# Faith and Thought

A Journal devoted to the study of the inter-relation of the Christian revelation and modern research

Vol. 97 Number 2 Winter 1968

R. E. D. CLARK, M.A., Ph.D.

# The Origin of Life*

The beginnings of life have long constituted a red rag to the atheist bull. Since Darwin's time evolution is supposed to have destroyed the argument for design based on the structure of species but Darwin declined to discuss the origin of life itself, declaring that one might as well discuss the origin of atoms. Atheists awaited the day when the origin of life could be profitably discussed from a materialistic point of view: now they think the day has come.

In his recent book, Professor J. D. Bernal tells us that he has been interested in this subject since his early days. However, the intellectual climate at Cambridge in the '20s and '30s discouraged baseless speculation – Rutherford himself was reputed to have said, 'Don't let me catch anyone talking about the universe in my laboratory!'. So young Bernal kept quiet. In 1922, Oparin – whom Bernal used to meet on his visits to Russia – set the ball rolling and J. B. S. Haldane followed soon after. Both served to whet J. D.'s appetite. Oparin's long essay was soon developed into a book (English edition, 1938) which was translated into many languages and used by the Russians to spread atheism. Haldane returned to the theme in later years.

Oparin's hypotheses took the following form. First organic molecules of biological interest came into existence. This could hardly have happened in the presence of free oxygen – so it was postulated (1936) that the early atmosphere was *reducing* – consisting of methane, ammonia, perhaps hydrogen, etc., with some carbon dioxide and water vapour. With these gases

* Essay Review of J. D. Bernal's *The Origin of Life*, Weidenfeld and Nicolson, 1967, 55*s*. The subject was last discussed by the Victoria Institute in 1949 by Dr. R. J. C. Harris, *q.v.*

suitable energy sources (radioactivity, electric discharges, ultraviolet light) *do* form such organic molecules as was discovered by Miller (1953), though many other compounds are also formed – about 85 per cent of the organic product formed by sparking in this early work is still unidentified.

Gradually as the materials accumulated the sea thickened to become a 'primitive soup' (Haldane). After a time precipitation began in the form of small blobs (*coacervates*). A primitive kind of natural selection then started and gradually the wonder was accomplished!

In his recent book, Professor Bernal sets out to analyse these and other suggestions more critically than has been done before, at least by the atheist school. The result is a not very readable yet interesting book, well illustrated and well documented – marred most unfortunately by a good deal of careless composition and manifest prejudice.

The main text occupies about 200 pages and this is followed by several Appendices (130 pages). In these we may find Oparin's original paper (1924) now given in English translation for the first time, the early essay by J. B. S. Haldane, a paper by G. Mueller on carbonaceous meteorites, a section by Bernal on generalized crystallography, a bibliography (122 references), a curious set of questions with answers by the author, and a useful glossary. Finally, there is an index.

The author's method is to develop, first of all, the 'myth' of how life *might*, have developed. Three stages are distinguished – biologically interesting molecules are formed, they polymerize, then life and evolution commence. At this stage of the book difficulties are cheerfully dismissed by bold assertion, on the basis of 'what I say three times is true'. Before Darwinian evolution could commence 'there must have been a long and slow chemical evolution'; life 'may and indeed must' have occurred elsewhere than on earth; 'the phenomenon of consciousness would be likely to evolve . . . to permit predatory feeding . . .'. With many more 'musts' and 'would-be-likely's' the story is complete.

The general picture of the early earth is as follows. For an aeon or so (1 aeon $=10^9$ years) after its formation about 4.5 aeons ago, the earth was very hot – or if not physically so, it

was at least 'hot' in the radioactive sense. So life could not start until 1–1.5 aeons had elapsed. The earliest forms of primitive life claimed are dated at 3.1 aeons ago, so the atmosphere must then have been reducing and life was confined to extremely small organisms which gained their energy by the equivalent of fermentation. About 0.7 aeons ago the atmosphere became oxidizing as a result of photosynthesis and morphological evolution took a sudden leap forward.

Professor Bernal is, of course, too good a scientist to leave the subject here. In the past, he says, 'there has been altogether too much slurring over the present difficulties in the study of the origin of life' (page 193). So in the chapters which follow, he discusses some of the difficulties and objections which have been advanced.

How did life start? There are formidable difficulties at every stage. Is it true after all that the conditions on the early earth were reducing – say after the first aeon when radioactivity had subsided? Much evidence points the other way. Ultra-violet light must have decomposed water to give oxygen (converted to ozone) and hydrogen – which escaped into space. The ozone layer came close down to the surface. It oxidized the early rocks turning them red. 'It must be admitted that the positive evidence for the existence of a reducing atmosphere on the earth [in the early days] is very slender and controversial at that' (page 123).

Let that pass. Suppose amino acids were formed in sufficient quantity for life to start, and that they remained undecomposed by the ozone and ultra-violet light. Various calculations for the concentration of the 'primitive soup' then give 0.1 per cent (Hull) and 25 per cent (Urey). Bernal himself thinks that some protection might have been afforded by adsorption on mud, but agrees that he has few followers in this. Hardly an encouraging start.

A living organism depends on the presence of enzymes which are proteins. But reproduction depends on nucleotides (DNA, etc.). The mechanisms by which DNA produces messenger – RNA, which in turn and in a different locality in the cell, produces enzymes, is highly complex. But which started first? The nucleotides or the enzymes? Proteins are not self-repro-

ducing, so it must have been the nucleotides. But if so, how did natural selection start? Suppose some of the nucleic acid spirals were more fit to survive than others, then perhaps we could imagine that they would have improved themselves? But they would not be organisms and, in any event, they would soon run out of the chemicals needed to make themselves. Some mechanism would have to evolve in order for the nucleic acid code to create the organism and natural selection would have to operate upon the organism and not upon the nucleic acids which are the mechanisms responsible for the reproduction. The problem fairly bristles with difficulties. What has Bernal to say about this? He is clearly confused: he leaves no clear picture in the mind as to what possible ways around the difficulty might be open; but, honest man, he apologizes for his vagueness!

The general gist of the argument is that the living organism – even of the simplest kind – is so complex that it could not have started at all in its present form, or anything remotely resembling that form. So we must ask first of all, how much simpler organisms, much simpler that is biochemically rather than morphologically, came into existence. But there is no clear evidence that they ever existed at all. So we are called upon to explain *something*, but we do not quite know what.

Now the difficulty, really, is to explain not the sophisticated system of today but any unsophisticated system that might have preceded it. Such argumentation necessarily involves postulation of proto-systems, proto-enzymes, proto-coenzymes and proto-nucleic acids. This in itself is objected to on the grounds that, following Occam's Razor, we have no right to multiply systems without reason. Here I think we have a reason, but the reason only allows us to postulate a system, it does not tell us precisely what system to postulate. Here, again, we must admit that we have to diverge considerably from what has been accepted as a scientific method in the past (p. 147).

Difficulties continue to come thick and fast. For instance, seeing how rarely the correct combinations of atoms must have come about in order to form the theoretically simplest self-reproducing system that could exist – the complexity of which can be dubiously calculated – a period *vastly* longer than a few aeons would apparently be required. How then did it all

happen so quickly? Again, what about the formation of the first nucleated cell? Here matters 'are even less satisfactory' (p. 133). Yet again, why is it that, despite all the interesting synthetic experiments of recent years, no one has been able to form a fat using electric sparks? But never mind. It will all come straight in the end. 'As long as we can count on finding some part of our picture of the world that cannot be understood, a way can always be found for divine interventions' (p. 141).

Thus, in chapter after chapter, Bernal shows how vast is our ignorance, how difficult it is to line up the no-life to life transition with what we know of biochemistry and physics. Many, in fact most, of these difficulties are new: no one ever guessed that the materialistic picture would be so difficult to piece together. From all of which Bernal draws a quite startling conclusion: 'The region of the mysterious is rapidly shrinking. Enough is known, at any rate, to know (*sic*) that the old explanations cannot possibly be right'. And so we are invited to admire Engels for his 'intuition' that 'life is the mode of motion of albumens' (p. 172) but to be scornful of 'explanations in terms of creator gods or life forces' which 'are soon seen to be tautological expressions of ignorance'. The fact is that Bernal makes no bones about his Marxist sympathies but has no use for Christian nonsense, for even for what are loosely called 'Christian values' which must often be opposed strenuously in order to bring in a happy godless world. Death troubles him a little – but perhaps it won't be very long before we learn the trick of not growing old (p. 178). Also there is much disharmony in our present non-Marxist world but 'once the potentialities of an evolving universe are fully, or even partially, grasped by the whole of mankind' we shall all co-operate happily and war will be no more (p. 180).

The book is beautifully produced and no misprints were noted. But it is odd that Professor Bernal sometimes slips up on matters of fact – even at quite an elementary level. It is not true that Giordano Bruno died merely for believing in a plurality of worlds (p. 174): he was indicted for many much more serious charges. Hebrews 11:1 does not equate faith with 'pure wishful thinking' (p. 166). It is untrue to say that 'Wöhler had

already shown by his experiments in 1828 that urea could be produced from inorganic materials' (p. 21) – he made no such claim and his starting point was *organic*. The statement that enzymes merely speed up changes 'which would occur spontaneously in any case' (p. 61) is misleading and, in general, false. 'The Reverend Dr. Paley' did not set forth 'the argument for divine creation and maintenance of the world' in his *Evidence for Christianity* as stated on p. 141, but in another book. The argument about entropy on p. 151, in which it is said that the 'very low entropy' of an organism is matched by an even lower entropy of a crystal is irrelevant and misleading. The formula for glutamine on p. 331 is incorrect and it is obviously not a misprint. It hardly seems justified to say that the Red Spot on Jupiter 'must' be caused by 'further synthetic processes' involving carbon and nitrogen compounds – Wildt's explanation (metals and ammonia) is surely worthy of mention.