Darwin's Black Box: The Biochemical Challenge to Evolution

by Michael J. Behe
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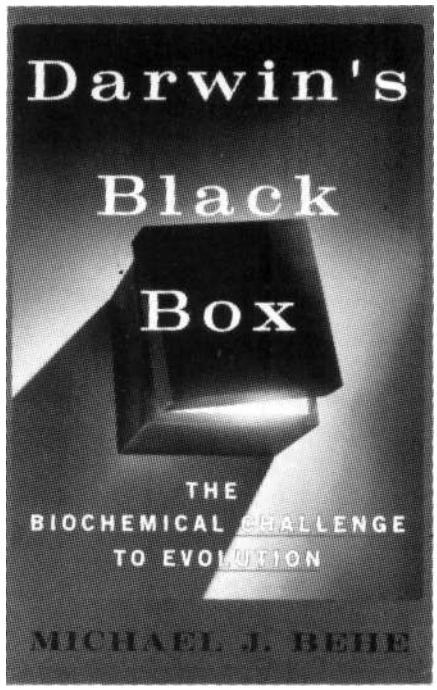

7 cannot look at the universe as the result of blind chance, yet I can see no evidence of beneficent design, or indeed of design of any kind, in the details.'

Charles Darwin, letter, July 12, 1870.

We know a lot more about animals and plants than Darwin did, and still not a single case is known to me of a complex organ that could not have been formed by numerous successive slight modifications. I do not believe that such a case will ever be found. If it is . . . I shall cease to believe in Darwinism.'

Richard Dawkins, **The Blind Watchmaker,** 1986, p. 91.

Periodically a book is catapulted on the scene that commands the attention of all factions in the creation/evolution debate. Michael Behe's **Darwin's Black Box** is just such a text. Behe, professor of Biochemistry at Lehigh University, Bethlehem, Pennsylvania, has breathed new life into the design argument and articulated an innovative critique of Darwinism which is as sure to fluster Darwinians, as it is to delight Biblical creationists. As with all of history's gadflies, Behe's apologetic is causing quite a stir. When a rigid practitioner of scientific methodology is accused of heresy by his colleagues, there can be assurance of garnering lots of attention in the public square. Since the book first appeared last year, it is enjoying its eighth printing, has been the object of both praise and excoriation in nearly a hundred reviews, and has been hotly debated on radio shows and the internet.

Behe has the enviable quality of hooking the reader right off the bat, and writing in an engaging, if not entertaining, fashion. The text is peppered with vivid, novice-friendly analogies, and provides intermittent in-text 'technical demarcations' for those wishing to go deeper. To make complex thought accessible to the masses is quite a feat; the fact that Behe does it so effortlessly, irenically and with such devastating clarity, guarantees his being placed on the evolutionists' hit list for wholesale castigation.[1] Whether the methodological naturalists can actually **answer** Behe, however, rather than feigning rational engagement, is quite another matter.

The central thesis of **Darwin's Black Box** is that life is characterised by irreducibly complex biochemical systems. By irreducible complexity, Behe means,

> *'a single system composed of several well-matched, interacting parts that contribute to the basic function, where the removal of any one of the parts causes the system to effectively cease functioning.'*[2]

Such systems are an aggregate of mutually dependent parts, all of which are simultaneously necessary for system functionality. Such symbiotic simultaneity militates against any notion of gradual increases in biochemical complexity vis-a vis piecemeal incrementalism, since natural selection is impotent **prior** to minimal function. Irreducible complexity, therefore, is a bare-knuckled challenge to the heart and soul of Darwinism.[3] Darwin himself laid down the gauntlet:

> *'If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.'*[4]

Behe picks up the challenge, and his entire book is a response to Darwin's, pinpointing specifically where his theory could be falsified.

PALEY'S WATCH AT THE MOLECULAR LEVEL

Behe begins his case with a thumbnail sketch of Darwin's thought, and how it laid the groundwork for modernity's creed that inorganic material gave rise to living matter, and subsequently progressed up the great chain of being entirely by natural processes. The central purpose of **Darwin's Black Box** is to demonstrate that Darwinism has been ill prepared to explain the paradigm-paralysing phenomena culled from recent breakthroughs in biochemistry. With his pen acting like a surgeon's scalpel, Behe points out that evolutionary theory, in its Darwinian phase, was able to weather much initial scientific criticism due to a rather crude understanding of cells. In Darwin's day it was assumed that the cell was nothing but a *'simple little lump of albuminous carbon '.* Such an understatement was not necessarily indicative of lack of empirical integrity, but merely a barometer of consensus prior to breakthroughs in biochemistry and the advent of the electron microscope. Molecular complexity was literally incomprehensible in the latter half of the nineteenth century.

Thus, in Darwin's day, the cell was a 'black box'. Behe claims that the history of science has been a chain of black boxes. This Behean metaphor refers to any device which performs a marvellous function, but whose inner mechanism[s] remain mysterious. It would be comparable to a child playing a computer game on the internet, while utterly oblivious of the 64 megabytes of RAM, 12X CD-ROM, Pentium chip, multi-gigabyte hard drive, etc. hidden in the box on Daddy's desk. The child knows **how** the game is played, but does not have the foggiest clue how the game **works.** And even if he is shown the components, they too would become 'black boxes'. Darwin's inability to access the box's content (that is, the cell's complexity) stemmed not only from an inability to visually access the inner sanctum of the box, but even more so from the sheer inability of anyone in his day to comprehend its astonishing contents.

But with recent technological advances, the box's 'content' has yielded a mind-boggling complexity, of which modern Darwinians **can** visually access, comprehend and assess the implications. Whereas Darwin might be contextually pardoned on this particular, modernity is without excuse for any studied disregard of the box's accoutrements. Now that the lid of this black box has been pried open, inviting us to peek inside, we encounter a flabbergasting array of intricate, synergistically complex design.[5]

Behe asks if the Darwinian rubric of natural selection, before which modern science feels obligated to remove its sandals, can account for 'irreducible complexity' of lilliputian biological phenomena. Those familiar with the tactics of Gould, Dawkins, Dennett, Kauffrnan, *et al.*, already know these polemicists for naturalism will **claim** their positions can meet Behe's challenge regarding irreducible complexity. But judicious note should be taken as to whether such responses are based on hard-nosed empirical science, or merely theory laden, 'fact-free' scientism, dressed up in prestige jargon.

Behe points out that among the thousands of articles in technical journals related to biochemical evolution, there is an eerie absence of papers which actually provide an empirically plausible scenario as to the origin and increase of irreducible, biomolecular complexity; ones which genuinely grapple with incipient forms and molecular transitional bridges. He found instead what true science should see, and what pseudo-science desperately hopes can be kept from public comprehension; that prestigious scientific journals are glutted with 'just so' articles, amounting to nothing more than fraternal order question-begging, where the very things that have to be proved are merely assumed *a priori.* The vast majority of articles fail to rise above the level of 'sequence comparisons in protein molecules'; which is light years away from substantiating one step up 'Mt Improbable'.[6] The paucity in the professional journals of falsifiable explanations for complex systems should not only cause the Darwinians to blush, but indicates how much these 'peer reviewed' periodicals traffic in 'hand-waving', partisan metaphysics.

Those familiar with the pre-Darwinian apologetic of William Paley will find many parallel threads in Behe. Paley fine-tuned a subset of the design argument, called the *'argument from perfection'.*[1] Darwin didn't answer Paley adequately,[8] and probably counted on readers of **The Origin** doing likewise. Modern readers, however, have no excuse, for according to Hoyle and Wickramasinghe,

> *'The Speculations of* ***The Origin of Species*** *turned out to be wrong .... It is ironic that the scientific facts throw Darwin out, but leave William Paley, a figure of fun to the scientific world for more than a century, well in the tournament with a chance of being the ultimate winner!*[9]

But if contemporary Darwinists would scientifically engage Paley at this point, rather than caricatures, they should see that he adroitly pre-nullified any notion of undirected increment-alism. Yet the predisposition today is to find **any** weak link in Paley's adjacent assertions, which then serves as a diversion to not have to take seriously his specific challenge. Since that strategy has been effective for 138 years, watch for it to be employed against Behe's thesis as well.

EXAMINING THE CONTENTS OF THE BOX

To illustrate that life is irreducibly complex, and therefore designed, Behe takes the reader on a microscopic expedition through the following mechanisms:

(1) the marvels of vision,
(2) bombardier beetle ballistics,
(3) bacterial flagella,
(4) the blood clotting process,
(5) intracellular transport, and

(6) disease immunity.

These each display different aspects of irreducible complexity, molecular cascading, and symbiosis of biochemical systems, and veto Darwinian gradualism in that natural selection is emasculated; that is, the incipient stages cannot even be conceptualised, much less in a way that would confer selective advantage.

A 'Light-Sensitive Spot'

Vision was a **black box** for Darwin. It should not be for Oxford zoologist, Richard Dawkins; but he seems to be equally in the dark. Through nothing more than the rhetoric of 'Mt Improbable', he has convinced many that sight evolved through a series of **speculative** infinitesimal increments. But in the wake of recent biochemistry, Behe asks: *'Are they infinitesimal?'* Just like Darwin, Dawkins smuggles in an allegedly primitive *'light-sensitive spot'* from the beginning. But given such a flare for the *a priori,* he 'almost always can spin a story', to achieve present complexity.

Behe spells out the details of what needs to take place for vision:

> *'Initially photons interact with 11-cis-retinal molecules, which reconfigure to trans-retinal in picoseconds. This catalyzes a metamorphosis and behavior modification in the protein rhodopsin, which is now called metarhodopsin II, which sticks to transducin, another protein. Just prior to this union, transducin tightly binds a molecule called GDP. . .'*

And so it goes for several pages, though one gets the impression this is just scratching the surface. Yet Dawkins has a penchant for side-stepping the cascade of unbelievably complex factors necessary for even something as rudimentary as mere light detection. And in fastidiously turning a blind eye to relevant details, which trip up 'just so' stories, Dawkins ironically exhibits the very fundamentalists fideism he deplores.

Behe tightens the noose further:

> *'Now that the black box of vision has been opened, it is no longer enough for an evolutionary explanation of that power to consider only the anatomical structures of whole eyes, as Darwin did in the nineteenth century (and as popularizers of evolution continue to do today). Each of the anatomical steps and structures that Darwin thought were so simple actually involves staggeringly complicated bio-chemical processes that cannot be papered over with rhetoric.'*[10]

Dawkins adamantly preaches that one per cent of an eye is better than none. But, no matter how crude the 'light-sensitive spot', the logic of this beginning should be plainly obvious. Like Darwin, Dawkins is asking us to **start** with an eye to get an eye. Describing it as 'crude' merely disguises the tautology. Dawkins adds complex systems to complex systems and baptizes this an explanation.[11] Clearly this does not follow. Dawkins can have blind faith in blind chance, but let us move this type of belief out of the halls of science and back into creative writing.

Dawkins' light sensitive spot (purely hypothetical to begin with) would still be

> *'a multi-celled organ, each of whose cells makes the complexity of a motorcycle or television set look paltry in comparison.'*[12]

Darwin's reflection on the seeming improbability of a full eye forming by chance would be applauded by Behe, and could be applied to Dawkins' palaeo-optics with equal effect:

> *'To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree.'*[13]

And to augment this absurdity even more, vision is far more complex than Darwin could have dreamed (and I believe more complex than even Behe can possibly comprehend). Compounding matters to the point of tears, contemporary evolutionists are committed to believing that the eye must have evolved at least 40 separate times![14] What Herculean restraint must Christians make to keep a straight face when **they** are mocked for exercising a blind faith. Believing that something seemingly *'absurd in the highest possible degree'* happened 40 times is not exactly convincing, even if Darwin and Dawkins think they have the solution. The power of the paradigm is so intoxicating that many do not realise that evolutionary theory not only conveys no knowledge, but somehow seems to convey anti-knowledge.[15]

Contemporary non-theistic scientists (and not a few theistic evolutionists) are so busy accusing creationists of invoking the 'God-of-the-gaps', that they hardly seem scandalised by the gaps **they** have to fill and the gargantuan special-pleading axioms necessary for their theory 'to catch fire' and account for vast saltations of information-bearing complexity, 'which give the appearance of having been designed'. Among other things, they invoke:

(1) a highly non-equilibrious 'open' system subject to continual influx of matter and energy;
(2) the presence of several catalytic, cross-catalytic, or feedback processes to insure that the description of system kinetics will include non-linear differential equations; and
(3) the imposition of specifically defined values and constraints to foster growth while fending off that nasty theory-buster called entropy.[16]

When Behe calls attention to such special pleading, 'fact-free science', and asks where the observational facts are, this is considered in poor taste, if not anathema. With inquisitional determination, Darwinists will do whatever to keep dissenters on the rack. And they can hardly be blamed, for who of sound mind would want to defend the hidden premises of

Darwinism in a court of scientific law where evidence is actually required?

Bombardier Pyrotechnics

Behe takes the famous bombardier beetle and updates a page straight out of the creationists' play book. When threatened by a predator, the beetle defends itself by squirting a caustic, scalding liquid from its posterior. Behe wants his readers, especially detractors, to eventually ask:

> *'How much of the beetle squirting apparatus can be removed while still preserving its functional integrity?'*

Once reduced to its bare essentials (squirt-worthiness), the follow-up question remains: *'Can such complexity have arisen by step-by-step accretions?'* To appreciate how uncomfortable such a question is for evolutionists, Behe provides a mini-anatomy lesson on the bombardier beetle. Again, he sketches just enough for us to be awed by these half-inch pyrotechnical marvels.

To discharge its boiling-hot defence requires at least six **simple** steps :-

(1) a mixture of hydrogen peroxide and hydroquinone lies dormant in specialised secretory lobes;
(2) such a mixture normally rises in temperature, producing steam and noxious quinone, but an inhibitor is present which suppresses this reaction;
(3) when the beetle senses it is a menu item, the mixture is shunted into a collecting vesicle adjacent to the 'explosion chamber', the two connected by a duct with a sphincter muscle;
(4) since the chemical reaction is so slow, several ectodermal glands secrete the enzyme catalase (anti-inhibitor) into the explosion chamber;
(5) this accelerates the volatile mixture, resulting in 'steam compression'; and
(6) with the sphincter now closed, the only exit out of the abdominal chamber for the boiling mix is through a sophisticated underbelly channel, reminiscent of a turret, aimed deftly at would-be predators.

Only with extreme slow motion videography can we witness the machine-gun-like 'pulsating', pinpoint accurate shooting of the beetle. Behe does not even have to elaborate on the (at least) four metabolic processes simultaneously taking place, nor mention other anatomical support, or the crucial aspect of synchronisation, etc. The design inference is clear for those who are open-minded.

Bacterial Swimming Lessons

Behe next meticulously unpacks the dizzyingly complex elements of the flagellum, which creationists have long used as an example of design, but too often merely as a wonderful example of miniaturisation. That it is, since each tiny bacterial motor contains hundreds of precisely tailored parts, and yet eight million of these motors could be placed on the cross-section of a human hair. These whiplike, thin spiral flagella (needing 40 different proteins to function) rotate to propel the bacterium at up to 15 body lengths per second, are reversible, and twirl many thousands of times per minute. Any further recapitulation here of Behe's adroit, but parsimonious, synopsis of the flagellum *bauplan* would be redundant, if not inadequate.[17]

After perusing Behe's case here, 'intelligent design' theorists would do well to soberly contemplate and build on the 'pattern' in this third chapter, and commit these basics to their arsenal of creational truth. It is the addition of Behe's concept of irreducible complexity to the swimming marvels that makes a good argument for design even better. The following points could surely be made with all the key areas in the debate on irreducible complexity.

First, Behe has noted elsewhere that this complexity is final, in that the flagella are not themselves 'composed'.[18] Therefore flagellar complexity has reached its limit, and future research and technology will not unpack boxes within boxes. But is Behe jumping the gun here? Who knows what future technology will be like? While present black boxes are sufficient to elicit the design inference, it may be premature to put the lid on future discoveries of what may be incomprehensible at present.

Second,

> *'as the number of required parts increases, the difficulty of gradually putting the system together skyrockets, and the likelihood of indirect scenarios plummets'*[19]

If no physical, functional precursors can be posited for even a simple five piece machine (that is, a mousetrap), then incipient stages up Mt Improbable are *a fortiori* harder to envision when considering something astronomically more complex[20] (that is, bacterial flagella). Darwinists must feel their knees buckling under the weight of these microscopic marvels.

Third, of the approximately ten thousand papers in technical journals addressing flagella, it would seem reasonable to expect there to be some understanding of the mechanistic details of how they evolved, the transitional stages they went through, the mobility of putative incipient flagella, etc. What one encounters instead is conjectural phraseology like, *'it can confidently be assumed'*, *'it is likely'*, and *'it can be suggested'*. Things have not changed since 1859, with **The Origin** containing phrases in the genre of *'we might suppose'*, over 800 times! But it is nonetheless true that

> *'lively prose can't disguise the fact that science hasn't a clue as to what might explain the development of life'*,

and irreducible complexity.[21]

Finally, when an empirical examination of the biochemical complexity of the bacterial flagellum fails to elicit awe, if not concession to the design inference, two questions must be asked :-

(1) What **would** the Darwinist allow to count for design?; and
(2) Is this not a clear example that more than science is involved?

HOW TO CATCH AN EVOLUTIONIST

To clarify irreducible complexity for the novice, Behe employs the lowly mousetrap. For such a device to function, a minimum number of components is required. Just look at a standard trap, and imagine taking away any one piece. Would it then function? Hardly. All the pieces are necessary, yet no piece is sufficient in isolation, and would not serve in any capacity to expunge rodents (except, of course in the most fertile Darwinian imagination[22]). The parallel is obvious: irreducibly complex molecular mechanisms also have a minimum number of components, where subtracting even one would make the entire 'machine' non-functional. Such non-functionality would have deleterious effects if the trap's continued existence depended on catching mice. Even more fundamental is the inference to design and therefore a designer (that is, trap maker).

Even here Behe is making generous concessions to the evolutionists. For it is not merely the five key parts that are necessary for the trap to function. We also need a sturdy platform (not paper, for example), secure anchoring of the components (no tape), and appropriate torque on the spring. Proper dimensions and placement are also necessary, like a 'holding bar' that reaches the 'catch', and a catch that is the optimum size to release at the optimum time. The fact that the mousetrap has nothing predating on **it** during its analogical incremental complexification is somewhat helpful, though of course unrealistic in the real world of food chains red in tooth and claw.

In addition, while all the parts above are necessary, they are not **sufficient** to eradicate mice. Such is the case with the bombardier beetle. There wouldn't be any spray if there was not enough hydroquinone to react and produce enough energy to boil the water. And how fortuitous that the cluster of chambers, chemicals, internal plumbing, and sharpshooter turret were all simultaneously on the same ledge of 'Mt Improbable'. Yet in order for any of these to be candidates for selection, there had to be some **minimal function** as well and the ability to execute a task[s] in physically realistic situations. Minimal function is critical in the evolutionary story, yet when coupled with irreducible complexity offers a nasty deterrent to Darwinian logic. Exactly the same holds for Behe's illustrations with flagella, clotting and cellular transport.

WHAT DOES THE BOX TELL US?

The continual use of the word 'machine' by Behe is no accident. A machine implies a 'machinist', which evolutionists will resist every step of the way through Behe's book. The reader should listen in the background for the faint echo of the Dawkinsian cliche that what we find in 'the box' is just the **appearance** of design, that is, designoid. Behe never states it as such, but he is asking these detractors what they **would** allow to count against their designoid thesis.[23] This is the Popperian falsifiability question they will always shy away from.

Some, like Stephen Gould, try to turn the table by touting the anatomy of the panda's 'thumb'[24] as an alleged example of dysteleology,[25] although it does a perfectly good job of stripping leaves from bamboo. Dawkins belittles an intelligent designer who would wrap the prostate gland around the ureter as having a 'wicked sense of humour'. But both these luminaries know it is only at the gross anatomy level that they can seduce the public, while never having to account in any experimentally kosher manner for the arrival of the panda in the first place, or the incipient stages of fibro-muscular tubes between kidney and bladder. They are ideologically constrained to counter with a litany of 'pre-adaptation/exaptation just so' scenarios,[26] but scientifically speaking these thought experiments carry no more credibility than Piltdown Man. Such fanfare will no longer be possible, or respectable, at the biomolecular level, according to Behe, provided we come to the debate with the singular disposition to be swayed by evidence instead of rhetoric.

The world around us abounds with irreducibly complex systems: the circulatory, reproductive, and central nervous systems, Paley's epiglottis, dolphin sonar systems, giraffe necks, bat radar, hummingbird aerodynamics, kangaroo and whale nursing apparatuses, the mammalian ear with the organ of Corti, photosynthesis, and feathers, flight and migratory instinct in birds, etc. 'Mount Improbable incrementalism' would place all these at a selective disadvantage in the unforgiving world of predation and the second law of thermodynamics. No doubt evolution-ists can romantically conceive of **functional precursors,** or perhaps complex, interdependent components fortuitously arising by multiple simultaneous mutations, resulting in numerous successive, slight modifica-tions. But for such a brute luck thesis to be taken seriously, **physical** precursors must be provided, instead of fuzzy **conceptual** ones where pivotal details are never fleshed out. If this cannot be done, Berkeley geneticist Richard Goldschmidt, of hopeful monster fame, must be exonerated.[27]

DON'T BOX ME IN!

Of course, resistance to the theses of Phil Johnson, David Berlinski, Paul Nelson, Bill Dembski, Stephen Meyer, J. P. Moreland, Michael Behe and other prominent design theorists has been fierce. Remember that the first dogma taught in the citadels of academia is the notion that there is no room for the 'God hypothesis' in the laboratory. Given such *carte blanch* delimination before the petri dishes are even unpacked, it comes as no great shock that there is no Designer around at quitting time, nor that Behe is scorned. Yet irreducible complexity is only controversial due to what it implies; it points to something beyond science, and indicates that science is not the

final locus of truth. But the biochemical data is decidedly uncontroversial and uncontested. Behe is being banished to the ghetto of creationism not because he has committed biochemical malpractice, but simply due to revulsion for the philosophical and cultural repercussions attending the design inference.[28] Matters are exacerbated for the Darwinists by the embarrassment of having the bankruptcy of their worldview exposed for what it is: falsified materialistic philosophy. But in turning a blind eye to Behe's case, methodological naturalists further entrench themselves in the ideological foxholes of irrationalism.

One must ask the question: 'What would be the status of contemporary science if the complexity of the cell **were** known in Darwin's day?' The question is rhetorical, since it is doubtful whether his theory would have made it out of the hangar, much less have gotten off the ground. And we must demand to know, then, why Darwinism should retain its position in academia's holy of holies. And to the degree that any philosophies, for example, those of viz. Nietzsche, Freud, Marx, Hitler, Secular Humanism, etc., were pre-authorised by the spreading ripples from Darwin's warm pond, they are deserving of the same verdict.

'CRITIQUES' OF BEHE

It is illuminating, if not downright entertaining, to sample a few of the creative ruses used to muzzle or marginalise Behe. James Shreeve does so not by offering better science, but with the diminutive snub that Behe's *'best weapon is* [merely] *a talent for lively exposition.'*[29] He then adds a rather hollow exhortation that Behe needs to *'make his analogies exact'*, rather than *'jury-rig a whole battery of mini-analogies .. .'*. Here we have echoes of David Hume, who in anticipation of Paley's watchmaker analogy, assaulted the **analogical teleological argument.**

But surely it is reasonable to allow an author the luxury of laying out inductive analogies, without fear that readers will retort that there is not **exact** correspondence down to the last peripheral minutia. Since analogy is mingled in deciphering practically all scientific matters, and is in fact essential for meaningful communication, Shreeve should:

(1) show where Behe's analogies are inexact in such a way that actually capsizes his main argument;
(2) provide an unassailable example of an **exact** analogy; and
(3) explain why he has **not** rained on Richard Dawkins' cyber-animated **biomorph** parade, which is a true example of analogical molestation.

The fact of the matter is that Behe does point out some weaknesses in Paley's famous analogy, but shows that it is more shock resistant once recalibrated to the standard of irreducible complexity.

Others accuse Behe of having *'abandoned science'*, yet they fault neither his research nor data. Actually he has only rejected any *a priori* veneration of the tenets of methodological naturalism. And for good reason: in its atheistic version it is bankrupt of explanatory power at the biochemical level; and in its compartmentalised theistic version, it makes theologically detrimental concessions. Others claim Behe is sidestepping *'current theories'*, but they neglect to specify exactly what these are, nor why their evidence (which is never actually shown) or conclusions are superior to Behe's.

One of the more persistent canards Behe is upbraided with is his alleged capitulation to the God-of-the-gaps. This fallacy is typically levelled at theists who, perceiving something to be naturalistically inexplicable, just insert God in that gap to 'explain it'.[30] Naturalists rebuff this not only as premature, but as effectively shutting down all scientific enquiry. But numerous theists, on the other hand, are equally irritated by God-of-the-gaps, fearing that if the miraculous is put in a present gap, and then science advances to the point of providing a credible explanation on the 'gap' in question, then God will dissipate *a la* Carroll's Cheshire cat.[31]

This latter group, while calling themselves Christian, energetically resist non-naturalistic interpretations. And like their non-theistic counterparts, they say Behe is not doing science, merely because he resists artificial communal standards of demarcation, and is willing to probe beyond sanctioned boundaries. Perhaps Behe just remembers that science was birthed out of a theistic worldview,[32] and that with rare exception the founding fathers of every major scientific discipline were theists. He seems to hold that

> *'the idea that the cosmos is the product of a rational mind (design) provides a superior philosophical foundation for science than the notion that everything in the universe emerged from mindless molecules. In Darwin's day many thought of materialism as a liberating response to religious dogma.'*[33]

But could it be that modern materialism is the dogma that is restricting scientific progress?

Additional criticisms are legion, and indicate that the mere possibility of intelligent design is terrifying to many scientists. One critic, undoubtedly anticipating both the reception of Behe's work and the earthquakes it will cause, made the rather boring prediction that

> *'the* ignoranti *will herald this as a "landmark achievement that breaks new ground "'.*

Actually it fine-tunes previous ground, buttressed with modern examples, and shows that **The Origin** was not the landmark achievement that many think it was. Other therapeutic attempts at damage control resort to *ad hominem* attacks, with one critic labelling Behe as a *'mystic*'; another accusing him of *'diversionary sleight of hand';* yet another saying he was

> *'ashamed to admit* [he had] *a grad degree from the institution where Behe is a professor*'.

In a recent interview, Dawkins spurned

intelligent design as *'a pathetic cop-out'*, describing Behe as

> *'simply too lazy to figure out how things work by attributing natural events to supernatural forces* [that is, God-of-the-gaps]'.

Such are the words of individuals caught in the hammer of Behe's mousetrap. The array of additional red herrings accompanying such attacks indicates a frantic effort to cauterise the wounds which have been, and will continue to be, inflicted by Behe's mousetrap. It is quite enjoyable to see such hysteria. The fact that none of the opprobrium is accompanied by a thimble of counter-evidence says something, and says it very, very loudly.

RESIDUAL CAVEATS

Darwin's Black Box should be mandatory reading for any thinking person, and especially those in education. But from the creationary perspective, while there is much to be lauded in **Darwin's Black Box,** many will take umbrage with a few of Behe's secondary assertions; ones which are not even integral to his primary thesis.

First, the fact that Behe treats Big Bang cosmology with kid gloves can be excused, since it is not the central ideational trajectory of his book. But one would hope that Behe, or his astrophysical equal, would subject the irresponsible conjecture which characterises the Hot Big Bang model[34] to the same masterful disambiguation of Darwinism-tainted biochemistry that he's accomplished in **Darwin's Black Box.**

Second, Behe briefly touches upon the wildly speculative quantum notion of **multiple universes** as a concomitant of the Anthropic Principle.[35] The Anthropic Principle and Behe's irreducible complexity overlap in a comparative sense, in that they both derive their postdictive power from tabulating the plethora of contingencies necessary for life, giving a thunderous eradication to Dawkins' unconscious watchmaker. But while strictly speaking, 'multiple universes' **are** entertained under the rubric of the Anthropic Principle today, the lay apologist instinctively knows that the Anthropic Principle can be fruitfully utilised while not having to buy into its more chimerical concomitants.

Third, Behe is very up front in his claim to have *'no reason to doubt that the universe is the billions of years old that physicists say it is*',[36] therefore accepting the standard evolutionary time-scale. This is ironic coming from such an acute mind, which spends nearly 300 pages convincing readers not to be beguiled by the mere assertions of the intelligentsia. While this does not undermine his biochemical case, it has the unintended effect of confirming his claim that so many are willing to accept majority consensus on an issue, while unaware that conclusions are based more on philosophical biases than observational fact.

Fourth, alert readers will catch the fact that Behe is not against evolution *per se*, but only rejects Darwinian gradualism as the climbing gear for 'Mt Improbable'. He seems to have little quarrel with the thesis of common ancestry. The journal articles and evidence in this category, however, seem every bit as theory-laden as the other areas he has researched, so this reviewer is curious to see what **specific evidence** tipped the scales so much to warrant his blessing.[37] Even more so, why even mention it in the book at all? It makes no contribution to his case. Could it be perhaps merely a peace treaty of sorts, to those whom he's calling to account, thus ensuring that his thesis will receive the widest possible hearing? Otherwise he might be accused of being a flat Earther, or worse yet, someone who takes the Genesis narrative at face value, which of course is tantamount to leprosy.

Fifth, while arguing that 'large jumps' (macroevolution) are not credible,[38] he then concedes that 'small jumps' (microevolution) **confirm** Darwinism on a small scale.[39] Rapid diversification of finch beaks and *Biston betularia* are referred to as *'hugely gratifying confirmation'* of Darwinian intuition. But something is amiss, in that the exact same examples can be used by the creationists as *'hugely gratifying confirmation'* of the stability of species[40] — Darwin's finches finickly remained finches, and Kettlewell's moths exhibited no de-peppering saltations. Environmentally catalysed adaptations which merely dipped into the pools of already existing genetic material can hardly be **hugely gratifying confirmation** for a position which demands transpeciation and common ancestry. While Behe has the prerogative to clarify in subsequent work which theory of origins he feels most comfortable being associated with, the reader is left to reflect on just where he stands, and where his ultimate source of authority lies; with Scripture, reason, tradition, or experience? As a Roman Catholic, does he resonate with the recent statements of John Paul II? What reservations, if any, does he have about theistic naturalism,[41] theistic evolution,[42] or progressive creationism[43]?

Finally, while Behe makes a cogent scientific argument for the existence of a Designer, the final product is hardly more appealing than the watchmaker/absentee landlord creator of Deism. He might believe otherwise, but from the case in **Darwin's Black Box** alone, we are left with 'intelligent design' at best. This itself is no doubt by design. And in a closed world that has been indoctrinated to mock notions of the transcendent, Behe nudges the pendulum back in the direction of mere design, while allowing readers the personal privilege of plumbing the depths of what a Designer implies. While recognition of a Designer does not translate *ipso facto* into genuflection at Calvary, it certainly renders such a surrender much more likely.

These shortcomings aside, here is a text which is required reading, if not memorisation, for all creationists who desire to be on the cutting edge in further buttressing their apologetic against evolution. Perhaps the biggest problem lovers of God's Word will have after reading **Darwin's Black Box,** is how to fight boredom till the arrival of

his next book.[44] For those with Darwinian proclivities, the thought of Behe's sequel could hardly be more nauseating.

Behe has only introduced us to the staggeringly lilliputian intricacies and masterfully designed efficiency of the cell. Future discoveries will continue to confirm the intelligent design thesis. But Behe has courageously put his neck on the line, and articulated what many honest scientists have known or suspected for quite some time but have been reticent to suggest because they are neither tenured or independently wealthy. With such ideological influences as research grants, careerism, peer pressure, publish or perish mandates and the agony of an autonomy-threatening paradigm shift, it is more than legitimate to ask how much real science is taking place in the academy.

Powerfully complementing Phil Johnson's writings, Behe augments the case that Darwinism is bad philosophy masquerading as science. When encountering the opened box, its contents will be too disturbing, and some will feel boxed in, refusing to revise their *Weltanschauung*. For those of Dawkinsian bent, the existence of an intelligent Designer will continue to prove elusive, regardless of any evidence, because of an *a priori* commitment to methodological naturalism. Dawkins cannot keep the box closed, and will therefore put an improbable spin on the mountain of biochemical evidence against designoids.

On the other hand, Christians who wish to give an answer for their faith will be drawn back to Behe again and again. And if you know a skeptic who is open-minded enough to be persuaded by a 'purely scientific' rebuttal of methodological naturalism, yet do not want to initially lose him in a plethora of 'thus saith the Lord's, this next December's holiday shopping has been made so much easier.

A special word of thanks must be extended to Dr Andrew Snelling, both for inviting me to review this book, and for untold hours of gracious editorial assistance, faxing and emails.

REFERENCES AND NOTES

1. Attacking Behe's evidence is not an enviable task, as will be seen, but it will be even harder to attack the man. Having heard both Behe and Phil Johnson speak, I can say that neither exhibits a single ounce of arrogance. Both employ a down home approach to matters, and exhibit every decorum as gentlemen and scholars. The fact that they do so articulately, and with good cheer, solid evidence and in indetourable command of the essentials of the debate, makes debate with them all the more unpalatable for detractors of the design inference.
2. Behe, M. J., 1996. **Darwin's Black Box: the Biochemical Challenge to Evolution,** The Free Press, New York, p. 39.
3. Note that Behe is not arguing against evolution *per se*, but only against any **Darwinian type mechanism** as an explanation for the origin of biochemical complexity.
4. Darwin, C, 1872. **The Origin of Species,** 6th edition, Mentor, New York, p. 171.
5. Readers may remember that the question of whether Darwinian selection can account for interdependent, functional complexity has been addressed many times. See:
   Bergman, J., 1991. Can natural selection produce complex organs? The problem of organ development. **CEN Tech. J., 5(1):** 48-52.
   Bergman J., 1995. Mutations and evolution. **CEN Tech. J.,** 9(2): 146-154.
   Aw, S-E., 1996. The origin of life: a critique of current scientific models. CEN **Tech. J.,** 10(3):300-314.
   Bergman, J., 1997. Cell cycle control and Paley's watch. **CEN Tech. J., ll(l):82-92.**
   Compare also:
   Armitage, M., 1997. Man, micro-parasites, and electron microscopy of trematodes. **CEN Tech.J.,ll(l):93-105.**
6. The reference is to Richard Dawkins' latest book, **Climbing Mount Improbable.** The metaphor refers to a climber who goes from bottom to summit by small steps. Likewise, life has slowly ascended to biological complexity via tiny random mutations of the blind watchmaker, rather than huge bounds to the top which might be likened to miracles. On the surface, descent with modification guided by random variation and natural selection seems astronomically improbable. But the Darwinian mechanism, according to Dawkins,
   'acts by breaking the improbability up into small manageable parts, smearing out the luck needed, going round the bach of Mount Improbable and crawling up the gentle slopes.'
7. Paley's contemporary, George Cuvier, also presaged irreducible complexity, calling it 'the correlation of parts'.
8. According to Hitching, Darwin had
   'a beguiling way of making you think he [had] *faced up to all the objections to his theory, and overcome them',*
   when he had in reality only supposed them away by imagining intermediate links, and relied on his readers not being able to distinguish between a mental construct and hard evidence.
   Francis Hitching, 1982. **The Neck of the Giraffe,** Mentor, New York, p. 215.
   Present day methodological and theistic naturalists will no doubt traffic in similar beguiling responses to intelligent design theorists.
9. Hoyle, F. and Wickramasinghe, N. C, 1981. **Evolution From Space: A Theory of Cosmic Creationism,** Simon and Schuster, New York, pp. 96-97.
10. Behe, Ref. 2, p. 22.
11. While complexity level may vary slightly, most sighted creatures possess the following six components: a lens, retina, optic nerve, geniculate body, occipital cortex and frontal lobe. Dawkins does not appear to have the foggiest clue that his ruminations about' 1 per cent' of an eye don't even offer ' 1 per cent' of an answer for such six-component, gross anatomy, irreducible complexity, which are all prior to the biochemical nightmares Behe has awaiting for him. Darwin was convinced that ***'natura non*** *facit saltum',* **but his modern** missionaries continue to leap across such chasms with the aid of a little pixie dust.
12. Behe, Ref. 2, pp. 46-47.
13. Darwin, Ref. 4, p. 168.
14. Mayr, E., 1988. **Toward a New Philosophy of Biology,** Harvard University Press, Cambridge, Massachusetts, p. 72.
15. This candid admission was made by evolutionist Dr Colin Patterson, Senior Palaeontologist of the British Museum of Natural History, New York City, November, 1981.
16. These three points are from:
    Bradley, W., Lecture at the **Mere Creation Conference,** Biola, November 14, 1996.
17. Behe, Ref. 2, pp. 59-73.
18. Nelson, P., 1993. **Thinking About the Theory of Design,** internet document, http://www/mrccos.com/arn/orpages/orl52/152main.htm, page 10.
19. Behe, Ref. 2, p. 73.
20. Compare the schematic drawings in Behe, Ref. 2, pp. 60,71.
21. Behe, M., 1996. Clueless at Oxford. **National Review,** October 14, p. 83.
22. The reader is urged to peruse critical reviews of Behe on this point, to sample just how anti-empirical some are willing to go in their thought constructs, to deny this simple point.
23. Here we have in mind Dawkins' contention that
    'Biology is the study of complicated things that give the ***appearance*** *of having been designed for a purpose'.*
    (Dawkins, R, 1986. **The Blind Watchmaker,** W. W. Norton and Company Ltd, London, p. 1, emphasis added.)
    In Dawkins' world, all facets of design in the natural realm, are only **apparent;** they are just 'designoids'. Perhaps in noting this neo-docetism, the critical thinker is justified in pondering whether it is Dawkins' scientific

objectivity which is apparent.

24. The 'thumb' is actually an enlarged wrist bone, called the radial sesamoid.
25. Dysteleology denotes alleged absence of purpose or design in nature (vestigial organs, etc.); that is, purposelessness. See:
    Bergman, J. and Howe, G., 1990. **'Vestigial Organs' Are Fully Functional,** Creation Research Society Books, Kansas City.
26. Gould, S. J., 1991. **Bully for Brontosaurus,** W. W. Norton and Company, New York, p. 144n.
27. In 1940 Goldschmidt posed challenges similar to Behe. He asked the scientific community to offer a step-by-step account leading to complex structures:
    'I may challenge the adherents of the strictly Darwinian view . . . to try and explain the evolution of the following features by accumulation and selection of small mutants: hair in mammals, feathers in birds, segmentation of arthropods and vertebrates, the transformation of the gill arches in phytogeny including the aortic arches, muscles, nerves, etc.; further, teeth, shells of molluscs, ectoskeletons, compound eyes, blood circulation, alternation of generations, statocysts, ambulacral system of echinoderms, pedicellaria of the same, cnidocysts, poison apparatus of snakes, whalebone, and finally, primary chemical differences like haemoglobin versus haemocyanin, etc.'.
    Goldschmidt, R., 1940. **The Material Basis of Evolution,** Yale University Press, New Haven, Connecticut, p. 7.
    Goldschmidt was regarded as a quack in his day, but sixty years later his challenges are still being ducked.
28. I am grateful to Michael Keas for this thought.
29. New **York Times Book Review,** August 8, 1996, p. 8.
30. This is virtually identical to the so-called **Argument from Ignorance.** Critics say that just because **Behe** cannot imagine a naturalistic mechanism for the cell or undirected evolution, does not mean that such will not come in the future. But such a claim itself ironically commits the fallacy of *argumentum ab futuris;* the claim that no matter how bad things are, evidence will be forthcoming to prove such and such. Just as hard to disprove as a universal negative, this is difficult to disprove as a 'universal positive'; truly a last resort for the chronically optimistic.
31. Stephen May captures it all when he writes that
    'subsequent discovery might unveil rational scientific reasons for what seems at present an extraordinary unlikely coincidence of events. I think here of what is being touted in some quarters as "complexity theory" [a development of chaos theory] *according to which the most incredibly sophisticated systems can appear to be spontaneously self-organising. One might again look at Darwin's theory of evolution and the way in which it is argued to explain, according to various principles following the laws of natural selection, what we might otherwise regard as highly improbable according to mere chance. The danger of such an approach is that perpetually threatening any kind of God-of-the-gaps approach'.*
    Rae, M., Regan, H. and Stenhouse, J. (eds), 1994. **Science and Theology: Questions at the Interface,** Eerdmans, Grand Rapids, p. 52.
    To interminably hope that *'subsequent discovery might unveil rational scientific reasons* 'for biochemical complexity is fine; but only as long as there is no law against daydreaming!
32. This point is ubiquitously chronicled in the writings of Stanley L. Jaki.
33. Adapted from class handout of Dr Michael Keas.
34. An Australian journalist once summed it up nicely:
    'First you have speculation; then you have wild speculation; then you have cosmology!'
    Martyn Harris, 'Stephen Hawking; genius or pretender', The **Weekend Australian,** July 4-5,1992, p. 19.
35. Behe, Ref. 2, p. 247.
36. Behe, Ref. 2, p. 5.
37. According to Phil Johnson:
    'The evidence from developmental biology, supposedly a major support for the common ancestry thesis [CAT], *actually undermines it. This is not noticed because common ancestry is* ***axiomatic*** *and hence never in question.'*
    Johnson, P., 1995. **Reason in the Balance,** InterVarsity Press, Downers Grove, Illinois, p. 213, emphasis added.
    Let us hope Behe subjects the CAT axiom to the same rigorous interrogation he's modelled in **Darwin's Black Box.**
38. Behe, Ref. 2, p. 14, passim.
39. Behe, Ref. 2, p. 15.
40. Confirmation of the unrelenting stasis of species is acknowledged by anti-creationist, Niles Eldredge:
    'But rarely do we see progressive transformation in any one direction lasting very long. What we see instead is oscillation. Variable traits usually seem to dance around an average value'.
    Eldredge, N., 1995. **Reinventing Darwin,** Wiley, New York, p. 69; cf. also p. 94.
41. For example, Ian Barbour, Arthur Peacocke and John Polkinghorne.
42. For example, Howard Van Till and most members of **The American Scientific Affiliation** (ASA).
43. For example, Pattle Pun, Bernard Ramm, and Hugh Ross.
    Progressive creationism is by far the most popular origins compromise in evangelical academic circles today. However, as with other illegitimate concordisms, one ends up chipping away at God's Word as prepositional truth. This begins with some type of **dual revelation,** which prompts a fuzzification of Pentateuchal perspicuity on *'yom',* followed by an obligatory watering down of Noah's Flood (if it's kept at all). Once this downward spiral of capitulation to modernity is initiated, the teeth are taken out of any resistance to further compromise. Particularly vulnerable are the doctrines of the atonement and divine omnibenevolence once the sin-death causal nexus is severed. This follows logically since the untold billions of carcasses depicted in the fossil record must now be deciphered as prelapsarian, intended as part of God's **very good** natural order, and not initiated by Adamic sin; thus 'original sin' is open to being retooled (it has already happened in some circles), which will exact a hermeneutically and theologically catastrophic price once the rest of Scripture is overhauled to conform to the initial capitulation.
44. In private correspondence, Behe told me that his editor has been enticing him to write a follow-up volume.

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