CHARLES DARWIN

Evolution of a Scientist

He had planned to enter the ministry, but his discoveries on a fateful voyage 170 years ago shook his faith and changed our conception of the origins of life

By Jerry Adler

On a December night in 1831, HMS Beagle, on a mission to chart the coast of South America, sailed from Plymouth, England, straight into the 21st century. Onboard was a 22-year-old amateur naturalist, Charles Darwin, the son of a prosperous country doctor, who was recruited for the voyage largely to provide company for the Beagle’s aloof and moody captain, Robert FitzRoy. For the next five years, the little ship—just 90 feet long and eight yards wide—sailed up and down Argentina, through the treacherous Strait of Magellan and into the Pacific, before returning home by way of Australia and Cape Town. Toward the end of the voyage, the Beagle spent five weeks at the remote archipelago of the Galapagos, home to giant tortoises, black lizards and a notable array of finches. Here Darwin began to formulate some of the ideas about evolution that would appear, a quarter-century later, in “The Origin of Species” which from the day it was written to the present has been among the most influential books ever published. Of the revolutionary thinkers who have done the most to shape the intellectual history of the past century, two—Sigmund Freud and Karl Marx—are in eclipse today, and one—Albert Einstein—has been accepted into the canon of modern thought, even if most people still don’t understand what he was thinking. Darwin alone remains unassimilated, provocative, even threatening to some—like Pat Robertson, who recently warned the citizenry of Dover, Pa., that they risked divine wrath for siding with Darwin in a dispute over high-school biology textbooks (see box “Other Schools of Thought”). Could God still be mad after all this time?

Unintentionally, but inescapably, that is the question raised by a compelling new show that opened Saturday at the American Museum of Natural History in New York. Here are the beetles Darwin collected fanatically, the fossils and ferns he studied obsessively, two live Galapagos tortoises like the ones he famously rode bareback, albeit these were hatched in the Milwaukee County Zoo. And here are the artifacts of his life: his tiny single-shot pistol, his magnifying glass and rock hammer—and the Bible that traveled around the world with him, a reminder that before his voyage he had been studying for the ministry. (Indeed, in a letter to his father, who opposed the trip, he listed all the latter’s objections, starting with “disreputable to my character as a clergyman hereafter.” Little did he imagine.) The show, which will travel to Boston, Chicago and Toronto before ending its tour in London in Darwin’s bicentennial year of 2009, coincides by chance with the publication of two major Darwin anthologies as well as a novel by best-selling author John Darnton, “The Darwin Conspiracy,” which playfully inverts history by portraying Darwin as a schemer who dispatched a rival into a volcano and stole the ideas that made him famous. Visitors to Britain will note that Darwin has replaced that other bearded Victorian icon, Charles Dickens, on the British 10-pound note. “Even people who aren’t comfortable with Darwin’s ideas,” says Niles Eldredge, the museum’s curator of paleontology, “are fascinated by the man.”

In part, the fascination with the man is being driven by his enemies, who say they’re fighting “Darwinism,” rather than evolution or natural selection. “It’s a rhetorical device to make evolution

Never a Dull Moment
From the start, the theory of evolution has provoked challenges rooted in religion.

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But the man is, in fact, fascinating. His own life exemplifies the painful journey from moral certainty to existential doubt that is the defining experience of modernity. He was an exuberant outdoorsman who embarked on one of the greatest adventures in history, but then never again left England. He lived for a few years in London before marrying his first cousin Emma, and moving to a country house where he spent the last 40 years of his life, writing, researching and raising his 10 children, to whom he was extraordinarily devoted. Eldredge demonstrates, in his book accompanying the museum show, “Darwin: Discovering the Tree of Life,” how the ideas in “The Origin of Species” took shape in Darwin’s notebooks as far back as the 1830s. But he held off publishing until 1859, and then only because he learned that a younger scientist, Alfred Russel Wallace, had come up with a similar theory. Darwin was afflicted throughout his later life by intestinal distress and heart palpitations, which kept him from working for more than a few hours at a time. There are two theories about this mysterious illness: a parasite he picked up in South America, or, as Eldredge believes, anxiety over where his intellectual journey was leading him, and the world. It appeared to many, including his own wife, that the destination was plainly hell. Emma, who had other plans for herself, was tormented to think they would spend eternity apart.
Darwin knew full well what he was up to; as early as 1844, he famously wrote to a friend that to publish his thoughts on evolution would be akin to confessing a murder. To a society accustomed to searching for truth in the pages of the Bible, Darwin introduced the notion of evolution: that the lineages of living things change, diverge and go extinct over time, rather than appear suddenly in immutable form, as Genesis would have it. A corollary is that most of the species alive now are descended from one or at most a few original forms (about which he—like biologists even today—has little to say). By itself this was not a wholly radical idea; Darwin’s own grandfather, the esteemed polymath Erasmus Darwin, had suggested a variation on that idea decades earlier. But Charles Darwin was the first to muster convincing evidence for it. He had the advantage that by his time geologists had concluded that the Earth was millions of years old (today we know it’s around 4.5 billion); an Earth created on Bishop Ussher’s Biblically calculated timetable in 4004 B.C. wouldn’t provide the scope necessary to come up with all the kinds of beetles in the world, or even the ones Darwin himself collected. And Darwin had his notebooks and the trunkloads of specimens he had shipped back to England. In Argentina he unearthed the fossil skeleton of a glyptodont, an extinct armored mammal that resembled the common armadillos he enjoyed hunting. The armadillos made, he wrote, “a most excellent dish when roasted in [their] shell,” although the portions were small. The glyptodont, by contrast, was close to the size of a hippopotamus. Was it just a coincidence that both species were found in the same place—or could the smaller living animal be descended from the extinct larger one?

But the crucial insights came from the islands of the Galápagos, populated by species that bore obvious similarities to animals found 600 miles away in South America—but differences as well, and smaller differences from one island to another. To Darwin’s mind, the obvious explanation was that the islands had been colonized from the mainland by species that then evolved along diverging paths. He learned that it was possible to tell on which island a tortoise was born from its shell. Did God, the supreme intelligence, deign to design distinctive shell patterns for the tortoises of each island?

Darwin’s greater, and more radical, achievement was to suggest a plausible mechanism for evolution. To a world taught to see the hand of God in every part of Nature, he suggested a different creative force altogether, an undirected, morally neutral process he called natural selection. Others characterized it as “survival of the fittest,” although the phrase has taken on connotations of social and economic competition that Darwin never intended. But he was very much influenced by Thomas Malthus, and his idea that predators, disease and a finite food supply place a limit on populations that would otherwise multiply indefinitely. Animals are in a continuous struggle to survive and reproduce, and it was Darwin’s insight that the winners, on average, must have some small advantage over those who fall behind. His crucial insight was that organisms which by chance are better adapted to their environment—a faster wolf, or deer—have a better chance of surviving and passing those characteristics on to the next generation. (In modern terms, we would say pass on their genes, but Darwin wrote long before the mechanisms of heredity were understood.) Of course, it’s not as simple as a one-dimensional contest to outrun the competition. If the climate changes, a heavier coat might represent the winning edge. For a certain species, intelligence has been a useful trait. Evolution is driven by the accumulation of many such small changes, culminating in the emergence of an entirely new species. “[F]rom the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows,” Darwin wrote.

And there was an even more troubling implication to his theory. To a species that believed it was made in the image of God, Darwin’s great book addressed only this one cryptic sentence: “Much light will be thrown on the origin of man and his history.” That would come 12 years later, in “The Descent of Man,” which explicitly linked human beings to the rest of the animal kingdom by way of the apes, “Man may be excused for feeling some pride at having risen, though not through his own exertions, to the very summit of the organic scale,” Darwin wrote, offering a small sop to human vanity before his devastating conclusion: “that man with all his noble qualities … still bears in his bodily frame the indelible stamp of his lowly origin.”

So it was apparent to many even in 1860—when the Anglican Bishop Samuel Wilberforce debated Darwin’s defender Thomas Huxley at Oxford—that Darwin wasn’t merely contradicting the literal Biblical account of a six-day creation, which many educated Englishmen of his time were willing to treat as allegory. His ideas, carried to their
logical conclusion, appeared to undercut the very basis of Christianity, if not indeed all theistic religion. Was the entire panoply of life stretching back millions of years to its single-celled origins, with its innumerable extinctions and branchings, really just a prelude and backdrop to the events of the Bible? When did Homo sapiens, descended by a series of tiny changes in an unbroken line from earlier species of apes, develop a soul? The British biologist Richard Dawkins, an outspoken defender of Darwin and a nonbeliever, famously wrote that evolution “made it possible to be an intellectually fulfilled atheist.” Although Darwin struggled with questions of faith his whole life, he ultimately described himself as an “Agnostic.” But he reached that conclusion through a different, although well-
traveled, route. William Howarth, an environmental historian who teaches a course at Princeton called “Darwin in Our Time,” dates Darwin’s doubts about Christianity to his encounters with slave-owning Christians—some of them no doubt citing Scripture as justification—which deeply offended Darwin, an ardent abolitionist. More generally, Darwin was troubled by theodicy: how could a benevolent and omnipotent God permit so much suffering in the world he created? Believers argue that human suffering is ennobling, an agent of “moral improvement.” Darwin acknowledged. But with his intimate knowledge of beetles, frogs, snakes and the rest of an omnivorous, amoral creation, Darwin wasn’t buying it. Was God indifferent to “the suffering of millions of the lower animals throughout almost endless time”? In any case, it all changed for him after 1851. In that year Darwin’s beloved eldest daughter, Annie, died at the age of 10—probably from tuberculosis—an instance of suffering that only led him down darker paths of despair.

A legend has grown up that Darwin experienced a deathbed conversion and repentance for his life’s work, but his family has always denied it. He did, however, manage to pass through the needle’s eye of Westminster Abbey, where he was entombed with honor in 1882.

So it’s not surprising that, down to the present day, fundamentalist Christians have been suspicious of Darwin and his works—or that in the United States, where 80 percent of the population believe God created the universe, less than half believe in evolution. Some believers have managed to square the circle by mapping out separate realms for science and religion. “Science’s proper role is to explore natural explanations for the material world,” says the biologist Francis Collins, director of the Human Genome Project and an evangelical Christian. “Science provides no answers to the question ‘Why are we here, anyway?’ That is the role of philosophy and theology.” The late Stephen Jay Gould, a prolific writer on evolution and a religious agnostic, took the same approach. But, as Dawkins tirelessly observes, religion makes specific metaphysical claims that appear to conflict with those of evolution. Dealing with those requires some skill in Biblical interpretation. In mainstream Christian seminaries the dominant view, according to Holmes Rolston III, a philosopher at Colorado State University and author of “Genes, Genesis and God,” is that the Biblical creation story is a poetic version of the scientific account, with vegetation and creature of the sea and land emerging in the same basic order. In this interpretation, God gives his creation a degree of autonomy to develop on its own. Rolston points to Genesis 1:11, where God, after creating the heavens and the Earth, says, “Let the Earth put forth vegetation … ” “You needed a good architect at the big bang to get the universe set up right,” he says. “But the account describes a God who opens up possibilities in which creatures are generated in an Earth that has these rich capacities.”

Collins identifies the soul with the moral law, the uniquely human sense of right and wrong. “The story of Adam and Eve can thus be interpreted as the description of the moment at which this moral law entered the human species,” he says. “Perhaps a certain threshold of brain development had to be reached before this became possible—but in my view the moral law itself defies a purely biological explanation.”

The Darwin exhibit was conceived in 2002, when the current round of Darwin-bashing was still over the horizon, but just in those three years’ time museum officials found they had to greatly expand their treatment of the controversy—in particular, the rise of “intelligent design” as an alternative to natural selection. ID posits a supernatural force behind the emergence of complex biological systems—such as the eye—composed of many interdependent parts. Although ID advocates have struggled to achieve scientific respectability, biologists overwhelmingly dismiss it as nonsense. Collins comments, in a video that is part of the museum show: “[ID] says, if there’s some part of science that you can’t understand, that must be where God is. Historically, that hasn’t gone well. And if science does figure out [how the eye evolved]—and I believe it’s very likely that science will … then where is God?”

WHERE IS GOD? IT IS THE mournful chorus that has accompanied every new scientific paradigm over the last 500 years, ever since Copernicus declared him unnecessary to the task of getting the sun up into the sky each day. The church eventually reconciled itself to the reality of the solar system, which Darwin, perhaps intentionally, invoked in the stirring conclusion to the “Origin”: “There is grandeur in this view of life … that whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful
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have been, and are being, evolved.” For all his nets and guns and glasses, Darwin never found God; by the same token, the Bible has nothing to impart about the genetic relationships among the finches he did find. But it is human nature to seek both kinds of knowledge. Perhaps after a few more cycles of the planet, we will find a way to pursue them both in peace.

With ANNE UNDERWOOD and WILLIAM LEE ADAMS