Research Article

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Bacon's *New Atlantis* and the Fictional Origins of Organised Science

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Abstract: It is a commonplace that science fiction draws inspiration from science fact. It is a less familiar thought—though still widely acknowledged—that science has sometimes drawn its inspiration from science fiction. (Arthur C. Clarke's idea of geostationary communications satellites is a well-known example.) However, the debt of science to science fiction extends beyond such specific examples of scientific and technological innovations. This essay explores the paradoxical-sounding thesis that science itself, as we now know it, was originally the product of a science fiction vision. At a time when the collective endeavours of early modern researchers amounted to something less than science, Francis Bacon's *New Atlantis* (1627) helped show what wonders might be achieved by organised and methodical state-sponsored scientific research. Bacon's vision was highly prescient: many of the scientific possibilities he sketched have since become realities. It was also highly influential: early modern science bears the characteristic stamp of Bacon's vision, and that same influence is discernible right down to the present day.

Keywords: Science fiction, scientific revolution, utopia, episteme

The Invisibility of Revolutions

In *The Structure of Scientific Revolutions*, Thomas Kuhn addresses the puzzle that some of the most dramatic developments in the history of science are unacknowledged in science textbooks. A historical survey of the development of a variety of sciences reveals that they are typically subject to a series of "revolutionary" upheavals. According to Kuhn, scientific revolutions occur as enquiry is deflected in entirely new directions, following dramatic changes to the basic theoretical, conceptual, methodological and evaluative frameworks ("paradigms") that govern research at specific stages of its history (182-187). However, if we were to go only by what science textbooks have to say we might never realise that this was the case. The textbooks present a picture of orderly and cumulative progress toward the ruling ideas of the day. Kuhn explains what he refers to as the "invisibility" of scientific revolutions on the basis that the textbooks are written after the fact and by the winning side (136-138). Learning about a science through its textbooks, he tells us, is like learning about a country through a tourist brochure (1). There is a good reason for this: it is in the revolutionaries' interests that ideas that appeared radical when first suggested come to be portrayed, once established, as natural and inevitable.

Kuhn argues that there has been nothing natural or inevitable about the processes by which the individual sciences with which we are now familiar originally came into being. For example, the history of the science of optics can be traced back to a point prior to that at which it first became established on a scientific footing. In mid-seventeenth century Europe there were a number of researchers investigating the phenomena that would later form the subject matter of the science of optics, and a range of competing

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schools of thought concerning light. Yet while the activities of the members of these schools themselves appear more or less scientific, such that "Any definition of the scientist that excludes at least the more creative members of these various schools will exclude their modern successors as well," the net result of their activity was "something less than science" (Kuhn 13). According to Kuhn, it was only with the publication of Isaac Newton's *Opticks* in 1704 that the science of optics acquired its first paradigm and began to be able to operate as a coherent and recognisably scientific research tradition (12-13).

Kuhn's discussion of scientific revolutions confines itself to the histories of specific sciences. On a more general level though, Kuhnian questions might be asked concerning the origins of modern western science as a whole. How did the activities of a scattered band of early modern investigators come to be established as contributions to a coherent tradition of scientific practice? Somewhere between the mid-sixteenth century and the late seventeenth century, a sequence of events occurred that are collectively referred to as *the* scientific revolution. Kuhn's explanatory strategy cannot explain the occurrence of *the* scientific revolution, since, for Kuhn, the reception of a paradigm is an event that occurs within a specific tradition of enquiry (10-22). It follows that the task of explaining the origins of modern western science, in general, requires us to look elsewhere, at features of the more general cultural context. Foucault, in *The Order of Things*, introduces the concept of the *episteme* with the specific aim of capturing what it is that, in a particular period, links a variety of sciences to features of the wider cultural context, such that they all display similar theoretical, methodological and evaluative features (xxii). The Foucauldian episteme, unlike the Kuhnian paradigm, articulates what disparate but contemporaneous scientific fields have in common, rather than what marks them out as individually unique. It may well be then that the concept of the episteme is more appropriate than that of the paradigm as a means by which to explain the origins of modern science in general. The provision of such an explanation is however far beyond the scope of this short essay. Instead, I shall focus on one important contributory factor in the birth of modern western science: the influence of the English lawyer, diplomat, essayist and philosopher Francis Bacon.

New Atlantis

Bacon is far from being an obscure figure even today, but his reputation has waxed and waned considerably since his death in 1626. In his 1750 "Discourse on the Moral Effects of the Arts and Sciences," Jean-Jacques Rousseau refers to Bacon as "perhaps the greatest of philosophers" (153). Later in the same century, Immanuel Kant opened his epoch-making *Critique of Pure Reason* (1781) with a quotation from Bacon. Today Bacon's reputation does not stand quite so high. It is perfectly possible to take a philosophy degree without studying any of his writings—indeed without even encountering his ideas (except perhaps as a footnote to a course on the philosophy of science). Reputationally, Bacon appears to have been a victim of his own success. In line with Kuhn's observations concerning the invisibility of scientific revolutions, as the ripples of the seventeenth-century scientific revolution have died away, so the reputation Bacon once held as the herald of the new age seems to have died with them—the increasingly forgotten prophet of an age whose self-assurance is manifest in the scepticism with which it regards prophets.

To appreciate the true nature and extent of Bacon's influence it is helpful to focus on his most prophetic text, *New Atlantis*. Following in the wake of Thomas More's original *Utopia* (1516), Bacon's *New Atlantis* is an early contribution to the tradition of utopian fiction. But whereas More's *Utopia* is a finished work running to around 100 pages in a modern edition, the *New Atlantis* runs to just thirty pages. Unfinished in Bacon's lifetime, it was published posthumously by his chaplain William Rawley.

In Bacon's tale, a group of seafarers crossing the Pacific Ocean are blown off course and are forced to shelter off the coast of the hitherto-undiscovered island of Bensalem. When they are finally allowed ashore, they find the inhabitants to be surprisingly prosperous and civilised, and they are looked after well. The people of Bensalem turn out to be Christians and have knowledge of the Bible—both Old and New Testaments. However, their Christian beliefs are untouched by Greek philosophy, and they remain free of the influence of Greek metaphysics - which, as will be discussed later, Bacon regarded as essentially pernicious. The prosperity of the inhabitants is initially inexplicable, but as the voyagers get to know them

better, they discover that their needs are provided for by a mysterious organisation known as Salomon's House or the College of the Six Days' Works. Salomon's house is dedicated to "the Study of the Works and Creatures of God," and is, in the islanders' view, "the noblest foundation … that ever was upon the earth; and the lanthorn of this kingdom" (Bacon, *New Atlantis* 229).

The individuals who make up Salomon's House itself—the "Fathers" of the House— are rarely seen by the rest of the population. The voyagers do however eventually get to meet one of the Fathers. Crowds of people turn out to watch him make his appearance—with great pomp and ceremony. He arrives in a gilded and jewelled chariot with fifty richly-dressed attendants, with all the officers and principals of the Companies of the City following behind. His physical appearance is interesting, combining ecclesiastical, aristocratic and pastoral elements. His hat is like a helmet or a huntsman's cap. His gloves and shoes are luxurious and heavily decorated. Yet the remainder of his clothing is essentially plain and severe, a robe of fine black cloth with wide sleeves and a cape, over a white linen undergarment reaching to his feet. He is equipped with a shepherd's crook like a bishop's crozier and has an aspect "as if he pitied men" (Bacon, *New Atlantis* 237).

Bacon's description of the Father is not apt to suggest, to a modern reader, the figure of an influential research scientist, but when the voyagers are granted an audience with him a few days later, that is in fact what he reveals himself to be. In his speech to the visitors, which occupies the entire latter half of Bacon's (unfinished) text, the Father outlines the purpose and activities of Salomon's House. He begins by announcing that, "The End of our Foundation is the knowledge of Causes and secret motions of things; and the enlarging of the bounds of Human Empire, to the effecting of all things possible" (Bacon, *New Atlantis* 239).

Evidently then, the organisation is not simply concerned with "the Study of the Works and Creatures of God." The goal is not simply the expansion of knowledge in the natural sciences but rather one that Bacon characterised elsewhere as the study of nature "with a view to works" (Bacon, *New Organon* aphorism 5), and (by implication at least) for "the relief of man's estate" (Bacon, *New Atlantis* 36). Having summarised the goal of Salomon's House, the Father then proceeds to list the various "preparations and instruments" which it has at its disposal— in exhaustive detail. The primary impression on the reader is of the sheer magnitude and ambition of the organisation's activities. Salomon's House appears to function as a giant scientific and technological research institute, with funds and capability to construct and manage mines ("six hundred fathoms" deep), towers (half a mile high), lakes, farms, orchards and gardens, as well as "houses" of one sort or another, all for research purposes. With these resources at its disposal, Salomon's House is able to investigate a bewildering variety of phenomena and develop advanced techniques for dealing with them. They have microscopes and telescopes. They have advanced medical and psychological techniques and are able to predict and to some extent manage the weather. They have the capacity to create metals and minerals artificially. Through vivisection and experiments in selective breeding, they have learned how to modify animals and plants to the point of bio-engineering. They can even re-animate the dead. They pursue research into engines and motion, weapons and explosives. They have apparently developed aircraft of some sort, as well as submarines. The list is breathtaking and the scale of the operation apparently huge (Bacon, *New Atlantis* 239-245).

Comparison with Utopian Fiction More Generally

Previous examples of utopian fiction tended to concern themselves primarily with setting out an ideal form of social organisation (in line with ancient archetypes of the genre such as Plato's *Republic* and *Laws*), to the relative exclusion of scientific and technological themes. More's *Utopia*, for example, written a century earlier, pays comparatively little attention to the technological resources available to the inhabitants of his ideal society and contains nothing remotely close to Bacon's account of the activities of Salomon's House. More does mention the utopians' agricultural knowledge and their knowledge of astronomy. He also refers to the instruments they make use of in their studies of astronomy and mentions the existence of mechanical contrivances serving as instruments of war. But the innovations of More's Utopians are essentially political

and cultural rather than technological, and nothing in More's text hints at scientific and technological capabilities that would have outstripped those of its author's own time.

The Atlantis-like city-state described in Campanella's *City of the Sun* (1602) places greater emphasis on learning and the imaginative application of knowledge. Parts of the city itself are set out like a giant museum or walk-through encyclopaedia, with mathematical symbols, geometrical proofs and biological specimens all on public display. Legendary inventors in science, warfare and law are celebrated. The citizens also make use of technological innovations. Like Bacon, Campanella recognises the epoch-making potential of gunpowder, the printing-press and the compass. In recognising this potential though, both authors were acknowledging the promise of innovations that were already well-known in their own time, rather than speculating on technologies that might be developed in the future. It is true that, besides the above, Campanella introduces some genuine novelties. He mentions wagons propelled by sails, novel designs of cannon and a stirrup that permits riders to steer their horses with their feet. Yet he offers no clue to the origins of these innovations and is apparently unconcerned to explain how and by whom they were designed and developed. As with More's *Utopia*, Campanella's overall emphasis is much more on the various social and political innovations of his ideal state than it is on the scientific and technological innovations it has at its disposal. In considering knowledge and learning, he is more concerned with recording the insights of past thinkers than he is with systematic and groundbreaking research. His text displays nothing comparable to Bacon's focus on large-scale collective endeavour for the expansion of knowledge and the development of new technologies.

Johannes Valentinus Andreae's *Christianopolis* (1619) is closer to Bacon's text both historically and thematically. Indeed, it has been argued that many of the features of Bacon's *New Atlantis* may have been directly inspired by Andreae's text (41-74). Organised scientific enquiry is a feature of the utopian society Andreae describes. Christianopolis incorporates gardens and farms for the selective breeding of agriculturally useful species (150-151). It also contains a laboratory for scientific research, and its inhabitants approach the investigation and exploitation of metals and minerals in particular in a systematic way (154-155, 200-202). But *Christianopolis* lacks Bacon's single-minded emphasis on techno-scientific elements. Scientific research is a relatively minor part of a more comprehensive utopian vision, which encompasses many branches of learning and retains the traditional utopian emphasis on practical arrangements for the proper ordering of society.

Two features of *Christianopolis*, in particular, reveal the gulf between Andreae's vision and that of Bacon: Firstly, as with More's *Utopia*, and unlike *New Atlantis*, there is no real emphasis on technological innovations that significantly outstrip the science and technology of the author's own time. Secondly, Andreae, unlike Bacon, includes a school of metaphysics in his utopia (216-217). Bacon had already voiced his suspicion of and impatience with metaphysics, in its relation to empirical science, in his *Advancement of Learning* (90-92). Bacon regards metaphysics as an impediment to the progress of the sciences. With its focus on enquiry into formal and final causes (as opposed to the material and efficient causes that are the object of empirical scientific study) metaphysical enquiry has, Bacon tells us, bred an altogether unhelpful barrenness and sterility in the sciences. For Bacon, a crucial precondition for science to make progress is that it cuts its ties with metaphysics and leaves Greek philosophy behind. In the *New Atlantis* those ties have been cut. Salomon's House engages in no metaphysical studies. Although the Fathers of Salomon's House make secret journeys to other lands in search of knowledge they focus on collecting knowledge of "sciences, arts, manufactures and inventions" rather than philosophy (230). Andreae, by contrast, is happy to accord metaphysics a place in his utopia alongside other areas of speculative intellectual enquiry— including for example theosophy (217-218).

None of the above is intended to suggest that the *New Atlantis* completely overlooks the traditional utopian aim of outlining a model society reorganised on what are regarded as beneficial lines. But Bacon's relative lack of emphasis on the political dimension is revealing. The *New Atlantis* is evidently intended to be an intellectually rather than a politically revolutionary text. The society sketched in *New Atlantis* has been reorganised for the sake of scientific and technological productiveness, and its potential attractions for the contemporary political establishment lie in the technological power which a reorganisation of society along these lines promises to make available. A wise monarch reading the *New Atlantis* would

find therein many suggestions concerning the ways that physical resources and efforts could be profitably invested for an impressive scientific and technological reward. But this same monarch need not worry that in following Bacon's suggestions s/he must necessarily fear for the security of the crown. The promised gains of the *New Atlantis* do not seem to come at any particular political price— aside from the obvious material investment required to establish and maintain an organisation like Salomon's House. All of this is consistent with Bacon's preference for combining scientific and technological radicalism with social and political conservatism. The distinctiveness of Bacon's influence appears partly to reflect his uniqueness. Bacon was not a social outsider in any sense but an establishment figure *par excellence*. His visionary ideas are combined with opinions that are consistent with his social background and the role he played at the heart of the British state. Of course, Thomas More was also an establishment figure and senior statesman. However, More's status as a utopian and visionary, and in general his political and ideological significance, hinge on the fact that he remained faithful to his ideals even when they clearly ran counter to the temporal powers of the day. More may have been a reluctant rebel, but a rebel he certainly was. Bacon on the other hand appears to have remained faithful to the state even beyond the point at which the state saw fit to distance itself from him. Of all the visionaries we have considered then, Bacon stands out as being a political conservative. Bacon carefully distinguishes between innovation in politics and innovation in the pursuit of knowledge:

> In politics even improvements are suspect on account of their power to disturb, for civil affairs rest on authority, assent, reputation, opinion, not on demonstration and on truth. But in the arts and sciences, as in mining for minerals, there ought everywhere to be the bustle of new works and further progress. (Bacon, *Thoughts and Conclusions on the Interpretation of Nature* 110)

Accordingly, despite its scientific radicalism, the *New Atlantis* is essentially politically orthodox— portraying an orderly, hierarchical God-fearing Christian society capable of exploiting and profiting from major technological innovations without any destabilising effect on the established political order. Bacon is not proposing a radical re-ordering of society for the sake of, for example, social justice. Rather, his proposal is that a wise monarch should commit a vast amount of resources to enable a cloistered group of researchers to develop entirely new technologies and scientific techniques with the ultimate aim of making life more pleasant and comfortable for all. Social salvation will take a technological rather than a political form.

Science Fiction?

While Bacon's work certainly belongs within the tradition of early modern utopian fiction, with its then-unique promise of salvation through science, it is also something else. Consider its primary ingredients. A band of bold adventurers is forced off course, and they find themselves off the shore of an unknown land; they receive a generous welcome at the hands of a peaceful and civilised people who are themselves eerily provided for by a mysterious and powerful agency. In due course, and with much pomp and ceremony, they meet a representative of this mysterious agency, who introduces the technological marvels at his command in fastidious detail... Where have we encountered these ingredients before? This could be the opening of any number of science fiction stories— or an early episode of S*tar Trek*. It is tempting to conclude that Bacon has produced not simply a piece of utopian fiction but an example (perhaps the first of its kind) of utopian *science* fiction.

Does it make sense though to speak of a work of science fiction written by a contemporary of Shakespeare? Utopian science fiction dating from before the birth of modern science? Unlike modern science fiction authors Bacon does not have the luxury of drawing on and embroidering established elements of science fact. Instead, he seems to be inventing them. The description of the Father of Salomon's house is one case in point. The Father is a key figure in a giant scientific and technological research institute. But Bacon cannot portray him in lab coat and wire-rimmed spectacles. Nor is the high-tech severity of a Bond villain available to him. How then does Bacon imagine this master scientist? He is a peculiar mixture of aristocrat, shepherd, huntsman and priest. It is interesting to consider why Bacon settled on precisely these elements. The

pastoral role of the Father is clear enough and combines priest-like and shepherd-like elements in a manner that contemporary readers would have found quite familiar. However, Bacon also clearly wishes the Father to be perceived as a man of action— not simply a thinker and onlooker on life but someone who by actively investigating nature intervenes to make a tangible difference. Hence, one imagines, the significance of the huntsman's cap. Finally, it seems important that the Father is perceived as a high-status figure. The jewelled shoes and gloves, and the chariot, are not necessarily incompatible with an ecclesiastical role, but they also serve to suggest that the qualities of the Father are compatible with the social role of the nobility. Perhaps the implicit message is that the active investigation of nature is not simply work for craftsmen and artisans but would not be undignified for an aristocrat— especially insofar as in involves something analogous to hunting and the thrill of the chase. What we see here is Bacon working hard to imagine a type of figure that did not exist in his own time but which, once established, has come to seem so much a part of our cultural background that it is hard for us to appreciate the creative endeavour involved. More recent exemplars of the noble and influential scientific visionary pervade science fiction, comfortably combining a powerful hunger for knowledge and an aristocratic background and temperament with "pastoral" elements and a strong sense of social responsibility. Jules Verne's Captain Nemo is just one outstanding example. Nemo is a mysterious figure of course, but to Verne's readership he would at least have been an intelligible one (not to say an intriguing one). To Bacon's contemporaries by contrast such a figure might have seemed so unfamiliar as to be quite unintelligible without very careful stage-setting. Bacon seems to have created a stereotype on which later science fiction writers were able more easily to draw. To the renaissance mind the Father of Salomon's House would perhaps have been understood as some kind of magician. But his is magic of a new kind— a form of magic that is supposed actually to work. Not the muttering of spells and the conjuring of demons, nor even Campanella's faith in astrology and the mysterious influence of the planets on human fates. The Father is an investigator and an innovator, inspired by noble ideals, who is dependent neither on supernatural agencies nor on the rediscovery of lost wisdom but instead on massive material investment in diligent and systematic scientific research.

Science Fiction and Progress: The Symbolism of Atlantis

Drawing on the Platonic myth of Atlantis for the title of his work is one way Bacon is able to reinforce the above message. Plato's Atlantis, described in the dialogues *Critias* and *Timaeus*, was no simple utopia. The *Critias*— like Bacon's *New Atlantis*— is brief and incomplete, but over half of the dialogue is devoted to an account of the nature and origins of Atlantis. Portions of the discussion, such as the description of the Atlantean palaces and the temple of Poseidon seem to be echoed in some of Bacon's descriptions of the wealth of Salomon's House. (Although there is nothing in Atlantis to parallel the most remarkable feature of Bacon's utopia: its technological advancement.) In the *Timaeus*, Atlantis appears as a powerful and belligerent state, in marked contrast to the civilisation of Athens, which is essentially peaceful and cultured, but heroic and strong when it is required to be. The Atlantis of the *Timaeus* is a kind of antithesis of Athens. Bacon, in the *New Organon*, also presents himself as the enemy of Athens. Bacon recognised that one of the most important impediments to his vision of scientific and technological progress was the self-confidence (or lack of it) of his own age:

> If [our age] but knew its own strength and chose to essay and exert it, much more might fairly be expected than from the ancient times (Bacon, *New Organon* aphorism 84).

What is holding the moderns back, according to Bacon, is an entirely mistaken attitude concerning the wisdom of the ancients. From the point of view of the individual, the ancestors are reasonably regarded as the repository of accumulated wisdom. Our parents and grandparents, for example, have so much more experience, that we rightly turn to them for guidance. It may seem natural then to turn to venerable figures from the ancient world for more valuable guidance still. For Bacon though this attitude is strikingly mistaken. In the course of a human life, and up to a point, wisdom no doubt comes with age and experience— and this might naturally lead us to think of our parents' parents' generation as the embodiment of wisdom.

However, it does not follow that our grandparents were any wiser than we will be when we have reached a similar stage of life. Seventy years or so might be necessary for achieving wisdom by building up the required life experience, but it doesn't follow that a seventy-year-old who lived a thousand year ago is any wiser than one living now. Age is correlated with increasing wisdom only up to a point. Beyond that point, one would expect that wisdom would belong to cultures rather than to individuals. Given that the stock of accumulated human wisdom increases as each generation of humans grows old and dies, it should, Bacon argues, be the present age, rather than ancient times, that is the true repository of wisdom. The lives of individuals come and go, but the life of the species goes on; and viewed from a standpoint that takes the life of the species into account it is modern times that are the true old age of the world, "the true antiquity," as Bacon puts it (Bacon, *New Organon* aphorism 84). Thus we would be better advised to look for wisdom among our contemporaries than we would to look for wisdom among the ancients.

With the above argument Bacon articulates a bold and recognisably modern idea of progress— an idea so familiar to us it is hard to imagine that anyone could ever have thought differently. And yet Bacon's Renaissance forebears seem to have spent as much if not more time looking over their shoulders at the fabulous achievements of classical antiquity than they did looking forward to the possibility of building a new world that would surpass anything known in classical times. More and Campanella seem to have been characteristically Renaissance thinkers in this respect. Bacon, by contrast, is introducing something genuinely new, and his view of progress is implicit throughout the *New Atlantis*. The task of Salomon's House is not to recapitulate and preserve ancient wisdom but to forge ahead into an exhilarating future, cutting the ties that bind knowledge to ancient metaphysics and Athenian ideals. It is hard for us to appreciate how Bacon struggled to articulate and popularise his new way of thinking, but great and influential ideas are often, as has already been emphasised, the hardest to appreciate. The more seamlessly they form a part of our basic view of the world the more invisible they become.

The *New Atlantis* should not be read then, as the contemporary fascination with the Atlantis myth might lead us to read it, as the history of a storehouse of ancient wisdom which has been lost in the mists of time. Bacon's Atlantis, like Plato's Atlantis, is the enemy of Athens. It represents an independent (though Christian) tradition dedicated to a new type of learning.

Conclusion

The brilliance of Bacon's achievement lies partly in the fact that he had no contemporary models available to him. Bacon was not himself a scientist, and his rather haphazard efforts at original scientific research seem to have been quite unsuccessful. Indeed, Bacon seems to have been surprisingly ignorant of some of the most important scientific advances of his own time, even when those responsible were known to him personally (for example, he seems to have been unaware of the discovery of the circulation of the blood, made by his own physician William Harvey). Bacon's interests lay more in the direction of scientific method than scientific practice. He had nothing on which he could base Salomon's house, and yet his fictional creation provided a model on which organised science could later base itself.

As with other similar historical events, it is hard to date the scientific revolution with any precision. What we can say is that its first stirrings had been felt by the time of Bacon's death and within just a few decades it was recognisably in full flow, bearing the unmistakable stamp of Bacon's ideas. A central aspect of Bacon's new vision of science is that human dominion over nature will only be achieved through co-operative and systematic enquiry (Losee 68). Notwithstanding Bacon's predilection for pomp and ceremony, Salomon's House breathes the air of modern science: organised, systematic, experimental, practical, progressive.

Bacon's motive in writing the *New Atlantis* was in large part that of persuading the political powers of his own time to invest resources in this type of research (Bacon, *The Advancement of Learning and New Atlantis* x-xi). His earlier *Advancement of Learning* and *Novum Organum* were explicitly designed to interest James 1st in revolutionising educational curricula and sponsoring systematic scientific research (Losee 68). The fictional form in which he casts his ideas is not supposed to engender nostalgia for ancient wisdom but

enthusiasm for an entirely new way of thinking and seeking knowledge— which, he is keen to emphasise, is quite compatible with political conservatism.

Bacon's vision reached fruition only in the succeeding generation. The Royal Society (founded 1660) was directly inspired by Bacon's ideas, undertaking to implement "not only Bacon's general attitude towards science but a number of Bacon's specific projects" (Losee 68).

Bacon himself deplored the stagnation of learning in his own time and the disorganised state of enquiry into nature. Within a generation, that situation had been turned around, and via bodies like the Royal Society, empirical enquiry into nature was making spectacular progress. It is hard for us to appreciate the frustration Bacon felt, because, for us, the revolution he was instrumental in bringing about is to a large extent invisible. But the effects of his writings were real and long-lasting— their influence almost incalculable. So much so that we seem to be justified in concluding that, paradoxical though it may seem, a primary impetus to the birth of modern science came from a piece of Jacobean science fiction.

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