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BY PETER NICHOLS

Penn anthropologist and literary stylist Loren Eiseley, Gr'37, once struggled with how he might answer a student in a science course who asked, "Where did I come from?" The question has a Baltimore Catechism ring to it, but Eiseley's response is, if not pure science, then science that is poetically rendered. " 'Son,' you say floundering ... 'There was an odd fish in a swamp and you have his lungs.' Or you say, 'Once there was a reptile whose jaw bones are in your ear.' Or you try again. 'There was an ape and his teeth are in your mouth. Your jaw has shrunk and your skull has risen. You are fish and reptile and a warm-blooded affectionate thing that dies if it has nothing to cling to when it is young. You are all of these things. You are also a rag doll made of patches out of many ages and skins.' "

The intrusion of scientific answers into what were once thought of as religious questions has been troubling to believers, especially to those who read the Genesis story as a science textbook. It took more than 350 years for the Catholic Church to admit the errors of inquisitors who persecuted Galileo when he offered proofs that Earth was not the center of the universe. With the publication of *Origin of Species* (1859), science revealed that we

Science philosopher Michael Weisberg holds a tray full of beetles from the collections of the entomology department at the Academy of Natural Sciences in Philadelphia.

**"I think they want to cut**

## A BIOLOGIST AND A PHILOSOPHER DISSECT A PSEUDOSCIENCE

are, in Eiseley's words, a "rag doll" descended from non-human – even nonliving – ancestors. Molecular biologists have elaborated Darwin's theory of evolution, casting all life as a restless patchwork of genes and proteins, woven and re woven over vast eons of time into a crazy quilt of furred, finned, winged and leaved species.

"I don't have any trouble with religion being part of how people live their lives," says Penn biologist Paul Sniegowski, "but I do have real problems, as a scientist, with making matters of faith part of how we evaluate scientific findings and theories."

Sniegowski studies genetic mutations that get passed down through generations of laboratory bacteria. Last winter, he and Michael Weisberg, an assistant professor of philosophy, wrote an open letter to the Dover school board, which oversees the education of 3,600 pupils 100 miles west of campus. The board had voted to introduce its students to "intelligent design" in order to assure "a fair and balanced science curriculum." Intelligent design is a critique of evolution that claims life is too complex to be explained by natural causes but requires the guiding hand of an outside intelligence. Not all advocates are biblical literalists. A few are scientists. They don't say whose fingerprints they've found in the natural order, but they contend their position is based on science.

Dover is the nation's first school district to place intelligent design before students as a scientific explanation for the origin of life. The board did not mandate instruction in this new "science," only that teachers should read a statement casting doubt on evolution – "Darwin's Theory ... is not a fact." – while holding up intelligent design as a viable alternative. Students were invited to explore the competing explanation in 60 copies of the intelligent-design manifesto *Of Pandas and People*, which had been given to the school district by an anonymous donor. "With respect to any theory," the statement advised, "students are encouraged to keep an open mind."

Weisberg, who studies theoretical models in evolutionary biology,

deconstructs the Dover statement. The board had singled out evolution, he notes, but it didn't urge the same open mindedness toward any other theory by name. No disclaimer admonished that atomic theory or relativity or plate tectonics might be wrong or controversial, and thus deserving of learners' circumspection. "Clearly, that's not what the board was trying to do with this," he stresses. "They were asking students to do more than keep an open mind – or less."

In a letter signed by 30 members of the biology and philosophy departments, Sniegowski and Weisberg told the Dover board that "the quality of science education in your schools has been seriously compromised." Science, they explained, is "based on ideas well

Photos by Lisa Godfrey

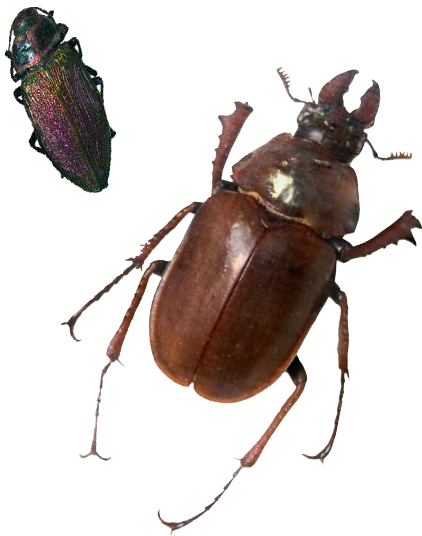
## Beetlemania

A cleric once asked J.B.S. Haldane (1892-1964), the British population geneticist, what he might infer about the deity, based on his lifetime of close observation of the natural world. Haldane replied that the creator seemed to have "an inordinate fondness for beetles." Entomologists have described and named more than 350,000 species of coleoptera since 1758. "One of every five species of living organisms – which includes plants, animals, bacteria, fungi and everything else – is a beetle," says Jason Weintraub, entomology collection manager at Philadelphia's Academy of Natural Sciences. Due to their hard exoskeletons, beetles are plentiful in the fossil record too. Paleontologists have tracked their ancestors back as far as 270 million years. ■

*Chiasognathus granti*, Darwin's stag beetle



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supported by evidence,” which is solidly the case for evolutionary theory. Intelligent design is “a form of creationism propped up by a biased and selective view of the evidence.”

Sniegowski, not to mention the 11 parents who brought a suit in federal court against the board, contends the Dover policy tries to slip religion into the science curriculum. Promoters of intelligent design, led nationally by the Discovery Institute, a Seattle think tank, studiously avoid references to God. “But if you look below the surface,” Sniegowski maintains, “you can see they are the lineal descendants of the creationists” who lost the anti-evolution court battles of the 1980s.

After their defeat, creationists regrouped and forged a new approach to undercut the teaching of evolution by putting forward intelligent design, “a science

consonant with Christian and theistic convictions.” The quote is from Discovery’s “Wedge Strategy,” a 20-year action plan posted on the Internet in 1999. The Wedge calls for a far-reaching campaign to pry open gaps in court decisions that ruled teaching creationism unconstitutional because it brought God into the classroom. Those verdicts left open the possibility of lesson plans that present other “scientific” origin theories alongside evolution.

Eric Rothschild, L’93, a lawyer with Pepper Hamilton, LLP, and the lead attorney in the case against the Dover board, observes that “intelligent design is a perfect illustration of evolution at work. Creationists were confronted with an inhospitable legal environment, so in order to survive they contrived a new label – intelligent design – for the same basic concept.”

By sidestepping talk about a creator, Rothschild explains, publicists spin intelligent design as a new movement of heretical scientists whose views deserve equal time with Darwinian orthodoxy. It’s about academic freedom. Schools, they insist, should “teach the controversy.” So effective has their publicity been that President Bush spoke on message at a summer roundtable with Texas reporters when he remarked that “both sides should be properly taught ... so people can understand what the debate is about.”

In fact, say the scientist and the philosopher, there is no controversy – the quarrel is being played out almost entirely in sound bites and media hype. At worldwide science conventions and in peer-reviewed journals, scientists have long moved past debate over the soundness of evolutionary theory. “It’s a non-issue,” Weisberg says. “There are scientists who continue to work

out the details of the theory, and there are internal controversies about how certain things should be interpreted, but certainly for the last 75 years there has been full scientific consensus.” Any “gaps” or “problems” in evolutionary theory are the places where investigators pose new questions and carry out research. The curiosity of scientists and their eagerness to be part of that long lineage of question and answer and question again is what keeps scientific inquiry alive.

“Evolutionary theory is testable and has been tested and continues to be tested and to produce fruitful new hypotheses that can be tested,” Weisberg points out. But intelligent design is a strikingly incurious science. Its most compelling finding, that nature gives evidence of an outside designer, has not prompted defenders to pose the next question: Who is the designer? There have been almost no papers in refereed science journals and hardly a hint of a research program at the Discovery Institute. That, declares Weisberg, is what marks it a pseudoscience. Intelligent design is little more than a “series of critiques” that predicts and produces nothing, and ends with an untested – and untestable – hypothesis. These anti-evolutionists, he adds, “spend a lot of time trying to characterize the sort of complexity that they think requires a designer.” The designer might be God; it could be an alien, proponents coyly respond when pushed. And then they cling to that ignorance as a virtue – or a legal expedient.

“I think they want to cut our understanding of nature to fit theological preconceptions,” Sniegowski states. “Dependable knowledge about nature is hard-won and extremely valuable. It’s what lets us run cars and cure diseases. Evolutionary

# THE GOD HYPOTHESIS

science is a vital part of that tradition. There really is no reason to change the rules about how we get dependable knowledge and every reason not to.”

The authors of the Wedge Strategy see Darwinism as a secular religion that overthrew traditional forms of Christianity and “infected virtually every area of our culture” with “materialism,” a belief that the world holds nothing more than what can be grasped by the scientific mind. Richard Dawkins, a fellow of the Royal Society and widely read popularizer of evolution, confirmed – and inflamed – that perception when he stated that Charles Darwin “made it possible to be an intellectually satisfied atheist.” If that is true, it is not a scientific finding but a personal discernment that Dawkins came to. Science, Sniegowski and Weisberg are quick to point out, has nothing to say about God, intelligent designer or otherwise.

Scientists of a reductionist stripe may be satisfied that the answers of science are the last word, but many investigators ply its method without professing the belief that science explains everything. For them, it is a tool of discovery that opens up a way of knowing nature rather than a dogma that shuts the door at genes and quarks and stars and fossils. Within the ranks of researchers, many question if there are more things in heaven and earth than are dreamt of in science, and some are even churchgoers. “I can’t reconcile those two things,” Sniegowski comments, “they haven’t been reconciled for 2,000 years, but I would point out that there are lots of things in our lives that we can’t reconcile.” Religion and science, he seems to suggest, are not natural enemies, although they may need to mark territorial boundaries a little

better. “The controversy,” he adds, need not be so polarizing.

Loren Eiseley was a scientist enchanted and awed by the sheer strangeness of evolution. “I too am a many-visaged thing that has climbed upward out of the dark of endless leaf falls and has slunk, furred, through the glitter of blue glacial nights.” Through Darwin’s eyes, he saw that life is a shape-shifter and humanity the latest “bloom on a curious animal extrusion through time.” It is the science-formed poet in Eiseley who speaks here. How natural is “natural”? he wondered. To his way of thinking, Darwin’s theory did not diminish the human race but opened a doorway to what he sometimes called “the unexpected universe.” What is it we are part of? he would ask. It’s not exactly a science question, although it comes from scientific insight, and it may not belong in a biology curriculum.

“Skins may still prickle in a modern classroom,” Eiseley observed, no doubt from personal experience. Those goose bumps once fluffed fur that warmed long-gone ice age ancestors – or bristled their hair in fear, the forebear of awe. “No living thing, not even man, understood upon what journey he had embarked,” Eiseley wrote. But, as he noted in another context, “there’s no use reporting it to the Royal Society.” ■

**“There really is no reason to change the rules about how we get dependable knowledge and every reason not to.”**



Elizabeth Frost

Paul Sniegowski

When physicist and mathematician Pierre-Simon Laplace published *Mécanique Céleste*, Napoleon asked why there was no mention of God in his five-volume treatise on how the heavens work. After all, the emperor pointed out, the great Isaac Newton, whose theories Laplace had built upon, had found a place for the divinity in his system. The French scientist replied, “I have no need of that hypothesis.”

Almost 100 years before, Newton had given a comprehensive account of terrestrial and celestial motion, which culminated in a theory of universal gravitation. In *Principia*, he laid out, like the innards of a clock, the physical laws that govern the machinery of the universe. Still, some observations were not as predicted, so Newton conjectured that the deity periodically reset the astronomical clock to keep it running on time.

By the early 19th century, the English philosopher William Paley thought he had glimpsed the handiwork of the creator in the intricate order of nature, just as one would infer that a watchmaker had devised a watch one came upon. “[I]ts several parts are framed and put together for a purpose,” he speculated, likewise the highly wrought apparatus of the world implied a world maker.

With the publication of Darwin’s *Origin*, even the cogs and wheels that turn the machinery of life could be bared and understood without invoking the intervention of an intelligent designer. “The old argument of design in nature, as given by Paley,” Darwin wrote, “which formerly seemed to me to be so conclusive, fails, now that the law of natural selection has been discovered.”

“I can tell you, as a working scientist,” biologist Paul Sniegowski says, “that the whole history of science is predicated on not taking it on faith. It’s predicated on putting things to the test. Supernatural explanations of natural phenomena never explained much.” ■