**Flights and Fancy: Wings and the Ethics of Knowledge in *Paradise Lost***

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Recent scholarship on *Paradise Lost*, influenced by the current vogue for studies that combine literary criticism with intellectual history, has made much of Milton’s interest in astronomy, and in doing so has seen in him a scientifically, as well as a politically and socially, progressive thinker. As Cummins and Burchell write: “[m]uch of the research undertaken by literary scholars on the connections between early modern poetry and science has focused on the prominent seventeenth-century poet John Milton showing him to be actively engaged in debates with his fellow scientists [sic] and philosophers and not merely presenting medieval scientific ideas in his poetry as previously thought” (5; for some other significant contributions see Martin, Edwards, Marjara, questioned by Poole, “Milton and Science”). One prominent example of this optimistic yoking of the history of science to literary studies is Dennis Danielson’s study, Paradise Lost *and the Cosmological Revolution* (2014). Danielson argues that, whilst exercises in “Whiggish ancestor chasing” are to be avoided, modern critics ought to mount a “rescue mission” to save Milton’s “cosmical epic” from the ignominy of being thought a “monument to dead ideas” (xvii). According to Danielson, we should situate “*Paradise Lost* nonreductively in a wider culture of thought, replete with influences” and so “examine and illuminate his poem’s rich engagement with astronomy and cosmology” (xviii). It remains to be seen however whether Danielson himself has fully escaped the charge of writing Whig history. More extremely still, Joanna Picciotto describes *Paradise Lost* as a “Baconian epic” and “Galileo’s literary equivalent,” and argued that Milton was himself an “experimentalist” (436, 462).

As Danielson’s rejection of “ancestor chasing” suggests, scholars interested in understanding Milton’s “engagement with astronomy and cosmology” are in many cases more likely to disagree about methodology and detail than they are about broad conclusions. The general consensus seems to be that Milton was indeed “actively engaged” with the natural philosophy and cosmology of his age, but the means by which we ought to trace this engagement remain contested. Should we, as Catherine Gimelli Martin and others have done, look for single, dominant influences (Martin proposes Francis Bacon for the role); should we, as Danielson prefers, attempt to locate *Paradise Lost*’s cosmological pronouncements and descriptions within the scientific literature of Milton’s age; should we, as Picciotto does, reinterpret Milton as a Baconian “experimentalist” and thus his poem, his imagery, and even his grammar in terms of contemporary “prostheses” (specifically the lens); or should we, as the more skeptical William Poole advises, revisit more critically and carefully the “scant documentary evidence of Milton’s contact with or, more importantly, opinions of individuals, groups, or ideas we commonly if loosely associate with the ‘new’ science” (“Milton and Science” 18).

This article proposes a radical correction both to the first three of these methodologies, and also to the view of Milton they have produced. It follows Danielson and others in seeking to consider *Paradise Lost* against the backdrop of “a wider culture of thought,” and it is sympathetic to the efforts of Picciotto, and even more so to those of Karen Edwards, to apply a literary eye to the prose of “experimentalist” writers as well as to the work of poets. Nevertheless, it proposes a return to a more cautious and traditional critical approach. Though the engagement of literary scholars with intellectual and scientific history has revealed much of value, this article argues that we must be wary of treating poetry, with all the allusive, shifting meaning that category entails, as though it were inert historical evidence. That way, as John Leonard has shown in his masterly unpicking of the history of misreadings of Miltonic cosmology, a collapse into erroneous literality lies (see 2: 705–848). Likewise it questions the value of reading *Paradise Lost* as an “experimentalist” text “modeled” on the lens (as Picciotto tries to do) without first considering carefully the evidence we have for Milton’s knowledge of, and attitude to, experimentalists and their lenses. This essay does not advocate searching the archives as Poole would have us do, though his work in this area informs the approach it takes: instead, it chiefly makes use of evidence internal to Milton’s poems, though it also leans on his prose and on some of the more rhetorical passages of contemporary writing on natural philosophy.

To do this, I will begin not with the references in *Paradise Lost* to Galileo and the telescope, though I will come to these later, but with a single, significant image that may not immediately appear relevant to the theme of Milton and science: the image of wings. This image is both uniquely important in *Paradise Lost* and also commonly used by writers of all intellectual stripes in seventeenth-century England to locate themselves within debates about knowledge and morality. Indeed, at the time of *Paradise Lost*’s composition and publication the idea of winged humanity---as a fantasy, a nightmare, or a practical project---functioned, alongside the fruit of knowledge itself, as a short-hand for authorial positions on the ethics of knowledge acquisition of multiple kinds. My discussion of this image will show that whilst Milton certainly had a humanist’s interest in Aristotle, a Hartlibian’s practical use for trigonometry, and a good Protestant’s distaste for the dogmatic embrace of any astronomical system, he was not a ‘scientist’ of any kind, and certainly not of the new sort. Indeed, my examination of the image of wings will also reveal in passing some of the ways in which the later proponents of Baconianism, such as Robert Hooke, departed both from Bacon himself and also from some of the more conservative members of their own community. As such, this essay is concerned not so much with the real state of the sciences during the period, but rather with the perception and rhetoric of the proto-scientific project.

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*Flight and falling: the iconography of wings in* Paradise Lost

*Paradise Lost* is a poem full of wings: the word “wing” and its cognates are used more than eighty times over the epic’s twelve books. This is hardly surprising: *Paradise Lost* is also full of angels, and angels are customarily attached to wings; some of Milton’s are blessed with a Biblical six each. Yet arguably the most significant use of the word in the poem, and the use on which this article’s argument will hinge, emphasizes not the abundant presence, but the meaningful absence, of the thing. In the moment of their fall, Adam and Eve “fancy that they feel | Divinity within them breeding wings | Wherewith to scorn the earth” (Milton, *PL* IX.1009– 11). The image perhaps strikes us with less force than it should because the “scorn” Adam and Eve begin to feel toward the earth transfers via the earlier word “fancy” into the narratorial tone. The reader in turn scorns this pretension and so brushes the image aside. Yet its appearance here is worth examining more closely, both because the traditions that inform it lean heavily toward moralized approaches to knowledge (of varying kinds), and also because Milton himself is particularly forceful about the significance of these imagined wings in ways that, as we shall see, are directly at odds with the rhetoric and aspiration of the proponents of experimentalism.

To begin with the former of these two points: in the classical tradition the image of Adam and Eve intending to “scorn the earth” with newly formed wings most powerfully recalls Icarus, who also scorned the earth, “attracted”, in Ovid’s *Metamorphoses*, “by a desire for the sky” (“caelique cupidine tractus” [VIII.224]). Icarus was then, as he is now, a byword for aspiring beyond one’s station, and for trusting too much to human ingenuity. Evoking his fate at the moment of the fall is therefore obviously appropriate, but it is also pointed in its implication of human inventiveness as well as human faithlessness in man’s original lapse. This allusion alone means that reading Milton’s Tree of Knowledge as Baconian – that is, seeing in it an interpretation of the fruit as representing merely the knowledge of good and evil (i.e. moral philosophy) rather than philosophical knowledge more broadly (i.e. natural philosophy or *scientia*) – would be difficult (see Bacon sig. A4r–v).

The ways in which these imagined wings appeal to the Protestant tradition are equally, if not more, problematic for those seeking a Baconian Milton. They particularly recall Calvin’s sermons, in which he wrote dolefully and repeatedly about the difficulty of bridging the gap between human understanding and God in terms of man’s lack of wings, and reminded his audience that faith and grace (rather than bone and feathers) were the truly necessary component. In his sermon on Paul to the Ephesians he wrote:

Must God then revele thinges in suche wise untoo us, as if wee were in such taking that wee could see nothing at all? And shall a man bee as a brute beast without discretion or iudgement? To answeare heereunto, it is true that wee have some wyt, but yit are wee blynd for all that, bycause wee be corrupted by sin. God therefore must bee fayne too give us new eyes, as I sayd afore. *And he addeth the woord* wisdome*, the better too beate downe the fond overweening that men conceyve in themselves, when they will needs flye without wings too come untoo God*. For there is not that man which woulde not bee wyse. If wee desyred trew wisdome by seeking it at Gods hand: it were a good and well ruled desire. But there are twoo faults in us: for wee will needes bee wyze after our owne conceyt.

(Calvin, [1577] 43–44)

It is difficult to exempt any category of knowledge or “wisdom” from this statement. The point is repeatedly stressed that wisdom and the means by which it is achieved must come “at Gods hand”, not “after our owne conceyt”. (The remark about mankind’s needing God to give him new eyes is of course particularly pertinent to this discussion, given some of the claims made for Milton’s interest in telescopes and microscopes). Moreover, this is just one example of the many locations in Calvin’s writings where the image of wings (and man’s lack of them) is used to suppress human “conceyt”, particularly where knowledge of some kind is at issue. It is hard to imagine that either Milton writing about the Fall and thinking of vainly imagined wings, or one of his earliest readers encountering the quoted passage in *Paradise Lost*, could have been unaware of the Calvinist moral backdrop.

Moreover there is a telling consonance between Calvin’s phrasing and that of Raphael when teaching Adam in Eden. For instance, in his sermon on Galatians, Calvin wrote: “God is … *fayne too drawe by little and little* by reason of our infirmitie, too make us too conceyve the things that otherwise are too high for us. For where are our wings too flie with above the heavens? We have much a doo to creepe heere beneath upon the earth” (Calvin, [1574] 173, my emphasis]. And on Ephesians: “He ment *too drawe them to him by little and little*, which were unable to come to him at the first dashe. For where are the wings that wee should flye above the clouds withall? But our faythe must flye up above the heavens” (Calvin, [1577] 286–87). Compare Raphael in *Paradise Lost* when he explains that all life tends toward God, “Each in their active spheres assigned, | Till body up to spirit work, *in bounds | Proportioned to each kind*’ (Milton, *PL* V.477–9, my emphasis). That “in bounds” is very carefully put; these are not “leaps and bounds” but “bounded measures,” as life is (in Calvin’s terms) “drawn” to God “by little and little” rather than “at the first dashe”, or, to return to Milton’s phrasing, “by gradual scale sublimed” (Milton, *PL* V.483). Indeed, Raphael’s “bounds | Proportioned” are implicitly contrasted with the “slight bound” with which Satan “high over leaped all bound” in order to enter Eden (Milton, *PL* IV.181).

Raphael’s promise of slow improvement is also hedged with admonishments of potential danger: it will take place only “If ye be found obedient,” and Raphael advises Adam to “enjoy | Your fill what happiness this happy state | Can comprehend, incapable of more” (Milton, *PL* V.501, 503–4). “Comprehend” here means both “contain” and “understand”, casting a further shadow over efforts to learn too much; the same word is used by Raphael again when he cautiously responds to Adam’s request for an explanation of the beginning of the world: “to recount almighty works | What words or tongue of seraph can suffice, | Or heart of man suffice to comprehend?” (Milton, *PL* VII.112 – 4) A few lines later, we see yet another use of that hedging word, “bounds,” from Raphael:

such commission from above

I have received, to answer thy desire

*Of knowledge within bounds*; beyond abstain

To ask, *nor let thine own inventions hope*

Things not revealed

(Milton, *PL* VII.118–122, my emphasis)

Again, we can see in this verse an echo of Calvin’s harsher prose: Adam must not attempt to “bee wyze after [his] owne conceyt” or his “own *inventions*” (a word to which we will return). Milton, then, may have been an Arminian on key doctrinal points, but Raphael’s teaching is traditionally Calvinist in its approach to knowledge and the means by which it is safely to be achieved. Obedience to God, not self-improvement, is the key to spiritual growth even for unfallen humanity, and attempts by Adam to “comprehend” things above his station are of particular concern. Pertinently for this discussion, it is during the same “conference” that the affable archangel eventually warns Adam away from questions of cosmology, advising him “Solicit not thy thoughts with matters hid” and “be lowly wise” (Milton, *PL* VIII.167, 173), and telling him that God will laugh at the astronomers of the future as they “build, unbuild, contrive” (Milton, *PL* VIII.81) and try to “scan” God’s secrets where they “ought | Rather admire” (Milton, *PL* VIII.74–75).

If Milton does not explicitly connect wider forms of knowledge and enquiry with the Fall, then, he certainly does not make any effort to exclude them. On the contrary, he shadows the eating of the fruit with an image that unavoidably calls to mind admonitions against intellectual (as well as moral) hubris in two of the dominant modes of thought of the period. Further, he uses the image of wings allusively to tie the moment of the Fall to Raphael’s multiple cautions against inappropriate methods of seeking knowledge. Bacon was at pains in his exegesis of the Fall to separate ethical and philosophical knowledge. Milton was not.

So much for the traditions underpinning the image of Adam and Eve fantasizing about growing wings. As forbidding, in my view, for those who would argue that Milton had Baconian sympathies are what these fancied wings have to tell us about, on the one hand, the meaning of the many other, actual wings inthe epic, and, on the other, Milton’s opinion of men who, like Adam and Eve, would literally be winged. Closer inspection of these lines reveals, as is so often the case in *Paradise Lost*, some meaningful chimes with wording elsewhere in the epic that both add meaning to the image and strengthen the opprobrium it contains. In a characteristic pairing of images we later learn that even as Adam and Eve had drunkenly imagined their wings sprouting, Sin had simultaneously experienced a kind of sympathetic delusion: “Methinks I feel new strength within me rise, | Wings growing, and dominion large | Beyond this deep” (Milton, *PL* X.243–45). Milton thus reasserts the significance of this image for understanding the nature of the Fall; Adam and Eve’s error about developing the capacity for flight is not only suggestive of their expectations that the fruit could improve them faster than the “bounds” upward prescribed by God, but also indicates that their belief in the availability of such quick fixes has itself added to the power and nature of Sin.

The phrase “scorn the earth” resonates in other, but related, ways unbecoming to Adam and Eve’s dignity. On the one hand it reminds us of Satan to whom the words “scorn” and “disdain” are consistently attracted in *Paradise Lost*, whilst on the other it recalls the birds that “summed their pens, and soaring the air sublime, | With clang *despised the ground*” (Milton, *PL* VII.421–22, my emphasis). In aspiring to be like angels or gods, Adam and Eve have merely brought themselves closer to demons and birds, agile yet mindless.

 Adam and Eve’s imagined wings are the result of what we would now call a category error, and Milton is careful to show his reader how they came to make it. According to the information the narrator gives us, the chief visible difference between the two humans and the angels they encounter prior to their fall is that the angels have wings. Milton’s description of Raphael’s wings is carefully literal, and he notes precisely and prominently that the angel appears to Adam and Eve in “his proper shape…A Seraph winged” (Milton, *PL* V.276–7). Similarly, we hear from Eve that the “angel” she sees in her dream is “one shaped and winged like one of those from Heaven | By us oft seen” (Milton, *PL* V.55–6). The humans understandably see these feathery appendages as the key ‘physical’ characteristics of their angelic visitors.

Furthermore, Raphael *seems* to indicate that wings are a vital part of getting to heaven. In the same explanation of the slow process of ontological improvement in which he explains that all life must move upward in prescribed ‘bounds’, he more explicitly advises Adam and Eve that “Your bodies may at last turn all to spirit, | Improved by tract of time, and winged ascend | Ethereal, as we” (Milton, *PL* V.496–99). Dazzled by the prospect of flight, a falling Adam and Eve seem willfully to have ignored the (abundant) fine print of “may,” “at last,” “improved by tract of time,” and indeed “turn all to spirit.” *May*, after all, is not *will*, “tract of time” implies a far longer process than the short period required to digest the forbidden fruit, and wings would not, in any case, be enough to get even unfallen man to heaven. The important part of Raphael’s suggestion is that their bodies must “turn all to spirit”. Wings alone make only birds; it is spiritual forms that make angels.

This is half of the mistake Adam and Eve make. The other half is to think that since angels *can* use their wings to get to (and from) heaven, that this must be the reason that angels have them. The reader should trace this logic to expose and understand its flaws, but he has no excuse for falling into the same error: the poem also makes it clear – clearer perhaps to its reader than to Adam and Eve – that cosmic conveyance is notwhat angels’ wings are for at all. Of course we do see angels fly in *Paradise Lost*: Abdiel, for instance, hurrying back to God to warn him of Satan’s plan, and Raphael “winnow[ing] the buxom air” “between worlds and worlds” (Milton, *PL* V.270, 268) on his way to have lunch with the humans.

Importantly, though, we also see angels getting to and from heaven by other means. Looking more carefully at Raphael, for instance, we find that he only travels part of the way to earth by use of his own wings. Once he is “within soar | Of towering eagles” (Milton, *PL* V.270–1) something rather peculiar happens: ‘to all the fowls he seems | A phoenix’ (Milton, *PL* V.271–2) until he alights ‘and to his proper shape returns | A Seraph winged’ (Milton, *PL* V.276–7). That is, for at least some of the flight between earth and heaven (and certainly any part of it during which he could theoretically be glimpsed by any of earth’s inhabitants) he uses not his own wings, but rather those of the phoenix into which he temporarily transforms. This might strike us as odd: one amongst the many meanings commonly attached to angelic wings is the signification of speed. Indeed, Milton’s Gabriel refers directly to that property when he hastily dispatches his troops to seek out demonic intruders into Eden: “with winged speed | Search through this garden” (Milton, *PL* IV.786–7), he advises Ithuriel and Zephon. And Raphael certainly seems keen to reach his destination: “Down thither prone in flight | He speeds” (Milton, *PL* V.266–7), and he winnows the air “with quick fan” (Milton, *PL* V.269). The metamorphosis as he enters the human world, then, is a puzzle; surely he does not take on the form of a phoenix solely to avoid alarming high-flying eagles?

Nor is Raphael alone in his decision not to use his wings for precisely the purpose Adam and Eve come to believe they were made – flight. Another hurrying angel we know of, Uriel, chooses not to use his wings at all in his descent from the sun, travelling instead on a sunbeam, as though it were a sort of interplanetary escalator. Joad Raymond has proposed that this is precisely because Uriel is pressed for time, and suggests that Milton might have thought a sunbeam would be quicker. Indeed, he concludes rather boldly that “[w]ings are an encumbrance, subject to obstruction through the medium through which they impel” and that “[t]he poem vividly delineates the limitations of angel speed” (Raymond 307). This is an optimistic conclusion to draw from the evidence. That “Abdiel takes a whole night to fly across heaven”, “Raphael takes a morning to fly to earth”, and “Uriel surfs the sunbeam” really only tells us that Milton conceived of his material angels as subject in some way to the laws of space and time (Raymond 307). Since the relative distances are only given either hazily or not at all, two of the angels choose to travel at least some of the way by means other than their own wings, and the other angel is of a different degree (and therefore, following Biblical sources, quite possibly has fewer wings than his more important brethren; in Ezekiel 10.21 we learn that cherubim, for instance, have only four wings), the firmest conclusion we can really draw is that Milton did not intend to commit to a coherent physics of angelic flight, or indeed of astronomical distances.

Besides, by the logic of Raymond’s reading, which requires that light is actually moving, Raphael could presumably only travel *to* earth on a sunbeam: but he takes the same route back, this time seeming to speed down the beam as though it were a slide to the setting sun (Milton, *PL* IV.589). Milton plausibly sees light as a hardening of space, capable of use as a guide, rather than a substance in motion. As a result, Raymond’s dogged research into the theories of angelic speed available to Milton, even alongside his remarks on the size and measurability of Copernican versus Ptolemeic universes, can gain no purchase. Rather, we are left, like Adam discussing the spheres, with the sense that we are dealing with “Speed, to describe whose swiftness number fails” (Milton, *PL* VIII.38). Notably Raphael advises Adam not to seek too much knowledge on questions such as this rather than rebuking him for a lack of intellectual ambition: “Heaven is for thee too high | To know what passes there; be lowly wise: | Think only what concerns thee, and thy being; | Dream not of other worlds, what creatures there | Live, in what state, condition, or degree” (Milton, *PL* VIII.172–6).

The problem of why Raphael and Uriel travel by means other than their own wings, then, clearly cannot be solved by an appeal to what Milton might have known of angelology or astronomy. It is in fact misleading to think of this as a natural philosophical problem at all. The mystery instead needs to be approached from a literary angle: what might the metaphorical or symbolic significances of these choices mean? Phrased in those terms, the question seems a good deal simpler to answer. The sunbeam and the phoenix are appropriate to each angel’s mission. Uriel is the angel who watches over the sun, and in this instance brings “light”, in the form of information, to earth. Raphael is an intercessor whose mission is to prevent the fall and thus thwart Satan, Sin and Death: that is, he is an unsuccessful precursor to the Son. As Thomas Greene long ago noted in *The Descent From Heaven*, Raphael’s phoenix is likely intended to recall “the late Latin poem *De Ave Phoenice* ascribed to Lactantius” (Greene 379). This poem (in common with others like it) was widely read as a meditation on the Resurrection; indeed, it appeared as a set text on John Colet’s curriculum for St Paul’s School (see Clark 125). Thus, as several scholars from Don Cameron Allen onwards have shown, Raphael’s phoenix “is susceptible to Christological interpretation” (Windsor 14); that is, as Raphael enters Paradise on a trip that is intended at least partly to ensure that Adam and Eve will be responsible for their own falls, he nevertheless arrives as a good omen, taking a form that prefigures the Son’s redemptive act of sacrifice.

 That Milton went to the trouble of finding such specific methods of transportation for Raphael and Uriel seems significant because he need not have done so, given that their angelic forms are by themselves symbolic in the Protestant tradition. Angels are, by their (etymological) nature, messengers; indeed, one of the glosses (tacitly resting on the well known commentary of Calvin) in the Geneva Bible on the passage of Isaiah on which Milton based his description of Raphael notes that the pair of a seraphim’s wings with which “he did flie”, “*declareth the prompt obedience of the Angels to execute Gods commaundement*” (Geneva Bible, Isaiah 6.2). Milton’s repeated use of such traditional formulae as “winged speed” indicates an acceptance of this gloss.

Elsewhere, too, Milton seems content to accept the interpretations offered in the Geneva Bible’s glosses on this passage. The angels in Milton’s heaven veil their eyes to protect them from the sight of God, recalling the Genevan gloss on Isaiah 6.2, which states that the uppermost pair of the seraphim’s six wings, with which “twaine he covered his face” “*signified that they were not able to endure the brightnesse of Gods glory*.” We also read that when Raphael arrives on earth, six wings “shade | His lineaments” (Milton, *PL* V.277–8), whilst “his feet” are “shadowed from either heel with feathered mail” (Milton, *PL* V.283–4), an allusion to the gloss on the pair of wings covering the seraphim’s feet in Isaiah, which is said to signify that “*man was not able to see the brightnes of God in them*.” Indeed, Milton’s wording here is pointedly Calvinist in a way pertinent to this article: in his commentary on this passage Calvin notes that some authorities have interpreted these lower wings as covering the seraph’s feet “lest they should touch the earth, and so get some soile from thence”, but Calvin’s own view is that

they had wings beneath to couer themselues from our sight. Now if it be so that wee can not behold so small beames of the brightnes of God which glimmereth in the Angels but we be by and by dazled; how can we behold that most excellent and bright maiestie of God which is able to swallow up our reason?

(Calvin, [1609] 65)

That is, Milton had the option in his description of these lowest wings of resisting a Calvinist reading of Isaiah that renders knowledge more rather than less suspect, but he chose instead to stress the more conservative and Calvinist interpretation. Indeed, the defensive shadow in the word “mail” strengthens this reading a little further. Raphael’s other wings are not made to seem like armour.

The broader significance of these lines is that Milton’s description of a seraph in *Paradise Lost* alludes closely enough to these glosses that we can be confident in thinking that he accepted the idea of angelic wings as charged with theological metaphor rather than merely existing for locomotive purposes. Milton wants his reader to notice, even if Adam and Eve do not, that the reason angels can get to heaven is not simply that they have wings, but because the ‘prompt obedience of the Angels to execute Gods commaundment’, as signified by their wings, fits them to be there.

 One final piece of evidence for this argument is that the fallen angels clearly *do* employ their wings primarily for flight, and correspondingly interpret their physical capacities and experiences in solely physical and literal (rather than moral and figurative) terms. Moloch, for instance, recalls that flying downwards toward Hell was particularly difficult, and reasons that this means the relative ease of flying upwards should give them a fresh advantage over the defending forces of Heaven:

 in our proper motion we ascend

 Up to our native seat; descent and fall

 To us is adverse. Who but felt of late,

 When the fierce foe hung on our broken rear

 Insulting, and pursued us through the deep,

 With what compulsion and laborious flight

 We sunk thus low? The ascent is easy then

 (Milton, *PL* II.75–81)

This is one of many plays on what William Poole has recently described as “the most famous of all Virgilian spatial moralisms…the descent to Hell is easy…but to climb back up, and to escape to the upper air, that is the difficulty, that the labour” (Poole, [2017] 256). Here, Moloch reasons that since falling was hard for them, he and the other fallen angels will naturally find it easy to rise. The reader, though, recognizes Moloch’s mistake, both because the Virgilian allusion functions as a reminder of the moral dimension to falling and rising that Moloch has forgotten, and also because he will shortly hear the similarity between this phrasing and that of Moloch’s colleague, Belial, who speaks of “preferring | Hard liberty before the easy yoke | Of servile pomp” (Milton, *PL* II.255–7). Falling is only difficult for the demons because disobedience to God is harder (for an angel) than obedience, and to fall is an act of disobedience. That Moloch recalls this downward flight as laborious has nothing to do with physics, or Raphael could not “speed” “down thither prone in flight” in Book V with such apparent ease.

Moloch is not alone in misjudging the meaning of his wings and his experience of flight; it is an error common to all the fallen angels, and this in turn has a thickening effect on the wings themselves. Where Raphael’s are feathery and waft forth fragrances, the demons’ wings are insectile. As they hurry into Pandaemonium “the spacious hall … Thick swarmed, both on the ground and in the air, | Brushed with the hiss of rustling wings” (Milton, *PL* I.762, 767–8). Do Raphael’s wings make any such suspiciously snaky sound as he flies? Do the angels in heaven appear to “swarm”? One imagines not. This thickening worsens as the wings are (mis)used; in Book II, as he leaves Hell to fly through Chaos, Satan finds that he must go “half on foot, | Half flying; behooves him now both oar and sail” (Milton, *PL* II.941 – 942). That pun on “behooves” is hardly flattering, calling to mind something cloven-footed and bestial, and “oar and sail” are arguably worse. Satan is no longer like an angel or a man, but a beast or a boat. Pressing the point still further, Milton goes on to liken Satan to the Argo when she “passed | Through Bosporus, betwixt the jostling rocks” (Milton, *PL* II.1017–1018): he is not the hero, but the cumbersome ship itself. That image, especially so shortly after the sight of him falling with “fluttering pennons vain” (Milton, *PL* II.933) into the depths of a vacuum, calls to mind the same moment in Ovid’s *Metamorphoses* as does the winged delusion of Adam and Eve’s fall: the fall of Icarus. Icarus too plummets, and he too has (or rather had) wings that bore comparison with oars (“nūdōs quatit ille lacertōs, | rēmigiōque carēns non ullās percipit aurās" [VIII.227–8). The fallen angel is many things in his flying, flapping, rowing use of his wings, but he is no longer angelic.

The centrality of Adam and Eve’s fantasy of growing wings to the moment of the fall thus becomes clearer the further one traces the use and meaning of the image of wings through the poem. Milton’s emphasis on this as a signifier of Adam and Eve’s misunderstanding also becomes increasingly legible: it is in part a misreading of a moral symbol as physical apparatus – repeated by modern critics – and in part a mistake about the possibility of self-sufficiency (rather than reliance on God-given grace) in reaching Heaven. (As a side note, this reminds us that Milton, in common with other “Arminians,” still shared much common ethical ground with traditional Calvinism.) We have also seen that these readings are best achieved from a poetic perspective, and that, so far from illuminating the meaning of the text, attempts to map “scientific” ideas about, say, the speed of angelic flight versus the speed of light onto the behavior of angels’ wings in the poem may risk collapsing into the same literalist errors made by Adam, Eve, and Satan. However, to understand the larger difficulties this image presents for those seeking to present a Milton who is “actively engaged in debates with his fellow scientists and philosophers”, we need to set this image within its wider Miltonic and cultural contexts.

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*Daedalus versus Icarus: same story, different meanings*

What, then, does Milton appear to think of the idea of wings, and winged men, elsewhere in his writing? And can it tell us anything about how he might view experimentalist science or, in Picciotto’s formulation, “prostheses” designed to overcome human physical limitations? Fortuitously, the *History of Britain*, probably researched and written partly before and partly alongside *Paradise Lost*,includes two stories that link disastrous attempts at human flight with over-ambitious and experimentalist efforts to gain knowledge. First we hear of the Galfredian King Lear’s father, Bladud, fabled founder of universities, who, Milton tells us, “was a man of great invention, and taught Necromancie: till having made him Wings to fly, he fell down upon the Temple of *Apollo* in *Trinovant*, and so dy’d after twenty years Reigne” (Milton, *YP* 5.21). If not for the mention of “necromancie” we might think this was a at least a neutral beginning, but if we look for other instances of this dark art in Milton’s work we are confronted with the villainous Comus, described as a “necromancer” in Milton’s masque (Milton, *SP* l.649). With that in mind, Milton’s bald statement that the production of the wings leads immediately to Bladud’s death sounds like an implicit judgment on the hubris of making them. Milton confirms an Icarian myth for England.

Later in the *History*, too, Milton gives us Elmer, the Flying Monk of Malmsbury, of whom he had read in William of Malmsbury. Milton introduces this story by way of discussing fortune-telling and omens in the sky; he says that when “a blazing Star…was seen to stream terribly, not only over England, but other parts of the World”, the “great Changes approaching” were “plainliest prognosticated by Elmer.” This sounds quite admiring. But he adds a scornful caveat.

[Elmer] could not foresee, when time was, the breaking of his own Legs for soaring too high. He in his youth strangely aspiring, had made and fitted wings to his Hands and Feet, with these on the top of a Tower, spread out to gather Air, he flew more then a Furlong, but the Wind being too high, came fluttering down, to the maiming of all his Limbs; yet so conceited of his Art, that he attributed the cause of his fall to the want of a Tail, as birds have, which he forgot to make to his hinder parts. This story, though seeming otherwise too light in the midst of a sad Narration, yet for the strangeness therof, I thought worthy enough the placing as I found it plac’d in my author.

(Milton, *YP* V.394–95)

Milton’s half-ironic explanation of his inclusion of the story – one he rather brutally calls “light in the midst of a sad Narration” in spite of its grim tale of maiming – only draws attention to the role it actually plays, which is to condemn this astrologer-monk for “strangely aspiring”, and not only in the matter of his disastrous attempt at flight. The maimed monk’s “prognostications”, Milton implies, are about as useful as his wings; the phrase “could not foresee, when time was, the breaking of his own Legs” is thick with the “satyricall witt” the biographer Aubrey mentioned as characteristic of Milton (Aubrey 2.67, 69). Similarly, the grim levity of the phrase “came fluttering down, to the maiming of all his Limbs” permits a reading of the account as frankly vindictive, particularly when we realize this represents an embroidering on his source. To quote French Fogle’s uneasy footnote in the Yale Prose edition of the *History*, “Malmesbury tells, without any apparent humor, of Eilmer’s attempt at flight and the breaking of his legs, but Milton cannot include the episode without wry comments on the uncertainty of the monk’s powers of prognostication and on Eilmer’s conviction that it was only the want of a tail that brought his downfall” (Milton, *YP* V.395, n.2). Finally, that helpless “fluttering” and the strange “aspiring” of Elmer both evoke, yet again, Milton’s Satan. As we saw above, he too sometimes “flutters” as he falls, whilst the verb “to aspire” is used fifteen times in *Paradise Lost*, almost always either about Satan, or by Satan as he talks about the possible falls of others. This, for Milton, is the language of moral disgust. Milton’s inclusion of Elmer’s story, then, looks like an attack on the morality of knowledge in more ways than one: first, it implies that fortune telling – attempting to see before time and by illicit means, into God’s plan – is deservedly doomed to failure.[[1]](#footnote-1) Secondly, it assumes that flight is impossible for even the most ingenious of men, and posits that arrogantly believing otherwise can only lead to catastrophe.

This is evidently not a Milton warmly in favour of experimental aspiration or the arrogance of cosmological assertion. He is thus very hard to square with modern critical trends that seek to find in *Paradise Lost* an endorsement of the emerging disciplines of the modern sciences.In this light, Adam and Eve’s fantasies about wings, and Sin’s concurrent feeling that she too is becoming winged, suggest a quite full-throated condemnation of the more extreme forms of scientific confidence. Bearing this in mind, and in spite of the careful arguments made byKaren Edwards to the contrary, it is hard to see how Eve’s realization that her fall was a “sad experiment” (Milton, *PL* X.948), or her urging Adam “On my experience…freely taste” (Milton, *PL* IX.988) can be read as a positive or even as a neutral comment on experimentalist approaches. Whilst, as Edwards notes, Satan has lied about the fruit, and thus “abused the potential of the new experimental philosophy for instilling wisdom,” (Edwards 18) Eve has not. She may have been mistaken about its effects, but so might any experimenter if overcome with optimistic enthusiasm for what Raphael might refer to as his or her ‘own inventions’.

Turning to the broader cultural context in which Milton wrote makes things no easier. Indeed, his unease with experimental science seems likelier still when one looks at both the figurative and the literal mention of wings by other writers during this period. For an example that chimes strikingly with *Paradise Lost* we might take the prominent Cambridge scholar Ralph Cudworth. In a famous sermon preached before the House of Commons in 1647, Cudworth remarked that “we have much enquiry concerning knowledge in these latter times. The sonnes of Adam are now as busie as ever himself was, about the *Tree of Knowledge* of good and evil, shaking the boughs of it, and scrambling for the fruit” (Cudworth 90). He expresses his disapproval further using a series of extended metaphors in which he makes striking use of the image of wings: “if at our first flight we aime so high, we shall happily but scorch our wings, and be struck back with lightning” (Cudworth 94). (That “happily” makes, of course, for a dark pun on a par with Milton’s levity about maiming.) Cudworth goes on, in what we can now hear as conventionally Calvinist tones,

it is a piece of that corruption that runneth through humane nature, that we naturally prize Truth, more than Goodnesse; Knowledge, more than Holinesse. We think it a gallant thing to be fluttering up to Heaven with our wings of Knowledge and Speculation, whereas the highest mystery of a Divine life here, and of perfect Happinesse hereafter, consisteth in nothing but mere Obedience to the Divine Will.

(One can almost hear Milton’s narrator bidding the as yet unfallen Adam and Eve “know to know no more” [Milton, *PL* IV.773]). Cudworth drove the point home:

It was by reason of this *Self-will*, that Adam fell in Paradise; that these glorious Angels, these *Morning-starres*, kept not their first station, but dropt down from heaven like Falling Starres, and sunk into this condition of bitternesse, anxiety, and wretchednesse in which they now are. They all intangled themselves with the length of their own wings.

(Cudworth 98–99)

Cudworth was not referring solely or specifically to scientific knowledge; his anxieties concerned in particular the impropriety of “peeping into those hidden Records of Eternity, to see whether our names be written there in golden characters” (Cudworth 95). Like Milton on Elmer (and Satan), though, he uses that disparaging word, “fluttering”. Like Milton, the problem Cudworth uses wings to express is that of men trying to get to heaven by their own means and in their own time, rather than God’s. Both were likely influenced by the Calvinist rhetoric quoted earlier in this article. Nor was Cudworth a fringe figure. He remained in favour with the Cromwellian regime, and would, during the Interregnum, be consulted by John Thurloe on, amongst other things, university appointments. This does not mean, of course, that Milton was thinking specifically of Cudworth when he wrote either *Paradise Lost* or the *History* – though we might be tempted to see in these lines a source for Milton’s description of Hephaestus’s fall from heaven, “Dropt from the zenith like a falling star” (Milton, *PL* I.745) – but it reminds us usefully that he and his early readers would have been sensitive to the significance of ambitions toward flight in the context of knowledge and learning.

Moreover, Milton was writing *Paradise Lost* and probably the *History of Britain* at a time at which other ideas about learning were becoming increasingly available, and during which these new ideas were often discussed in the same figurative terms. Sometimes experimentalist texts even involved real plans to make men fly, with hopes of greater success than that experienced by Elmer. These were the years during which the men who would become early Fellows of the Royal Society, John Wilkins and Robert Hooke, were discussing the possibility of making flying machines and recording privately (at least in Hooke’s case) early experimental successes.[[2]](#footnote-2)

By 1664, Henry Power, another early Fellow of the Royal Society, was cheerfully re-deploying, but to opposite moral effect, precisely the imagery Cudworth had used in his sermon, and that Milton would use in *Paradise Lost*. Glancing admiringly back to the Baconian defense of science as a form of knowledge excluded from the purview of the forbidden fruit, he complains that by Catholic dogma and other “hindrances to the advancement of Learning” some men “have not onely stifled the blossoming of the Tree of Knowledge in themselves, but also have nipp’d the very Buds and Sproutings of it in others”.[[3]](#footnote-3) He goes on, “Had the winged Souls of our modern Hero’s been lime twig’d with such ignoble conceptions as these, they had never flown up to those rare inventions with which they have so enrich’d our latter dayes” (Power 190).

Again, I do not suggest that Milton read or was responding to this book in particular, but simply to observe that such figurative language and imagery as Milton and Cudworth used in automatically admonitory terms were, even at the time Milton was preparing *Paradise Lost*, being appropriated by certain prominent experimentalists (and sympathetic poets, such as Abraham Cowley) to express a very different, and indeed a provocatively subversive, view of knowledge and learning. There was, in other words, a debate about modes of acquiring knowledge taking place at the level of metaphor during this period, and Milton does not appear to have been on what we would now consider the ‘progressive’ side of that debate. Indeed, if Cudworth and Milton both made their appeals to the cautionary example of Icarus, the scientists increasingly claimed Daedalus as their hero, and none more enthusiastically than John Wilkins, Robert Hooke’s mentor and Oliver Cromwell’s brother-in-law. He would go so far as to give the title “Daedalus” to one of the sections of his 1648 book, *Mathematicall Magick*.

Wilkins’s writing, too, is directly comparable in its subject matter with *Paradise Lost* as Grant McColley noted as long ago as 1937, and though I would not go so far as to agree with McColley that Wilkins’s writing should be considered a secure source for *Paradise Lost*, Milton must surely have known of it (McColley 728–62). Wilkins, after all, was the pre-eminent apologist for the “new science”, and he, like Milton, had rooms in Whitehall during the interregnum. Milton would at the very least have heard talk of Wilkins’s interests, and it is perfectly possible that the two men met and conversed.

In his *Discourse concerning a new world & another planet*, published in 1640, a revision of a 1638 work, Wilkins wrote that “there may be many other species of creatures beside those that are already knowne in the world; there is a great chasme betwixt the nature of men and Angels; it may bee the inhabitants of the Planets are of a middle nature between both these” (Wilkins, [1640] 190). The similarity between this view and that advanced by Milton’s narrator in *Paradise Lost* on the same subject looks startling:

Not in the neighbouring moon as some have dreamed;

Those argent fields more likely habitants,

Translated Saints, or middle Spirits hold

Betwixt the angelical and human kind.

(Milton, *PL* III.459–2)

Wilkins, though, is quite in earnest. Milton’s narrator, on the other hand, is in the midst of a tonally difficult passage often seen as more interested in satirizing Catholic expectations of the afterlife than in advancing serious theories about lunar life. Those “more likely” Wilkinsian “habitants” are not therefore probable in Milton’s eyes; their presence is only *less* improbable than the Limbo of Vanities envisaged by Ariosto in *Orlando Furioso* (34. 70 – 73).[[4]](#footnote-4) This may well be a case of laughingly comparing absurdities rather than endorsing any one proposition. Besides, we have already in this article seen Raphael cautioning Adam “Dream not of other worlds, what creatures there | Live, in what state, condition, or degree” (Milton, *Paradise Lost* VIII.172–6). Elsewhere, too, Milton’s and Wilkins’s views are widely divergent. Milton’s epic, as we have seen, concludes that one’s body must be turned to spirit before flight might be possible, and his *History of Britain* roundly mocks (indeed condemns) the idea of mechanical flight. Wilkins, by contrast, devotes considerable space in his later book, *Mathematicall Magick*, to the question of “what meanes there may be conjectured, for our ascending beyond the sphere of the earths magneticall vigor” to make a visit to these other beings’ and artificial wings are his first suggestion:

Tis not perhaps impossible that a man may be able to flye, by the application of wings to his owne body; As Angels are pictured, as *Mercury* and *Daedalus* are fained, and as hath bin attempted by divers, particularly by a Turke in Constantinople, as *Busbequius* relates.

(Wilkins, [1648] 237–8)

Wilkins was, like Milton in his *History of Britain*, interested in historical accounts of attempts to fly, and he recorded several of them, including that of the unfortunate Elmer of Malmsbury: “’Tis related of a certaine English Munk called *Elmerus*, about the Confessors time, that he did by such wings fly from a Tower above a furlong”. Where Milton dwelt gleefully upon poor Elmer’s maimed limbs, and scoffed at his theories about the addition of a tail, Wilkins remarked with rather more humanity and optimism:

Though the truth is, most of these Artists did unfortunately miscarry by falling down and breaking their arms or legs, yet that may be imputed to their want of experience… Those things that seem very difficult and fearfull at the first, may grow very facil after frequent triall and exercise.

(Wilkins, [1648] 204)

Wilkins, then, thought that it was not only possible that men should learn to fly, but that it was desirable for them to do so. Again, it is hard to imagine that the Milton this article has described would react to such claims with anything other than derision. This becomes clearer still if we follow Wilkins’s logic through to its inevitable, ambitious conclusion. If a species of creature part way between men and angels lives on the moon, and if mankind were able to create wings and go to visit them, would men not, to all intents and purposes, be part way between men and angels, ontologically as well as spatially? And if so, what would stop man from flying all the way to Heaven, if he so wished? How would he then be different from an angel? Adam and Eve’s delusion in *Paradise Lost* was Wilkins’s real ambition in 1648.

 Wilkins was by no means alone in voicing such thoughts. Probably the greatest proponent of the idea that flight should, some day soon, be available to mankind was Robert Hooke. Whilst Wilkins’s *Mathematicall Magick* had still an excitedly hypothetical tone, Hooke’s writing treats the issue of human flight as a tricky but entirely soluble engineering problem. In the Preface to *Micrographia* (1665) he wrote:

The way of *flying* in the Air seems principally unpracticable, by reason of the *want of strength* in *humane muscles*; if therefore that could be suppli’d, it were, I think, easie to make twenty contrivances to perform the office of *Wings*: what attempts also I have made for the supplying that Defect, and my successes therein, which, I think, are wholly new, and not inconsiderable, I shall in another place relate.

(Hooke, [1665] sig. d1v)

Not only does Hooke take Wilkins’s largely theoretical discussion into confidently practical territory, he also boasts about the ease with which this new technology could be accomplished with just a few additional advances. Hooke, one suspects, would see nothing strange or humorous at all in Elmer’s pondering on the aerodynamic deficiency of his tail even in the wake of his own maiming.

Elsewhere in the same text Hooke wrote more metaphorically, but no less ambitiously of wings:

it seems to me, that the Intellect of man is like his body, destitute of wings, and cannot move from a lower to a higher and more sublime station of knowledge, otherwise then step by step…But if the ascent be high, difficult and above its reach, it must have recourse to a *novum organum,* some new engine and contrivance, some new kind of *Algebra,* or *Analytick Art* before it can surmount it.

(Hooke, [1665] 93)

Hooke’s language here might have unnerved Milton, or indeed his Raphael. This, clearly, is not a man prepared to move “step by step”, or, in Raphael’s terms “in bounds proportioned”. Rather, he will find “some new kind of *Algebra*, or *Analytick Art*,” to attach wings to his mind as well as to his body. He would cheerfully be “wyze after [his] owne conceyt” and “let [his] own inventions hope/ Things not revealed.” Perhaps more alarmingly still, whilst the issue of progress and flight were still in some sense moral concerns for John Wilkins (meeting half-angels is part of his goal, for instance), for Hooke the question of morality, and indeed of God, does not arise. The essential moral underpinning for Milton had simply ceased to exist for Hooke who sees only technological problems, and seeks only technological solutions.[[5]](#footnote-5)

 Nor was Hooke the most outlandish character giving voice to such thoughts. The Anglican clergyman Joseph Glanvill, a fringe figure influenced by Henry More and Origen, with a notably unrequited interest in the Royal Society, wrote in his *Vanity of Dogmatizing* (1661) that

It be may some Ages hence, a voyage to the *Southern* unknown *Tracts*, yea possibly the *Moon*, will not be more strange then one to *America*. To them, that come after us, it may be as ordinary to buy a *pair* of *wings* to fly into remotest *Regions*; as now a pair of *Boots* to ride a *Iourney*.

(Glanvill 181–82)

Glanvill, who (perhaps uniquely) typified the Baconian experimentalist as it has been outlined by Joanna Picciotto, is a useful comparison with Milton. He – unlike Milton – demonstrably imagined Adam as a perfect experimentalist whose “natural Opticks (if conjecture may have credit) shew’d him much of the Coelestial magnificence and bravery without a *Galilaeo*’s tube” (Glanvill 5). As a result, he was apt to fantasize about regaining the abilities of an unfallen man through the use of Picciotto’s “prostheses”, whether wings or a “Galileo’s tube”. For Glanvill the degeneration experienced by man at the fall was intellectual as much as it was moral: amidst his optimistic predictions of cobblers selling pairs of wings alongside travelling boots, Glanvill’s book also includes the sorrowful remark that

whereas our ennobled understanding could once take the wings of the morning, to visit the world above us, and had a gloriest display of the highest form of created excellencies, it now lies groveling in this lower region, muffled up in mists, and darkness: the curse of the Serpent is fallen upon *degenerated humanity*.

(Glanvill 12)

Glanvill’s Adam was equipped with a mind and eyes powerful enough to penetrate “the world above us”; Milton’s has, so far as we can tell, physical faculties not vastly different from fallen man’s, and broadly comparable intellectual capacities. Whilst Milton’s Adam and Eve clearly experience mental fogging and fractured thought in the aftermath of the fall, this appears to be conceived of in far more traditional humanistic terms. They are not less intelligent afterwards so much as less reasonable. For Glanvill – again, quite unlike Milton – the chief loss experienced by fallen man appears not to be his relationship with God, but his superhuman faculties. Indeed, Glanvill himself is not unlike Milton’s falling Adam and Eve, except that he looks vainly back to a better state, complete with “wings of the morning”, whilst Milton’s Adam and Eve look vainly forward to their own winged bodies and understandings.

Since he conceives of the “curse of the Serpent” as a physical and intellectual one, Glanvill’s view is that this loss can be partly repaired by (and in) such “heroes” as “*Cartes*, *Gassendus*, *Galilaeo*, *Tycho*, *Harvey*, *More*, *Digby*”; these “generous Vertuoso’s…dwell in an higher Region than other mortals; should make a middle species between the *Platonical Θεοι* …and *common Humanity*” (Glanvill 239–40). Wilkins imagined mankind generally being able to progress, artificially winged, toward “intermediary” beings; Hooke thought only in terms of what might be scientifically possible; but Glanvill imagined an intellectual (rather than spiritual) elect dodging some of the consequences of the fall and equipping themselves and others with enhancements to ameliorate its other effects. He does not go quite so far as to say this elite would become like angels, but he offers the suggestive parallel that they differ from other men “as much as *Angels* from *unbodyed Souls*” (Glanvill 100). It is hard to imagine a position more clearly distinct, whether in its theology or its approach to artificially enhanced fallen humans, from Milton’s own.

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*‘God therefore must bee fayne too give us new eyes’*

These, then, were the men who publicized the new scientific community in England as Milton wrote and published *Paradise Lost*; this was their rhetoric, and these their aims. A comparison of Milton’s writing with theirs, if conducted with a literary critical rather than purely historical eye, shows us that his views and their views on the purpose and methods of expanding human knowledge were widely divergent. What, though, of his explicit engagements with new technologies? The reader will have noticed that two of the works quoted above – Hooke’s *Micrographia* and Henry Power’s *Experimental philosophy* – explore one of the hot natural philosophical topics of the 1660s and earlier decades, the new perspective on the world achievable through a microscope. There is no biographical evidence for what Milton thought of these developments, but the word “microscope”, if not exactly the instrument itself, makes an appearance in *Paradise Regained* (1673), and it is quite revealing:

Many a fair edifice besides, more like

Houses of gods (so well I have disposed

My airy microscope) thou mayst behold

Outside and inside both

 (in Milton, *SP* IV.55–8).[[6]](#footnote-6)

The first point to make is that we ought not to get too excited simply about Milton’s name-dropping of the microscope. Though two significant texts had recently been published by Royal Society Fellows on the subject, microscopy had by this time been quite widely talked and written about for decades, including amongst the Hartlib circle.[[7]](#footnote-7) These lines do not constitute evidence of specific interest in the Royal Society or its activities, but a general allusion to a technology now two generations old.

The second point I want to address is that these lines are spoken by Satan as he tempts Jesus with the glittering prospect of Rome, and this raises two questions. Why does Milton equip Satan, of all characters, with a contemporary technology for his temptation, and why does Satan appear a little hazy on the actual function of microscopes? For this “microscope” is used to look *inside* things, like a pair of x-ray goggles, and to inspect distant objects closely, rather than to magnify the surfaces of things near at hand. That is, Satan really has a sort of enhanced telescope. How much of this is mistake and how much poetic licence, and how much of either is Milton’s or Satan’s, is not obvious. What we can be sure of is that Milton knew that the device he had given to his Satan had a telescopic function because several lines earlier the narrator describes it thus:

Porches and theatres, baths, aqueducts,

Statues and trophies, and triumphal arcs,

Gardens and groves presented to his eyes,

Above the height of mountains interposed:

By what strange parallax or optic skill

Of vision multiplied through air, or glass

Of telescope, were curious to enquire

(in Milton, *SP* IV.37–42)

Whilst these lines show us a somewhat technologically informed (and interested) Milton in the sense that he chooses the right term for the basic function of this apparatus, they also reveal a Milton who has added a curiously periscopic capacity to the telescope-microscope his Satan wields. His phrasing indicates that he believed “glass of telescope” really could enable the viewer to look at gardens over the tops of mountains, so it is entirely possible that he thought it might also permit the viewer to see inside houses.

 This expansive view of what could be achieved with lenses matters, first because it indicates that Milton thought the application of such things might be decidedly sinister (spying into private homes) and secondly because it suggests that he either had a less than perfect understanding of what telescopes and microscopes could do, or that he cared little enough about the precise physical function of these objects that he made them do whatever he deemed necessary for his poem. Had he wanted to be precise and accurate in his description of modern technologies he could surely have done so; though he was completely blind by the time Power and Hooke published their texts on microscopy, he could have had them read to him had he been sufficiently interested, and, as I noted above, there had been plenty of discussion of microscopes as well as telescopes before he lost his sight. There were also people close to him who could, and probably did, talk to him about such objects: for instance, Milton’s nephew, Edward Phillips, offered a brief but quite correct description of microscopes in his 1658 *New World of English Words*, where he defined the word “microscope” as “a certain instrument whereby the full proportion of the smallest things may be discerned”. Probably, then, Milton simply prioritized poetic effect over technological accuracy.

 Whether a keen follower of the new science would have been so cavalier about his description of the emerging discipline’s instruments is questionable but whilst this point casts doubt on the depth of his interest, it does not necessarily tell us anything about his approval (or otherwise). What might, though, is that this ‘airy microscope’ (or telescope) is placed by Milton into the hands of Satan. Worse still, it is one of the instruments of Satan’s temptation of Jesus. Perhaps the mildest available reading of these lines is that Milton’s Satan is using technological language to lend legitimacy to what Milton’s contemporaries would have called “juggling” or sorcery. We might compare Thomas Cooper’s remarks in his *Sathan transformed into an angell of light* (1622), a text whose longer title promises a discussion of the “*doctrine of witchcraft, and such sleights of Satan, as are incident thereunto*.” Cooper enumerates the ways in which “strange Feats are performed, not by reall charmes, but onely by deluding of the eye, and some extraordinary sleight”, including “Altring the Aire whereby the obiect is conueyed to the eye” (Cooper 172). Certainly this sounds like an “airy microscope”. Tellingly, Cooper further notes that “juggling is not by opticke skill”. He goes on, “for howsoeuer some strange things may bee done by bodily sleights and by Opticke Arts, yet these are kept within the compasse of nature” (Cooper 172). By Cooper’s logic, if Satan were able to pass off his “juggling” as merely “optic skill”, it might not be trustworthy, but it would not, at least, be actually diabolical.

 Were this a secure reading, though, one would expect the narrator to point up the occult quality of this visual phenomenon so as to impress upon the reader Satan’s attempt to smuggle in magic under the guise of technology. Not so: the explanations his narrator offers are ostensibly natural, though with unsettling undercurrents. The word ‘parallax’ has, and had, a perfectly respectable mathematical sense which could theoretically apply here: “Difference or change in the apparent position or direction of an object as seen from two different points” (*OED*). Yet it could also mean “Distortion; the fact of seeing wrongly or in a distorted way” (*OED*), as in Samuel Daniel’s *Musophilus*:‘Undeceived with the Paralax | Of a mistaking eye of passion” (quoted in *OED*). “Optic skill”, meanwhile, has a faintly disreputable ring, rejecting as it does the higher-brow “optic arts” for the more questionable, tradesmanly “skill” – as perhaps in Cooper’s comments, above – but it nevertheless suggests a mechanical rather than a magical explanation.

Indeed, the closest parallel I have found for Milton’s use of the term is in Thomas Storer’s 1599 poem *The Life and Death of Thomas Wolsey*, in which it describes, in somewhat doubtful terms, users of telescopes:

 Yea they, whose opticke skill redoubles light,

And teaches men how they may see too farre,

That Art which bids Natures poore eies good night,

Gazed vpon the shewes of painted warre,

Or on an arras-wouen blazing starre:

Where Art with Nature curiously did strive,

In busie works of shadowes prospectiue:

(Storer sig. H1r)

“[T]eaches men how they may see too farre” and “bids Natures poore eies good night” are not straightforwardly approving remarks, even spoken by the notorious over-reacher Cardinal Wolsey (or, in this case, his ghost). Further, this complex passage, which describes the ways in which Wolsey *seemed* rather than *was* holy, has its users of telescopes gazing not on real battles but on painted ones, and on woven rather than real stars. Artificially enhanced eyesight is untrustworthy as well as arrogant.

 Milton, then, is here not at pains to distinguish between Satanic illusions and the visual effects achieved through technology. If anything, he seems to blur them: from the narrator’s point of view, there appears to be no discernible difference, moral or experiential, between a devilish trick of the air and a tricky use of a lens. Indeed, the narrator’s suggestion that Satan might have achieved his effects by means of “glass of telescope” goes further and makes Satan the pre-inventor of this equipment. We have seen Milton palm off morally dubious technologies onto Satan before, of course: in *Paradise Lost* Satan builds the first cannons to give his armies an advantage in the war in heaven. Not only are lenses here made demonic tools of temptation, then, but they appear to be placed in the same category as those other “implements of mischief” (Milton, *PL* VI.488), the use of which amongst men is, according to Raphael, “inspired | With devilish machination…to plague the sons of men’ (Milton, *PL* VI.504–5). There is little evidence here for any enthusiasm for lens technologies or experimentalism.

The language in which Milton describes the reaction of Satan’s colleagues to the cannons is also significant: “The invention all admired, and each, how he | To be the inventor missed” (Milton, *PL* VI.498–9). The same word is used again soon after: “Eternal Might | To match with their inventions they presumed | So easy” (Milton, *PL* VI.630–32). In fact, the word “invent” sticks glue-like to the cannons: Nisroch seeks one who “can invent | With what more forcible we may offend | Or yet unwounded enemies” (Milton, *PL* VI.464–66) and Satan replies “Not uninvented that” (Milton, *PL* VI.470). Elsewhere, in Michael’s future-history lesson for Adam, we hear that Cain’s descendants are “studious…Of arts that polish life, inventers rare; | Unmindful of their Maker” (Milton, *PL* XI.609–11). And of course, as we saw earlier, Raphael bids Adam “nor let thine own inventions hope | Things not revealed” (Milton, *PL* VII.121–22). In the early modern period the words ‘invent’ and ‘invention’ did not always bear the modern meaning, but in *Paradise Lost* they do, and they are not used with approval.

The question remains whether we might at least make a firm distinction between, say, astronomers such as Galileo (in whom Milton was at least passingly interested, clearly) and experimentalists such as Wilkins, Hooke, and their medieval precursor, Elmer? From Milton’s point of view, one suspects not. After all, if Milton effectively dismissed the microscope as a devilish instrument in *Paradise Regained*, ‘glass of telescope’ was implicated too. Further, he was by no means enthusiastic about the Galilean telescope in *Paradise Lost*. There, too, technology is brought into close contact with Satan as Milton compares the devil’s shield with 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.

(Milton, *PL* I.287–291)

The description, like most of Satan in these early books of *Paradise Lost*, is only superficially flattering. The allusion is primarily to Homer’s comparison of Achilles’s shield with the moon, but as Fowler notes, “there the comparison is one of brightness, not of size” (in Milton, *PL* I.286 – 91n). In fact we could read Milton’s description as supplying a much more direct comparison with the target of his allusion. Rather than emphasizing the silvery brightness of Satan’s shield, Milton’s comparison implies that it is pitted, rough, and distorted. The point of the simile is not that the telescope is a wonderful instrument, but that Satan’s shield is a mess. As A. D. Nuttall wrote, the word “spotty” is a “shock-word…low, almost brutal,” and its contrast with both its subject (the moon) and airier terms (such as “circumference”) in the same description draws our attention to Satan’s own “leprous-luminous” condition (Nuttall 78). Homer’s poetry and Milton’s poetic device are as important to our understanding of this moment in the text as Galileo’s observations. We might also see an implied similarity between the “Tuscan artist” who ignores the beauties of Italian hilltop towns and river valleys (Fesole and Valdarno) fancifully to pick out “rivers or mountains” in the moon with a Satan who turns away from the glory of God vainly to descry equivalent glories in himself; or, even more closely, Adam and Eve when they learn to “scorn the earth” (and even Paradise) for the vague, unsubstantiated promise of new, celestial climes. As Adam himself acknowledges in Book VIII, “to know | That which before us lies in daily life, | Is the prime wisdom, what is more is fume, | Or emptiness, or fond impertinence” (Milton, *PL* VIII.188 – 95).

 This admonitory second reading seems more likely still when we consider the second mention of the telescope in the poem. There, “the glass | Of Galileo” (Milton, we might note avoids the technical term ‘telescope’ in his first epic) is “less assured” than the angel Raphael’s eyesight when it “observes | *Imagined* lands and regions in the moon” (Milton, *PL* V.261–263, my emphasis).[[8]](#footnote-8) That phrasing, “observes imagined lands’, is wonderfully shifty and deflating of astronomical ambitions; it is not the *glass* that has helped the stargazer to see ‘lands and regions’, but only his imagination. In other words, the glass has got him no closer to an understanding of the moon’s real character than his own eyes, and has possibly led him into fresh errors of the imagination. Indeed, this was precisely the objection leveled at lens technologies by Margaret Cavendish in her 1666 *Observations*: how could the user of a telescope ever be sure of the accuracy of the image he seemed to see?

At any rate, these references to the telescope characterize it as, at best, a curiosity that may sometimes reveal ugliness in beautiful things, and at worst an instrument that encourages vain misapprehensions about the other possible worlds in God’s creation whilst distracting the user from the one mankind has been given. What matters most, perhaps, is that all three of the ‘technologies’ here discussed – artificial wings, microscopes, and telescopes – are designed by men who presume to augment the form given to humanity by God. This is why the comparison of the telescope with Raphael’s eyes is important: angelic forms are designed for long-distance vision, just as they are designed for flight. The forms of men are not designed, or intended, for either.

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*Conclusion*

I will volunteer one final piece of evidence that suggests that Milton’s early readers would probably have understood the references to wings in *Paradise Lost* in precisely way I have described, and that some, even within the emerging scientific community, would have been sympathetic to his position. In 1692, Richard Bentley, who would later win for himself the everlasting opprobrium of generations of scholars of Milton for his attempts to emend *Paradise Lost*, gave the first series of Boyle lectures against atheism. Like Boyle himself, and his correspondent Sir Isaac Newton, Bentley was a man of religion (later regius professor of divinity, no less). However, he (like Milton) was by no means opposed to the mathematical branch of scientific enquiry then known as geometry and (probably unlike Milton) was actively interested in the activities of the Royal Society. He was, then, no religious conservative, and he was up-to-date with the latest developments in what we would now think of as the scientific disciplines. Nevertheless, he too adopted the example of artificial wings as a shorthand for discussing the ethics of human self-improvement, and for situating himself in that debate. He too had some thoughts on lenses of one kind or another. In the third of his eight sermons, Bentley stated that

we affirm, that our Senses have that degree of Perfection which is most fit and suitable to our Estate and Condition. If the *Eye* were so piercing, as to descry even opake and little Objects a hundred Leagues off, it would do us little service; it would be terminated by neighbouring Hills and Woods, or in the largest and evenest plain by the very Convexity of the Earth, unless we could always inhabit the tops of Mountains and Cliffs, or had Wings too fly aloft, when we had a mind to take a Prospect. And if mankind had had Wings (as perhaps some extravagant Atheist may think us deficient in that) all the World must have consented to clip them; or else the Human Race had been extinct before this time, nothing upon that supposition being safe from Murder and Rapine.  Or if the *Eye* were so acute, as to rival the finest Microscopes, and to discern the smallest Hair upon the leg of a Gnat, it would be a curse and not a blessing to us; it would make all things appear rugged and deformed; the most finely polish’d Chrystal would be uneven and rough: The sight of our own selves would affright us.

(Bentley 12)

“Wings too fly aloft,” instruments for “descrying” objects “a hundred Leagues off,” microscopes for discerning “the smallest Hair upon the leg of a Gnat,” and senses “fit and suitable to our Estate and condition”: here we find brought together the ethical concerns of Milton and the technology on display in Hooke’s *Micrographia* – and written, indeed, in their very words. Like Milton, it is clear that Bentley was skeptical of the value of supplementing human sight with either telescopes or microscopes – “rugged and deformed” echoes *Paradise Lost*’s “spotty globe” – and he was plainly appalled at the thought of men equipping themselves with wings.[[9]](#footnote-9) Like Milton, too, Bentley’s view is that mankind’s physical condition is fitted to his ‘estate and condition’: in his view, we do not have wings or powerful vision because we neither need nor deserve them. Even Bacon himself might not have admittedto agreeing with Robert Hooke; in his *Advancement of Learning* he too deployed the image of wings to conservative effect: “it is true that it hath proceeded that diuers great learned men haue beene hereticall, whilest they haue sought to flye vp to the secrets of the Deitie by the waxen winges of the Sences” (Bacon 6). If he ought not to approach knowledge of God “by the waxen winges” of his senses, how much less ought he to try to build wings for his body with which to fly in the deity’s actual direction? Bacon’s own words indicate that he could participate quite comfortably in the conventional rhetoric, and that he accepted that there was only so far a man’s body could, or should, take him.

In Bentley’s case it is quite possible that he was thinking of Milton, and of the fallen Adam and Eve, when he wrote the words quoted above. He was well acquainted with *Paradise Lost*, and would in fact cite it in his eighth Boyle lecture. More generally, though, we can begin to pick out a narrative in which those wishing to express anxiety (or, in Bacon’s case, soothing traditionalism) about intellectual over-reaching use the image of wings to evoke an over-reaching Icarus, experimental scientists of a particularly confident type subvert this image by appealing to Daedalus, and moderates of one kind or another find ways of locating themselves somewhere along a spectrum between the two extremes. Wherever the reader or writer stood along that spectrum, though, the imagery itself was perfectly legible.

Much has nevertheless been made of Milton’s account in *Areopagitica* (1644) of when he “found and visited the famous *Galileo* grown old, a prisner to the Inquisition, for thinking in Astronomy otherwise then the Franciscan and Dominican licencers thought” (Milton, *YP* 2.538).[[10]](#footnote-10) Yet this statement tells us nothing about what Milton thought of Galileo’s work, other than that he thought censoring it was reprehensible, which need hardly be considered surprising in a tract written against censorship. True, the anecdote follows a complaint about the loss of intellectual freedom in Italy, and how it has “dampt the glory of Italian wits”, but Milton, when writing with the left hand, was certainly not above the opportunistic recruitment of a *cause celebre*. At any rate, the primary point is not to defend science against religion, but rather to promote Protestant tolerance over “Franciscan and Dominican” repression. This, finally, offers us an alternative way of reading Milton’s gestures toward Copernican (as well as Ptolemaic) possibilities in the cosmology of *Paradise Lost*: he is demonstrating that he himself, as well as his “affable archangel” and indeed his God, are good, anti-dogmatic intellectual Protestants, and that the prescriptive iniquities of “Franciscan and Dominican licencers” are beneath them.

Tolerance, though, does not constitute endorsement, and ambiguous allusions to telescopes do not amount to active or enthusiastic engagement with the emerging sciences. John Milton, in short, was not a “Baconian” or any other kind of natural philosopher, and he was most certainly not (as Burchell and Cummins would have it) a “scientist”. To try to force him into these categories without addressing the ample literary evidence to the contrary, is to practise Whig history, regardless of whether or not one ‘chases ancestors’ along the way.

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1. Milton was far from being alone in responding to astrology and similar arts with suspicion. Indeed, in 1653, one T. S. was moved to publish the tract *Divinity No Enemy to Astrology*, in which the author distinguished between his (true) discipline and that of ‘jugling’ (‘*It is, I confesse*, Deception, *and against* Society’), ‘Witch-craft’ (‘*it is, I confesse,* Diabolicall, *and against* Divinity’), and ‘Calculation of Princes Nativities’ (‘*it is, I confesse* Curiosity, *and against the* Law of Man’) (S., T. A2r-A2v). [↑](#footnote-ref-1)
2. E.g. Hooke's diary entry for 8 October 1674: 'at Councell at Arundell told Sr Robert Southwell that I could fly not how.*'*  [↑](#footnote-ref-2)
3. Compare also Cowley’s provocative, and utterly un-Miltonic, use of the Tree of Knowledge in his ‘To the Royal Society’ (in Sprat):

|  |  |
| --- | --- |
|  The orchard’s open now, and free; |  |
| Bacon has broke that scarecrow deity; |  |
|   Come, enter, all that will, | *60* |
| Behold the ripened fruit, come gather now your fill. |  |
|   Yet still, methinks, we fain would be |  |
|   Catching at the forbidden tree, |  |
|   We would be like the Deity, |  |
| When truth and falsehood, good and evil, we | *65* |
| Without the senses’ aid within ourselves would see; |  |
|   For ’tis God only who can find |  |
|   All nature in his mind. |  |

 [↑](#footnote-ref-3)
4. Ariosto, *Orlando Furioso*, 34. 70–73 (1532). [↑](#footnote-ref-4)
5. In fact Milton might not have approved even of Hooke’s ‘step-by-step’ progress, if it tended too far upward. Cf. the Richardsons’ note on *PL* VIII.72–75, “the great Architect | Did wisely to conceal, and not divulge | His secrets to be scanned by them who ought | Rather admire” : “*Scann’d* From *Scandere* to Climb up to” (quoted in Leonard 727). As Leonard notes, “The image of astronomers climbing to the stars (as if on a ladder) is richly satirical and exactly right for this moment.” [↑](#footnote-ref-5)
6. John Milton, *Paradise Regained* in *Milton: The Complete Shorter Poems*, ed. John Carey(Harlow: 1968, 2007). [↑](#footnote-ref-6)
7. See for instance *Ephemerides* 1653, Part 2, 2 March-May, in the Hartlib papers (Hartlib). [↑](#footnote-ref-7)
8. On contemporary skepticism about the efficacy of the new technologies, compare Samuel Butler’s satire on the Royal Society, *The Elephant in the Moon* in which the moon’s vast inhabitants are revealed to be a mouse caught in the lens of the telescope. [↑](#footnote-ref-8)
9. See also Bentley’s note to *PL*, VIII. 148–9: ‘[Milton] overshoots the Mark; when he says *Adam will descry* those Planets. That’s beyond the Power of all Telescopes and utterly impossible’ (quoted in Leonard 2. 724–5). His explanation for why this represents an “overshooting” is practical (“the Distance is so immense”, but his tone edges toward the moral. It need not: Milton’s angel was suggesting this to an unfallen Adam and the implication is that the future ability to see this would depend on his body’s improvement toward a spiritual rather than a physical state – as Leonard notes elsewhere, “Adam’s ‘Circumstances’ might change” (Leonard 2. 730). But certainly Raphael would not want Adam trying to build a lens with which to test such hypotheses; the angel closes this section “Solicit not thy thoughts with matters hid” (Milton, *PL* VIII.167). His point is that one can imagine much but see little when looking at the firmament. [↑](#footnote-ref-9)
10. The legitimacy of this account has of course been repeatedly questioned; see Butler. [↑](#footnote-ref-10)