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impact on Ibn Ṭufayl's forerunners, especially Avicenna, whom Ibn Ṭufayl quotes expressly. Salim Kemal's 'Justifications of poetic validity' gives a very condensed summary of his monograph *The poetics of Alfarabi and Avicenna* (Leiden, 1991). But I doubt whether Ibn Ṭufayl's novel kind of thought experiment can be grasped in terms of Avicenna's poetology.

The medieval Latin translators did not concern themselves with this text, but Moshe Narboni wrote a Hebrew commentary, which is discussed by Larry B Miller (pp. 229–37). This contains allusions to persecutions and many hardships endured by Narboni, who died in 1362. He deemed the mystical conjunction with the upper world impossible in his generation, due to the lack of calm.

In his epilogue Conrad takes up the principal question: what was Ibn Ṭufayl's real aim? In our century two tendencies have emerged. Léon Gauthier saw the harmony of philosophy and religion as Ibn Ṭufayl's main concern. This seems to be the theme especially of an appendix of the tale, where Ḥayy, having reached perfection, meets Absāl, who comes from a neighbouring island with an established religion very similar to Islam. Ḥayy imparts his wisdom to him, and they find that the beliefs of Absāl's countrymen coincide basically with it, but that they lack an ascetic lifestyle and adhere to a primitive understanding of scripture. Ḥayy and Absāl decide to convert the inhabitants. The attempt fails and they both return to their lonely island. Gauthier's interpretation was challenged by George F Hourani who saw in Ḥayy's biography only the model of the *philosophus autodidactus* who reaches perfection without the assistance of a revealed religion. Conrad comes nearer to Gauthier but sees the attempt to reform the religion of the islanders as reflecting Ibn Ṭufayl's own social aspirations. Bürgel, in his paper, gives more weight to the failure of their mission (p. 132) and I see in the ultimate departure for Ḥayy's island an outright allegoric symbol for the "inner emigration" of the enlightened intellectual in Almohad society.

The volume concludes with a rich bibliography composed by Conrad, and a "General Index". To the list of Russian translations I would add: *Ibn Tuḥayl', Povest' o Khaje syne Jakzana*, translation, introduction, and commentary by A V Sagadeev, Moscow, 1988, who mentions three reprints of the older translation by I P Kuz'min, and also a second edition in 1700 of the English translation of 1671.

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**Roger French and Andrew Cunningham,**  
*Before science: the invention of the friars' natural philosophy*, Aldershot, Scolar Press, 1996, pp. ix, 298, illus., £45.00 (1-85928-287-3).

In recent years the study of medieval texts has been hugely influenced by borrowing from literary studies a focus on the intended readership and reception of the text through reading or hearing its contents. *Before science* demonstrates this influence in a striking way, arguing that treatises on natural philosophy created by the Dominican and Franciscan friars of the twelfth and thirteenth centuries were not early examples of "objective" scientific enquiry, as many later historians have believed, but were instead intimately bound up in these orders' very different attempts to fight heresy. French and Cunningham provide a close reading of the major writers from each order and their sources, and a meticulous discussion of the effects that such ideas might have when preached to the populations of the burgeoning medieval towns. The book first explores the Platonic and Aristotelian ideas that would later attract and be modified and used by Christian writers. The metaphor of "Egyptian gold"—using pagan philosophy for the benefit of Christianity—was controversial, and the fate of the mystical Gnostics and the rejection of Platonic, Arian discourse anticipate later

developments. A shaky discussion of the early middle ages leads rapidly to the “revolutionary” twelfth century, the authors uncritically adopting this characterization on limited secondary evidence. An examination of the monastic houses and cathedral schools, along with major figures including John of Salisbury, Peter Abelard and Bernard of Clairvaux, is however more effective, conveying the sense of excitement that the twelfth-century theological debates engendered. Pagan philosophy—“Egyptian gold” again—remained contentious, St Bernard being a vociferous opponent.

Translations were made of specific texts, contradicting the simplistic “thirst for knowledge” as an explanation for the intensive translation work in this period. A key theme at this point was “nature”. For the Greek philosophers, nature had nothing to do with the gods, obviously a problem for Christian thinkers like William of Conches and Hugh of St Victor, whose alternative views are explored. Newly-translated texts from the Arabic, often linked with medical practice, were a further stimulus: but whilst medical men studied nature literally, philosophers reached for the Creator behind the creation.

The danger of heresy is illustrated by a discussion of how the Cathars—including medical doctors—used the texts in very different ways. Cathars held that all matter was evil, created by an evil God, provoking early refutations from Alain of Lille and Alexander Neckham. The Catholic message, however, had to be conveyed by more effective means than textual disputation, and here Dominic and his highly mobile Order of Preachers appear. A chapter on surviving Cathar texts—including a useful section on *The two principles* for beginners—highlights the need for Catholic preachers to refute Cathar arguments through learning: “this was not a peasants’ heresy”. A programme of formal Dominican education, with authors such as William of Auvergne equipping Dominican preachers with precise quotations and a firm philosophical foundation, now sought to combat heresy. A valuable summary follows of the work of Vincent of

Beauvais, Thomas of Cantimpré, Albertus Magnus, Robert Kilwardby and Thomas Aquinas.

Dominican education rested on the proposition that God and His creation are good and that a Christianized version of (mostly) Aristotelian teaching could be used to demonstrate this. The Franciscan friars, however, took a very different line. For them, meditation on nature was the first step on a path of practical and mystical contemplation, leading, it was hoped, to ecstatic visions of God Himself. The source behind the contemplative theme of Franciscan writing was not Aristotle but pseudo-Dionysius. Dionysius had stated that the point of contemplation was to become deified. Importantly, Dionysius equated visible light with God’s work in the material world—so when Franciscans studied light, they studied God Himself. The study of light to the Franciscans contributed to their contemplative, *religious* experience; thus interpretations of the work of authors such as Robert Grosseteste on geometry and Roger Bacon on mathematics as the first signs of “objective”, scientific enquiry in medieval Europe are mistaken. French and Cunningham argue that the thirteenth-century friars were not pursuing the ancient study of optics in an imperfect way, but were in fact creating a natural philosophy for their own, specific purposes.

Taken overall, *Before science* is a rather uneven book. The seams of co-authorship are apparent in the elaborate linking between chapters and sections, particularly in the first half of the book. The need to bridge the gulf between antiquity and the twelfth century also results in a rather forced “early medieval” chapter. That said, the authors have constructed a persuasive argument on the purpose and reading of the friars’ natural science which manages simultaneously to convey the essence (and excitement) of the works to the non-specialist whilst providing sufficient detail and supporting references for historians of science and philosophy. The authors rightly insist that historians of science should consider “individual and group motivation, emotion and

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ambition”, that is, the social context, when reading and assessing medieval, “scientific” texts. This is a lesson which also might be noted by their colleagues working on the history of medicine.

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**David C Lindberg**, *Roger Bacon and the origins of Perspectiva in the Middle Ages. A critical edition and English translation of Bacon's Perspectiva with introduction and notes*, Oxford, Clarendon Press, 1996, pp. cxi, 411, £60.00 (0-19-823992-0).

The bibliographic details will convince any well-educated historian that this book should be available in all good libraries. So indeed it should. The advent of microfilm has helped the editor to make full use of many more manuscripts than his predecessors, with consequent benefit to the authority of the resulting text.

Roger Bacon's treatise, which David Lindberg, following a “guess” by Stewart Easton, dates to about 1263 (p. xxiii), is a foundation text for the science of *perspectiva* as it was understood in the following three centuries or so. The author explicitly identifies many of his sources, for instance Aristotle and several commentators, Avicenna, Constantine (that is Constantine the African, the translator of Hunayn's *On the eye*, whom Roger Bacon mistakenly supposes to be its author), Euclid and Alhacen. (Lindberg makes a straightforward case for the spelling Alhacen: it is found in the majority of the manuscripts. The form “Alhazen” marks the influence of the spelling adopted in Friedrich Risner's edition of 1572.) Some mentions of “the physicians” are explained in the notes (pp. 341–92) as references to Galen, but as the index does not cover the notes the passages can be retrieved only through the Introduction.

Since this book includes a translation, its users will very probably include newcomers to the subject. They would run into problems if they simply started with the Introduction.

Understandably fed up with being regarded as experts on the boring intermission between Antiquity and the Renaissance, some earlier medievalists made what now seem to be exaggerated claims alleging similarities between the rôle of experiment in the work of (among others) Roger Bacon and Galileo Galilei (1564–1642). Deploying the level-headed scholarship familiar to readers of his numerous earlier publications on medieval optics, Lindberg is polite but firm in dealing with such claims; however, newcomers may not understand why some of this needs to be said. Further, the account of later developments is too brief to be helpful. For instance, fifteenth-century authors listed as having read Roger Bacon are provided only with dates of death, though for many, such as Lorenzo Ghiberti (1378–1455) and Leonardo da Vinci (1452–1519), dates of birth are also known; and there is no explicit acknowledgement that it is generally highly uncertain how any debt is to be apportioned between Roger Bacon himself and his sources. For example, it has been proved conclusively that Lorenzo Ghiberti made use of a thirteenth-century vernacular translation of Alhacen (see G Federici-Vescovini, ‘Il problema delle fonti ottiche medievali del Commentario terzo’ in *Lorenzo Ghiberti nel suo tempo*, Florence, 1980, pp. 347–87). The historical importance of Roger Bacon's subject is beyond dispute, but the *fortuna* of his text is not so well-defined as is implied by the introduction in this edition. Similar over-concision becomes even less helpful in the extension of the story to include the work of Johannes Kepler (1571–1630).

To summarize: do not let your students read only this book: it partly needs the rest of the good library in which it will be found. All the same, for anyone frivolous or serious enough to plunge straight into the main text, it is very good indeed, with scholarly notes providing hand-holds and water wings.

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