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Routes of Learning: Highways, Pathways, and Byways in the History of Mathematics (Book Review)

Abstract

Reviewed Title: *Routes of Learning: Highways, Pathways, and Byways in the History of Mathematics* by Ivor Grattan-Guinness. Baltimore, MD: The Johns Hopkins University Press, 2009. xii + 372 pages, with index. ISBN: 9780801892486.

Keywords

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Disciplines

Christianity | Mathematics

No longer need we blame a Creator God's direct hand for any of these disturbing empirical facts. Instead, we can put the blame squarely on the agency of insentient, natural evolutionary causation.

This reasoning will strike many readers of *PSCF* as basically flawed. While some may agree that natural causation rules out the work of God's "direct hand," the suggestion that this shifts responsibility away from him completely, does not follow. After all, one need not wield a weapon with one's own hands to be held culpable for a crime. I suspect that most Christians would agree with me that there is little if any distinction between causing pain and standing by while it is caused by someone or something else. Blame-shifting just does not help: once we confess an omnipotent deity with the means to intervene, we put that deity right back on the hot seat of theodicy. Perhaps Avise has a different god in mind when he seeks to absolve the divine. In any case, assessing his success requires identifying this god a priori.

Avise has argued successfully against the proposal that the human genome is an example of excellent design, or even a product of a little bit of optimization, and his case is worth examining. And while his attempt to bring some peace to the struggles between evolution and some sectors of Christendom is a decent thing, few of us would have thought that the problem of evil could be so easily dispatched.

Reviewed by Stephen F. Matheson, Associate Professor of Biology, Calvin College, Grand Rapids, MI 49546.

ROUTES OF LEARNING: Highways, Pathways, and Byways in the History of Mathematics by Ivor Grattan-Guinness. Baltimore, MD: The Johns Hopkins University Press, 2009. xii + 372 pages, with index. Paperback; \$35.00. ISBN: 9780801892486.

Ivor Grattan-Guinness has enjoyed a long and illustrious career as a prominent historian of mathematics. Since 1970, after receiving his doctorate in history of science, he has authored several large books and numerous articles, and he has edited both a massive two-volume survey work (*Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences*) and a work containing extensive primary source material (*Landmark Writings in Western Mathematics, 1640–1940*). In addition, he has delivered hundreds of invited addresses worldwide, been an editor for several important journals in the history of science and mathematics, founded and edited *History and Philosophy of Logic*, and held high offices in professional organizations related to history of mathematics.

Grattan-Guinness's special interests and scholarly output lie mainly in the history of calculus (foundations and physical applications), mathematical logic, and foundations and philosophy of mathematics. While his primary focus has been nineteenth- and twentieth-century European mathematics, some of his writings treat earlier developments and other cultures, such as Greek geometry, and he has also written a general work on the history of mathematics. His entry into the field of history of mathematics was, as was my own and others', prompted by dissatisfaction with the way undergraduate mathematics is typically

taught—with little reference to central motivating questions and almost no discussion of its historical development or human involvement. This experiential background manifests itself in Grattan-Guinness' keen interest in the meaning and use of history of mathematics, in his passion to make history of mathematics serviceable to mathematics educators.

Routes of Learning reprints (occasionally, revises) some of Grattan-Guinness's earlier articles. These go back as far as 1972, but the book is certainly not a *best of career* reproduction, showcasing what he has been engaged with over the last forty years. In fact, very few of the eighteen chapters touch on the topics for which Grattan-Guinness is best known. None deal with the history of mathematical physics, calculus, analysis, mathematical logic, set theory, or foundations of mathematics, except in an incidental or illustrative manner. *Routes of Learning* has instead a more philosophical or epi-mathematical bent, containing reflective essays on the value and use of history of mathematics and its connections with matters somewhat off the beaten path.

The book begins with an introductory autobiographical piece on how Grattan-Guinness came to the field of history of mathematics, a field he wryly categorizes, with regret, later in the book (chap. 6) as being "too mathematical for historians and too historical for mathematicians" and "both too historical and too mathematical for philosophers," undoubtedly along with everyone else. Nevertheless, interest in history of mathematics has increased over the last half century, if the rise of the field as a bona fide profession (documented in chap. 3) is any indication.

Part 1: Highways in the History of Mathematics explores various historiographic issues, broadly considered. The questions it implicitly takes up in seven essays are the following: What is history of mathematics, and how does it differ from mathematical heritage? Who should (and does) do history of mathematics? Whom and what is it for? How is it related to mathematics? to the history of science? Does mathematics develop historically in qualitatively different ways from physics and other sciences? Does it include revolutions and radical paradigm shifts or only convolutions (Grattan-Guinness's term for a more complex sort of change)?

Part 2: Pathways in Mathematics Education looks at ways history of mathematics can enrich and inform mathematics education. Grattan-Guinness discusses this in general terms, but he also investigates specific fields and topics (Greek geometric algebra, number concepts and computational procedures, calculus), and he sketches out a history of mathematics course he once developed for teachers.

Part 3: Byways in [the History of] Mathematics and Its Culture traces the multifaceted relations connecting mathematics and religion, and the various numerological ties linking mathematics and music. We will say more about this section shortly.

Part 4: Lollipops is a peculiar supplement tacked on to the end of the book. It consists of one ten-page chapter, devoted to an exposition of *Four Pretty but Little-Known Theorems Involving the Triangle*. This might be of some interest to mathematics educators, but little hinges on it from a historical or philosophical perspective.

Book Reviews

Taken together, the essays in this book give the reader a good picture of what has motivated Grattan-Guinness's tireless work as a historian of mathematics. It presents the author's personal viewpoint on a number of historiographic and interpretative issues that have been debated by historians of mathematics over the last generation or so. The book is rich in references and allusions to historical topics that Grattan-Guinness has spent a lifetime researching, but at times one wishes he would share more of the wealth of his knowledge to flesh out off-hand comments or bare-bones assertions not readily comprehended by outsiders, such as the claim that Descartes' algebraic geometry was not coordinate geometry (p. 199) or that Piaget misunderstood Bertrand Russell's program (p. 207). However, for those interested in Grattan-Guinness's take on the topics under consideration here, this volume provides them with an easily accessible source.

Back now to the book's less-traveled byways, what some might consider oddball connections between mathematics and religion. Readers of this journal might be more interested than most in Grattan-Guinness's essays on mathematics and religion or mathematics and numerology/Freemasonry. One essay details numerological features of the music of Mozart and Beethoven, while two longer essays are devoted to connections between mathematics and different Christian traditions (here called "the Christianities"). Noting that this topic remains largely outside the pale of normal historians' interests, Grattan-Guinness makes a case for why it deserves more attention than it has been given.

His main focus in the first of these essays is the influence of mathematics through special numbers and shapes on Christian sacred writings, doctrines, and architecture. The second essay explores the decreased linkage between mathematics and religion since the time of the Enlightenment (with certain notable exceptions), attributed to the secularization of mathematics and science in Western cultures. Grattan-Guinness finds this public silence by mathematicians on religion somewhat puzzling, however, since debates over the relation of science and religion have never completely disappeared, and he wonders whether further historical research into the phenomenon would clarify or modify our picture of this development. He recognizes to some extent that there still are Christian mathematicians and educators, particularly in English-speaking countries, who desire to give a greater role to Christian faith in their work. The annotated *Bibliography of Christianity and Mathematics* edited by Gene Chase and me in 1983 is cited in a footnote, but he nevertheless seems unaware of the Association of Christians in the Mathematical Sciences, which has been in existence in the USA since 1977 and has had an online presence since 2004. While he recognizes that many mathematicians now and earlier have held private religious beliefs, he asserts that this has had no real impact on their view of mathematics or its practice.

Grattan-Guinness is fascinated by the possible mystic connections between faith and mathematics, but he lacks sympathy for those who would embrace closer connections between the two: "My own logical stance is, God save us from religions [i.e., organized faiths], especially the aggressive ones" (p. 242). This negative attitude notwithstanding, those taking a different approach to this

topic will still want to read what Grattan-Guinness has to say about it, for not much has been written on Christianity and mathematics from a scholarly historical viewpoint.

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PHILOSOPHY & THEOLOGY

BELIEF: Readings on the Reason for Faith by Francis S. Collins, ed. San Francisco, CA: HarperCollins, 2010. 352 pages. Paperback; \$19.99. ISBN: 9780061787348.

Francis Collins wants you to believe in God, not in any particular religious tradition's understanding of God—it would seem—just the general concept of God. And he is persuaded that you are more likely to believe in God if you can first believe that it is not irrational to do so.

Collins has both experience and credibility to make this argument, despite his repeated protestations in this volume that he is neither theologian nor philosopher and therefore an unlikely editor of a collection of readings on the rationality of belief. Currently the director of the National Institutes of Health and former director of the National Human Genome Research Institute, Collins wrote *The Language of God: A Scientist Presents Evidence for Belief*, a 2006 memoir of his own intellectual journey from atheism to Christian theism, which subsequently became a *New York Times* bestseller. In other words, people are reading Francis Collins, and they are specifically reading his thoughts on the existence of God. HarperCollins was thus wise to publish *Belief*.

Who has been buying and reading *The Language of God*? Are they atheists or agnostics who are genuinely interested in hearing how one of their own came to faith? Are they wavering believers who have been jolted by the assault of the new atheism over the past decade? Or are they devout believers in God whose own confidence in their faith is bolstered by the testimony of a celebrated, respected, and highly educated scientist? I suspect that a significant majority of Collins' readers represents that third demographic. In an era in which scientists often carry the authority of a secular priesthood, Collins' conversion story has had a salutary effect, particularly for his fellow evangelical Christians, many of whom have believed themselves increasingly marginalized in American culture.

Whoever has been buying *The Language of God*, this new volume is explicitly directed at a market of unbelievers, specifically those who have given up on the rationality of faith. To make the argument, Collins amasses a collection of readings from a few historic but mostly contemporary philosophers, theologians, and other writers. They are an impressive and varied array of voices, including quite a few who were alive and active in the early twenty-first century. These include N. T. Wright, Annie Dillard, the Dalai Lama, Os Guinness, John Stott, Desmond Tutu, Elie Wiesel, Tim Keller, John Polkinghorne, Art Lindsley, Keith Ward, Madeleine L'Engle, Alister McGrath (who assisted in the selection of readings), Hans Küng, Paul Brand, Alvin Plantinga, and Antony Flew. It is interest-