Francis Bacon and the Scientific Method:

Bringing Home the Bacon

by Dr. Jeffrey Barclay

Consider this syllogism:

Major premise: real science applies Francis Bacon's inductive reasoning.

Minor premise: the scientific method is real science.

Conclusion: the scientific method applies Francis Bacon's inductive reasoning.

This kind of Aristotelian, deductive syllogism represents the means early scientists used to deduce new truths. Eventually, scientists from both the Muslim East and Christian West expanded this practice by combining rational arguments with investigative observations.[1] But syllogisms were not capable of managing the many sub-premises of increasingly complex analyses. This also meant expectations of empirical experimentation and independent substantiation were now going to be weighed against the intuition of medieval natural philosophers.

With the Renaissance came thinkers like Francis Bacon and his stubborn commitment to empiricism. Bacon's *scientific method* was explained in his *Novum Organum*. Bacon was adamant that hypotheses emerge from investigation, "which ought only to give definiteness to natural philosophy, not to generate or give it birth."[2]

Fast forward to my lifetime. I was doing research in marine biology. Shipping companies spend millions of dollars each year removing barnacles and other marine invertebrates from the bottoms of their boats. I intended to discover an environmentally acceptable way to stop their growth. In the great tradition of capitalism, I was going to bring home some "bacon" as the grateful owners of those vessels shared a portion of their savings with me!

Francis Bacon's intent was for man to utilize rational induction as a tool in fulfilling God's dominion mandate from Genesis 1:28.

I conducted carefully designed tests on marine ecosystems inhabiting ship hulls. Exercising experimental controls, I meticulously applied the scientific method. With exacting scrutiny I recorded what could keep what from growing where. As a budding scientist I knew others, not the least of which were my professors, would seek to reproduce and validate my claims.

Francis Bacon argued for inductive study. "The best demonstration by far is experience, if it goes not beyond the actual experiment."[3] "If a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts, he shall end in certainties."[4] In so many words, Bacon's scientific method told me (and all scientists before and after me), "Jeff, you can't claim to know how to safely keep the hulls of ships free of fuel-robbing invertebrates, until you have repeatedly kept similar hulls free of fuel-robbing invertebrates in similar conditions."

Bacon, noting syllogism's limitations due to a lack of experimental empiricism wrote in his *Rerum Novarum* (1605) that Aristotle was a bond-servant to his logic. According to Bacon this rendered Aristotle's syllogisms "contentious and well nigh useless."[5] Bacon argued the only knowledge of importance was empirically rooted in *hypothesis, experimentation, observation, conclusion*, and independent *verification*. He was convinced his method would make a better world for man by eventually disclosing all that is hidden in the universe.

On the title page of Francis Bacon's *Instauratio Magna* is the image of a ship.[6] The ship is tacking through the legendary Pillars of Hercules. These pillars symbolized the ancients' perceived limits of human discovery. Through unsullied experimentation, Bacon asserted mankind was going to claim new "ports" of human advancement.

Bacon's proposal evoked a sense that the study of nature was preferred, as opposed to a study of God, since nature is observable and God is not. Bacon believed the goal of knowledge was mastery. Since his Christian doctrine taught man cannot and

Dr. Jeffrey Barclay *is the administrator at Veritas Christian School in Lawrence, Kansas. Learn more about Veritas School at http://www.veritascs.org/*

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should not seek mastery over God, as God already masters man, it was reasonable for him to declare, "Certainly nature is a more suitable scientific preoccupation than God."

As science has helped secularize Western culture, some historians argue Bacon advocated secularization. Stephen A. McKnight's book, *The Religious Foundations of Francis Bacon's Thought*[7], refutes this view: "Bacon's program was grounded in genuine and deeply felt religious convictions." I have come to recognize Bacon's religious convictions to be what gave him the security and confidence to advocate rigorous scientific analyses. In *Of Superstition,* Bacon recorded, "The times inclined to atheism … they were civil times. But superstition has been the confusion of many states…"[8] Bacon's remarks should be viewed as a Reformation-influenced acknowledgment that religion, even canonized religion, when misapplied through human predisposition, can kick up a blinding dust.

Bacon's *Of Atheism* also contains a clarifying thesis, "…a little philosophy, inclineth man's mind to atheism; but depth in philosophy bringeth men's mind around to religion."[9] Most convincingly, the title page from *Instauratio Magna* included Daniel 12:4, "Many will pass through and knowledge will be increased." Bacon, recognizing his Christian faith had settled the big questions of life, death, and eternity, was now ready to proceed to new horizons of naturalistic inquiry.

Francis Bacon's intent was for man to utilize rational induction as a tool in fulfilling God's dominion mandate from Genesis 1:28. "If a man endeavor to establish and extend the power and dominion of the human race… the empire of man depends wholly on the arts and sciences. We cannot command nature except by obeying her. "Man, as the minister and interpreter of nature, is limited in action and understanding by his observation of the order of nature; neither his understanding nor his power extends further than his knowledge."[10] Referencing back to my barnacle research, my work was going to explain how man could "obey" the ecosystem on boat bottoms. Through that understanding, boat owners could "take dominion" of those creatures and extend power over that niche of nature.

A lesser referenced, but of no less importance in our day, was Bacon's postulate describing intellectual fallacies. They were described in his *Novum Organum* under four headings. Using Biblical terminology he named them idols.[11]

Bacon called the first *Idols of the Tribe*. These are the tendencies of all men to exaggerate and distort. Eventually these imaginings gain dignity and become mingled with enough facts until the "new combination" becomes inseparable. This may explain Bacon's epitaph which is said to be a summary of his entire philosophy. It reads, "Let all compounds be dissolved. "[12]

The second classification Bacon titled *Idols of the Cave*. These are the peculiars of individual education, experience, environment, and temperament. The title page of Bacon's *New Atlantis* (1626) showed Father Time lifting a female figure from a dark cavern. This was generally understood to be truth rescued from the cave of biased personal intellect.

A third category was *Idols of the Marketplace*. This referred to the problems of language. For Bacon the semantics of science should be accurate and universal. In spite of Latin's singular use in the scientific reporting of his day, Bacon pointed out that deceit and misapplication of words hindered empirical explanations of data.

Bacon's final division was *Idols of the Theatre*. These were abuses of sophistry and false learning. These false philosophies are rehearsed into believability. Then their erroneous merit is rewarded by being cheered on the world's stage.

These days we would benefit from a fresh introduction of Bacon's idols to *things scientific*. Scienticism has pressed the theory of evolution. A bevy of books have responded to explain why a theory, whose proposed results have never been repeated in a laboratory, can be popularly treated like a law.

What a marvel of *the Cave, the Tribe, the Marketplace* and *the Theatre* when a theory, founded upon accident and chance, has been suggested as offering "order" to an evolved, random, and accidental universe! Bacon was commenting on poorly practiced science when he wrote, "The cause and root of nearly all evils in the sciences is this–that while we falsely admire and extol the powers of the human mind we neglect to seek for its true helps."[13]

Another current scientific controversy involves global warming. Have the inventions of science turned our planet into a warming oven? What data is trustworthy? Taken from Aphorism 46 in *Novum Organum*, Bacon confronted scientific partiality when he penned, "Human understanding, once it has adopted an opinion either as being received opinion or as being agreeable to itself, begins drawing everything else to support and agree with it.

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And though there be a greater number and weight of instances to be found to the contrary opinion, yet these it either neglects and despises, or else by some distinction sets aside and rejects, in order that by this great and pernicious predetermination the authority of its former conclusions may remain non-violated."[14]

A contemporary of Bacon, astronomer Johan Kepler, said, "As a priest of the highest God I was merely thinking God's thoughts after him." We must teach young minds that good science can be a mark of servant leadership, honesty, and Christian discipleship. "No pleasure is comparable to the standing upon the vantage ground of truth… and to see the errors… in the vale below, always to be with pity, not pride."[15] To conclude, the Lordship of Christ has eternal prospects in science. To echo thoughts from *The Second Book of Francis Bacon of the Proficience and Advancement of Learning*[16] (1605), scientific research ought not only be esteemed when it has immediate and present uses, but particularly when it reveals truths of universal and permanent consequence. These will always direct more light upon our Triune God, the one of whom is the noblest Light.

Bacon's methods do not preclude the marvel of fortuitous discoveries. (For instance, science guys like me know about how a technician accidentally discovered microwaves. The Hershey bar in his shirt pocket melted during an experiment that was supposed to be exploring the applications of radar.) Yet, properly practiced, Bacon's insistence upon empiricism will protect truths, even those as yet unknown, from manipulation, lies, and myth. It is time to bring Bacon (and our God) back home to science.

ENDNOTES

[1]D.C. Lindberg, *Theories of Vision from al-Kindi to Kepler*, (Chicago: Univ. of Chicago Press, 1976), pps. 60-67.

[2]Francis Bacon, *Novum Organum*, Aphorism 96 (1620) in Stephen McKnight, *The Religious Foundations of Francis Bacon's Thought*, (Columbia: University of Missouri Press, 2006), p. 88.

[3]Ibid., Aphorism 70, pp. 80-81.

[4]The Advancement of Learning, (1605) *The Works of Francis Bacon* (1887-1901), Vol. 3, p. 293.

[5]Francis Bacon, *Rerum Novarum* (1605), referenced in *Stanford Encyclopedia of Philosophy*, http://plato.stanford.edu/entries/francis-bacon, section 2, paragraph 2, line 2.

[6]Francis Bacon, Instauratio Magna, cover page at http://oregonstate.edu/instruct/phl302/philosophers/bacon.html

[7]Stephen McKnight, *The Religious Foundations of Francis Bacon's Thought* (Columbia: University of Missouri Press, 2005).

[8]Francis Bacon, "Of Superstition," in *The Essays*, http://ebooks.adelaide.edu.au/b/bacon/francis/b12e/essay17.html

[9]Francis Bacon, "Of Atheism," in *The Essays*, http://ebooks.adelaide.edu.au/b/bacon/francis/b12e/essay16.html

[10]Francis Bacon, *Novum Organum*, Aphorism 1 (1620), McKnight, p. 75.

[11]Manly P. Hall, *Francis and His Secret Empire*, quoted at *www.sirbacon.org/links/quotesabout.html*, entry 80.

[12]Ibid., entry 86.

[13]Francis Bacon, *Novum Organum*, Book I, Aphorism 9 in McKnight, p. 77.

[14]Ibid., Aphorism 46, pp. 80-81.

[15]Basil Montagu, *The Works of Francis Bacon, Lord Chancellor of England*, (Ann Arbor, MI: Scholarly Publishing Office, 2005), vol. 1, p. 173, referencing Bacon's "Of Truth", in *Essays* (1597).

[16]Francis Bacon, *The Second Book of Francis Bacon of the Proficience and Advancement of Learning* (1605), http://ebooks.adelaide.edu.au/b/bacon/francis/b12a/ (accessed January 16, 2009)