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The edge of intelligence

by John Blanton

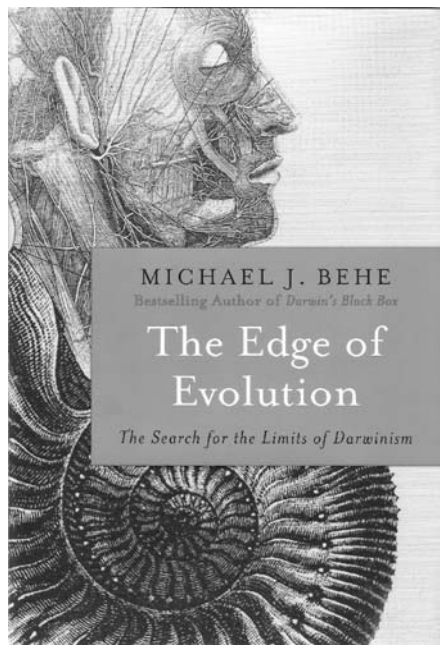
Michael J. Behe
The Edge of Evolution
2007, Free Press, 305 pages

I previously discussed reviews of Michael Behe's book *Darwin's Black Box* in 1999. Behe is a creationist, but not one in the traditional sense. He accepts the age of the universe and the fossil record, but he has issues with Darwin and the idea that random mutation and natural selection can account for biological evolution. In his previous book Behe argued that Darwin's concept of evolution cannot explain the origin of a number of biochemical processes, the study of which is Behe's professional field. Back then I summarized his idea:

Chemical processes that control such diverse life functions as blood clotting and disease immunity are exceedingly complex. Additionally, such processes are constructed like a house of cards in such a way that one missing card would bring down the whole business. Behe calls such systems "irreducibly complex."¹

The problem is Behe's idea is considerably at odds with some known science. I noted some disagreements, including remarks by Donald C. Lindsay:

Behe doesn't seem to be up to date. Although he implies on page 114 that he is expert at computer searches for scientific articles, he somehow managed to not find pretty well the entire literature on biochemical evolution. I personally own a



The Edge of Evolution by Michael Behe

EVENTS CALENDAR

July Program

Saturday, 18 July, 2009

2 p.m.
Center for Nonprofit
Management
2900 Live Oak Street in Dallas

Child of Pain

Danny Barnett will present material from his book on the history of homeopathy in America.

NTS Board meeting and social dinner

Saturday, July 25, 2009

7 p.m. at _____
Glorias
4140 Lemmon Ave.
Dallas, TX 75219
Tel: (214) 521-7576



Let us know if you are coming. We sometimes change or cancel these events.

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textbook entitled *Molecular Evolution*, despite his claim that no such book exists.²

DBB was not our first encounter with Michael Behe. We met him in March 1992 when he participated in a conference at Southern Methodist University titled “Darwinism: Science or Philosophy.” Unfortunately I was absolutely clueless at the time and failed to recognize the crystallization of Intelligent Design that was unfolding before my eyes. Behe was completely beneath my radar on that day.

Thankfully for skeptics, Behe is back again, this time with a new book about an old idea. Will our cup ever run dry?

In *DBB* Behe pushed the idea that Darwinian evolution, as it manifests for cell chemistry, is a black box. The term *black box* relates to any mechanism whose external appearance and actions are well known, but nothing is known about its interior workings. In computer science a software process is typically designed as a *block box*. Its functions and its interfaces are carefully defined, but details of how the code performs its tasks are left up to the designer. Design, again.

Behe was not so much stuck on the *black box* concept in his previous book as he was on *irreducible complexity*. The biochemical processes Behe championed were deemed to be so critically constructed that they would not have been viable in a more primitive form. Therefore they could not have evolved by random mutation coupled with natural selection.

With *DBB* Behe made a big splash with creationists. Not such a big splash, however, where the rubber meets the road. When showdown time came, and he testified for Intelligent Design in the 2005 *Kitzmiller* creationism trial, he was forced to admit under cross examination he had not bothered to read the many books and scientific publications refuting his *DBB* claims.

DBB was round one. *EoE* appears to be round two.

I will not present an original review of this book. Others better at the matter are doing an excellent job of that. I will present some knowledge gleaned from existing reviews, and I will throw in some thoughts of my own.

The complete title of Behe’s new book is *The Edge of Evolution: The Search for the Limits of Darwinism*. Behe has not abandoned the black box in *EoE*. In his new book Behe even resuscitates the *irreducibly complex* bacterial flagellum. The bacterial flagellum that other scientists have explained appears not to be so irreducibly complex. Which explanations Behe fails to appreciate in his continued arguments for Intelligent Design and which explanations were explained to him again during his *Kitzmiller* cross examination.

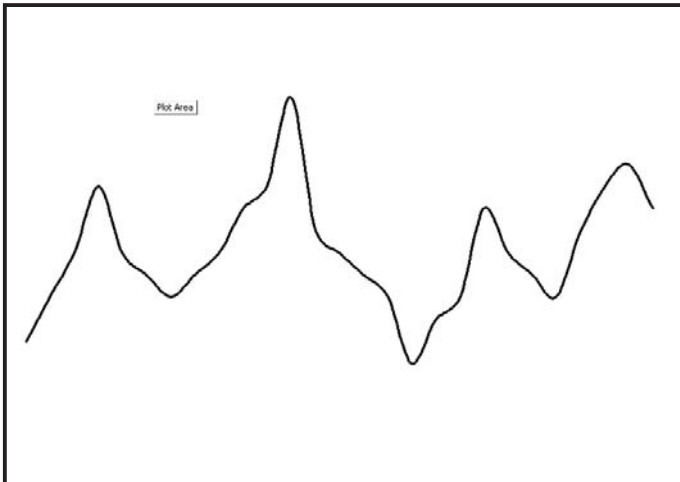
What Behe is now beating the drums about is the limits of Darwinian evolution. The Intelligent Design movement casts a broad net to pull in support from religious fundamentalists, so it will come as a surprise to these creationists that Behe actually believes in evolution. In fact, he

emphasizes his support for evolution a number of times in *EoE*. And that's about as far as it goes.

There are limits to Darwinism, Behe asserts. Here is an example:

The structural elegance of systems such as the cilium, the functional sophistication of the pathways that construct them, and the total lack of serious Darwinian explanations all point insistently to the same conclusion: They are far past the edge of evolution. Such coherent, complex, cellular systems did not arise by random mutation and natural selection, any more than the Hoover Dam was built by random accumulation of twigs, leaves, and mud.³

Here is the basis for Behe's main argument, and it's an essential point of traditional evolutionary theory. Please refer to the figure below. The line represents the plot of an arbitrary mathematical function. Engineers, computer scientists, and others are often interested in extreme points on the graph. Of particular interest are greatest and least values of the function.



Software algorithms use climbing methods to find extreme points of functions.

A mathematician possessing a formula for a well-behaved function can quickly locate maxima and minima by applying differential calculus.

If there is not a convenient mathematical formula describing the function, the problem gets harder, and computer scientists use numerical methods to locate maxima and minima. A computer program computes values of the function within a small region and then determines the general trend. If the goal is a maximum point, and the function seems to be headed north on the right side of the region, then the program will direct its search to the right of the region. The process continues until the program cannot detect any change in the value of the function

across the region, and victory is declared. The program has found a maximum point.

What all of this has to do with evolution is that evolution is often compared to this mathematical process. If the survival fitness of a population can be compared to some sort of mathematical function, then members of the population having a higher fitness value (higher point on the plot) will prevail in the competition for survival. If any genetic change between successive generations produces a horizontal shift in the plot, then the lucky (or unlucky) heir to these traits will move up (or down) the slope of the plot and will either win or lose the next round of the competition.

In this sense, population shifts due to random mutation and natural selection are comparable to this computer process. Random mutations produce horizontal shifts along the plot, and natural selection locks in any resulting upward movement on the plot.

My diagram shows a case for a single random variable, the horizontal axis in the plot. Of course, populations are driven by multitudes of variables, but the process is extensible to any number of random variables acting simultaneously.

Behe has a couple of nice examples of plots with two independent variables on page 115 of his book. The issues are the same, but this time the goal is to find peaks in a two-dimensional surface.

Now here is the rub, as Behe points out. Suppose a population finds itself somewhere on the slope of the first peak on the left. A computer algorithm set to find the maximum value of the function will climb to the top of the left-most peak and stop there, stuck forever, unable to climb down and never able find the top of the highest peak just to the right.

Behe argues that this process will stymie the advancement of any population seeking to advance through natural selection. Natural selection, he asserts, is inadequate. The inescapable conclusion, according to Behe, is there must be some other process at work. He hints broadly at this process throughout the book. Here is an excerpt from a section titled "How deep goes design?"

Up until now we have examined molecular structures and processes and have drawn a tentative line marking the molecular edge of Darwinian evolution. Most protein-protein interactions in the cell are not due to random mutation. Since cells are integrated units, it's reasonable to view cells in their entirety as designed. But keep in mind that accidents do happen, so there are Darwinian effects, of some degree, everywhere. For example, just as automobiles may accumulate dents or scratches over time or have mufflers fall off, but nonetheless are

coherent, designed systems, so, too, with cells. Some features of cells of course result from genetic dents or scratches or loss, but the cell as a whole, it seems, was designed.⁴

OK, maybe not so broadly.

What Behe seems to be saying here is cells were designed, and Darwinian evolution only contributed accidental defects. Design made it right, evolution damaged it.

I admit to reading Behe's book from beginning to end just so I could say I had. I was curious about what process Behe would invoke to explain design in nature. Apparently I was not alone. One of the reviewers of *EoE* is the high-profile biology professor and blogger P.Z. Myers. He has this to say:

It's true. Nowhere in the entire book does he offer a mechanism to resolve this disconnect. He claims things were "designed", but doesn't explain by who [sic], how, or when, and doesn't even give a clear picture of what parts of evolution are designed, and which aren't. It's nothing but one long and almost entirely fallacious gripe about the insufficiency of natural mechanisms.⁵

This seems to be a perpetual problem with Intelligent Design. Let me summarize what Intelligent Design really says:

1. Natural processes alone cannot produce the life forms we see today.
2. Therefore some sort of design process is at work.
3. This design process cannot involve natural processes alone. Else statement 1 would not be true.
4. Therefore at some point in the evolution of life some natural laws must have been violated.

Intelligent Design proponents pointedly do not emphasize statement number 4. Were they to do so, they might then be obliged to describe a scenario involving a supernatural process.

That seems to be the case with Behe in *EoE*. The book's index includes only two links to the word "God," involving only four pages. He will certainly not identify the God of Abraham as the designer. Creationists have been down that road before.

When school board member William Buckingham and other creationists lurched into promoting creationism in the Dover, Pennsylvania, science curriculum, they (figuratively) held the banner of God out in front. Even conservative federal judge John E. Jones III recognized this as a step toward a state religion and slapped the Intelligent Design movement down in a stinging 139-page decision.

Sensibly, Behe's references to God in his book are less committal than would have been comfortable for Buckingham. Here is an example:

To reach a transcendent God, other, nonscientific arguments have to be made—philosophical and theological arguments. It is not my purpose here to rehearse what has been said over the millennia on that score, or to say why I myself find some of those arguments persuasive and others not. Here I'm content to "take purposeful 'designer' in a very broad sense."⁶

Disregarding God, what mechanism does Behe propose to replace natural processes? First, he states he is not required to propose a mechanism. He does, however, make an attempt at supplying some detail:

...If random mutation is inadequate, then (since common descent with modification strongly appears to be true) of course the answer must be *nonrandom* mutation. That is, alternations to DNA over the course of the history of life on earth must have included many changes that we have no statistical right to expect, ones that were beneficial beyond the wildest reach of probability. Over and over in the past several billion years, the DNA of living creatures changed in salutary ways that defied chance.⁷

This explanation is not very soul-satisfying. Behe wants to hide God within the vagaries of chance. Not a good hiding place. Statistical probabilities may be the only place where pure mathematics and physical analysis truly intersect. Statistical probabilities explain why we must place a pot on a stove-top burner to cook food rather rely on heat from the air to suddenly migrate into the food. And that is the only explanation. When we find statistical probabilities being skewed, we wisely look for an underlying cause.

Permit me to provide a non-scientific example. In my favorite classic movie, *Casablanca*, casino owner Rick Blaine (Humphrey Bogart) wants a young refugee from Nazism to win at roulette. He tells the player to bet on 22, and he winks at the croupier. The player wins on the first spin, and Rick tells the player to let the pot ride for another spin. "Vingt-deux!" the croupier exclaims as 22 wins again. The croupier merely looks at Rick and shrugs. Do we suspect something nefarious is involved? Does Rick ever say "Here's looking at you, Kid?"

The contention that we can hide purpose and design within mathematical probabilities is simply appalling. Paraphrasing Slim Pickens in another classic movie, "I've been to one world fair, a picnic, and a rodeo, and that's the stupidest thing I ever heard coming from an educated scientist."

In last month's issue I discussed the philosophical weakness of the design argument. The point was, the only thing that seems to drive purpose and design is competition for survival within a population. It is purpose and design that have come about by random mutation coupled with natural selection. It is not the features of living organisms that have developed because of purpose and design.⁸

Scientists who have reviewed *EoE* have been more pragmatic. I shopped around my references for a quote that summarizes the assessment by mainstream science of Behe's argument. I found this by Sean B. Carroll writing in the 8 June 2007 issue of *Science*:

Behe's chief error is minimizing the power of natural selection to act cumulatively as traits or molecules evolve stepwise from one state to another via intermediates. Behe states correctly that in most species two adaptive mutations occurring instantaneously at two specific sites in one gene are very unlikely and that functional changes in proteins often involve two or more sites. But it is a non sequitur to leap to the conclusion, as Behe does, that such multiple-amino acid replacements therefore can't happen. Multiple replacements can accumulate when each single amino acid replacement affects performance, however slightly, because selection can act on each replacement individually and the changes can be made sequentially.⁹

There are numerous serious reviews of *EoE*, and Wikipedia is a good place to start looking. The site offers numerous links to critiques of the book, both by mainstream scientists and by creationists. Here is the page:

http://en.wikipedia.org/wiki/The_Edge_of_Evolution

References

1. <http://ntskeptics.org/1999/1999november/november1999.htm#behe>
2. Donald C. Lindsay at <http://www.best.com/~dlindsay/creation/behe.html>.
3. *EoE*, page 102.
4. *EoE*, page 171.
5. http://scienceblogs.com/pharyngula/2007/06/behes_edge_of_evolution_part_i.php
6. *EoE*, page 229.
7. *EoE*, page 165.
8. <http://ntskeptics.org/2009/2009june/june2009.htm#design>
9. <http://www.sciencemag.org/cgi/content/full/316/5830/1427>

Fees going up

Reality has overtaken the NTS (imagine that). The cost of printing and mailing newsletters is about to cause us to lose money on these operations, so...

So we are resolving the issue in a pragmatic way. Starting 1 July 2009 the new fee structure will be as follows:

	Newsletter by e-mail	Newsletter by post
Members	\$30	\$50
Non-members	\$10	\$25

In short, membership will be \$30, and we will not mail you a newsletter. Membership is still \$30, and we will charge \$20 to print and mail your newsletter.

If you were planning to join or to renew under the old rates, you can still do so during the month of June.

Note the following: Twenty years ago NTS membership was \$30 per year, and you received six newsletter issues a year by mail. Turn the clock forward, and we have kept your out-of-pocket cost the same by dropping the hard copy newsletter.

Those with an affection for paper have two options:

1. Pay an extra \$15 per year (you were paying \$35) and continue to receive the newsletter by post.
2. Download your newsletter from our Web site in PDF format and print it on your printer, which is what I do. The newsletter you print at home is exactly the same as the one you are now receiving by mail.

Enjoy.

John Blanton
NTS President and Web Master
skeptic75287@yahoo.com

Future Meeting Dates

18 July 2009 — Danny Barnett will present material from his book on the history of homeopathy in America.	19 September 2009 — John Brandt will present a talk on food and nutrition myths.
15 August 2009 — Presentation by Claudia Meek	17 October 2009
	14 November 2009
	12 December 2009

What's new

By Robert Park

[Robert Park publishes the What's New column at <http://www.bobpark.org/>. Following are some clippings of interest.]

Cold fusion at 20: It will be on 60 Minutes this Sunday.

The faithful, who regard themselves as martyrs, have endured the scorn of skeptics for 20 years. An appearance on an evening entertainment program won't make it science, and it's unlikely to change the minds of many scientists, but it's the most they've had to cheer about. At least three well-known scientists who were interviewed by CBS will not appear on the show. I don't know who will.

It's still cold: But do I still think it's science?

A month before CBS aired the 60 Minutes program on cold fusion, I commented in WN that "I think it's real science." I still do. That doesn't mean I think it's good science. Science is conditional; everything is open to further examination. Some scientists think the community was too hasty in writing off the claims of cold fusion in 1989. They believe there may be important truths yet to be revealed. They have searched for those truths for 20 years and have every right to continue doing so. However, I think the likelihood of success is extremely low and, if asked, I would recommend against the use of public funds for that purpose. Their case is not helped by embracing any scientific sounding nonsense that purports to show excess energy — which brings us to Irving Dardik.

Cold fusion: Please, may I have a cup of tea?

Last Sunday's edition of the CBS News program 60 Minutes was titled "Race to Fusion." It was 1989, Fleischmann and Pons are shown with the "cold fusion" test tube that would have killed them had they been right. Because they lived, the race was called off. Michael McKubre of SRI apparently didn't get the memo; he just kept doing it over and over for 20 years. Lucky for him there's still no fusion, but he says he does get heat — except when he doesn't. How does it work? He hasn't a clue, but he showed a video cartoon of deuterium defusing through palladium and said it might be fusion. In fact McKubre called it "the most powerful source of energy known to man." Whew! But wait, Dick Garwin did a fusion experiment 60 years ago; it worked all too well. Garwin thinks McKubre is mistaken. Just about every physicist agrees, so the American Physical Society was asked to name an independent scientist to examine the claims of Energetics Technology, according to 60 Min correspondent Scott Pelley. An APS statement issued Wed. says this is totally false, and the APS does not endorse the cold fusion claims on 60 Min. (Aside: This morning I thought I should watch the video on the 60 Min web site one more time. Drat! CBS took it off. No matter, there's a full transcript. Uh oh! The part where CBS says the APS picked Rob Duncan to look into the ET SuperWave is gone. CBS can change history? My God, time travel! Now that is powerful.)

Superwave: It explains everything — but predicts nothing.

Written as SuperWave it seems to be a registered trademark. What exactly is it? Anything you want it to be. Irving Dardik was in sports medicine, a specialty notoriously prone to alternative medicine. He treated sports injuries with rhythmic exercise, and invented a catchy name, LifeWaves. This led to an epiphany: you can explain everything by wave interference. The French mathematician Fourier, figured that out in the 18th century, but Dardik doesn't do math. Even solid matter is waves, he concluded, i.e. SuperWaves. Is this big? Louis de Broglie won a Nobel Prize for that idea in 1929, and Irving Schrodinger won the Nobel Prize in 1933 and transformed the world by putting wave theory into an equation. But Dardik doesn't do equations. Instead he hired a flack, Roger Lewin, to gush endlessly about him in a 2005 book, Making Waves, with a Forward by, uh, Michael McKubre. So the CBS "science buzz" consists of one chemist?

Superwave: Impaled on the sharp stake of replication.

Rob Duncan, vice chancellor of research at the University of Missouri, went to Israel with 60 Minutes to visit Energetics Technologies, which claims SuperWave Fusion will solve the

energy problem. It shouldn't be necessary to remind scientists that neither visiting a laboratory, nor peer reviewing a manuscript, is enough. There must be independent replication of the ET claims. Without replication, the claims are nothing. The genius behind ET is the CVO, Chief Visionary Officer, Irving Dardik, MD. Dardik got into cold fusion after losing his license to practice medicine in New York. It puts us in mind of Randy Mills of BlackLight Power, another MD who says he can solve the energy problem. Is SuperWave Fusion another scam?

Dateline: A new wrinkle on the hydrogen-fuel scam.

Last Sunday, NBC Dateline exposed the Hydro Assist Fuel Cell, sold by Dennis Lee, as a scam. It seemed like such a simple idea: powered by the alternator, the HAFC decomposes water into hydrogen and oxygen and adds a whiff of hydrogen into the combustion mixture, supposedly extending the mileage you get. There are two small problems: it takes more energy to decompose water than you get from combustion of the hydrogen, and Dennis Lee is notorious for his scams. The hydrogen fuel scam has been fooling the scientifically ignorant, including George W. Bush and former congressman Robert Walker, for at least 40 years. This time, however, Lee was up against tough Dateline investigators aided by the indefatigable Eric Krieg of the Philadelphia Association for Critical Thinking, and a cameo appearance by Bob Park. Lee got clobbered. I think.

Dennis Lee: Top dog of the perpetual scam.

In July of 1997, I was invited to go with an NBC Dateline camera crew to cover a demonstration of a perpetual motion machine in Hackensack, NJ. You don't get a chance to do that everyday. "Put one in your home and you will never have to pay another electric bill," an ad in the Wall Street Journal said. But Lee doesn't sell perpetual motion machines; he sells dealerships for perpetual motion machines. The machine turned out to be the Gamgee Zero- motor, invented in 1880 by John Gamgee who managed to sell it to the Navy; it didn't work then either <http://bobpark.org/WN97/wn071897.html>. The idea is to use a liquid that boils at room temperature to drive a piston, thereby extracting energy from the ambient. Gamgee tried ammonia, but only confirmed the Second Law of Thermodynamics. Lee solved that by using carbon dioxide, which is liquid only under pressure. Thus the machine actually ran on compressed carbon dioxide; not quite perpetually, but long enough for a demonstration. NBC decided it was too technical for the Dateline audience and it was never used. Two years later, I was a consultant for ABC Good Morning America at a Lee demonstration in Columbus, Ohio. He now had a perpetual-motion machine that used permanent magnets (the 1870 Paine machine). By the time he got to Spokane in 2002 it

was "the principle of counter rotation." Only the scam was perpetual. □

Bob Park can be reached via email at opa@aps.org.

NCSE's Scott awarded Stephen Jay Gould Prize

The following release is from the National Center for Science Education. NCSE is the organization that has been promoting the teaching of evolution in public schools for over twenty years, and Scott has been in the forefront for most of that time.

NCSE's executive director Eugenie C. Scott is to be the first recipient of the Stephen Jay Gould Prize, awarded annually by the Society for the Study of Evolution "to recognize individuals whose sustained and exemplary efforts have advanced public understanding of evolutionary science and its importance in biology, education, and everyday life in the spirit of Stephen Jay Gould." According to the citation:

As the executive director of the National Center for Science Education she has been in the forefront of battles to ensure that public education clearly distinguishes science from non-science and that the principles of evolution are taught in all biology courses. ... In these efforts, she has been an important leader in the public sphere, molding and focusing the efforts of scientists, educators, lay people, religious groups, skeptics, agnostics, believers, scholars, and ordinary citizens through firm but gentle guidance. ... Dr. Scott is a gifted communicator and public intellectual. She is a frequent guest on radio and television shows, and an eloquent spokeswoman for science. Her writings have illuminated the process of science to thousands, and her books have exposed the efforts of many groups in our society to hobble and undermine the teaching of science to our younger generation. The organization she helped create far transcends the considerable reach of her own voice, vastly amplifying her impact on public understanding. For these many reasons, it is extremely appropriate that Dr. Scott be the first recipient of the Gould Prize.

Scott received the award at the Evolution 2009 conference, held June 12-16, at the University of Idaho. □

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