This book is by a professor at the Department of Earth Sciences, my home at Cambridge University. This review was written in October 2003.

Lively, mind-expanding, infuriating and incisive

"Life's solution" celebrates convergent evolution, which Conway Morris uses to account both for the apparent progress of life from amoeba to whale, and its end in Homo Sapiens. He extends this notion to the emergence of human society, and the prospects of life "altogether elsewhere".

The issue of whether life history has an arrow of destiny at all (rather than random bumbling that may occasionally hit an anthropomorphic jackpot) is still up in the air. Natural selection certainly produces environmental adaptation over the fine grain of centuries and millenia. And over millions of years, an increase in complexity has been observed in such esoteric organs as arthropod appendages and crinoid feeding nets. But at the grandest scale, we have little to go on other than Victorian ideas that reptiles were bested by mammals in a great Darwinian struggle, which is nonsense. Bad luck - a bad asteroid - wiped out the dinosaurs, leaving empty space that mammals could fill. 180 million years earlier, it was the ancestors of mammals that drew the short straw.

But Conway Morris, unusually, isn't interested in whose sperm survives the apocalypse. Since environments cleave form to function, the same general biological properties arise everywhere. So New Caledonia, lacking mammalian predators, evolved giant flightless birds, the tigrish Sylviornus, with hooked beaks. (They were wiped out by the ancestral Polynesians, with good reason). Aping Darwin's writing, "Life's solution" is a book of examples, an accumulation of examples of convergence in action. This structure lends the book a bitty texture; it says the same thing over and over again, so reading five pages at a sitting will not lose the thread. This makes it an ideal book for busy readers.

The book is threaded with the notion of "biological hyperspace," a conceptual landscape in which each point corresponds to a design for life. Hills in the landscape are poorly adapted to the environment, and, over time, natural selection nudges life into the better-adapted valleys. Although life takes very varied routes through this landscape, functional constraints limit the number of destinations - each corresponding to an ecological syndrome such as hive society, the compound eye or intelligence. Michael Denton and Craig Marshall claim that "underlying all the diversity of life is a finite set of natural forms that will recur over and over again anywhere in the cosmos where there is carbon-based life." This refers to proteins, not pianists, but makes a key point: progress-through-convergence is equivalent to destiny. And teleology, with its register of "inferior" and "better" forms, is a dangerous brew. Conway Morris wonders how much of convergence may be the working-out of the particular inherent potential of the animal genetic architecture. At what point, he wonders, did intelligence become inevitable? His answer: close to the origin of life.

Convergence is powerful, and Conway Morris is right to emphasise it's importance in driving evolution over millions of years. But his attempt to extend it to the billions of years of Earth's

story is tenuous. There are several problems. The main events in the early evolution of life - sex, oxygen, and the chlorophyll/Rubisco stitch-up - were probably accidents. Niche specialisation erodes the genetic plasticity that convergence needs. And once life underwent the Cambrian Explosion - somehow turning from slime into animals - it became especially vulnerable to rare shocks and their afteraffects.

Here's a catastrophic example. I am united with gerbils and the platypus by having a kind of window in my skull, just behind the eyes. This makes me a synapsid. The dinosaurs (with two holes in their heads) were diapsids, and hole-less turtles are anapsids. For argument's sake, let's reroute the asteroid that hit Earth 251 million years ago, hitting Pangaea instead of Panthallasa. Destruction on the supercontinent is total; the synapsids and diapsids are wiped out; only a few well-armoured, ageless anapsids survive to reconquer the planet. But once the anapsid syndrome - toothless, stiff-necked, boneheaded, and boxed inside tough shells - became dominant, it is difficult to see how the delicate, social sentients seen as inevitable by Conway Morris could have evolved. Until the next disaster, Earth would have been in mutant turtle lockdown.

Conway Morris' chapters on the origin of life are unfortunate. He talks about chemistries, while most workers talk about energies and information. "Life's solution" glibly dismisses the theory of self-organisation and criticality, the rock and foundation of the claim that life is a cosmic principle.

This book continues an argument with the late, brilliant Harvard evolutionary theorist Stephen Jay Gould, whose overweight prose was matched only by his girth. He called progress "a noxious, culturally embedded, untestable, nonoperational, intractable idea that must be replaced." Conway Morris countered that progress remained a cornerstone of evolutionary understanding. This was not just an argument about science, because each man saw the other's theory as the surface expression of an iceberg of repugnant dogma. In 1999, Gould wrote that he "would value... explicit attention to the sources of [Conway Morris'] own unexamined beliefs" - i.e., Christianity.

Conway Morris' reply is an attempt to construct a theology of evolution. Monotheism (founded on holy mystery) is to science (founded on reason) as oil to water: coexistence is possible but mixing requires plenty of energy. The last Cambridge scholar to try, the young Ludwig Wittgenstein, lost his footing badly. "Life's Solution" is more cautious. Joining the ellipses, hints, and things implied but left unsaid, Conway Morris appears to believe that life was created by divine sparkplug and that convergence was designed-in to jolly life along the golden path from bog to Bhopal. Make of this what you will, but my instincts are that this "God? The Naked Mole Rats Say Yes!" stuff, popularised by Connie Barrow, is a form of intellectual cowardice. It's as unenlightening and unenlightened as the long-dead view that an irreducible "vital force" accounted for biological energy. (In one sense it does; it's called citric acid). Natural order need be neither implicate nor inscribed, yet retains its wonder and majesty.