

HAROLD FROMM

---

## Back to Bacteria: Richard Dawkins' Fabulous Bestiary

"FABULOUS" SUGGESTS A FABLE, but Richard Dawkins' *The Ancestor's Tale*<sup>1</sup>—a reverse journey of sorts from *Homo sapiens* to the primal blob—is in large part fact, slightly smaller part inspired speculation, and still smaller part artful fabrication. Only a master of the game of evolutionary history could have produced an opus as grandly magnum as this one. To create his journey back to the parent of us all, Dawkins has founded his six-hundred-page epic on an act of poetic license that probably causes more trouble than it's worth. Acknowledging that a retro-history of evolution back to square one could very well begin with any extant creature, he nonetheless (bowing to "human interest") chose *Homo sapiens* as his startup vehicle, while deciding to treat the journey as a pilgrimage in the style of *The Canterbury Tales*. In the persona of a Host, he picks up a "pilgrim" at each point at which a species branch reconnects (since we're going backwards) to a larger branch of the evolutionary tree, a point in other words where, in retrospect, we can identify a new taxonomic lineage as having arisen. These pilgrims are actually progenitors of the new species, common ancestors whom Dawkins has neologized as "concestors," most of whom, at least in theory, tell a "tale," like Chaucer's pilgrims.

One could wish that this literary device had worked out better than it does, since in reality there is no Host, no pilgrims, no tales and no Canterbury, just Dawkins as the grand narrator who speaks in a number of voices, not in order to imitate diverse pilgrims (who are nowhere in evidence) but to employ the rhetorical mode that his story requires at each turn. These modes range from genial, literary, knockabout informal discourse to highly technical set pieces in the specialized language of zoology. I would call this virtuoso performance an oratorio—with recitatives, stately arias, and maybe an occasional grand chorus—more like Haydn's *The Creation* than Chaucer's *Canterbury Tales*. The result is a book that is at once awe-inspiring and not quite satisfactory.

A multi-modal performance such as this raises the question of what constitutes a "book," or at least a book that produces a distinct and

<sup>1</sup> THE ANCESTOR'S TALE: A Pilgrimage to the Dawn of Evolution, by *Richard Dawkins*. Houghton Mifflin. \$28.00; \$16.00.

powerful impression. The familiar Richard Dawkins, celebrated for such cultural artifacts as *The Selfish Gene* and *The Blind Watchmaker* as well as collections of essays and reviews such as *A Devil's Chaplain*, is here only fitfully in evidence, mainly in the meditative arias. The long discursive unwrappings of a single theory or insight that drives his well-known works provide them with a continuity of narrative and voice that serve as a motive force largely lacking in *The Ancestor's Tale*. There are a lot of dry (but densely informative) zoological recitatives describing the major life forms along the way, admittedly the heart of the book. The most gripping parts are the discourse-rich early pages presenting general ideas, the periodic "arias" in which Dawkins steps back from his ongoing bestiary to speculate and ruminate about the significance of its zoological particulars or to hurl political, religious, and scientific thunderbolts at his *bêtes noires*, and the final pages in which he attempts an overview and summation. But six or eight pages on the electrical fields of platypuses are bound to fatigue the most indomitable of nonspecialists. In the course of 600 pages, one is likely to wonder who is the intended audience.

Dawkins was justified in his supposition that starting at the beginning of reproductive life perhaps three and a half billion years ago and moving forward to the present would have given the impression of a progress toward us (an evolutionary no-no), whereas going backwards avoids such an anthropocentric assumption, squashing our grandiosity by reducing us to the blobs of bacteria from which we and all other life emerged. As he puts it, "We can be very sure there really is a single ancestor of all surviving life forms on this planet. The evidence is that all that have ever been examined share (exactly in most cases, almost exactly in the rest) the same genetic code; and the genetic code is too detailed, in arbitrary aspects of its complexity, to have been invented twice." How is it possible to learn so much about life forms from the distant past, many of them extinct? Dawkins offers three sources of information: archaeology, renewed relics, and triangulation. Archaeology studies bones, teeth, pots, artifacts, as well as fossils that have survived for millions of years, some unearthed by digs, others by having been compressed into formations like the Burgess Shale (the subject of Stephen Gould's *Wonderful Life*) that reveal even soft tissue. Renewed relics are accounts found in written records, such as literary works and discoveries like the Dead Sea Scrolls. But writing goes back only 5000 years, a mere blip in the record of life on earth. The real archival golden relic is DNA. Although the actual molecules of dead animals don't last very long—mostly days or years, but "for plants in permafrost, the record is about 400,000 years"—nevertheless the information in those molecules is "copied for millions, sometimes hundreds of millions of years" in subsequent generations whose DNA turns out to be a record of the past, preserved like digital copies of a compact disk even when the original vehicle is destroyed. As for triangulation, the most speculative of the three techniques, Dawkins gives an optimistic report: "Even if we

had no fossils, a sophisticated comparison [i.e., triangulation] of modern animals would permit a fair and plausible reconstruction of their ancestors."

With these basic investigative tools explained, Dawkins sets out on his journey to the source, starting with *Homo sapiens* and regressing through forty branchings to arrive at primal bacteria. The first backwards split or branching occurred about five million years ago, when our line broke off from that of chimps and bonobos, our closest relatives (which means sharing very similar genomes). Bipedality and brain enlargement provide two of the most speculative cruxes in evolutionary biology, since they are the driving forces behind the acceleration of culture and technology. Many theories to explain these cruxes derive from the renewal of interest in Darwin's *The Descent of Man* for its introduction of the concept of sexual selection, the libidinal trigger behind mating preferences, which are principally the whims of females dazzled by displays of male fitness. Theories abound in which bipedality's upright posture exposes genitals and invites copulation; male ornamentation (as in peacocks' tails) influences females' choice of mates; the costliness of useless ornaments becomes a sign of fitness (i.e., virility to spare); the right shade of red in birds' feathers is a turn-on. Geoffrey Miller's *The Mating Mind* carries this even further, treating the intelligence generated by gradually enlarging brains as a sexual come-on involving the talk, music, painting, ornament that superior brainpower produces as an aphrodisiac—plausible up to a point, but to suppose that Beethoven's last quartets are just a ploy of evolution to attract females is quite a stretch.

What will surprise a newcomer to evolutionary science is the extremely brief period during which a civilization like that of the West has been in existence. Most of the very basic elements of what we now call culture are associated with the Great Leap Forward of 40,000 years ago, the period of the Cro-Magnons, when paintings, carvings, ornamentation "suddenly appear in the archaeological record, together with musical instruments such as bone flutes, and it wasn't long before stunning creations like the Lascaux Cave murals" started off a process that Dawkins sees as precursors to the Sistine Chapel and the *Goldberg Variations*. Most of the so-called "venerable" traditions that people speak of today—hanging Christmas lights, preserving "family values," idolizing childhood and children, human rights, and standards of "mental health" are merely recent flickers in the evolutionary movie. With writing only 5000 years old and farming only 10,000, the matters of settling down into communities, growing crops, building houses, establishing legal systems, specializing in artisanal skills—all these are products barely as old as yesterday, a micro-moment in a sequence that will take us back four billion years.

The domestication of animals has changed the genetic makeup of those that were bred for specific purposes, sometimes benignly as with dogs, all derived from the grey wolf no matter how diverse the spectrum

from Pekinese to pit bull. Yet settling down has not always produced beneficial alterations in humans, animals and plants. We learn, for example, that lactose intolerance and allergic reactions to wheat derive from the radically altered diet of post-farming societies, whose ancestors stopped drinking (human) milk at age four and ate few cereal grains until farming's systematic cultivation of the grasses that produce them. And we know from today's obesity crisis that the refined carbohydrates that dominate the manufactured, highly processed Western diet are a recent invention that runs counter to millions of years of primate nourishment, while the "germs" in Jared Diamond's *Guns, Germs, and Steel* are disease sources produced by the increased aggregation of humans into settled societies where transmission of infectious agents becomes all the more likely.

These human interest considerations occupy only about one sixth of *The Ancestor's Tale*, but that is a relatively large portion of the book considering how small a percentage of life on earth involved the evolution of hominids. Though the bulk of the book deals with animals, most of these creatures, such as barnacles, worms, and coral would not occur to laymen as animals at all. Priority in evolutionary sequence, however, is given to funguses, then the rest of the multicellular organisms, then plants, and finally single-celled microbes, the very foundational elements in the origins of life.

One of the most important events in the animal story is the devastation of our planet sixty-five million years ago by a comet that snuffed out not only dinosaurs but about half of all other species. As Dawkins describes it,

The noise of the impact, thundering round the planet at a thousand kilometers per hour, probably deafened every living creature not burned by the blast, suffocated by the wind-shock, drowned by the 150-metre tsunami that raced around the literally boiling sea, or pulverized by an earthquake a thousand times more violent than the largest ever dealt by the San Andreas fault. And that was just the immediate cataclysm. Then there was the aftermath—the global forest fires, the smoke and dust and ash which blotted out the sun in a two-year nuclear winter that killed off most of the plants and stopped dead the world's food chains.

The elimination of dinosaurs resulted in an amazing proliferation of animal and mammal life forms, formerly nocturnal and very small (to evade the dinosaurs). As I write this, newspapers are reporting the discovery of small mammal fossils showing digestive remains of tiny baby dinosaur bones, but these seem to be atypical of the ecology of that Cretaceous period, when dinosaurs ruled.

Raising the subject of whether today's technology has the power to intercept similarly life-destroying missiles from outer space, Dawkins cannot resist a few stabs at the Bush regime that he so profoundly

loathes: "Politicians who invent external threats from foreign powers, in order to scare up economic or voter support for themselves, might find that a potentially colliding meteor answers their ignoble purpose just as well as an Evil Empire, an Axis of Evil, or the more nebulous abstraction 'Terror,' with the added benefit of encouraging international cooperation rather than divisiveness. . . . The mass realization that humanity as a whole shares common enemies could have incalculable benefits in drawing us together rather than, as at present, apart." This, if anything, could be said to be the submerged thematic undercurrent of an overtly athematic macro/micro zoological history of Planet Earth.

This implicit theme—of the unity of life, so dramatically revealed in the project of tracing us back to bacteria—surfaces again in a major aria later in the "pilgrimage," an account of "ring species" and racism, nicely tailored to illustrate another of Dawkins' favorite ideas, the illusoriness of gaps and discontinuities and the false belief in essences, going back in Western culture to Plato's essentialist Ideas of Good, Beauty, and whatnot. It is worth quoting at length one of the most fascinating passages in the entire book, on ring species:

If you follow the population of herring gulls westward to North America, then on round the world across Siberia and back to Europe again, you notice a curious fact. The "herring gulls," as you move round the pole, gradually become less and less like herring gulls and more and more like lesser black-backed gulls until it turns out that our Western European lesser black-backed gulls actually are the other end of a ring-shaped continuum which started with herring gulls. At every stage around the ring, birds are sufficiently similar to their immediate neighbors in the ring to interbreed with them. Until, that is, the ends of the continuum are reached, and the ring bites itself in the tail. The herring gull and the lesser black-backed gull in Europe never interbreed, although they are linked by a continuous series of interbreeding colleagues all the way round the other side of the world. [I.e., they are separate species.]

If it had happened that humans and chimps were a ring species, "what would it do to our attitudes to other species? Many of our legal and ethical principles depend on the separation between *Homo sapiens* and all other species." As for people who blow up abortion clinics, eat meat, and don't care about chimps, "Would they think again, if we could lay out a living continuum of intermediates between ourselves and chimpanzees . . . ?" Much of the illusion of essentially different species is the result of the absence of fossils for the intermediate forms that would show an unbroken link between apparent disparates. "There is no such thing as essence," Dawkins writes. If intermediates were still visible, "instead of discrete names, we would need sliding scales, just as the words hot, warm, cool and cold are better replaced by a sliding scale such as Celsius and Fahrenheit."

The further implications of this continuity are picked up a hundred pages later in a discussion of race in connection with "The Grasshopper's Tale." In a brilliantly conceived use of a photograph showing Condoleeza Rice, Colin Powell, George Bush, and Donald Rumsfeld standing side by side, Dawkins asks whether a Martian seeing them all together would suppose it was a case of three against one, three whites and one black. That Powell is regarded as "black" (standing between a very dark Rice and a white Bush) when he more closely resembles Bush and Rumsfeld, raises all sorts of ethical questions about essences, continuity, and illusions. "Why," Dawkins asks, "do people so readily swallow the apparent contradiction . . . between the verbal statement, 'he is black,' and the picture it accompanies?" It is, he replies, an instance of the "tyranny of the discontinuous mind." This gradual blending over large periods of time, concealed by missing intermediate fossils, recurs as ground bass throughout the accounts of forty branchings. Whales, it turns out, are close aquatic cousins of hippos, whose characteristic body parts lie within the whale body; and we ourselves are kin to lobefin fish, "who have muscles in the fleshy fins themselves, just as we have biceps and triceps muscles in our upper arms and Popeye muscles in our lower arms." Species, Dawkins believes, are the illusory fixities of mind-created discontinuities. Biologists regard inability to mate as the criterion for recognizing species, but the deeper continuities, like the hippo/whale relationship, are masked by this taxonomic privileging. After quoting a really shocking racist passage from H. G. Wells invoking genocide against blacks and Jews, Dawkins asks, "What, I wonder, will our successors of the twenty-second century be quoting, in horror, from us? Something to do with our treatment of other species, perhaps?" Given the already proliferating writings on the subject of speciesism from Peter Singer to J. M. Coetzee to *People for the Ethical Treatment of Animals* (PETA), it's a pretty plausible guess.

In "The Fruit Fly's Tale," this theme is picked up yet again in an extended account of the Hox gene, which Dawkins describes as "a gene whose mission in life is to know whereabouts in the body it is, and so inform other genes in the same cell" so that legs do not grow out of heads, as they are sometimes known to do when Hox genes malfunction. Since Hox genes are a characteristic of animals (as opposed to plants and protozoa), Dawkins sees them as yet another type of unity: "The Hox story shows that animals are not a highly varied, unconnected miscellany of phyla, each with its own fundamental body plan acquired and maintained in lonely isolation. If you forget morphology and look only at the genes, it emerges that all animals are minor variations on a very particular theme."

As we go back further and further to the earliest concestors, we arrive at the first animals that Dawkins can trace, a category of single-celled parasites known for short as DRIPS. These are preceded in time by fungi, then plants, which "sit, indispensably, at the base—the very foundation—of nearly every food chain . . . the first living things any

visiting Martian would remark. By far the largest single organisms that ever lived are plants." Lastly, or firstly, are the bacteria, the earliest and most prevalent form of life on this planet. "There is no doubt that the great majority of life's diversity at the fundamental level of chemistry is microbial, and a substantial majority of it is bacterial." But not until the development of the contemporary science of molecular biology was it possible to inspect the real structure of living things. "We didn't even know about bacteria until the nineteenth century," or even whether the specimens seen through powerful microscopes were animals or plants. Amoebas were once thought to be the "grand ancestor of all life—how wrong we were, for an *Amoeba* is scarcely distinguishable from a human when viewed through the 'eyes' of bacteria." Molecular biology has resolved many of these ambiguities by showing the limitation of morphology, the relatively superficial study of apparent forms.

As we arrive at this point close to the beginnings of life, a number of philosophical questions inevitably suggest themselves. If once again a missile from outer space were to destroy most of existing life, would evolution re-run its course more or less as it did this time around? Dawkins thinks that the re-run would be similar to but not identical with what we now have. To support this supposition, he reminds us of the phenomenon of "convergence," the independent development of similar structures in species that have been isolated geographically. The movement toward eyes, for example, seems inevitable, independently achieved by various isolated species, but a new round of creatures who have them would almost certainly not be identical with the creatures of today, since natural selection depends on ecological and genetic variables that have no real chance of occurring exactly as they have done once before. Similar but different looks like a prudent guess.

Equally speculative is the question of how non-life became life, though Dawkins equates the first instances of heredity, that is, replication, with "life" itself, since these events initiated the chain whose links are all the species that have in fact evolved. But the mysteriousness of "life" seems less mysterious than sheer existence after reading a book like this, further demolishing the notion of life as a "spirit" breathed into matter by some sort of transcendent bellows. More intelligible, more plausible (to me, at any rate) is the recognition that chemical reactions and physical changes, the intermixing and clinging together of elements and their subsequent transformation into greater complexities, are not many steps away from the simplest form of "life." One can easily imagine a single jog that jolts these chemico-physical reactions into a self-sustaining process to be known as "life." Or as Dawkins put it in *The Blind Watchmaker*, "There is nothing special about the substances from which living things are made. Living things are collections of molecules, like everything else." Beyond this, the development of consciousness and self-consciousness strikes me as much more unfathomable than mere "life." The cognitive neurosciences still have a long way to go to psych out psychology itself. Life begins to look more and

more like physics and chemistry taken to a point of even *more so*. But consciousness?

Dawkins' final pages, which he calls "The Host's Farewell," are an expression of wonder as to why there is something rather than nothing and why that something is sometimes "life." "The fact that life evolved out of nearly nothing, some 10 billion years after the universe evolved out of literally nothing—is a fact so staggering that I would be mad to attempt words to do it justice." Taking a parting shot at cheap simplistic supernaturalism that explains nothing beyond human fantasies and desires, he concludes, "My objection to supernatural beliefs is precisely that they fail to do justice to the sublime grandeur of the real world. They represent a narrowing-down from reality, an impoverishment of what the real world has to offer." And the real world of *The Ancestor's Tale* is, in a word, fantastic.

#### The Friends of The Hudson Review

**In Autumn 2000, we launched The Friends of The Hudson Review to give our loyal readers an opportunity to participate in our vibrant literary adventure and to support our outstanding writers. The overwhelming response from subscribers has been heartwarming, and we thank all of our Friends, old and new, for their generosity. In particular, we wish to acknowledge by name those who chose to contribute at the Centenary level to provide major support to The Hudson Review during its second half-century.**

The Alfred and Jane Ross Foundation, Armando T. Belly  
 The Joan L. and Julius H. Jacobson II Foundation,  
 Robert W. Kean, Jr., Mr. and Mrs. Lawrence W. Kown,  
 James Thurmond Smithgall,  
 Soros Fund Charitable Foundation,  
 Elizabeth A. Straus,  
 Mr. and Mrs. William B. Warren