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Galileo's telescope in John Milton's *Paradise Lost*: the modern origin of the critique of science as instrumental rationality?

“Almost in the same historical moment when Galileo directed all modern physics to the reading of that book which Nature was supposed to have written herself in geometric or, subsequently, algebraic signs, the modern novel and modern theatre stepped in as evidence that modern readers and spectators enjoy the effects of those fictions most of all when they are altogether free of science.”¹

Friedrich Kittler, “Man as a drunken town musician”

1. The Argument

The perturbations introduced into the field of knowledge in the seventeenth century by the emergence of what we would today call the “natural sciences” are so profound – and are immediately recognised as such – that they preclude any authoritative resolution.² At the same time, there is no seventeenth-century discourse that remains untouched by these new sciences – if they are not al-

¹ F. Kittler, “Man as a Drunken Town-musician,” *MLN*, No. 118 (2003), p. 637.

² This paper is part of a large collaborative project on which I am currently working with my colleague Marion Campbell, provisionally entitled “Science and Politics in *Paradise Lost*.” The point of this title is that the politics of the poem cannot be understood without a proper understanding of how Milton treats the contemporaneous sciences there, and vice-versa. To try to separate these elements in Milton is an error, an error that Milton in some ways nonetheless wants his readers to make – if only because they then might have the chance of seeing this error as their own. If this situation cannot be adequately sketched here, I will attempt to sketch some of the justifications for our general approach and give some specific arguments about certain elements of the poem. If, for ease of reference, I use a term that is somewhat anachronistic in the seventeenth century context, that is, “science,” this term doesn’t for all that undermine the argument. The key point is that Milton and his contemporaries knew that something irrevocable was happening in the field of “knowledge,” whose consequences were unprecedented, irreversible, and as-yet unformalizable – and this ferment was a necessarily a cause of anxiety and of anticipated conclusions. Yet, at this moment *they knew they no longer knew what it was to know*, they also knew it would be necessary to develop new discourses for continuing, *Paradise Lost* being one paradoxical outcome of such an attempt.

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ways touched in ways that are clear, distinct or perspicuous. I am interested here in the consequences of this emergence for poetry, and *a fortiori* upon poetry that explicitly takes these consequences as one of its own crucial themes. One of the abiding difficulties in the complex historiography of the “scientific revolution” is the interpretation of contemporaneous reactions to the new discoveries, at the very moment where the counter-effects of these reactions often enter immediately back into the situation itself.

John Milton’s *Paradise Lost* (1st edition in an original 10-book version 1667; 2nd edition in the now-canonical 12-book version 1674, the year of Milton’s own death) is almost-universally acknowledged to be the single greatest and most influential work in English-language poetry. Its author, infamous in his own time not for his poetry but for his radical politics – which had given him a European-wide reputation as a proselytizer for revolution, regicide, divorce and anti-censorship – somehow survived the Restoration of the Stuart dynasty in 1660 (for reasons that are still enigmatic), and, despite suffering penury, blindness, and political opprobrium, not to mention a brief period of incarceration, made a surprising return to public life with this extraordinary work. Even longstanding political enemies were immediately impressed: John Dryden, Poet Laureate and early fellow of the Royal Society, proposed turning *Paradise Lost* into the period equivalent of a big-budget rock opera (lamentably, never performed). Since its publication, the poem has never gone out of print.

If poetico-theological interpretations have understandably dominated the history of its interpretation, there has also been a sporadic puzzling throughout this history about the peculiar status of the new sciences in and for the poem. As the greatest of English epics, with concomitantly encyclopaedic aims, *Paradise Lost* famously attempts to account for the new forms of knowledge (and non-knowledge) introduced in and by the natural sciences: their claims, procedures, personnel, results and consequences. In Milton’s attempt to do so, however, he encounters aporias that integrally affect the status of his own presentation. As these aporias cannot be ignored, yet demand resolution, Milton must not only stage the necessity of the emergence of these aporias, but clarify his own response to them within the text itself. Yet the difficulties attendant on such an attempt leave their traces in the text of the poem itself, notably as volatile enigmas, e.g., why is Galileo the *only* contemporary mentioned in the poem? Why the recurrent allusions to the telescope? Why so many fudgings

regarding the status of “infinity”? Why such a bizarrely mixed cosmology? Why do bodies move in such inconsistent ways? With these questions in mind, I will propose a new contextualisation of Milton's poem, as well as a new interpretation of several of its key moments.

My argument can be summarized as a ten-point plan:

- 1) Milton is very conscious of divisions introduced into the field of knowledge by the new scientific methods, which sever worldly explanation from scriptural inheritance, transforming the status of knowledge and its claims;
- 2) Milton wants to reunify all knowledge under a single heading or, more accurately, wishes to provide the definitive account of knowledge's necessary dis-unity;
- 3) Milton's demonstration of *the necessity to work towards a reunification that simultaneously knows that it must fail* requires encyclopaedic reach as part of its self-authorization, thereby implicating the new sciences both as topic and method;
- 4) This requires a new account of the foundations (onto-theology) and modes of acquisition of knowledge (epistemology), as well as of their necessary limits;
- 5) This justification requires re-establishing the problem of the *form* (the presentation) of address, not just of its scope (encyclopaedic) or its principles and methodology (knowledge can be *neither* simply observational nor revealed);
- 6) Yet Milton knows 2) is impossible under contemporaneous conditions;
- 7) Milton provides a narrative aetiology of this impossibility in *Paradise Lost* in the terms of “the Fall”;
- 8) Milton explicitly makes this impossibility an integral part of the justification for the *form* his intervention takes, i.e., a renovated epic;
- 9) Milton's attempt is a failure, and betrays its failure in a variety of symptoms;
- 10) Milton tries to transvalue this failure as if it were a consequence of his success.

To put this another way, *Paradise Lost* is one of the greatest attempts to salvage a possibility for the unity and universality of knowledge at the moment of its

irretrievable fragmentation. In doing so, it has to present itself as necessarily failing, and for reasons which, if they are accepted, show that the unity of thought is only potentially but never actually possible – and that this potentiality can now only be given in the form of *Paradise Lost* itself. If Milton, like Francis Bacon, was indeed concerned with “the advancement of learning,” he could not be content with Bacon’s own proposals, nor, for that matter, with the proposals offered by other great new philosophers of the seventeenth century. Above all, Milton is essaying to make an intervention into a situation in which the status of poetry has been radically destabilised by the new demands of scientific discourses.

My approach therefore attends to torsions in *Paradise Lost* that, in this case, bear primarily upon epistemological and cosmological issues. These torsions can be discerned at every level of the text, from the nominal (e.g., the use of words such as “infinite,” “void,” “chaos,” etc.) through the thematic (e.g., the cosmological descriptions offered throughout) and the syntactic (the famous “Latinated” expression), to the formal and technical (the extraordinary prosody). In addition to the large-scale strategic goals of *Paradise Lost*, it is also necessary to be attentive to the poem’s tactical mobility. Indeed, Milton sometimes intervenes clearly and directly into the contemporary discussions about epistemology, coming down for one side or another; sometimes he uses as-yet undecided disputes as themselves evidence of the irresolvability and *hence* futility of those disputes (e.g. the cosmological account proffered Adam by Raphael), a course which then allegedly justifies a restriction of the quest for knowledge to personal, pragmatic concerns; sometimes he explicitly proposes his own contradictions as evidence of the necessary consequences of the Fall, and the staging thereof as evidence for the rightness of his general position as to immutable human limits to knowledge; sometimes he pretends that he is not engaging at all with such disputes; sometimes he acts as if his refusal to decide one way or another is proof of his own probity, etc. If these tactics are, strictly speaking, inconsistent, a narrative staging of this inconsistency becomes a proof for Milton of the priority that should be accorded his own position.

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2. Major interpretations of the sense of science in *Paradise Lost*

The history of interpretation of *Paradise Lost* has itself seen only inconsistent and uncertain attention given to the topic of contemporaneous science. If this

history has often emphasized *Paradise Lost* as a great epic work in a predominantly literary tradition; a theologico-political rewriting of Biblical tropes; an encyclopaedic philosophical essay on abiding problems of free-will and history; a post-Republican lament for the Republic; and so on, it has never really taken on the full force of the scientific revolution, nor its impact upon the writing, publication, and reception of the poem.³ It is precisely the impact of the scientific revolution on Milton's thought that I wish to point to here.

Certainly, there have been a number of concerted attempts to speak of "Milton and Science." The major twentieth-century monographs on this conjunction include those of Kester Svendsen, Lawrence Babb, Harinder Singh Marjara and, most recently, Karen Edwards and Angelica Duran; there are also a number of related studies, including those by such writers as Douglas Bush, Stephen Fallon, John Rogers and Catherine Gimelli Martin, as well as some quite surprising left-field interventions by such people as the great science-fiction writer Isaac Asimov.⁴ There have also several classic studies that focus on particular

³ Evidence of this neglect is legible in the non-appearance of the category of "science" (or its contemporary synonyms) in almost all of the introductory and companion texts to Milton. See, for instance, T.N. Corns (ed.), *A Companion to Milton* (Oxford: Blackwell, 2001), where we find such headings as "The Cultural Context" (comprising "Genre," "The Classical Literary Tradition," "Milton on the Bible," etc.), "Texts," "Influences and Reputation," and "Biography," but no listing, even in the index, under "science." The closest hit is Diane Kelsey McColley's entry for "Milton and Ecology," pp. 157–173, which, after a minimal scene-setting via Bacon and Descartes, turns to a more traditional exploration of theme. Then there is the D. Danielson (ed.), *The Cambridge Companion to Milton*, Second Edition (Cambridge: Cambridge University Press, 1999), in which such familiar headings as "Milton's politics" and "The genres of *Paradise Lost*" appear, again with no sustained reference to science, even in the index. Then there's R. Bradford's *The Complete Critical Guide to John Milton* (London: Routledge, 2001) with its "Religious and political contexts" and "Civil War and early political writing" but, again, no science. It is then of extreme interest to note the remarks of various authors collected in T.C. Miller (ed.), *The Critical Response to John Milton's Paradise Lost* (London: Greenwood Press, 1997), where there is not only a significant index listing for "science" (albeit in a number of the diverse senses of this word), but some genuine attention paid to its impact on the poem. We also find it in the deferrals of commentators such as William Poole, who writes: "The role of the Fall in later seventeenth-century science is for another book, but the epistemological questions it posed remained," *Milton and the Idea of the Fall* (Cambridge: Cambridge University Press, 2005), p. 198. But these questions cannot be deferred without rendering incomprehensible much of *Paradise Lost*.

⁴ See K. Svendsen, *Milton and Science* (Cambridge: Harvard University Press, 1956); L. Babb, *The moral cosmos of Paradise Lost* (East Lansing: Michigan University Press, 1970); S. Fallon, *Milton among the Philosophers: Poetry and Materialism in Seventeenth-Century England*

elements and images in *Paradise Lost*, notably Katherine Morse on cosmology, Marjorie Nicolson's work on the telescope or Grant McColley's work on the import of seventeenth-century theories of the plurality of worlds for Milton.⁵ How-

(Ithaca and London: Cornell University Press, 1991); H.S. Marjara, *Contemplation of Created Things: Science in Paradise Lost* (Toronto: University of Toronto Press, 1992); K.L. Edwards, *Milton and the Natural World: Science and Poetry in Paradise Lost* (Cambridge: Cambridge University Press, 1999); A. Duran, *The Age of Milton and the Scientific Revolution* (Pittsburgh: Duquesne University Press, 2007); D. Bush, *Science and English Poetry: A Historical Sketch, 1590–1950* (New York: Oxford University Press, 1950); J. Rogers, *The Matter of Revolution: Science, Poetry, and Politics in the Age of Milton* (Ithaca and London: Cornell University Press, 1996); C.G. Martin, "What If the Sun Be Centre to the World?: Milton's Epistemology, Cosmology, and Paradise of Fools Reconsidered," *Modern Philology*, Vol. 99, No. 2 (2001), pp. 231–265. Isaac Asimov's marginalia are often of real scientific interest: *Asimov's Annotated Paradise Lost* (New York: Doubleday, 1974).

⁵ See K. Morse, "Milton's Ideas of Science as Shown in *Paradise Lost*," *The Scientific Monthly*, Vol. 10, No. 2 (1920), pp. 150–156; M. Nicolson, "Milton and the Telescope," *ELH*, Vol. 2, No. 1 (1935), pp. 1–32; Lubomir Konecny, "Young Milton and the Telescope," *Journal of the Warburg and Courtauld Institutes*, Vol. 37 (1974), pp. 368–373; G. McColley, "The Theory of a Plurality of Worlds as a Factor in Milton's Attitude Toward the Copernican Hypothesis," *Modern Language Notes*, Vol. 47, No. 5 (1932), pp. 319–325, "Milton's Dialogue on Astronomy: The Principal Immediate Sources," *PMLA*, Vol. 52, No. 3 (1937), pp. 728–762. Indeed, there is an enormous dossier to be revisited on Milton and Galileo beyond the more familiar political references stemming from Milton's own account in *Areopagitica*, particularly regarding the invocation of the telescope in *Paradise Lost*: see Dr. Johnson, "Life of Milton"; T. De Quincey, "System of the Heavens, as Revealed by Lord Rosse's Telescopes," *The Collected Writings of Thomas De Quincey*, ed. D. Masson. Vol. VIII (Edinburgh: Adam and Charles Black, 1890); H. Bloom, *A Map of Misreading* (Oxford: Oxford University Press, 1980); J. Guillory, *Poetic Authority: Spenser, Milton, and Literary History* (New York: Columbia University Press, 1983); R. Flannagan, "Art, Artists, Galileo and Concordances," *Milton Quarterly* XX, No. 3 (1986), pp. 103–105; J. Walker, "Milton and Galileo: The Art of Intellectual Canonization," in J.D. Simmonds (ed.), *Milton Studies* XXV (Pittsburgh: University of Pittsburgh Press, 1990), pp. 109–123; J. Scherer Herz, "For whom this glorious sight?" Dante, Milton, and the Galileo Question,' in Mario Di Cesare (ed.), *Milton in Italy: Contexts, Images, Contradictions* (Binghamton: Medieval and Renaissance Texts and Studies, 1991), pp. 147–57; D. Friedman, "Galileo and the Art of Seeing," in Di Cesare, pp. 159–174; D. Albanese, *New Science, New World* (Durham and London: Duke University Press, 1996); D. Palmieri, "Milosz and Einstein, Milton and Galileo: the cosmologic poet and the physicist," *West Virginia University Philological Papers* (Fall 2002), pp. 4–11; J. Ulreich, "Two great world systems: Galileo, Milton, and the problem of truth," in *Cithara*, Vol. 43, No. 1 (2003), pp. 25–36; E. Spiller, *Science, Reading, and Renaissance Literature: The Art of Making Knowledge, 1580–1670* (Cambridge: Cambridge UP, 2004); M. Brady, 'Galileo in Action: The "Telescope" in *Paradise Lost*,' *Milton Studies* 44 (2005), pp. 129–152; J. Sawday, *Engines of the Imagination: Renaissance culture and the rise of the machine* (London and New York: Routledge, 2007); I. McAdam, "Milton, Satan, Galileo and Gunpowder," *Notes and Queries*, September 2008, pp. 289–291. Beyond the specialist

ever, the methodologies, evidence and results of these studies are so heterogeneous that they are difficult, if not impossible to reconcile.

Svendsen, in his classic work on the subject, argues that Milton's "science" was in fact already anachronistic in his time, a judgement essentially echoed by Lawrence Babb; Bush, on the other hand, argues that Milton was familiar with, but ambivalent about, the new cosmological theories of Copernicus, Brahe, Kepler and Galileo; Stephen Fallon examines the development of Milton's metaphysical monism as an up-to-the-minute response to countervailing tendencies in the reigning 'mechanical' theories of the time; Harinder Singh Marjara claims that Milton's attitude towards such discoveries was neither mediaeval nor obscurantist; John Rogers has shown how *Paradise Lost* draws from diverse sources in seventeenth-century vitalist materialism; Karen Edwards has argued for the determining role played by natural history, of a comparable order to that of Thomas Browne and Robert Hooke, in the poem; and Catherine Gimelli Martin demonstrates that Milton's cosmology is informed by Baconian and Galilean themes.

Moreover, several of these studies not only attempt to show how modern Milton is in his uptake of science, but how this scientific content is redeployed for specific political and poetic effects within the text of *Paradise Lost*. Thus Edwards argues that the very modes by which the poem depicts the natural world are calibrated to inspire in its readers a new kind of attentiveness that is continuous with the endeavours of seventeenth-century natural scientists. For Edwards, it is not just that Milton draws on the new *content* available from the new researches into nature, but that, in doing so, he develops an absolutely novel poetic procedure that attempts to induce, in and by the poetry itself, his readers into thinking differently about science, politics and the world. This "performative" element is therefore crucial to take into account when reading *Paradise Lost*, for it implicates the content, imagery, syntax, language, aims and ends of the poem.⁶

academic studies, and the small industry involved in constantly re-broaching the question as to whether the two ever really met, there is also an enormous interest in Milton and Galileo in other realms, e.g., J. Rosen, "Return to Paradise," *The New Yorker*, Vol. 84, No. 16 (2008), pp. 72–76, or H. Henderson, "A Dialogue in Paradise: John Milton's Visit with Galileo," *The Physics Teacher*, Vol. 39, March 2001, pp. 179–183.

⁶ In this, Edwards is in some ways following the testimonies of scientists such as John Tyndall, who claims that 'The piercing through the involved and inverted sentences of *Paradise Lost*; the linking of the verb to its often distant nominative, of the relative to its distant an-

In any case, we are confronted by a rattle-bag of opinions regarding Milton's relationship to science. Milton allegedly knew very little of contemporary science and did not care for it, though he worried a lot about its consequences and drew on it for his imagery (Svendson); he knew a lot about it, and affirmed much of it, particularly the cosmology (Martin); he drew heavily on the medical vitalist texts of the period and drew political consequences (Rogers); he recognised that science had radically shattered the unity of knowledge and responded ambivalently (Bush); he knew a lot about science and drew happily on it for his poetic ambitions, and nothing more (Marjara); he liked the technological innovations and their implications, but only really for poetic inspiration and effects (Nicolson); he knew a lot about the particularities of nature, and, taking on the injunction to encourage people to assume a scientific attitude, tried to use the poem itself as a re-educative goad for the reader (Edwards); he is part of a general enthusiasm for poetic and scientific collaboration, with no real sense of irreconcilable differences (Duran), etc. What emerges, then, from these studies is that none of the authorities can agree on what, exactly, the "science" of Milton is, what use he makes of it, or its significance for understanding the poem. What is lacking in the authorities to date is an adequate theory of discourse able to account for the very radical shifts in the course of the seventeenth-century that stem from the emergence of what is already recognisably "modern science"

tecedent, of the agent to the object of the transitive verb, of the preposition to the noun or pronoun which it governed, the study of variations in mood and tense, the transpositions often necessary to bring out the true grammatical structure of a sentence – all this was to my young mind a discipline of the highest value, and a source of unflagging delight. How I rejoiced when I found a great author tripping, and was fairly able to pin him to a corner from which there was no escape! As I speak, some of the sentences which exercised me when a boy rise to my recollection. For instance, "He that hath ears to hear, let him hear;" where the "He" is left, as it were, floating in mid air without any verb to support it. I speak thus of English because it was of real value to me,' J. Tyndall, "An Address to Students" in *Fragments of Science: A series of detached essays, addresses and reviews*, 6th edition, Vol. 2 (London: Longmans, Green and Co, 1879), available online. Citing this passage, Gillian Beer writes that "It is not surprising that the ambitiousness and mastery of [Milton's] epic should have drawn those seeking to gain a new centrality for the scientific imagination. It is to Milton's work that Tyndall turns in his essay on the use of the scientific imagination," *Open Fields: Science in Cultural Encounter* (Oxford: Oxford University Press, 1996), p. 210. However, I would be tempted to suggest that, rather than itself exemplifying the impact of the new sciences, this aspect of *Paradise Lost* has rather more Protestant roots: the injunction to read and reread endlessly the sacred texts (these positions are of course not incompatible).

and, *a fortiori*, the effects of this emergence on such discourses as poetry and political theory.⁷

3. Science slits the throat of poetry

For if Galileo, Francis Bacon, René Descartes, among a host of others, also had, like their Renaissance predecessors, an extreme consciousness that they were forging an entirely new way, *this* “great instauration” didn’t – as had the program of the earlier humanists – promote itself as a *rupture-restoration*. For the new philosophers, authority came not from the past, from the incomparable titans of antiquity, but from a future that *essentially* threatened all inherited ancestral knowledge. Bacon’s work is exemplary here: there must be a radical suspicion towards all received wisdom (the “idols” which he denounces in *The*

⁷ Indeed, this lack is often noted in the review literature – without ever having been made good in the dedicated studies. For example, both Ronald J. Corthell and Stephen Fallon mark this fact in their reviews of Marjara’s book. Corthell notes that Marjara’s “lack of a theory of discourse seriously undercuts his ability to explore the relationship between scientific and poetic texts” and that: “One might turn [Marjara’s] argument around to ask why Milton felt the need to include so much scientific discourse in his poem. In any case, the challenge of a fresh approach to Milton’s poetic use of science would entail an analysis of the competing systems of humanist and scientific power/knowledge in *Paradise Lost*,” R.J. Corthell, “Review of *Contemplation of Created Things: Science in Paradise Lost*,” *Renaissance Quarterly*, Vol. 47, No. 3 (1994), pp. 702–4. For his part, Fallon points out that, Marjara “is sometimes insensitive to the rhetorical complexity of seventeenth-century natural philosophy,” “Review of *Contemplation of Created Things: Science in Paradise Lost*,” *The Journal of English and Germanic Philology*, Vol. 93, No. 3 (1994), pp. 428–431. On the other hand, the emergent strategies of seventeenth century political discourse have received nothing but sophisticated attention, for example, in the work of David Norbrook, David Lowenstein, Sharon Achinstein, and so on. However, it is worth remarking that either these scholars ignore the scientific revolution entirely or they do everything they can to reduce its effects, notably in the sphere of mathematical deduction and experimental innovation. Skinner is of course an exception to this, for example, in his chapters on Hobbes and science in *Reason and Rhetoric in the Philosophy of Hobbes* (Cambridge: Cambridge University Press, 1996), esp. pp. 294–326, where he recognises that Hobbes “fully endorses Descartes’s sense that all the genuine sciences proceed deductively, and that their goal must be the attainment of knowledge in the form of demonstrative certainty,” p. 296. Yet most such attempts can be located in the revisionist, essentially ‘culturalist’ ideals of commentators as diverse as S. Shapin and S. Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985) and A. Grafton, *Defenders of the Text: The Traditions of Scholarship in an Age of Science, 1450–1800* (Cambridge and London: Harvard University Press, 1991).

Advancement of Learning); knowledge must be refounded on unprecedented new principles; this refoundation must be pragmatic, technical and testable; it requires new forms of collective work and institutions to support it; it is cumulative, acquisitive and in principle endless; it is directed towards power over nature (indeed, in Bacon's extraordinary dictum, "knowledge is power"). However one interprets Bacon's program or its import, its crucial elements are linked to a new vision of rupture-without-precedent – and thus without any real continuity with the ancients.⁸

In a word, early modern science was born as a self-conscious 'rupture with the rupture,' that is, as a deliberate break with the break of the Renaissance. Moreover, its major protagonists were not only convinced of their own novelty, but considered it crucial to proselytize for it in a variety of manifesto-like forms.⁹ It effected: a crisis of authorization (which is tantamount to opening the possibility of republicanism-of-thought, since knowledge can no longer be authorised by any proper name but rather by methods available in principle to absolutely anybody); a dispersion of knowledges (not all that counts as knowledge can be treated as the *same* kind of knowledge, religious utterances for instance); a temporalisation of knowledge, insofar as it is the pressure of the future upon the received notions of the past that leads to the urgency to test the validity of knowledge-claims (this is, by the way, why Bacon can be considered the father

⁸ As Stephen Gaukroger notes, "Bacon is criticizing the exclusivity both of the guilds, where practical information is esoteric by virtue of keeping knowledge or techniques within a trade or profession to which access is then restricted, and of the universities, where an esoteric and often convoluted language renders information inaccessible to all but those accepted into the university system," *Francis Bacon and the Transformation of Early-Modern Philosophy* (Cambridge: Cambridge University Press, 2001), p. 9. On the Baconian influence on subsequent thought, see L. Lampert, *Nietzsche and Modern Times: A Study of Bacon, Descartes, and Nietzsche* (New Haven: Yale University Press, 1993).

⁹ Indeed, even the revisionists are forced to acknowledge the extraordinary polemical polarisation between the new scientists and their old enemies, even as they deny that the differences are as real as they are supposed.

of plagiarism in its modern sense)¹⁰; and an asymmetry of information, in that “rejected knowledge is not knowledge at all, but error.”¹¹

In this unprecedented restructuring of the very foundations of knowledge – and even if Karl Popper’s theorisation of falsification in science is centuries away – it is already immediately evident that the status of knowledge is radically altered. Despite the strenuous and concerted attempt by culturalist obscurantists today to try to ignore, misunderstand and undermine the status of the scientific revolution, everybody who matters in the seventeenth century is fully aware of at least the following consequences of the new sciences: authorisation crisis; fracturing of knowledge; temporalisation of knowledge; asymmetry of knowledges.

Certainly, the program is hardly unified. On the contrary, it is taking a number of very different directions at once: logical, mathematical, philosophical, observational, experimental, technological. The program is not fully separated, indeed it is not always clearly and distinctly identifiable as *a* program. Residues of the very Aristotelianism they dislike inhere in the work of the period’s greatest scientists and mathematicians, unacknowledged; often they do not admit any difference between what we would call “science” and what we would now call “magic,” “theology,” or “astrology.” Even more strongly, to the extent that there is a “scientific” “program” at all, it is in no way separable from religious tenets and, indeed, is bound up with the problem of rethinking the consequences for religious practices and beliefs. Into the bargain, not only is it neither uni-

¹⁰ In such a context, the conditions of the emergence of the specifically *modern* problem of plagiarism become clear. Plagiarism in fact has a double aspect, one unimaginable before the post-Baconian injunction for novelty in knowledge: 1) if knowledge must be “new” (or, at least, newly re-established), then plagiarism must become a problem for the first-time insofar as it threatens self-dissimulating repetition, an issue of the past pretending to be of the future, and therefore undermining the very principles under which knowledge can be properly produced, circulated, received and archived; 2) if knowledge must be “new,” the novelty still requires authorisation; such authorisation, as post-Foucauldian research has conclusively demonstrated, comes to be provided by the renovation of the institution of the author itself, in a circular suture of the proper name (whether of an individual or a corporation) to each new product. One notes immediately that the tension between “knowledge wants to be free” and “knowledge wants to be expensive” is therefore irreducible in modern conditions: both universalising novelty and proper name must be in play at once, and each affronts, as it supplements, the other.

¹¹ Shapin and Schaffer, *Leviathan and the Air-Pump*, p. 11.

fied nor separated, but the program of natural science is not even available as a program to the key actors themselves, who are often working without really being able to say clearly and explicitly what they are doing.¹²

This is because the key players often *cannot* say what they are doing, sometimes for political reasons (whether they censor themselves pre-publication or, à la Galileo, are punished post-publication), sometimes for epistemological reasons (they don't themselves quite know what they're doing), sometimes for essential reasons (it is discursively inexpressible as the language is lacking). Nonetheless, these features – which obviously require a detailed historical approach in order to track their development – don't vitiate the attribution of a clear epistemological break to the seventeenth century, nor the attribution of the prime causes of the break to natural science in particular.¹³ Indeed, despite the triple obscurity just mentioned (not-unified, not-separated, and not-expressible), this did not prevent the actors in the situation from themselves recognising that a revolution in the status of knowledge was in process *even if they knew they did not know what it now was to know*. This recognition is perhaps most clear in the express polemics of the time, and it is necessary to remember that the seventeenth century was an eminently *polemical* century. So Francis Bacon denounces the “Four Idols” and Galileo mocks the idiocy of his opponents. Moreover, new institutions are developed to disseminate the new thought, and their

¹² One of the best accounts of the development remains Hans Blumenberg's *The Genesis of the Copernican World*, trans. R.M. Wallace (Cambridge and London: The MIT Press, 1987), which provides extraordinarily detailed analyses of the complexities of the emergence of the new cosmos, from Copernicus through Galileo and beyond. For an earlier overview, see Hannah Arendt's *The Human Condition*, 2nd edition (Chicago and London: The University of Chicago Press, 1958).

¹³ As Zachary Luke Fraser summarizes the concept of “epistemological break”: “The term itself is somewhat unfortunate, and misleading in its connotations of suddenness. It tempts us to imagine the break as a specific instant, a singular historical moment. It tempts us, moreover, to draw premature analogies between epistemological break and event. For both Althusser, as well as for his teacher Bachelard, from whom he inherited the term, what is at issue in the epistemological break is not an instant in time but an ongoing process, an interminable struggle between the scientific and the ideological at the heart of scientific practice,” “Introduction. The category of formalization: From epistemological break to truth procedure” in A. Badiou, *The concept of model: an introduction to the materialist epistemology of mathematics*, ed. and trans. Z.L. Fraser and T. Tho (Melbourne: re.press, 2007), p. xvii.

founding documents present themselves as conscious of the radical novelty of their enterprises.¹⁴

The consequences of these new discoveries and physical theories are overwhelming, transforming the very ways in which knowledge is acquired, inscribed and transmitted. Such knowledge cannot be given in experience, only repeated by experiment (simple observation would be more likely, as Alexandre Koyré has emphasized, to confirm Aristotle's findings); it cannot be formalised by natural languages, only written mathematically, as Galileo famously put it; it cannot be derived from authority (whose paradigm is Holy Scripture), only ceaselessly retested to exhaustion (even if Protestantism and religious humanists proved key in this development).¹⁵ The scientific revolution is all the more

¹⁴ "The primary aim of the Royal Society has never been in doubt, for it was recorded in the minutes of the first, preliminary meeting on 28 November 1660. Then those gathered in the room of Lawrence Rooke (d. 1662), Gresham Professor of Astronomy, spoke of "a desigene of founding a Colledge for the promoting of Physico-Mathematicall Experimentall Learning," which it seemed might best be done by having "a more regular way of debating things, and according to the manner of other countries" in order to "the promotioing of experimentall philosophy." The repeated emphasis upon experiment is the more worthy of notice because it was entirely original," Marie Boas Hall, *Promoting Experimental Learning 1660–1717* (Cambridge: Cambridge University Press, 1991), p. 9.

¹⁵ On the import of Protestantism for the new philosophies, see P. Harrison, *The Bible, Protestantism, and the Rise of Natural Science* (Cambridge: Cambridge University Press, 1998) and the essays in K. Killen and P.J. Forshaw (eds.), *The Word and the World: Biblical Exegesis and Early Modern Science* (Houndmills: Palgrave, 2007). There is also the extraordinary account of Koyré's which argues that Judeo-Christian monotheism was in fact a necessary precondition for modern science. Koyré's analysis suggests that Galileo's *scientific* genius derived from his taking the Bible absolutely *seriously*: 'Curious thing: two thousand years earlier Pythagoras had proclaimed that number was the very essence of things; and the Bible had taught that God founded the world on "number, weight, measure." Everyone repeated this – but no-one believed it. At least, no one up to Galileo took it seriously,' A. Koyré, *Etudes d'histoire de la pensée philosophique* (Paris: Gallimard, 1971), p. 349. The French psychoanalyst Jacques Lacan took up this hypothesis, noting that: "[Descartes'] reference to a nondeceiving god, the one accepted principle, is based on results obtained by science... It need hardly be said that matter does not cheat, that it has no intention of crushing our experiments or blowing up our machines. This sometimes happens, but only when we have made a mistake. It's out of the question that it, matter, should deceive us. This step is not at all obvious. Nothing less than the Judaeo-Christian tradition was required for it to be taken with such assurance," J. Lacan, *The Psychoses: The Seminar of Jacques Lacan, Book III 1955–1956*, trans. R. Grigg (New York: Norton, 1993), pp. 64–5. Or, as Lacan adds elsewhere, "modern science, the kind that was born with Galileo, could only have developed out of biblical or Judaic ideology, and not out of ancient philosophy and the Aristotelian tradition," *Seminar VII: The Ethics of Psychoanalysis*,

disturbing at the time given that its propositions are as-yet inadequately unified, its methods still confused and erratic, and its doctrinal consequences still unsettled. Yet the very intensity of the disputes between and within Baconian, Galilean, Cartesian, neo-vitalist and neo-atomistic strains of the new sciences show how immediately and universally intellectual Europeans recognised the import of the advances in scientific methodologies, technologies and results.¹⁶ If not a single verity remains untouched in this uproar, it is vital to avoid the temptation of nominating this complex “complexity”: on the contrary, the irreducible complexity of what was happening is belatedly able to be referred to the clarity of what I am calling a “rupture-with-the-rupture.”¹⁷

trans. D. Porter (London: Routledge, 1992), p. 122. See also the ongoing work of J.-C. Milner, above all, *L'Oeuvre Claire: Lacan, la science, la philosophie* (Paris: Seuil, 1995).

¹⁶ One almost universal consequence was, as a number of authorities have emphasized, that the *problem of method as an uncircumventable problem* emerges at the centre of thought. So Jacob Klein notes that “modern mathematics... turns its attention first and last to method as such. It determines its objects by reflecting on the way in which these objects become accessible through a general method,” *Greek Mathematical Thought and the Origin of Algebra*, trans. E. Brann (Cambridge: The MIT Press, 1968), p. 123. Or, as Yirmiyahu Yovel puts it in a more general frame, “From Bacon and Galileo through Descartes to Locke and Kant, modern philosophers have given logical priority to the study of method,” Y. Yovel, *Spinoza and Other Heretics: The Adventures of Immanence* (Princeton: Princeton University Press, 1989), p. 35.

¹⁷ Although there is not the space to go into it here, it is precisely *space* that bears much of the brunt of the new sciences: thinking about what a body is, what it does, and what it can do, is thereby fundamentally transformed. This is due, moreover, to the new physics, in which the problem of bodies is integrally linked to a problematic of *falling* bodies. As Peter Damerow et al. remark in their *Exploring the Limits of Preclassical Mechanics*: “The discovery of the law of free fall is usually considered to be a milestone in the development of modern physics and a major step in superseding medieval ways of thought,” *Exploring the Limits of Preclassical Mechanics*, Second Edition (New York: Springer, 2004), p. 1. First formulated by Galileo in 1604, this fundamental law of modern dynamics proves central to the development of the revolutionary scientific theories and practices of the century, culminating in Newton’s work of 1687. For the new physics, a body no longer falls, as Aristotelian doctrine maintained, as a return to its “natural” place; on the contrary, this new fall can only be treated in ways irreconcilable with all preceding classical and Christian forms of thought. The key claim that seized seventeenth century thinkers was precisely that *rest is a special case of motion*: the law of inertia states, quite to the contrary of all possible sense perceptions, that movement is the basic state, and that rest, as opposed to being that toward which all movement tends, is rather a special case of movement. See A. Koyré, *From The Closed World to the Infinite Universe* (Baltimore and London: The Johns Hopkins Press, 1957); M. Jammer, *Concepts of Space: The History of Theories of Space in Physics* (Cambridge: Harvard University Press, 1969); E. Grant, *Much Ado About Nothing: Theories of Space and Vacuum from the Middle Ages to the Scientific Revolution*

Most importantly here: those identifying with the new sciences almost invariably and explicitly scorn poetry. As Douglas Bush puts it: "In the world of the new philosophy, a mechanistic and deterministic world inhabited by mechanistic and egotistic beings, there was little room for imagination and intuition, for spiritual struggle and mystical contemplation. Even if poets did not accept the new creed, they could not help breathing a different air."¹⁸ This scientific scorn

(Cambridge: Cambridge University Press, 1981). For an account of some of Milton's issues with space, see J. Gilles, "Space and place in *Paradise Lost*," *ELH*, Vol. 74, No. 1 (2007), pp. 27–58.

¹⁸ Bush, *Science and English Poetry*, p. 43. So, despite the uncircumventable confusions, some of the consequences of their new science are pretty clear to Bacon, Galileo, Descartes and others, whether or not they felt compelled to polemicise in its favour or tried to avoid undue publicity. As Ernst Cassirer comments of Galileo: "when Galileo draws the dividing line between the objective truth of nature and the world of fable and fiction, both poetry and art are relegated to the latter world," *The Individual and the Cosmos in Renaissance Philosophy*, trans. M. Domandi (New York: Harper, 1964), p. 157. Bluntly, this means that rhetoric, logic and grammar – the classical *trivium* – are excluded from the avant-garde of knowledge, which, indeed, is genuinely an avant-garde for the first time. What was perhaps most horrific to the educated men of the seventeenth century were the implications for belief. There is a general sense of irreversible and radical epistemological division, sometimes idealised (as with Bacon), sometimes pathologized (as with Burton); there is a transformation of the ground and a proliferation of methodologies, whether observational or experimental, inductive or mathematized (e.g., a general hostility to the explanatory use of formal and final causes); there is a radical deconsecration of authority (whose epitome is provided for Protestantism by the Pope as Antichrist); uncertainty as to the relationship between appearance (as given to the senses) and reality (as given in anti-commonsensual experiments and observations); scepticism in regard to natural languages and measuring devices (à la the concerted seventeenth-century efforts towards the creation of artificial and coded languages, from Bacon through Wilkins to Leibniz); proliferation of new specialised academies, which emerge out of the older patronage networks and circles of enthusiasts (from the academies of Italy to the learned patronage entourages of England); the concomitant development of new forms of transmission of knowledge (for which Descartes' *Meditations* can stand as emblem); there is a transformation in the nature of space (on the one hand, there is now no hierarchy of spaces with different laws, e.g., sub- and super-lunary spheres, but the universe is everywhere governed by the same mathematical order; on the other hand, this order can often only be discerned by cutting out an experimental space in the real spaces of life, that is, by establishing an artificially-produced place). There is a celestial unhinging: geo- or heliocentric, geostatic or heliostatic – or something else? Above all, we find the horror of a contingency that can no longer be ignored or explained-away (as exemplified by the horrified enthusiasm in the rediscovery and multiple translations of Lucretius' *De rerum natura*, regarding which see, *inter alia*, S. Greenblatt, *The Swerve: How the World Became Modern* (New York: Norton, 2011)). Finally, we find that the *status* of truth changes irrevocably: scientific truth is at once absolute and transient, ever-ready to be falsified by *discoveries* but no longer by the *debates* of scholars, if it can even be accepted in the first place...

for their enterprises cannot be mistaken by poets themselves, who are forced to find some way to respond to the new epoch. This was particularly pressing in England following the Restoration, with the establishment of the Royal Society. As Jonathan Sawday elaborates in his *Engines of the Imagination*:

To the savants of the Royal Society, the reform of language and the promotion of the mechanical philosophy were seen as allied endeavours... The tropes, conceits, metaphors, similes, the entire panoply of rhetorical devices beloved by the poets, had to be banished in order to produce a “strict account” of nature.¹⁹

And:

For Milton, committed (as he was) to a language impregnated with simile, fable, allusion, and reference, Thomas Sprat’s attack on the language of “wits and scholars,” published in the same year that *Paradise Lost* first appeared, was an attack on his very identity as a poet and as an intellectual. More than that, Sprat’s appeal to the language of “artisans,” “countrymen,” and “merchants” was an appeal to the language of the practical men of business who, in their anxiety to secure their economic privileges had (so Milton believed) been foremost in betraying the ideal of an English Republic.²⁰

My main point should now be clear: the rupture introduced into the field of knowledge by the new philosophy is radical and irreversible; at its limit, particularly in the realm of cosmology, the new philosophy relies on mathematization, technological application, and propositions that have no authority but experiment as their conditional validation. The new philosophy is at best indifferent to poetry, at worst, flagrantly hostile. And it is politically emergent, redistributing all existing social and epistemic stratifications. No educated person can ignore the consequences for the personnel, production, circulation and validation of knowledges in general. One of the consequences is, as Leo Strauss notes, is that “[c]orrespondingly, poetry is no longer understood as inspired imitation or reproduction but as creativity.”²¹ These consequences have, natu-

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¹⁹ J. Sawday, *Engines of the Imagination: Renaissance culture and the rise of the machine* (London and New York: Routledge, 2007), p. 257.

²⁰ Sawday, pp. 258–9.

²¹ L. Strauss, *An Introduction to Political Philosophy*, ed. H. Gildin (Detroit: Wayne State University Press, 1989), p. 88. Niklas Luhmann puts this in a slightly different way: “When science –

rally, political as well as poetic resonances that integrally concerned Milton. The paradox is that Milton becomes radically new in his attempt to remain old-fashioned. He wishes to preserve and extend the highest ambitions for poetry, but in a context which he both knows and doesn't know is putting an end to such ambitions. To advert to terms recently provided by Alain Badiou, it is *because* Milton is a scientific *reactionary* and a republican *radical* that he comes to incarnate a *resurrected subject* of poetry itself.²²

4. Milton and Galileo

Having belaboured this point, I want to essay a close reading of an element of *Paradise Lost* that has always exercised its critics: its invocation of Galileo. Why is Galileo repeatedly mentioned in connection with the telescope in particular? How does this mention affect, if at all, a global interpretation of the poem itself? Does it have consequences for our understanding of Milton's theory of knowledge? Of action? And so on.

Galileo had already notoriously functioned as a reference for Milton in *Areopagitica* (1644), a political treatise arguing against pre-publication censorship, in which the latter writes of his own trip to Italy in the late 1630s: "There it was that I found and visited the famous *Galileo* grown old, a prisner [sic.] to

in the wake of Copernicus and Galileo, assisted by the telescope and mathematics – set out to explore realities that seemed at first implausible, rhetoric, in alliance with poetry, conceived its task to be finding lasting forms for astonishment and wit," *Art as a Social System*, trans. E.M. Knodt (Stanford: Stanford University Press, 2000), p. 258. It is precisely this situation that T.S. Eliot denominated "the dissociation of sensibility," which, in its own way and with serious reservations (not least its politico-theological dismissal of Milton as a real thinker), remains a strong reading of the effects of the scientific revolution upon the poetry of the seventeenth century.

²² See A. Badiou, *Logics of Worlds*, trans. A. Toscano (London: Continuum, 2009), esp. pp. 45–78. What is odd, in the terms of the tables Badiou provides on p. 77 and p. 78, is that one could quite directly say that *Paradise Lost* is evidence at once of Milton's communist invariance in politics, neo-classicism in art, and second encounter in love (*Paradise Lost* is mainly composed while married to his "3rd and Best Wife") – but of reactionary pedagogism in science. Badiou himself would not have any truck with such a typology (his truth-procedures being radically incommensurable in the real of their self-production), but such a possibility certainly remains real if unrealizable for Milton himself, and it can usefully exemplify what I am arguing more generally here: Milton's unprecedented poetic radicality can only emerge on the basis of an attempt to retain an active fidelity to politics *and* a reactionary pedagogism of science, the latter thereby returning in symptoms throughout the text itself.

the Inquisition, for thinking in Astronomy otherwise than the Franciscan and Dominican licensers thought.”²³ Whatever the veracity of Milton’s testimony here, it only emphasizes the importance of the reference. For Milton explicitly names “Astronomy” as the cause of Galileo’s imprisonment, as well as the two Catholic orders he most despises – which also turn up again in *Paradise Lost* as “Embryos and idiots, eremites and friars/White, black and gray, with all their trumpery” (3: 474–5). An immediate political reading is imaginable and, certainly, there is a long tradition in Milton studies which would read such figures as Galileo as, in John Guillory’s words, “a cryptic self-portrait.”²⁴ For there are certainly some personal traits which might induce Milton to forge an identification. Both men went blind, both became political outcasts, and both certainly considered themselves geniuses. But these are merely external traits. When Galileo appears in *Paradise Lost*, it is as coupled integrally with the telescope, that is, as a *kind* of “astronomer” – though, significantly, no longer as an astronomical *thinker* as such (as in *Areopagitica*) but as a *technician-observer*. Galileo, indeed, had become famous throughout Europe for his construction of a telescope, the most powerful then available.

The first and best-known reference in *Paradise Lost* comes in the form of an epic simile:

He scarce had ceased when the superior fiend
 Was moving toward the shore; his ponderous shield
 Ethereal temper, massy, large, and round,
 Behind him cast; the broad circumference
 Hung on his shoulders like the moon, whose orb
 Through optic glass the Tuscan artist views
 At evening from the top of Fesole,
 Or in Valdarno, to descry new lands,
 Rivers or mountains in her spotty globe (1: 283–291).

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The telescope is such a crucial invention for the seventeenth century that it’s difficult not to find it discussed by an extraordinary range of thinkers of mo-

²³ J. Milton, *Complete Prose Works of John Milton*, Vol. II, 1643–1648 (New Haven: Yale University Press and London: Oxford University Press, 1959), p. 358.

²⁴ J. Guillory, *Poetic Authority: Spenser, Milton, and Literary History* (New York: Columbia University Press, 1983), p. 161.

dernity, far beyond the field of history and philosophy of science. There are certainly a number of notable features about the instrument. Lenses had been introduced into Europe at the end of the thirteenth century. If classical antiquity had been aware of the magnifying properties of lenses, it was only in the fourteenth century that spectacles began to be made to supplement magnifying glasses for scholars. One of the questions arising from this, relevant in the present context is: why wasn't the telescope invented by the fifteenth century, when all the necessary components were available? The first known telescopes are invented in Holland in late September 1608, with a contested origin and patent applications.²⁵ These devices magnified only three to four times; they were immediately used as demonstrations for rulers. Very quickly, the device spread across Europe. The English researcher Thomas Harriot looked at the moon with a 6x telescope by August 1609.²⁶ But it is Galileo who gives the telescope its decisive impetus.

According to his own account, Galileo first heard reports about the instrument, then reconstructed it, sight unseen, on the basis of theoretical principles. His first version magnified 8x; his next version, the one with which he made his famous discoveries, 20x. It's true, of course, that a great deal of craft skill is involved in this reconstruction, and that the theoretical basis on which Galileo does this has to be normed by the materials themselves, through a painstaking process of trial and error. But Galileo's craftwork depends on his theory, and not the other way around, and it is this *theoretical* priority which it is critical to understand in modern science. In 1610, he published *Sidereus Nuncius*, announc-

²⁵ For an accessible recent account of this invention, see E. Reeves, *Galileo's Glassworks: The Telescope and the Mirror* (Cambridge: Harvard University Press, 2008). For an overview of the uses Galileo made of the telescope, see N.M Swerdlow, "Galileo's discoveries with the telescope and their evidence for the Copernican theory," in P. Machamer (ed.), *The Cambridge Companion to Galileo* (Cambridge: Cambridge University Press, 1998), pp. 244–270. As Swerdlow emphasizes, Galileo was not an astronomer in the sense of Copernicus, Tycho Brahe or Kepler (p. 244), and that "his originality lies not so much in what he found as in how he interpreted his discoveries. Even his discoveries with the telescope, as interesting as they are in themselves – and it is hard to think of more surprising discoveries in the entire history of science – are of still greater interest for the conclusions that he drew from them," p. 244. This confirms the tendentiousness of Milton's characterisation of Galileo as an "artist."

²⁶ See R. Kargon, *Atomism in England from Harriot to Newton* (Oxford: Clarendon Press, 1966), p. 20.

ing his discoveries.²⁷ In this book, Galileo gives an account of his discovery that the moon is spotted; indeed, that it contains mountains and valleys like the earth. In addition, Galileo measured those mountains, discovered earthshine (solar reflection off the earth), many more stars than had been supposed, observed four moons of Jupiter (which he denominated the “Medici satellites”), as well as seeing “ears” on Saturn (his telescope was not powerful enough to resolve them as rings).

As Harold Bloom argues about the passage in question, picking up on Dr Johnson’s famous remarks: “Satan, excelling both [Achilles and Radigund] in his bad eminence, is seen accurately through the optic glass of the British artist’s transumptive vision, even as Galileo sees what no one before him has seen on the moon’s surface.”²⁸ There is thus an implicit equation drawn here between Galileo’s technologically-enhanced vision and the muse-enhanced vision of the blind poet; moreover, this equation enables, as Bloom shows, a very effective assault on Milton’s literary precursors, including Homer, Virgil, Ovid and Spenser. The problem for Milton is that, if Galileo can indeed aid him in these literary-political struggles, Galileo also harbours dangerous and volatile properties.

For the consequences of Galileo’s observations literally unleashed a kind of cosmic *pandaemonium*.²⁹ If the moon is like our own earth, what becomes of the otherness of the heavens? If planets looked like discs through the telescope, but the stars didn’t, then there may well be immense differences in the distances between them. If the earth shone with reflected light, why not the planets? And so on. A number of postulates of Aristotelian physics are immediately destroyed by these observations, first, the immobility of the earth, and, second, any clear distinction between sublunary and celestial spheres. Yet heliocentric theory didn’t proceed from observations with the instrument but the other

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²⁷ See G. Galilei, *The Sidereal Messenger*, trans. with intro and notes E.S. Carlos (Pall Mall: Dawsons, n.d).

²⁸ Bloom, p. 133.

²⁹ Along with a surprising number of other words (he is certainly one of the first to use the now-ubiquitous psychological term “self-esteem”), *Pandaemonium* is Milton’s own coinage, for the city the fallen devils construct in hell. One of the implications, then, for Milton of Galileo’s discoveries is that, with the latter’s utter destruction of the Aristotelian cosmos, the totality of fallen creation is Lucifer’s capital itself.

way around.³⁰ Moreover, entirely new materials, technologies, and principles of practice take priority.³¹ As if that wasn't enough, in order to use the new instrument, the human sensorium itself had to be retrained. As Joseph Vogl puts it:

The telescope's "self-referentiality" means three things. First, the telescopic view pinpoints the observer as much as the object observed. Second, any relation to the object in Galileo's observations is also a relation of observation to itself. Finally, the telescope's medial character is also revealed in its self-referential structure.³²

³⁰ As Denise Albanese notes, invoking Paul Feyerabend's *Against Method*, "the early telescope was an undependable apparatus and no guarantor of proof; rather, it seems to have demanded the conceptual a priori of heliocentrism in order for it to underwrite any demonstration of heliocentrism's veracity," D. Albanese, *New Science, New World* (Durham and London: Duke University Press, 1996), p. 174. However, this point has implications that go against one dominant revisionist strand in the history of science. For the very undependability of the instrument in itself can be taken to reveal the undependability of *all* forms of knowledge, not only of revelation but of observation too. Next thing you know, Descartes, Hobbes and Spinoza will purport to resolve the issue altogether by adverting to the constructive apodicticity of mathematics: since Milton incontrovertibly knew the work of the first two, and possibly, through his correspondence with Oldenburg, something of the third, it is undoubtedly crucial that it is *not* Galileo's famous dictum about the book of the world being written in mathematical script that is invoked here. As a poet – and not a philosopher – Milton cannot accept this claim without attempting to overturn its grounds. For possible connections with Spinoza, see D. Saurat, *Milton: Man and Thinker* (New York: Haskell House, 1925), pp. 323–4.

³¹ "Galileo was the first man in history to realise fully that there was a certain system of science that had begun to disappear – namely the Aristotelian system based on the common-sense's view of things as individual substances – and that a new system was about to take its place: mathematical science. That meant transforming the universe into a set of letters and numbers arranged into equations, and by the same token transforming the man of science into a subject that has nothing to do with subjectivity since it is devoid of all psychological or human attributes; its sole definition, as given by Descartes, lies in thought. Moreover, Galileo improved the quality of the lenses in his telescope, which enabled him to discover the four moons of Jupiter – a discovery which amounted to a visible refutation of the Aristotelian thesis according to which the earth was the only centre around which the other planets rotated," M. Safouan, *Why are the Arabs not free? The politics of writing* (London: Blackwell, 2007), pp. 37–8.

³² J. Vogl, "Becoming-media: Galileo's Telescope," *Grey Room*, 29 (2008), p. 18. As Vogl also points out, 'the telescope creates the senses anew: it defines the meaning of vision and sensory perception, turning any and all visible facts into constructed and calculated data. Ultimately, all the phenomena and "messages" it produces bear the mark of theory... Galileo's telescope thus erases the coordinates of natural vision, the natural view, and the natural eye,' p. 17. Or again, as Peter Dear emphasizes, Galileo's visual observations were directed towards his program of mathematization of the cosmos. See *Discipline & Experience: The Mathematical Way in the Scientific Revolution* (Chicago and London: Chicago University Press, 1995).

In other words, the telescope is integrally linked to the dissolution of the Aristotelian cosmos: at once agent, proof, and index of the new confusion. The telescope implies cosmic pandaemonium, a perspectivalism; that is, a universal relativity of observation without any localisable centre (if such relativity is not, strictly speaking, a *relativism*). If a stronger telescope reveals more stars invisible to the unaided eye, what might a yet-stronger telescope reveal? It is not simply new worlds that are seen through the telescope: the telescope is evidence not only of human frailty, but of technology's incapacities as well. A new relation between seeing and knowing is at stake. With a telescope, seeing is no longer believing; rather the telescope shows seeing's limitations, and this showing operates upon, as it forces its observers to acknowledge, unprecedented theoretical principles. These principles are altogether other than those that would make great humanists comfortable. As Denise Albanese writes, following John Guillory, "As an apparatus that signifies the 'New Science' of the seventeenth century, and a technology that makes 'new worlds' available for inspection, the telescope seems a useful index of the transfer of cultural authority from humanism's printed texts to colonialism's and science's natural ones."³³ The question of authorization is clearly at stake in the comparison.

Why Galileo, then, for Milton?

- 1) Galileo and his telescope, coupled irremediably for the period, are the exemplary agents and exemplars of the new sciences, which are now instituting their dominance in a public way;
- 2) Galileo is a victim of the idolatrous hand of Catholicism, the victim of the censorship of new knowledge by sclerotic and Satanic institutions;
- 3) Galileo is a great man, both of science and politics, persecuted by his enemies for his genius.

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If Milton strongly identifies with Galileo, Galileo has also become exemplary of a form of knowledge that is irreproducible by any form of traditional humanistic knowledge, and which indeed threatens integrally the practices of humanists

³³ Albanese, p. 122. Indeed, this link between colonialism and science is made clear in John Keats's very famous sonnet, "On First Looking into Chapman's Homer," where the writer-narrator becomes a reader-explorer: "Then felt I like some watcher of the skies/When a new planet swims into his ken;/Or like stout Cortez when with eagle eyes/He stared at the Pacific..." (with, of course, its notorious mistake that substitutes Cortez for Balboa).

and the truth-claims of poetry. Milton thus has to operate a number of incommensurable identifications simultaneously. Certainly, he can work a paralogism:

- like Galileo, Milton has gone blind;
- like Galileo, Milton has been politically persecuted for truth-telling;
- like Galileo, Milton is a great man.

But that's not enough. Let's take the denomination of Galileo as an "artist" in the aforementioned passage as symptomatic, all the more so since it is, as Roy Flannagan has observed, the only use of the word in Milton's poetic oeuvre.³⁴ After all, Milton could have called him an "astronomer," "philosopher," "observer," even an "experimenter" (leaving metrical concerns aside). Although clearly parasiting on Galileo's reputation, by playing on the much broader semantic range of the word at the time, Milton seems to be implying, all at once:

- like Milton, Galileo is a great artist;
- like Milton, Galileo is therefore not a "new scientist" (or, at least, that Milton's "art" is comparable and not inconsistent with Galileo's "art");
- unlike Milton, Galileo is merely an artisan (a mechanic or practical man);
- unlike Milton, Galileo is an artist in the sense of a "schemer" or "contriver."³⁵

³⁴ Flannagan, p. 103. The *Oxford English Dictionary* 2nd Edition defines "Artist" thus: I. 1) skilled in liberal arts (eg Chettle 1592, Shakes Tr & Cr 1606); 2) One who pursues some practical science; a scientific man, man of science, savant. Obs. 1667. Milton P.L. II.288 "The Moon, whose Orb Through Optic Glass the Tuscan Artist views"; 3) physician, astrologer, alchemist; II. One skilled in the useful arts: 4) 'One who follows any pursuit or employment in which skill or proficiency is attainable by study or practice; hence a. A skilled performer, a proficient, a connoisseur. b. A practical man, as opposed to a *theorist*. Obs. 5) a 'A follower of a manual art; an artificer, mechanic, craftsman, artisan. 6) "In this sense now influenced by 7 and applied to: One who practices a manual art in which there is much room for display of taste; one who makes his craft a 'fine art'"; III. One who pursues an art which has as its aim to please. 7) a. "One who cultivates one of the fine arts..." b) fig. 8. a) one skilled in music, b) skilled in dramatic art, c) now especially one who practices the arts of design; IV One who practises artifice. 9. "One who practises artifice, stratagem, or cunning contrivance "; a schemer, contriver. Cites 1649 Bp Hall Cases Consc III. li (1654), "The Devill is a most skilfull Artist", 10) Usu. Preceded by a defining word: a person, "chap," "fellow,"; also, one devoted to or unusually proficient in something (reprehensible).

³⁵ Flannagan has pointed out that the word 'artist' may here be linked to black magic, for it has these connotations in the period; for his part, in modifying Neil Harris's position, McAdam suggests Milton may be allusively placing 'the Italian philosopher in the same class as the (incorrectly reputed) inventor of gunpowder, the English scientist and magician, Roger Bacon,' McAdam, p. 291.

As Brady notes, Milton's *not* calling the telescope a telescope (it is an "optic glass") is to denominate the instrument with terms that were already outdated by 1667, and is in any case itself a distancing literary device.³⁶ Milton is therefore covertly presenting himself as newer than the new sciences: he can beat them on their own terms. Moreover, just as Galileo saw and told the truth about the fallen cosmos, Milton can see and tell the truth about the prelapsarian cosmos too. Galileo can describe what happens in the book of nature, but Galileo cannot give any account of, nor justify, "the ways of God to men."

To return to the first passage, we should also emphasize how it links Galileo to Satan in a peculiarly ambivalent way, a link which will be taken up later in *Paradise Lost*. Moreover, some kind of bizarre locational scrambling is going on here: the Tuscan artist seems to scry the moon's "spotty globe" from both "the top of Fesole" (one of the hills overlooking Florence) and in "Valdarno" (the Arno valley), where, in fact, Galileo had been imprisoned by the Inquisition. Given that the simile in Book 1 comes just after Satan has woken and arisen in hell, that is, in the ultimate imprisonment, one might even discern an obscene and shadowy assault on Galileo himself by means of the simile: like Satan, Galileo has fallen through his own actions from the top of Fesole to his imprisonment in the depths, and, like Satan, he deserves his fate. The man simply doesn't know where he is.

Perhaps surprisingly, it is the word "spotty" that proves to be crucial here.³⁷ Indeed, "spot" and cognates appear in a number of significant spots throughout

³⁶ "The instruments Galileo constructed and presented to audiences in 1610 and 1611 are distinguished from the telescope by nomenclature. In *The Starry Messenger* (1610) Galileo refers to his device as 'organum,' 'instrumentum,' and 'perspicillum,' while in his Italian correspondence of the period his most common name for it is 'occhiale.' These terms do not specify how the device worked or what it did: 'instrumentum' and 'organum' designate simply a tool; 'perspicillum' means something that is looked through; and 'occhiale' indicates spectacles or eyeglasses. By contrast, the term 'telescope' is fairly specific; it is a Greek neologism meaning, literally, 'to see from afar.' It was proposed at the feast celebrating Galileo's induction into the Accademia dei Lincei in the spring of 1611, an occasion that has also been taken to mark the certification of his discoveries," Brady, p. 132.

³⁷ See Amy Boesky, "Milton, Galileo, and Sunspots: Optics and Certainty in *Paradise Lost*," in *Milton Studies* 34, ed. A. Labriola (Pittsburgh: University of Pittsburgh Press, 1996), pp. 23-44.

the poem.³⁸ The word "spot" is a good Middle English word, which, according

³⁸ In the 1667 10 book version of the poem, we find: "spotty globe" (1.291); III: "Thou wilt not leave me in the loathsom grave/His prey, nor suffer my unspotted Soule/For ever with corruption there to dwell;/But I shall rise Victorious, and subdue/My Vanquisher, spoild of his vanted spoile"; 2) "a spot which like..."; 3) "that spot to which I point is Paradise" (3.733); IV: "Sin-bred, how have ye troubl'd all mankind/With shews instead, meer shews of seeming pure,/And banisht from mans life his happiest life,/Simplicitee and spotless innocence"; V: "Evil into the mind of God or Man/May come and go, so unapprov'd, and leave/No spot or blame behind: Which gives me hope/That what in sleep thou didst abhorr to dream,/Waking thou never wilt consent to do"; 2) the Galileo reference; 3) "The grosser feeds the purer, earth the sea,/Earth and the Sea feed Air, the Air those Fires/Ethereal, and as lowest first the Moon;/Whence in her visage round those spots, unpurg'd/Vapours not yet into her substance turnd"; VII: 1) "At once came forth whatever creeps the ground,/Insect or Worme; those wav'd thir limber fans/For wings, and smallest Lineaments exact/In all the Liveries dect of Summers pride/With spots of Gold and Purple, azure and green:/These as a line thir long dimension drew,/Streaking the ground with sinuous trace; not all/Minims of Nature; some of Serpent kinde/Wondrous in length and corpulence involv'd/Thir Snakie foulds, and added wings"; 2) & 3) "When I behold this goodly Frame, this World/Of Heav'n and Earth consisting, and compute,/Thir magnitudes, this Earth a spot, a graine,/An Atom, with the Firmament compar'd/And all her numberd Starrs, that seem to rowle/Spaces incomprehensible (for such/Thir distance argues and thir swift return/Diurnal) meerly to officiate light/Round this opacous Earth, this punctual spot,/One day and night"; 4) "What if that light/Sent from her through the wide transpicuous aire,/To the terrestrial Moon be as a Starr/Enlightning her by Day, as she by Night/This Earth reciprocal, if Land be there,/Feilds and Inhabitants: Her spots thou seest/As Clouds, and Clouds may rain, and Rain produce/Fruits in her soft'nd Soile, for some to eate/Allotted there; and other Suns perhaps/With thir attendant Moons thou wilt descree/Communicating Male and Femal Light,/Which two great Sexes animate the World,/Stor'd in each Orb perhaps with some that live"; Book VIII: "Neerer he drew, and many a walk travers'd/Of stateliest Covert, Cedar, Pine, or Palme,/Then voluble and bold, now hid, now seen/Among thick-wov'n Arborets and Flours/Imborderd on each Bank, the hand of EVE:/Spot more delicious then those Gardens feign'd/Or of reviv'd ADONIS, or renown'd/ALCINOUS, host of old LAERTES Son,/Or that, not Mystic, where the Sapiant King/Held dalliance with his faire EGYPTIAN Spouse." Spots also turn up elsewhere in Milton's work, as in *Comus*: "Above the smoke and stir of this dim spot/Which men call earth..." (5-6); "the spotted mountain pard" (444); "And from her fair unspotted side/Two blissful twins are to be born" (1009-10). Aside from *Comus*, I could not find the word in the 1645 volume of Milton's poems, but in the 1673 reprint of this early volume (which adds a number of poems and the treatise *Of Education*), Sonnet 23 has the line: "Mine as whom washt from spot of child-bed taint,/Purification in the old Law did save..." *Spot* is linked in this line both to the Fall and to the blight of sexual difference as maternal transmission. Neither could I find any uses of the word in *Paradise Regained* nor *Sampson Agonistes*; nor in *Areopagitica*, *Of Education*, *Martin Bucer*, *The Tenure of Kings and Magistrates* – except, suggestively, as part of "despot." In *Of Reformation*, however, he speaks of "mere necessity to vindicate the spotless truth from an ignominious bondage," and "Then was baptism... thought little enough to wash off the original spot"; in *Of Prelatical Episcopacy*,

to the *Oxford English Dictionary*, can mean “a moral stain, blot or blemish,” “the stigma of something disgraceful,” “a substance causing strain or disfigurement,” “a particular place,” and so on.³⁹ “Spot” therefore combines the senses of topology, a physical mark and the index of a moral fault.

It is therefore not entirely unexpected that the next mention of Galileo in *Paradise Lost* would also bring up the word, thereby recapitulating these anxieties and ambivalences.

There lands the fiend, a spot like which perhaps
Astronomer in the sun’s lucent orb
Through his glazed optic tube yet never saw (3: 588–90).

This “spot” – Satan landing *on* the sun, an alien object – is, moreover, a clear reference to Galileo’s 1613 work on sunspots, itself a response to Christoph Scheiner’s argument that sunspots were little planets circling the sun. Galileo showed, by contrast, that the spots moved together, moved slowly, were irregular, were foreshortened at the edge of the sun – and were therefore connected to the sun’s surface. They were not planets, but literally spots upon or in the face of the sun.⁴⁰ Milton thereby reinforces the links we’ve already noted: first, the connection of Galileo with Satan; and, second, with Milton’s ability to see further and other than Galileo. As Amy Boesky notes, “for Milton, the telescope

of “the spotless and undecaying robe of truth”; it also turns up in *The Doctrine and Discipline of Divorce*, *The Reason of Church Government*, *Tetrachordon*, *Colasterion*, and *An Apology for Smectymnuus*, most often in such locutions as “unspotted law” and “unspotted churches.” Perhaps not incidentally, if Milton did indeed have glaucoma, the symptoms can include: tiny spots at edge of vision that slowly get larger and spread; blurred vision; halos around lights; affecting peripheral vision; and problems adjusting to dark rooms. Milton’s own careful self-presentation of this can be found in “To Mr Cyriack Skinner Upon his Blindness”: “Cyriack, this three years” day these eyes, though clear/To outward view, of blemish or of spot;/Bereft of light their seeing have forgot,/Nor to their ideal orbs doth sight appear/Of sun or moon or star throughout the year,/Or man or woman.’ For a recent medical opinion, see G.B. Bartley who thinks the most likely diagnosis is of “bilateral retinal detachments,” in “The blindness of John Milton,” in *Documenta Ophthalmologica*, No. 89 (1995), p. 27.

³⁹ “Spot” can be a mark or discoloration, pips on playing-cards, a variety of domestic pigeon, a small quantity; note too, as a verb, one can “spot” (i.e., which creates spots) or “spot” (i.e., which clears up spots), both of which are at stake in looking at the world...

⁴⁰ See Galileo, *Letters on Sunspots*.

appears to be an overdetermined symbol, a magnification of vision that is at once an augmentation and a distortion."⁴¹ Quite.

The third invocation of Galileo introduces a new note. Rather than Satan, Galileo comes up in the course of God's mission for Raphael, the affable angel speeding from gates of heaven:

From hence, no cloud, or, to obstruct his sight,
 Star interposed, however small he sees,
 Not unconform to other shining globes,
 Earth and the garden of God, with cedars crowned
 Above all hills. As when by night the glass
 Of Galileo, less assured, observes
 Imagined lands and regions in the moon:
 Or pilot from amidst the Cyclades
 Delos or Samos first appearing kens
 A cloudy spot... (5: 257–265).

Here Raphael's sight – and, of course, Milton's – is explicitly compared to Galileo and his "less assured" technology. Note the recurrence of the "spot" along with Galileo and his glass. There is a play on the ambivalence of Galileo's accomplishment ("*Imagined*" is not just "imaged"), not to mention the comparison with the "pilot." The word "kens" here returns us to Book 1 of the poem, where Satan's fall and his vision are linked: "At once as far as angels" ken he views/The dismal situation waste and wild...' (1: 59–60). And, a little further on in the same book, we find another "pilot of some small night-foundered skiff" who blindly mistakes Leviathan for an island... In other words, Milton, unlike Galileo, will not be misled by false appearances, mistaking a whale for a refuge. Moreover, to the extent that Milton and Raphael are implicitly identified here *against* Galileo, we shouldn't neglect Raphael's warning to Adam in Books 7 and 8 for "knowledge within bounds" (7: 120) and for restraint in cosmological speculations.

⁴¹ Boesky, p. 30. She immediately continues: "I do not think Milton forgets Galileo's blindness in *Paradise Lost*; rather, blindness becomes associated for him with the telescope, an instrument Milton suspected not because he was less prescient than his contemporaries, but because he questioned the scopic power represented by Galileo's optic glass (Pepys' "great pleasure of seeing and gazing") even as he applauded it."

But there is also something else going along here with the recurrent linkage of “spots” to mortal sight. For Milton, of course, unlike Galileo, is blind when he makes his own great work:

... cloud in stead, and ever-during dark
 Surrounds me, from the cheerful ways of men
 Cut off, and for the book of knowledge fair
 Presented with a universal blank
 Of nature’s works to me expunged and razed,
 And wisdom at one entrance quite shut out.
 So much the rather thou celestial Light
 Shine inward, and the mind through all her powers
 Irradiate, there plant eyes, all mist from thence
 Purge and disperse, that I may see and tell
 Of things invisible to mortal sight (3: 45–55).

That is, of things invisible to *Galileo’s* sight. Milton’s “universal blank,” by contrast, gives him access to a media technology so much better than the telescope: the muse Urania. Urania, of course, functions as a very singular medium, whose proper name is itself a necessary catachresis: “the meaning, not the name I call” (7: 5). The chains of association thereby return us to *Areopagitica* and the problem of purification, of the two “blanks” that are indiscernible in the world. Milton writes: “That virtue therefore which is but a youngling in the contemplation of evil, and knows not the utmost that vice promises to her followers, and rejects it, is but a blank virtue, not a pure; her whiteness is but an excremental whiteness.”⁴² There are two virtues, then, that look identical: an “untested” as distinct from achieved virtue, and, if they necessarily appear the same in our fallen world (just as Edmund Spenser’s Red Crosse Knight cannot initially tell Una from Duessa in his incomplete epic *The Faerie Queene*), that is, as blanks, one, the untested, is defective, whereas the other, the achieved, is the true purity. But to have been achieved, that virtue must have passed through all the spots of the world (spots as both places and occlusions of place-within-place). What Milton’s “im-mortal” (i.e., “purified”) blank vision therefore literally traverses in *Paradise Lost* are the spots that are the moon, Satan himself as a spot on the sun, and a cloud or clouded spot. And it is therefore no surprise that, in

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⁴² Milton, *Areopagitica*, pp. 515–6.

Book 3 of *Paradise Lost* (3: 248), the Son speaks of his own “unspotted Soul,” that is, his *immaculate* soul: regularly we find in Milton that the negation of a privation proves the ready and easy way both to designate purity *and* exemplify the work of purification, in the necessarily-compromised language of a postlapsarian situation which can never speak straight, and must continually work to expose its own duplicity *through* its duplicity if it is not to deceive.⁴³

A final point. I have already noted how, between Milton's first allusion to Galileo in *Areopagitica* and Galileo's later reappearance in *Paradise Lost*, that the latter moves from being characterised as a “thinker” to being *essentially* identified with a piece of optical technology, an “optic glass.” In this shift, Galileo is not only intellectually demoted, but his expertise is linked to an artisanal engineering of the fallen world, with all the implications I have noted. Yet there is another allusion to Galileo in *Paradise Lost*, one that has only recently been identified because it is covertly intercalated into the poem itself. Ian McAdam has noted a clear paraphrase of a line from Galileo's *Dialogue concerning the two chief world systems* (1632), in the devils' response to Satan's invention of gunpowder:

Th'invention all admir'd, and each, how hee
To be th'inventor miss'd, so easy it seem'd
Once found, which yet unfound most would have thought
Impossible... (6: 498–591).

McAdam comments that this is “a perfect paraphrase of Galileo's maxim” that “*Or vedete come e'facile da intendersi... Tali sono tutte le cose vere, doppo che son trovate; ma il punto sta nel saperle trovare.*” This identification not only con-

⁴³ Strikingly, and although he frequently uses words such as “immortal,” “immutable,” “infinite,” and so on, Milton hardly ever uses the word “immaculate,” and not, as far as I know, in any of the major poems – much preferring instead the word “unspotted.” I would speculate that this is for a number of reasons, above all, due to the crucial role the word plays in Catholicism; its *non-appearance* in the context of Galileo may itself be more directly politically freighted (i.e., it's the Latin of the Dominicans and Franciscans who are allegedly persecuting and censoring him). It may, moreover, be directly linked to the linguistic politics of the poem (e.g., Milton's staging of his anxieties vis-à-vis the geohumoral problems of living in a too-cold climate too-far north, his literary belatedness vis-à-vis Italian and Roman poetry, his desire to write a specifically *English* epic, etc.). I would like to thank Geoffrey Gilbert for alerting me to this immaculate absence in Milton's text.

firm the movements I have been tracking in regards to the explicit allusions to Galileo in the poem (although I will shortly dispute McAdam use of “perfect”), but enables a decoding of Milton’s fundamental, wish-fulfilling interpretation of the status of the new sciences: *the essence of science is technology; the essence of technology is destruction*.⁴⁴

Although McAdam does not note this, there are immediately two other crucial intertexts that must be referenced here (although others are operative too). The first is linked to Francis Bacon’s famous dictum regarding the “arts of printing, gunpowder and the nautical compass,” “which have changed the whole aspect and state of things throughout the world.”⁴⁵ This Baconian line had deeply impressed the young Milton, in a peculiar double way: around 1626, he wrote four Latin epigrams on the 1605 Gunpowder Plot, the Catholic attempt on the life of James I, the first Stuart and father of then-king Charles I (whose trial and execution Milton would later become the greatest ideologue for), as well as one on the inventor of gunpowder (then regularly mis-identified as Roger Bacon). All these

⁴⁴ This enables us to see that Martin Heidegger’s interpretation of modern science has its origins nowhere else than in *Paradise Lost*: Milton is the first modern that I know of to establish this link as such, in this way, and to draw all the consequences that will later be taken up and reconfigured by Heidegger: science as a *techné* that does not think; an analysis of the current desolation of the times as “nihilism” (though Milton obviously does not use this word in its post-Enlightenment sense); the originary revelation of the sense of being as delivered poetically; and a reconstruction of the becoming of humanity as coupled integrally with the historicity of grace (“Being”), etc. M. Heidegger, *The question concerning technology and other essays*, trans. W. Lovitt (New York: Harper and Row, 1977) should therefore be reread in tandem with the final books of *Paradise Lost*, where the problem of human history in its imbrication with technology is explicitly at stake. For different accounts of this issue, see K.J. Knoespel, “Milton and the Hermeneutics of Time: Seventeenth-Century Chronologies and the Science of History,” *Studies in the Literary Imagination*. Vol. 22, No. 1 (1989), pp. 17–35; A. Guibbory, “Milton’s 1667 *Paradise Lost* in Its Historical and Literary Contexts,” in M. Leib and J.T. Shawcross (eds.), *“Paradise Lost: A Poem Written in Ten Books”: Essays on the 1667 First Edition* (Pittsburgh: Duquesne University Press, 2007), pp. 79–96. Guibbory is concerned to place Milton’s position in a specific political context: “Milton’s treatment of the invention of gunpowder (6.498) or the disembowelling of the earth for gold (1.688–90), his location of experiments, dangerous inventions, or building bridges (1.1027–30) in demonic impulses and hell, demand to be read in the specific context of the 1660s, when the Royal Society, founded and patronized by Charles II, was being lauded as a means for recovering paradise. Although atomistic philosophy could provide a scientific model for populist or revolutionary politics, Milton’s 1667 poem insistently places itself at odds with the experimental new science of the Restoration,” p. 86.

⁴⁵ F. Bacon, Book 1, 129.2, *Novum Organum*, trans. J. Bennett, available online, http://www.earlymoderntexts.com/f_bacon.html.

share an extraordinary rhetoric of “Tartarean fire” and anti-Papist bombast, entirely consonant with the later Miltonic sublime.⁴⁶ Yet *In Inventorem Bombardae* expresses a paradigmatically Baconian enthusiasm for the priority of modern technology over ancient fable: the human inventor of a new mode of power over nature is celebrated as greater than Prometheus. It is this position that Milton modifies in *Paradise Lost* insofar as the *truths* of which Galileo speaks are now absolutely identified with the (torturing) *instruments* to which Bacon alluded when he spoke of putting “nature to the question.”⁴⁷ For Milton, knowledge and truth have come apart in the Fall, and are expressed in the relation between science-qua-technology (the paradigm of fallen knowledge as destructive instrumental power) and poetry-qua-vitalism (essential truth as ethical modality). What has been variously called Milton’s “materialist vitalism” or “animist materialism” is therefore itself a *reactionary consequence* of his struggle to confront the challenges of science and technology by fusing the two.

To conclude. I want to emphasize, first, just how serious and extensive is the work that “Galileo” is doing for Milton, how it implicates an extraordinary and perhaps unexpected range of elements of *Paradise Lost* (those I have too-briefly discussed are merely among the most evident); and how, second, this work – absolutely desirable, useful and necessary as it is in and for the poem – also necessarily slips from Milton’s grasp. It is not that Milton did not know what he was doing, or what the risks were. It is that his struggle with the new sciences induces him to make identifications which are unable to be sustained without a fall into an inconsistency that eludes logic. The benefits that Milton expects to gain – indeed, actually gains – from the citations of Galileo, according to the sorts of identificatory paralogisms I have outlined, are quite clear. But

⁴⁶ See *The Poems of John Milton*, ed. J. Carey and A. Fowler (London: Longmans, 1968), pp. 33–36. At the same time, Milton was also composing a much longer Latin poem on the Plot, *In Quintum Novembris*.

⁴⁷ See the strong (if controversial) claims of C. Merchant in this regard, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper Collins, 1980) in this regard, as well as Merchant’s recent defences of her position in such essays as “The Scientific Revolution and the Death of Nature,” *Isis*, No. 97 (2006), pp. 513–533 and “Francis Bacon and the Origins of Experimentation,” *Isis*, No. 99 (2008), pp. 731–760. Merchant’s demonstration that Bacon’s scientific rhetoric is integrally linked with implications of information-extraction through legal means such as torture seems incontrovertible – not least because it is independently confirmed in the current context by Milton’s own position. In fact, once again, I would propose that Merchant’s position is an offshoot of a Miltonic lineage.

what also needs to be emphasised is that these citations only enable Galileo to function as a power-name insofar as it is also covertly assaulted, and put in its proper place – something only Milton is allegedly able to do. Yet Milton’s rhetoric of self-authorization renders itself suspicious, precisely because, after Galileo, it no longer has any good way of preventing its rhetoric from appearing as no more than, precisely, *rhetoric* in the modern sense, i.e., empty if persuasive speech with no traction on the real.

Such remarks can only be a beginning of a study into Milton’s response to the new sciences, but they already permit us to draw certain conclusions. Milton knew a great deal about the new sciences, knew that he had to go at least some way with them, yet at the same time knew the sciences’ costs for the humanist project, and this ambivalence is legible throughout the poem. In the end, he is perhaps the first great modern thinker to forge a position that is still with us today: the essence of science is technology, and this essence is inherently destructive; it can only be combated by a return to the originary disclosure of world through words that make evident unactualised possibilities for new life. To the extent that Milton is conscious of the consequences of the impossibility of reconciliation, this consciousness itself becomes a feature of the work. And since he has set out to “justify the ways of God to men,” this consciousness of possible impossibility threatens to overrun the work itself. A work that takes its own possible impossibility absolutely seriously is necessarily going to encounter difficulties at every level. For the traces of the threat of its own impossibility leave their mark within the work, at the very least as textual traces of struggle. One could even turn this into a hypothesis about *Paradise Lost*’s achieved authority: part of the reason why it becomes so authoritative as a poem is that it not only struggles so directly with impossibility; but that it presents the failure of its struggle with impossibility as an integral aspect of the success of its presentation itself. As I have shown, this also opens a question about the discursive conditions under which such a struggle with such an impossibility becomes necessary and desirable. My argument here has been that it is due, above all, to one of the most thoroughgoing epistemological ruptures in human history, that of the emergence of modern science