gic, concern with the practical sciences such as mining, and the revival of interest in mathematics and the exact sciences. Paracelsus and Christian utopian writers such as Andreae, Campanella, and Francis Bacon constitute the climax to Olson's account of the role of Christian humanism in transforming science. Olson summarizes the effect of Christian humanism on science thusly: "The notion of spiritual perfection and of material improvement have gradually become disassociated from one another in the modern world... But it is worth remembering that at the origins of the modern scientific emphasis on experiment and gaining natural knowledge for application in the world lay a serious religious impulse associated with Christian humanism" (Olson, p. 55, my italics).

Although Olson is certainly aware of hostile interactions between religion and science, he is more interested in charting the positive ones. So Chapter 3 on "Science and Catholicism in the Scientific Revolution" focuses on the role of the Jesuits in furthering science through teaching and research. And Chapter 4 ("Science and Religion in England, 1590-1740") details the well-studied impact of the various strands of British Protestantism on the uptake of science in seventeenth-century England. Of particular interest to me was the role of the Elizabethan, Richard Hooker, in devising an inclusive religious ideology that highlighted natural theology (the use of natural knowledge to display the manifest glory of God and His creation) and probabilistic interpretation of tenets of both religious and natural knowledge.

It would extend this review unacceptably to recount the rest of Olson's rich narrative in any detail. There are chapters on: Newtonian religious beliefs and eighteenth-century reactions, general philosophical and religious reactions to the rapidly developing sciences in the eighteenth and nineteenth centuries (curiously, Marx receives barely a mention), developments in geology and theories of the origins of the earth, and finally a chapter on reactions to Darwin's theory of evolution strangely titled "What to do about Darwin?". I shall offer a few general comments on these latter chapters: (1) Olson is primarily an historian of ideas. Within this restriction, he is superb, offering sophisticated philosophical analyses and insights. However, institutional developments and more general historical contexts hardly figure at all in these chapters. (2) The general trend in them is a shift from religion influencing science to religion reacting to it. This trend is not particularly noted by Olson but is there for the reader to see and is no doubt related to the growing institutional autonomy and then professionalization of science in the eighteenth and nineteenth centuries.

Olson's book does not have any concluding punch line comparable to Grant's on the role of religious and institutional contexts of the high Middle Ages as pushing western European science towards world leadership. Rather, he ends by paraphrasing John Hedley Brooks, the distinguished historian of religion and science, on the complexity of the interactions between the two enterprises.

Had these books appeared in mid-twentieth century, my review would almost certainly not have begun with the acrimonious "warfare" motif. It looked then as if science had moved into an authoritative position vis-à-vis religion regarding natural knowledge. One of the fascinating cultural developments of the second half of the twentieth century has been the upsurge of aggressive religious fundamentalism, often anti-science in sentiment, and a concomitant response from atheistic or irreligious supporters of science. Where this will all lead, in our age of cyberspace and clones, is anyone's guess. It seems clear to me that a third volume in this sequence will soon be called for.

SEYMOUR H. MAUSKOPF

IVAR EKELAND, The Best of All Possible Worlds. Mathematics and Destiny. Chicago and London: The University of Chica-
This book, written by a distinguished mathematician, begins with Galileo: a symbol of the scientific revolution. He does to time "what the great geometers of antiquity did to space: he turns it into a homogeneous and measurable quantity" (p. 5).

What follows is very far from a conventional story about the development of science till now, as Ekeland's history of science has a well-defined protagonist: Maupertuis' least action principle. The author shows how this idea, which he regards as the first expression of the concept of optimization, progressively evolves. A turning point is "Hamilton's discovery that the quantity of action is not minimized but made stationary. From then on, the least action principle became a purely mathematical tool, the usefulness of which was not fully understood until the twentieth century" (pp. 74-75).

Every reader will surely enjoy the reading of chapters 4 and 5 where the author, with the help of simple examples (a circular billiard table, an elliptic billiard table, a general billiard table) explains, in a concrete and profound way, how the properties of predictability and stability are especial to integrable systems. A non elliptic billiard table gives an unpredictable system, "where non single cause can be found for a single event: everything, always, has to be taken into account" (p. 97).

The exposition of Poincaré's new ideas of using the stationary action principle (the natural evolution of the least action principle) to find closed trajectories of non-integrable systems is another gem of this interesting book.

Chapter 6 signs a provisional end: by means of Feynman, Maupertuis' vision of the real world as the best of all possible ones disappears (p. 121). "Nothing much is left of Maupertuis' dream. If not in physics, where are we to find the best of all possible worlds? Perhaps in biology? Let’s give it a try" (p. 128)

What the author reaches might appear as rather discomforting: "Nature is indifferent. There is no one out there to watch over us. We are an animal species like so many others which have appeared and disappeared on Earth, and our Sun is a star like countless others in the universe. There is no hint in the laws of physics or biology of any special provision to take care of us" (p. 149)

A look at human history with the help of Thucydides and Guicciardini leads the author to claim that "...history is as chaotic as any physical system and there is no God-given or natural order" (p. 164).

The successive chapter 9 (The common good) concludes that: "Our journey ends in a world where God has receded, leaving humankind alone in a world not of its choosing. Technological progress, however, has enabled us to play God, by shaping our environment and ourselves, on a scale which has now reached the planet and is growing at an unprecedented pace. What do we want to do with this power? What kind of world do we want to create, among the many possible ones? This is an entirely new question, which humanity faces in an entirely new situation" (p. 180).

Chapter 10 (A personal conclusion) is rather puzzling, because its plea for "a race of intellectual conquerors" who "will settle in the valley of spiritual abundance" (p. 191, a quotation from Musil) is not so obviously connected to what precedes.

"The least action principle ended up looking very different, but more interesting, than Maupertuis had suspected. The metaphysics have gone, but the physics and the mathematics are deeper and better" (p. 183). On the other hand, "Fermat, Huygens, Euler, Lagrange, would have been thrilled at the progress we have made in understanding nature. Unfortunately, they would probably have expected the development of human society to match the progress of scientific knowledge, and they would have to be sorely disappointed" (ibidem).

The abundance of quotations, and of quotation inside quotations, in this personal conclusion, that calls for the use of reason to free people from all kinds of bondage