

1-1-2003

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Recommended Citation

Anderson, Paul (2003) "Quakers and Science- Myths, Realities and the Science- Religion Dialogue," *Quaker Religious Thought*: Vol. 99, Article 9.

Available at: <http://digitalcommons.georgefox.edu/qrt/vol99/iss1/9>

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QUAKERS AND SCIENCE—MYTHS, REALITIES AND THE SCIENCE- RELIGION DIALOGUE

PAUL ANDERSON

A great chasm has existed between religion and the sciences in the modern era. In fact, it is no exaggeration to say that the authority enjoyed by religion between the fourth and sixteenth centuries in Western civilization was supplanted by the rise of scientific method and its growing domination from the seventeenth century to the present. Further, the prevalent “mythology of the modern era” has tended to supplant religionism with scientism. Rather than seeing the religious quest as the answer to the world’s problems, the myth of scientism has promised that humanity would evolve higher and higher on the basis of technological advances and problem-solving abilities. Science has often been pitted against religion, and vice versa, but these conflicts are more often than not overblown.¹ Where scientific discovery is self-evident, religion tends to go along; and, where religion contributes genuinely to society, rarely is it turned away—by the scientifically minded or otherwise. The conflict between science and religion, however, continues with a few exceptions. Interestingly, *Quakers* provide several of those most notable exceptions, as Friends have done extremely well in the sciences, and the question is: *why?*

No shortage of attempts to answer this question abounds, and one of the most interesting explanations of Quaker success in science and industry is put forward by David Hurst, a major steel-industry analyst. According to Hurst (author of *Crisis & Renewal*, Boston: Harvard Business School Press, 1995, citing Raistrick’s statistics), Quaker representation as Fellows in the Royal Society has outnumbered the rest of the population by a ratio of 40:1, and this is a very interesting phenomenon. In his analysis of Quaker involvement in science and industry, Hurst focuses on Quaker discoveries in Coalbrookdale and the Severn Valley, which Hurst describes as “the Silicone Valley of the English industrial revolution.” Among Hurst’s points, he notes that Quakers cooperated together across societal stratification, they problem-solved readily, they made do with what they had, which often led to innovation, and at times they stood for

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principle against morally problematic opportunity, and in so doing, became discoverers of new ways of doing things. The classic tale involves the refusal to sell iron to the English government during the war effort, and because of having a surplus of iron, the Coalbrookdale Quakers used the iron for rails, paradoxically becoming innovators in the rail and steam-engine enterprises. Put otherwise, Quakers sought to *do good*...and ended up *doing well*.

These and related interests, however, have contributed to something of a Quaker mythic lore, which deserves to be assessed critically regarding its relation to reality. To what degree were Quakers disproportionately on the forefronts of discovery—scientific and otherwise—and in what ways did adherence to moral principle actually turn out to be beneficial? And, even if Quaker innovation has tended to gravitate around the mundane and the ordinary fields of preventive medicine, technology and botany, rather than in the more advanced sciences, why might Friends have been so prolific at discovery? Arthur Raistrick's own commentary upon the reasons for these connections puts forth the following reflection:²

The seventeenth century was a time of real advance in science and of the formulation and extension of scientific enquiry and experiment along modern lines. Alongside the religious questings and searchings out of which Quakerism emerged there was an ever-increasing urge to explore and to understand the physical world and its implications.... It is not, therefore, surprising that Friends should have had close contacts with, and even contributed to, this birth of modern science, in spite of the many serious obstacles that stood in their way. What is surprising, is that this aspect of Friends' activities should have passed with so little comment, although it has been stated in recent years that in strict proportion to their numbers, Friends have secured something like forty times their due proportion of Fellows of the Royal Society during its long history. Surely it is significant that the scientist and the Quaker share the insistence on the complete surrender to the guidance of truth, and that the scientist, if his science is to flourish, must exercise an ethical standard of integrity and unswerving loyalty to the revelation of truth that his work affords, that is identical with the faith of Friends, being expressed only in a different vocabulary.

With this statement, Raistrick makes two claims: the first is an empirical claim. Quakers are dramatically over represented among the ranks of noted scientists. The second is an analytical assertion that the resolute quest for truth, common between Quakers and scientists, explains the correlation. The first claim, even if it is overblown, seems remarkable.³ It challenges the modernistic myth that science is the enemy of religion, calling into question basic assumptions upon which the age of secularism is founded.⁴ Indeed, if there is even some sort of positive correlation between Quakerism and scientific discovery, this pattern demands an explanation. Rather than being the enemy of scientific discovery, authentic religion may be its greatest catalyst.

If something like this were true, Raistrick's explanation, then, is not far off the mark. The thesis that the common feature between scientists and Quakers is their unrelenting pursuit of the truth accounts for some of the synergy, but it is not the only factor. Several others may also have been involved. First, taking the above point further, Friends have believed centrally that *all truth is God's truth*, and they have committed themselves centrally to the seeking of truth wherever it may lead. Therefore, challenges brought to religion and society have equally been levied in the name of truth. Friends have advocated that it is to be sought and minded at all costs, and such is the basis for all academic, scientific, and spiritual ventures alike.

A second factor in the correlation is the refusal to regard the spiritual realm as divorced from the physical world. A *unitive view of the character of truth* has contributed to Friends' openness to God's revelation in the created realm, and attending God's order and handiwork in the physical realm is held to be coherent with revealed truth, not contradictory to it. In that sense, discovery in the realms of science is held to be congruent with the apprehension of divine openings and leadings that comes in a "gathered" meeting for worship. Phenomenologically, many scientists have also described the sense of Gestalt and synthesis that accompanies discovery as a deeply *spiritual* process, inspiring awe and wonder. The conviction that God's revealing work continues as a factor of the unfolding of God's purposes and activity in history also yokes the spiritual and the scientific quests together into a complementary union. Each propels the other forward in ways that make genuine progress possible.

A third factor involves the conviction that the accomplishment of God's spiritual purposes in the world *includes material realities* cen-

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trally. Despite the spiritual and unmediated approach to God advocated by Friends, they have been among the most insistent upon the importance of meeting the *physical* needs of humanity. Feeding programs, development projects, economic concerns, business ventures, technological improvements, medical and hygiene interests, peace work, educational programs, and environmental concerns have characterized Friends commitments in the world, and all of these material ventures are rooted in a *profoundly spiritual* vocation. God calls us, Friends attest, into a human/divine partnership whereby the real needs of the world are met by those who serve out of a genuine sense of God's love for the world. This explains also the predominance of service and social-work professions chosen by Friends historically. The love of God calls for action rooted in loving concern for the world, and this often involves material aid and problem-solving as a partial answer to the world's problems

For this reason, Friends have considered Christian ministry to involve the *identifying* of a human need followed by the *addressing* of that need, energized and empowered by the transforming love of God. This means that spiritual ministry is considered less a function of formal or structured religious activity, and more a result of meeting the needs of humanity in ways that are effective. Indeed, most of the ministry of Jesus and his disciples involved the addressing of physical needs, and Friends have continued in that trajectory. The vocational result, however, has been that Friends have taken seriously as a spiritual calling any endeavor that furthers God's work in the world by means of addressing more effectively particular human needs. The intrinsic interest in this pursuit also has contributed to the authenticity of the venture, enhancing the effectiveness of investigations into the truth and resultant discoveries.

A fourth factor stems directly from the third: the *workplace* is understood to be *the context of witness and service*, and the sort of work one does occupationally is thought to be an extension of one's spiritual vocation. Therefore, Friends have seen serving the needs of the world as an expression of one's calling to serve, and this has caused Friends to choose some venues of work over and against others. Resultant from such a conviction is the Quaker commitment to integrity, and this priority results in several manifestations: a) Letting one's "yes" be yes, and one's "no" be no implies honesty and forthrightness. The first generations of Friends moved to a fixed-price system of trade, and because the Quaker merchants could be trusted,

their businesses flourished. b) Commitments to equality led to plain speech and the egalitarian treatment of persons from varying sectors of society. This meant that business owners and their families intermingled with laborers and their families, and these interactions actually increased the effectiveness of corporate ventures. c) Abusive and damaging ventures were often rejected by Friends, sometimes at a considerable cost. Friends being among the first to liberate their slaves, and John Woolman's rejection of indigo dye are but a couple of the principled stands taken by Friends involved in business and technology. d) Friends provided for their workers' housing and welfare needs, and the company homes provided in Bournville, England, and Bessbrooke, Northern Ireland, stand out as great examples of doing the right thing because it was the right thing. Paradoxically, it also worked well. Employees and their families did better, and were generally more healthy, which contributed to their ability to work more productively for the good of the company. Finally, e) Friends lived frugally, not spending capital on diversions or excessive comforts, but often ploughing resources back into development and building the infrastructures that made other aspects of the enterprise work well.

A fifth factor involves the challenge of *prospering over adversity*. Because Friends refusing loyalty oaths were not allowed to attend the elite universities in England, they had to come up with their own educational systems. They invested heavily in the practical disciplines and became very adept at problem solving. Exclusion from religious rites of passage forced Friends to keep their own records, and they became very adept at record keeping. Keeping track of liquid assets led to adeptness with banking and money management. Addressing the problem of dwindling charcoal supplies for smelting furnaces led to experimenting with burning coke, which burned at a higher temperature, producing a higher grade of product, cast iron. And, finding things to do with excess iron at Coalbrookdale led to the replacing of wooden rails with iron ones, and the creation of the first iron bridge. These are but a few ways that discovery was furthered by hardship, especially when addressed creatively.

A sixth factor in Quaker inclination to discovery involves a *stubborn refusal to settle for suffering and hardship in the world*. Joseph Lancaster refused to tolerate the ignoring of the uneducated masses of London and set about to offer learning opportunities to any who would like to learn. This led to an over-subscription of attenders, and

older and more able students were pressed into the service of teaching others. It was found that the tutors also learned in the process. In a variety of attempts to reverse the maladies of common illnesses, Joseph Lister discovered antiseptics; his father, Joseph Sr., had discovered the compound microscope along with Thomas Hodgkin, who did ground-breaking research on gland ailments (Hodgkin's Disease is named after him); John Fothergill produced an inoculation for smallpox; and Len Lamerton advanced significantly the field of radiation biology. In addition, Friends were among the first to care for the needs of the dispossessed, and Elizabeth Fry's prison reforms, William Tuke's founding of the first care facility for the insane (The Retreat at York), and the ground-breaking social work of Jane Addams all are examples of providing a redemptive alternative to the "givens" of life.

A seventh factor in Friends' tendency toward discovery involves *attending the details—noticing everything*. Note these advances that Friends have made in the sciences, simply by observing: John Dalton, the headmaster and chemistry teacher, discovered the weight of atomic particles, and Dalton's Periodic Chart (the eventual outlining of atomic weights) has become the world standard for chemical theory. Thomas Young, with his double-slit experiments established that light was a wave motion, challenging the Newtonian particle theory of light. Arthur Eddington developed a theory of stellar evolution and contributed to the establishment of Einstein's theory of General Relativity. Kathleen Lonsdale, one of the first two women inducted into the Royal Society, made extensive advances in crystal research and the ring-structure of benzene. Maria Mitchell discovered a telescopic comet in 1847 and was the first woman member of the American Academy of Arts and Sciences. And, Jocelyn Bell Burnell carried out the research for which the Nobel Prize was awarded in 1974 for the discovery of the pulsar. These are but a few examples of Quaker scientists who have furthered discovery by attending details and noticing God's handiwork.

An eighth factor in Quaker discovery is an *open and interactive approach to networking and a continued openness to the revealing work of God in the world*. Many examples abound where one Friend working on one project networked with another on a different one, maximizing social resourcefulness in ways that have crossed over disciplinary boundaries and limitations. Joseph Fry worked with chocolates and with soaps; William Allen made advances in pharma-

ceuticals and educational and philanthropic ventures; John Bellers advanced social, education, and prison reforms; and Sylvanus Thompson argued effectively for the integration of science and religion. Perhaps the most important aspect of this factor, though, is the belief that God's truth continues to be disclosed to those whose lives are open to it. Indeed, the practical implications of a doctrine of continuing revelation are that God is actively seeking to lead humans into truth on all sorts of levels. In politics, art, science and religion, the invitation is the same: to be led into truth, believing that truth is always liberating. Certainly in the meeting for worship many a problem is addressed with fresh creativity, and the Quaker Meeting for Worship itself might well be considered a ninth factor if another were to be added.

Indeed, much of the mythology around Quakers and science is overblown. Much of Quaker discovery, as the above examples suggest, is not scientifically oriented in narrow, disciplined ways. Nonetheless, in the practical, problem-solving ventures of life, Friends continue to make advances toward the truth, seeking to employ all means that are serviceable. It is also a fact that not all of the sixty or so "Quaker" members of the Royal Society's eight thousand members deserve equal consideration as Friends. Some came from Quaker backgrounds, but then left Friends later in life. Some joined Friends later, or had only a loose connection with Friends. In that sense, Raistrick's numbering reflects a "generous" approach to statistics, but it is not entirely misleading. The reality is that Friends have continued to play major roles in ventures of discovery, and at least part of this phenomenon is a reflection of the conviction that God calls us to further God's work and purposes in the world.

So why is it that Friends have played a disproportionately large role in scientific and industrial innovations, and what are the implications for the science-religion dialogues today? No single answer will do. The place to begin, though, is centrally connected with the belief that God is at work in the world, seeking to lead the seeker into liberating truth. That being the case, no legitimate truth-seeking venture is off limits. Rather, advances made on one level propel the way forward on others, and in science, as well as religion, we are invited to live life *experimentally!*

NOTES

1. See, for instance, Ian Barbour's excellent treatment of the subject: *Religion and Science; Historical and Contemporary Issues* (New York: HarperCollins, 1997). Of four models of engagement, the "conflict" model often gets the most publicity, but it is least represented among the finest scientists and theologians.
2. Arthur Raistrick, *Quakers in Science and Industry* (New York: Augustus M. Kelley, Publishers, 1968), 221-222. This is the passage cited by Hurst, above, and in the following essay by Cantor.
3. Renown physicist Kathleen Lonsdale suggests in her essay, "Science" (in *The Quaker Approach to Contemporary Problems*, Ed. by John Kavanaugh [New York: G. P. Putnam's Sons, 1953]), that even if the number was only half of Raistrick's figure, say, a 20:1 over-representation in the Royal Society, and especially during the middle part of the 19th century, this would still be significant.
4. At the "Truth in Science, Truth in Religion" conference held at Harvard University in late June and early July 2002, the assumption was expressed that some academicians assumed that religion had to be abandoned if one were to be a first-rate academician. Ninety-five percent of the attenders, however, including several Nobel Prize winners, disagreed diametrically. Nonetheless, it is a common assumption that science is the enemy of religion, even if it is held unreflectively. Indeed, many of the greatest scientists in the modern era have been persons of deep religious faith.