

topic, mass extinction. In his final summarising chapter, Schopf proposes to follow Gould's triple theses—anti-theses, but even the summary strongly belies Gould's insistence that evolution has made no difference in these old "metaphors" (his term for them).

The one apparently almost total exception to the presence of a central body of varied but widely accepted principles is the chapter by Eldredge. He insists that "there are two fundamentally different ways of looking at the evolutionary process" and that before him palaeontologists have been following the wrong one. That wrong way is to think of evolution as morphological change. The right way is to think of it as speciation (the origin of new clades at the specific level). He says that neodarwinism (his historically ambiguous term for the synthetic theory) "is a nearly total admixture of

the two approaches", but he is definitely opposed to that school of thought. It is therefore surprising to find that when he gets down to discussion of his own speciality, the evolution and classification of trilobites, his treatment is likewise a nearly total mixture of the two approaches. Except for a few esoteric terms, what he has to say is quite "neo-darwinian" (syntheticist).

Eldredge's most extraordinary statement, however, is that until now palaeontology has made no substantive contribution to evolutionary theory. The whole book, including his chapter, adduces strong evidence to the contrary. □

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## Islamic mathematics

*The Muslim Contribution to Mathematics.* By Ali Abdullah Al-Daffa'. Pp. 121. (Croom Helm: London, 1977.) £7.95.

THE same increase in world oil prices which has begotten militaristic extremes of nationalism in certain Arabic countries has in others led to a gentler resurgence of pride in their common language and Muslim culture, and of a fresh consciousness of their once-great past a thousand and more years ago when Islam held sway over half the world. There have, ever since our own European intellectual 'rebirth' in the sixteenth century with its heavy emphasis on the rediscovery of Greek thought and civilisation, always been scholars around who have been ready to give just appraisal of the Arabic achievement in science in its widest sense, but it has never seemed important for our historical textbooks to dwell more than fleetingly on this millennium of Oriental dominion between the passages of arms in ancient Greece and Rome and the wars and political passions of our modern Latin West. It is understandable that the Arabs, even as they pour some of their new-found riches into bringing themselves into line with so much in areas in which they had previously lagged behind, should also put money into making propaganda for their own past, stressing wherever possible its originalities and depths of vision. And indeed who has escaped a glimpse at least of the bandwagon of *The World of Islam* as it has recently creaked along in this country in one form or another? Unfortunately, the purblind amateurishness of those who ride trumpeting

upon it so often gainsays the attractive freshness of their enthusiasm for their cause. And so it is with this little book (quite outrageously priced for the half-dozen short essays which it comprises) from the pen of—so the dustjacket blurb informs—the Chairman of the Department of Mathematics at the University of Petroleum and Minerals, Dhahran, Saudi Arabia.

Al-Daffa' begins briskly enough by sketching the beginnings of Islam from the Prophet Mohammed through the Caliphates to the 'ruthless' Mongol invaders who broke up the central Muslim Empire in our mid-thirteenth century (no mention that those same pitiless heathens set up in their wake what was Islam's finest and most elaborate observatory-cum-mathematics centre at Samarkand . . .). Then come a dozen (or less) pages each on Arabic arithmetic, algebra, trigonometry and geometry, each supported by several pages of bibliographical notes (their contents are listed again alphabetically by author at the end of the book) where reference is made to such scholarly works on the Arabic endeavour as Hogben's *Mathematics for the Million*, Bernal's *Science in History* and numerous obscure American high-school mathematics textbooks. The kindest comment I have to pass on Al-Daffa's own scholarship is that it is shallow, basically uninformed and mostly out of date when it has a firm basis in fact. In arithmetic (which "the author believes [*sic*] is a vital part of daily living because it meets practical needs") he correctly singles out the importance of the Arabs' fashioning and refining of the Hindu system of numerals into effectively its modern form, with zero (*sifr*) as a place value, and its novel extension to embrace decimal fractions (but nowhere mentions the name of

Al-Kashi, who at Samarkand in the fifteenth century did most to advance numerical methods making use of the latter's power). In algebra he makes much of Al-Khwarizmi on the solution of quadratic equations, insisting much on the "*Regular [sic] Falsi*", the method of false position, which yields their numerical roots (but fails anywhere to mention the 'Mongol' Al-Tusi of Maragha who went on to duplicate the general resolution of the numerical equation which we Europeans know as Viète's). Of the Islamic achievements in number theory Al-Daffa' is especially proud, pointing to Thabit ibn Qurra's parametrisation of amicable numbers in the ninth century (though he cannot properly state it on his p44) and to the unidentified "Muslims" who first "discovered" Fermat's theorem that "for integers the sum of two cubes can never be a cube" (but he seems not to know that Al-Husayn, who reports to us this tenth-century guess of Al-Hughandi's, states firmly that he could not prove it).

And so I could go on. It fits in with the general quality of this new contribution to our European understanding of the Islamic achievement in exact science that the dustjacket reproduces (from an un-named manuscript) a figure illustrating "Ibn Al-Shatir's"—it is in fact Al-Tusi's dressed up—"theory [*sc.* 'Copernican' model] of planetary motion": one whose copyist has so little understood what it is he transcribes that he has drawn the primary epicycle fixed on the rotating deferent vector, producing a 'lunar orbit' with perigees at syzgies and apogees at quadratures.

It is my plain duty to tell anyone who wants an introduction to the Muslim achievement to go elsewhere, and leave this deplorable book gathering dust on the booksellers' shelves from which it ought never to be sold. For the same price or thereabouts, let me add, one may now buy the balanced and scholarly survey by A. P. Youschkevitch of *Les Mathématiques Arabes (VIII<sup>e</sup>-XV<sup>e</sup> siècles)* (Paris: Vrin, 1976; a corrected and much amplified version of the central chapter in his standard Russian monograph on medieval mathematics). You may be sure that Al-Daffa' does not know even Youschkevitch's name, or that of his colleague Boris Rosenfeld or of most other current non-Arabic workers in the field of classical Islamic mathematics. No manner of enthusiasm can make up for deep-rooted ignorance.

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