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The Catholic Intellectual Tradition

Scholarship, Faith, and Higher Education

Edited by John J. O'Keefe, Gina Merys, and Bridget Keegan

Response

A Biologist's Perspective on Science and the Catholic Intellectual Tradition

Charles Brockhouse, Creighton University

Introduction

[1] No consideration of the Catholic Intellectual Tradition would be complete without a treatment of the development of modern experimental (natural) science. Alas, such a work is beyond my expertise and available time as a practicing scientist and lecturer in the general area of genetics and molecular biology. While my colleague, physicist Michael Cherney, gives a consideration of some of the more prominent Catholics scientific figures, this chapter offers a distillation of my personal framework. This perspective developed during a lifetime in a family largely formed of converts to Roman Catholicism (and many non-RCs who did not covert) who also placed an enormous emphasis on scholastic development and intellectual rigor. Prominent among my intellectual influences are both my parents; Doris

Brockhouse who was educated by the highly scholastic Basilian order at the University of Toronto, and Bertram Brockhouse, a physics Nobel laureate, who spent much of his later life engaged in reflecting upon the nature of the physical and spiritual worlds. My father's experience during his long process of conversion to Roman Catholicism, spanning youthful agnosticism followed by Anglicanism prior to his final conversion, was particularly important in setting the context for my own scientific development.

[2] In recent years it has once again become fashionable to present religious faith and scientific knowledge as dichotomies. This intellectually flawed view has been promoted by rather obstreperous radical atheists (including some prominent former scientists), and enthusiastically embraced by many in the fundamentalist Christian community. Yet, it is clear that this is an historical travesty. The natural sciences have deep roots in the intellectual life of medieval Western Europe; that is, in the Catholic Intellectual Tradition. To maintain the "dichotomy view" it is necessary to assert that the intellectual giants of this earlier stage of Western development could somehow not surmount their social milieu, while the more enlightened moderns are capable of such prowess. I would assert that this is the equivalent of a teenager sneering at last year's fashions (*"That's soooo 1990s"*), and that it is just as intellectually valuable. The difficulty that many have in grasping the medieval mind is, I believe, largely due to our culture's tendency to view the past through a Protestant Reformation lens that distorts rather than clarifies our image of the world occupied by our intellectual forebears. A less biased consideration of the development of Western science would see the Catholic contribution not only as proportionate to our numbers, but as seminal in setting the context in which the modern natural sciences have arisen.

The Medieval Contribution

[3] No time or civilization is independent. Like all others, Western medieval civilization was extensively informed by outside influences particularly the preceding Greco-Roman culture, and the neighboring Arabic-Muslim civilization. So there is naturally a strong tendency among popular considerations of medieval life to attribute the intellectual innovations of the age as merely the importation of established knowledge from other cultures, either preceding or neighboring. Yet, anyone who has spent time wandering in the great northern cathedrals such as Salisbury (construction starting in 1220) or Chartres (1024 *ff*) must surely grasp how intellectually vibrant the culture was. The spectacle of massive roofs made of stone, wood, and lead apparently floating on curtains of stained glass gives one a visceral grasp of the energy and innovative nature of that civilization. The progress made in engineering, and the rapid spread of innovations across Europe from one cathedral to another demonstrates a strong grasp of empirical methods and mathematics, particularly geometry.

[4] While the basics of mathematics were in great degree inherited or re-acquired from contact with Arabian civilization, several of the intellectual giants of the age such as Roger Bacon (c. 1219-1294) and William of Occam (c. 1288-c.1348), made important contributions to the development of both the intellectual approaches and their practical application in the form of geometry. (The response by Cherney, this collection, goes into more detailed consideration of the contributions of the individuals in question.) Even the inheritance of Greco-Roman knowledge was made possible through the efforts of Irish Catholicism, with their insatiable transcription of ancient texts, and their restless missionary activity which

restored orthodox Christianity, some degree of literacy, and copies of ancient works to mainland Europe (Cahill). It was the Irish monks that kept learning alive during the long Dark Ages that followed the fall of Rome, and preceded the rise of the medieval Western civilization.

[5] In terms of the development of scientific methodology, one event stands out both by its historical importance and the sheer charm of the story. In his *magnum opus*, *Ascent of Man*,[1] Jacob Bronowski vividly recounts the work of Theodoric of Freiberg (c. 1250-1310), which investigated the nature of rainbows. Bronowski gives this the status of the first exemplar of the scientific method. First the observation: rainbows are seen when both sun and rain are occur together, and are viewed from the correct angle. Second, the hypothesis: the raindrops are scattering and reflecting the light in such a way as to produce the concentric colored arcs. While several scholars had considered this phenomenon previously (including Roger Bacon), Theodoric's efforts were distinguished by his going beyond proposing a reasonable explanation, and even beyond proposing geometric models of the interacting of light and raindrops. Theodoric had glass spheres of various sizes made in an abbey workshop, and used them to simulate raindrops, producing his own rainbow. He tested his hypothesis and theoretical model, and in the process set the standard for the scientific method. All this took place not by some alchemist in dark cellars, hiding away from the authorities, but by a noted scholar at the behest of the Pope, literally in the light of day.

[6] One critical development from the Western Christian medieval world, more than any other, had a formative impact on the development of the modern west, which continues to this day. The influence of *the university* cannot be overstated; there is no facet of modern Western life which is not profoundly impacted by the scholarship and training produced by this innovation. The origin of this unique institution was as a gathering of scholars at Bologna (1088) that was subsequently granted papal protection and encouragement (1148). Universities at Paris (c. 1160), Oxford (late 1000s, formalized in 1167), Cambridge (1209), Salamanca (1218), and other centers followed. The university gathered scholars from different orders, nationalities, and disciplines together in a milieu that enjoyed more protection from hostile secular authorities than was previously possible (which continues to this day as the tradition of academic freedom). The institution provided a source of intellectual continuity to a degree not seen before. Schools of thought could interact, and continue to develop over generations undisrupted by the death of single scholars. The medieval society of Western Christendom thus produced the intellectual and institutional tools that led to development of modern science, and indeed the wider modern society.

Renaissance

[7] Of all the involvement of Catholics and Catholicism with the natural sciences none has been so persistently misunderstood and misrepresented than that of Galileo Galilei and his interactions with Pope Urban VIII. Several historical corrections and commentaries, more authoritative than this treatment, have been published. Readers interested in the details of this controversy might consult the extensive references of The Galileo Project Library (Rice),

[1] This was originally a BBC television series, made to accompany and counter-point Sir Kenneth Clarke's *Civilization* series.

the interesting article by Johnson, the Galileo entry of the Catholic Encyclopedia, or numerous articles in Scientific American over the past several decades.

[8] In view of the persistent misunderstanding of Galileo's confrontation with church authorities, it is worth noting several points. Beginning in his agnostic phase my father, a physics Nobel laureate (1994), said on several occasions that Galileo "got what he asked for." This puzzled me for some time. However, accumulated reading (and experience) made it clear that Galileo presented his material with unnecessary belligerence, using his publications to insult those who disagreed with him, including those who befriended and supported him. During his interactions with church officialdom, he managed to alienate first the Jesuits who had advocated many of his scientific views, and then his friend and patron, Pope Urban VIII. The latter had dared to disagree with Galileo on the nature of proof vs. evidence, resulting in Galileo producing a character "The Simpleton," a thin disguise for Urban, to present the arguments contrary to heliocentrism. The resulting trial and punishment were, objectively, a grotesque over-reaction, but given the context of time and place, they were *relatively* benign. It does not take too much imagination to perceive what would have happened to Galileo had he chosen in ridicule the monarchs James I/VI in Britain, Philip III in Spain, or Louis XVIII in France. Indeed, the specter of the ancient Athenian's treatment of Socrates demonstrates fully the perils of being an "impertinent scholar." Before leaving this topic, it should be noted that the technological limitations of the day prevented Galileo from observing some phenomena that were requisite if heliocentrism were correct, leaving scientific contemporaries including Tycho Brahe (1546-1601), who did not live to see the telescopic evidence, and Francis Bacon (1561-1626) unconvinced. I would also add a personal caveat to my father's "he got what he asked for": if everyone "got what he asked for," many of us would be in very great trouble indeed.

Experimental Biology: Into the Modern Era

[9] While "Biology," broadly considered, is surely one of humanity's oldest occupations in terms of hunting/gathering and later agriculture and agronomy, it is also the youngest of the natural sciences as an experimental/empirical discipline. Prior to the mid-1800s the term "natural philosophy" was an apt description of the scholastic pursuits that would now be subsumed into Biology. Unfortunately, the giant of Biology's transition into an experimental science falls outside the "taxonomy" of this chapter: Charles Darwin spent the first part of his religious life as a member of the Church of England (i.e., Anglican), and apparently transitioned into a troubled agnosticism (Barlow).

[10] Two other giants fall firmly into the scope of this book: Gregor Mendel, founder of Genetics and Jean-Baptiste Carnoy, father of Cell Biology. Both were clerics: Mendel an Augustinian monk and priest in the Austrian Empire, Carnoy a secular priest in Belgium. The two deserve special consideration in this chapter from among the myriad of "modern" Catholic scientists not only as the founders of my own field within Biology, but as founders of the most dynamic and fast moving of all the modern Biological sciences.

[11] Most readers will be familiar with the basics of Mendel's life (see further Barlow). As an Augustinian monk, he was a member of the abbey in Brno, of the Austrian Empire (in that area which is now the Czech Republic). Eventually he was elected Abbot of his house, which had the unfortunate effect of ending or at least severely curtailing his scientific experiments.

He was at once extremely familiar with biological systems as a gardener, and highly numerate having trained at the University of Vienna in mathematics and physics. His rigorous experiments with plant genetics produced the basis for transmission genetics including the notions of diploidy, independent segregation, and independent assortment of alleles and genes. The sheer genius of these inferences cannot be overstated; in the absence of any knowledge of the relationship between genes and chromosomes, Mendel correctly described their behavior, solely from the observation of ratios of genetic variants resulting from controlled crosses of pea plants. Such was the clarity of his data that the eminent British mathematical geneticist, R.A. Fisher asserted that the data must have been fudged. Much later, a re-analysis by the brilliant geneticist Charles Novitski demonstrated that there was no need to invoke any nefarious behavior on Mendel's part to explain his observations.

[12] In some respects, Mendel is the founder of genetics only in a formal sense. His work, although available and circulated, seemed to fail in the standard test of replication. Breeding experiments using other organisms and traits produced quite different patterns of inheritance. In retrospect, we very clearly understand the reasons for this: phenomena such as linkage, incomplete dominance, co-dominance, and gene interactions all mask the underlying "Mendelian" patterns of inheritance. A generation passed before his work was "rediscovered," and integrated into the young field of genetics.

[13] Jean-Baptiste Carnoy (1836-1899), although more directly connected with the discipline that he helped create, is a far more obscure figure in the common history of science than his contemporary, Mendel. Practicing cell biologists and cytogeneticists are intimately familiar with his name as the title of a dizzying array of biological fixatives ("Carnoy's solution," etc.), which have the purpose of preserving cell and tissue specimens in an appearance as close to "living" as possible. My own rather limited knowledge of Carnoy's biography was tested only recently by a student's question. My cytogenetics course makes extensive use of Carnoy's fixative (3 parts pure ethanol, 1 part glacial acetic acid; an excellent fixative for polytene chromosomes, and a truly wicked remover of paint on cars). In addition to it's fixative and car-paint removing properties, it has a powerful odor. One student, after getting too close to the bottle of Carnoy's, was inspired to ask "Who was this Carnoy guy anyway?" "This Carnoy guy" was a Belgian priest, who ultimately became a professor at the University of Louvain, teaching Biology. In particular, he focused on microscopy and what would now be termed cell biology. He founded the early scientific journal "La Cellule," and pioneered the science of cytology and the use of biological fixatives to improve microscopic studies. His fixatives have made a profound impact on cell biology, through cytogenetics to modern genetics and molecular biology. Perhaps because his work lacks the romance of being "lost" and rediscovered, he seems to be a much more obscure historical figure than his counter-part, Mendel. Yet these two Roman Catholic priests can be justly considered founders of the twin disciplines of genetics and cell biology, which have united into the molecular revolution in biology that is transforming Western science.

On "Scientific" Atheism

[14] It has once again become fashionable for some public figures to espouse an aggressive form of proselytizing atheism (see the recent popular works by Richard Dawkins and Christopher Hitchens, among others). Atheism is being presented as a "scientific" viewpoint,

as opposed to the superstitious and antiquated religious world-view. This is a prime example of standing reality on its head. As my father repeatedly pointed out, atheism is a profoundly unscientific framework. At its base, it postulates a negative: "God does not exist." No scientist would frame his research question in this way. Russell's "Teapot Fallacy" argument is often invoked to counter this revelation. The "teapot fallacy" attempts to reverse the burden of proof, by suggesting that anyone proposing an ultimately unfalsifiable assertion must prove it, rather than claiming belief in the assertion on the basis that it cannot be disproved. There are two major flaws in the "teapot fallacy" in the context of "scientific atheism." First, billions of people, spanning all of recorded human history have not made the assertion that there is a teapot orbiting Saturn, or any such absurdity. They have made the assertion that something other than us exists on a spiritual plane. The off-hand rejection of this speaks to a corrosive intellectual arrogance. More importantly, the "scientific" atheist using this argument simultaneously demands a special exemption from the scientific process, while insisting that their interlocutor must rigorously follow the scientific method (which of course was invented by convinced theists). This is a classic "having your cake and eating it too" position. By asserting the "teapot fallacy," the atheist puts the ball squarely back in the philosophical court, removing it from the sphere of natural science. Now, most theists would not claim that a belief in God is *scientific*, only that it is reasonable (see John Paul II's *Fides et Ratio*). All the positive "evidence" provided by atheists for their religious stance that I have ever encountered boil down to the view that the universe is not what they would design and allow, if they were God.

[15] As C.S. Lewis pointed out, the atheist must believe that the vast majority of humans who have ever lived were *completely* wrong in their beliefs about the very fundamental nature of their existence, whilst they themselves have escaped from this superstitious trap. The intellectual arrogance is breathtaking. A fuller discussion of atheist arguments and assertions is outside the sphere of this chapter, and would require someone with more expertise and willingness to engage in this arena than I. Personally, I am no more willing to commit to such a task than I am willing to invest time and energy in refuting those who believe the earth is flat, or in challenging those who assert young-earth creationism. In closing, it should be noted that atheism is an entirely different beast than agnosticism, because agnosticism lacks the taint of arrogance, and is more compatible with a scientific framework.

Some Reflections on Catholic Education

[16] The modern Western world is highly technological and ultimately the product of the spectacular success of the natural sciences. All the routine activities of our lives – turning on the lights in the morning, commuting to work, taking antibiotics or antivirals when ill – are dependent on the products of the scientific method (and of universities for that matter). If the Church wishes to remain an effective force in Western life, it must be deeply engaged with the natural sciences. Our own institution, Creighton University, provides a model for deep commitment to both Catholicism and scientific scholarship. While one can respectfully argue the relative weight given to the two facets (and we do), no one will dispute the importance of both to the institution, and to the education it provides. In my view, too little of this synergism is seen in most levels of Catholic education. We have lost, or are losing, many of the greatest biomedical ethics disputes of our time in large part because of a

perception that "the scientific view" favors those who would sever our traditional ethical standards. We must have committed Catholic scientists, physicians, engineers, etc., in order to keep a seat at the debate table. In short, we must rediscover, value, and promote the Catholic Scientific Tradition.

Bibliography

Barlow, Nora, editor

1958 *The Autobiography of Charles Darwin*. New York: Norton.

Bronowski, Jacob

1074 *The Ascent of Man*. Boston: Little & Brown.

Cahill, Thomas

1995 *How the Irish Saved Civilization*. New York: Anchor.

Fisher, R. A.

1936 "Has Mendel's Work Been Rediscovered?" *Annals of Science* 1: 115-37.

Gerard, John

1909 "Galileo Galilei." *The Catholic Encyclopedia*. Available online at http://www.newadvent.org/cathen/06342b.htm.

Johnson, George Sim

1994 *The Galileo Affair*. Princeton: Scepter.

Lewis, C. S.

1952 *Mere Christianity*. New York: MacMillan.

Novitski, C. E.

2004 "Revision of Fisher's Analysis of Mendel's Garden Pea Experiments." *Genetics* 166: 1139-40.

Rice University

n.d. *The Galileo Project Library Bibliography*. Available online at http://galileo.rice.edu/lib/bibliography.html.