699, Iberville found the mouth of the Mississippi and navigated upstream to Bayou Manchac, a few miles southeast of present-day Baton Rouge. The challenging hydro-geological conditions of the region immediately struck him. On their way back to the gulf via the lakes Maurepas, Pontchartrain, and Borgne, the French identified but 'one place, thirty leagues from the sea, that was not inundated'—possibly the very same spot on which the city of New Orleans now stands.[179] After some uncertainty, Iberville decided to leave the Mississippi behind and to build a fort further east on the coast. It is around this outpost, founded in the spring of 1699 and baptized Fort Maurepas, that Biloxi (now Ocean Springs, Mississippi), the first French settlement in Louisiana, developed in the following months.

In a report written after his return to France, Iberville explained that this particular site had been chosen for entirely pragmatic reasons: the Bay of Biloxi was the only place where the French, exhausted and almost out of victuals, had been able to lay anchor in miles. It was a temporary location, chosen in haste 'while waiting to see where it will be judged convenient and most advantageous to establish a colony'.[180] But Iberville did believe the place to be suitable for long-term habitation: everything suggested 'that good

[178] See Rémonville 1880. Rémonville (dates unknown) was a ship-owner, merchant, and explorer, formerly involved with La Salle in the colonization of Illinois. The *mémoire* of 1697 was sent to Rémonville's friend and royal *procureur de prises* Pierre-Joseph Argoud, who forwarded it to Phélipeaux. Others before Rémonville had tried to defend La Salle's idea of a colony in Louisiana: particularly his friends, the Abbé Claude Bernou and the Abbé Eusèbe Renaudot, both respected intellectuals and prolific journalists with close ties to the government milieus (see Feyel 1999 and Burger 1999 respectively). Renaudot (1648-1720)—who was the son of Théophraste Renaudot, the founder of the *Bureau d'adresse* (on which see below, 4.2)—devoted an important *mémoire* to the issue in 1684 (see Renaudot 1878). Bernou wrote about it in a report to Colbert, also in 1684 (see Bernou 1877).

[179] Iberville 1875: 28 ('Les terres du bord de la rivière neyent partout en bien des endroits, que nous avons veus à une lieue plus ou moins dans les terres; elles ne neyent pas environ à trente lieues de la mer. Le sieur de Sauvole, qui, en descendant avec les chaloupes, se rendit aux vaisseaux huit heures après moy, a remarqué un endroit où le bord ne neye pas'; Iberville 1880a: 123).

[180] Iberville 1875: 30, modified translation ('En attendant que l'on voye où l'on jugera apropos de placer une colonie et dans les lieux les plus avantageux'; Iberville 1880a: 125).

crops can be raised in that country, which is very temperate', and the area seemed healthier than any other in the region.[181]

Other contemporary observers confirmed Iberville's favourable impression. One of them was the French missionary Jacques Gravier, S.J., who visited Biloxi from Illinois in 1700-1701. In a later report addressed to his Father Superior, Gravier recalled how the navigation down the Mississippi had been troubled by swarms of blood-sucking insects, torrential rains, extreme heat, and 'miserable landings in mud and clay'.[182] But as soon as he reached Biloxi, he found that the air was 'better', the country 'well cleared', and a lovely sea breeze would come every morning to blow away the heat. The Bay also abounded in wildlife and 'all sorts of cultivations', which further testified to the temperateness and salubriousness of its climate. Biloxi thus met all of the preconditions for long-term habitation that a well-educated observer such as the Jesuit Gravier would deem essential on the basis of traditional climate theories.[183]

Those who stayed in Biloxi long enough, however, realized that the site was not all that hospitable after all. Sauvole, Iberville's second-in-command, reported many cases of dysentery due to the brackish water of the bay; as for the soil, he found it 'fort ingrat' (highly unproductive)—indeed, it was nothing but 'burning sand'.[184] Far from being blessed with a temperate climate, Biloxi was so cold and windy in the winter that water

[181] Iberville 1875: 31 ('Une colonie en ce pays-là sera bien plus facile à faire qu'en tout autre pays, par le peu de maladies qu'il y aura en se précautionnant pour cela'; Iberville 1880b: 320).
[182] 'C'est une navigation bien longue que celle du Mississipi, bien ennuyante et bien difficile surtout à remonter, et bien incommode à cause des coussins et autres mouches appelées maringouins, brulots et moustiques, et des grandes pluyes, les chaleurs excessives, les méchants débarquements dans la boue et dans la terre glaise, souvent jusqu'à mi-jambe et pour la méchange chère' (Gravier 1859: 52).
[183] 'L'air y est meilleur, le pays plus découvert, l'on y fait toute sorte de jardinage. Le chevreuil en est tout proche et il y a très bonne chasse; et pour y temperer la chaleur qui y seroit excessive, tous les jours une heure ou deux avant midy, il vient un vent de la mer qu'ils appellent la brise qui rafraichit l'air' (Gravier 1859: 54).
[184] Sauvole 1880: 451, 454 ('sable bruslante'). Sauvole's testimony ('Nos gens ont semé très fréquemment et très infructuesement') directly contradicts Iberville's earlier statements in this respect.

froze, trees were uprooted, and the colonists' houses heavily damaged;[185] in the summer, disease spread quickly and spared but few.[186] Soon enough, the necessity of finding a more suitable site became apparent to everyone. The French then set their sights on a location in the Mobile-Tensaw River Delta, some sixty miles northeast of Biloxi. In the winter of 1701-1702 they built a fort at Twenty-Seven Mile Bluff, on the shores of the Mobile River—the first germ of what is now Le Moyne, Alabama. Iberville wrote approvingly of this upriver location in his journal: 'The settlement is on a ridge more than 20 feet above the water, wooded with mixed trees […]. This ridge and all the land about it are exceedingly good'. Although he noticed that the banks of the Mobile River were 'flooded in some places', he gave his blessing to both 'Fort Louis de la Louisianne' and the new settlement, 'La Mobile', which was growing around it in a simple grid pattern.

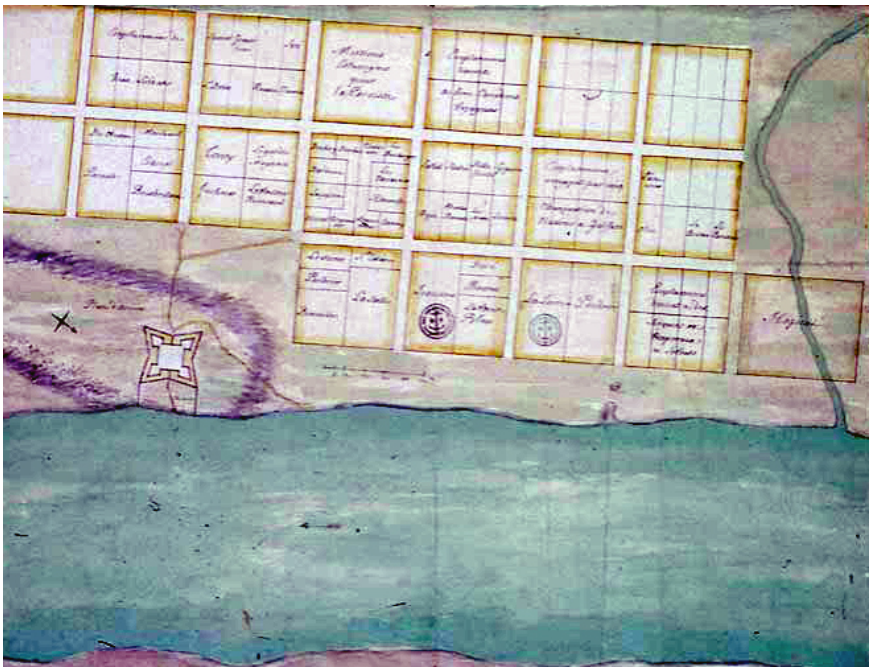

Figure 11 (above). (Charles Levasseur?), 'Plan de la ville et du Fort de La Mobile', 1702. © Archives Nationales de France. Aix-en-Provence, Centre des Archives d'Outre-mer, Dépôt des Fortifications des Colonies, Louisiane, III 6 PFB 119.

[185] Sauvole 1880: 454, 458.
[186] See Pénicaut 1879: 423. Pénicaut attributes such high mortality to the bad quality of local waters.

Iberville had great ambitions for La Mobile. Within months of its foundation, he had developed 'a whole plan of colonization' that particularly included 'a vast project for the transmigration' of native populations (both French-Canadian and Indian) into the region.[187] Yet despite a good start, La Mobile's growth was painfully slow. Between 1704 and 1708 the population rose from 180 to merely 279 heads, and plummeted to 178 after the epidemics of 1709-1710. The area was perceived to be damp and unhealthy: wooden buildings (including the fort) rotted quickly, and, as Iberville had suspected since his first visit, the land was subject to seasonal flooding from the Mobile River. 'People hesitate to settle down here', Iberville's brother noted in the summer of 1706. 'The Parisians especially, forced to live off Indian corn, curse the bishop of Québec who had described Louisiana as a promised land'.[188] In 1710, after several outbreaks of yellow fever and a severe flood that left the entire town underwater for a month, the decision was taken to relocate again. The settlers chose a spot further south, in the estuary of the Mobile River, and here they established 'La Nouvelle Mobile'—the immediate ancestor of modern Mobile, Alabama.

According to an anonymous French traveller who visited it around 1735, Mobile Bay was an obvious choice for settlement. In his manuscript 'Relation de la Louisianne' (a precious, though virtually unknown, source held at the Newberry Library), this writer described the area as 'the most delightful place in the entire country', praising its healthful

[187] Lauvrière 1940: 96. Iberville's *mémoire*, dated 20 June 1702 (Iberville 1880c: 593-607), was received coldly by the Navy Secretary, Phélipeaux (known by then as Pontchartrain), who commented in a letter to the Governor-General, Jacques-Charles Bochart de Champigny: 'Il n'y a pas lieu de croire que M. d'Iberville puisse exécuter la proposition qu'il a faite d'approcher du Mississipi les Sauvages Illinois et Sioux. Des nations entières ne se transportent pas ainsi d'un pays dans un autre; et quand cela seroit possible, il ne le faudroit pas' (Pontchartrain 1880: 607).

[188] 'Les habitants hésitent à s'établir. Les Parisiens surtout, réduits à ne vivre que de mahis, pestent contre l'évêque de Québec qui leur avait décrit la Louisiane comme une terre de promission' (letter of 28 July 1706, quoted in Lauvrière 1940: 118). Jean-Baptiste Le Moyne, Sieur de Bienville (1680-1767), was appointed governor of Louisiana in 1701 after Sauvole's death.

air, handsome views, and tempering sea breeze.[189] Yet the same observer noted that the Bay was also more subject to hurricanes than the old location further inland, and since the shoreline was extremely low, 'if a hurricane hits the coast, within two days the water is at your door'.[190] Another matter of concern was the proximity of La Nouvelle Mobile to Pensacola, a Spanish stronghold on the western limit of the territories controlled by the Spaniards. For these reasons, within a few years the capital was moved again to a newly established coastal settlement not far from the abandoned town of Biloxi. Rather unsurprisingly, 'Nouveau Biloxi' (now Biloxi, Mississippi) proved just as unsuitable as its predecessor to any form of sustained human presence—and for the exact same reasons.[191]

As the French saw all their colonization attempts in Louisiana systematically end up in failure, scepticism and frustration mounted. By the 1710s, many considered the colony a lost cause. Despite what La Salle had originally promised, life in Louisiana was no less different from a traditional European lifestyle than life in Canada. Arable land was scarce along the coast and even where the soil was rich enough to allow cultivation, European crops rotted before harvest because of the hot and humid climate.[192] The settlers were forced to live off fishing and hunting, exactly as they did in New France; itinerant figures, resembling more nomadic Indians than civilized Europeans, roamed through the colony.[193] In 1720, one anonymous writer described the strange 'deterioration' to which

[189] 'L'endroit le plus riant du pais […] L'air y est plus sain, la vue plus belle, à cause de cette baye qui a vis à vis la ville trois lieux d'étendue. Ce qui rend encore l'endroit plus gracieux c'est la brize qui vient de la mer presque tous les jours, qui rend les chaleurs bien plus supportables que par tout ailleurs' ('Relation de la Louisianne', Chicago, Newberry Library, MS Ayer 530, n.p.).
[190] 'Comme le bord de la mer où l'on habitte ce sont des costs [*sic*] plattes, si l'ouragant passe deux jours l'eau est à la porte des maisons' ('Relation de la Louisianne', n.p.).
[191] According to the anonymous author of 'Relation de la Louisianne', 'Le seul agreement qu'on y pouvoit trouver estoit la beauté de la vue, l'air sain de la mer', and the abundance of fish and game. On the other hand, the soil was barren, the terrain 'nullement propre à faire un establissement', and the coastline too exposed to the fury of the elements (n.p.).
[192] See the testimonies reported in Lauvrière 1940: 109-18, particularly that of Antoine-Jean de Laval in his unpublished 'Voyage de la Louisiane' (*c.* 1720).
[193] Thus argues Paul du Poisson, S.J., in a letter of 3 October 1727 ('aux Akensas') to an unknown Jesuit addressee (see Poisson 1781b: 393).

the settlers were subject in Louisiana: 'a man who was an excellent subject becomes a mediocre subject in America and a mediocre subject becomes very bad'. One possible reason he suggested was the 'food, which does not have the same substance as in Europe'.[194] Others blamed the mollifying climate of the South, which notoriously had the power to transform good people into 'slackers, libertines, and even more so rogues' ('fainéants, libertins, et plus encore fripons').[195] Some observed that 'Europeans transplanted to this country become sterile'—definitely a bad omen for a colony that needed to multiply in order to survive.[196]

In 1717, under a new administration,[197] plans were made to relocate the capital once more. A few months later, Paul du Perrier, engineer-in-chief for the Mississippi Company, was sent on a surveying mission along the Mississippi River to identify a suitable spot.[198] His instructions were clear: the chosen location should combine a fertile soil, commodity for trade, security from flooding, and a wholesome climate ('bonté de l'air'). In other words, it should be close enough to the mouth of the river to allow for quick and easy access, but not so close as to endanger the health, safety, or subsistence of its inhabitants.[199] The choice eventually fell on a natural levee between the lakes

[194] 'État de la Louisiane au mois de juin 1720' (quoted and translated in Dawdy 2008: 26; original not provided).
[195] These are words of the French priest François Le Maire (dates unknown), vicar-general of the bishop of Québec in Louisiana, in an unpublished 'Mémoire sur la Louisiane' written in 1717 for the Navy Council (Paris, Bibliothèque Nationale, MS Fr. 12015; quoted in Lauvrière 1940: 166). Le Maire described Louisiana as 'une véritable Babylone' (Lauvrière 1940: 166). On Le Maire, see Giraud 1958: 29-31.
[196] This opinion is reported in Vallette de Laudun's 'Journal d'un voyage à la Louisiane, fait en 1720' (quoted and translated in Dawdy 2008: 45; original not provided).
[197] In 1717 the Mississippi Company, the body responsible for the administration of Louisiana, was purchased by the Scottish economist, banker, and gambler John Law (1671-1729), just recently appointed Controller General of Finances by the French regent Philippe d'Orléans. Law dragged Louisiana into one of the earliest examples of an economic bubble by grossly overestimating its wealth in order to boost investments in the Company's shares. When the bubble exploded in 1720, Law was fired and fled to Venice.
[198] The idea of moving the capital from La Nouvelle Mobile to a more sheltered location in the Lower Mississippi Valley had been suggested as early as 1708 by the French-Canadian officer Pierre d'Artaguiette: see Lauvrière 1940: 116.
[199] The full text of the 'Instruction pour M. Perrier, ingénieur en chef de la Louisiane, 14 Avril 1718' is reported in Margry 1876-1886, vol. 5: 605.

Pontchartrain and Borgne, a relatively dry stretch of ground where a Quinipissa village once stood—precisely the same spot that Iberville had noticed years before on his way from Manchac to the sea.[200] Construction began later that same year and in 1723, after extensive drainage works, the capital was ready to be relocated from Nouveau Biloxi to 'La Nouvelle Orléans'.

It was the fourth time in less than twenty-five years that the French were moving their chief settlement. The inherent disadvantages of such continuous relocation did not escape contemporary observers, who commented that 'these various changes of location' had 'prevented the settlers from putting down roots anywhere'.[201] Because of constant relocation, the land was neither well drained nor well cultivated, the colony was unproductive and subject to flooding, and the settlers lacked any serious work ethic. La Nouvelle Orléans was supposed to provide a different kind of experience. Unlike previous settlements, it was conceived from the outset as a carefully planned community—'a civilized metropolis in the swamp', an engineered 'environment where the colonial population could meet on new terms'.[202] In this sense, the new colonial city perfectly embodied the Enlightenment dream that 'rationality and experimentation' together would 'restructure French society and devise new methods of social control'.[203]

Reality, however, once again contradicted such generous expectations. Despite a few isolated voices, most travellers to New Orleans in the mid-eighteenth century brought

[200] See Morris 2012: 70. Iberville's younger brother and future governor of the colony, Jean-Baptiste de Bienville, approved of this choice: see Lauvrière 1940: 116.
[201] 'Ces différens changemens d'établissemens […] ont empesché les colons de prendre racine à aucun endroit' (Marc Antoine César Anne Hubert [Paris] to the Duke of Noailles, 11 April 1723; quoted in Margry 1876-1886, vol. 5: 642).
[202] Dawdy 2008: 12.
[203] Dawdy 2008: 11. Dawdy also stresses that 'New Orleans was meant to be a new and improved *French* city, not a city designed to control foreign natives' (16), and that its designers 'hoped that the careful physical ordering of the town' would have 'a direct impact on the social order' (21).

back images of social failure, moral depravity, and environmental disaster.[204] For the anonymous writer who visited Louisiana in 1735, New Orleans was too close to the sea to allow for a genuinely European lifestyle: 'it should have been placed some twenty leagues up north', he stated, since there one would have found 'higher and therefore drier land', a climate 'more or less similar to that of France', and a 'land of plains and mountains, clearer [from vegetation] than down by the sea'. Such an environment was overall more conducive to a sedentary, civilized existence, revolving around the cultivation of staple French foods (wheat, oats, wine).[205] Proceeding upstream towards the land of the Illinois, one could indeed encounter well-functioning settlements of industrious European farmers, living side by side with friendly natives.[206] In 1762, a few years after losing Canada to the British, King Louis XV handed Louisiana over to Spain, thus putting an end to six decades of mostly unenthusiastic French presence in the Lower Mississippi Valley.

c) A Comparison of English and French Relocation Strategies

At first glance, the cases of Williamsburg and New Orleans could not stand in starker contrast to each other. The former offers a success story of European adjustment to unfamiliar environments: by means of steadfast exploration, knowledge acquisition, and

[204] See Dawdy 2008, who also reports examples of favourable views of life in colonial New Orleans (for instance, those expressed by the French military officer Jean-Bernard Bossu, who lived in Louisiana from 1751 to 1762 and wrote about his experience in his 1768 book *Nouveaux voyages aux Indes Occidentales*: see Dawdy 2008: 54-56).

[205] 'Il auroit mieux valu la placer à une vingtaine de lieux au dessus' […]; 'des terres hautes et par consequent plus seiches'; 'le climat y est à peu pres comme en France, pais de plaine et de montaigne, plus decouvert qu'aupres de la mer'; 'du blé de large, de l'avoine, de la vigne, et des fruits de toutes especes dont on a porté des plantes' ('Relation de la Louisianne', n.p.). Compare Vivier 1781b: 99 ('le terroir est fertile: toute espece de légumes y réussiroit presqu'aussi bien qu'en France, si on les cultivoit avec soin').

[206] See the letter of Louis Vivier, a Jesuit missionary to the Illinois, to an unknown Jesuit addressee (8 June 1750): 'les François habitués en ce pays-ci sont appliquées, pour la plupart, à la culture des terres […]. Les sauvages, et surtout les Illinois, sont d'un caractère doux et fort sociable' (in Vivier 1781a: 80). The author of the 'Relation de la Louisianne' explicitly contrasted the industriousness of these inland settlers to the 'luxe au bas du fleuve' (n.p.).

accurate planning, the English were able to turn the early Jamestown failure into a lesson for the future. The result was Williamsburg, a thriving city that in the eyes of contemporary observers ensured the reproduction of a European lifestyle in the distant American colonies. New Orleans, on the other hand, was widely perceived as yet another fiasco in a long series of failed attempts at transplanting France onto the semi-tropical shores of the Gulf of Mexico. The fruitless impatience with which the French kept moving their main settlement—four times in twenty-five years—cannot but compare negatively to the single, and immediately effective, act of relocation that the English performed in 1699.

Such an assessment, however, places too much retrospective coherence on a process that, as we have seen, was in both cases fraught with difficulties, controversies, misdirected expectations, and sudden afterthoughts. Upon closer inspection, particular historical conjunctures and purely random circumstances contributed just as much as (if not indeed more than) environmental savviness and wise policy-making in ensuring the success of a colony. In this respect as in others, the cases of English Virginia and French Louisiana resemble each other much more than they differ. In both cases, the settlers pursued adaptation in the colonies not by adjusting their European expectations to the objective conditions of a non-European (and profoundly unfamiliar) environment, but rather by looking for an environment that would match their expectations. Relocation was, in both cases, the colonists' response to initial failure; in both cases, the act of relocating can be interpreted as a form of coping with undesirable environmental influences that hinder the reproduction of a fully European lifestyle in the colonized lands. In this perspective, the end-result of the relocation (success in the English case, failure—at least perceived failure—in the case of the French) is perhaps less meaningful than the act itself and the strategic reasoning behind it.

Both English Virginia and French Louisiana can be taken as paradigmatic examples of a phenonomenon that we could call 'the avoidance of creolization', and which decisively characterizes the early-modern colonial experience. Creolization, as defined by David Buisseret, is the inevitable, and largely unvoluntary, process whereby European cultures and lifestyles changed in colonial environments under the influence of contact with cultures, lifestyles, and environments other than theirs.[207] Scholars have shown how early modern Europeans sought to avoid creolization in three distinct (though not mutually exclusive) ways: by avoiding prolonged stays in colonized territories (something that could be achieved by establishing military garrisons and trading posts rather than settler colonies); by fixing clear social and ethnic boundaries between European settlers and native populations; and by following dietary, medical, and architectural practices that would supposedly protect their native identities from the transformative action of foreign environments.[208]

The previous sections have shed light on a fourth way in which Europeans believed they could avoid creolization: namely, by careful selection of settlement sites that would preserve (if not improve) the physical and moral health of prospective colonists. While the criteria that guided siting decisions were drawn from a long-standing tradition of environmental and climatological thinking (see section 3.3.2), they were further popularized in this period thanks to a flourishing promotional literature that described the reproduction of a European lifestyle overseas as the ultimate goal of all colonial endeavours—as well as the touchstone of a settlement's success (see above, section 3.3.1).

What the previous sections have also shown, however, is that the care that settlers put in choosing suitable locations rarely saved them from making mistakes. One way to

[207] See Buisseret 2000a.
[208] Socolow 1986: 7; Buisseret 2000b; Hill 2013.

explain spectacular failures such as the ones examined here has been to consider how the traditional environmental knowledge that Europeans summoned in assessing prospective sites for settlement was often inadequate to the purpose.[209] This explanation has many undeniable merits: in particular, it sheds light on the tight connection between theories and practices, showing how European environmental ideas first shaped colonial strategies and were then reshaped by them as the settlers gradually (and often painfully) gained a deeper understanding of American environments. When seen from this perspective, colonial failure was often a trigger of positive intellectual change and knowledge acquisition, thus ultimately contributing to the development of modern European science.[210]

A weakness of this explanation, on the other hand, is that it tends to obscure the exact dynamics of these intellectual transformations, the speed at which they took place, and—most importantly—the resilience of old epistemic paradigms. As the cases above have shown, the way in which Europeans made sense of, and coped with, colonial disaster suggests enduring adherence to received environmental knowledge rather than a movement away from it. When confronted with failure, the settlers' first impulse was first to blame external circumstances, and only then to reconsider the assumptions that had guided their decisions. Even as they proceeded to question inherited ideas and strategies, their attitude towards them was not one of radical critique but rather one of selective revision, as the debates on coastal versus inland settlements that preceded the foundation of Williamsburg prove especially well. Overall, 'new' experiences of colonial environments led the settlers not so much to abandon their 'old' environmental theories as to rework them from within; moreover, such 'new' experiences were themselves understood and assimilated on the basis of, and in keeping with, 'old' epistemic paradigms. The various cases of relocation

[209] See, e.g., Reps 1972.
[210] For a similar argument in a different context, see Grove 1995.

examined in this chapter confirm this point, both because they show to what extent settlers kept relying on received environmental knowledge in assessing possible alternative sites, and because they collectively testify to the persistence of climate theory as a general conceptual framework for understanding the relationship between place and human nature.

Chapter 4 will return to these complex ties between tradition, experience, and intellectual change in order to study developments in environmental theories and practices in seventeenth- and early eighteenth-century Europe. Before moving on to this, however, I shall consider one final example of relocation as a means of coping with environmental influence in the early-modern colonial world: the 're-education', through forced resettlement, of hundreds of thousands of native Americans in Central and South America. While the scenario examined in the next section differs in many important respects from the one addressed in previous parts of this chapter—not least because it involves an extreme case of 'coerced' displacement of subjugated populations, as opposed to the relatively free mobility of European settlers[211]—we shall see that one crucial way in which these two contexts resemble each other is that the theory and practice of relocation was in both cases inspired and oriented by a long-standing tradition of climatological thought.

3.3.3. Resettling the Natives: Forced Resettlement in Colonial America

One of the most spectacular effects of the European colonization of Central and South America was the transformation of 'the dispersed pattern of settlement characteristic of

[211] But see above, section 3.2.2, for some necessary qualifications. On 'coerced' versus 'free' displacement, see Eltis 2002b.

most indigenous groups' into urban communities modelled after European standards.[212] While the dramatic demographic decline experienced by native populations throughout the colonial age was, to a large extent, a consequence of uncontrollable biological forces,[213] this profound change in the 'physical configuration' of indigenous communities was instead the result of conscious efforts by secular and ecclesiastical authorities alike.[214]

From the 1530s onwards, religious missionaries and Spanish colonial officials launched sweeping resettlement campaigns that over the course of two centuries moved more than one million Indians from their native lands to new villages specifically conceived for that purpose.[215] Among the best studied examples of this phenomenon are Vasco de Quiroga's 'utopian' communities in the Michoacán region of Mexico; Viceroy Francisco de Toledo's plan for a 'Reducción General' (General Resettlement) of native Indians, which started in the early 1570s and continued into the following decades, primarily affecting the Andean communities of modern Peru and Bolivia; and the Jesuit reductions of Paraguay—the result of long-term missionary effort in this region (1610-1767).[216]

Although the Indian settlements established before, during, and after Toledo's resettlement campaign differed in some important respects from the Jesuit *reducciónes*,[217] the two projects—which alternated periods of fruitful collaboration with moments of

[212] Martin 1996: 194. See Lockart and Schwartz 1983: 35-57 for an overview of sedentary, semi-sedentary, and nomadic peoples in pre- and early-colonial South America. More broadly on the ecological impact of colonization in Central and South America, see Crosby 1986; Melville 1997.
[213] See Crosby 1972.
[214] Martin 1996: 194.
[215] Mumford 2014; Scott 2004: 886. This figure merely refers to Andeans displaced during the General Resettlement of 1569-1575 and does not take into account earlier and later projects.
[216] See Bakewell 2004: 137-58, 257-61. Jeremy Mumford (2012: 48) has offered an explanation of the origins and early modern meaning of the word *reducir*, from which the term *reducciónes* (then generally applied to any plan for 'resettling Indians into a central location') was derived. Stelio Cro (1994) has argued that utopian elements akin to Quiroga's planned communities can be found in the Jesuit *reducciónes* as well; on Jesuit utopianism, see also Paschoud 2008: 140-44; Imbruglia 2014.
[217] Aguilera Rojas (1994: 266) particularly draws attention to the Jesuit principle of limited urban growth (in terms of both geographical extension and population size), as opposed to the potentially unlimited development for which contemporary Spanish colonial cities were usually designed.

tension and conflict[218]—shared deep similarities. The self-avowed objective of both secular and religious authorities in concentrating the natives in more compact, nucleated settlements was to make them more amenable to a civilized, Christian way of life, while at the same time keeping them separate from settler communities.[219] Besides the aforementioned European bias for urban living as a precondition for civilization, a number of reasons explain this preference for a town-based model: in particular, urban communities, as opposed to scattered populations, were easier to control, convert, and conscript for military service or forced labour.[220] The resettlement schemes of the sixteenth and seventeenth centuries thus appear to have served a triple purpose: to break indigenous resistence by removing the Indians from their familiar environments, communal solidarities, and places of aggregation;[221] to facilitate the religious indoctrination and economic exploitation of subjugated populations; and to force a 'civilized' lifestyle upon the natives, by literally plunging them into a physical space designed to resemble European cities—or, rather, European urban ideals.[222] For Spanish colonial officials as for Jesuit missionaries, removing the natives from their 'woods and mountains' and implanting them into the rational space of the *reducción* was indeed the precondition 'for turning them into

[218] See Solano 1987: 122-23. Crétineau-Joly's *Histoire religieuse, politique et littéraire de la Compagnie de Jésus* (1844-1846) provides several examples of tensions between missionaries (particularly Jesuits) and colonial authorities. See also the *Mémoire apologétique* by Gaspar Rodero, S.J., composed in Spanish in 1732 and translated in the *Lettres édifiantes et curieuses* (Rodero 1781).
[219] See Viceroy Toledo's *Instrucción general para los visitadores* of 1569-1570 (preparatory to the 'General Resettlement' campaign that started two years later): 'para dar orden y forma cómo los indios tengan competente doctrina y mejor puedan ser industriados en las cosas de nuestra sancta fee cathólica, y con más facilidad y comodidad se les pueda administrar los sacramentos y sean mantenidos en justicia y vivan pulíticamente como personas de razón y como los demás vasallos de su majestad […] convien que los indios que viven diversos y derramados, se reduzgan a pueblos con traza y orden' (Toledo 1986: 33). On ethnic segregation, see Socolow 1986: 7; Martin 1996: 209 (who also notes how the segregation did not always work in actual fact: for instance, 'favourably situated villages attracted non-Indian settlers as wearly as the sixteenth century').
[220] Martin 1996: 194.
[221] Viceroy Toledo's *Instrucción general* makes this point clear under the heading 'Sobre las reducciónes de los Indios', where it is recommended 'que las dichas reduciones se hagan [distantes] de las huacas y mochaderos que los indios solían tener en tiempo de su infidelidad' (Toledo 1986: 35; on *huacas* and *mochaderos*, i.e., the traditional Andean worship places, see Mills 1997, Chapter 2).
[222] For this latter point in particular, see Scott 2004.

human beings, first, and then into Christians' ('pour en faire d'abord des hommes et ensuite des Chrétiens'), in the words of Father Charles Le Gobien, S.J. (1653-1708).[223]

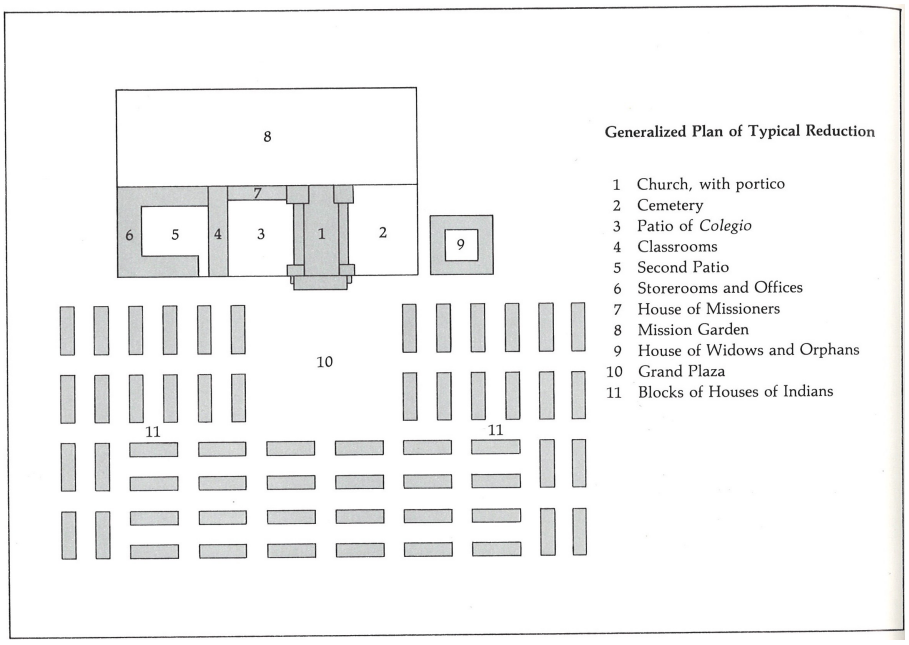

Figure 12 (above). Modern reconstruction of typical Jesuit *reducción* (McNaspy 1982).

Both civil and religious *reducciónes* were generally designed according to a similar layout—a symmetrical checkerboard plan revolving around a central *plaza*, with streets of varying width depending on local climatic and topographic conditions (see Figure 12).[224] Natural features of the site, including its landscape and climate, were indeed considered to be just as important as the urban pattern imposed upon them for ensuring the success of a settlement. Evidence coming from prescriptive texts such as Viceroy Toledo's edicts or the *Ordenanzas de descubrimiento, nueva pueblación y pacificación* compiled in 1573 by the

[223] Le Gobien 1781, vol. 6: 4. These words are taken from Le Gobien's opening preface to Volume 6 (the first of four American-themed volumes) of the immensely popular collection of Jesuit missionary letters known as *Lettres édifiantes et curieuses* (more on the *Lettres* below). Volume 6 first appeared in 1706 (for the Parisian printer Nicolas Le Clerc); it was then republished several times along with other volumes in the collection. For all quotations from the *Lettres*, I will be referring here to the second edition of 1780-1783, in 26 volumes.

[224] See McAndrew 1965: 94; Rojas-Mix 1978; Messmacher 1987; Aguilera Rojas 1994: 96, 154, 318; Mumford 2012: 41-51. Although such principles were rarely followed in every detail (see Sánchez-Bella 1982), scholars nevertheless agree on their pivotal role in orienting urbanization practices in Latin America.

Council for the Indies and incorporated (with revisions) in the *Recopilación* of 1680,[225] suggests that sites for prospective Indian *reducciónes* (not unlike sites for prospective settler towns) were carefully vetted based, among other things, on a consideration of local environmental influences and their expected effects on transplanted populations.[226] Scholars like Gabriel Guarda, Javier Aguilera Rojas, and others who have examined such documents in depth, have noticed how the environmental knowledge displayed and exploited in these texts was taken directly from the works of ancient and modern climate theorists, including Aristotle's *Politics*, Vitruvius's *De architectura*, Thomas Aquinas's *De regimine principum*, Leon Battista Alberti's *De re aedificatoria*, and Thomas More's *Utopia*.[227] The latter, in particular, was a declared source of inspiration for Vasco de Quiroga's plan to realize Utopia in America, which led to the foundation of several experimental Indian communities in sixteenth-century Mexico.[228]

Viceroy Toledo, for instance, stressed that the new Indian settlements should be sited 'in salubrious and temperate regions'.[229] In doing so, Toledo was manifesting concern for the future of the Spanish empire as much as for the natives' 'good health'—the one, indeed, was inseparable from the other, since the Spaniards relied essentially on native manpower and know-how for mining and other activities.[230] Observing how the once 'rich and populous land they had seized from the Inkas was becoming poor and depopulated',

[225] See Poole 2004: 146.
[226] On the rationale for selecting sites for settler towns, see Socolow 1986: 4.
[227] Guarda 1965; Solano 1987: 110-12; Aguilera Rojas 1994: 113-15. For further discussion of these writings, see above, Chapter 1 (specifically on Thomas Aquinas, see 1.3.1).
[228] Many of these communities (including some that were founded after Quiroga's death) were extremely successful and long-lived, lasting well into the eighteenth century: see Kubler 1942: 628. According to Kubler,'[t]he work of Quiroga cannot be overlooked […]. It created a stable mode for Indian life unparalleled elsewhere in the colonial world', something comparable only to the Jesuit *reducciónes* in Paraguay. On Quiroga (1470-1565), a lawyer trained in the tradition of legal humanism, appointed royal auditor of New Spain in 1530, see also Gómez 2001.
[229] 'Se reduzgan a pueblos […] en partes sanas y de buen temple […] de manera que los indios puedan vivir sanos' (Toledo 1986: 33).
[230] Lockhart and Schwartz 1983: 91-92; Bakewell 201-04. Specifically on the relationship between resettlement schemes, climate theory, and Spanish dependence on native manpower, see Poole 2004: 135.

Spanish officials set out to bring orderly life back into what appeared to them as an impoverished, disaggregated human landscape.[231] The resettlement schemes of the second half of the sixteenth century (and the planned communities to which they gave birth) can thus be interpreted, in Toledo's own words, as deliberate attempts at 'preserving and augmenting' the human capital represented by the natives, in response to catastrophic demographic loss in the previous decades.[232] Building on this fundamental insight, a recent wave of scholarship combining a Foucauldian attention for spatial rationalities of power with direct archeological fieldwork has established that the *reducciónes*, far from pursuing merely repressive goals such as forestalling rebellion and dismantling consolidated patterns of leadership, hierarchy, and mutual alliance, were conceived as carefully planned biopolitical spaces in which a new generation of strong, healthy, civilized native Americans could be positively engineered and multiplied.[233]

More specifically, the reasoning behind such resettlement schemes reveals a precise belief in the transformative effects of climate and place, as well as an optimistic assessment of man's capacity to control them and exploit them in his favour. This particular aspect often comes to the fore in the 'relations' (reports) and letters that Jesuit missionaries to Guyana, Paraguay, and other regions of Central and South America sent back to their General Provincials in Europe. Some of these letters were later published in the four American-themed volumes of the *Lettres édifiantes et curieuses*, a collection of

[231] Mumford 2014: 6.
[232] Toledo 1986: 85 ('una de las cosas que más importaban para el asiento y estabilidad de estes Reinos, conservación y aumento de los naturales dél […] ha sido y es que los dichos naturales se reduzcan y hayan reducido a pueblos y congregaciones donde tengan polícia y doctrina'). For the close ties between demographic decline among the natives and resettlement schemes see Kubler 1942; Mumford 2012: 184-85).
[233] This productive dimension of colonial resettlement schemes—often performed in negotiation with local cultures and landscapes—has been particularly emphasized by Jeremy Mumford (2012, 2014), Parker VanValkenburgh (2012), and Steven Wernke (2013). I am grateful to Parker VanValkenburgh for letting me see a draft of his forthcoming book chapter 'Historias galonadas' (see Bibliography, section 3). For a Foucauldian approach to space and environment as 'rationalities of government', see Huxley 2007.

Jesuit correspondence that continued to grow by accumulation since its first publication in 1702, thus ensuring long-lasting popularity to these writings.[234]

That these Jesuit letters should manifest a special interest in the transformative effects of climate and place is not surprising. As François de Dainville showed in his classic study on 'humanist geography', the relationship between physical nature and human nature had been at the centre of Jesuit concerns since the very foundation of the Society in the mid-sixteenth century.[235] Paying close attention to 'the geographical conditions in which their activity should take place',[236] Jesuit missionaries particularly developed questionnaires for the collection of environmental data, an initiative that closely parallels, and indeed anticipates, similar undertakings by the scientific societies of the seventeenth century.[237] Such endeavours were inspired by a strong belief in the influence that 'the state of the air' and 'the nature of places' exert on 'human mores', as stated by the very founder of the Order, Ignatius of Loyola (1491-1557).[238] Indeed, some of the most influential climate theorists of the sixteenth and seventeenth centuries were Jesuits or had been trained as such. These include the Spaniard José de Acosta (1539-1600) and the Piedmontese Giovanni Botero (1544-1617), both of whom, as we shall see, devoted a special attention to South America in their remarkably popular works.[239]

While scholars generally acknowledge that climate theory occupied an important role within the Jesuit world view, the extent to which it also shaped Jesuit missionary

[234] No single overarching study about the *Lettres édifiantes et curieuses* exists to date. Specifically on the American-themed volumes (vols 6-9, first published in 1706-1711) see Paschoud 2000; Bernier 2014; and the individual studies by Girolamo Imbruglia, Frédéric Dorel, and Letizia Norci Cagiano in Menant 2011.
[235] Dainville 1969: 81-83.
[236] Dainville 1969: 113.
[237] Dainville 1969: 114. On environmental questionnaires compiled by seventeenth-century scientific societies, see below, Chapter 4.
[238] Letter of 22 November 1547, quoted in Dainville 1969: 113 (original not provided in the reference).
[239] On Acosta and Botero, see further below in this section.

practices has gone almost completely unnoticed.[240] Yet many reports and letters show that Jesuit missionaries educated in this intellectual tradition would often rely on it to make sense of the relationship between American environments and native populations, and thus shape their evangelizing strategies accordingly. Because they conceptualized the Indians' 'barbarity' as a direct consequence of their nomadic life in the forests and mountains of Central and South America, the missionaries came to the conclusion that the first step towards civilizing the natives was to 'get them out of their caves and grottos and to gather them in villages, so as to change to some extent their natural character' ('les tirer de leurs antres et de leurs cavernes, pour changer en quelque sorte leur naturel, en les réunissant dans des peuplades').[241]

This tight relationship between human character and the natural environment, stressed in several letters, often took the form of a dialectic opposition between highland and lowland Indians. 'There are two sorts of men in this country', one missionary wrote from Buenos Aires in 1729, further contrasting the 'absolute barbarity' of mountain tribes with the 'gentle, righteous, peace-loving nature' of those who lived in the plains.[242] The transformative effects of mountainous environments appeared particularly obvious in the case of the so-called Chiriguano Indians, a subset of the Guaraní people who inhabited Paraguay. In a letter from Buenos Aires, the Flemish missionary Ignace Chomé (best

[240] Some useful remarks can be found in Paschoud 2008: 126-132; Ouellet and Bernier 2014; but neither of these studies takes climate theory specifically into account.

[241] The text quoted here is presented in the *Lettres* (1781, vol. 9: 7) as a translation of a relation originally written in Spanish by Father J. P. Fernandez: the *Relación historial de las misiones de indios chiquitos*, published in Madrid in 1726 and subsequently reprinted and translated into several languages (German, 1729; Italian, 1729; Latin, 1733). However, having consulted a more recent edition of Fernandez's Spanish relation (Fernandez 1895), I have not been able to identify the passage supposedly translated in the *Lettres*. The words quoted above are quite likely the result of editorial interpolation.

[242] 'On peut cependant dire en général qu'il a deux especes d'hommes dans le pays dont je parle. Les uns sont absolument barbares, les autres conservent, jusques dans le sein même de la barbarie, une douceur, une droiture, un amour de la paix, et mille autres qualités estimables, qu'on est tout étonné de trouver dans des hommes sans éducation' (Cat[taneo?] 1781: 361-62). The available evidence suggests that the mysterious 'Father Cat' to whom the letter is attributed in the 1781 edition of the *Lettres* may be the Modenese Giuseppe Cattaneo (1696-1733), who spent the last four years of his life in Paraguay.

known for his grammar of the Zamuco language, composed between 1738 and 1745) explained that the Chiriguano descended from a group of Guaraní who had refused to embrace the Gospel. 'Fearing the resentfulness of their fellows', the obstinate yet harmless heathens decided to 'quit their native [lowlands]' and to 'fix their abode in the middle of the mountains', where they would be safe from retaliation. The surrounding tribes allowed them to settle there, judging that the fugitives, 'being born under a scorching sun and having now relocated into an exceedingly cold country, would not be able to tolerate the hardships of such a harsh climate for very long, and would soon die miserably'. They thus called them 'Chiriguano', which in their language meant 'the cold will destroy them'. The opposite happened. Far from killing the Chiriguano, the cold and rough environment fortified them, transforming them into a hardy, fierce, and prodigiously fecund nation that soon proceeded to exterminate all surrounding tribes.[243] Years later, the Chiriguano were commonly regarded as the 'most ferocious' and 'intractable' of all South-American nations, and the most difficult to convert, living as they did among 'horrible mountains' of an 'extraordinary height'.[244]

[243] Father Ignace Chomé (Buenos Aires) to Father Vanthiennen, 21 June 1732 (Chomé 1781a: 242-43): 'Ces barbares craignant le ressentiment de leurs compatriotes, dont ils n'avoient pas voulu suivre l'exemple, prirent la résolution d'abandonner leur terre natale et d'aller chercher un asyle dans d'autres contrées; dans cette vue ils passerent le fleuve Paraguay, et avançant dans les terres, ils fixerent leur demeure au milieu des montagnes. Les Nations chez lesquelles ils s'étoient réfugiés en conçurent de la défiance, et après avoir délibéré sur le parti qu'elles avoient à prendre, ou de déclarer la guerre à ces nouveaux venus, ou de les laisser vivre tranquillement dans les montagnes, elles jugerent qu'étant nés sous un Ciel brulant, et passant dans des pays extremement froids, ils ne pourroient résister long-temps aux rigueurs d'un si rude climat, et qu'ils y périroient bientot de misères. *Chiriguano*, disoient-elles en leur langue, c'est-à-dire, le froid les détruira […]. Ces Nations se trompoient dans leurs conjectures; les Chiriguanes multiplierent prodigieusement et […] comme ces peuples sont naturellement belliqueux, ils se jetterent sur leurs voisings, les exterminerent peu-à-peu, et s'empararent de toutes leurs terres'.

[244] Father Ignace Chomé (Tarija) to unnamed addressee, 3 Octobre 1735 (Chomé 1781b: 298-99; 'Ce sont des peuples intraitables, du naturel le plus féroce, et d'une obstination dans leur infidélité que les plus fervens Missionnaires n'ont jamais pu vaincre. On compte plus de vingt mille ames de cette Nation, répandues dans d'affreuses montagnes […] si prodigieusement hautes […] que nous trouvant déjà bien avant sous la Zone Torride, et au commencement de novembre, que les chaleurs sont excessives dans le Tucuman, nous avions néanmoins à essuyer une neige abondante qui tombait sur nous').

For the Jesuit missionaries, taking (and keeping) the natives away from 'forests and mountains' was thus an essential step in the civilizing and evangelizing process.[245] In accordance with their negative view of mountainous environments, the Jesuits tended to site their *reducciónes* in low-lying, or at the very least flat, places—a trend that was also followed by Spanish colonial officials in the foundation of new settlements (for instance, the important mining town of Potosí, in the Bolivian Andes, was established on ostensibly level ground at an elevation of over 4,000 metres: see Figure 13), and which differed markedly from indigenous patterns of settlement.[246]

Another good reason for choosing to build in the plains was that climate theorists commonly ascribed to flat places a homogenizing influence on human nature. Smooth terrain, they argued, bred uniformity of character and unanimity of opinion, and that was why civil strife had haunted and ruined many famous cities built on uneven ground (including Athens, Rome, and Florence) whereas level settlements had largely escaped such a cruel fate.[247] Building the *reducciónes* on flat terrain could thus be expected to reinforce the taming effect that the Jesuits were pursuing, while also promoting an evangelical equality of sorts among the natives.[248]

[245] Defending the Jesuits' work in Latin America against widespread accusations from Spanish colonial authorities, Father Gaspar Rodero insisted that the *reducciónes* played a fundamental role in the colonial ecosystem: whenever a mission was closed, all the Indians that the Jesuit Fathers had painstakingly 'removed from their forests and mountains' soon returned to the wilderness, where they lost their faith and the King a great number of subjects (Rodero 1781: 229-30).
[246] See Lockhart and Schwartz 1983: 48; Bakewell 1997: xviii-xix; Mumford 2012 (Chapter 2).
[247] See, e.g., Bodin 1986, vol. 5: 8 (5.1).
[248] This aspect was particularly apparent in Vasco de Quiroga's experimental towns, as noted in Kubler 1942: 627-28, but we also find it in later Jesuit *reducciónes*. Father Armand Jean Xavier Nyel (1670-1732), a French Jesuit based in Lima in 1705, wrote that in each of the Peru *reducciónes* 'les rues sont égales et tirées au cordeau, les maisons uniformes' (Nyel 1781: 145).

Figure 13 (above). Gaspar Miguel de Berrío, 'Descripción del Cerro Rico e Imperial Villa de Potosí', *c.* 1758. Sucre (Bolivia), Museo Colonial Charcas.

Finding an appropriate spot remained, in most cases, a feat of negotiation between the general principles fixed by European environmentalism and the practical circumstances of missionary work. Resettling the Indians was 'an extremely difficult enterprise', not only because of the dangers and hardships of operating in a vastly unknown territory, but also because the 'natural inclination' of many native tribes for a nomadic lifestyle made it challenging to force them permanently into a 'fixed abode'.[249] Siting decisions therefore needed to take into account the necessity of offering certain incentives to the natives, as the French Jesuit Pierre Aimé Lombard (1678-1748) understood perfectly well. Entrusted with the task of founding a mission in French Guiana, he began by identifying a site that satisfied at once European environmental standards (temperate, flat, situated along a river)

[249] 'C'étoit une entreprise d'une exécution très-difficile. Une demeure fixe est entièrement contraire au génie de ces peuples; l'inclination qui les porte à mener une vie errante et vagabonde est née avec eux. Cependant leur penchant naturel céda à la douce éloquence du Missionnaire' (Father Crossard [Cayenne] to Father La Neuville [Procurator-General of the American missions], 10 November 1726; Crossard 1781: 270-71). The same point was made by Father Fauque in two letters to the same Father La Neuville, one dated Kourou, 15 Janvier 1729 (Fauque 1781a: 283), and the other dated Ouyapoc, 20 April 1738 (Fauque 1781b: 384).

and native demands (the selected spot was equidistant from the territory of each tribe); he then immediately planted 'manioc, Indian corn, and several other local roots, enough for the subsistence of those whom he wished to attract by his side'.[250] Founded shortly after 1710, the Kourou mission thrived until 1762 (when the Society of Jesus was disbanded in France and all French territories overseas)[251] and was often praised as a virtuous example of Jesuit 'accommodation'—in this case, a successful compromise between missionary ambitions and native needs.

Jesuit missionary letters can thus be seen as a significant example of positive attitudes towards geographical displacement in the early colonial world, and as a valuable—though not entirely disingenuous—window into the practical projects that these attitudes inspired. While Jesuit *reducciónes* may not be taken as representative of all projects of forced resettlement in early colonial Latin America, they do however share a number of analogies with similar plans developed by other religious groups (particularly Franciscan missionaries) and by secular authorities. Such similarities may be explained in light of the shared intellectual tradition into which these different sets of projects equally tapped: the long tradition of climate theory that, as we have seen, inspired and oriented resettlement programmes by revealing the biopolitical potential of geographical displacement.

Within this relatively unified environmental culture there remained, however, substantial divergences. In the case of resettlement programmes, this fact is confirmed by the numerous expressions of resistance that such schemes aroused not only among native

[250] 'Il y planta du manioc, du bled d'Inde, du mais, et différentes autres racines du pays, autant qu'il en falloit pour la subsistance de ceux qu'il vouloit attirer auprès de lui' (Crossard 1781: 267).
[251] The decision, taken in 1762, was actually halted for eight months and became effective in the Spring of 1763. Subsequent attempts at transforming Kourou into a French settler colony, under the direction of Étienne-François Turgot (brother of the future controller-general Anne-Robert-Jacques Turgot), failed miserably: see Dobie 2010: 219.

communities, but among European observers themselves.[252] To some extent, such forms of opposition found their justification in the inherent ambivalence of European views of displacement.[253] Relocation, as this chapter has shown, had the potential to be an extraordinary tool for individual and collective improvement; but it was also a risky undertaking that could easily end in catastrophe.

Such a tension, which was inscribed within the very foundations of European attitudes to human mobility, was so undeniable that even Viceroy Toledo—one of the principal instigators of such resettlement plans—had to acknowledge the possible downsides of his proposed enterprise. When in 1574 Toledo investigated a recent surge of mortality in the Peruvian *repartimiento* (district) of Valle de Jauja, he was informed that many of the victims had fallen ill after leaving 'their lands and climates' ('sus tierras y temples') to visit the main seat of justice in Lima.[254] The sudden change from the cold highlands of Jauja to the hot coastal plains ('de aquella tierra fría al calor de los llanos y Audiencia de Lima') had to be the main reason for these deaths, the Viceroy concluded in an 'Ordenanza' issued at the end of the same year.

Toledo's climatological explanation of the events in Jauja demonstrates his adherence to the environmental knowledge of the time and suggests that he was aware of the dangers inherent in his resettlement schemes (still, this awareness did not prevent him from pursuing such schemes relentlessly over the following years). It also represents one of the earliest known examples of an explicit causal correlation between altitude change and illness. Toledo's views on the matter have thus far gone unnoticed, though: credit for

[252] Native resistances to resettlement campaigns have been widely investigated: see, for instance, Martin 1996: 196 (primarily on resistance to secular plans); Williams 2005 (on opposition in the Chocó region of Central America).
[253] See above, section 3.2.
[254] 'Ordenanzas sobre pleitos de Indios e instrucción para sus defensores', La Plata, 22 December 1574 (in Toledo 1986: 491).

this discovery is usually given to another Spaniard, José de Acosta S.J., who spent seventeen years in Central and South America between 1570 and 1587 (the decades of Toledo's General Resettlement) and may thus have been familiar with Toledo's 1574 'Ordenanza'.[255] In his best-selling *Historia natural y moral de las Indias* (1590), which was translated into Latin and all main European languages within fifteen years of its publication, Acosta examined at length the physiological effects of altitude change in those who moved between the coastal lowlands of Peru and the Andean sierras.[256] Thanks to the long-lasting success of his treatise, Acosta's insights into altitude change went on to shape medical and scientific views of environmental influence for centuries to come, attracting the attention of authors such as the English scientist Robert Boyle (1627-1691)—who, as we shall see in the next chapter, was actively involved in the environmental debates of his time.[257]

More specifically, Acosta's considerations about altitude change cast a dim light on the convenience of geographical displacement. Although the Spanish Jesuit did not articulate a critique of resettlement schemes in his treatise, others after him would develop his ideas on displacement with specific reference to the forced relocation of native Indians in early colonial America. Writing just one year after the first edition of Acosta's *Historia*, and explicitly building on it, the north-Italian writer Giovanni Botero—himself a Jesuit from his early youth until 1580—argued in his *Relationi universali* that part of the reason why the New World was 'considerably less populated today than it used to be' lay in the 'faulty policies' that the first generation of Spanish colonial officials adopted vis-à-vis the native populations: 'not so much because they ruled them too oppressively, but because they kept transferring them from one place to another, far from their native air; and thus

[255] See Gilbert 1981: 5-7; West 1998: 10-19.
[256] Acosta 1590: 142-44 (3.9).
[257] See Gilbert 1981: 5-7; West 1998: 10-19.

they died'.[258] While Botero did not draw explicit parallels between these early policies and the more recent resettlement schemes that secular and religious authorities had been implementing in the South-American colonies, a consideration of his intended readership (which included Jesuits and Spanish policy-makers) suggests that his silence was a sign of caution rather than of disregard for the contemporary implications of such views.[259] The message, though, was clear: relocation, as a colonial strategy, was a dangerous and ultimately self-defeating practice that destroyed the subjugated populations instead of ameliorating their physical and moral nature.

3.4. Conclusions

The comparative angle adopted in this chapter has made it possible not only to capture the extraordinary pervasiveness of notions of climatic influence at various socio-cultural levels, but also to explore how such notions oriented, and were reoriented by, daily practices and governmental strategies in different geographical areas of Europe and the colonies overseas. By taking into account a wide array of authors and sources (ranging from classically-trained physicians and missionaries to figures of more modest education and renown), and by teasing out the environmental assumptions underpinning these texts, this chapter has aimed to reconstruct some of the forms and contexts of the early modern debate on relocation, in order to show that early modern attitudes to mobility and travel

[258] Botero 1596: 201 (1.4): 'Ma hoggi il Mondo Nuovo è anche meno popolato di prima […] parte per il disordine de gli Spagnuoli in quei principii: non tanto perché affaticassero immoderatamente i popoli: quanto perché li trasportavano da un luogo all'altro lungi dall'aria natia, ove perivano'. The passage is found in the first book of Botero's geographical encyclopedia *Relationi universali*, which is comprised of four books published at different times (plus a fifth book which remained in manuscript until Gioda's modern edition of 1894). Book 1 was first published in 1591, then reprinted together with the others in all subsequent editions. I quote here from the first complete edition, published in Bergamo by Comino Ventura in 1596 and reissued in Venice by Giorgio Angelieri in the same year. On Botero's view of the New World, see Albonico 1990.

[259] On the intended and actual reading publics of Botero's *Relationi*, see, among others, Headley 2000; Fitzmaurice 2007; Descendre 2009.

were much more complex, diversified, and fluctuating than is often assumed. What has particularly emerged is the ambivalent nature of geographical displacement as a way of coping with, and possibly capitalizing on, the transformative effects of place and climate. Though extremely powerful when administered in the right way, geographical displacement was also seen as a dangerous practice that often led to unpredictable and undesirable side effects. Ultimately then, displacement alone could hardly represent a satisfying solution to the problem of coping with environmental influence. A different, and more radical, approach to the matter came to the fore in the second half of the seventeenth century as a joint result of technological, intellectual, and institutional changes in Europe and the European colonies overseas, and it is to such an approach—proactive environmental engineering—that we shall now turn.

CHAPTER 4

ENGINEERING ENVIRONMENTAL INFLUENCE:

PLACE-MAKING, CLIMATE CHANGE, AND HUMAN IMPROVEMENT

> Man has it in his power to dominate all three realms of nature;
> he can rule over the earth's soil, change its climate,
> reshape its elements, alter its boundaries, and expand
> internal communication. Not only does he have this great power;
> he uses it, sometimes to advantage, sometimes to disadvantage.
>
> —Johann Christoph Gatterer[1]

4.1. Introduction: Knowledge and Power

Early modern Europeans developed various ways of coping with the perceived influence of place and climate. Corrective regimen and geographical displacement were two such ways, examined in Chapter 2 and Chapter 3 respectively. Each of these counter-measures, as we have seen, had particular strengths but also weaknesses that elicited debate and ultimately spurred the search for more radical and effective ways of negotiating environmental influence.

This chapter examines direct human intervention on nature as a third major way of coping with environmental influence during the early modern period. In particular, the following pages will explore Europe-wide attempts at regulating and changing the climate of a locality through agricultural 'improvement', landscaping, and urban planning. Early modern schemes of environmental governance are usually investigated from the standpoint of social, agrarian, and economic history,[2] or within the larger context of scientific and

[1] Gatterer 1773: 26-27 (quoted and translated in Reill 1975: 70).
[2] See, e.g., Darby 1970; Thirsk 1978: 164; McRae 2009: 44-54; Hoyle 2011.

intellectual developments in seventeenth-century Europe.[3] Scholars such as Clarence Glacken and Richard Grove, however, have shown that such undertakings were also crucially interwoven with old and new climatic theories.[4] The intimate connection between climatology, political thought, and environmental practice to which Glacken and Grove have directed attention is one that still warrants further investigation; the pre-Enlightenment period, in particular, has been insufficiently studied.[5] In what follows, I intend to contribute to this expanding line of research by showing that early modern attempts at environmental manipulation may be seen more specifically as a response to persisting notions of climatic influence. In particular, I suggest that early modern 'place-making'—the art of transforming the surrounding landscape by means of 'terraculture' and urban management[6]—was in part conceived of, and should therefore be interpreted, as a self-consciously bio-political activity directed to 'the improvement of lands and hands'.[7] This means that belief in environmental influence on the one hand, and a confidence in man's power to renegotiate such influences by means of direct environmental intervention on the other, jointly provided a context for the development of new forms of social engineering that aimed at forging improved, if not ideal, political communities.

The first part of this chapter traces the rise of an ideology of environmental 'improvement' in seventeenth- to mid-eighteenth-century Europe and sets it against the backdrop of broader intellectual and historical developments. Throughout this period, the

[3] See, e.g., Webster 1975: 324-483; Leslie and Raylor 1992a; Barnard 1994; Dixon Hunt 1994; Slack 1999 and 2014.
[4] Glacken 1967: 461-97; Glacken 1970; Grove 1995: 24-30.
[5] Valuable insights, but with reference to a later period, can be found in Huxley 2007; Fressoz 2012.
[6] I borrow the term 'place-making' from eighteenth-century garden theory, and more particularly from the celebrated British landscape architect Lancelot 'Capability' Brown (1716-1783): see Williams 1983; Dixon Hunt 2000. The word 'terraculture' was used in early eighteenth-century England 'to encompass the various activities we denote and separate by "agriculture", "horticulture" and other terms' (Leslie and Raylor 1992b: 1; see also Otten 1985: xix). I use it here to designate various forms of human intervention on the land, including husbandry, silviculture, and hydraulic engineering (more on this below, 4.3.4).
[7] McCormick 2010: 163.

Baconian project of a 'great instauration' of the natural sciences—based on instrumental experimentation, quantitative analysis, and an optimistic appraisal of man's ability to understand and control the physical world—inspired the formation of intellectual circles, societies, and academies both in and outside England.[8] The chapter particularly shows how the activity of such communities and institutions—which, after 1662, included the Royal Society of London and its worldwide network of correspondents—came to redefine the relationship between man and nature on both a theoretical and a practical level, notably by promoting studies of geological and anthropogenic environmental change.

The sources used for this purpose include both printed and manuscript materials, many of which are studied here for the first time. In particular, my analysis rests on a thorough survey of the archival holdings of the Royal Society in London. The chronological continuity and ease of access of the Royal Society's records—as opposed for instance to the limited availability of materials relating to the early 'Académie des Sciences' (for the most part dispersed during the French Revolution)[9]—has been an important reason for focusing primarily on English sources in reconstituting the intellectual climate of those years. As we shall see, another good reason for paying special attention to the Royal Society is that throughout the late seventeenth- and early eighteenth-centuries its extraordinary network of fellows and collaborators was at the forefront of a genuine 'paradigm shift' with respect to environmental matters. Using the Royal Society as a window into the larger world of early-modern environmental science, this chapter sheds light on the complex dynamics of transnational scholarly collaboration in a time of enhanced competition between European nation states.[10]

[8] Webster 1975; Rappaport 1997.
[9] See Demeulenaere-Douyère and Sturdy 1998.
[10] My argument here builds on Sophus Reinert's recent study of competition and collaboration in early-modern political economy (2011). Reinert's examination of the tension between 'secretive and public

Having reconstructed the rise of an ideology of environmental intervention against the background of larger historical developments, the second part of this chapter turns to discuss the central idea of place-making as a means of coping with environmental influence. I first show how various types of place-making (from husbandry and gardening to urban planning and hydraulic engineering) were progressively identified as anthropogenic causes of climate change. I then examine how this new awareness of man's influence on climate ultimately reshaped not only climate theory itself, but also its possible implications for political practice. Engaging with Foucauldian theories of governmentality and bio-power, I particularly suggest that the identification of a network of mutual influences between man and climate paved the way to new uses of space and place as political technologies. A new form of bio-political governance thus emerged in late seventeenth-century England and France that sought to re-engineer human populations by manipulating their living environments.

While most of this chapter focuses on positive views of human intervention on nature and the practical schemes that they inspired, the final section investigates cases of theoretical and practical resistance to the dominant ideology of environmental 'improvement'. Certainly the seventeenth century witnessed an increasing optimism about man's capacity to master the natural world. Not everyone however saw nature as 'dead' matter, readily available to any kind of 'manipulation', 'disruption', and 'exploitation' on man's part.[11] Early-modern environmental thought has often been seen as revolving around the (supposedly unchallenged) notion of man's 'dominion over nature'.[12] More recently, however, historians such as Donald Worster, Karl Appuhn, and Richard Hoyle have

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cultures of learning' (69), as well as his notion of 'emulative cultures of translation' (61), have been particularly fruitful in my research.

[11] Merchant 1990: 20.

[12] Webster 1975: 324. See Grove 1995; Appuhn 2009; Hiltner 2011; Hoyle 2011b.

helpfully called into question this dominant narrative and replaced it with a more nuanced understanding of the purposes and dynamics of the so-called Scientific Revolution.[13] This chapter builds on their insights to show that early-modern ecological sensibilities were diverse and—more often than not—mutually conflicting. Belief in climatic influence, in particular, could inspire human attempts at sweeping environmental change just as well as it could be invoked as a strong reason to oppose such changes. By considering a few examples of resistance to anthropogenic environmental change, the final part of this chapter draws attention to the conflicted nature of early-modern environmental discourse and to the flexibility of climate theory as a rhetorical tool within this discourse.

4.2. Improving Nature

'Wherever men live', the eminent American geographer Carl O. Sauer once noted, 'they have operated to alter the aspect of the Earth, both animate and inanimate, be it to their boon or bane'.[14] Environmental intervention is, in this sense, as old as mankind itself, since there has never been a time in which humans have not transformed the physical world around them.[15] On the other hand, environmental intervention accompanied and justified by an ideology of improvement is a distinct and much more recent phenomenon, whose emergence is largely to be traced back to the late sixteenth and seventeenth centuries. Scholars, indeed, have singled out this period as the cradle of a discourse of environmental

[13] See particularly Worster 1994; Appuhn 2009; Hiltner 2011; as well as John Morgan's recent work on various ways of negotiating wetlands in late Renaissance England ('Flooding in Early Modern England', see Bibliography, section 3). For a similar outlook, but applied to a later period, see Fressoz 2012. The scholarship mentioned here mostly focuses on Western environmental ideas and practices; a much broader overview would be required to take into account non-European perspectives and how they interacted with colonial activities. For two exemplary approaches, see Cronon 1983; Grove 1995.
[14] Sauer 1970: 49.
[15] Dixon Hunt 2000: 8.

improvement that has few (if any) parallels in history, not only for its coherence and pervasiveness, but also for the scale of the transformations that it inspired.[16]

From the late sixteenth century onwards, Europe and the European colonies overseas witnessed an extraordinary degree of environmental activity—ranging from wetland reclamation to forest management, river diversions and experiments in soil fertilization—legitimized by explicit appeals to the 'public good' and often conducted under the aegis of state authorities.[17] Urban, as well as natural, spaces were reshaped and reorganized for multiple purposes, including enhanced sanitation, circulation, and social control.[18] On a smaller scale, the proliferation of old and new manuals on husbandry and horticulture (including Latin classics such as Virgil's *Georgics* and Columella's *De re rustica*) testifies to an awakening interest in landscape-changing practices such as gardening, agriculture, and arboriculture among the wealthy and educated, who could put such advice directly into practice in their own private estates.[19] At different levels and in so many different ways, the seventeenth century can thus be seen as a golden age of what the American landscape architecture historian John Dixon Hunt has aptly called 'place-making': 'an art of milieu' directed at manipulating the nature of a place so as to harness the physical, aesthetic, and spiritual influences that the latter supposedly exerts on its 'inhabitants and users'.[20]

Such developments have mostly been studied in relation to shifting religious sensibilities,[21] the contemporary revival of pastoral and georgic literary forms,[22] and the

[16] Webster 1975: 324-483; Glacken 1976: 462; Hiltner 2011; Warde 2011; Slack 2014.
[17] For England, see, for instance, Elton 1973; Slack 2006: 100. For France, see Morera 2011: 51, 113, 127.
[18] Foucault 2007: 11-23.
[19] Leslie and Raylor 1992b.
[20] Dixon Hunt 2000: 2.
[21] Otten 1985; Glacken 1967; Webster 1975; Leslie and Raylor 1992a; Drayton 2000. Early modern terraculture was invested with deep ethical and religious meanings, especially (though not exclusively) among Protestant communities for whom tending to the land was at once a morally redeeming activity, an

ever-deepening dichotomy between city and countryside that accompanied it in public perceptions.[23] Crucially, however, they were also part of a larger culture of environmental governance rooted in the notion of 'improvement'—a 'bettering' or 'progress' extending to all fields of human activity.[24] 'A new English coinage' that entered into common usage in the wake of Francis Bacon's *Advancement of Learning* (1605), the term 'improvement' had no exact equivalent in other European languages, where it was typically rendered through 'versions of the English words betterment, increase or advance'.[25] But while the word itself may have had a peculiarly English flavour, the notion of improvement firmly belonged to a broader European culture, fostered by, and consolidated through, human mobility, scholarly exchange, and the circulation of technical knowledge across national and linguistic borders.[26] Although England was unquestionably one of the main centres of this movement, other European countries—including France, Italy, and the Netherlands—played an important role in it, sometimes anticipating English developments by several years.

This international dimension of seventeenth-century improvement campaigns, which is often overlooked in a predominantly England-centred scholarship,[27] is well represented in figures such as Humphrey Bradley (*fl.* 1584–1625), the Anglo-Dutch engineer entrusted by the French King Henry IV with the task of 'draining and drying up' all the 'swamps and marshes' of France, so as to turn them into 'land suitable for

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imitation of Adam's edenic lifestyle, and a fulfilment of God's mandate of human stewardship of the earth. I shall return to this point in section 4.3.1 below.

[22] Fowler 1986 (revisited in Fowler 1992); Patterson 1986; Hiltner 2011.

[23] Williams 1973; Hiltner 2011.

[24] Kerridge 1967; McRae 1992; Drayton 2000; Warde 2011; Slack 2014.

[25] Slack 2014: 5-6.

[26] Morera 2011: 19, 56.

[27] For a few notable exceptions, see Ciriacono 1994; Grove 1995; Holmes 2004.

husbandry, pasture or grassland'.[28] Prior to offering his services to the king in 1596, Bradley—born in Antwerp of an English father and a Dutch mother, and fluent in at least four languages (Dutch, English, French, and Italian)—had gained extensive expertise as a hydraulic engineer in his native Brabant, the Duchy of Württemberg, and England. Here, he was notably involved in the land reclamation projects instigated by Queen Elizabeth's General Drainage Act (1585).[29] Reflecting upon his English experience in two distinct manuscript treatises addressed to Lord Burghley—one in Italian ('Discorso sopra il stato delle paludi over terre inundate (volgarmente Fennes)', 1589) and the other in English ('A proiect for the drayning off the fennes', 1593)[30]—Bradley pointed out that improving the eastern Fens was at once a profitable undertaking, a moral imperative, and an urgent political necessity: the region, indeed, was not only a barren 'wildernesse', contributing little or nothing to the national economy;[31] it was also the home of an unproductive and uncivilized population, who could only be turned into 'decent men' ('huomini da bene') by refashioning the place in which they lived.[32]

[28] '[…] que tous les palus et maraiz estant dans nostredit royaume […] soyent desseichez et essuyez par ledit Bradley ou associez ou lesdits propriétaires, et par eux rendus propres audit labour, prairies ou herbages' ('Edit pour le desséchement des marais, portant commission à cet effet à un étranger', Fointainebleau, 8 avril 1599, preamble; quoted in Morera 2011: 63). The edict was printed in Bordeaux in 1599.
[29] Darby 1968: 16; Holmes 2004; Morera 2011: 58.
[30] London, British Library, MS Lansdowne 60/34, fols 85^{r}-89^{r}; London, British Library, MS Lansdowne 74/65, fols 180^{r}-183^{r}. These manuscripts have recently been studied by Clive Holmes (2004) and Raphaël Morera (2006, 2011).
[31] MS Lansdowne 74/65, fol. 180^{v} (quoted in Holmes 2004). Modern scholarship has emphasized how ill-founded such representations of wetland environments were: see Morera 2011: 25-32.
[32] MS Lansdowne 60/34, fol. 86^{v} (quoted in Holmes 2004). See another passage from the same manuscript, here quoted in Darby's translation: 'The dwellers in this desert of common lands, always naked and needy, leave to their successors a heritage of poverty, with what education and discipline, God only knows' (Darby 1968: 266). Bradley made a similar point in a memorandum of 1592 (written in French) about the on-going Anglo-Spanish war ('Memoires sur la guerre presente entre la Reine d'Angleterre et le Roi Philippe'), where he argued that extensive common lands could only breed lazy troublemakers ('gens ocieus et pleins de toute license'): London, British Library, MS Cotton Galba D IX, fol. 106^{r} (quoted in Holmes 2004).

Besides setting the terms for later representations of the Fens as 'a wasteland, "a meer quagmire"' breeding an idle, dangerous, and backward population,[33] Bradley's treatises—whose circulation would merit further study[34]—more generally contributed to a rhetoric of environmental improvement in which economic, social, and moral preoccupations came together to justify intensified human intervention on nature. Bradley's stance, of course, was not entirely new in this respect. In previous chapters, I have shown how early-modern environmental discourse operated at the crossroads between several disciplinary fields, including medicine, ethics, politics, and the natural sciences.[35] Bradley's views on the many benefits of drainage can be situated in this wider intellectual tradition, which in the late sixteenth century—Bradley's formative period—was being reinvigorated by internationally renowned scholars such as Joseph Justus Scaliger (1540-1609), the French-born son of the Italian humanist Julius Caesar Scaliger (see Chapter 1). Writing to King Henry IV from his new residence in Leiden (where he had recently been invited to replace Justus Lipsius as professor of philosophy), Joseph Scaliger observed that wetland drainage was not only economically profitable, as the Dutch experience showed so well, but also beneficial to the local populations, whose physical and mental integrity suffered greatly from the infectious 'evil vapours' arising from the swamps.[36]

Scaliger and Bradley's views on drainage allow us to catch a glimpse of a mind-set that increasingly gained momentum from the late sixteenth century onwards, and which is

[33] Holmes 2004 (quoting an unreferenced seventeenth-century source); for more on the Fens debate in sixteenth- and seventeenth-century England, see below, section 4.5.1.
[34] The issue is briefly discussed in Holmes 2004, but more research appears necessary in this direction.
[35] For a similar view, see Leslie and Raylor 1992b; Dixon Hunt 2000; Grove 2005; Hiltner 2011; Moreira 2011; Slack 2014.
[36] 'Les palus rendent beaucoup de mauvayses vapeurs, et infectent l'ayr' (Paris, Bibliothèque Nationale, MS Fr. 3175, fol. 179^{r}; quoted in Morera 2011: 18). The letter—a real treatise on hydraulic engineering—bears the date 5 March 1602. It is not included in Paul Botley and Dirk Van Miert's recent edition of Scaliger's correspondence (2012).

of primary importance for understanding the environmental culture of this period. A combination of historical and intellectual factors—often interacting with each other in complex ways—provides the backdrop against which such a mind-set was able to establish itself and influence actual practice. Among such factors were increasing competition among Europe's main powers for economic and territorial supremacy both in Europe and in the colonies,[37] shifting demographic and socio-economic patterns,[38] the rapid development of joint-stock chartered companies operating at the junction between state's policy and private profit,[39] and the rise of a mercantilist ideology linking the state's power to population growth and a more intensive exploitation of the country's economic potential, with a view to producing an exportable surplus.[40]

As a result of this multifaceted context, seventeenth-century thinkers and policy-makers progressively came to identify the physical space of the nation as a critical object of governmental attention. Such a 'territorialization of politics', as it has fittingly been called,[41] is also reflected in shifting lexical usages: for instance, it was in this period—between the end of the sixteenth and the early seventeenth centuries—that the English word 'country' began to signify at once 'indivisibility of political and legal state, physical environment, and social community', thus pointing to the growing centrality of territorial imagery for the self-fashioning of early modern nations and societies.[42]

The increasingly tight relationship between politics, economy, and geography is further reflected in the numerous natural and political histories of European and extra-European countries or regions that began to circulate from the late sixteenth century

[37] See, for instance, Ormrod 2003; Reinert and Røge 2013; Fusaro 2015.
[38] Thirsk 1978: 164-65; Grigg 1980 (Chapter 6).
[39] Dent 1973; Dessert 1984; Mitchell 2015.
[40] Glimp 2003.
[41] Descendre 2009.
[42] Leslie and Raylor 1992b: 3.

onwards. These included Giovanni Botero's *Relationi universali* (published between 1591 and 1596),[43] Pierre d'Avity's *Estats, empires et principautez du monde* (1614),[44] and *Ireland's Naturall History* (1652)—the first part of an ambitious editorial project carried out by the Dutch brothers Gerard and Arnold Boate under the patronage of the Anglo-German polymath Samuel Hartlib, one of the most influential figures in mid-seventeenth-century English science.[45] Despite fundamental differences in background, scope, and purpose, all of these works belonged to a common culture that over the course of the seventeenth century contributed significantly to the rise of new disciplines such as economic geography, political economy, and geopolitics, while also deeply reshaping environmental ideas and attitudes.[46]

The combined influence that changing socio-economic conditions, enhanced territorial concerns, and shifting political ideologies had on the development of a rhetoric of environmental improvement has one of its earliest and most remarkable expressions in the desiccationist 'fever' that hit France at the turn of the seventeenth century.[47] As Raphaël Morera has shown, the wide-ranging drainage schemes launched by Henry IV in 1599 were elaborated under the joint pressure of social, technical, and ideological circumstances, including the 'failure of medieval and sixteenth-century modes of managing marshland' caused by more than three decades of civil unrest; 'the increasing

[43] On the publishing history of Botero's *Relationi universali*, see above, 3.3.3. For an in-depth study of the work, see Descendre 2009.
[44] D'Avity's work, which owed much to Botero's *Universal Relations*, was extremely popular and enjoyed numerous reprints and translations all over Europe throughout the seventeenth century. See Gilbert 1919.
[45] On the Boate brothers, see Coughlan 1994. On Hartlib, see Webster 1975; Greengrass et al. 1994.
[46] Earlier works such as Flavio Biondo's *Italia illustrata* (written in the mid-fifteenth century and published in 1474), Gonzalo Fernández de Oviedo's *Sumario de la natural historia de las Indias* (1526), Sebastian Münster's *Cosmographia* (published in Latin in 1544 and thereafter translated into many European vernaculars), and Andrew Boorde's *Fyrst Boke of the Introduction of Knowledge* (1547) were important in establishing a tradition of chorographical description, but they appear radically different in character from later works such as those mentioned above. Useful remarks on the difference between sixteenth-century chorographies and seventeenth-century natural histories are in Webster 1975: 421; Barnard 1994.
[47] Morera 2011: 10-18.

territorial influence of ruling elites'; and the growing importance of a mercantilist credo revolving around demographic growth and intensive land exploitation.[48] The trends identified by Morera for France are mirrored elsewhere in Europe: in England, for instance, texts such as Bacon's essay 'Of the True Greatness of Kingdomes and Estates' (1625), Walter Raleigh's *Observations Concerning the Causes of the Magnificency and Opulence of Cities* (composed in the first decade of the seventeenth century, but published posthumously in 1651), and Robert Burton's general preface to *The Anatomy of Melancholy* (1621) similarly testify to the emergence of an ideology of environmental improvement from a shared set of politico-economical and populationist concerns.[49]

Although such trends can already be documented for the early decades of the seventeenth century, it was only in the second half of the century that a fully developed ideology of improvement began to take root in England, France, and other European countries, particularly through the work of increasingly institutionalized scientific circles—including the Royal Society of London (since 1662),[50] the 'Académie des Sciences' (founded in Paris in 1666),[51] and prestigious Italian academies such as the 'Accademia del Cimento' in Florence (1657-1667), the 'Accademia Fisico-Matematica' in Rome (1677-1698), and the 'Accademia degli Inquieti' in Bologna (created in 1690, and transformed into the new 'Accademia delle Scienze dell'Istituto' in 1714).[52] Such institutions—often evolving from less formal scientific networks (such as the Hartlib circle in England and Théophraste Renaudot's 'Bureau d'adresse' in Paris)[53]—not only engaged in lively exchanges with each other, both by means of personal epistolary contact and

[48] Morera 2011: 38, 51, 53.
[49] See Gowland 2006; Fitzmaurice 2007. I have examined the issue further in a separate, forthcoming study ('Debating Greatness', see Bibliography, section 3).
[50] Webster 1975; Hunter 1989.
[51] Hahn 1971.
[52] Cavazza 1990; Rotta 1990; Rappaport 1997; Donato 2000; Favino 2008.
[53] Solomon 1972; Webster 1971 (see in part. 67-77 on Hartlib's project of an 'Office of Address' modelled after Renaudot's *Bureau*); Greengrass et al. 1994.

through an ever-expanding number of academic journals and gazettes;[54] they were also closely related to older, and supposedly more conservative, establishments such as universities and professional colleges.[55]

Modern narratives have often overstated the distance between old and new centres of learning; in truth, however, there never seems to have been such a clear divide between the two.[56] For instance, numerous Fellows of the Royal Society—especially in its early stages—were Oxford or Cambridge graduates, and members of relatively traditional institutions such as the London College of Physicians, which remained a stronghold of Galenism throughout the seventeenth century. The same can be said of many Italian academies, which positioned themselves both in continuity and in discontinuity with the 'official culture' represented by the universities.[57] Courtly milieus such as the French royal court, the papal court in Rome, or the grand-ducal court in Florence—all of which had provided patronage for scientific and cultural production in the sixteenth century—also continued to play a pivotal role in this sense in the centuries that followed.[58] The boundaries between such diverse centres of learning were thus porous and ill-defined, with frequent cross-affiliations and constant collaboration and exchange between their members. As we shall see, such a continuum between tradition and innovation in the production and circulation of scientific knowledge also had a bearing on the modern

[54] Among the most important, it is worth mentioning the *Philosophical Transactions of the Royal Society* (since 1665); the French *Journal des Sçavans* (since 1665), *Histoire et mémoires de la Royale Académie des Sciences* (since 1699), and the mostly Jesuit *Journal de Trévoux* (1701-1782); the *Giornale de' letterati*, printed in Rome from 1668 onwards; and the *Acta eruditorum*, published in Germany between 1682 and 1782. See Rotta 1990: 114; Rappaport 1997 (Chapter 1).
[55] See Purver 1967 (and its helpful review by Hill 1968); Boehm and Raimondi 1981 (on academies, universities, and scientific societies in Italy and Germany); Lux 1991.
[56] Dear 2009: 99-101. For a similar point for the fifteenth and sixteenth centuries, see Lines 2006.
[57] Girardi 1995: 19 (with specific reference to the sixteenth-century *Accademia degli Infiammati* in Padua); Calcaterra 2009 (on connections between humanism and the university in Bologna).
[58] See Findlen 1993; Gross 2002; Boschiero 2007; Andretta and Nicoud 2013; Petto 2015.

ideology of improvement, which was itself the result of a long-standing intellectual tradition revisited under new historical conditions.

Indeed, long before landscape architecture established itself as a separate domain with a highly specialized literature of its own,[59] place-making had represented 'a fundamental mode of human expression and experience', and as such it had been discussed in a number of works spread across various disciplinary fields, including architecture, husbandry, horticulture, hydraulics, medicine, and natural history.[60] Classics such as Xenophon's *Oeconomicus,* Vitruvius's *De architectura*, Virgil's *Georgics*, and the corpus of the *Rei rusticae scriptores* (which included Latin treatises on agriculture by Cato, Varro, Columella, and Palladius) continued to be printed, translated, and widely read until at least the mid-eighteenth century,[61] while modern equivalents such as Leon Battista Alberti's *De re aedificatoria* (first printed in 1485),[62] Charles Estienne's *Praedium rusticum* (1554),[63] and Konrad Heresbach's *De re rustica* (1570)[64] also enjoyed a comparable success, with multiple editions, translations, and imitations all over Europe.[65] This revival of interest in 'terracultural' affairs reached its peak around the mid-seventeenth century, when botany, husbandry, and landscape architecture became fashionable subjects 'within institutes of higher education',[66] as well as matters of acknowledged public relevance.

[59] Dixon Hunt (2000: 1) echoes a common view when he dates the constitution of landscape architecture as a self-standing discipline around the first half of the nineteenth century.
[60] Dixon Hunt 2000: 8.
[61] McRae 1992; Thirsk 1992.
[62] For the history of Alberti's text and an overview of its European reception, see Rykwert 1988: xviii-xxi.
[63] The work was translated into French by Estienne himself, and published in 1564 in an enlarged French edition by Estienne's son-in-law Jean Liébault, under the title *Maison Rustique* (Dixon Hunt 2000: 4). An English translation by Richard Surflet appeared in London in 1600, and was reprinted several times (McRae 1992: 38).
[64] On Heresbach's treatise, see Oestreich 1976: 320-21; McRae 1992: 38. The work was translated into English by Barnabe Googe in 1577, under the title *Foure Books of Husbandry*.
[65] McRae 1992; Thirsk 1992; Dixon Hunt 2000: 3-4.
[66] Dixon Hunt 2000: 6; Leslie and Raylor 1992b; Drayton 2000.

The specificity of early modern place-making, however, does not merely lie in its growing popularity at all levels of society, nor in the ever greater interest manifested in it by governments and public authorities. Although such aspects were undoubtedly important—the latter, in particular, because state patronage made it possible to pursue landscape-changing projects of an unprecedented scale—they cannot fully explain the transformations that occurred in the theory and practice of place-making over the course of the seventeenth century. In particular, why did a unified culture of environmental intervention emerge and establish itself in this period and not earlier? The answer, I suggest, lies in the dynamics and contexts of seventeenth-century intellectual production.

Most, if not all, of the scientific circles and institutions mentioned above—from the Royal Society to the Florentine 'Accademia del Cimento'—operated under the inspiration of a research programme that emphasized the encyclopaedic character of knowledge and the practical utility of the natural sciences for national enhancement. This tightening alliance between natural and politically-motivated inquiry—apparent in the very titles of many influential works of this period, including William Petty's *Political Anatomy of Ireland* (composed in 1672 and first published in 1691)[67]—had two major consequences that are worth singling out here. First of all, it established the idea that an accurate knowledge of a country's environmental qualities—gained, for instance, by means of land surveying, map-making, and chorographical writing—was indispensable not only for taking full advantage of the country's natural resources, but also for enabling interventions and 'improvements' that would further maximize its economico-political potential.[68] In this perspective, seventeenth-century place-making was characterized by an unprecedented

[67] The notion of 'political anatomy' actually dates back to Samuel Hartlib, who intended it as a form of 'natural history extended to embrace geographical, economic and social phenomena', and arranged on a regional basis (Webster 1975: 423). See Hartlib 1648.
[68] Grove 1995; Drayton 2000. Specifically on surveying and map-making, see, among others: Fordham 1929; Jacob 1992; Petto 2015.

degree of interaction between the scientific knowledge of a given territory and wide-ranging plans of territorial governmentality. Moreover, the overlap between natural philosophy and political concerns promoted research in disciplinary domains that had previously attracted little attention, and some of which never actually existed as such before. Statistics (then known as 'political arithmetic'), demography, political economy, and economic geography were only some of the fields that began to be explored and formalized in this period, at the crossroads between natural science and political theory.

As an institution concerned with the advancement of all forms of human knowledge for the sake of the 'public good', the Royal Society is exemplary of many of these transformations.[69] A rapid survey of the subject headings under which the Royal Society classified the hundreds of scientific papers it received from all over the globe shows not only the breadth of interests cultivated by its members—ranging from 'Staticks' and 'Mechanicks' to 'Physiology', 'Zoology', 'Trades', and 'Travels'[70]—but also the novel connections that the Fellows were able to establish between previously distinct fields of knowledge: the 'political arithmetic' of William Petty and John Graunt, for instance, emerged from just such a fresh encounter between mathematics, environmental medicine, natural philosophy, and political analysis.[71] Even when such cross-disciplinary overlaps were not especially innovative in and of themselves, they acquired new meaning in the light of the methodologies and epistemologies that sustained them.

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[69] Miller 1999: 185.

[70] The 'Classified Papers' collection at the Royal Society archives is comprised of twenty-five volumes covering the period 1660-1741. Among the subject headings (made directly from the content of the papers, and thus faithfully reflecting seventeenth- and early-eighteenth-century disciplinary categories) are: Arithmetick, Algebra, Geometry, Trigonometry, Surveying, Opticks, Perspective, Sculpture, Painting, Music, Mechanicks, Trades, Physiology, Meteorology, Pneumaticks, Weather, Staticks, Hydrostaticks, Hydraulicks, Hydrology, Architecture, Ship-building, Geography, Navigation, Voyages, Travels, Astronomy, Mineralogy, Magneticks, Botany, Agriculture, Pharmacy, Chemystry, Anatomy, Surgery, Monsters, Longevity, Physick, Zoology, Grammar, Chronology, History, Antiquities, Inoculation.

[71] Buck 1977; Rusnock 2004. For more on Petty and Graunt, see below, 4.4.

A case in point is that of meteorology and agriculture. These two disciplines had been closely related ever since Antiquity; indeed, elements of agrometeorology can already be found in Hesiod's *Works and Days* (a didactic poem on husbandry composed around 700 BC), as well as in Virgil's *Georgics*. Although such texts remained authoritative sources of agricultural knowledge throughout the early modern period,[72] seventeenth-century agrometeorology differed from its earlier versions in three fundamental respects: first, the quantitative nature of the data collected to support its claims; secondly, the use of instruments—such as barometers, thermometers, and hygrometers—in order to collect such data; and thirdly, the sheer wealth of empirical information which was now available, thanks to multiple daily observations and systematic comparison of weather journals compiled in different cities, regions, or countries (see Figures 14 and 15).

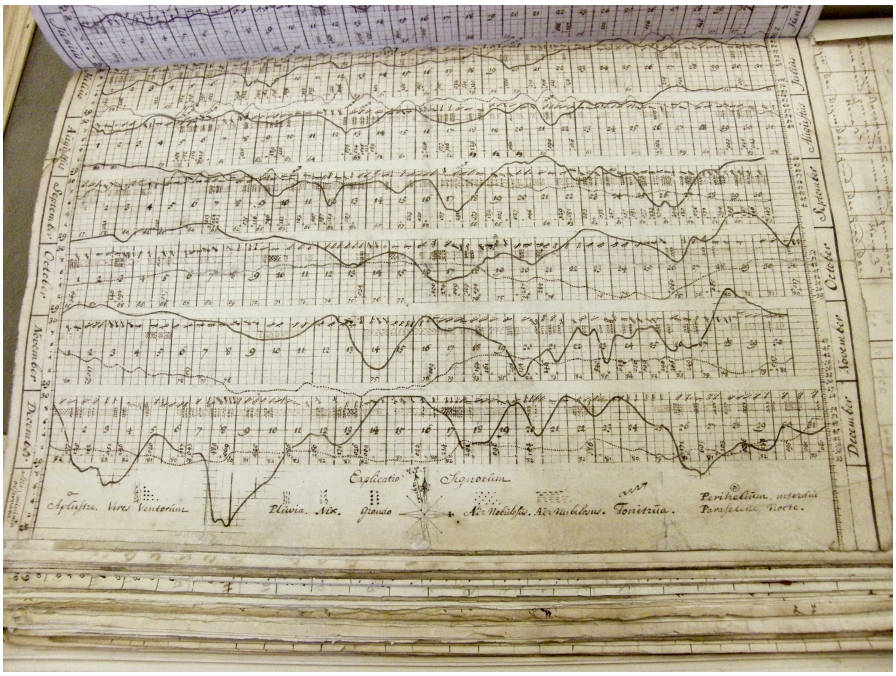
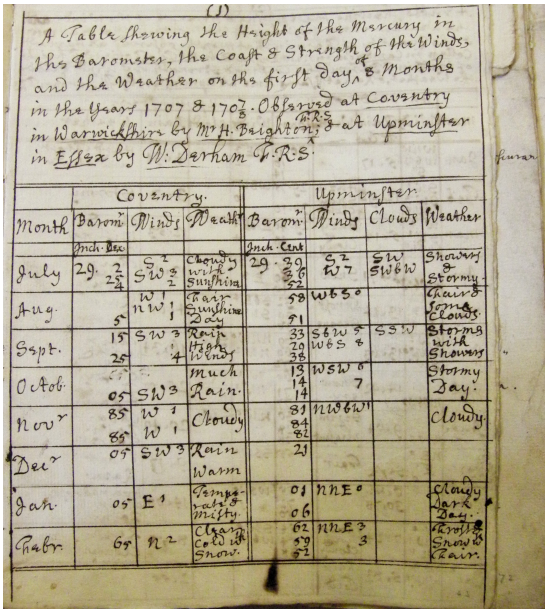


Figure 14 (above). Detail of weather chart by Nicolaus Cruquius, Leiden, 1724 ('Tabula meteorologica Lugduni Batavorum. Anno 1724'). London, Royal Society, Classified Papers, 5/33.

[72] Fowler 1992; Haskell 2003.



A Table Shewing the Height of the Mercury in the Barometer, the Coast & Strength of the Winds and the Weather on the first day of 8 Months in the Years 1707 & 1708. Observed at Coventry in Warwickshire by Mr H. Beighton, M.R.S. & at Upminster in Essex by W. Derham F.R.S.

Month	Coventry. Barom. Inch. Dec.	Winds	Weath	Upminster. Barom. Inch. Cent.	Winds	Clouds	Weather
July	29. 2 2 4	S W 2 2	Cloudy with Sunshine	29. 29 28 28	S 2 W 7	S W S W W	Showers & Stormy
Aug.	5	W 1 N W 1	Fair Sunshine Day	28 31	W b S 6		Clear & fine Clouds
Sept.	15 25	S W 3 4	Rain High Winds	33 30 38	S b W 5 W b S 8	S S W	Storms with Showers
Octob.	05	S W 3	much Rain.	13 14 14	W S W 6 7		Stormy Day.
Nov.	85 85	W 1 W 1	Cloudy	81 84 82	N W b W		Cloudy
Dec.	05	S W 3	Rain Warm	21			
Jan.	05	E 1	Temperate & Misty	01 06	N N E 0		Cloudy dark Day.
Febr.	65	N 2	Clear Cold & Snow.	02 59 52	N N E 3 3		Frost & Snow & Rain

Figure 15 (above). Comparative weather chart by Henry Beighton (Coventry) and William Derham (Upminster), 1707-1708. London, Royal Society, Classified Papers, 5/14.

Natural history was similarly revived in this period in a fruitful tension between tradition and innovation. In the 1670s, for instance, Pliny the Elder's *Naturalis historia* provided the model for Robert Plot's ambitious plan of a natural history of England, possibly inspired by Hartlib.[73] The project, known under its working title of 'Plinius Anglicus' ('The English Pliny'), was never completed, despite enthusiastic support from Robert Boyle and other prominent intellectuals.[74] Still, Plot's vision stimulated analogous undertakings by other Royal Society Fellows, including the diarist and antiquarian John Aubrey (1626-1697), who wrote natural histories of his native Wiltshire and Surrey.[75] The county-based

[73] Webster 1975: 423.

[74] London, Royal Society, Classified Papers, 22i/12; London, Society of Antiquaries, MS/85. See DNB, article 'Plot, Robert (*bap.* 1640, *d.* 1696)' (by A.J. Turner). Plot only managed to publish two parts—*Natural History of Oxfordshire* (1676) and *Natural History of Staffordshire* (1686)—and was working towards a third (a natural history of London, Middlesex and Kent) when he died in 1696.

[75] Aubrey's *Natural History of Wiltshire*, composed around 1675 and later revised, remained unpublished. The text survives in two manuscripts, one (London, Royal Society, MS/92) copied in 1691 from Aubrey's first draft (submitted to the Royal Society in 1675), while the other (Oxford, Bodleian Library, MS Aubrey 1-2) is an autograph dated 1685 and containing Aubrey's final corrections. In the same period, Aubrey also started working on a *Perambulation of Surrey*, with a view to writing a natural history of the county, which had been commissioned to him by the royal cosmographer John Ogilby. This work too was left unpublished (Oxford, Bodleian Library, MS Aubrey 4). On Plot and Aubrey, see Hunter 1975: 70-73, 101.

model adopted by Plot, Aubrey, and most seventeenth-century English chorographers not only made the task of compiling a general natural history of England more manageable;[76] it also fit nicely within a collaborative culture of learning that sought to produce knowledge by 'collecting' and 'collating' vast amounts of empirical data.[77]

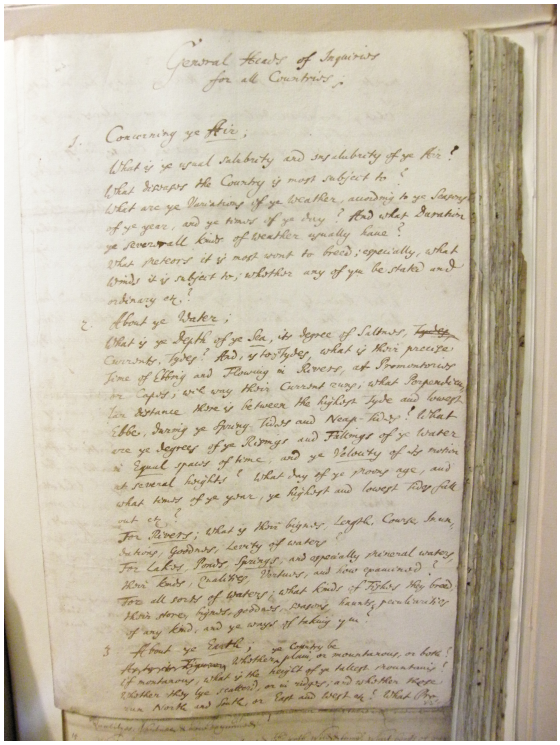


Figure 16 (above). Henry Oldenburg, 'Generall heads of inquiries for all countries' (1669). London, Royal Society, Classified Papers, 19/43.

This collaborative spirit, already apparent in Samuel Hartlib's plans for a 'universal reformation' in the 1640s-1650s, became ever more prominent in the following decades as scholarly networks and transnational scientific projects—such as the Royal Society's plan

[76] Webster 1975: 427.

[77] Barnard 1994. While this collaborative culture has precedents in the previous century (see, e.g., Findlen 1996), it distinguishes itself for its increasing institutionalization and for the crucial role played by journals and gazettes in circulating knowledge and facilitating networking. See below in this section for more details on the role of journals and gazettes.

for a universal history of air based on comparative meteorological observations[78]—developed throughout the continent. National and international cooperation was presupposed, and actively sought, for many intellectual ventures of this period—from the numerous questionnaires proposed by the Royal Society to their English and foreign correspondents with the purpose of gathering information on the natural and economic history of 'all countries' (see Figure 16 above),[79] to the comparative weather charts published in scientific journals such as the *Philosophical Transactions of the Royal Society* and the *Histoire et mémoires de l'Académie Royale des Sciences*.

In a period of enhanced competition among Europe's main powers, such collaborative enterprises often took a slightly paradoxical form. On the one hand, international cooperation was increasingly recognized as an essential precondition for each country's own national development; on the other, international relations were often fraught with violence and conflict—be it in the form of open war or in the indirect guise of commercial and naval rivalry—and, more importantly, they were explicitly conceptualized as such by those very intellectuals who dreamed of, and worked towards, the establishment of a European republic of sciences and letters.[80] Nowhere is this ambivalent mixture of admiration, rivalry, and fear clearer than in the intricate intellectual relationship between

[78] See a letter sent on 1 January 1725 by Nicola Cirillo (1671-1735), professor of Medicine at Naples since 1706, to James Jurin (1684-1750), FRS and Fellow of the London College of Physicians, in which Cirillo requests thermometers and barometers in order to collaborate with the Royal Society on its project of an 'Aëris historiam ex undique collectis meteorologicis observationibus' (London, Royal Society, Classified Papers, 5/27). Cirillo's letter was read before the Royal Society on 11 March 1725; for Jurin's response, see Jurin 1996: 149.

[79] See Henry Oldenburg's 'General Heads of Inquiries for all Countries' (London, Royal Society, Classified Papers 19/43, now printed in Hunter 2015: 79-80), compiled around 1669 but based on an earlier list by Robert Boyle. Around 1678, Robert Plot published a similar list of *Enquiries to be propounded to the most Ingenious of each County in my Travels through England and Wales, in order to their History of Nature and Arts*, with a view to collecting material for his projected *Plinius Anglicus* (an earlier version of this list had appeared in 1670, under the title *Quaer's to be propounded to the most ingenious of each County in my Travels through England*).

[80] See, for instance, John Beale's unfinished manuscript *From Utopia* (*c.* 1683; London, Royal Society, MS/366/1/6; see Slack 2013: 153) and the epistolary exchanges between Henry Oldenburg and Robert Boyle before the outbreak of the second Anglo-Dutch war in 1665 (London, Royal Society, Early Letters, OB).

England and the Netherlands around the time of the Anglo-Dutch wars of 1652-1674—a topic most recently investigated by Lisa Jardine, but still warranting further attention.[81]

It was in this pan-European context—prefigured at the turn of the seventeenth century by Bacon's dream of an encyclopaedic 'advancement of learning' in the service of public welfare and political greatness, and subsequently nourished by the work of countless scientists and intellectuals spread across old and new centres of learning—that a new ideology of environmental intervention unfolded in the seventeenth century. Keeping this context firmly in mind, we shall now turn to consider more specifically, first, the relationship between place-making and climate theories, and then the bio-political projects that such a relationship inspired.

4.3. Place-Making and Climate Change

The previous section has illustrated the intimate connection between seventeenth-century place-making practices and the new ideology of environmental improvement that sustained them. Among the factors enabling such an ideology to emerge and take root, I ascribed a particular importance, on the one hand, to the institutional contexts and collaborative nature of seventeenth-century scientific debate, which affected how environmental knowledge was produced and shared in this period; and, on the other hand, to the growing interaction between scientific research and political power, which led both scientists and policy-makers to recognize the land and its management as critical governmental objects. In this section, I shall bring into focus some of the most important types of early modern

[81] Jardine 2008. Jardine's book is to date the only complete (though inevitably not exhaustive) investigation of Anglo-Dutch cultural exchange in the seventeenth century. For a similar study, but from the Dutch perspective, see Van Bunge 2003. On Anglo-Dutch political and diplomatic relations before the outbreak of the first war in 1652, see the classic study by Van Dorsten (1962) and, more recently, Poot 2013. On Anglo-Dutch intellectual relationships at a slightly later date (early eighteenth century), see Bots 1983.

place-making, including gardening and horticulture, husbandry, forestry, hydraulic engineering, and urban planning. For each of these activities, I shall particularly raise the question—further explored in the remainder of this chapter—of the impact that it was thought to have on climate and thus, through climate's influence, on human well-being and national development. These brief remarks, which I propose here with no pretence of exhaustiveness, are meant as helpful preliminaries to the more detailed discussion of environmental and human improvement that will follow in section 4.4.

4.3.1. Gardening and Horticulture

Gardening was an extremely popular activity in the early modern period, as the numerous botanical, medicinal, and pleasure gardens established in this period all over Europe and the European colonies overseas amply attest.[82] New aesthetic sensibilities and a scientific interest in botany—sparked by the appearance in print of the works of Theophrastus, Dioscorides, Pliny, and other ancient naturalists, as well as by the encounter with foreign plant species in the New World[83]—were not the only reasons behind this growing passion for gardens: in the early modern period, garden-making was a complex cultural phenomenon with rich spiritual, intellectual, and political implications. The extraordinary pervasiveness of horticultural imagery in seventeenth-century literature has been explained by Charlotte Otten, Philip Almond, and other scholars in light of contemporary religious sensibilities. The Garden of Eden, progenitor and model of all its earthly imitations,

[82] Drayton 2000 (Chapters 1-3); Grove 1995: 13-14; McClellan III 1992 (Chapter 2).

[83] Unlike Theophrastus's works, which before the fifteenth century (the first Latin translation is of 1486) were mostly known via Pliny's *Naturalis historia* (itself printed for the first time in 1469), Dioscorides's *De materia medica* (composed in the first century AD), continued to be widely read in the medieval period; however, the publication of the Aldine edition of the Greek text in 1499 (translated into Latin by Jean Ruel in 1516) marked an important step towards the scientific study of botany in the Renaissance. See Stearns 1970 (Chapter 2); Grove 1995: 74; Drayton 2000: 5-14. On the relation between botany and colonialism, see also Crosby 1972; Schiebinger and Swan 2004; Bleichmar 2012.

represented the ideal of a pre-lapsarian world in which man and nature enjoyed a perfect harmony. In striving to reproduce the beauty and pleasure of such paradisal environment, early modern garden-makers were thus, in a sense, pursuing the dream of regaining—if only partially and derivatively—that lost perfection.[84] The spiritual dimension of horticultural practice appears to have acquired particular importance in Puritan England, where millenarian expectations created a fertile soil for hopes of spiritual regeneration.[85] Far from representing a confessionally-coloured phenomenon, however, this particular view of garden-making as a morally and spiritually uplifting activity extended to areas of seventeenth-century English culture that were only peripherically touched by Puritan millenarianism. Thus the Anglican John Evelyn (1620-1706), the author of numerous works on horticulture and a passionate gardener himself, conceived of garden-making in very similar terms to those of the Puritan Ralph Austen (1612-1676), author in 1657 of an influential treatise on *The Spiritual Use of an Orchard or Garden of Fruit-Trees*. Evelyn and Austen had one more thing in common: they were Fellows of the Royal Society in the very same years, as were many other prominent horticultural theorists of the time, including their common friend John Beale (1608-1683).[86] Thus, seventeenth-century horticulture was as profoundly intertwined with contemporary scientific culture as with the religious sensibilities of the time.

Indeed, 'aside from the symbolism of redemption and recreation' suggested by the biblical imagery of Eden as a garden, there were other—more practical and literal—ways in which seventeenth-century horticulture could be taken as a means of remoulding and improving human nature.[87] As the noted historian of gardens John Dixon Hunt has shown,

[84] See Almond 1999: 91; Otten 1985.
[85] Leslie 1992: 156; Otten 1985.
[86] For more on Beale, see below, 4.4.
[87] Grove 1995: 13.

gardens were often conceptualized in the early modern period as controlled, concentrated spaces where the relationship between physical and human nature could be explored, experienced, and experimented with.[88] Describing early modern gardening as a 'privileged' form of place-making, Dixon Hunt suggests that horticulture and other forms of landscape architecture were 'concentrated' and 'perfected' ways of manipulating the surrounding environment towards a desired end.[89]

The full implications of this notion become clear when we take into account the larger culture from which these horticultural theories and practices emerged. Seventeenth-century garden-makers often explicitly conceived of their own activity as part of an ambitious plan to recreate paradise on earth by literally engineering micro-climates that would foster collective human improvement. As Richard Grove has shown, such views on the transformative powers of gardens largely derived from 'established Hippocratic ways' of understanding the relationship between man's health and environmental factors.[90] In this perspective, gardens were especially valuable as they offered a controlled space in which environmental influence could be tested and manipulated in order to achieve intentional transformative effects.[91] Later in this chapter, we shall see indeed that the works of mid- and late-seventeenth-century English theorists such as John Beale and John Evelyn explicitly theorize gardening as an activity that may enable man to reshape climatic influence through landscape changes, and human character through both. First, however, let us turn to other major forms of environmental management—first among all, agriculture.

[88] Dixon Hunt 1994: 332. Also see Otten 1985; Chambers 1992; Leslie 1992; Parry 1992.
[89] Dixon Hunt 2000: 11.
[90] Grove 1995: 13. See also Leslie and Raylor 1992b: 3-4.
[91] See Parry 1992.

4.3.2. HUSBANDRY

Ever since the first vegetal and animal species were domesticated in the Near East and in South-West Asia about 12,000 years ago, the history of husbandry has been one of entrenched traditions, sudden crises, and slow-paced technical revolutions.[92] One such revolution took place during the early modern period, when changes in rotation and fertilization systems, technological advances, higher investments, and further social developments made it possible to achieve 'a strong increase in the productivity of labor and in marketable agricultural surplus'[93]—although clearly the size and pace of such transformations varied deeply among countries and even regions within the same country.[94] Notably, Europe's 'agricultural revolution' of 1560 to 1767 was accompanied by a significant renewal of interest in agriculture as a scientific discipline.[95] Alongside other factors, the activity of newly established centres of learning, such as academies and scientific societies, came to play a critical role in this process. After its foundation in 1662, the Royal Society particularly became one of the major clusters of agricultural research in Europe and the centre of a lively scientific network with partners all over the world.

The Society's archives in London hold many unpublished writings bearing witness to the Fellows' keen interest in land management and to the 'revolution in terracultural thinking' that they helped to bring about.[96] Some of these materials were sent to the Royal Society by external collaborators all across the country, in response to a series of

[92] Mazoyer and Roudart 2006: 71-72, 313.
[93] Mazoyer and Roudart 2006: 314.
[94] On France, see Bourde 1967; on Italy, see Sereni 1961.
[95] Kerridge 1967: 328, 338. Kerridge's periodization, and more generally his notion of an 'agricultural revolution', have elicited some debate among agrarian historians. In particular, Joan Thirsk has recently suggested that what took place in the early modern period was not so much a revolution as 'a major surge of an agricultural alternative to mainstream cereal-based farming' (Brookfield 2013: 187, commenting on Thirsk 1997). For an overview of critical positions, see Overton 1998 (Chapter 1).
[96] Leslie and Raylor 1992b.

'Enquiries concerning Agriculture, for Arable and Meadows' published in the very first issue of the *Philosophical Transactions* (March 1665), and revolving around the central question of agricultural improvement. Other information was drawn from foreign publications, carefully scrutinized during Society meetings and often translated into English to ensure a wider circulation.[97] In its quest for up-to-date agricultural knowledge, the Society could also rely on its ever-expanding epistolary network, which included correspondents in Lisbon, Zurich, Padua, and the colonies overseas.

This constant flow of technical information across regional and national boundaries—further attested by the numerous editions and translations of old and new works on husbandry published in this period[98]—also fostered a new awareness of the relationship between land management and climate change. Speculation in this sense dates as far back as to the fourth century BC, with Theophrastus's claims of a causal link between land clearance, rainfall decline, and further climatic change (see below, 4.3).[99] However, it was not until the seventeenth century that the first consistent theories of anthropogenic climate change—based on wide-scale observation in Europe and the European colonies overseas—began to emerge.[100] Two steps were necessary in this direction: first, tracking atmospheric and meteorological variations at a more-than-local level; second, relating them to different patterns of land use. Both were greatly facilitated by the international settings of early-modern scientific debate and by the new methods of knowledge acquisition and sharing that they promoted. More importantly for our present

[97] For instance, in March 1670 John Evelyn read out before the Society Edward Montaigu's translation of a Spanish paper on a new invention called the 'sembrador' ('sower'): London, Royal Society, MS/366/1/3. A letter of Evelyn on the same topic was then published in the *Philosophical Transactions* in June 1670 ([60]: 1055-65). Similarly, translations of agricultural excerpts taken from a collection of Jesuit missionary letters printed in Paris in 1713 were read at a Society meeting only a few months later (London, Royal Society, Classified Papers, 10i/42 (4 March 1714).
[98] Leslie and Raylor 1992b; Thirsk 1992; McRae 1992; Drayton 2000.
[99] Glacken 1967; Grove 1995; Fleming 1998.
[100] Grove 1995; Fleming 1998.

purposes, this growing recognition of the connection between farming and climate change ultimately led some early modern thinkers to envision possible uses of husbandry for climate control and the production of artificial climates (see section 4.4 below). The same conclusion, as we shall see in the next section, was invited by contemporary studies of deforestation.

4.3.3. FORESTRY

Throughout human history, woods have been conceptualized and represented in many different ways—from precious timber reserves to unhealthy wastelands sheltering robbers, 'lawless squatters', and 'barbarous men'.[101] Practical attitudes to forests have varied accordingly, with conflicting views and uses of woodland often coexisting side by side within a same community. A similar ambivalence characterizes early modern strategies of forest management and the environmental mentalities that underpinned them. On the one hand, the critical importance of woodland as a source of 'timber, fuelwood, and other forest resources' became ever more apparent in this period, as demand for such commodities soared to unprecedented levels, due, among other things, to demographic growth and the strategic importance of ship-building in a time of colonial and mercantile expansion.[102] Maritime powers—and particularly Venice, which, unlike other European states, did not have 'access to extensive foreign supplies of naval-grade timber'—were indeed among the first to address the risk of timber shortage by introducing forest conservation measures.[103]

[101] Thomas 1996: 195.
[102] Appuhn 2009: 5.
[103] Appuhn 2009: 6. As Appuhn, Glacken (1967) and others have stressed, concerns with timber shortage are by no means specific to the early modern period; as early as in the thirteenth century, forest ordinances were

However, such general recognition of the value of woods did not necessarily lead to a keener awareness of the finitude of forest resources and the need to protect them. At the very same time as the Venetian Republic was developing its pioneering conservationist policies, other nations were following quite a different path, privileging a 'philosophy of profit-driven improvement' over Venice's 'managerial organicism'.[104] In most European countries, negative descriptions of woodland as a dangerous, insalubrious, and unproductive wasteland became more widespread in this period, and were often instrumental in justifying sweeping deforestation in the name of an all-encompassing 'improvement'.[105] Within colonial narratives, land-clearing and tree-felling stood as the very symbols of civilisation advancing into a barbarous wilderness; indeed, as William Cronon and others have shown, the ideology of full exploitation played an important role in legitimizing European conquest in principle.[106]

Nevertheless, early modern attitudes to deforestation were more nuanced than is sometimes assumed. Even in countries where the logic of 'improvement' prevailed (as in England or France), deforestation did not receive unanimous support. Concerns particularly arose over the long-term impact that a reduction in wood cover would have not only on a country's economy, but also on its ecological balance, especially since ancient authorities and recent scientific observation concurred in highlighting direct connections between land clearance and climate change.[107] As we shall see later in this chapter, the

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passed in England to the effect of regulating timber consumption, and in 1371 Charles V of France introduced the office of 'Souverain Maître des Eaux et Forêts par tout le royaume'. The scale and efficacy of such conservationist measures, however, remained rather limited before the early modern period, and the responsibilities of such officers grew substantially in the sixteenth and seventeenth centuries (see Devèze 1961; Waquet 1978).

[104] Appuhn 2009: 9. Appuhn uses the phrase 'managerial organicism' to designate Venice's peculiar form of forest management, based on what he regards as a 'unique view of the relationship between humans and the natural world that stressed the preservation', rather than the exploitation, of nature.

[105] Cronon 1983. See also Glacken 1967; Grove 1995; Rangarajan 1996.

[106] Gerbi 1985; Grove 1995; Rangarajan 1996.

[107] Grove 1995; Fleming 1998.

debate over the benefits and pitfalls of deforestation intensified in the course of the seventeenth century, and scientific institutions such as the Royal Society in London contributed greatly to this discussion, on the one hand by fostering further research into the relationship between vegetation and atmospheric composition,[108] and on the other hand by collaborating with the state's administration in monitoring national woodland.[109] Before examining these developments, however, let us first consider two more classic areas of governmental attention for the environment: hydraulic engineering and urban planning.

4.3.4. HYDRAULIC ENGINEERING

Hydraulic engineering in its various forms—including drainage, land reclamation, irrigation, channelization, and the construction of aqueducts, fountains, and sewers—made considerable advances in the early modern period. From the sixteenth century onwards, water management came to occupy an increasingly prominent place on the agenda of many European states, including France,[110] England,[111] Spain,[112] and such paradigmatic 'water

[108] Stephen Hales's *Vegetable Staticks* (1727), a landmark in this discussion, was the culmination of many years of research into the relationship between vegetation and air. As early as in the 1650s, the issue aroused considerable interest in English scientific circles: Beale and Hartlib, for instance, had extended conversations on the perspiration of trees, as did other Royal Society Fellows, including Robert Hooke and Daniel Cox. Cox's unpublished paper 'A History of Vegetables' (London, Royal Society, Classified Papers, 10i/8, 4 June 1668) particularly contains a section on the 'Artificiall Operations about Vegetables' where Cox discusses 'how the aer may bee made to chang [*sic*] the nature or properties of plants either by substracting the aer from them by M. Boyles pneumatick engine, keeping them in close rooms, covering them close abroad'. On Cox's and Hooke's interests in vegetation, see Boas Hall 1991: 67-68.

[109] See John Evelyn's *Sylva, or A Discourse of Forest-Trees and the Propagation of Timber in His Majesty's Dominions*, published in 1664 in response to a specific request of the State's naval commissioners (see Darley 2006: 181). Evelyn had previously worked on environmental issues such as afforestation and air pollution for his 1661 book *Fumifugium, or The inconveniencie of the aer and smoak of London dissipated*. I shall say more on both texts below (sections 4.3.4 and 4.4).

[110] See, e.g., Morera 2011.

[111] See, e.g., Darby 1970; Reeves and Williamson 2000.

[112] See, e.g., Lemeunier 2004.

civilizations' as Holland and Venice.[113] It was also deeply important in European interactions with colonial environments, from the highland bogs of Ireland to the lakes of Spanish Mexico and the wetlands of French Louisiana.[114]

Recent work in the still relatively young fields of eco-criticism, environmental history, and the environmental humanities has made us more alert to the complex interplay of economic, socio-political, and cultural factors underlying early modern attitudes to water and waterscapes. It has also shown that such attitudes were themselves remarkably varied and conflicted.[115] Water—one of the three environmental determinants of human health according to the Hippocratic treatise *Airs, Waters, Places*—elicited ambivalent reactions in the early modern period, ranging from an acknowledgment of its crucial importance for human life to deep-seated distrust and fear.[116] More generally, however, water was conceived as a highly unreliable element requiring man's careful mastery in order to be fully exploited and subdued. In this sense, early-modern water management can and should be understood as a culturally complex way of coping with a ubiquitous, and potentially hazardous, environmental component of human life.

Ideological assumptions about water's influence on human physical and mental health colour a number of hydraulic projects undertaken in this period. Several of these projects significantly targeted coastal marshes, highland bogs, and fenlands, whose wetland ecosystems blurred familiar distinctions between land and water, thus posing both practical and conceptual challenges. Draining and embanking were often described as means to establish firmer boundaries between the two realms and to make wetland

[113] The term 'water civilizations' ('civilisations d'eau') is taken from Ciriacono 2006: 10. Ciriacono's book offers a comparative study of water-management practices in early modern Venice and Holland. On the Low Countries, see also Van de Ven 1993.
[114] See, for instance, Morris 2000; Barnard 1994; Candiani 2012; López 2012. On colonial Louisiana, see above, 3.3.2.b.
[115] See, for instance, Ash 2007; Hiltner 2011.
[116] See Esser 1997. See also John Morgan's yet unpublished PhD dissertation ('Flooding in Early Modern England'; see Bibliography, section 3).

environments suitable for conventional forms of habitation, appropriation, and land use, as well as to eliminate the dangers traditionally associated with stagnant waters and overly wet surroundings. Behind most early-modern drainage schemes was thus a twofold discourse of profit and improvement (environmental and human) that served to legitimize intense intervention on nature as well as to overcome opposition from locally adapted communities (see section 4.5).

Among the various types of place-making examined in this chapter, hydraulic engineering, and particularly drainage, was possibly the one in which transnational collaboration was most intense in the period under consideration. The transfer of technical knowledge from countries with a strong tradition in water management (such as the Low Countries) to less experienced ones occurred in many different ways, including direct involvement of foreign engineers and investors. For instance, Dutch engineers of international renown such as Cornelis Drebbel (1572-1633) and Cornelius Wasterdyk Vermuyden (1595-1677) died in London after making crucial contributions to the introduction of land reclamation systems in England, whereas the Anglo-Dutch Humphrey Bradley, as we have seen, collaborated on numerous hydraulic projects all over Europe, including England and France (see section 4.2 above).[117]

Virtuous examples of water management also came from northern Italy, where channelization and drainage works began as early as in the twelfth century with the construction of the Milanese *navigli*, and culminated in the sixteenth and seventeenth centuries in wide-scale land reclamation schemes in the Po River Delta.[118] In describing such undertakings as admirable feats well worthy of being imitated elsewhere, influential authors such as Alvise Cornaro, Giovanni Botero, and Robert Burton called attention to the

[117] See Harris 1953; Harris 1961; Morera 2011. The involvement of Dutch engineers is also documented for drainage schemes in Italy and Spanish colonial Mexico: see Ciriacono 2006; López 2012.
[118] Ciriacono 2006.

considerable benefits that effective water management had brought to these regions on many different levels.[119] Speaking from his own experience in the countryside around Padua, Cornaro argued for instance that drainage made the air pure and wholesome and thus 'perfected' God's creation by turning a land 'more suitable for snakes than men' into a well-tilled, densely populated region.[120] As we shall see in the next section, Cornaro's claim of a direct connection between drainage and atmospheric change is one of the earliest examples of a type of discourse that would gain increasing importance in the following centuries.

4.3.5. URBAN PLANNING

Insofar as place-making is concerned with any sort of 'environs or surroundings' in which 'we see or set ourselves', and by which we are supposedly affected in various ways, its scope of action necessarily includes the built environment of cities as well as the natural or semi-natural environment of forests, swamps, gardens, and agricultural land that I have thus far examined. In a time that witnessed fast-paced urban growth in many parts of northern and western Europe,[121] urban planning represented a particularly important mode of place-making, encompassing such different activities as waste removal, the construction and maintenance of public infrastructure (including aqueducts, fountains, streets, and

[119] Cornaro 1620: 37-38; Botero 1956b: 238-39 (1.10); Burton 1989, vol. 1: 83. For the European reputation of north-Italian water management schemes, see Cosgrove 1990; Grove 1995: 52, Morera 2011: 17. On the other hand, the attempted drainage of the Pontine marshes in Latium was often mentioned as a negative example in the English fenland debate (Hiltner 2011: 148-49). See below, section 4.5.1, for further details on this debate.

[120] 'Si ritrova hora, Dio gratia, molto bene habitata, che prima non era così, anzi tutto il contrario: perché era paludosa, et di malaere, et stanza più presto da biscie, che da huomini. Ma havendole io levato l'acque, l'aere si fece buono, et le genti vi vennero ad habitare, et l'anime cominciorno a moltiplicare assai, et si ridusse il luogo alla perfettione, che li vede hoggidì' (Cornaro 1620: 37-38).

[121] See De Vries 1984 for an overview of the issue. Seventeenth-century England, in particular, witnessed substantial demographic growth accompanied by shifting demographic patterns and rapid urbanization (Wrigley 1985).

canals), and the development of regulatory frameworks for both public and private architecture. More than any other form of environmental intervention, urban planning was usually undertaken with the support of, if not under direct mandate from, governments and other public authorities, although unsolicited proposals—of a more or less utopian nature—were by no means rare in this period.[122] While such public patronage did not necessarily imply higher chances of implementation for urban planning schemes than for other place-making projects, it did give the former a more immediate political relevance, as is attested for instance by the crucial role of urban management in early modern strategies of colonial governmentality.[123]

Urban planning is an especially well-documented area of early modern place-making. Recent work on London and Rome—to mention only two notable examples—has particularly advanced our knowledge of the interplay between medical and environmental cultures on the one hand, and actual practices of urban management on the other.[124] Seminal studies such as Raymond Williams's *The Country and the City* have shown that early modern cities—not unlike forests and watery environments—were at the centre of two competing discourses: a positive one, emerging from classical notions of the *polis* as the cradle of all civilisation; and a negative one, which drew from the often dismal reality of early-modern city life to underscore the moral and physical dangers of urban milieus.[125]

The contrast between these two discourses on the city is evidenced in the opposite uses that each of them made of the same image, namely that of 'domestic fire'. On the one hand, the heat coming from hearths, stoves, and other types of fireplace was often praised for dissipating the wetness typical of wild, uncultivated spaces, and for improving the

[122] Kruft 1989.
[123] Shammas 2012; for further discussion of this aspect, see above, 3.3.3.
[124] See, e.g., Jones and Falkus 1990; Jenner 1995; Rinne 2007; Rinne 2012; Slack 2014. See also Pierre Claude Reynard's recent study on Lyon (2010).
[125] Williams 1973.

surrounding climate. On a metaphorical level, 'culinary fires' thus stood as a symbol of the civilizing power of human intervention on nature.[126] However, the seventeenth century also witnessed the emergence of a medical discourse stigmatizing the disastrous effects of fumes—including coal smoke from residential fireplaces—on human health.[127] In this view, domestic fire was a polluting agent, rather than a symbol of civilisation; consequently, the city was a corrupted (and corruptive) place, standing in stark contrast to the natural healthiness of a sparsely populated countryside.

Early-modern urban planning emerged at the intersection between these two contradictory impulses. While it encouraged further urban growth, in accordance with the idea that true civilisation could only flourish in compact human settlements such as towns and cities, urban planning also promoted the improvement of existing cityscapes by such means as the cleansing of streets and other public spaces, the planting of fragrant trees and shrubs, and tighter restrictions on the industrial and commercial activities allowed within the city limits.[128] Most interestingly, manifestos of urban improvement such as John Evelyn's *Fumifugium* (1661), on which I shall say more later, clearly show that the manipulation of urban environments was intended as a means to promote the physical and spiritual amelioration of local communities through the improvement of their living spaces. In this sense, urban planning, as every other form of environmental intervention explored in this section, can be seen as an expression of a new type of governance that aimed to 'make men' as well as places—that is, to shape the conduct (and, to some extent, the very nature) of individuals and entire populations by re-engineering the milieus in which they lived.

[126] The expression 'culinary fires' is in Arbuthnot 1733: 18 (within a discussion of the differences between 'air of the country' and 'air of great cities'). See also Doni 1667: 13, 132, 143-46.
[127] See, for instance, Evelyn 1661; Cheyne 1725 (compare Parry 1992: 141; Jenner 1995; Hiltner 2011).
[128] Jones and Falkus 1990; Jenner 1994; Hiltner 2011.

4.4. From Climate Change to Human Improvement

We have seen that the seventeenth century witnessed an unprecedented attention to the climatic repercussions of man's environmental agency. The notion of man-made climate change, however, has a history that long predates these early modern developments and that is important for understanding their origins. As early as in the fourth century BC the Greek philosopher Theophrastus (Aristotle's disciple and successor as the head of the Peripatetic School) collected several examples of 'anthropogenic changes in climate due to drainage and deforestation' in his works on botany and anemology.[129] His views on the subject lived on throughout Antiquity and beyond, partly by being incorporated into larger compilations such as Pliny the Elder's *Naturalis historia*, which enjoyed an almost uninterrupted fortune until at least the seventeenth century.[130] From the late fifteenth century onwards, when Latin translations of Theophrastus's works began to circulate more widely in print, his hypothesis of a causal link between deforestation and 'desiccation' (manifesting itself in soil erosion, lower humidity, and a general reduction in precipitation) was often invoked to illuminate the relationship between human agency and environmental change. Christopher Columbus, for instance, appears to have drawn upon this theory to explain the decline in rainfall in the heavily deforested Canaries, Madeira, and Azores.[131]

[129] Hughes 1985: 302. Theophrastus's discussion of anthropogenic climate change was based on first-hand observation in Thessaly and elsewhere in Greece: see Theophr., *Caus. pl.*, 5.14.2-5; *De ventis*, 13.
[130] See above, 4.3.1, for further details on Theophrastus and Pliny's publishing history.
[131] According to his son and biographer Ferdinand, Columbus knew about this causal connection merely 'from experience' (Columbus 1959: 142-43; see Thompson 1980: 47). However, Columbus's personal library included a copy of Pliny's *Naturalis historia* (still preserved at Seville's Biblioteca Colombina), which the Admiral perused and heavily annotated (see Grove 1995: 30-31; Wey Gomez 2008). Columbus could thus have become familiar with Theophrastus's desiccationist theory through Pliny.

Further evidence of man's impact on the environment and its repercussions on climate came in the next two centuries, particularly from first-hand observation in the American colonies. Around 1525, the Spanish chronicler Gonzalo Fernández de Oviedo reported that the hot, humid climate of Central and South America was showing signs of improvement as a consequence of dramatic changes in land use. 'The region and its rigours are being tamed and softened thanks to the rule of the Spaniards', Oviedo argued, specifically relating such changes to the introduction of livestock farming.[132] Both the English and the French observed similar trends in their North-American colonies, where a famously uneven climate—characterized by freezing winters and scorching summers—appeared to become less extreme as forests and groves were progressively replaced by towns, plantations, and cultivated land.[133] The French, in particular, noted that deforestation in Canada seemed to make the climate warmer, while the opposite phenomenon was taking place in naturally warm Louisiana.[134] They thus concluded that deforestation tended to have positive, tempering effects on climate.

By 1650, correlations between shifting land-use patterns and climate change were almost commonplace among Anglo-American settlers. John Mason, an Englishman who relocated to Massachusetts, not only posited that uncultivated regions are naturally cooler than agricultural ones, but also argued that a region like Newfoundland was colder than England because it was considerably less populated than the latter, and lacked the warmth radiated by towns and cities. Another Englishman, William Wood, believed that rainfall patterns in the Massachusetts Bay were changing as a consequence of intense agricultural

[132] The text, taken from Oviedo's *Sumario de la natural historia de las Indias* (6.46), is quoted and translated in Gerbi 1985: 289 (original not provided).
[133] Kupperman 1982; Kupperman 1984; Grove 1995: 5; Fleming 1998 (all of these scholars have focused primarily on English examples).
[134] 'Relation de la Louisianne', n.p. This anonymous manuscript (*c*. 1735) has been examined above, 3.3.2.b.

development in the area.[135] Overall, colonists looked favourably on these perceived changes, which they thought were making the North-American climate milder, less subject to extreme seasonal variability, and more generally suitable for European settlement.[136]

Was there any truth to these claims? Was the American climate really changing, and to what extent do European descriptions of climate manipulation in the colonies match historical fact? Ideology and reality are often difficult to disentangle in these colonial reports. On the one hand, the early colonial age almost exactly coincided with what climate historians have called the 'Little Ice Age'—a period of actual climatic variation (possibly due to alterations in sunspot activity and North-Atlantic pressure systems) that manifested itself in perceptibly lower temperatures, longer winters, and frequent hard frosts.[137] Such changes heavily affected the life of local communities (for instance through harvest failures, advancing glaciers, and frozen harbours and rivers), and, according to some scholars, may in fact have shaped history at an even deeper and global level.[138] There is thus a sense in which the early modern climate was indeed changing, although hardly in the ways and for the reasons suggested by the colonists.

The colonists were also not entirely incorrect in assuming that European settlement was deeply reshaping colonial ecosystems. [139] Their self-perception as crucial environmental agents was probably enhanced by the fact that the introduction of Western systems of land use in the colonies did have an important, and very noticeable, impact on colonial environments. In the Old World, where these systems had been reshaping the

[135] Kupperman 1982.
[136] See Thompson 1980, who also tracks the development of these ideas up to the twentieth century.
[137] See Fagan 2000; Behringer et al. 2005.
[138] See Geoffrey Parker's recent book, *Global Crisis*, in which he argues that the so-called General Crisis of the seventeenth century is positively connected to the climatic changes of the Little Ice Age (Parker 2013).
[139] Supported by abundant textual and environmental evidence, this fact is now commonly accepted among early-modern colonial historians: see Crosby 1972; Cronon 1983; Crosby 1986; Grinde and Johansen 1995; Grove 1995.

landscape for centuries, their environmental effects were much harder to grasp.[140] Because the settler experience facilitated the development of a heightened sense of environmental agency, colonial observers were thus in an ideal position to develop an early notion of anthropogenic climate change.

At the same time, ideology unquestionably played an important part in the settlers' self-fashioning as environmental agents and 'improvers'. European notions of the pre-colonial American environment as a pristine wilderness, and of the indigenous populations as idle hunter-gatherers without a serious tradition of environmental intervention (a view that is as historically inaccurate as it is generally widespread in the early modern period),[141] particularly reinforced the settlers' conviction that the reported climatic changes were a direct result of their place-making activity in the colonies. In other words, the climate and landscape of colonial environments were indeed changing during the early age of empires, but the way in which European observers perceived, described, and explained such processes often testified more to their own preconceptions than to the actual dynamics of ecological change.

Colonial reports can therefore be seen as valuable documents of shifting environmental mentalities. In particular, these reports signal a crucial change in the way of conceptualizing both climate and man's relationship with it. With only rare exceptions, ancient, medieval, and Renaissance climate theories had rested on the assumption of fixed, ahistorical climates—and of equally fixed, ahistorical national characters. Starting in the seventeenth century, however, climate began to be recognized as an entity changing not only across space, but also over time, partly as a consequence of slow-paced natural processes and partly under the pressure of intense human intervention on the environment.

[140] Grove 1995: 5.
[141] See Cronon 1983.

The French cleric and magistrate François-Ignace d'Espiard (1707-1777) captured this idea in his influential *Essais sur le génie et le caractère des nations* (1743): 'climates,' he wrote, 'are not always immutable: they sometimes change as a result of alterations that may either take place in the natural order itself, or be artificially provoked by man'.[142]

This historicization of climate had important repercussions on climate theory as well, as it led to seeing human beings not merely as passive recipients of external influences, but as geological agents in their own right. This is not to say that seventeenth- and eighteenth-century Europeans thought of themselves as unaffected by their milieu; in fact, the notion of environmental influence was rarely, if ever, called into question before the mid-eighteenth century.[143] However, this new understanding of climate as the changeable product of both natural and artificial processes decisively shifted the balance in man's favour by allowing an unprecedented degree of power to human initiative. If men could not escape the influence of environment, they now at least had a chance to renegotiate it, perhaps even turn it to their own advantage.

Environmental influence thus gradually came to be identified as a resource to exploit, rather than (simply) as an enemy to fight. In a time of increased debate about national enhancement and social reform,[144] this conceptual revolution was bound to have far-reaching implications. If climate governed men, but men could govern climate, it was no longer inconceivable to govern men *through* climate—that is, to steer the character and behaviour of individuals and entire populations in any desired direction, not by means of political or ethical reform, but through environmental engineering. Climate theory thus

[142] 'Les climats ne sont pas toujours immuables. Quelques-fois ils changent par les mutations survenues dans la nature même, ou procurées par l'industrie des hommes' (Espiard 1753, vol. 1: 26 [1.5]). I quote from a 1753 reprint of the 1752 revised edition published in The Hague. I shall say more on Espiard below, 'Epilogue'. See also Vyverberg 1989: 68.
[143] For the eighteenth-century debate on the reality of environmental influence, see 'Epilogue'; Vyverberg 1989 (Chapter 4); Griffin 2013 (Chapter 1).
[144] See above, 4.1.

became instrumental to a new form of governance that sought to shape men's conducts indirectly by transforming their living milieus.

Bio-environmental governmentality, as I propose to call this emerging technology of power,[145] has one of its most striking theorizations in Jean-Baptiste Moheau's *Recherches et considérations sur la population de la France* (1778), a founding text of modern statistic demography.[146] According to the author of this book, states and rulers should carefully redesign their climates through place-making and then capitalize on their transformative powers for ambitious plans of social engineering. In the concluding chapter, entitled 'Of the influence of the government on all the causes that can determine gains or losses in population', Moheau argued that:

> It is up to the government to change the air temperature and to improve the climate; a direction given to stagnant water, forests planted or burnt down, mountains destroyed by time or by the continual cultivation of their surface, create a new soil and a new climate. […] If the unknown principle that forms the character and the mind is the outcome of the climate, the regime, the customs, and the habit of certain actions, we can say that sovereigns […] govern the physical and moral existence of their subjects. Perhaps one day we will be able to call on these means to give whatever hue we wish to morality and the national spirit.[147]

France itself, according to the author of the *Recherches*, offers a paradigmatic example of this tight connection between changes in the land and in human nature. Just as the ancient Gaul described by Caesar, with its thick woods, vast marshes, and unproductive

[145] This term brings together Foucault's concepts of governmentality (on which see above, 'Introduction') and 'biopower' (a particular form of governmentality that aims to conduct populations by regulating their biological life—'births, deaths, reproduction and illnesses' [Dean 1999: 10]).

[146] Very little is known of Moheau, so little indeed that according to some scholars the name is actually a pseudonym for Antoine-Jean-Baptiste-Robert Auget, Baron de Montyon (1733-1820), councillor of State since 1775 (see Chevalier 1948; Esmonin 1958).

[147] 'Ces moyens de diriger et de changer le cours de la population sont dans la main du gouvernement; sa puissance est plus étendue encore; souvent il dépend de lui de changer la température de l'air et d'améliorer le climat. Un cours donné aux eaux croupissantes, des forêts plantées ou brulées, des montagnes détruites par le temps ou par la culture continuelle de leur superficie, forment un sol et un climat nouveau. Si du climat, du régime, des usages, de l'habitude de certaines actions, il résulte le principe inconnu qui forme les caractères et les esprits, on peut dire que les Souverains […] régissent l'existence physique et morale de leurs sujets. Peut-être un jour pourra-t-on tirer parti de ces moyens pour donner aux moeurs et à l'esprit de la nation une nuance à volonté' (Moheau 1778: 291-92, 'De l'influence du Gouvernement sur toutes les causes qui peuvent déterminer les progrès ou les pertes de la population'; quoted and translated in Foucault 2007: 22-23).

wastelands, bears little resemblance to the well-cultivated landscape of eighteenth-century France, so modern Frenchmen differ remarkably in character and appearance from their distant ancestors.[148] In France, Moheau argues, 'a different climate has given shape to a novel species'.[149] Between these past changes and those that Moheau hopes to see implemented in his own time there is, however, one crucial difference. Historically, the 'interventions that have changed the climate of our kingdom' were for the most part private undertakings conducted for the sake of personal gain and without a clear overarching plan. Moheau, on the other hand, calls for greater governmental involvement in determining the nature, pace, and purpose of future environmental works, as only governments possess the resources and foresight required to turn environmental change into a tool of national improvement.[150]

A few years after Moheau, we find echoes of his ideas in Jean-Noël Hallé (1754-1822), one of the fathers of modern public hygiene, who wrote in France during the revolutionary period.[151] In his article 'Hygiène' for the *Encyclopédie méthodique* (1798), considered at the time as one of the 'best works on health that has hitherto appeared',[152] Hallé reported numerous historical examples of environmental works executed by states and governments and 'essentially connected with the health of the citizens'.[153] In northern Italy, swamps were drained and rice fields removed from the vicinity of large cities, on the

[148] 'Les Gaules ne ressembloient point à la France telle qu'elle existe dans le dix-huitième siècle: ces bois, ces forêts immenses ont disparu; les marais sont déssechés, les pacages rapportent des grains; on reconnoît difficilement les Gaulois dans leurs descendans; on ne retrouve plus ces grands hommes, ces tailles sveltes, ces peaux blanches, et ces cheveux blonds dont César nous donne la description' (Moheau 1778: 292).
[149] 'Un climat différent a formé une espèce nouvelle' (Moheau 1778: 292).
[150] Moheau 1778: 292-93.
[151] See Ramsay 1994: 46-51.
[152] Sinclair 1807: 260.
[153] 'C'est en Italie que le gouvernement s'est le plutôt occupé de ce genre de travaux importans pour la santé des citoyens' (Hallé 1798: 393; translated in Sinclair 1807: 332-33).

grounds that their 'exhalations' might 'prove injurious to the inhabitants of these cities'.[154] In the west of France, technological advances had finally made it possible to reclaim the 'noxious and useless' Rochefort marshes, in the modern region of Poitou-Charentes.[155] For Hallé, these and other similar cases showed that the 'solicitudes of governments' could go so far as to 'change the influence and temperature of a country' and 'avert […] every species of noxious influence' from the citizens.[156]

Moheau and Hallé represent two late examples of a line of thought that has its origins in the cultural developments of the seventeenth century, and particularly in shifting attitudes to the physical world and man's relationship with it. I mentioned earlier that the exact nature of this shift, and the extent to which post-seventeenth-century theories of nature may be said to depart from earlier world views, have been (and still are) a matter of considerable debate. Did 'the scientific revolution of the seventeenth century' truly replace the ancient notion of nature as a living agent with a 'mechanistic' conception of nature as 'passive and manipulable', as the eco-feminist historian Carolyn Merchant suggested over three decades ago in her still influential *The Death of Nature* and other studies?[157]

Texts such as those of Moheau or Hallé seem to tell a different and perhaps more complex story than the one spearheaded by Merchant. Even though seventeenth-century Europeans were generally more optimistic than previous generations about their capacity to curb and refashion nature according to their needs, they never came to see nature as

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[154] 'En Piémont et dans le Milanais, on s'est occupé de faire des lois pour éloigner les rizières des grande villes, dans la crainte que leurs émanations ne nuisissent aux habitans des cités' (Hallé 1798: 393; translated in Sinclair 1807: 332-33).

[155] 'Ce n'est que de nos jours, qu'on a executé aux environs de Rochefort, les travaux nécessaires pour changer les influences et la température d'un pays depuis si long-tems insalubre et marécageux, et l'Europe ainsi que la France présentent encore de grandes surfaces couvertes de marais inutiles et malfaisans!' (Hallé 1798: 393; translated in Sinclair 1807: 332-33).

[156] 'O habitans des villes… c'est autour de vous encore que se réunissent toutes les sollicitudes des gouvernemens pour écarter toutes sortes d'influences nuisibles' (Hallé 1798: 393; translated in Sinclair 1807: 332-33).

[157] Merchant 1987: 267; Merchant 1990 (first published in 1980).

entirely passive—'dead and inert matter', to put it in Merchant's words—but rather reconfigured it as a dynamic element within a circle of action and reaction. Certainly the perceived power-relations between climate and mankind changed greatly in this period, as Europeans became progressively more aware of themselves as active environmental forces. Yet throughout early modernity environmental influence never ceased to be seen as one of the most powerful determinants of human nature. Indeed, it was precisely this persistent belief in the effectiveness of climatic influence that made intentional environmental change so appealing from a bio-political viewpoint.

Seventeenth-century Europe offers several examples of an incipient bio-environmental governmentality that foreshadows and prepares the developments outlined above. Drawing upon Jean Bodin's idea that 'there is no wealth nor power other than in men'—a cornerstone of mercantilist populationism throughout early modernity[158]—seventeenth-century political theorists often claimed that the physical and spiritual betterment of a country's population would make the state richer and stronger in more than a merely metaphorical way. Thus the English agricultural 'improvers' of the mid- to late-seventeenth century posited that a more efficient and systematic exploitation of nation's countryside would not only boost economic growth by ensuring larger and better yields, but also fortify the nation by stimulating demographic growth.[159]

The archives of the Royal Society in London hold a wealth of manuscripts and other understudied materials that shed new light on this important strand of seventeenth-century thought. These include the papers of Hartlib's close friend John Beale (*c.* 1608-

[158] 'Il n'y a richesse, ni force que d'hommes' (Bodin 1986, vol. 5: 64 [5.2]). See Stangeland 1904; Charbit 2010.
[159] I have explored this topic further in my forthcoming book chapter 'Debating Greatness' (see Bibliography, section 3).

1683), an agricultural theorist who contributed significantly to this line of thinking.[160] Beale was convinced that a proper 'politicall conduct' of agriculture would promote 'health and peace' and 'the increase of people', to the advantage of the whole English nation.[161] As a good disciple of Bacon, however, he was also careful to point out that the greatness of a country should not be measured simply in terms of 'numbers of people'. In his essay 'Of the True Greatness of Kingdomes and Estates' (1625), Bacon had argued that it was pointless, not to say dangerous, for a state to have 'great population and little strength': an overpopulated country full of hungry and degraded subjects made a poor candidate for 'empire and greatnesse', and an ideal cradle for civic discord.[162] Similarly, Beale stressed the importance of pursuing both quantitative increase and qualitative improvement, for instance by privileging the cultivation of potatoes and other foods that 'give strength for labour, athletic health, and genitale vigour'.[163]

Beale also alluded to yet further positive effects of agriculture on population. Among other things, he observed that the transformation of 'many millions of acres' of 'waste lands' into 'rich corne fields' would make the English countryside more pleasant and wholesome, with immediate benefits for the health and spirits of local populations.[164] Drawing on Walter Blith's celebrated handbook of agricultural improvement, *The English Improver Improved* (1652), he explained how proper cultivation and extensive drainage

[160] Although some scholars have stressed the importance of Beale's thought (Webster 1975; Stubbs 1982; Stubbs 1989; Leslie 1992), he remains a largely neglected figure of mid-seventeenth-century English intellectual history. Many of his papers and letters examined here have never been the object of extended study.
[161] Beale, 'Some politicals to be considered in Agriculture', §5-6 (London, Royal Society, Early Letters, B1/42, 20 June 1664, n.p.).
[162] Bacon 1985: 93-95. An earlier and shorter version of 'Of the true Greatness of Kingdomes and Estates' was already included in the 1612 edition of the *Essays* with the title 'Of the Greatness of Kingdomes'; the 1625 version was composed around 1622.
[163] Beale, 'The second instalment on the theme of agriculture', §21 (London, Royal Society, Early Letters, B1/43, 27 June 1664, n.p.).
[164] Beale, 'Some politicals', §6. In a slightly earlier letter to Hartlib, Beale mused: 'If I could turne the wildernesse and waste grounds of England into a paradyse, that by a natural pregnancy should content with the fairest of his artificial enforcements […]', adding that the whole enterprise would greatly 'serve the public' (26 March 1660; London, British Library, Add. MS 15948, fol. 91^{r}; quoted in Chambers 1992: 182).

works could correct the 'unhealthfulnes' of certain parts of his native Herefordshire and neighbouring Somerset, thus ensuring 'more health, and better minds and manners' to their 'boorish and inhuman' inhabitants.[165]

Even bolder ideas regarding the direct causal link between environmental and human improvement come from Beale's horticultural letters to Samuel Hartlib, Henry Oldenburg, John Evelyn, and Robert Boyle (the latter three all early Royal Society Fellows like Beale himself). Here Beale developed what we could call an 'hortulan' approach to climate engineering, suggesting that garden-making and other forms of small-scale landscape architecture made it possible 'to sweeten the dewes of the morne, to multiply the beautyes of the spring, and to enrich the very influences of the heavens' by skilfully managing environmental features and their spatial disposition.[166]

A particularly important document in this respect is a letter of 1659, probably addressed to Oldenburg, subsequently shared with Hartlib and Evelyn, and copied almost word for word by the latter in a crucial passage of his unpublished treatise on garden art, 'Elysium Britannicum'.[167] In the letter, Beale first promises to reveal 'the sure and infallible elements' for the 'transmutation of flowers and improving their smell, beauty and taste', and then goes on to show how gardening and landscaping may serve 'to rectify and purify the ayre of all the neighbouring countrey, both for the health of body and of minde; and to prepare and dispose for vertue, and for sanctity; and to procure longevity'. Garden-

[165] Beale, 'Of Springs, Fountains, Lakes, Waters […]' (London, Royal Society, Early Letters, B1/33, 15 January 1663 n.p.).
[166] John Beale to Samuel Hartlib, 27 May 1658 (Sheffield, Hartlib Papers, 52/72b; quoted in Leslie 1992: 156).
[167] John Beale to Henry Oldenburg (?), 30 September 1659. London, Royal Society, Early Letters, B1/13 (now printed in Oldenburg 1965-1986, vol. 1: 314-21). Another copy is in the Hartlib archives at Sheffield (HP 67/22/1A-4B) and has been printed in Greengrass et al. 1994: 357-64. See Leslie 1992 for a textual comparison between Beale's letter and Evelyn's use of it in 'Elysium Britannicum' (a modern edition of the entire work, based on the autograph preserved at Christ Church College, Oxford, has appeared in 2000; the relevant excerpt had been previously published by Goodchild 1991).

making, Beale argues, does more than just 'correcting the ayre'[168] and modifying the weather of a given locality (for instance by procuring 'evening-dewes and rayne' or, as he writes elsewhere,[169] by 'altering the ayre to summer heate in winter, and to winter cooleness in summer'); its transformative powers go so far as to 'correct the stars' and 'alter that which wee call the coelestiall influences'. Although Beale does not explain how exactly gardening is supposed to perform such wondrous effects (perhaps, it has been suggested, because he could count on his reader's familiarity with widespread assumptions in this respect),[170] he does offer a detailed description of an ideal garden that would concentrate the widest possible range of positive environmental influences in the smallest possible space, thus guaranteeing 'Elysian raptures' to whoever happened to frequent it.[171]

Often dismissed as picturesque and rather weightless reveries, Beale's self-avowedly 'very strange discourses' (which he nevertheless described as 'experimentally true') have been recently reappraised as precious testimonies of mid-seventeenth-century English attitudes to garden-making and its complex cultural, spiritual, and moral dimensions.[172] I would suggest that Beale's ideas on the transformative powers of gardening can be taken as representative of an even longer tradition of environmental thought, stretching forward into the European Enlightenment. Although Beale's horticultural theories were intimately connected to the cultural climate of Interregnum and early Restoration England, with its peculiar interplay of natural-philosophical research,

[168] In his only published work, *Herefordshire Orchards, a Pattern for All England* (London: Roger Daniel, 1657), Beale had explained how orchards 'do not only sweeten, but also purifie the ambient aire (which I conceive to conduce very much to the constant health and long lives, for which our country hath always been famous)' (7).
[169] John Beale to Samuel Hartlib, 26 March 1660 (London, British Library, Add. MS 15948, fol. 91^{r}; quoted in Chambers 1992: 182).
[170] Dixon Hunt 1994: 322.
[171] Beale took inspiration from a real place, Backbury Hill in Herefordshire, for conceiving this ideal site (see Goodchild 1991).
[172] See particularly Parry 1992; Leslie 1992; Dixon Hunt 1994; Dixon Hunt 2000. For earlier interpretations of the letter, see Goodchild 1991; Mowl 1993 (both interpretations are discussed in Dixon Hunt 1994).

Puritan spirituality, and millenarian expectations,[173] Graham Parry has shown how Beale's 'hortulan' doctrines were able to subsist in the changed intellectual context of late-seventeenth-century England through the intermediary of authors less conditioned by, and less identified with, the millenarian atmosphere of mid-century.[174]

One such author was the English polymath and Royal Society Fellow John Evelyn, born in 1620 and thus about twelve years Beale's junior. A much more prolific writer than Beale (who only published one book in his entire life),[175] Evelyn picked up and developed his friend's horticultural ideas in many of his works, including the unpublished manuscript 'Elysium Britannicum' and the printed treatises *Fumifugium, or The Inconvenience of the Aer and Smoak of London Dissipated* (1661) and *Sylva, or a Discourse of Forest Trees and the Propagation of Timber in His Majesties Dominions* (1664)—the latter written upon direct royal commission.[176]

Parry and others have shown how both *Fumifigium* and *Sylva* deeply bear the mark of Beale's influence. For instance, Evelyn's idea of correcting air pollution in London by planting a 'green belt' of trees and shrubs around London—'as yield the most fragrant and odoriferous flowers, and are aptest to tinge the aer upon every gentle emission at a great distance'—came directly from his correspondence with Beale.[177] *Sylva* too, though conceived as a rather pragmatic treatise on England's plummeting timber supply and urgent need for reforestation, is pervaded with a 'highly imaginative atmosphere' and 'shot

[173] See Webster 1975; Otten 1985.
[174] See Parry 1992, who thus revises previous views of Beale as a 'vanquished of history' (advanced, for instance, in Leslie 1992 and Chamber 1992). Further intellectual changes resulted from the death of Henry Oldenburg in 1677 (which led to profound transformations in the *Philosophical Transactions*: see Chambers 1992: 188; Atkinson 1999: 21) and from that of William Petty in 1687, which 'effectively marks the end of the first, pioneering phase of improvement' (Slack 1999: 100).
[175] See footnote 168 in this section. On Beale's reluctance to allow his treatises into print, see Leslie 1992: 151-52.
[176] For further details on these texts, see section 4.3.2 above.
[177] 'The whole city', Evelyn argues, will 'be sensible of the sweet and ravishing varieties of the perfumes' (1661: 25); see Parry 1992: 141. More generally on *Fumifugium*, see Jenner 1995; Hiltner 2011.

through with visions of England as a paradise of noble groves, that elevate the souls of the fortunate men who dwell among them'—a vision that Evelyn shared with his older friend and mentor.[178]

This twofold dimension, practical and spiritual, of Evelyn's environmental outlook appears accentuated, rather than reduced,[179] in later revisions of his works: indeed, the second edition of *Sylva*, published in 1670, includes a new section entitled 'An Historical Account of the Sacredness and Use of Standing Groves', which evokes 'the sanctity and mysteriousness of trees, with their benevolent influence of mankind', and shows how (in Evelyn's own words) 'the air of such retired places may be assistant and influential' to the soul.[180] Evelyn's belief in the benign influence of woodland is fleshed out even more clearly in a preparatory note to this revised edition, where he argues that 'The forrest might soone be made the glory, wealth, and beauty of England; their groves, thickets purifye the ayre of provinces, and sweeten the navigable streames'.[181]

The European fortune of Evelyn's environmental writings (particularly well documented for France) was one of the channels through which Beale's 'hortulan' doctrine of environmental influence continued to shape the theory and practice of place-making in late-seventeenth- and early-eighteenth-century Europe.[182] But Beale and Evelyn were not isolated figures in their efforts to theorize the manufacturing of benign environmental

[178] Parry 1992: 142. See also Chambers 1992.
[179] This fact seems to disprove Michael Leslie's thesis of an ever greater separation between 'the spiritual and the material' in the latter half of the seventeenth century. According to Leslie (1992: 156), within a few years of the publication of some of the most influential horticultural texts of this period (including Ralph Austen's *Treatise of Fruit-Trees and the Spirituall Use of an Orchard*, published in 1653), the alliance between spiritual and practical concerns that had been so central to Beale's understanding of garden art would fall apart, as late-seventeenth-century natural scientists increasingly tended to 'differentiate the spiritual and the material' and rejected the strongly religious overtones of mid-seventeenth-century English scientific culture.
[180] Quoted in Parry 1992: 142.
[181] Oxford, Christ Church, Evelyn MS 38, fol. 186^{r} (quoted in Chambers 1992: 175).
[182] See Glacken 1967: 460-61; Grove 1995: 160 and *passim*. For an assessment of Evelyn's work in a European perspective, see Levine 1998; O'Malley 1998.

influences for the sake of human improvement. In *Nature's Government*, Drayton observes that the early modern campaign for agricultural improvement was often explicitly aimed at ameliorating human populations just as much as soils and crops. English (and, after 1707, British) colonial efforts to 'redeem the barbarous Irish', for instance, were inseparable from attempts to reconvert the native's pastoral lifestyle into a sedentary existence of 'contented farmers with a stake in the peace'.[183] The emergence of such schemes of human reformation via environmental improvement is usually explained in terms of cultural dichotomies associating pastoralism to idleness, and agriculture to an industrious, morally upright life. [184] Climate theory, however, is another angle from which we can make sense of early-modern improvement campaigns. These, indeed, were often understood and described as bio-environmental efforts to correct or perfect the natural character of local populations by means of planned environmental change.

The argument that environmental improvement would lead to human improvement was made explicitly in William Petty's aforementioned *Political Anatomy of Ireland* (see section 4.2). Petty (1623-1687), a French- and Dutch-educated founding member of the Royal Society who spent a large part of his adult life in Ireland, was intrigued by the puzzle of Irish 'savagery'.[185] Observing that the climate of Ireland was quite similar to the English climate in many respects (including temperature, average rainfall, and number of frost-free days), Petty wondered what caused the national character of Englishmen and Irishmen to be so different.[186] His answer was that the savagery of the Irish was essentially linked with the neglected state of their land: as the Irish let acres and acres of their agricultural land turn into unproductive bogs, their naturally good constitution degenerated

[183] Drayton 2000: 55.
[184] See Patterson 1986; Fowler 1986; Fowler 1992. Both Fowler and Patterson base their accounts on a study of the shift from pastoral to georgic modes of literary expression in this period.
[185] On Petty, see Reungoat 2004; McCormick 2010.
[186] Petty 1691: 50-52.

along with the environment in which they led their lives.[187] Petty concluded that 'the manners of the Irish […] proceed rather from want of imployment and encouragement to work, than from the natural abundance of flegm in their bowels and blood', and expressed his confidence that the Irish character would quickly improve under the rational government of the English.[188]

At first glance, Petty's remarks were not particularly original. His account of environmental degeneration in Ireland, for instance, follows quite closely that of the Dutch brothers Boate in their *Naturall History of Ireland* (1652),[189] while his views on the benefits of English government in the Irish plantations echo those of many other English or English-based thinkers who were also personally involved in the 'improvement' of Ireland. In many respects, then, the interest of Petty's position lies less in its exceptionality than in its being representative of a broader intellectual climate.[190] More than most contemporary authors, however, Petty proceeded to integrate his understanding of the relationship between environment and population into a sophisticated and ambitious theoretical framework, which had 'the improvement of mankind in his masse' as its ultimate goal.[191]

Petty's 'political arithmetick', outlined in the eponymous treatise of 1676 (first published in 1690), was essentially 'a sort of applied natural philosophy, a way not only of knowing but more importantly of operating upon nature, including human nature, in the interests of the state'.[192] Partly developed in collaboration with his friend and fellow Royal Society member John Graunt (1620-1674),[193] Petty's ideas were deeply influential in and

[187] For the Irish as 'bog people', and the Irish bog as a 'cultural and historical myth', see Klein 2007: 136.
[188] Petty 1691: 98-99. See Drayton 2000: 55.
[189] Coughlan 1994: 305-06; Drayton 2000: 55.
[190] On the 'cult of improvement' in Ireland, see Barnard 1994; Coughlan 1994 (with particular reference to bog drainage).
[191] Petty 2012: 96. See also Rhodri Lewis's introduction to the text (in Petty 2012: 62-71).
[192] McCormick 2007: 1.
[193] See particularly Graunt's *Natural and Political Observations Made upon the Bills of Mortality*, first published in London in 1662 and expanded numerous times (the final edition came out posthumously in

outside England, shaping population thought until the late eighteenth century.[194] Among many others, they were important for Jean-Baptiste Moheau, whose remarks on governmental climate change opened my discussion of early-modern 'bio-environmental governmentality'. Moheau's debt to seventeenth-century English thought is apparent throughout his *Recherches et considérations*, from the title-page (which boasts a quotation from Bacon's *Cogitata et visa*)[195] to the concluding chapter on climate, where he explicitly describes anthropogenic environmental change as an instrument of 'political arithmetic' ('arithmétique politique').[196]

Such visionary plans of man-made climate change for the sake of human improvement testify to a new understanding of climatic influence as a resource to exploit rather than a threat to defuse. In promoting an ideology of proactive environmental intervention, seventeenth-century scientists and policy-makers ultimately came to conceptualize environmental 'improvement' not just as an art of 'making places', but as a way of making (or remaking) men. Belief in climatic influence was crucial in this sense, as it provided an authoritative theoretical framework within which environmental changes could be thought in conjunction with changes in human nature. Not everyone, however, saw these developments favourably. As we shall see in the next section, early modern Europe offers several examples of theoretical and practical resistance both to specific schemes of environmental intervention and to the broader ideology of 'improvement' from which they emerged. By drawing attention to some of these cases, I shall once again

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1676). In 1666, Petty published a review of Graunt's book in the French *Journal des Sçavans*; according to Hacking (2006: 102), it was in the aftermath of this publication that Paris began to keep its own vital statistics.

[194] See Chaplin 2008, which particularly examines the influence of Petty's political arithmetic on Benjamin Franklin.

[195] Bacon 1869: 140 ('Ergo rem quam ago, non opinionem, sed opus esse, eamque non sectae alicujus, aut placiti, sed utilitatis esse et amplitudinis immensae fundamenta'). The same quotation had already appeared in Diderot's article on 'Art' for the *Encyclopédie* (1751, vol. 1: 715), from which Moheau may indeed have drawn it.

[196] Moheau 1778: 292.

emphasize the lack of consensus that characterizes early-modern environmental ideas and the practices that they inspired.

4.5. Disproving Improvement

Prior to the seventeenth century, when theories of climatic influence were predominantly based on a view of climate as static and unalterable, the issue of man's environmental agency and its potential implications was only rarely addressed.[197] However, once the idea that climate changes over time—particularly as a result of human intervention—became increasingly accepted in the early colonial period, the question of how environmental change might affect human nature could no longer be avoided.

Broadly speaking, two different attitudes were taken. One saw man-made environmental change as a window of opportunity, opening up new spaces for human intervention and self-determination vis-à-vis climatic influence. It was this optimistic outlook, buttressed by notions of environmental 'improvement', that inspired the bio-political projects examined in the previous section. But environmental change was also viewed as an undue alteration of the order of nature, and therefore opposed as an impious, dangerous, or otherwise unwise activity. In this section, I shall briefly explore various forms of resistance to the ideology of environmental improvement across early modern Europe. Though extremely diverse in motives and outcomes, such forms of environmental 'counter-conduct' collectively promoted an outlook that emphasized restorative forms of human intervention on nature, in opposition to the more aggressive forms of environmental

[197] Exceptions have been considered in section 4.3 above.

manipulation theorized by the advocates of improvement.[198] The topic is extremely broad, and I approach it here without any pretense of exhaustivity. I shall in fact confine my attention to a particularly germane aspect for my dissertation, namely the role that climate theory played in the emergence of this counter-culture. Throughout the following analysis, I shall particularly emphasize the complexity of early-modern environmental discourse, showing how one and the same notion (in our case, climatic influence) could be invoked in support of competing attitudes and conducts.

4.5.1. Does Nature Need to Be 'Improved'?

Commenting in 1590 on contemporary Spanish plans to dig a canal across the Panama isthmus in Central America, the Jesuit naturalist José de Acosta (1539-1600) wrote:

> I think that such a plan is useless […]. I believe that no human power is capable of tearing down the strong and impenetrable mountain that God places between the two seas, with hills and rocky crags able to withstand the fury of the seas on either side. And even if it were possible for men to do it, I believe it would be very reasonable to expect punishment from Heaven for wishing to improve the works that the Maker, with sublime prudence and forethought, ordered in the fabric of this world.[199]

Similarly, when William Camden (1551-1623), some seventeenth years later, discussed current drainage works in Cambridgeshire in the revised edition of his famed chorography of Britain, he reported widespread fears that, despite all attempts to dry it up, 'this fenny country […] would come againe to the former state, so that many think it the wisest and

[198] For the concept of 'counter-conduct', see Foucault 2007: 201.
[199] 'Mas para mí tengo por cosa vana tal pretension [...] pero eslo para mí, que ningun poder humano bastará á derribar el monte fortísimo é impenetrable que Dios puso entre los dos mares, de montes y peñas durísimas, que bastan á sustentar la furia de ambos mares. Y cuando fuese á hombres posible, sería á mi parecer muy justo temer del castigo del Cielo, querer enmendar las obras que el Hacedor, con sumo acuerdo y providencia, ordenó en la fábrica de este universo' (Acosta 1590: 148 [3.10], translated in Acosta 2002: 124). On Acosta, see above, section 3.3.3.

best course according to the sage admonition in like case of Apollo his Oracle, *Not to intermeddle at all with that which God hath ordained*'.[200]

In the early modern period, this notion of a divinely ordained balance of nature could operate as one of the most powerful arguments against 'improvement'. For Acosta and Camden, as for many other contemporaries, the natural landscape in all of its aspects was a direct manifestation of God's superior wisdom; to try and alter it to man's supposed advantage was to call into question the goodness of God's design and to usurp a role that does not, and cannot, belong to man. Pointing to ancient examples and authorities,[201] both the Spanish Jesuit and the English chorographer argued that man's inability to carry out ambitious engineering works of channelization and drainage should be seen less as a technological failure than as evidence of their inherent unlawfulness. Nature's resilience—as in Camden's example of reclaimed wetland reverting to marshes—proves that whatever technical power man may boast, God's design will always ultimately prevail over human attempts at 'improvement'. In this view, the very idea of 'improvement' is ill-founded—nature, indeed, simply does not need to be improved. Even those features (such as swamps or mountains) that may appear unpleasant or unpractical from man's limited perspective undoubtedly fulfil a precise, though inscrutable, role within God's providential plan, and must therefore be accepted as an integral part of the cosmic balance.

The notion of the 'earth as a planned abode' is often associated with the Christian theme of man's stewardship of creation and with positive views of man's environmental

[200] 'De hac palustri regione exsiccanda […] verendum autem ne […] ad pristinum statum redigatur. Adeo ut consultissimum nonnullis videatur quod in re simili monuit Apollinis oraculum: *Rebus divinitus constitutis manum non esse iniiciendam*' (Camden 1607: 361; here quoted in Philemon Holland's contemporary translation [Camden 1610: 492]). The first edition of Camden's *Britannia* appeared in 1586; expanded editions were published in 1590, 1594, 1600, and 1607.

[201] Camden's reference to Apollo's oracle is taken from Pausanias's *Description of Greece* (second century AD), whereas Acosta draws upon Herodotus, Aristotle, and other ancient authors in his account of abandoned plans for a canal linking the Nile to the Red Sea under Sesostris (Acosta 1590: 148; translation in Acosta 2002: 124). See Hdt., 2.108, 2.158; Arist., *Mete*, 1.14, 352b30-1; Strab., 17.25; Diod. Sic., 1.33; Plin., *HN*, 6.33.

agency.[202] Texts such as those of Acosta and Camden, however, are representative of a different culture, one in which religious imperatives sustained an anti-interventionist attitude to environmental change. To some extent, this ambivalence lies in the Scriptures themselves, with their openness to multiple interpretations of nature's perfection and of mankind's role within it.[203] Scriptural authority could thus be invoked to justify a view of man as 'God's helper in finishing the creation',[204] but it could equally well inspire an understanding of nature as a perfectly accomplished balance, which men should strive to preserve rather than alter.

Other factors besides religious sensibilities contributed to the rise of proto-conservationist ideas in the early modern period. Fears of unexpected consequences resulting from man's intervention on nature were not always inspired by a religious belief in divine retribution, as in Acosta's text; they could also rest upon the recognition that the outcomes of man's environmental agency are sometimes undesirable,[205] and, more importantly, difficult to predict in advance. In 1707, the Archbishop of Dublin William King (1650-1729) made this point explicitly in an as yet unpublished letter to the Royal Society, where he reported that one of the most common ways 'to reduce heath and bog to arable land' in the Irish highlands (consisting in removing the turf, burning it in heaps, and scattering the ashes on the ground) had been found to cause a series of unexpected 'inconveniences', including a deterioration of the local climate.[206] The point that King was raising was in fact a delicate one, especially if one considers his intended readership: in

[202] See Glacken 1967: 312. Chapters 1.1, 2.1, 3.1, and 4.1 of Glacken's book provide a thorough investigation of the notion of the earth as a planned abode from Greek Antiquity to the eighteenth century. The idea that Christianity is, 'of all the major religions of the world […] the most insistently anti-natural' (Worster 1996: 27) was particularly advanced by Lynn White (see, e.g., White 1967).
[203] Arnould and Glon 2005: 8.
[204] Glacken 1967: 293.
[205] Glacken 1967: 316.
[206] London, Royal Society, Classified Papers, 10iii/39 ('The inconveniences are first, that such burning defiles the air, causeth rain and wind, is not practicall in a wett summer, and by destroying the sap of the earth and roots of the grass and all other vegetables […] doth […] depauperate the ground').

previous years, the Royal Society had supported projects such as those of Samuel Colepresse (dates unknown), a Dutch-educated physician who, in his 1667 'Georgicall Account of Devonshire and Cornewalle', had proposed to 'rarifye' the 'miasmatic dews' of south-eastern England by lighting fires in the countryside.[207]

People also feared that inconsiderate environmental change would directly affect human life in undesirable ways. In seventeenth-century England, for instance, local communities often resisted fen drainage projects on the grounds that these would destroy traditional ways of living off unique wetland ecosystems.[208] Drawing upon ideas of environmental influence to reverse the hygienist rhetoric of the drainage undertakers, the fenlanders also argued that drainage would damage, rather than ameliorate, their physical and mental health: indeed, according to the Cambridge-educated historian Thomas Fuller (1608-1661), 'the grossness of the air is conceived by some, to quicken their wits, and strengthen their memories'.[209]

One of the leading historians of ecology, Donald Worster, has suggested that although 'the term "ecology" did not appear until 1866 […], the *idea* of ecology is much older than the name'. According to Worster, the birth of ecology should be traced back to the eighteenth century, when 'a more comprehensive way of looking at the earth's fabric of life' led to reconceptualizing 'all of the living organisms of the earth as an interacting whole'.[210] A sense of ecological relations, however, is already apparent in the fenlanders' description of wetland environments as uniquely functional ecosystems deserving special protection. As the case of the seventeenth-century English fenlands shows, the

[207] Colepresse's 'Account' has been published in Stanes 1964; I am quoting here from the original autograph manuscript, preserved in the Society's archives in London (Classified Papers, 10iii/12).
[208] On opposition to drainage in the Fens, see Darby 1970: 49-64; Ash 2007; Hiltner 2011; Thirsk 2013: 117-29.
[209] Fuller 1840: 109. Fuller, however, personally upheld the view that 'a pure air, in all impartial judgments, is to be preferred for students to reside in'. See Darby 1970: 87.
[210] Worster 1994: x.

environmental insight of local communities often crucially contributed to the emergence of new ecological sensibilities in a time of intensifying conflict over land use issues.[211]

A flourishing tradition of county-based natural-historical writing also played an important role in these developments.[212] Indeed, the close study of local and regional environments often paved the way for a re-evaluation of commonly berated landscape features such as wetlands, forests, mountains, and glaciers. An exemplary case in this respect is that of the Swiss physician Johann Jakob Scheuchzer (1672-1733), one of the leading geologists of his time and a Fellow of the Royal Society since 1703.[213] The author of internationally acclaimed works, such as the monumental *Physica sacra* of 1728,[214] Scheuchzer was also among the first to advocate a new vision of high mountain environments as providentially designed to fulfil a fundamental role within the larger 'economy of nature'.[215]

In both published treatises and manuscript letters to his international correspondents (including Royal Society Fellows John Woodward and Hans Sloane), Scheuchzer consistently challenged standard views of the Alps as 'bleak-looking places' unfit for human habitation by pointing to their vital importance as water reservoirs, thermal regulators, and ecological niches for countless plant and animals species.[216] Situating

[211] See Thirsk 2013: 117-29; Glacken 1967: 329 (though with reference to an earlier period). For a similar dynamic in seventeenth-century France, see Morera 2011: 145-81.
[212] The contribution of natural histories to environmental thought has been examined in section 4.1 above.
[213] On Scheuchzer, see Fischer 1973; Boscani Leoni 2010. More particularly on Scheuchzer's contact with the Royal Society and its members, see Kempe 2000.
[214] Also known as the *Kupferbibel* for its magnificent copper engraved plates, Scheuchzer's *Physica sacra* is one of the best examples of early modern physico-theology, a strand of natural philosophy aimed at demonstrating the compatibility between modern science and the Holy Scriptures. See Müsch 2000; Giacomoni 2010; Gisler 2010. More generally on physico-theology, see Glacken 1967 (chapter 3.1). The physico-theological tradition was particularly strong in late-seventeenth- and early-eighteenth-century England: among its most important representatives were John Ray (1627-1705) and William Derham (1657-1735), the latter elected to the Royal Society in the same year as Scheuchzer (1703).
[215] Worster 1994: x.
[216] Scheuchzer, 'De ignis seu caloris certa portione Helvetiae adsignata' (London, Royal Society, Classified Papers, 14i/54). This text, thus far unpublished, is translated and commented in Barton and Miglietti, 'An Eighteenth-Century Thought Experiment' (see Bibliography, section 3). Scheuchzer developed similar ideas

himself firmly in the Hippocratic tradition,[217] Scheuchzer further argued that the excellence of Swiss 'airs, waters, and places' was reflected in the extraordinary physical, mental, and moral integrity of the 'mountain-roaming Swiss nation' ('natio Helvetica montivaga').[218] In this sense, it has been suggested that Scheuchzer was 'the first to lay scientific basis for the myth of the "homo alpinus helveticus", whose physical and moral constitution is seen to stem directly from the peculiarly mountainous Swiss terrain'.[219]

The well-balanced mix of religious belief and scientific observation underpinning Scheuchzer's ecological outlook is nowhere as clear as in his essay 'De ignis seu caloris certa portione Helvetiae adsignata', which he sent to the Royal Society in the winter of 1707-1708.[220] Constructed in the form of a thought experiment, this fascinating paper—thus far virtually unknown to scholars—presents itself as an articulate response to the 'foolish wishes' of climate warming expressed by 'natives and foreigners' alike. 'So many', Scheuchzer notes, 'desire a greater heat in many parts of Switzerland, and especially in mountainous areas, so that crops could mature more quickly, perpetual snows could be melted, summers could be prolonged, winters could be shortened, and we would enjoy so many other comforts that the bitter cold now denies us'.[221]

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in his *Itinera Alpina* (London: Henry Clements, 1708) and in other papers that he sent to the Royal Society around the same years, including his 'Account of Alpine trees and plants' (London, Royal Society, Early Letters, S2/32); 'Account of the water in Switzerland' (London, Royal Society, Register Book Original, 9/67); 'Concerning fertility in Switzerland' (London, Royal Society, Register Book Original, 9/69). On Scheuchzer's re-evaluation of Swiss mountain landscapes, see Giacomoni 2010, Hentschel 2010. For Scheuchzer's sources, see in particular Korenjak 2012.

[217] See 'Account of the water in Switzerland' (London, Royal Society, Register Book Original, 9/67).

[218] Scheuchzer, 'Account of a disease common in Switzerland called "nostalgia"' (London, Royal Society, Classified Papers, 14i/62).

[219] Boscani Leoni 2008: 114. See also Marchal 2010; Hentschel 2010.

[220] For details on this text, see footnote 216 in this section. On the interplay of religion and science in Scheuchzer, see Gisler 2010.

[221] 'Ratio perversa maiorem desideraret pro plerisque Helvetiae partibus, speciatim montanis, calorem, ut maturescere possent fruges, solvi aeternae nives, prolongari aestas, decurtari hiems, aliaque plura in nos redundare commoda, quae nunc surripit acerbum frigus' (London, Royal Society, Classified Papers, 14i/54, n.p.).

In contrast to such widespread ideas, Scheuchzer firmly believes that the cold climate and snow-capped mountains of his homeland are part of a providentially designed ecological balance that no one should dare or desire to alter. His 'De ignis certa portione' outlines in considerable detail the catastrophic consequences of rising temperatures not only for the Alpine ecosystem, but for Europe as a whole, and ends with the recognition that 'this marvellous providence of God greatest and best' has 'blessed' Switzerland with just the right amount of heat 'for our earth and the whole of Europe'.[222]

Although it is difficult to gauge whether he intended his paper to be openly provocative, Scheuchzer was probably aware that the ecological outlook propounded in his 'De ignis certa portione' was at odds with the ideology of environmental 'improvement' so popular among his Royal Society readers.[223] London, predictably enough, reacted by ignoring Scheuchzer's request to include the paper in the *Philosophical Transactions*, where his 'Observations on a lunar eclipse' had been published the previous year.[224] While it is unclear to what extent the incident of the 'De ignis certa portione' may have contributed to Scheuchzer's cooling relationship with the Royal Society in subsequent years,[225] it did undoubtedly signal a fundamental disagreement between the Swiss naturalist and the prestigious London institution regarding man's role within the divine

[222] 'Laudemus plenis buccis infinitam Dei sapientiam, ac potentissimam bonitatem, quae regiones nostras, aëre alias rariori et frigidiori circumfluas, calore sufficienti, et terrae nostrae, totique Europae proportionato beat [...]. Miram hanc Dei optimi maximi prouidentiam decantemus' (London, Royal Society, Classified Papers, 14i/54, n.p.).

[223] See Barton and Miglietti, 'An Eighteenth-Century Thought Experiment' (n.p., forthcoming).

[224] See Barton and Miglietti, 'An Eighteenth-Century Thought Experiment' (n.p., forthcoming: see Appendix, item 1.1). The Royal Society also sponsored and paid for the publication of Scheuchzer's first three *Itinera alpina* (1708).

[225] From 1708 to 1730 Scheuchzer submitted no further papers to the Royal Society (with the exception of a series of meteorological observations for 1724, sent to the Society in the late spring or early summer of 1725: see London, Royal Society, Classified Papers, 5/26). In 1730, a few months after the premature death of his son Johann Gaspar, Scheuchzer resumed contact with Hans Sloane, whom his son had served as personal secretary for many years (numerous manuscript papers by Johann Gaspar are still held in the Royal Society archives—some incorrectly catalogued under his father's name). This resulted in a series of new papers (mostly on medical and astronomical topics) by Scheuchzer Sr being read before the Society from 1730 and 1733 (the year of Scheuchzer's death).

order of nature. Perhaps even more than revealing the different pace at which ecological ideas were developing on the continent and in the British Isles,[226] Scheuchzer's case shows to what extent different, and indeed contradictory, ideas and attitudes could coexist within a shared physico-theological culture, thus confirming once more the diverse character of early-modern environmental thought.

4.5.2. CONSERVATION, RESTORATION, IMPROVEMENT

The texts of José de Acosta, William Camden, and Johann Jakob Scheuchzer examined in the previous section represent three possible inflections of early-modern conservationist discourse from different periods, places, and cultural contexts. With Scheuchzer, in particular, we have seen how conservationist ideas could emerge from the very same intellectual climate that inspired and legitimized more aggressive forms of environmental improvement. This particular dynamic finds parallels elsewhere. In his analysis of the colonial genesis of conservationism, which emphasizes the 'heterogeneous and ambivalent nature of the workings of the early colonial state',[227] Richard Grove has shown that far from being 'purely destructive' environmental agents, colonial states often fulfilled a 'pioneering conservationist role', acting in the name of both 'the long-term economic security of the state' and the climatic theories developed by academies and scientific societies based throughout the colonial world.[228] 'While the colonial enterprise undoubtedly promoted large-scale ecological change at some periods', Grove notes, 'it also helped to create a context that was conducive to rigorous thinking about the actual

[226] The theory and practice of conservationism developed on the continent (particularly France and Holland) long before becoming widely accepted in Britain—and this despite the fact that British science (particularly Newtonian physics) provided many of the ideas and principles underpinning scientific ecology (Grove 1995).
[227] Grove 1995: 7.
[228] Grove 1995: 7-8.

processes of ecological change as well as thinking about the potential for new forms of land control'. More importantly, 'the absolutist nature of colonial rule' made it possible not just to envision, but also to implement 'interventionist forms of land management that, at the time, would have been very difficult to impose in Europe'.[229]

Such examples suggest that the traditional dichotomy conservationism versus interventionism requires some reconsideration. Conservationism itself emerged as an intensely interventionist response to 'a fast-moving ecological crisis' caused by short-sighted colonial exploitation. In this sense, the difference between conservationist and interventionist ideologies lies not so much in the *degree* of human intervention on nature, as in the latter's *purpose* and *direction*. The colonial conservationists studied by Grove intended their environmental agency as restoration, rather than active transformation. Unlike the environmental 'improvers', who subjected colonial ecosystems to sweeping changes in an attempt to 'reconstruct European-type landscapes in the island colonies', conservationists understood colonial environments as 'earthly paradises' that required no further improvement.[230] Thus, where colonial 'improvers' cleared the land to make room for mono-cultural plantations, meadows, and spacious vistas, conservationists reforested, among other reasons, to bring imperial landscapes back to their 'natural', pre-colonial character.[231]

Grove's account of the colonial origins of modern conservationism shows how competing environmental mentalities could lead to opposite assessments of the value of natural landscapes and to different ways of interacting with them. Ultimately, though, it also suggests that the distance between conservationism and improvement is less pronounced than is commonly assumed. While conservationists certainly did not conceive

[229] Grove 1995: 7.
[230] Grove 1995: 65.
[231] Grove 1995: 155.

of themselves as 'agents of creative evolution',[232] they did understand their environmental agency as a positive, and indeed necessary, contribution to a divinely ordained economy of nature. Distancing themselves from more aggressive forms of environmental intervention, advocates of conservation believed their own activity to be helpful and benign, as it helped restore a natural order that had been unduly altered by past generations.

While Grove's research sheds light on many important nuances of early-modern environmental ideas and practices, his overall thesis—that modern conservationism developed as a direct consequence of European encounter with tropical islands and other exotic colonial contexts—seems less convincing. Assuredly, the colonial experience played a crucial role in modifying and reorienting the environmental outlook of early modern Europeans;[233] it was not, however, the only source and motor of these changes—nor were colonial empires the only contexts in which these conceptual transformations were taking place. For a good case in point, one can take Giovanni Battista Doni's *De restituenda salubritate agri Romani*, a paradigmatic, though little known, instance of early conservationist thought on the continent.[234] Doni (1594-1647), a Florentine polymath with close ties to the powerful Barberini family in Rome, wrote his treatise at a time when the Italian debate on the insalubrity of Roman air had been raging for almost half a decade.[235] Doni's *De restituenda salubritate*, while framing the issue through traditional ideas of

[232] I borrow this elegant expression from Charles Webster (1975: 466), who used it to describe the ideas of the natural philosopher and deputy-governor of the Royal Mines John Pettus (1613-1690). In his *Volatiles from the History of Adam and Eve* (London: T. Bassett, 1674), Pettus developed his own Baconian brand of the Christian theory of continuous creation, arguing that 'God did at first create the kinds of all plants, yet doubtless man had and yet hath an honest allowance to procreate a diversity of species by transplantation, ingraftings, innoculatings, and other various cultivations, which were incestuous in other creatures; but as I conceive allowed from the words here *to dress and keep it*' (43-44).

[233] For further discussion of this point, see section 3.4 above.

[234] Written around 1629-1631, the treatise was published posthumously in 1667 (Florence: 'All'insegna della Stella') on the initiative of Doni's sons. It was then reprinted twice, at The Hague (1716) and Venice (1735), and exerted a long-standing influence on Italian environmental debates (see Carrafiello 2014: 225). On Doni, see DBI, article 'Doni, Giovannni Battista' (by Gianfranco Formichetti).

[235] For more information on this debate, see above, 2.3.1 (on Cagnati and Petronio), as well as my forthcoming study 'Wholesome or Pestilential?' (see Bibliography, section 3).

environmental influence and erudite quotations of classical authors, took an unusual stance within this debate by proposing an ambitious programme of environmental engineering in the Roman region. Many of Doni's proposed measures resembled, and sometimes anticipated, comparable developments in other European countries: among these were widespread deforestation, land-levelling and drainage, increased settlement, intense land cultivation, and the construction of dams and dykes to shield inland Latium from harmful coastal vapours.[236]

Yet Doni was not an 'improver' in the ordinary sense of the term. Throughout his treatise, he stressed that the Roman region could be made healthy only because it originally used to be such. Drawing upon literary, epigraphic, and archaeological evidence, Doni indeed showed that most of the areas that in his own time were commonly considered insalubrious were healthy and populous during Roman Antiquity. He concluded that the present insalubrity was not a fact of nature, but the result of a process of environmental degradation triggered by human causes and thus reversible by artificial means ('ulla cultura vel industria').[237] Environmental engineering in the Roman region was therefore not transformative, but restorative of an original order ('pristinus status'), and it was only in this light that Doni justified it and expected it to be successful.[238]

Doni was far from alone in thinking along these lines. His understanding of environmental engineering as a restorative, rather than transformative, form of human intervention on nature found many advocates in seventeenth-century Europe, and some of those whom we usually regard as partisans of improvement were indeed closer to Doni's

[236] Doni 1667: 132-46, 164. For parallel developments in Europe, see Hoyle 2011a; Warde 2011; Slack 2014.
[237] Doni 1667: 78 ('maiorem huius agri partem a veteri salubritate degenerasse'). Elsewhere in the same text (15, 24, 128), Doni notably argued that the 'degeneration' began in the aftermath of the 'barbarian invasions' ('barbarorum vastationes') of late Antiquity, when a once populous and well-cultivated territory became depopulated and was turned into a 'miserable desert' ('miseranda vastities'; Doni 1667: 68, 99).
[238] Doni 1667: 133.

perspective than to the bold experimentalism of genuine 'improvers' such as Beale. I already mentioned, for instance, that Petty's justification of English environmental engineering in Ireland rested on the idea that Ireland's unwholesomeness was the result of human, rather than natural, causes.[239] Cases such as those of Doni and Petty show that our understanding of seventeenth-century environmental attitudes needs to be nuanced in light of the remarkable diversity of ideas and practices that the early modern world was able to accommodate.

4.6. Conclusions

This chapter has shown that place-making, on account of its alleged climate-changing powers, was conceptualized in the early modern period as one possible way of coping with environmental influence besides those discussed in previous chapters. In particular, place-making differed from both discipline and displacement in that it provided a *proactive*, rather than a *reactive*, strategy for dealing with climate's transformative powers.

Discipline, as seen in Chapter 2, proposed to rectify the temperamental imbalances resulting from environmental factors by means of a correcting regimen. As for the various types of geographical displacement analysed in Chapter 3—from medical migration to colonial mobility—they all conformed to a logic that we could call of 'programmatic adaptation', which consisted in choosing a prospective site based on an anticipation of its effects on the displaced group or individual. Despite important differences, discipline and displacement thus had one major aspect in common: both assumed environmental

[239] For a similar perspective, see William King's aforementioned paper on Irish agriculture (London, Royal Society, Classified Papers, 10iii/39).

influence as fixed and predetermined—that is, as part of a larger natural order that it was not within man's power to alter.

Place-making, on the other hand, suggested the opposite. It showed not only that the natural environment was pliable to man's transformative activity, but also that local environmental changes could often have much broader repercussions on the climate of a whole region. Environmental influence, in other words, was not unalterable, but could be negotiated and re-engineered in order to suit man's needs. In this perspective, it even became conceivable to exploit the transformative powers of climate as an instrument of human improvement and social reform.

This new outlook took a long time to develop and an even longer time to start affecting actual practice. In order to reconceptualize environmental influence as subject to man's agency, at least three major changes had to take place in the dominant understanding of climate. In particular, it was necessary, first, to replace the traditional notion of a static climate with one of climatic variability; second, to acknowledge the close dependence of climate on topographic factors (thus also shifting the balance from a cosmological to a chorological model of climate theory);[240] and third, to identify positive causal connections between human intervention on nature and climate change. As this chapter has shown, the second half of the seventeenth century was home to important transformations in each of these respects, particularly thanks to the work of scientific circles, networks, and academies such as the Royal Society. While the historical and intellectual changes leading to this 'paradigm shift' radiated out from multiple centres and were not confined to England alone, the Royal Society did provide an unparalleled platform for ground-breaking research into the old question of environmental influence.

[240] For the categories of chorological and cosmological climate theory, see above, 1.2.3.b.

New possibilities, but also new problems, came with this novel understanding of man's ability to affect the climate. At the same time as emerging notions of anthropogenic climate change and a persisting belief in climatic influence came together to inspire plans of human engineering through premeditated environmental change, voices of dissidence arose all over Europe to critique the dominant ideology of environmental 'improvement'. Describing environmental and climatic engineering as a risky and hubristic undertaking, critics of improvement called attention to the benevolent design that invisibly reigned over nature's economy, guaranteeing the best possible equilibrium between human beings and their living ecosystems. Supported by religious sensibilities, embryonic precautionary principles, and a growing awareness of ecological relationships, such critiques drew upon notions of climatic influence to show that any undesirable changes in the fabric of the earth would also inevitably reverberate on the quality of human life: on this view, the greatest lesson that climate theory could teach in a time of heightened technological intervention was that nature's vulnerability to human intervention is ultimately one and the same with man's vulnerability to himself.[241]

[241] See Jonas 1984: 6-7.

Epilogue

I leave here many things on the point of my pen.
All that can be said should not be said.
I am content to work as is done with maps,
where a small point signals a large region.

—Antoine de Montchrestien[1]

1. The 'Life of Nature': Climate Theory in the Seventeenth Century

'Nature', it has been said, 'is perhaps the most complex word in the language'.[2] It is also one of the most contentious: its 'multiple, shifting, and unstable' meanings encapsulate different and often opposed conceptions of 'the world or human beings or both', thus reflecting competing understandings of the human condition as a whole.[3] Few other notions accommodate a comparable semantic diversity; few are so easily inflected for ideological purposes, or mobilized in political 'struggle and conflict'.[4]

Something similar may be said of the concept of climate. Throughout this study, climate has emerged as another emblematic example of a semantically complex 'keyword' that 'carries, over long periods, many of the variations of human thought'.[5] The stratification of meanings conveyed by this concept can be examined diachronically, by looking at semantic shifts over time, or synchronically, by observing the simultaneous coexistence of rival understandings of climate within the same society at any particular time in history. In this dissertation, I have pursued both approaches at the same time, on the premise that any historical account that does not pay equal attention to diachronic

[1] 'Je laisse, en ce lieu, beaucoup de choses au bout de la plume. Tout ce qui se peut ne se doit pas dire. Je me contente de travailler comme en une carte où un petit poinct marque une grande province' (Montchrestien 1889: 295).
[2] Williams 1985: 220. See Lovejoy 1948 for a taxonomy of ideas on nature.
[3] Watts 2005: 144.
[4] Watts 2005: 145.
[5] Watts 2005: 144.

change and to synchronic variety (in the form of local controversies, competing models, and so forth) runs the risk of being unilateral and flawed.

Two central questions have particularly oriented this research: first, how did seventeenth-century individuals and societies construe themselves in a dynamic relationship (both theoretical and practical) with their physical milieus? Secondly, where do their attitudes stand in relation to a centuries-long tradition of environmental thought and praxis? By addressing the first of these questions, I have sought to do for seventeenth-century Europe what Jean-Baptiste Fressoz has recently accomplished for post-revolutionary France, namely to demonstrate how the 'notion of climate is essential for understanding the reflexivity of modern societies'.[6] Fressoz's concept of reflexivity is especially helpful for thinking about the peculiar 'epistemic space' ('lieu épistémique') that climate theory creates between man and nature. In social theory, 'reflexivity' designates a bidirectional relationship between causes and effects that mutually influence each other in an open-ended spiralling process. In this sense, I have argued, the relationship that climate theory establishes between humankind and its living environments is inherently 'reflexive'. As Jean Golinski and Catherine Larrère have shown for eighteenth-century Britain and France respectively, the essence of climate theory consists in abolishing any rigid dualism between nature and culture—between social interactions on the one hand and man's relationship with the natural world on the other.[7] Constantly mediating between these two sets of relations, the principle of environmental influence produces what Larrère calls 'an integrated ecology' ('écologie intégrative'): as she explains, 'man ought not to be envisaged as external to nature, since his action on nature is not conceived in terms of domination or opposition: if man can be seen as a geographical

[6] Fressoz 2012: 13.
[7] Golinski 2007; Larrère 2012.

agent, it is because his action does not interrupt natural processes, but rather inscribes itself within them'.[8]

Jean-Patrice Courtois's notion of a 'transaction' between man and climate also points to a similar perspective. Building on Georges Benrekassa's fundamental work on Enlightenment climate theory, Courtois has shown that the complex set of interactions that climate theory establishes between humankind and its milieus is more accurately framed in terms of an exchange or negotiation than in the more familiar vocabulary of causality and determination.[9] The analysis offered in this dissertation confirms Larrère's, Courtois's, and Fressoz's understanding of climate theory as a non-dualistic and anti-deterministic form of environmental thought, which opens up 'spaces of coexistence' and mutual collaboration between man and nature.[10] While these authors have developed their interpretative frameworks primarily with reference to Enlightenment and post-revolutionary developments, the research presented here shows that earlier discussions also reflected similar characteristics, particularly during that 'long' seventeenth century that has thus far been unjustly neglected by historians of climate theory.

By drawing attention to the theoretical debates and practical attitudes that the notion of climatic influence elicited throughout this period, I have sought to demonstrate that climate theory was a fundamental component of the way in which people conceptualized their living environments and related to them. The account that I have proposed not only challenges standard views of the seventeenth century as an age of stasis or decline in the long-standing tradition of climate theory; it also calls into question still-persistent images of this period as a time in which man's relationship with nature changed

[8] Larrère 2012: 154.
[9] Courtois 2002: 148. See also Benrekassa 1983.
[10] See Benrekassa's notion of climate theory as a 'common space' ('espace commun') between man and nature (1983: 207). For a similar perspective, see Larrère 2012: 153.

from one of dependence and subjection to one of domination and control. Such an interpretation, most prominently advanced in Carolyn Merchant's *The Death of Nature*,[11] is in my view doubly misleading: first, because it exaggerates the helplessness of 'pre-modern' men and women before the natural world, thus making climate theories appear much more deterministic than they ever were; and, secondly, because it conveys the false impression that seventeenth-century Europeans placed themselves above, rather than within, the order of nature.

Of course, the technological, intellectual, and geo-political developments that took place over the course of the seventeenth century did not fail to affect the way that Europeans understood nature and their own place within it. Overall, this period witnessed a growing faith in man's capacity to master the natural environment both conceptually and practically, and even to 'improve' it through conscious transformative activity. By the end of the timespan covered in this dissertation, the balance of power between nature and humankind may thus seem to have shifted in favour of the latter—if not in actual fact, at least in the perception of those who lived through such transformations.

However, it would be wrong to conclude that this new optimistic appraisal of man's environmental agency entailed a drastic break with past conceptions of nature as an active and forceful presence in human life. As this study has shown through a range of pan-European and colonial examples, seventeenth-century men and women still largely conceived of themselves as embedded in, and conditioned by, the milieus in which they lived. Maintaining the notion of environmental influence firmly at the centre of their world view, they kept looking for ways to fashion themselves as free moral subjects in spite of (or alongside) the power of climate and place.

[11] Merchant 1990.

Corrective regimen (discussed in Chapter 2) and geographical displacement (examined in Chapter 3) were two such ways of coping with environmental influence, both theorized and practised since classical Antiquity, and still widely popular in the early modern period. Direct environmental manipulation—or, as I have preferred to call it, 'place-making'—was another, which, though not previously unknown, gained increasing importance over the course of the seventeenth century (Chapter 4). While differing in many respects, these various strategies for confronting and managing environmental influence collectively testify to a continuing belief in man's vulnerability to climate and other environmental factors throughout the period under consideration. At the same time, such strategies also show that this perceived vulnerability was counterbalanced by a deep trust in man's resilience and capacity for self-determination.

In light of the above, it seems necessary to reconsider some familiar narratives that have long dominated the history of early-modern natural philosophy. One example is the dichotomy (established, among others, by Keith Thomas and D.G. Charlton) between 'those who felt "sympathetic" towards nature and wished to "collaborate" with it', and those who instead sought 'to "exploit" it, to modify it for utilitarian ends'.[12] In this perspective, 'collaboration' with nature presupposes an understanding of the latter as a living organism and an active force; 'exploitation', on the other hand, entails that nature be conceived as purely passive, or, in Merchant's terms, as 'dead and inert matter'.[13]

Convincing as it may seem at first sight, such a distinction is problematic on many levels.[14] Most importantly for the purposes of the present study, this binary interpretation

[12] Charlton 1984: 212. See also Thomas 1996.
[13] Merchant 1987: 267.
[14] Some of the most interesting arguments against any rigid dichotomy between cooperation and exploitation can be found in recent discussions of 'deep ecology', the Gaia hypothesis, and contemporary environmentalism in general: see the excellent overviews of Sideris 2003 (Chapter 2) and Cannon 2015 (Chapter 1).

fails to capture an essential aspect of early modern attitudes to the physical world. As I have shown in Chapter 4, early modern attempts at modifying nature were often underpinned by a belief in nature's own influence on man: it was precisely because the environment was seen as a crucial determinant of man's character and constitution that its manipulation appeared as a worthwhile, and indeed necessary, undertaking. Jean-Baptiste Fressoz has rightly indicated how one of the most important epistemic functions of climate theory was to show that man's action on the environment ultimately corresponded to an indirect action of man on himself through the medium of environmental influence.[15] By modifying their living environments, people were thus reasserting, rather than negating, the fundamental bond uniting them with the natural world. Environmental intervention, in other words, was not always, nor was it necessarily, the expression of a civilization disconnected from its physical surroundings—of a 'culture' without 'nature'.

2. Continuities and Discontinuities in Climate Theory

Another major question addressed in this dissertation has concerned the position of seventeenth-century climate theories within a long-standing tradition of environmental thought and praxis. As this study has shown, seventeenth-century climate theories were in many important respects a natural continuation of Renaissance systems of thought, which in turn stemmed from, and were indebted to, the much older models elaborated in classical Antiquity. For instance, the textual corpus with which seventeenth-century climate theorists engaged was still in large part the same that had framed the climatological debate of the previous century. This corpus particularly included Greek and Roman authors such

[15] Fressoz 2012: 13-14; 21; 111-202.

as Hippocrates, Aristotle, Polybius, Vitruvius, Strabo, and Ptolemy. Even when such authorities were used against each other (as was so often the case), criticism of one classical source was typically buttressed by a direct appeal to another: for instance, the sixteenth-century Roman physician Marsilio Cagnati invoked the testimony of Vitruvius in order to reject the Hippocratic arguments of his senior colleague Alessandro Petronio, within the context of the controversy on the insalubrity of Roman air.[16] This particular debate thus shows to what extent early-modern climate theorists still recognized the ancient doctrinal body utilized by their Renaissance predecessors as authoritative and worthy of attention.

Overall, the very epistemic status of climate theory appears to have changed little, if at all, throughout the early modern period. In the seventeenth century as in the sixteenth, the study of environmental influence was an essentially multidisciplinary endeavour, attracting interest from fields so diverse as medicine, pedagogy, political theory, natural philosophy, architecture, travel writing, and yet other domains of intellectual production. Throughout this dissertation, I have particularly emphasized how knowledge transfers across different disciplinary fields were a constitutive trait of seventeenth-century climate theories, from their conceptual formulation, over their dissemination and reception, right through to their practical application in various contexts.

This persistently multidisciplinary character of climatological discourse may, at first sight, appear surprising. At a time when key progress was made in relevant areas such as meteorology, geography or physics,[17] one would perhaps expect the discourse on climate to have spawned increasing specialization. Yet it was not until much later that specialized climatology in its modern sense of atmospheric science arose. While a

[16] On this controversy, see above, 2.3.1.
[17] See Livingstone 1990; Grove 1996; Jankovic 2010; Martin 2011; Hoppen 2013.

complete scholarly consensus does not exist as to the exact chronology and causes of these changes, recent studies suggest that scientific climatology emerged over the course of the nineteenth century out of an encounter between meteorology and physical geography, supported by 'late Enlightenment methods of precise instrumentation and measurement'.[18]

Without completely overthrowing the earlier tradition of climate theory,[19] modern climatology marked itself off from the latter in two fundamental respects: first, for its essentially meteorological view of climate as 'the prevalent pattern of weather in a region throughout the year, in respect of variation of temperature, humidity, precipitation, wind, etc.', as opposed to the much broader range of geographical, atmospheric, and even astral features that climate theory typically took into account;[20] secondly, for its taking climate, in and of itself, as its chief (if not exclusive) object of study. The same cannot be said of climate theory, which, since its origins in ancient Greece until its most recent developments, consistently presented itself as a science primarily concerned with man rather than climate.[21] Climate theory, in other words, was an anthropology before being a climatology.[22]

For climate theory, as opposed to climatology, climate was first and foremost a conceptual tool to think and speak of other things, all of which pertained to various aspects of the human condition: the diversity of individual temperaments and national characters; the relationship between nature and culture; the laws of historical development; the spatial

[18] Feldman 2003: 156. See Franz Mauelshagen's forthcoming monograph on the birth of modern climatology.
[19] As highlighted for instance in Livingstone 1991 and Feldman 2003.
[20] OED, article 'Climate', 2a.
[21] This anthropocentric approach is apparent for instance in Domenico Panarolo's 1642 *Aërologia, cioè Discorso dell'aria*, a treatise that despite its title has as its main topic 'man, the most perfect of all living beings' ('Il soggetto è grande, del quale si discorre, poiché è l'huomo più perfetto di tutti gl'altri animanti'; Panarolo 1642: 1). On this treatise, see Hinsdale 1923.
[22] I use the term 'anthropology' in Michèle Duchet's broad sense of any possible discourse 'concerning human nature and the origins and transformations of human societies', regardless of whether its aim is to 'establish a general science of man' or to 'found a moral and a politics' (Duchet 1995: 19).

dimension of political power; and so forth.[23] This, however, should not be taken to mean that climate theory did not stake a claim to explaining the actual workings of nature. Rather, it suggests that the opposition now commonly established between human sciences and natural sciences held less (if any) importance at the time considered in this study. Early-modern climate theory was indeed at once a science of nature and a science of the human spirit, as its purpose was precisely to explain the human spirit through, and in relation with, nature.

In all of these respects, seventeenth-century climate theory can be seen as standing in direct continuity with an earlier tradition, as well as anticipating the developments of the Enlightenment period (see below). Yet the seventeenth century also marked an important moment of transition within this long-standing tradition. Among the most significant changes evidenced in this dissertation are a general trend away from cosmological and towards chorological models of climate theory;[24] the establishment of clearer boundaries between the notions of climatic and astrological influence;[25] the growing importance of more proactive ways of coping with environmental influence, including 'place-making' in its various forms; and an ever keener awareness of the historical variability of climate.

Prior to the seventeenth century, climate theory was dominated by the idea of fixed, ahistorical climates. Such an idea often fulfilled a critical epistemic role within this theory: in Bodin's model, for instance, the immutability of climate was precisely what allowed the latter to operate as the ultimate baseline against which all historical change could be set

[23] See Richard Spavin's paper 'Jean Bodin and the Idea of Anachorism', presented at the conference 'Ruling Climate: The Theory and Practice of Environmental Governmentality, 1500-1800' (University of Warwick, 16 May 2015). A revised version of this paper is in preparation for Morgan and Miglietti's edited volume *Governing the Environment* (see Bibliography, section 3).
[24] For the categories of 'cosmological' and 'chorological' climate theory, see above, 1.2.3.b.
[25] This aspect, which I have not been able to examine in all due detail here, is at the centre of a separate study (working title: 'Astrology, Medicine, and Climate in the Early Modern Period') that I plan to complete in the near future.

and reduced to order.[26] Over the course of the seventeenth century, however, climate and history gradually ceased to be antithetic concepts as climate itself came to be understood as an historical object, namely as an entity that could, and did, change over time.[27] This new attention to climate's historicity represented a genuine novelty in the landscape of seventeenth-century climate theories. It was also full of consequences for subsequent developments and uses of these theories in the Enlightenment period, as the next (and last) section will show by way of final consideration.

3. Looking Forward: Climate Theory after the Seventeenth Century

What happened to climate theory after the period covered in this study? Scholarly opinion is largely divided on the subject: while some view eighteenth-century climatological thought as a natural continuation and indeed an apogee of earlier models of climate theory,[28] others argue for a radical epistemic shift (in the late Englightenment and onwards) from classic geo-humouralism to the more deterministic doctrines of racial environmentalism.[29] Yet other scholars see the eighteenth century as the cradle of an anti-climatological outlook that eventually came to deny all efficacy to climatic and environmental influence, in overt reaction to the tradition of climate theory.[30] Besides raising substantial problems of historical periodization, such debates also reveal the existence of a profound disagreement as to what climate theory was, and how we can distinguish it from other types of climatological thought.

[26] See Staszak and Couzinet 1998.
[27] See above, 4.5.
[28] See, for instance, Larrère 1992; Courtois 2002; Courtois 2007; Golinski 2007: 173-74.
[29] Glacken's view that 'the ancient writers on the whole were far less rigid in their determinism that many thinkers of the eighteenth and nineteenth centuries' (1956: 74) is followed, among others, by Mark Harrison (1999) and Mary Floyd-Wilson (2003).
[30] Withers 2008: 142-43.

None of the positions briefly outlined above is absolutely right or wrong. Each of them captures an aspect of a picture that was extremely complex, and that we need to grasp in its entirety in order to make sense of the epistemic status and historical trajectory of climate theory throughout the eighteenth century and beyond. Clearly the question is too far-reaching to be addressed here in full detail. In what follows, I shall limit myself to a few reflections that will hopefully pave the way to further studies in the future.

1748 was a momentous year for climate theory. In early November, a large volume was published anonymously in Geneva, under the title: *De l'Esprit des lois, ou du rapport que les loix doivent avoir avec la constitution de chaque gouvernement, les moeurs, le climat, la religion, et commerce*.[31] The book, soon recognized as the work of Charles-Louis de Secondat, Baron de Montesquieu (1689-1755), was an immediate success: reprints, translations, and pirate editions appeared all over Europe in the following months, despite the official prohibition imposed by the Catholic Church.[32]

Early readers of the *Esprit des lois*, not unlike modern scholars, were especially struck by the fundamental role that Montesquieu assigned to climate in shaping what he called 'the general spirit of a nation' ('esprit général d'une nation').[33] 'In the *Esprit des lois*,' one commentator wrote in 1751, 'climate is what motion is in the Universe, that is,

[31] See Tomaselli 2006: 9.

[32] The *Esprit des lois* was included in the Index of Prohibited Books in 1751 after the joint attacks of Jesuits and Jansenists. On secular and religious censorship of the work, see Bald 2006: 317-18. A revised edition, incorporating Montesquieu's final corrections, was published in Paris two years after the author's death (see Porret and Volpilhac-Auger 2002; Volpilhac-Auger 2011). The *Esprit des lois* was not the only writing in which Montesquieu addressed the issue of climatic influence: for a list and discussion of other relevant texts, see Courtois 2002 and 2007.

[33] See Böelke 1999. In earlier writings, such as the *Considérations sur les causes de la grandeur des Romains et de leur décadence* (1734), Montesquieu uses the term 'esprit' interchangeably with 'caractère' or 'génie' (a word introduced into the discussion on climate and national character in 1719, with Jean Baptiste Dubos's *Réflexions critiques sur la poésie et la peinture*). The same vocabulary is adopted by François-Ignace d'Espiard (see above, 4.4) for his *Essais sur le génie et le caractère des nations*, first published in Brussels in 1743 and re-edited in The Hague in 1752 under the revised title *L'Esprit des nations*—quite possibly a shrewd marketing move for taking advantage of Montesquieu's recent success. The 1752 edition formed the basis of all further reprints and translations. On Espiard, see Ehrard 1963, vol. 2: 715-17; Bell 2001 (Chapter 5).

the universal cause of everything'.[34] So great appeared the prominence of climate theory within Montesquieu's framework that in their respective entries on climate for the *Encyclopédie*, both published in 1753, the *philosophe* Jean d'Alembert (1717-1783) and the chemist and physician Gabriel François Venel (1723-1775) hailed the *Esprit des lois* as one of the best and most complete books ever written on the 'influence of climates on the mores, characters, and laws of peoples'—a judgement that matches that of many modern historians of climate theory.[35]

The same year 1748 also saw a revised and expanded edition of David Hume's *Essays, Moral and Political* (this appeared simultaneously in Edinburgh and London for Alexander Kincaid and Andrew Miller, following the much slimmer *editio princeps* of 1741 and the 'corrected' version of 1742). This third edition, to which the Scottish philosopher (1711-1776) added incessantly for the next three decades,[36] included a brand new essay 'On National Characters' that was later translated as a self-standing piece in the *Mercure de France* (January 1756). 'On National Characters' can be counted among the very first instances of a fully-fledged critique of climatic influence. Although Hume's attack could not have been aimed against Montesquieu's *Esprit des lois* for obvious chronological reasons, it cannot be excluded that Hume may have had in mind Montesquieu's climate theory as formulated in earlier writings.[37] What is certain is that

[34] 'Le climat est dans *l'Esprit des Loix* [*sic*], ce que le movement est dans l'Univers, la cause universelle de toutes choses' (De la Porte 1751: 88; quoted and translated in Romani 2002: 31).
[35] D'Alembert 1988; Venel 1988. D'Alembert's entry notably addressed climate from the angle of geography, whereas Venel's discussed it from a medical perspective.
[36] A definitive collection of thirty-nine *Essays, Moral, Political, and Literary* appeared posthumously in 1777 (Edinburgh: R. Fleming and A. Alison for A. Kincaid).
[37] See footnote 33 in this section. Hume knew Montesquieu's work well, as the numerous letters that the two exchanged between 1749 and 1755 abundantly attest.

many of the points raised in Hume's essay were subsequently echoed by other authors in their critiques of the climatological sections of the *Esprit des lois*.[38]

Following in a long tradition of 'characterological' studies,[39] Hume conceded that 'each nation has a peculiar set of manners and that some particular qualities are more frequently to be met with among one people than among their neighbours'.[40] Holding fast to received stereotypes—the witty Frenchman, the grave Spaniard, the obtuse Dane—Hume dismissed apparent counterexamples (such as the Spanish picaresque author Miguel de Cervantes or the brilliant Danish mathematician Tycho Brahe) as exceptions to a well-established rule. Where he did depart from tradition, though, was in addressing some questions of his time. Two of the most pressing were the following: Were national characters the result of 'moral causes', such as 'the nature of the government, the revolutions of public affairs, the plenty or penury in which the people live, the situation of the nation with regard to its neighbours'?[41] Or were they a direct consequence of 'physical causes', namely 'those qualities of the air and climate, which are supposed to work insensibly on the temper, by altering the tone and habit of the body, and giving a particular complexion, which, though reflection and reason may sometimes overcome it, will yet prevail among the generality of mankind, and have an influence on their manners'?[42]

Hume's answer was unambiguous—and deliberately provocative: 'As to physical causes,' he wrote, 'I am inclined to doubt altogether of their operation in this particular; nor do I think, that men owe any thing of their temper or genius to the air, food, or

[38] See the various sets of commentary notes reported in Parrelle's edition (Montesquieu 1826, vol. 5/2). For the French reception of 'On National Characters', see Malherbe 2005.
[39] See Romani 2002; Margolin 2003; Leerssen 2006: 52-70.
[40] Hume 1748: 267.
[41] Hume 1748: 268.
[42] Hume 1748: 268.

climate'.[43] For him, the emergence of national characters had to be ascribed entirely to the action of moral causes, and particularly to political government, 'sympathy or contagion of manners',[44] and the decisive power of culture. Hume allowed that some traits of character or behaviour—such as the intemperate drinking of the Northerners or the 'amorous disposition' so prevalent in the southern climates—could in part be explained in light of 'physical principles'; but even if climate could indeed 'affect the grosser and more bodily organs of our frame', it could not, he reckoned, 'work upon those finer organs, on which the operations of the mind and understanding depend'.[45]

No one before Hume had ever contested the notion of climatic influence in such blunt and unequivocal terms. In the sixteenth and seventeenth centuries, there had certainly been heated debates as to the exact nature, extent, and impact of climatic influence on human life; yet the principle itself, as we have seen in the first chapter of this dissertation, was hardly ever called into question. Hume's essay 'On National Characters', on the other hand, led its attack directly against the foundations of climate theory. Among the many arguments that Hume proposed in his critique of 'physical causes', there were three in particular that were bound to resonate with Montesquieu's readers in the following years. The first of these arguments concerned the relationship between particularity and universality. Even though he did not go so far as to deny all validity to the notion of uniform national characters, Hume explicitly contested the tendency of both characterology and climate theory to produce undue generalizations from a collection of individual cases. 'The vulgar,' he wrote,

> are very apt to carry all *national characters* to extremes; and having once establish'd it as a principle, that any people are knavish, or cowardly, or ignorant,

[43] Hume 1748: 271-72.
[44] Hume 1748: 275.
[45] Hume 1748: 285-87.

> they will admit of no exception, but comprehend every individual under the same character. Men of sense condemn these undistinguish'd judgments.[46]

Hume's argument from universality was a strong one that many later critics of climate theory would subsequently embrace. We find it, for instance, in Constantin de Volney's *Voyage en Syrie et en Egypte*, an account of the travels that the French historian and orientalist (1757-1820) undertook in the Middle East from 1783 to 1785. First published in 1787, the book contained a section on the 'political organization of Egypt' where the author rejected the classic idea, also entertained in Montesquieu's *Esprit des lois*,[47] 'that the inhabitants of warm climates […] are naturally destined never to be anything else than slaves of despotism'.[48]

According to Volney, such an idea rested on undue generalizations of 'isolated phenomena'. Were there not cold countries where despotism had also been able to flourish? And were there not countless 'secondary circumstances' to be taken into account besides climate, in studying the character and history of world nations? 'People are too hasty in drawing general laws from particular cases', Volney warned. 'We must be wary of building systems upon imaginary foundations'.[49] This notwithstanding, in his later *Tableau du climat et du sol des Etats-Unis de l'Amérique* (1803), Volney himself did not hesitate to suggest possible correlations between certain physical features of the North-American continent (such as the 'swiftness of air currents', 'the dryness of the atmosphere', and the

[46] Hume 1748: 267.
[47] See Boesche 1990.
[48] 'L'on veut en appuyer ce prétendu axiome, *que les habitans des pays chauds, avilis par tempérament et par caractère, sont destinés par la nature à n'être jamais que les esclaves du despotisme*' (Volney 1787, vol. 2: 178). My emphasis. I quote from the second edition, 'revised and corrected', which appeared in the same year as the first.
[49] 'A-t-on bien examiné si des faits semblables ne sont jamais arrivés dans les climats qu'on veut honorer du privilège exclusive de la liberté? A-t-on bien observé si les faits généraux dont on s'autorise, ne sont point accompagnés de circonstances et d'accessoires qui en dénaturent les résultats? Il en est de la politique comme de la medicine, où des phénomènes isolés jettent dans l'erreur sur les varies causes du mal. On se presse trop d'établir en règles generals des cas particuliers […]. On doit souvent craindre d'élever des systèmes sur des bases imaginaires' (Volney 1787, vol. 2: 178-79).

'abundance of electricity' in the air) and the psycho-physiological state of local populations.[50]

Hume's second argument against climate theory was grounded in a distinction between two different understandings of environmental influence. Taking into account the classic remark that 'most conquests have gone from North to South', Hume gave a completely different explanation of this phenomenon than earlier climate theorists such as Jean Bodin or Francis Bacon.[51] As the latter noticed in his essay 'On Vicissitude of Things' (1625), 'it hath seldom or never been seen that the far southern people have invaded the northern, but contrariwise'. Hence, Bacon concluded that 'the northern tract of the world is in nature the more martial region'—a fact for which he offered a strictly climatological explanation: 'the cold of the northern parts […] is that which, without aid of discipline, doth make the bodies hardest, and the courages warmest'.[52] Hume—who explicitly mentioned Bacon's *Essays* in his own piece[53]—saw things quite differently. Not only did he reject the idea of a direct physiological influence of climate on human minds and characters; he was also unconvinced that the great military conquests of the past should be seen as the result of a 'superior degree of courage and ferocity' that some nations naturally possess and other lack. 'Most conquests', he countered, 'are made by poverty and want upon plenty and riches'.

[50] 'Ainsi la configuration plane de l'Amérique, en occasionant la rapidité des courants de l'air, la célérite de l'évaporation de l'eau et la sécheresse de l'atmosphère, devient une cause primordiale de l'abondance de l'électricité' (Volney 1825: 237-38). Further below in the text, Volney offers a discussion of endemic diseases in the United States, and relates them essentially to 'the quality of the air' ('la qualité de l'air'). His advice is based on a centuries-long tradition of environmental medicine: 'to change air, and choose one known to be elastic and pure, of the kind that in our own climates is easily found on elevated ground' ('changer d'atmosphère, et choisir un air reconnu pour élastique et pur, tel qu'il se trouve assez ordinairement dans nos climats, sur les lieux élevés'; Volney 1825: 279).
[51] See Bodin 2013: 236-37 (5.26); Bacon 1985: 231.
[52] Bacon 1985: 231.
[53] Hume 1748: 281.

In Hume's view, the physical milieu only influences human history in a very indirect fashion: sterile lands generate poor economies, and these in turn force struggling nations into predatory warfare and military expansion at the expense of richer and more fertile places.[54] By operating such a distinction between direct physiological influence and indirect economic influence, Hume was thus able to acknowledge the role of factors such as climate or terrain in shaping the life of nations, without however admitting any effect of the milieu on human character as such. Hume's elegant argument, which anticipates in some respects the solution of modern geographical possibilists such as Vidal de La Blache and Lucien Febvre,[55] presupposed the abandonment of geo-humouralism—a tradition with which climate theory had historically been associated, and to which the Scottish philosopher overtly preferred the new perspective of racial biology.[56] For instance, Hume contested the classic geo-humoural idea that moving from one climate to another would cause the 'temperament' to adapt and change. According to Hume, such an idea was plainly contradicted by experience: 'The same set of manners will follow a nation, and adhere to them over the whole globe, as well as the same laws and language. The Spanish, English, French and Dutch colonies are all distinguishable even betwixt the tropics'.[57] This phenomenon, Hume concluded, was a strong indication that culture and government are indeed more powerful than climate.

A third major axis of Hume's critique of climate theory revolved around the issue of national characters and their historical variability. That 'the manners of a people change very considerably from one age to another',[58] no one—not even the staunchest advocates of climate theory—had ever denied. Renaissance climate theorists such as Levinus

[54] Hume 1748: 283-84.
[55] Vidal de la Blache 1898; Vidal de la Blache 1908; Febvre 1922.
[56] On these issues, see Chukwudi Eze 2000.
[57] Hume 1748: 277.
[58] Hume 1748: 277.

Lemnius and Jean Bodin mostly tended to explain the mutability of national characters in terms of cultural and moral training—or 'discipline', as they would often call it.[59] Things began to change over the course of the seventeenth century, when a growing attention to phenomena of environmental and climatic change led to establishing a link between the historicity of national characters and that of climate itself.

One of the most articulate formulations of this idea can be found in Jean-Baptiste Dubos's *Réflexions critiques sur la poésie et la peinture* (1719), a text justly known as one of the great masterpieces of climate theory. Wondering why 'the Romans of today do not resemble those ancient Romans so famous for their military prowess' and for their utter disregard of all 'vain demonstrations of respect',[60] the Abbé Dubos (1670-1742) came to the following conclusion: 'Such great changes have occurred in the air of Rome and in that of its surroundings since the time of the Empire, that it is not surprising that its inhabitants are now different from what they once were'.[61]

For Dubos, the gradual deterioration of Roman air—due, among other things, to the poor state of aqueducts and sewers and to the depopulation and neglect of the surrounding countryside—went hand in hand with substantial climatic change. 'Another proof of the physical alteration that the air of Rome and of its surroundings has undergone,' he argued, 'is that the local climate is now less cold than it used to be in the early imperial age, and this despite the fact that the region was more intensely inhabited and better cultivated at

[59] See above, 1.3.2.b and 2.1.
[60] 'Les Romains ne ressemblent plus [...] aux anciens Romains, si fameux par leurs vertus militaires […] des gens ennemis de toutes ces vaines démonstrations de respect qui ne sont que des cérémonies' (Dubos 1993: 260 [2.15]).
[61] 'Il est arrivé de si grands changements dans l'air de Rome et dans l'air des environs de cette ville depuis les César, qu'il n'est pas étonnant que les habitants y soient à présent différents de ce qu'ils étaient autrefois' (Dubos 1993: 261 [2.15]).

that time than it is today'.[62] According to Dubos, this phenomenon had to be related with the recent 'maturation' of underground deposits of alum, sulphur, and arsenic, which sometimes caught fire in the summer and thus sent 'evil exhalations out in the air'.[63] Such radical changes in the Roman milieu could not fail to have consequences on the nature of its inhabitants: indeed, for a climate theorist like Dubos, the 'alteration of the cause' (climate) was one and the same with that of its 'effect' (human character).[64]

By the mid-eighteenth century, the connection between climatic and human change was an established fact requiring little elaboration: for the celebrated naturalist Georges-Louis Leclerc, Comte de Buffon (1707-1788), nothing was less dubious than the fact that all living species, man included, may

> change their nature, that is, become perfected or degraded, through great changes in the distribution of land and ocean, through the cultivation or neglect of the country which they inhabit, through the long-continued effects of either favourable or adverse climatic changes, so that they are no longer the same species that they once were.[65]

In the last quarter of the eighteenth century, this notion of a direct relation between climate change and variations in national character came together with an ever-greater optimism in man's capacity to produce and control climate change through environmental intervention. One of the outcomes of this encounter was the elaboration of bold Rousseauvian dreams of

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[62] 'Ce qui prouve encore qu'il est survenu une altération physique dans l'air de Rome et des environs, c'est que le climat y est moins froid aujourd'hui qu'il ne l'était au temps des premiers Césars, quoique le pays fût alors plus habité et mieux cultivé qu'il ne l'est à présent' (Dubos 1993: 262 [2.15]).

[63] 'Cette altération procède des mines d'alun, de souffre et d'arsenic, qui depuis quelques siècles auront achevé de se former sous la superficie de la terre, et qui présentement envoient dans l'air, principalement durant l'été, des exhalaisons plus malignes que celles qui s'en échappaient, lorsqu'elles n'avaient pas encore atteint le degré de maturité où elles sont parvenues aujourd'hui […] durant les chaleurs il en sort des exhalaisons qui s'allument d'elles-mêmes et qui forment de longs sillons de fer ou des colonnes de flammes, dont la terre est la base' (Dubos 1993: 262 [2.15]).

[64] 'Suivant notre système, il fallait que la chose arrivât ainsi, et que l'altération de la cause alterât l'effet' (Dubos 1993: 261 [2.15]).

[65] 'Combien d'autres espèces s'étant denaturées, c'est-à-dire perfectionnées ou dégradées par les grandes vicissitudes de la terre et des eaux, par l'abandon ou la culture de la nature, par la longue influence d'un climat devenu contraire ou favorable, ne sont plus les mêmes qu'elles étaient autrefois!... Leur état, leur vie, leur être dépendent de la forme que l'homme donne ou laisse à la surface de la terre' (Buffon 1761: 385-86). See Duchet 1995: 246. See also Wolloch 2011: 109-10.

national regeneration via anthropogenic climate change, of the kind embodied in Jean-Baptiste Moheau's *Recherches et considérations sur la population de la France* (1778).[66]

In contrast with the theories just outlined, Hume's essay 'On National Characters' maintained that the mutability of national characters was proof of the fact that climate theory was fundamentally mistaken. Yet his criticism implied an understanding of climate as fixed and unalterable; such a viewpoint, as we have seen, was already outdated by the time that he was writing. Hume's failure to take into account the latest developments of climate theory may tell us something about the sources with which he was working, as well as about his intended polemical targets. Most interestingly, however, it shows to what extent Hume's critique of climate theory, often hailed as an important step forward in 'secularizing' universal history, was in some respects more conservative and backward-looking than eighteenth-century climate theories themselves.[67]

After coming under Hume's close scrutiny in 1748, climate theory elicited numerous other responses from European intellectuals, often in direct response to Montesquieu's *Esprit des lois*. Among Montesquieu's most vocal critics were the Scottish historian Henry Home, Lord Kames (1696-1782), who was also one of Hume's protectors;[68] the Swiss politician and universal historian Isaak Iselin (1728-1782), author in 1764 of a *Geschichte des Menschheit* that deeply criticized Montesquieu's vision of human progress;[69] and the Franco-German *philosophe* Paul-Henri Thiry, Baron d'Holbach (1723-

[66] See above, 4.4.
[67] Paul Ehrard has characterized Montesquieu's climate theory as similarly conservative and backward-looking—though not necessarily in a negative way (1963, vol. 2: 730-32). Yet although only faint traces of an historicization of climate can be found in the *Esprit des lois*, Montesquieu was deeply interested in questions of geologic, environmental, and climatic change, as evidenced by earlier writings such as the manuscript *Changements arrivez sur la surface de la Terre et de la mer depuis l'autre siècle*, composed in 1719, and the *Projet d'une histoire de la terre ancienne et moderne*, of the same year (see Courtois 2007).
[68] See Carhart 2007; Meyer 2008.
[69] According to Carhart (2007: 159) and Meyer (2008: 244), the impulse behind Iselin's critique of Montesquieu in *Geschichte der Menschheit* (1764) originally came from the above-mentioned Henry Home, who in this period was in epistolary contact with various Swiss men of letters. In a 1763 letter to a friend of

1789), who discussed climate theory in his 1776 *Ethocratie, ou le gouvernement fondé sur la morale*, as well as in other works. This mounting wave of criticism has led more than one scholar to postulate a general decline of climate theory in the second half of the eighteenth century.[70]

Such a view, however, fails to take into account the many favourable reactions to Montesquieu's *Esprit des lois*, including more particularly its sections on climate. It also exaggerates the polemical intentions of those who did criticize Montesquieu's climatological doctrine. Upon closer inspection, such critics were eager to distance themselves not from climate theory as such, but merely from Montesquieu's particular inflection of it, which they saw (more or less fairly) as leaning towards a dangerous form of determinism.[71] Hence, Holbach posited in his *Ethocratie* that 'not climates but laws determine mores';[72] elsewhere, however, he freely allowed that 'the food we eat, the quality of the air we breathe, the climate in which we live' cooperate with cultural and moral factors in changing the 'temperament' received at birth.[73] What Holbach rejected was thus not the notion of 'physical causes' in itself, but a certain way of framing the relationship between physical and moral causes that laid too much emphasis on the former at the expense of the latter. The same, as Michèle Duchet has rightly stressed, can be said of other authors who are often described as sworn enemies of climate theory, such as the

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Iselin, namely the Bernese jurist Daniel Fellenberg, Home wrote that 'human nature itself has a greater influence on the introduction of laws and customs than all the other causes that Montesquieu describes' (quoted in Carhart 2007: 74).

[70] See Romani 2002.

[71] Montesquieu reacted against these accusations in his *Défense de l'Esprit des lois* (Genève: Barrillot & Fils, 1750), now in Montesquieu 1951, vol. 2 (on climatic influence, see particularly pp. 1145-46).

[72] 'Ce ne sont point les climats, ce sont les lois qui décident des moeurs' (Holbach 2009: 124 [10]). Holbach continues shortly after: 'C'est bien plus le gouvernement qui façonne ou modifie les peuples, que le climat […] une nation reçoit toujours de ses chefs des impulsions générales, continues, réitéerées, qui décident de leurs habitudes, de leurs idées, de leurs moeurs nationales' (124-25 [10]).

[73] 'La nourriture que nous prenons, la qualité de l'air que nous respirons, le climat que nous habitons, l'éducation que nous recevons, les idées qu'on nous présente et les opinions qu'on nous donne, modifient ce tempérament' (Holbach 1770, vol. 1: 123 [9]).

French *philosophe* Claude Adrien Helvétius (1715-1771): for Duchet, Helvétius 'does not deny the influence of climate' on man; he simply believes that such an influence works both ways, taking the form of a 'mutual action of man on his natural milieu, and of the latter on man'.[74]

It is hard, if not impossible, to summarize the eighteenth-century fate of climate theory in a simple formula. As shown in this brief survey, Enlightenment attitudes to the notion of climatic influence form a vast and diverse cultural landscape, ranging from enthusiastic adhesion (Dubos, Espiard, Montesquieu) to outright rejection (Hume) through an array of intermediate nuances. While Hume's refutation of climatic influence certainly marked an important turning point in the centuries-long history of climate theory, signalling the first attempt to reject the very principles on which the latter was founded, the radicality of his critique remained largely unparalleled for most of the eighteenth and nineteenth centuries. Nevertheless, many individual ideas expounded in his essay 'On National Characters' became instrumental in rethinking climate theory from within, in a time of decisive cultural transformations. How, why, and to what extent climate theory changed after the eighteenth century in the wake of these transformations, however, will be a different story to tell.

[74] Duchet 1995: 384. Duchet makes a similar point about Buffon (1971: 234-49).

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