

Evolution leaves God with nothing to do, argues Richard Dawkins

BEFORE 1859 it would have seemed natural to agree with the Reverend William Paley, in "Natural Theology," that the creation of life was God's greatest work. Especially (vanity might add) human life. Today we'd amend the statement: Evolution is the universe's greatest work. Evolution is the creator of life, and life is arguably the most surprising and most beautiful production that the laws of physics have ever generated. Evolution, to quote a T-shirt sent me by an anonymous well-wisher, is the greatest show on earth, the only game in town.

Indeed, evolution is probably the greatest show in the entire universe. Most scientists' hunch is that there are independently evolved life forms dotted around planetary islands throughout the universe—though sadly too thinly scattered to encounter one another. And if there is life elsewhere, it is something stronger than a hunch to say that it will turn out to be Darwinian life. The argument in favor of alien life's existing at all is weaker than the argument that—if it exists at all—it will be Darwinian life. But it is also possible that we really are alone in the universe, in which case Earth, with its greatest show, is the most remarkable planet in the universe.

What is so special about life? It never violates the laws of physics. Nothing does (if anything did, physicists would just have to formulate new laws—it's happened often enough in the history of science). But although life never violates the laws of physics, it pushes them into unexpected avenues that stagger the imagination. If we didn't know about life we wouldn't believe it was possible—except, of course, that there'd then be nobody around to do the disbelieving!

The laws of physics, before Darwinian evolution bursts out from their midst, can make rocks and sand, gas clouds and stars, whirlpools and waves, whirlpool-shaped galaxies and light that travels as waves while behaving like particles. It is an interesting, fascinating and, in many ways, deeply mysterious universe. But now, enter life. Look, through the eyes of a physicist, at a bounding kangaroo, a swooping bat, a leaping dolphin, a soaring Coast Redwood. There never

Please turn to the next page

Continued from the prior page
was a rock that bounded like a kangaroo, never a pebble that crawled like a beetle seeking a mate, never a sand grain that swam like a water flea. Not once do any of these creatures disobey one jot or tittle of the laws of physics. Far from violating the laws of thermodynamics (as is often ignorantly alleged) they are relentlessly driven by them. Far from violating the laws of motion, animals exploit them to their advantage as they walk, run, dodge and jink, leap and fly, pounce on prey or spring to safety.

Never once are the laws of physics violated, yet life emerges into uncharted territory. And how is the trick done? The answer is a process that, although variable in its wondrous detail, is sufficiently uniform to deserve one single name: Darwinian evolution, the nonrandom survival of randomly varying coded information. We know, as certainly as we know anything in science, that this is the process that has generated life on our own planet. And my bet, as I said, is that the same process is in operation wherever life may be found, anywhere in the universe.

What if the greatest show on earth is not the greatest show in the universe? What if there are life forms on other planets that have evolved so far beyond our level of intelligence and creativity that we

should regard them as gods, were we ever so fortunate (or unfortunate?) as to meet them? Would they indeed be gods? Wouldn't we be tempted to fall on our knees and worship them, as a medieval peasant might if suddenly confronted with such miracles as a Boeing 747, a mobile telephone or Google Earth? But, however god-like the aliens might seem, they would not be gods, and for one very important reason. They did not create the universe; it created them, just as it created us. Making the universe is the one thing no intelligence, however superhuman, could do, because an intelligence is complex—statistically improbable—and therefore had to emerge, by gradual degrees, from simpler beginnings: from a lifeless universe—the miracle-free zone that is physics.

To midwife such emergence is the singular achievement of Darwinian evolution. It starts with primeval simplicity and fosters, by slow, explicable degrees, the emergence of complexity: seemingly limitless complexity—certainly up to our human level of complexity and very probably way beyond. There may be worlds on which superhuman life thrives, superhuman to a level that our imaginations cannot grasp. But superhuman does not mean supernatural. Darwinian evolution is the only process we know that is ultimately capable of generating anything as

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