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“I am Primarily a Scientific Philologist”: J.R.R. Tolkien and the Science/Technology Divide

Kristine Larsen

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In his famous 1959 lecture *The Two Cultures*, British scientist and novelist C.P. Snow lamented the apparent split of the “intellectual life of the whole Western society” into “two polar groups.... Literary intellectuals at one pole – at the other scientists, and as the most representative, the physical scientists” (11-2). Snow warned that such a division had serious consequences “for our creative, intellectual, and above all, our moral life. It is leading us to interpret the past wrongly, to misjudge the present and to deny our hopes of the future” (54). Given J.R.R. Tolkien’s well-known love for the natural world (especially trees) and open disdain for the increasingly destructive technologies of industry and war, one might be tempted to offer Tolkien as a prime example of what Snow took as the stereotype of the literary intelligentsia. However, a closer examination of Tolkien’s life and work clearly demonstrates that, in fact, he moved seamlessly between the two cultures in his own mind, aided by strong personal ethics and religious values that allowed him to evaluate the benefits and limitations of both cultures’ particular point of view.

Despite what you might have been told or read online, Tolkien was not anti-science. On the contrary, he reported in his famous essay “On Fairy-stories” that as a young child “a liking for fairy-stories was not a dominant characteristic of early taste.... I liked many other things as well, or better: such as history, astronomy, botany, grammar, and etymology” (Flieger & Anderson 56). In other drafts of the essay he notes that “In that distant day I preferred such astronomy, geology, history or philology as I could get, especially the last two” and that as a young child “I was ready enough to study nature scientifically – very ready, quite as ready as to read fairy-stories. But I was not going to be quibbled into science nor cheated out of Faerie” (Flieger & Anderson 189; 234).

As a citizen of both of C.P. Snow’s cultures, Tolkien was able to recognize and appreciate the beauty and value in both points of view. This synthesis is most apparent in his description of his chosen academic field, philology, defined by the *Oxford English Dictionary* as “the branch of knowledge that deals with the structure, historical development, and relationships of a language or languages.” In a 1964 letter Tolkien explained “I am primarily a scientific philologist. My interests were, and remain, largely scientific” (Carpenter 345). This scientific view of the study of language was applied to his own sub-creation as well as our Primary

World. For example, in a 1951 letter to Milton Waldman Tolkien notes of the two Elvish languages, Quenya and Sindarin, that their “forms (representing two different sides of my own linguistic taste) are deduced scientifically from a common origin” (Carpenter 143).

While Tolkien had a natural interest in science from a very young age and was fascinated with a dinosaur jaw “with nasty teeth” (Rateliff 539) that he had found at the famous fossil beds at Lyme Regis, he also had a very important role model in his mother’s younger sister Jane Suffield (later Neave), whom he referred to as a “professional aunt” (Carpenter 377). He proudly explained that the woman who had tutored him in geometry had been “one of the first women to take a science degree” and in her eighties had gone “botanizing in Switzerland” (Carpenter 308). Christine Scull and Wayne Hammond explain (842) that between 1893-6 (while a mistress at Bath Row School for girls) Jane “studied geology, botany, and physiology at Mason College, the predecessor of the University of Birmingham, earning a Bachelor of Science degree in 1895 under the examinations of the University of London.” Having such a positive scientific role model certainly influenced the young Ronald.

On the other hand, a common misconception is that Tolkien could not have ‘believed’ in modern science such as the Big Bang and evolution because he was a Catholic. Putting aside the fact that the original Big Bang model was actually developed by Father Georges Lemaître, a Belgian astrophysicist and Roman Catholic priest, we have Tolkien’s own words on the matter in a 1969 letter to Camilla Unwin: “Those who believe in a personal God, creator, do not think the Universe is in itself worshipful, though devoted study of it may be one of the ways of honouring Him” (Carpenter 400). Tolkien may have been specifically referring to Lemaître here, or more generally to numerous comments by Pope Pius XII, whose service spanned the time of Tolkien’s writing of *The Lord of the Rings*, and who was well-known for his support for science. This Pope proclaimed that “as with every art, every science serves God, because God is *scientiarum dominus* – Master of sciences – and *docet hominem scientiam* – Teacher of sciences to mankind” (Chinigo 145). Pius XII argued in numerous speeches that our ability to know the universe comes directly from God, and that as a “friend of truth, the Church admires and loves the progress of knowledge, as she does that of the arts and of everything connected with learning” (Chinigo 145). Pius XII clearly distinguished between the disobedience of Adam and Eve and the search for knowledge in general, explaining in a 1956 address to a gathering of gynecologists that although humans have lost Paradise,

God did not wish to forbid and did not forbid men to seek after and make use of all the riches of creation; to make progress step by step in culture; to

make life in this world more bearable and more beautiful, to lighten the burden of fatigue, pain, sickness, and death. (Haigerty 181)

Pius XII's most famous (and controversial) public embracing of science was his November 22, 1951 address to the Pontifical Academy of Sciences, in which he argued that the Big Bang model for the origin of the universe was not only aligned with the teachings of Genesis, but, he believed, actually provided irrefutable evidence of the veracity of Genesis and the existence of God. He opined that as a "mind enlightened and enriched with modern scientific knowledge" ponders the creation of the universe

with the same clear and critical look with which it examines and passes judgment on facts, it perceives and recognizes the work of creative omnipotence, whose power, set in motion by the mighty 'Fiat' pronounced billions of years ago by the Creating Spirit, spread out over the universe, calling into existence with a gesture of generous love matter bursting with energy. (Pope Pius XII)

It is important to note that for his part, Lemaître was more closely aligned with the views of paleontologist Stephen Jay Gould and other scientists who seek to end the non-productive war of words between science and religion, noting that "Once you realize that the Bible does not purport to be a textbook of science, the old controversy between religion and science vanishes" (qtd. in Laracy).

Pius XII also warned on many occasions against the misuse of technology and embracing of materialism, explaining that at its worst technology

empties life of meaning, since it affects the spiritual and material values connected with man's nature and personal dignity. Wherever technology reigns supreme, there human society will be transformed into a colorless mass, into something impersonal and unenduring, contrary to the clear designs of nature and the Creator. (McLaughlin 213)

This science/technology divide is also at the heart of Tolkien's personal beliefs and in a very interesting way mirrors an important shift (and ongoing philosophical discussions) concerning the history of science.

As I described in Chris Vaccaro and Yvette Kisor's volume on *Tolkien and Alterity* (Larsen 2017), Tolkien's views on science are aligned with both the medieval concept of *organicism* and a modern feminist epistemology. In the former, the natural world was viewed as alive and part of the gods' domain, most commonly seen in the metaphor of Mother Earth or Mother Nature. In her seminal work *The Death of Nature*, Carolyn Merchant (189) argues that this medieval

concept of the “nurturing earth” was “superseded by new controlling imagery” in the Scientific Revolution. Observation – a passive, and in Aristotelian terms, feminine, scientific method – was replaced by active experimentation, where agency was the embodiment of the masculine principle.

In *The Masculine Birth of Time*, Francis Bacon, one of the fathers of the Scientific Revolution, explains that his methodology is “leading you to nature with all her children to bind her to your service and make her your slave...” (qtd. in Merchant 170). Nature is to be dissected, “forced out of her natural state and squeezed and molded” by the (presumably male) “scientist’s ‘hard facts,’ ‘penetrating mind’ or the ‘thrust of his argument’” (qtd. in Merchant 171). Carolyn Merchant (171) refers to Bacon’s attitude towards nature as the “‘rape’ of nature for human good.” In the words of Evelyn Fox Keller (*Reflections* 48), Bacon’s “central metaphor – science as power, a force virile enough to penetrate and subdue nature – has provided an image that permeates the rhetoric of modern science.” Similar language is employed in Mary Shelley’s famous cautionary tale *Frankenstein* (32-3) when, early in the work, the titular character delights in a college lecture concerning modern scientists. He is inspired by the idea that they are said to “penetrate into the recesses of nature and show how she works in her hiding-places.... They have acquired new and almost unlimited powers; they can command the thunders of heaven, mimic the earthquake, and even mock the invisible world with its own shadows.”

Tolkien noted this lust for power in a 1956 draft to a letter to Joanna de Bortadano (Carpenter 246), famously writing of *The Lord of the Rings* “Of course my story is not an allegory of Atomic power, but of *Power* (exerted for Domination).” In a 1951 letter to Milton Waldman, Tolkien further explains that the Fall of humans in his works (and, by analogy, in the real world) occurs when the sub-creator (or engineer, in a technological sense)

wishes to be the Lord and God of his private Creation. He will rebel against the laws of the Creator – especially against mortality. Both of these (alone or together) will lead to the desire for Power, – for making the will more quickly effective, and so to the Machine (or Magic). By the last I intend all use of external plans or devices (apparatus) instead of developments of the inherent inner powers or talents – or even the use of these talents with the corrupted motive of dominating: bulldozing the real world, or coercing other wills. The Machine is our more obvious modern form though more loosely related to Magi than is usually recognized. (Carpenter 145-6)

Again, Tolkien was not anti-science; he was, however, a vehement critic of the misuse and overuse of technology that he saw as the corrupt legacy of the Scientific and Industrial Revolutions.

Tolkien was certainly not a lone voice in this regard. Maria Mitchell (236), the first American woman astronomer, wrote in 1870 “the true observer will study Nature because he loves her, and seeking neither reward nor renown, will open his heart to her wonderful revelations.” A century later, philosophers of science recognized a movement toward a “feminist science” or “feminist epistemology” based in large part on the work of Anne Fausto-Sterling, Sandra Harding, and Evelyn Fox Keller. This revisioning of the scientific method places “emphasis on intuition, on feeling, on connection and relatedness” (Keller *Reflections* 173). Nobel Prize winning biologist Barbara McClintock’s research style perhaps best epitomizes this view of science. She attributes her great success in understanding plant genetics to her ability to devote “the time to look, the patience to ‘hear what the material has to say to you,’ the openness to ‘let it come to you.’ Above all, one must have ‘a feeling for the organism’” (qtd. in Keller *Feeling* 197-8). Evelyn Fox Keller makes the important distinction that here *organism* is not to be understood in the narrow modern sense of a biological entity, but rather in a classical organicist view, as a piece of the natural world that is to be understood. She also notes that McClintock believes that the goal of science is “not prediction per se, but understanding; not the power to manipulate, but empowerment” (*Reflections* 166).

But it is not just medieval minds or feminists who disagree with a strictly Baconian view of modern science. In *The Two Cultures* C.P. Snow (64-5) explained that science has two explicit motivations: the understanding of the natural world (which we will call “pure science,” for reasons which will soon become clear), and its domination (which we will refer to as the Machine, to use Tolkien’s terminology). Patrick Curry (63) agrees, noting that “some scientists are more oriented to the wonder of the natural world (i.e. enchantment) than its manipulation and exploitation (i.e. magic).” Patrick Curry, Matthew Dickerson and Jonathan Evans, Liam Campbell, and Susan Jeffers, among many others, have noted the myriad modern 20th century ecological threads in Tolkien’s works. Carolyn Merchant (100) explains that modern ecology very much has its “roots in medieval organicism – the idea that the cosmos is an organic entity, growing and developing from within, in an integrated unity of structure and function.”

One character whose actions clearly demonstrate such a pure scientific perspective is Tom Bombadil. When asked by Naomi Mitchison if there was a connection between Tom and the Entwives, Tolkien replied that Bombadil “is almost the opposite, being say, Botany and Zoology (as sciences) and Poetry as opposed to Cattle-breeding and Agriculture and practicality” (Carpenter 179). This philosophy is echoed elsewhere. For example, in a 1954 letter to Peter Hastings, Tolkien explains that Tom Bombadil is “an ‘allegory,’ or an exemplar, a particular embodying of pure (real) natural science: the spirit that desires knowledge of other things, their history and nature ... and entirely unconcerned with ‘doing’ anything with the knowledge: Zoology and Botany not Cattle-breeding or Agriculture”

(Carpenter 192). Bombadil has “no desire of possession or domination at all. He merely knows and understands about such things as concern him in his natural little realm” (Carpenter 192). Similarly, in a letter to Michael Straight, Tolkien explained that

The Elves represent, as it were, the artistic, aesthetic, and purely scientific aspects of the Humane nature raised to a higher level than is actually seen in Men. That is: they have a devoted love of the physical world, and a desire to observe and understand it for its own sake and as ‘other’ – sc. as a reality derived from God in the same degree as themselves – not as a material for use or as a power-platform. (Carpenter 236)

The distinction between pure science and applied technology – the Machine – is also illustrated through the fate of the Entwives and their sundering from the Ents. For while the Ents were content to be the shepherds of the forests and speak with the trees, the Entwives

did not desire to speak with these things; but they wished them to grow according to their wishes, and bear leaf and fruit to their liking, for the Entwives desired order, and plenty, and peace (by which they meant that things should remain where they had set them). So the Entwives made gardens to live in.... (*TT*, III, iv, 79).

This reliance on the taming or domination of nature, i.e., technology, didn’t end well for the Entwives. It never does in Arda, not since its very beginning.

Melkor, the mightiest of the angelic powers, or Ainur, was originally given by the supreme deity Ilúvatar “the greatest gifts of power and knowledge” (*Sil* 16). He was not satisfied with these gifts, and like Frankenstein, became so consumed with the desire for more of both that he fell from being the chief among the Powers to the Great Enemy. Melkor sought to gain ultimate knowledge and power over the very spark of life, the so-called Flame Imperishable. Among his blasphemous thoughts was the desire to “bring into Being things of his own,” kindled by his impatience in what he perceived as Ilúvatar’s slowness in filling the Void (*Sil* 16). Here we find two of the most important recurring themes in the Fall from pure science into technology in Middle-earth: the desire to be a Creator (a role assumed to belong solely to God), and a desire to change the pace of the natural world through artificial means – through the use of the Machine.

The *legendarium* features numerous cautionary messages against trying to create life. All that Melkor and Sauron can manage is to twist and pervert creatures to their design, the ‘unholy’ origin of orcs, Uruk-hai, and trolls. Aulë, the craftsman – or engineer – of the Valar, was given by Ilúvatar “skill and knowledge scarce less

than to Melkor,” a particularly ominous connection (*Sil* 19). Unlike Melkor, Aulë freely gave the fruits of his skills to others and delighted in the process and outcome of his labors rather than in possessiveness and hubris. But like Victor Frankenstein, Aulë tried to master the secret of creating life (i.e., tried to play God) and thereby make living beings of his own. Both Frankenstein and Aulë initially believe their motivations justify their actions but are eventually forced to face the folly of their experiments. Aulë wished to have living beings whom he could teach and share his skills with and had grown impatient waiting for the promised arrival of the Children of Ilúvatar. Like Frankenstein, Aulë knew that his peers would not understand his motivations, and thus he labored in secret, but was unable to keep his actions hidden from the true Creator. Upon fashioning the seven dwarf fathers, Aulë was visited by the Voice of Ilúvatar and faced the failure of what he had attempted to accomplish: “Why dost thou attempt a thing which thou knowest is beyond thy power and thy authority? For thou hast from me as a gift thy own being only, and no more” (*Sil* 43). Demonstrating his infinite love and pity, Ilúvatar adopts the dwarfs and gives them the autonomous spirits (souls) that Aulë does not have the power to bestow.

A similar example of the downward spiral into sin caused by haste and a desire to harness powers beyond one’s God-given potential can be found in Saruman. His transformation from the chief of the Istari, emissary of the Valar, and student of Aulë, into a mad engineer consumed by a “mind of metal and wheels,” and further into the pitiful Sharkey, a mere shell of his former power, is one of the more obvious cautionary lessons of *The Lord of the Rings* (*TT*, III, iv, 76). As Saruman succumbs to his lust for knowledge, and with it power, he falls into sin and abuse of the natural world. So, too, does his laboratory, Isengard, transforming from a beautiful tower where “wise men” had once engaged in observing the heavens (an example of pure science) into a “child’s model or a slave’s flattery of that vast fortress, armory, prison, furnace of great power, Barad-dûr, the Dark Tower” (*TT*, III, viii, 160-1). Saruman’s desire for knowledge and power led him into a Faustian deal with the devil – Sauron in this case – and despite Saruman’s prideful belief that he could somehow manipulate the deal to his benefit, the reader understands Tolkien’s message that this is utter folly. Tom Shippey (171) refers to Saruman’s fall as an extreme case of “Sandyman’s disease,” the devolution of scientific curiosity into technology and from there into an irrational hatred of the natural world and desire to utterly dominate and destroy it. Pope Pius XII echoes Tolkien’s caution against becoming “intoxicated with the spirit of technology,” warning that it may lead man to become “prostrate at its altar” as it sates his “boundless thirst for knowledge and power” (McLaughlin 209-10).

Tolkien’s most interesting cautionary tale against an unfettered desire for knowledge and the danger of Faustian bargains is found buried in his notes to one of the works posthumously published in the *History of Middle-earth* volumes,

“Athrabeth Finrod ah Andreth” (written circa 1959). In “The Tale of Adanel” we read how the disembodied Voice of Ilúvatar spoke to the newly awakened humans with words quite reminiscent of Genesis: “In time ye will inherit all this Earth, but first ye must be children and learn” (*MR* 345) At first humans obeyed the Voice of their Creator, and as often happens, Ilúvatar’s human students discovered that “learning was difficult” (*MR* 345) and sought the easy and immediate answers from Ilúvatar himself. In response, Ilúvatar cautioned them to “First seek to find the answer for yourselves. For ye will have joy in the finding, and so grow from childhood and become wise. Do not seek to leave childhood before your time” (*MR* 345-6). As with most students thus addressed, the first humans became impatient and “desired to order things to our will; and the shapes of many things that we wished to make awoke in our minds. Therefore we spoke less and less to the Voice” (*MR* 346). Thus humanity fell from science into technology, from the satisfaction of merely understanding into a desire for practical uses, and their personal relationship with their Creator suffered. A shortcut came in the form of Melkor, promising to help humanity attain the “marvelous riches which knowledge can unlock. Ye could have food more abundant and more delicious than the poor things that ye now eat. Ye could have dwellings of ease, in which ye could keep light and shut out the night...” (*MR* 346). What is he promising? Technology!

Thus tempted, humans accept this false teacher, who secures their continued loyalty with occasional gifts of knowledge and goods. All gifts were accepted without question, and with the fear that they would cease without warning. With the trap set, Melkor sealed the deal, using the somewhat theatrical device of a solar eclipse to frighten humanity into final unquestioning obedience to him alone and repudiation of the Voice, their true Creator. When Ilúvatar finally spoke to them again, it was to warn them of their Fall from initial grace, and the resulting punishment – the shortening of their lives from the span initially gifted by their Creator. As a result, humanity was afterwards plagued “by weariness, and hunger, and sickness; and the Earth and all things in it were turned against us. Fire and Water rebelled against us. The birds and beasts shunned us, or if they were strong they assailed us. Plants gave us poison; and we feared the shadows under trees” (*MR* 348). After their initial Fall, humanity fell further still into sin and blasphemy, ultimately leading to human sacrifice and the granting of secret (one might say arcane) knowledge to selected individuals in exchange for unwavering loyalty and the subjugation of fellow humans.

Compare the “Tale of Adanel” with the more well-known story of the second Fall of humanity in Middle-earth, the “Akallabeth.” In this case, Sauron, Melkor’s chief disciple, ensnares many of the Númenóreans with the promise of secret knowledge, playing on their increasingly obsessive desire for prolonged life and ultimately immortality. Seeking these vain technological goals, clearly at odds with the nature imbued on them by Ilúvatar, their Creator, the Númenóreans

delayed death “by all means that they could; and they began to build great houses for their dead, while their wise men laboured unceasingly to discover if they might the secret of recalling life, or at the least of the prolonging of Men’s days” (*Sil* 266). The parallels with *Frankenstein* are also striking.

This brings us to the final scientific lesson of Tolkien’s *legendarium*, namely the concept of responsibility for one’s actions. In the case of the scientific community, this has been a point of contention, especially since World War II. One point of view is that scientists are beholden to the scientific method alone. Their sole responsibility is the search for knowledge, without concern for any eventual applications or implications of their discoveries. This perspective sometimes results in righteous indignation, as in the following argument by chemistry professor Brian Silver (481):

As a scientist, I am offended when science is falsely accused and the real criminal, irresponsible technology, roams the streets free. The tank was not invented by a scientific “loony,” neither was the sword, the musket, the bow, the bayonet, or gunpowder.

Tolkien has some sympathy for this point of view, with clear limitations. He describes Celebrimbor and the smiths of Erebor as an instance where the Elves “came their nearest to falling into ‘magic’ and machinery. With the aid of Sauron’s lore they made *Rings of Power* (‘power’ is an ominous and sinister word in all these tales, except as applied to the gods)” (Carpenter 152). He called them

No more wicked or foolish (but in much the same peril) as Catholics engaged in certain kinds of physical research (e.g. those producing, if only as by-products, poisonous gases and explosives): things not necessarily evil, but which, things being as they are, and the nature and motives of the economic masters who provide all the means for their work being as they are, are pretty certain to serve evil ends. For which they will not necessarily be to blame, even if aware of them. (Carpenter 190)

Where Tolkien clearly drew a line in terms of responsibility is the role of scientists in the development of nuclear weapons. In many letters to his son Christopher, an airman in World War II, the elder Tolkien used the pejorative term Machine to describe the rapidly evolving technology of war. But his language in an August 9, 1945, letter to his son is far stronger. Here Tolkien lamented that “the news today about ‘Atomic bombs’ is so horrifying one is stunned. The utter folly of these lunatic physicists to consent to do such work for war-purposes: calmly plotting the destruction of the world!” (Carpenter 116).

Eleven years later, in that often-cited 1956 draft to a letter to Joanna de Bortadano, Tolkien noted that as a specific example nuclear physics could be used for domination,

But they [sic] need not be. They need not be used at all. If there is any contemporary reference in my story at all it is to what seems to me the most widespread assumption of our time: that if a thing can be done, it must be done. This seems to me wholly false. (Carpenter 246)

The first test of the far-larger thermonuclear bomb in 1952 is certainly a primary example. As he had presciently noted in his 1943 revisions to his essay “On Fairy-stories,” “science (so noble in origin and original intent) has produced in alliance with sin nightmare horrors and perils of the night before which the giants and demons grow pale” (Flieger & Anderson 269). He reiterates in a 1951 letter that “frightful evil can and does arise from an apparently good root, the desire to benefit the world and others – speedily and accordingly to the benefactor’s own plans – is a recurrent motive” (Carpenter 146). In the hands of humanity pure science too often devolves into the terror of technology, at the peril of both science and humanity.

In “The Critique of Impure Reason II: Sin, Science, and Society,” Marx Wartofsky reflects that “scientific innocence consists in the pure pursuit of truth for its own sake, in a selfless inquiry detached from consideration of personal advantage, practical consequence, or ideological prejudice.” Tolkien may have been an idealist when it came to science, but he was certainly not a lone voice crying in the wilderness. This scientist learned early and well from her own Ph.D. thesis advisor (a former Lieutenant Colonel in the Air Force) to not seek or accept grant money from the Department of Defense and has made it a point to never charge people money to look through a telescope, under any circumstance. As the late Canadian astronomer Allie Vibert Douglas (230) mused, “Of star dust are we made and by starlight we live.” The stars of Varda belong to us all, not only Elves, Dwarfs, Hobbits, Ents, Humans, Eagles, and Maiar, but even Orcs, Trolls, and Balrogs. In the age of Anthropogenic Climate Change, we would all do well to ponder the difference between science and sin, methodology and the machine. Tolkien would wisely say that it is imperative to listen to the former and treat with suspicion the latter.

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