

to God from science, the most effective part was played by a factor, apparently not at all mathematical. . . .

is a bit of a mouthful, particularly as the least of the many sins for which Jaki castigates Carl Sagan is for being a "consummate artist of sentences resting on double, triple and at times quadruple negatives".

Professor Jaki carries his argument through five chapters which read like five separate essays. In the first, "An Uneasy Fashion", he traces twentieth-century fashions in cosmology and the variable willingness amongst cosmologists to look through their specialization to the question of creation and a creator. His own view is that "he who says cosmos must say Creator in the traditional sense if man's sense of reality, purpose and consistency deserve more than lip-service", and he gives short shrift to some of those who have thought differently. Of course, proponents of the steady-state theory came into this category — continuous creation was "the most glaring trick ever given scientific veneer".

The next chapter begins with a text, or rather an anti-text from Anatole France — "The universe which science reveals to us is a dispiriting monotony. All the suns are drops of fire and all the planets drops of mud". Jaki rather ponderously rises to this bait by emphasizing the beauty of science, and then goes on to discuss whether the universe is necessary or merely contingent: the climate of thought in our time is not at all favourable for a recognition of reason's ability to bring within sight the contingency of the universe and its *raison d'être*, its having been created by a Being truly necessary.

Jaki then turns to look at creation from the viewpoint of Christian theology — not just as a vague general belief but as a dogma or proposition which demands unconditional assent. The *Fontana Dictionary* says that "dogma" is today "mostly used pejoratively, to mean an opinion held on grounds, and propagated by methods, which are unreasonable". I think that most scientists who wade their way through this difficult chapter, with its assertion that the first chapter of Genesis is the classic statement of the dogma of creation, will incline to the same view, and retreat to the position that religion is mainly an ethical matter and on many dogmatic matters they can at best be agnostic.

Following a chapter on the philosophical status of books, the relevance of which to the general thread of the volume escapes me even after four readings, Jaki concludes with a discussion on extraterrestrial intelligence — "this ultimate extension of Darwinism and an utterly self-defeating exercise in wishful thinking". Darwinism itself is for him a belief in the meaningfulness of existence and much to be reviled, although he does believe in evolution as an "imperfectly understood instrumentality of a species in the rise of another". Present-day advocates of taking ETI seriously look in it for a "final rebuttal of supernatural

revelation", and come in for some predictable stick. On the other hand, theists, for whom "intellects are a special creation of God", not a mere epiphenomenon of biochemical diversification, can keep an open mind about ETI and even look forward to a possible encounter with other intellects because both sides "will know something of a universal brotherhood based on a common dependence on the Creator".

I have read this book from a scientist's perspective, and maybe it looks different from a theologian's. But, much as it has

made me think, got under my skin and in some places stimulated me, I feel ultimately that it has helped me disappointingly little. The opacity, the dogmatism, the verbal tricks all speak to me of a failure by the author to reach out and understand his "wider public" and hold a helpful dialogue. Professor Jaki, it seems to me, wants to tell rather than to help. I think most of us need help. □

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A population problem for archaeologists

Colin Renfrew

Demographic Archaeology. By F.A. Hassan. Pp.298. ISBN 0-12-331350-3. (Academic: 1981.) \$32, £21.20.

FIFTEEN years ago, following the publication of Ester Boserup's stimulating work *The Conditions of Agricultural Growth* (Aldine, 1965), geographers and archaeologists fully realized that population, or population density, must no longer be regarded as a highly dependent variable, fixed or at least rigidly limited in Malthusian manner by environmental constraints. On the contrary, the mode of exploitation of resources could be varied according to need, and the level of population came to be seen rather as an independent variable (although not an unconstrained one) which would in part govern the way in which a society would intensify its agricultural production.

Since that time, demographic arguments, some of considerable sophistication, have loomed large in archaeological explanations. Their proponents have been encouraged by the new rigour of archaeological survey procedures, which have moved on from the casual serendipity of the weekend outing or the summer safari to the often exhausting demands of probabilistic sampling strategies and intensive field-walking by disciplined survey teams.

Demographic Archaeology undertakes a comprehensive review of demographic thinking and population models in contemporary archaeology. It ranges from the consideration of the population density of hunter-gatherer groups, where the context is very much one of biogeography, through the impact of sedentism and food production upon carrying capacity, and on to the emergence of complex, urban civilizations with their large population centres. As a general survey it succeeds admirably in bringing out the central role of demographic argument in much contemporary archaeological thought, and in summarizing the rather formidable range of quantitative formulations which have already been put forward.

One central weakness in the whole subject area, however, is that early population figures, for any given time and place, are extremely difficult to arrive at, based as they almost invariably are on fragmentary survey data, supplemented by the incomplete excavation of a few settlement sites. At present this often restricts an estimate of the population variable from rising beyond the purely notional.

The crucial question of estimating population size from archaeological data takes up only one 32-page chapter of Hassan's book. And while this chapter is a very competent review of what has been written, it is not a very critical one, nor does it, to my mind, bring out the still unresolved difficulties in estimating population figures with any degree of accuracy and reliability from archaeological data. Until these difficulties are overcome, the demographic explanation in archaeology must remain something of a will o' the wisp: an enticing hypothesis, the testing of which remains a frustrating task. Hassan might have dealt at greater length with this crucial problem, for it is in the improved estimation of early population figures that the future of demographic archaeology must lie, rather than in the production of ingenious theories which, however attractive and plausible, have merely the status of speculation until sustained by acceptable data from the field.

Despite this central difficulty, which is not Hassan's problem alone but one which faces all researchers, his book is undoubtedly a sustained and coherent contribution to archaeological theory. It serves to bring together a whole series of ideas never before so effectively related, and takes its place at once among the small number of books on archaeological theory which rise above mere polemic to serve as valued works of reference. □

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