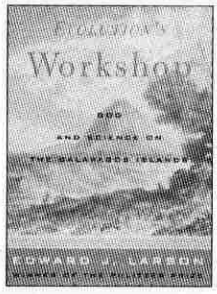
We're All Darwinians Now

But did God smite the car-sized armadillos?

BY GREGG EASTERBROOK

THE CENTURY-AND-A-HALF OLD struggle between evolution and faith seems to be entering a new phase, in which the argument no longer concerns whether natural selection is real but rather what the reality of natural selection means. Religious leaders have begun to make their peace with natural selection as fact; Pope John Paul II five years ago called evolution "more than just a theory," and few mainstream Protestant denominations today contest Darwin, if only because they do not wish to sound like Luddites. When the Kansas State Board of Education two years ago recommended that some Darwinian ideas be dropped from school curricula, its members were promptly voted out of office, indicating that even evangelicals, a big voting bloc in Kansas, are losing patience with trying to deny Darwin. Barring some really unexpected fundamental discovery, it now seems inarguable that living things evolve.



EVOLUTION'S WORKSHOP: God and Science on the Galapagos Islands
by Edward J. Larson
Basic Books, $27.50

Yet, even as natural selection becomes entrenched, there remain deep mysteries of creation against which scientific understanding has made no progress at all—especially the origin of life, which Darwinian theory can't account for. Science continues to illuminate aspects of the natural world in which consciousness and complexity seem, if not necessarily divinely guided, pretty damn hard to explain based on chance forces. Even as natural selection prevails as the key to fathoming important aspects of our biology, there remain nagging questions about whether existence reflects something like the purposefulness that faiths teach.

Not surprisingly, there has recently been an outpouring of books on evolution and the faith/science boundary. *Evolution's Workshop* by Edward Larson, which details the history of the Galapagos, is an outstanding contribution. Larson, of the University of Georgia, is becoming one of the leading historians of his generation: His previous work, *Summer for the Gods*, a study of the Scopes trial, won a Pulitzer in 1997, and *Evolution's Workshop* is at least its equal.

Larson begins by reminding us that Charles Darwin was far from the first to wonder at the unusual ecosphere of the Galapagos, just the first to fathom what it meant. The first European to gaze at the islands, Tomàs de Berlanga, a Spanish bishop, arrived there in 1535—three centuries before the *HMS Beagle*—and pronounced the Galapagos cursed by God because they had no fresh water and no large mammals. Because the islands defied established ideas about the natural order, Larson writes, the Galapagos became a subject of European fascination from that point forward. The Galapagos even figured prominently in a popular British book of natural history published in 1684, predating *Origin of Species* by 200 years.

While the lack of fresh water is what dismayed the

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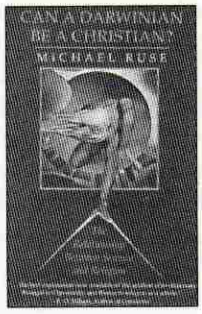
first sailors to call on the Galapagos, it was the strangeness of the fauna that puzzled naturalists and clergy. "Since medieval times," Larson writes, "Europeans had seen the natural world as a vast spiritual allegory created by God to instruct humans." But the New World ecology did not compute. Augustine thought dogs were created to bark to protect their masters; when Columbus encountered the mute dogs indigenous to the Caribbean, he was startled—why would the Maker design a dog that couldn't bark? Vespucci, finding numerous new species in South America, said it made him wonder how two of every creature could possibly have fit into the Ark.

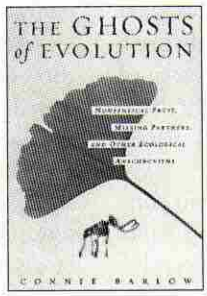
Most strangely to European eyes, the New World held few large mammals. Since horses and cattle were the species of highest utility to *Homo sapiens*, their absence from an entire hemisphere called into question standard assumptions about divine intent. One pope would declare that New World peoples must all be vegetarians, since God had denied them proper meat. The Galapagos seemed especially disfavored in this regard, populated only by birds and reptiles—the Maker's lowest handiwork, as readers of Genesis know. How did Galapagos creatures arrive on outcroppings so far from the mainland? Why did they seem slightly different from island to island? Europe's sailors came to terms with the Galapagos giant tortoise, after learning it was an ideal provision—taken aboard ships, the tortoises could live for weeks without food or water, then be cooked into tasty fresh stews. Europe's scientists and clergy found the islands deeply disturbing.

By the early 19th century, the French naturalist Georges Cuvier would attempt to resolve some paradoxes of species discoveries by proposing a theory of multiple creations—God made life not once but several times, choosing different creatures in response to environmental change. One of Cuvier's examples was the Galapagos where, he supposed, the Maker must have formed only those that could survive in the unusual conditions.

Multiple-creation theory backed by the Galapagos was a common subject for discussion in European universities when the British Navy tasked the *Beagle* to conduct a mapping expedition along the South American coastline. Captain Robert Fitzroy despaired of his assignment, for he was to be the only gentleman aboard. Fitzroy asked to bring along a well-bred guest so that he would have someone to talk to; he found the young Darwin, then in the early stages of study for the Anglican priesthood. (Darwin hoped to be a university cleric, not a parish priest; at the time, almost all academics at Cambridge and Oxford wore the collar.) Darwin talked his father into paying passage for his manservant, one Syms Covington; that the founder of evolutionary theory chased Galapagos mockingbirds while accompanied by a butler is something history tends to gloss over. Preparing for the voyage, the sheltered Darwin excitedly bought rifles and pistols for protection from wild beasts.



CAN A DARWINIAN BE A CHRISTIAN?
The Relation Between Science and Religion
by Michael Ruse
Cambridge University Press
$24.95



GHOSTS OF EVOLUTION:
Nonsensical Fruit, Missing Partners and Other Ecological Anachronisms
by Connie Barlow
Basic Books, $26.00

The weapons were never fired. Darwin found he could walk right up to Galapagos creatures, causing him to reason that local species had been exempt from predation so long, they had evolved away from the flight response. To this day, the same remains. When I was in the Galapagos a few years ago, I was able to approach an albatross or blue-footed booby without causing any reaction, other than tut-tutting from local naturalists. The passivity of Galapagos creatures made them ideal for study; the differing environments of the islands helped Darwin realize how species adapt to circumstances.

The Ghost in the Machine

Over the years, Darwin's premises have solved so many puzzles of biology that many now believe all questions have been answered. But they haven't been, not by a long shot. There are both small mysteries and great ones remaining.

One of the remaining small mysteries is the subject of *The Ghosts of Evolution*, a fine work by the science writer Connie Barlow. Her topic is the contemporary biologist Dan Janzen and his obsession with rotting fruit on the floors of Central American forests. Why do plants produce so much fruit that it ends up rotting? Why, Janzen long wondered, doesn't something eat the stuff? Janzen eventually came to theorize that the somethings that used to eat the fruit of Central American forests are now extinct, but the plants have not yet "realized" that.

Wild plants are thought to have evolved alluring fruits so that animals will munch the offerings, then walk somewhere else and excrete seeds, spreading the

plant's DNA. The rotting fruits of Central American forest floors, Janzen thinks, once attracted large herbivores that no longer exist. This is in synch with what other researchers have found about the recent past, geologically speaking. Very large herbivores once were common in most of the world—mastodons, woolly mammoths, jumbo rhinos, glyptodonts (armadillos about the size of a car), ground sloths as big as elephants. In North America, giant camels, large native horses, and a beaver the size of a bear also roamed the landscape. But large land creatures started to fall extinct about 50,000 years ago, and every one mentioned in this paragraph was gone by about 13,000 years ago. Cows and bison are about all that's left to fill their vacated ecological niches. Barlow writes, "Janzen was beginning to suspect that the forests and savannas where livestock grazed were in some ways closer approximations to the human past."

Extinctions of the large land animals roughly coincided with the end of the Pleistocene ice age, but the fossil record suggests that these species had survived ice cycles before. What the large herbivores had never before had to deal with was *Homo sapiens*, which became anatomically and mentally "modern" about the time the extinctions began. It's not a wild guess that, as humans learned to make weapons and start fires, they hunted large game to extinction—if the creatures had never had predators, perhaps the humans could have walked right up to a mastodon or giant beaver and thrust a spear in. To ancient men and women, the presence of huge, dull-witted, appetizing mammals might have seemed providential—as if a higher power had placed them there for human sustenance.

The Ghosts of Evolution goes on to speculate in considerable detail on why the profusion of rotting fruits proves that much of the world's ecology was "recently" dependent on animals that have disappeared, and offers rather more specifics than most non-specialists will desire on exactly how seeds are evolved to pass through the guts of mammals. My favorite factoid: Seeds of the honey locust tree are so toughly coated that they will not sprout for gardeners unless the outer layer is mechanically cracked or the seed dipped into sulfuric acid. But if that seed goes through the digestive system of a cow, the coat is degraded just enough that the seed will germinate as soon as it leaves the animal. Profound forces must underlie such a sophisticated biological relationship. Maybe these forces are natural, and we simply haven't yet figured them out. Maybe something larger is at work.

Fertile Finches

Whether evolution and faith both belong in these debates is the subject for Michael Ruse's *Can a Darwinian be a Christian?* Ruse, a professor of philosophy at Florida State University, has acquired a reputation for exacting accuracy in writing about the science/religion boundary. In this book, he doesn't dwell on the obvious, but digs into the particulars of selection theory as applied to larger issues.

Consider, for example, the very high rates of death in nature. Most species—Galapagos finches among them—produce far more young than can possibly survive. Seeing that most offspring perish, Darwin supposed this an evolutionary necessity: Parents have huge numbers of young with slightly different features, so that there can be a lively competition to find the offspring best suited to the immediate environment. Darwin was heavily influenced by Malthus, who argued that human beings reproduce too much and therefore either runaway population growth or species limitation through starvation was inevitable. Darwin thought the preponderance of early death among animals and people both (childhood death, still common in the 19th century, would claim Darwin's beloved daughter Annie) showed the natural realm fundamentally pitiless. If nature is pitiless, Darwin reasoned, this disproves any guiding hand. He concluded, "There seems no more design in the variability of organic beings ... than in the course which the wind blows."

And yet some creatures, especially territorial predators, don't produce huge numbers of surplus young; somehow they know what their ecological niche can support, and limit their offspring. How predators self-regulate population is a current research mystery. *Homo sapiens* turns out to be another creature with population sense. Malthus believed raising standards of living would be disastrous because this would only put the poor into a position to have runaway numbers of babies. Contrary to his assumptions, in nearly all nations, as family income rises, average family size declines. Currently, developing world fertility is declining far more rapidly than projected, a reason that a human population catastrophe may never happen.

Species that don't over-produce young have evolved too, so huge numbers of dying offspring are not necessary for natural selection. Insights like this tend to muddy the Darwin-versus-God debate. The natural system hardly seems perfect—there are all those baby finches that die—but it's not heartless either. It seems to be seeking the greatest possible amount of life, which sounds rather like a higher goal.

The Origin of Species

Though the public debate about evolution and

faith continues to center on fringe creationist claims that Darwin should be rejected, among specialists, the question of the moment is not whether species evolve but why there are species in the first place. Darwinian mechanics only describe how creatures that already exist change in response to environment; selection theory is silent on how life began, and contemporary biology can offer no explanation. Darwin famously mused that in prehistory a "warm little pond" of chemicals may have been struck by lightning, but he admitted this was weak tea. One clue came in the Miller-Urey experiments of the 1950s, in which elements representing the ancient atmosphere formed amino acids when subjected to simulated lightning.

But nothing in Miller and Urey's test tubes came to life. Follow-up experiments, including a recent effort by the Carnegie Institution and NASA, have shown that certain important properties of organic compounds can arise naturally—but why shouldn't God employ compounds with natural properties? The Carnegie-NASA tests did not produce anything even remotely alive, either. Lately researchers have been toying with the notion that the first living substance was RNA, a relative of DNA. But RNA doesn't reproduce, and attempts to make it do so in the lab have failed.

How chemicals advanced from inanimate reactions on the barren rock faces of ancient Earth to extremely precise self-replication by the billions of DNA points is a much more interesting question than how the beaks of finches adapt to the shapes of various seeds. Here the "intelligent design" camp becomes relevant. This group's basic contention is that the leap from inanimate to animate seems unimaginable without guidance, and it's a haunting point.

Consider that Darwinian theory asserts a single common ancestor for all living things. The genetic structures shared by many creatures do show a web of interrelationship—your chromosomes contain more segments identical to fruit-fly DNA than you might care to know. But supposing the origin of life was wholly natural, why could it have happened just once, in the dawn of the common ancestor? If a natural process causes inanimate compounds to start living, this should happen all the time.

Perhaps origins of life are in fact happening unnoticed every day, since existing, specialized organisms might crowd out any new kids on the block. Nevertheless if the origin of life was wholly natural, then it should be possible to create life in a laboratory: It's odd to posit that life once began unaided in a harsh, sterile environment containing zero knowledge, but today cannot begin under ideal conditions controlled by researchers possessing elaborate information. And no researcher has even come close to manufacturing life. Until such time as biology grad students can create life whenever they wish, higher influences cannot be dismissed.

Can a Darwinian Be a Christian? suggests the debate on natural selection as fact is about to end, to be supplanted by a debate regarding how biology and faith should modify each other. Ruse's conclusion: "The Christian would be foolish to think that Darwinianism insists that humans are uniquely significant and bound to appear. However, the Christian can find in Darwinianism some support for the belief about the special significance of humans and the probability of their appearance." Substitute "believer" for Christian and the meaning remains the same.

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Not only are religious leaders making their peace with natural selection; on the flip side, as the biotechnology era begins, science increasingly finds itself facing ethical quandaries that sound very much like spiritual questions. If you create an artificial human embryo, for example—as a Massachusetts company did last month—have you created something sacred or a research tool? Science just can't answer that; it's going to need help from theology.

David Lack, the 1940s biologist who did the definitive work on Galapagos finches once said that neither scientific materialism nor religious devotion can alone explain the living world, as both entail "unexplained gaps and contradictions." Today it is fashionable to assume that science and faith are bent on each other's destruction. Both ways of knowing may be necessary if we are ever to understand why we are here.