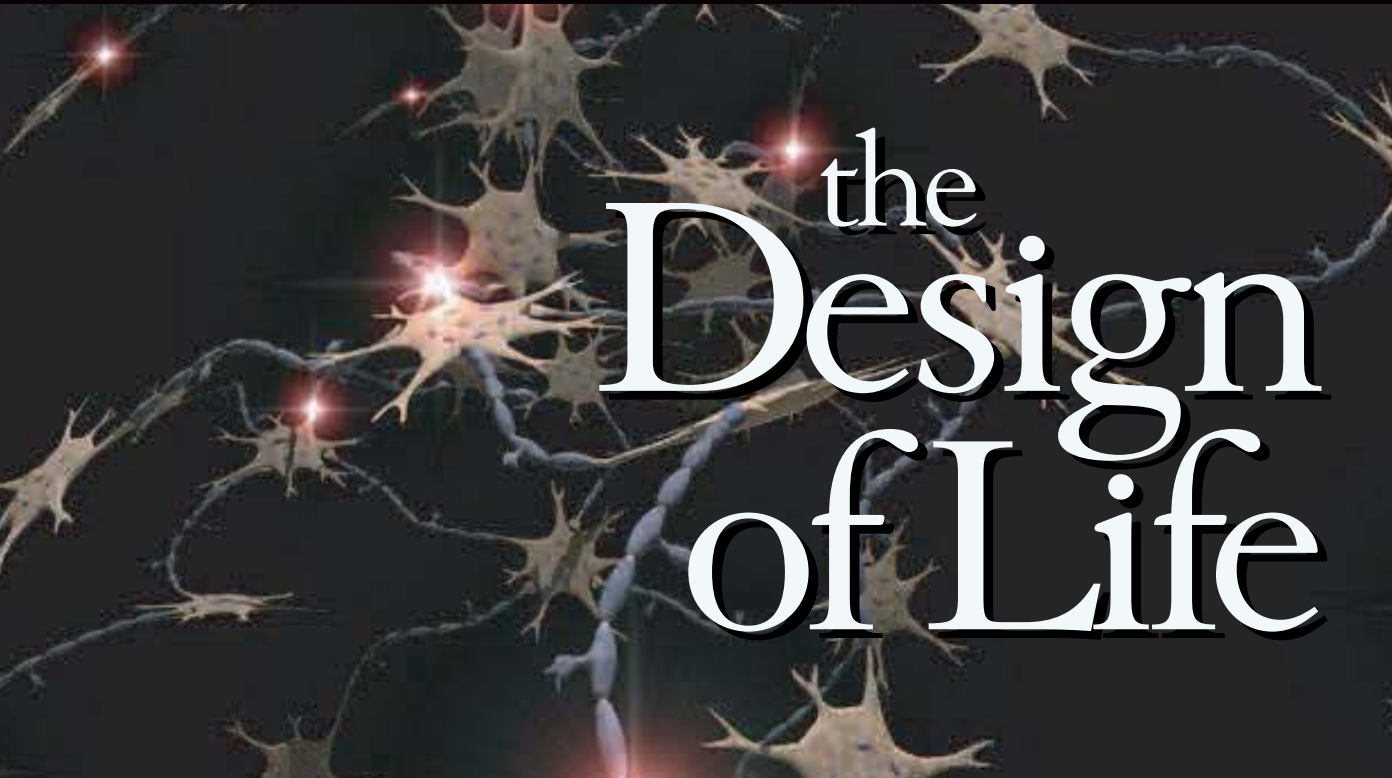


*Discovering Signs of Intelligence
in Biological Systems*

A microscopic image of neurons, showing their complex branching structures. Several nodes or synapses are highlighted with bright, glowing light, creating a sense of activity and connectivity. The background is dark, making the neurons stand out.

the Design of Life

William A. Dembski | Jonathan Wells

the Design of Life

*Discovering Signs of Intelligence
in Biological Systems*

“The illusion of purpose is so powerful,” writes Richard Dawkins, “that biologists themselves use the assumption of good design as a working tool.” As an ardent proponent of Darwinian evolution, Dawkins imagines that all design in biology is merely an illusion.

By contrast, this book shows that biologists use the assumption of design with success precisely because design in biology is not an illusion but real. In this book, William Dembski and Jonathan Wells present a compelling scientific case for the intelligent design of biological systems. Their laser-like analysis, clear explanations, and brilliant analogies will captivate every reader, whether trained scientist or curious layperson.

Intelligent design (ID), as the study of patterns in nature best explained by intelligence, is already accepted in many special sciences. Archeology, forensics, and the Search for Extraterrestrial Intelligence (SETI) all belong to ID in this broad sense. These sciences, however, are uncontroversial because any intelligence there could be an “evolved” intelligence.

In biology, by contrast, intelligent design is highly controversial because any intelligence there would be an “unevolved” intelligence—it would not be the product of purely material evolutionary processes. Thus, to convinced materialists like Richard Dawkins, who dogmatically accept Darwinian orthodoxy, this book comes as a shot across the bow.

Scientists who support the intelligent design of biological systems are routinely held up to ridicule, stripped of their status, denied tenure, and driven from their posts. Why? They do not agree that the universe, life, and the human mind are the accidental outworking of purely material forces.

Continued from Inside front flap

And why don't they agree? Because the evidence of science shows otherwise. This book presents that evidence clearly and cogently. Written for the general reader, it will quickly enter the national conversation. In *The Design of Life*, Dembski and Wells make the most powerful and comprehensive case to date for the intelligent design of life.

This is the book that promoters of unintelligent evolution do NOT want you to read.

ABOUT THE AUTHORS

Photo courtesy of Lashia Benzec



William A. Dembski is a Senior Fellow at the Discovery Institute's Center for Science and Culture. He has authored and edited numerous books, including the first book on intelligent design to be published by a major university press, *The Design Inference: Eliminating Chance Through Small Probabilities* (Cambridge University Press, 1998).

He has seven earned degrees, including a Ph.D. in philosophy (University of Illinois at Chicago) and a Ph.D. in mathematics (University of Chicago), and currently lectures around the globe on the topic of intelligent design. Bill and his wife, Jana, live in Central Texas with their daughter and twin boys.



Jonathan Wells is a Senior Fellow at the Discovery Institute's Center for Science and Culture. He holds two doctorates, one in molecular and cell biology from the University of California at Berkeley, the other in religious studies from Yale University. As the author of *Icons of Evolution: Why Much of What We Teach about Evolution Is Wrong* (Regnery, 2000), Wells has emerged

as one of the key figures for reforming the teaching of evolution by correcting textbook errors and by insisting that the evidence that both confirms and disconfirms Darwinism be taught. He is a widely acclaimed lecturer and debater on the topic of intelligent design. Jonathan and his wife, Lucy, live in the Seattle area.

Continued on back flap

Jacket design by Buell Design

ABOUT THE **Cover**

The cover of The Design of Life features an artist's portrayal of human brain circuitry as it might appear if magnified many thousands of times. The portrayal illustrates an intriguing discussion of the human brain in Chapter One, quoted here in part:

During the first eighteen months from conception, the brain's neurons are formed, deployed, and connected in a tsunami of activity, *at the rate of 250,000 per minute*, until 100 billion neurons are arrayed in a powerful, organized matrix. Each neuron may have tens of thousands of finger-like appendages, or dendrites, which connect with other neurons and dendrites in a bafflingly complex circuitry. No two neurons are exactly the same, with the result that the circuitry of each brain is unique. That circuitry is more complex than all the telephone circuitry on the face of the earth. Three decades ago science-writer Isaac Asimov was so impressed with the densely organized complexity of the human brain that he wrote: "In Man is a three-pound brain, which, as far as we know, is the most complex and orderly arrangement of matter in the universe."

the Design of Life

*Discovering Signs of Intelligence
in Biological Systems*

William A. Dembski | Jonathan Wells
Editor, William A. Dembski

*The important thing in science is not so much
to obtain new facts as to discover new ways of
thinking about them.*

- Sir William Lawrence Bragg

Foundation for Thought and Ethics, Dallas

The Foundation for Thought and Ethics
Dallas, 75248

Copyright © 2008 The Foundation for Thought and Ethics
All rights reserved
including the rights of reproduction or transmission in any form.

Published in the United States

Cataloging-in-Publication data will be held on file with the Library of Congress

ISBN-13: 978-0-9800213-0-1

ISBN-10: 0-9800213-0-8

Typesetting, design and production *Characters, Buell Design*, Dallas, Texas

Dedication

In honor of Drs. Paul (1914 – 2003) and Margaret (1919 –) Brand. Convinced that we live in an intended world, that humans are not accidental happenings, and that the stunning design of the human body rightly inspires awe and gratitude, these medical pioneers dedicated their lives to alleviating the devastating effects of Hansen’s disease (leprosy). Today millions of people around the globe with this disease enjoy a quality of life once unimaginable. At enormous personal cost to themselves and in opposition to settled medical practices and superstitions, this amazing couple pursued decades of painstaking research, developing orthopedic and ophthalmologic techniques that revolutionized the medical treatment of leprosy. Their lives attest to the vast potential of science to illumine the world and enhance human life.

TABLE OF Contents

Foreword *by William Harris*
Preface *by Jon Buell*
The Meanings of “Evolution”

1	HUMAN ORIGINS	
1.1	William James Sidis	1
1.2	Our Fossil Ancestors?	5
1.3	The Ninety-Eight Percent Chimpanzee?	7
1.4	The Benefits of Bigger Brains	9
1.5	The Benefits of Smaller Brains	11
1.6	Language and Intelligence	14
1.7	Morality, Altruism, and Goodness	17
1.8	Modified Monkey or Modified Dirt?	21
1.9	Discussion Questions	23
2	GENETICS AND MACROEVOLUTION	
2.1	Darwin’s Theory	25
2.2	Mendel on Inheritance	30
2.3	Genetic Diversity	33
2.4	The Molecular Basis for Genes and Evolution	36
2.5	The Adaptational Package	40
2.6	How Many Genes Must Change?	45
2.7	“Evo-Devo”	47
2.8	Discussion Questions	54
3	THE FOSSIL RECORD	
3.1	Reading the Fossil Record	57
3.2	The “Gravest Objection” to Darwin’s Theory	59
3.3	Major Features of the Fossil Record	63
3.4	Imperfect Record	69
3.5	Insufficient Search	71
3.6	Punctuated Equilibrium	73
3.7	Abrupt Emergence	77
3.8	Using Fossils to Trace Evolutionary Lineages	81
3.9	Abusing Fossils to Trace Evolutionary Lineages	86
3.10	Discussion Questions	91

4	THE ORIGIN OF SPECIES	
4.1	Evolution's Smoking Gun	93
4.2	Species as Reproductively Isolated Populations	95
4.3	Alleged Instances of Observed Speciation	99
4.4	Microevolution, Macroevolution, and Evo-Devo	102
4.5	Speciation and Intelligent Design	106
4.6	Discussion Questions	110
5	SIMILAR FEATURES	
5.1	Classification and Interpretation	113
5.2	Analogy and Homology	117
5.3	The Puzzling Pandas	120
5.4	Darwinism's Redefinition of Homology	124
5.5	Molecular Phylogeny	126
5.6	Vestigiality: The Best Evidence for Evolution?	131
5.7	Recapitulation	136
5.8	Common Design, Common Ancestry, or Both?	140
5.9	Discussion Questions	143
6	IRREDUCIBLE COMPLEXITY	
6.1	Molecular Machines	145
6.2	Michael Behe's Dangerous Idea	146
6.3	The Bacterial Flagellum	149
6.4	Coevolution and Co-option	151
6.5	The Argument from Irreducible Complexity	156
6.6	Discussion Questions	162
7	SPECIFIED COMPLEXITY	
7.1	The Mark of Intelligence	165
7.2	Defining Specified Complexity	168
7.3	The Reach of Chance	172
7.4	Climbing Mount Improbable Without Design?	175
7.5	The Appearance of Design	180
7.6	Hurdles Evolution Must Overcome	183
7.7	The Origination Inequality	189
7.8	Not Too Complex, Not Too Simple, Just Right	194
7.9	Variation and Selection out of Sync	199
7.10	Discussion Questions	204

8	THE ORIGIN OF LIFE	
8.1	What Needs to Be Explained?	207
8.2	Oparin’s Hypothesis	213
8.3	The Miller-Urey Experiment	218
8.4	Problems with Oparin’s Assumptions	222
8.5	The Proteinoid World	234
8.6	The RNA World	238
8.7	Self-Organizing Worlds	240
8.8	Molecular Darwinism	246
8.9	The Medium and the Message	249
8.10	The God of the Gaps	253
8.11	A Reasonable Hypothesis	255
8.12	Discussion Questions	265

9	EPILOGUE: THE “INHERIT THE WIND” STEREOTYPE	
9.1	Hollywood’s Version of the Scopes “Monkey Trial”	267
9.2	The Actual Scopes Trial	268
9.3	The Importance of Keeping Science Honest	270
9.4	The Santorum Amendment	272
9.5	Postscript: Kitzmiller v. Dover	274

General Notes
Reference Notes
Glossary
Index
Authors
Credits

Foreword

In 1999, the Kansas Board of Education established new science standards for Kansas public schools. These standards advocated a sober assessment of Darwin’s theory of evolution and left the responsibility for how to teach the science of biological origins to local school districts. This was, by any reasonable account, a modest change to the Kansas Science Standards. Yet critics saw the new standards as the next salvo in the ongoing “evolution wars.” They responded by misrepresenting the new standards and accusing the Board of eliminating the teaching of evolution and replacing it with religious dogma. The ensuing controversy quickly escalated until the change in Kansas science standards became a “shot heard ‘round the world.” National and international media joined major scientific organizations across the globe in heaping ridicule and scorn upon Kansas.

Earlier in the decade I had read the seminal works of Phillip Johnson (*Darwin on Trial*, Regnery Gateway, 1991) and Michael Behe (*Darwin’s Black Box*, Free Press, 1996). These and other writings familiarized me with the idea of intelligent design and convinced me that its proponents were onto something big—that standard evolutionary theory was not nearly as well confirmed as it was widely touted and that intelligent design (ID), as an alternative approach to biological origins, had real scientific and intellectual merit. Nonetheless, it took the Kansas controversy to bring me “out of the closet.”

As a native Kansan engaged in full-time medical research in the Kansas City area, I became actively involved in the debate, writing letters to the editor and speaking at a public forum sponsored by the Board of Education. It was here that I met John Calvert and Jody Sjogren, fellow travelers in the ID community. Together we formed Intelligent Design Network (IDnet). The goal of IDnet was to foster institutional objectivity in the teaching of origins science.

Why should such an organization be necessary at all? The Kansas controversy made it clear that the “institutions of science”—from the national academies to text book writers and publishers to the public schools—were uniformly committed to a materialistic, reductionistic view of origins. In consequence, they reflexively opposed the dispassionate consideration of any evidence that does not fit with that perspective.

After losing the majority in 2001 (which resulted in a reversion to the Darwin-only standards), a new Kansas Board, whose majority favored a free and open discussion of evolution, won in the 2004 elections. Thus, the time came for another round of discussions on how the Kansas Science Standards should treat biological origins.

The Board therefore organized a Review Committee, on which I was invited to serve. Working in that capacity gave me the opportunity to bring my scientific perspective (twenty-five years in medical research producing over a hundred scientific publications and many funded research projects) directly to the Board. Nonetheless, the two individuals who chaired the Committee favored a “Teach Darwin Selectively” approach, focusing only on the positive evidence that confirms Darwinian evolution. Moreover, the Committee itself was similarly inclined (by a ratio of three to one).

It therefore promised to be an uphill battle for the eight of us on the Committee (the “Minority”) who favored a “Teach Darwin Comprehensively” approach, focusing not only on the positive evidence that confirms Darwinian evolution but also on the negative evidence that disconfirms it. Thanks to a majority on the Board that favored the latter approach, the Minority Position received a sympathetic hearing and was ultimately accepted (at least in large part) by the Board.

What was the Minority Position? What were its main tenets? Remarkably, in laying out the evidence for and against Darwinian evolution, this book by William Dembski and Jonathan Wells outlines the Minority Position in exquisite detail and with substantial scientific support. To be sure, in also presenting the theory of intelligent design, *The Design of Life* goes well beyond the Committee’s mandate, which was concerned exclusively with the teaching of evolution and not with the teaching of intelligent design. (Contrary to widespread reports, the Board did not mandate the teaching of ID; in fact, it explicitly stated in the new Standards that it was not mandating ID.)

This book both provides the critical analysis of Darwinian evolution and also reflects the attitude of free and open inquiry that we hoped would become the norm for everyone with an interest in biological origins, first in Kansas and then, ideally, worldwide. In chapter seven, the authors make a statement that crystallizes the problem we were trying to remedy in Kansas, and then they go further to offer a solution that even Charles Darwin would likely have found acceptable:

Evolutionary biology, by unfairly privileging Darwinian explanations, has settled in advance which biological explanations must be true as well as which must be false apart from any consideration of the empirical evidence. This is not science. This is arm-chair philosophy. . . . [I]n the *Origin of Species*, he [Darwin] wrote: “A fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question.”

In 2005, the Kansas Board agreed with the Minority: To be informed citizens, students need to be informed regarding scientific controversies. They need to know the multiple definitions of “evolution” and understand to what extent the scientific evidence backs up each meaning. They must be aware that the great mysteries of life remain just that—mysteries awaiting a satisfactory explanation.

The scientific community continues to wrestle with deep and fundamental questions: Where did the universe come from? How did life originate? How did a coded language (i.e., DNA) come to form the basis of life? How could multicellular life have originated from unicellular life? What is the origin of complex molecular machines that are inside every cell and that are necessary for life?

These and other problems have stubbornly resisted the standard materialistic, reductionistic approach to science, and students need to know this. In particular, students need to realize that old lines of evidence historically used to support Darwin’s theory have come under significant scientific criticism in recent years and that entirely new lines of evidence have seriously challenged the theory (especially evidence from molecular biology).

Scientific claims are, by their very nature, tentative and always subject to change in light of new evidence. Students of science therefore need to be encouraged to keep an open mind and to let evidence speak for itself, not only in regard to biological origins but in regard to all other scientific issues. Indeed, this attitude stands as the bedrock of all true scientific inquiry, and it, above all others, needs to be nurtured in students. Especially in Kansas!

As of this writing (February 2007), a new Kansas Board of Education has shifted back to a teach-only-the-evidence-that-supports-Darwin approach to the study of biological origins. In fact, they have gone further, mischaracterizing science as a reductionistic enterprise that “describes and explains the physical world in terms of matter, energy, and forces.” By so defining science, the new board has not only defined intelligent design out of existence but has also redefined what it means to be human. In particular, human free will and consciousness, which science studies, must, according to these new standards, be described only by reference to matter, energy, and physical forces. Far from being objective and neutral, the new standards now endorse a materialistic philosophy and worldview.

Despite this political ping pong over the Kansas Science Standards and despite the increasing stridency of those who would promote and enforce an ideologically charged conception of science, significant progress in framing the relevant questions over biological origins has been made, and an enduring record of what objectivity in science education might look like has been created. I am confident that others will pick up where we left off in Kansas, and, with the help of volumes like this, will make Darwin's hope of achieving a "fair result" by "balancing the facts and arguments on both sides" increasingly a reality.

The Design of Life gives all interested parties in the debate over biological origins the hard scientific evidence they need to assess the true state of Darwin's theory and of the theory of intelligent design. But it does much more: it carefully fosters the attitude of open inquiry that science needs not only to thrive but also to avoid becoming the play-thing of special interests. The authors, William Dembski and Jonathan Wells, are to be commended for writing a sparkingly clear book that empowers readers to navigate the captivating and controversial waters of biological origins.

William S. Harris, Ph.D.

*Director of Nutrition and Metabolic Diseases Research,
Sanford Research*

University of South Dakota
Sioux Falls, South Dakota

Preface

Of *Pandas and People* was the first book to propose intelligent design as a scientific alternative to Darwinian evolution. In fact, it marked the first use of the term “intelligent design” as the scientific investigation into the effects and products of intelligent causes within biology. The scientific status of intelligent design remains to this day hotly debated. Yet the fledgling case for it advanced in *Pandas* looked to the very same methods of testing used throughout the sciences. These methods assess hypotheses in light of evidence and thus ensure that all scientific hypotheses, however well established they may look at the moment, are subject to refutation in light of novel evidence. Accordingly, these methods keep science honest, ensuring that the outcome of any scientific investigation is not predetermined. *Pandas*, far from prejudging the case for or against intelligent design, sought to let the evidence for design in biological systems speak for itself, unimpeded by either religious or materialistic ideology.

More than a decade has passed since the Foundation for Thought and Ethics commissioned Percival Davis and Dean Kenyon to write and later update *Pandas*. When the second edition of *Pandas* appeared in 1993, intelligent design consisted of sporadic criticisms of Darwinism and offered only glimmers of what a positive science of intelligent design might look like. Since then, intelligent design (or ID) has grown from a small and marginalized protest against Darwinian evolution to a comprehensive intellectual program for reconceptualizing biology. Intelligent design has now laid the foundations for a general biology whose fundamental organizing principle is not blind material forces but intelligently devised information.

The impact of intelligent design is being felt in both the scientific community and the culture at large. Front page stories in major newspapers such as the *New York Times* have given intelligent design respectful treatment in their science section.¹ Periodicals such as *Time* and *Newsweek* have featured it on their front covers.² Television programs, movies, and popular novels are exploring the theme of intelligent design.³ Talk shows and news programs—everything from ABC’s *Nightline* to Jon Stewart’s *The Daily Show*⁴—regularly discuss the topic. The *Nova*-style science documentary *Unlocking the Mystery of Life* argues forcefully for intelligent design and has been broadcast in all major PBS markets (from New York to Los Angeles). At the same time, the BBC counterpart to *Nova*, called *Horizon*, has produced a documentary titled *A War on Science* challenging intelligent design.

Image

On the scholarly and educational fronts, intelligent design is also making deep inroads. Peer-reviewed articles supporting intelligent design have begun to appear in the mainstream biological literature (e.g., *Protein Science*, *Proceedings of the Biological Society of Washington*, and *Journal of Molecular Biology*). Research scientists have begun to found labs devoted to intelligent design research. For instance, Douglas Axe, formerly a molecular biologist at

Cambridge University, has founded The Biologic Institute; and Robert J. Marks II, Distinguished Professor of Electrical and Computer Engineering at Baylor University, has founded The Evolutionary Informatics Lab.⁵

Universities such as Cornell, Stanford, and Cal Berkeley now have student chapters known as IDEA Clubs that support intelligent design (IDEA = Intelligent Design and Evolution Awareness).⁶ School boards, state legislatures, and the courts are weighing in on whether intelligent design may legitimately be taught in the public school science curriculum (the most notable instance being *Kitzmiller v. Dover*—see the epilogue). As a result, intelligent design is now being vigorously debated throughout the academic and scientific communities. It is high time, therefore, to issue a sequel to *Pandas* that reflects the progress of intelligent design over the last decade.

Darwinian theorists have long acknowledged that biological organisms “appear” to be designed. Oxford zoologist Richard Dawkins, a leading Darwinian spokesperson, has admitted, “Biology is the study of complicated things that give the appearance of having been designed for a purpose.”⁷ Statements like this echo throughout the biological literature. The late Francis Crick, Nobel laureate and co-discoverer of the structure of DNA, wrote, “Biologists must constantly keep in mind that what they see was not designed, but rather evolved.”⁸ Darwinists insist that the appearance of design is illusory because evolutionary mechanisms such as natural selection entirely suffice to explain the observed complexity of living things.

Over the last forty years, however, many evolutionary theorists have acknowledged fundamental difficulties with the Darwinian explanation for apparent design.⁹ As a result, an increasing number of scientists have begun to argue that organisms *appear* to be designed because they actually *are* designed. These scientists (known variously as *design proponents* or *design theorists*) see impressive evidence of actual intelligent design in biological systems. As their numbers have grown, their work has sparked a spirited scientific controversy over this central question of biological origins. They argue that, contrary to Darwinian orthodoxy, biology displays abundant evidence of real, not just apparent, design.

Biologist Jonathan Wells is a case in point. He has found persuasive evidence for design in embryological development and in the molecular biology of the cell.¹⁰ Moreover, through his book *Icons of Evolution* (Regnery, 2000), Wells has also become the leading spokesperson for correcting textbook errors in the teaching of biological evolution. In addition, mathematician William Dembski has published an important work on the theoretical underpinnings for detecting design. In *The Design Inference: Eliminating Chance Through Small Probabilities* (Cambridge University Press, 1998), he shows how design is empirically detectable and therefore properly a part of science.

The Foundation for Thought and Ethics is therefore extremely fortunate to have Dembski and Wells author this sequel to *Of Pandas and People*. Though originally planned as a third edition of *Pandas*, *The Design of Life* quickly took on an identity all its own. More than two-thirds of the material is completely new, and what remains of the original material has been thoroughly reworked and updated. Though there is continuity with the old book, *The Design of Life* is essentially a new book. As a standalone volume aimed at the general reader, *The Design of Life* provides the evidence and conceptual tools necessary to understand the scientific case for intelligent design.

Despite the progress that this volume represents, the Foundation for Thought and Ethics remains extremely grateful to Percival Davis and Dean Kenyon for laying the groundwork for it. In writing *Pandas* under the editorial eye and learned pen of Charles Thaxton (himself a seminal thinker in the intelligent design movement),¹¹ Davis and Kenyon drew from a wealth of experience and expertise. Davis had coauthored with Eldra Solomon and Harvard biologist Claude Villee what at the time was the best-selling college biology textbook for biology majors (originally titled *The World of Biology* and later retitled simply *Biology*).¹² Kenyon, a professor of biology at San Francisco State University, was one of the top authorities in the world on the origin of life. Not only did he coauthor a seminal text on the subject (*Biochemical Predestination*), but he also contributed to the prestigious Festschrift volumes for both Alexander Oparin and Sidney Fox (when the first edition of *Pandas* appeared, Fox was the most frequently cited origin-of-life scientist in high school biology textbooks).¹³

Davis and Kenyon have left their imprint throughout *The Design of Life*, but especially in the chapters on macroevolution (2), fossils (3), biological similarity (5), and the origin of life (8). Most of their insights remain valid. Yet, with the passage of time, their work has had to be updated. For instance, the origin-of-life chapter that Davis and Kenyon wrote for *Pandas* has a wonderful treatment of spontaneous generation, Oparin's hypothesis, and the work of Stanley Miller and Sidney Fox. But since the last edition of *Pandas* was published, there have been many new proposals for the origin-of-life, including the RNA world and various self-organizational scenarios. The present volume thoroughly critiques these more recent scenarios. Moreover, with the evidence and theoretical insights that have emerged since the publication of *Pandas*, this volume demonstrates far more convincingly than its predecessor could that the origin of life requires an intelligent cause. The need for a book like this is more urgent than ever. Whenever the topic of evolution comes up, many scientists and educators give the impression that all fundamental debate about biological origins has long since ceased.¹⁴ Nor do the media have the information necessary to correct this impression, perpetuating instead the stereotype that any challenge to Darwinian evolution is a challenge to science and must be religiously motivated (see the epilogue). But evolution, in its contemporary neo-Darwinian form, is not the only scientific account of biological origins. There is in fact a substantial scientific literature that critiques the adequacy of Darwinian explanations for the complexity and "apparent

design” of biological organisms.¹⁵ Thus the debate—*the scientific debate*—over Darwinian evolution remains very much alive. *The Design of Life* provides readers with an up-to-date overview of intelligent design and its contribution to that debate.

The Foundation for Thought and Ethics is grateful to the many people who helped bring this project to fruition. Dean Kenyon and Percival Davis deserve enormous thanks in laying the groundwork for this volume. The fellows and staff of Discovery Institute’s Center for Science and Culture provided invaluable assistance always: from reading and proofing drafts to offering key biological insights; from digging up references to marketing the book. This help is perhaps not surprising since the authors, William Dembski and Jonathan Wells, are themselves Senior Fellows of the Center for Science and Culture. But it was gratifying to see such an outpouring of support across the board. Among the Center’s fellows and staff who contributed significantly to the content of this book, Michael Behe, Scott Minnich, Stephen Meyer, Paul Nelson, and Casey Luskin stand out.

William Harris, Denyse O’Leary, James Barham, and Jonathan Witt read the manuscript in its entirety and offered detailed, helpful comments that greatly improved it. William Harris went even further and graciously wrote the foreword. Edward Peltzer vetted the origin-of-life chapter. Finally, Edward Sisson did the spadework for the epilogue, teasing apart the actual Scopes Trial from the mythology that has developed on account of its dramatization in the play and movie *Inherit the Wind*. To all the individuals who helped on this project, named and unnamed, the Foundation for Thought and Ethics owes a great debt and expresses its heartfelt thanks.

Jon A. Buell, *President*
The Foundation for Thought and Ethics
Dallas, Texas

THE MEANINGS OF “Evolution”

Some meanings of “evolution” are uncontroversial, such as that organisms have changed over time, that organisms can adapt to changing environmental conditions, or that gene frequencies may vary in a population. If this is all that evolution meant, the general public would leave it well enough alone. Thus, when school boards and biology teachers must answer what they are teaching about biological origins, they often provide an innocuous version of evolution: *Of course you believe that organisms have changed over time... Surely you’ve heard of bacteria developing antibiotic resistance... This is evolution in action.*

Such depictions of evolution may alleviate public fears and sidestep controversy, but only for the moment. In fact, they hide what is really at stake in the debate over evolution. Bacteria developing antibiotic resistance do indeed exemplify evolution in action. But this is small-scale evolution (microevolution), which no one disputes and which is irrelevant to the really big claims of evolutionary biology.

Evolutionary biology makes two big claims:

1. The bacteria that develop antibiotic resistance and you, the human whose immune system cannot fend off the bacteria, are, along with all other organisms, descendants from a common ancestor in the distant past; and

2. The process that brought the bacteria and all other organisms into existence by descent from a common ancestor operates by chance and necessity and thus without any discernible plan or purpose.

The first of these is a claim about natural history and is known as “common descent” or “universal common ancestry.” According to it, there is a common ancestor to which all living organisms trace their lineage. The second asserts that evolutionary change proceeds by purely material mechanisms and thus requires no intelligent guidance. Intelligence, on this view, is a product of evolution rather than something that guides it.

These twin pillars of evolutionary biology may rightly be credited to Charles Darwin. In proposing his mechanism of natural selection acting on random variations, Darwin seemed to remove any need for intelligence in accounting for biological systems. Instead, he made chance (in the form of random variations) the raw material for biological innovation, and necessity (in the form of natural selection) the driving force that separates among those variations, preserving organisms whose variations confer reproductive advantage while eliminating the rest.

This is the Darwinian mechanism of evolutionary change, and most biologists look to some version of it to explain biological diversification and to justify the first of Darwin’s pillars, common descent. For instance, University of Chicago evolutionary geneticist Jerry Coyne writes,

There is only one going theory of evolution, and it is this: organisms evolved gradually over time and split into different species, and the main engine of evolutionary change was natural selection. Sure, some details of these processes are unsettled, but there is no argument among biologists about the main claims. . . . [W]hile mutations occur by chance, natural selection, which builds complex bodies by saving the most adaptive mutations, emphatically does not. Like all species, man is a product of both chance *and* lawfulness. [*Don’t Know Much Biology*,” June 6, 2007, www.edge.org]

Throughout this book, we use the terms “evolution” and “Darwinism” interchangeably to denote this view of evolution.

Epilogue: The “Inherit the Wind” Stereotype

9.1 HOLLYWOOD’S VERSION OF THE SCOPES “MONKEY TRIAL”

Critics of intelligent design frequently portray anyone who is willing to consider alternatives to Darwinian evolutionary theory as a religiously motivated opponent of science. Using a stereotype epitomized in the Hollywood film *Inherit the Wind*, a fictional portrayal of the 1925 Scopes “Monkey Trial,” many in the academy and media treat any challenge to Darwinism as a challenge to truth and rationality. Yet, it is the failure to examine evolution critically that poses the real challenge to truth and rationality.

Jerome Lawrence and Robert Lee wrote the play *Inherit the Wind* in the 1950s. It was produced on Broadway in 1955, but is best known as a 1960 black-and-white movie starring Spencer Tracy and Frederic March. A more recent version of the movie, made in 1999, starred Jack Lemmon and George C. Scott, but the 1960 version has been far more influential (you should be able to find it in the “classics” section of your local video rental store).

Like the Scopes trial, the play is set in 1925. In it, Bert Cates (the John Scopes character) is hounded by religious fundamentalists in the town of Hillsboro (which corresponds to Dayton, Tennessee) for teaching Darwin’s theory of evolution. Henry Drummond (who corresponds to famous defense attorney Clarence Darrow) bravely offers to defend Cates. To counteract Drummond and suppress the spread of evolutionary ideas, narrow-minded Matthew Harrison Brady (the fictional double of popular political figure William Jennings Bryan) offers to prosecute Cates.

While *Inherit the Wind* makes for fine storytelling, it makes for atrocious history. Cates, because of his stand for evolution, is portrayed as in danger of being imprisoned and losing all that's dear to him (especially the woman he loves). The real Scopes was never in such danger. Cates is portrayed as a valiant defender of truth and reason against fundamentalism and bigotry. The real Scopes had less lofty motives for defending evolution.

9.2 THE ACTUAL SCOPES TRIAL

John Scopes agreed to take part in the trial because local boosters put him up to it. They thought an “evolution-monkey trial” would put the town of Dayton Tennessee on the map—which it did! Scopes was a physical education teacher who taught biology part-time. Local prosecutors agreed to go along with the charade. Things got out of hand when Clarence Darrow offered to defend Scopes and William Jennings Bryan volunteered to speak for the prosecution.

Bryan, unlike Brady in the play, was not a reactionary or a fundamentalist. Bryan was a three-time Democratic presidential candidate and a progressive politician who sought to protect farmers and blue-collar workers from exploitation by big business. Unlike Brady, Bryan did not interpret the book of Genesis literally (he did not, for instance, hold that the earth was only a few thousand years old or that the world was created in six 24-hour days). Bryan personally rejected Darwinism because he saw the evidence for it as unconvincing. That by itself, however, was not enough to prompt his public opposition to Darwinism. Bryan organized public opposition to Darwinism because he saw it as justifying unrestrained capitalism as well as the militarism that led to World War I.

Darrow was not only a famous trial lawyer but also a nationally recognized lecturer who promoted agnosticism and argued publicly against religion on the basis of evolution. In 1924, the year before the Scopes trial, Darrow was the lead defense attorney in the notorious Leopold-Loeb murder case. At that trial, Darrow introduced Darwinian arguments into criminology. Nathan Leopold and Richard Loeb, two rich and well-educated college students at the University of Chicago, admitted to killing a 14-year old boy, Bobby Franks, for the thrill of committing the “perfect murder.” They thought they were too smart to get caught. Darrow argued against the death penalty by suggesting that this “distressing and weird homicide” happened “because somewhere in the infinite [evolutionary] processes that go to the making up of the boy or the man something slipped.”

Leopold and Loeb—Darrow kept calling them “children”—were really helpless pawns of their evolutionary past: “Nature is strong and she is pitiless. She works in her own mysterious way, and we are her victims. We have not much to do with it ourselves. Nature takes this job in hand, and we play our parts.” Speaking of Richard Loeb, he asked,

Is Dickey Loeb to blame because out of the infinite forces that conspired to form him, the infinite forces that were at work producing him ages before he was born, that because out of these infinite combinations he was born without it [i.e., normal emotional reactions]? If he is, then there should be a new definition for justice. Is he to blame for what he did not have and never had? Is he to blame that his machine is imperfect? Who is to blame?¹

Machines act blindly and automatically—they are not responsible moral agents who can legitimately be blamed for their actions. For Darrow, evolution justified a biological determinism that turned humans into puppets of their evolutionary past.

In 1997, Edward Larson, a University of Georgia professor in the history of law, published a critical reassessment of the Scopes Trial. In *Summer for the Gods: The Scopes Trial and America’s Continuing Debate Over Science and Religion*, Larson thoroughly deconstructed *Inherit the Wind*, showing just how badly the “Scopes Trial” stereotype misrepresents the actual Scopes Trial. The book shows that the debate over biological origins was—and is—far more complex than most Americans have been told. For his book, Larson was awarded the 1998 Pulitzer Prize in history.

In the actual Scopes trial, evolution, and the evidence for it, were never subjected to cross-examination. Scopes’s lawyers presented extensive written statements from seven scientists stating that evolution is the correct explanation for the diversity of life on earth.² Statements of Drs. Metcalf, Nelson, Lipman, Judd, and Newman were read in court; statements of Drs. Cole and Curtis were also submitted in writing. The prosecution sought permission to cross-examine the five pro-Darwinian science experts whose statements were read in open court, but Darrow and the other Scopes lawyers objected, and the court refused to allow it.³

Certainly, the most dramatic aspect of the Scopes trial was Darrow’s questioning of Bryan about the Bible. But this raises an obvious question: given that Darrow got to question Bryan about the Bible, why didn’t Bryan get to question Darrow about evolution? In fact, Bryan agreed to be questioned by Darrow on his personal interpretation of the Bible *only if* Darrow agreed to be questioned on the evidence for evolution. Moreover, the court agreed that Bryan could question Darrow after Darrow questioned Bryan.⁴

But, at the conclusion of his famous examination of Bryan, Darrow unexpectedly asked the judge to instruct the jury to find his client guilty. By doing this, Darrow in effect changed the plea to guilty. By not entering an actual plea of guilty, Darrow took advantage of a technical procedural rule that preserved the right to appeal the judge's rulings—a straight guilty plea would have foreclosed the right of appeal. The upshot is that in demanding a directed verdict, Darrow closed the evidence and made it impossible for Bryan to call Darrow to the stand and question him on evolution.⁵

Darrow could easily have demanded a directed verdict against his own client, a verdict of guilty, before his examination of Bryan (in which case Bryan's defense of the Bible would never have made it into the trial transcript) or after Bryan examined him (in which case Darrow's defense of evolution would also have made it into the trial transcript). But, by demanding that his client be found guilty *right after* he examined Bryan and despite agreeing that Bryan could examine him next about evolution, Darrow made clear that his intention all along was to question Bryan and then escape questioning himself. Bryan immediately recognized this and remarked: "It is hardly fair for them [Darrow and the defense team] to bring into the limelight my views on religion and stand behind a dark lantern that throws light on other people, but conceals themselves."⁶

Because of Darrow's shrewd legal maneuvering, scientists in the Scopes trial were able to present their case for evolution without any challenge. Evolutionary theory has a long history of evading critical scrutiny and escaping proper cross-examination. The late Fred Hoyle, founder of the Institute for Astronomy at Cambridge, did not mince words when he remarked that scientific challenges to evolution have "never had a fair hearing" because "the developing system of popular education [from Darwin's day to the present] provided an ideal opportunity . . . for awkward arguments not to be discussed and for discrepant facts to be suppressed."⁷

9.3 THE IMPORTANCE OF KEEPING SCIENCE HONEST

Evolution, as taught in 1925, was eminently deserving of critical scrutiny and cross-examination. Back then, Darrow denounced opponents of Darwinian evolution as "bigots and ignoramuses" trying to "control the education of the United States."⁸ Stereotypes like this, however, cut both ways. According to Harvard law professor Alan Dershowitz, those in 1925 who advocated for evolution included "racists, militarists, and nationalists" who used evolution "to push some pretty horrible programs" including the forced "sterilization of 'unfit' and 'inferior'" people; "the anti-immigration movement" that wanted to bar immigration of people of "inferior

racial stock”; and “Jim Crow” laws that evolutionists “rationalized on grounds of the racial inferiority of blacks.”⁹

Dershowitz goes on to note that the very textbook Scopes taught to high school students, Hunter’s *Civic Biology*, divided humanity into five races and ranked them in terms of superiority, concluding with “the highest type of all, the Caucasians, represented by the civilized white inhabitants of Europe and America.” *Civic Biology* also advocated that crime and immorality were inherited and ran in families, and that “these families have become parasitic on society. . . . If such people were lower animals, we would probably kill them off. . . . [W]e do have the remedy of separating the sexes in asylums or other places and in various ways preventing intermarriage and the possibilities of perpetuating such a low and degenerate race.”¹⁰ The lab book for Hunter’s text, at Problem 160, asks students to use inheritance charts “[t]o determine some means of bettering, physically and mentally, the human race.” What’s more, a “note to teachers” says that “[t]he child is at the receptive age and is emotionally open to the serious lessons here involved.”¹¹

Of course, the scientific community today denounces all such biological racism. Nonetheless, some prominent contemporary Darwinists, like Daniel Dennett, are so assured of the truth of Darwinism that they now embrace a cultural elitism in which anyone who dissents from Darwinian orthodoxy is regarded as culturally substandard and in need of being segregated from the culturally acceptable people who embrace Darwinism. Dennett, for instance, advocates that children be forced to learn that they are “the product of evolution by natural selection” because “our future well-being depends on the education of our descendants.”¹² Moreover, he advises that parents who stand in the way of such enforced education be quarantined: “Those whose visions dictate that they cannot peacefully coexist with the rest of us we will have to quarantine.”¹³

But consider, the very textbook from which Scopes taught—the very book that today’s scientific community insists Scopes had the absolute right to teach public school students—includes material that today’s scientific community passionately rejects. Imagine a hypothetical 1925 state law—a law that permitted the teaching of eugenics as the scientific community of the time demanded, but also required that challenges to that theory be taught. Would not everyone today applaud the foresight of any state that had enacted such a law? Hear, hear! Let the science of the day have its say, but then teach its weaknesses, criticisms, and alternatives.

This hypothetical example of a state law that mandates the critical examination of the “science” of eugenics demonstrates that it is appropriate for those who oversee our school science curricula not to be slavishly bound to whatever the scientific community espouses at the moment. The population at large—who are free from the institutional

incentives and professional biases that often impair the scientific community—are entirely in their rights to question a scientific theory regardless of how confidently the scientific community espouses it.

Indeed, if the history of science is any indicator, every scientific theory has faults and is eventually abandoned in favor of a better, more accurate theory. Why should we expect any different from evolutionary theory? A scientist's confidence in a theory is no guarantee that it is true. As Nobel prize winning biologist Peter Medawar put it, "I cannot give any scientist of any age better advice than this: the intensity of the conviction that a hypothesis is true has no bearing on whether it is true or not. The importance of the strength of our conviction is only to provide a proportionally strong incentive to find out if the hypothesis will stand up to critical examination."¹⁴

To discredit those who opposed the teaching of Hunter's *Civic Biology* in 1925, mainstream scientists and media figures insisted that religious convictions were the only motive for opposing that textbook. Dershowitz notes that even the U.S. Supreme Court agreed with the evolution-inspired eugenics program, upholding a mandatory sterilization law on the view that "three generations of imbeciles are enough."¹⁵ But fortunately for civil rights in America, intelligent, inquiring people of good will (not "religious fanatics" or "opponents of science") questioned the reprehensible teachings of Hunter's *Civic Biology*. And fortunately, too, enough people were willing to consider both the official position of science and—to borrow a phrase from another and more recent Hollywood film—the "minority report."

So too, in our own day, intelligent, inquiring people of good will (not opponents of science and not Daniel Dennett's cultural inferiors) can question the teaching of Darwinian and other materialistic forms of evolution. It is entirely legitimate, both intellectually and scientifically, to question whether evolution operates exclusively by means of unintelligent, purely mechanistic processes like natural selection. Far from repeating the one-sidedness of the Scopes Monkey Trial, the approach embodied in this book remedies it. It does so by providing the kind of cross-examination that the Scopes science experts and lawyers should have had to face, but conveniently avoided.

9.4 THE SANTORUM AMENDMENT

The United States Senate has itself recognized the need for such cross-examination. In 2001, ninety-one United States Senators voted to make rational, science-based questioning of Darwinism the law of the United States by voting in favor of an amendment (offered by Senator Rick Santorum) to an education bill. The language,

known as the “Santorum Amendment,” mandated that “good science education should prepare students to distinguish the data or testable theories of science from philosophical or religious claims that are made in the name of science” and that “where biological evolution is taught, the curriculum should help students to understand why this subject generates so much continuing controversy.”

A joint Senate-House Conference Committee eventually moved the language to its published Conference Report. Conference reports authoritatively interpret the bills they accompany. In words virtually identical to the Santorum Amendment, the senators and representatives on that committee declared in the Conference Report that “a quality science education should prepare students to distinguish the data or testable theories of science from philosophical or religious claims that are made in the name of science” and “where topics are taught that may generate controversy (such as biological evolution), the curriculum should help students understand the full range of scientific views that exist.”¹⁶

Ninety-one United States Senators, along with House and Senate members of the Conference Committee, are on record favoring that the full range of scientific views about biological evolution be taught. Intelligent design is one of those views. Proponents of intelligent design do not argue that evolution and the evidence for it must be suppressed because of some alleged conflict with the Bible. Instead, they argue that evolution—specifically, the theory that evolution occurs exclusively by means of undirected mechanistic processes such as natural selection and random variation—may legitimately be questioned because the scientific evidence used to support it is weak. Noted neo-Darwinist Theodosius Dobzhansky famously asserted, “Nothing in biology makes sense except in the light of evolution.”¹⁷ In fact, nothing in biology makes sense except in the light of *evidence*.

Where does the evidence of biology lead, to unguided evolution or to intelligent design? This textbook, in presenting the evidence and arguments for intelligent design, provides students with the information they need to answer this question. Providing this information is not just pedagogically sound but also legally permissible. In 1987, the U.S. Supreme Court ruled in *Edwards v. Aguillard* that “teaching a variety of scientific theories about the origins of humankind to school children might be validly done with the clear secular intent of enhancing the effectiveness of science instruction.”¹⁸ By telling about the evidence and arguments for intelligent design, science educators help fulfill that Supreme Court mandate. But they do more. They also foster the true spirit of scientific inquiry.

9.5 POSTSCRIPT: *KITZMILLER V. DOVER*

On December 20, 2005, as this book was undergoing its final revisions, Judge John E. Jones III rendered his verdict in the first court case over intelligent design. In *Kitzmiller v. Dover*, also billed as “Scopes II,” Judge Jones not only struck down a Dover school board policy advocating intelligent design but also identified intelligent design as nonscientific and fundamentally religious. Accordingly, he concluded that the teaching of intelligent design in public school science curricula violates the Establishment Clause and therefore is unconstitutional.

It is hard to imagine how a court decision could have been formulated more negatively against intelligent design.¹⁹ Nevertheless, it would be a mistake to view this case as a decisive blow against intelligent design. True, Judge Jones’s decision will put a damper on some school boards that would otherwise have been interested in advancing intelligent design. But this is not a Supreme Court decision. Nor will it be appealed to the Supreme Court since the Dover school board that instituted the controversial policy supporting intelligent design was voted out and replaced in November 2005 with a new board that campaigned on the promise of rescinding the policy. This they have now done.

Without an explicit Supreme Court decision against intelligent design, grass roots pressure to open up discussion about intelligent design in the public schools and to critically analyze its evolutionary alternatives will only increase. Because of *Kitzmiller v. Dover*, school boards and state legislators may tread more cautiously. But no court case can make the controversy over evolution disappear. In our culture, that controversy possesses an unquenchable vitality.

It is therefore naive to think that this case threatens to derail intelligent design. Even if the courts censor intelligent design at the grade and high school levels (and with the Internet censorship means nothing to the enterprising student), they remain powerless to censor intelligent design at the college and university levels. Intelligent design is quickly gaining momentum among college and graduate students. Three years ago, there was one IDEA Center at the University of California at San Diego (IDEA = Intelligent Design and Evolution Awareness—see www.ideacenter.org). Now there are thirty such centers at American colleges and universities, including the University of California at Berkeley and Cornell University. These centers are vigorously pro-intelligent design.

The significance of a court case like *Kitzmiller v. Dover* depends not on a judge’s decision but on the cultural forces that form the backdrop against which the decision is made. Take the Scopes Trial. In many people’s minds, it represents a decisive victory for

Darwinian evolution. Yet, in the actual trial, the decision went against evolution. Indeed, John Scopes was convicted of violating a Tennessee statute that forbade the teaching of evolution.

Judge Jones's decision may make life in the short term less pleasant for ID proponents. But the work of intelligent design will continue. In fact, it is likely to continue more effectively than if the judge had ruled in favor of intelligent design, which might have encouraged complacency, suggesting that intelligent design had already won the day when in fact intelligent design still needs to continue developing its scientific and intellectual program. In the end, that program, and not any court rulings or public policies or Hollywood films, will decide the merit of intelligent design.²⁰

“When future intellectual historians list the books that toppled Darwin’s theory, The Design of Life will be at the top.”

– Michael J. Behe, Ph.D., Prof. of Biochemistry, Lehigh University, and author of *Darwin’s Black Box* and *The Edge of Evolution*

“The Design of Life gives all interested parties in the debate over biological origins the hard scientific evidence they need to assess the true state of Darwin’s theory and of the theory of intelligent design. But it does much more: it carefully fosters the attitude of open inquiry that science needs not only to thrive but also to avoid becoming the plaything of special interests.” (from the Foreword)

– William S. Harris, Ph.D., Director of Nutrition and Metabolic Diseases Research, Sanford Research, University of South Dakota

ACCLAIM FOR THE AUTHORS’ PREVIOUS BOOKS

“Dembski’s analysis of randomness is the most sophisticated to be found in the literature, and his discussions are an important contribution to the theory of explanation, and a timely discussion of a neglected and unanticipatedly important topic.”

– William Wimsatt, University of Chicago – Re: *The Design Inference*

“I disagree strongly with the position taken by William Dembski. But I do think that he argues strongly and that those of us who do not accept his conclusions should read his book and form our own opinions and counter-arguments. He should not be ignored.”

– Michael Ruse, editor of *Biology and Philosophy*; author of *Monad to Man* and many other books on Darwinism – Re: *No Free Lunch*

“Wells is one of the leading lights of the emerging movement which is attempting scientifically to study evidence of intelligent design in the physical and biological realms.”

– Arthur Jones (Curriculum Consultant, UK), in *The Third Way* 24 (February 2001): 28-29

“Wells is a leading figure in the intelligent design (ID) movement.”

– Douglas Groothuis (Philosophy Professor, USA), in *The Denver Journal* 9 (2006)

“Dembski lays the foundations for a research project aimed at answering one of the most fundamental scientific questions of our time: what is the maximal specified complexity that can be reasonably expected to emerge (in a given time frame) with and without various design assumptions.”

– Moshe Koppel, Bar-Ilan University, Israel – Re: *No Free Lunch*

