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Doubting Darwin?

Creationist Designs on Evolution

Sahotra Sarkar

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BLACKWELL PUBLISHING

350 Main Street, Malden, MA 02148-5020, USA

9600 Garsington Road, Oxford OX4 2DQ, UK

550 Swanston Street, Carlton, Victoria 3053, Australia

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First published 2007 by Blackwell Publishing Ltd

1 2007

Library of Congress Cataloging-in-Publication Data

Sarkar, Sahotra.

Doubling Darwin? : creationist designs on evolution / Sahotra Sarkar.

p. cm.

Includes bibliographical references and index.

ISBN-13: 978-1-4051-5490-1 (hbk.: alk. paper)

ISBN-13: 978-1-4051-5491-8 (pbk.: alk. paper)

1. Creationism. 2. Intelligent design (Teleology) 3. Evolution (Biology) 4. Evolution—Religious aspects. 5. Religion and science. I. Title.

BS651.S3167 2007

231.7'652—dc22

2006033450

A catalogue record for this title is available from the British Library.

Set in 11/13.5pt Dante

by Graphicraft Limited, Hong Kong

Printed and bound in Singapore

by Markono Printers Pte Ltd

The publisher's policy is to use permanent paper from mills that operate a sustainable forestry policy, and which has been manufactured from pulp processed using acid-free and elementary chlorine-free practices. Furthermore, the publisher ensures that the text paper and cover board used have met acceptable environmental accreditation standards.

For further information on

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www.blackwellpublishing.com

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For John Stachel, comrade and friend

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Preface

In the United States, its President, George W. Bush, does not get due credit for a war he is actually winning, his Administration's ongoing war on science.¹ The battle is being fought under the banners of God and Big Business. It has many fronts including global warming, stem cell research, and most importantly for the purpose of this book, biological evolution. On August 1, 2005, during a round-table interview with reporters from five Texas newspapers, Bush proposed that Intelligent Design (our contemporary version of anti-evolution creationism – see Chapter 1) should be taught in schools along with the biological theory of evolution.² Bush's remarks came in a context in which a School Board in Dover, Pennsylvania, had mandated the teaching of Intelligent Design (ID) in its *biology* classes³ and the Kansas State Board of Education was well on its way to dilute the teaching of evolutionary biology in high schools.⁴ A legal challenge by a group of parents against the Dover policy, and joined by the American Civil Liberties Union (ACLU), was making its way through the courts (see below).

Meanwhile, in California, in 2005, the University of California system faced a lawsuit which argued that it violated the constitutional rights of applicants from Christian schools by deeming that some of their high school coursework was inadequate preparation for college. Creationism was at stake in this complaint because the plaintiffs cited the University system's policy of rejecting high school biology courses that used creationist-inspired textbooks published by Bob Jones University Press and A Beka Book. Lawyers representing the plaintiffs included Wendell Bird, a former staff attorney for the Institute for Creation Research.⁵ In 2004, the Ohio State Board of Education had passed a proposed model

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science curriculum which included a controversial model lesson plan, “Critical Analysis of Evolution,” designed to generate skepticism about evolutionary biology. A similar measure had also been passed in 2002.⁶ On only a slightly lighter note, in June 2005, the Park and Recreation Board of Tulsa, Oklahoma voted to have a display depicting the Biblical account of creation at the Tulsa Zoo. In July, though, they rescinded this entertaining decision.⁷

The assault on the teaching of sound science in schools in the United States has reached a level not seen for over two decades.⁸ Largely this is due to well-funded religious fundamentalist think tanks such as the so-called Discovery Institute’s Center for Science and Culture (originally, the Center for *the Renewal of*⁹ Science and Culture) in Seattle which have been successfully peddling creationist propaganda to media outlets throughout the United States and making inroads in a few other countries, especially Australia, Britain, and Turkey.¹⁰

Outside the United States, the situation in Britain is perhaps the most pathetic. In 2002, the Prime Minister, Tony Blair, told Parliament that he was happy that creationism was taught along with evolution in controversial state schools run by the private Emmanuel Schools Foundation.¹¹ And, in 2005, under question in the House of Lords, Junior Education Minister, Geoffrey Filkin, explicitly refused to preclude the teaching of creationism in state schools.¹² The rest of the world is not entirely without bizarre incidents. In 2004, Rio de Janeiro State in Brazil authorized the teaching of creationism in state schools while, over a few days, Serbia banned and then reinstated the teaching of evolution in biology classes.¹³ In July 2005, in a *New York Times* opinion piece, Archbishop Cardinal Christof Schonborn of Vienna called neo-Darwinian evolution incompatible with the Catholic Church and in conflict with nature itself.¹⁴ The Archbishop seemed to support Intelligent Design and contradict the Vatican’s acceptance of the theory of evolution. This did not sit well with the Vatican. Its astronomer, Rev. George Coyne, the Jesuit director of the Vatican Observatory, went out of his way to declare explicitly that Intelligent Design was not science.¹⁵

On some occasions, scientists, conscientious educators, and their supporters have managed to fend off religious challenges to science education. A 2003 battle over textbooks in Texas had loomed large in the picture in the United States because the Texas State Board of Education, with a solid Republican majority, was the largest textbook buyer in the country. Biologists were drawn into participating in the political debate

by many organizations, most notably, the Texas Freedom Network. Creationists' efforts to change textbooks to include skeptical and derogatory remarks about evolution failed comprehensively in Texas even though, in 2002, conservatives in the same Board had managed to ban a textbook on environmental science that they found offensive to their corporate instincts. (Should too much be read into this about the maturity of Texas' political culture, in January 2006, the Texas Governor, Rick Perry, voiced support for teaching Intelligent Design in schools.¹⁶)

There have been several other recent successes at resisting the creationists. In 2005 the Alaska State Board of Education strengthened the teaching of evolution in its curriculum.¹⁷ In Utah, the State Board reaffirmed the teaching of evolution in 2005 even though some legislators continued to threaten legislation mandating the teaching of Intelligent Design.¹⁸ Since 2002, Cobb County in Georgia had required the placement of a disclaimer about evolution in school biology textbooks. The disclaimer warned students: "This textbook contains material on evolution. Evolution is a theory, not a fact, regarding the origin of living things. This material should be approached with an open mind, studied carefully and critically considered." In 2005 a federal court ruled against the stickers in a lawsuit brought by local parents and supported by the ACLU though, in May 2006, an appeals court vacated the ruling and sent it back to the lower court.¹⁹ In February 2006, Ohio's State Board of Education reversed its earlier attempts to sneak Intelligent Design into the school curriculum under the guise of requiring a critical discussion of evolution.²⁰ And in December, 2005, a federal court in Pennsylvania ruled comprehensively against the Dover School Board, accepting the plaintiff's arguments that Intelligent Design is a religious doctrine. Meanwhile, the creationist School Board had been voted out in November and no appeals were expected.²¹ Judge John E. Jones, a Republican appointed by George W. Bush, who ruled in this case, held \$2 million to be a reasonable amount for plaintiffs' costs. The School Board settled the case for \$1 million.²² The amount awarded should deter future efforts to impair the teaching of sound science in schools throughout the United States.

But, by and large, so far, these are isolated examples of sanity. Alabama has had a disclaimer on its biology textbooks since 1995.²³ There are few states in the United States that have not seen some challenge to the teaching of evolution during the past decade.²⁴ When the Thomas B. Fordham Institute evaluated state science standards in the United States

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in 2000, twenty-four states received what they deemed a “sound” (that is, good) or at least a passing grade for the teaching of evolution; in 2005, when it repeated that exercise, that number had decreased to twenty.²⁵ On both occasions only seven other states received passing scores. Poor science standards were not limited to the teaching of evolution. When all of science is considered, in 2005, only nineteen states received a “sound” grade, a number unchanged since 2000.

The attacks on the teaching of evolution in public schools in the United States and attempts to replace it with creationism are motivated by a religious fundamentalist agenda that would like to see a return of sectarian religion into public life. (Some Intelligent Design creationists, for instance, Philip Johnson, freely admit this goal.²⁶) However, what makes this attack dangerous, and not merely to be dismissed like the old-fashioned creationism of the 1970s and 1980s, is that Intelligent Design (ID) creationism is a somewhat more sophisticated doctrine and often presented by its proponents disguised as science, replete with apparently impressive mathematical formalism and arguments.

In the United States the courts have presumably removed the possibility of teaching Biblical creation as science in public schools for the foreseeable future. But ID claims to be science, and thus not subject to these precedents. This book is about the claim of ID to be good science (if it is science at all), something with sufficient achievement and sufficient promise to be introduced in our schools. It also attempts to describe some biology, its history, and its philosophy through its examination of ID.

Beyond scientific critique, this book also includes an examination of the philosophical arguments over ID. Though this book is written by a professional biologist and philosopher of science, it is intended for a more general audience, including a religious audience interested in understanding the intellectual debate about ID. The idea of this book arose during the discussion following a short talk I gave to theologians at the annual meeting of the American Academy of Religion (San Antonio, 2004) in response to a presentation by William Dembski. Many theologians in the audience were embarrassed by ID and critically and deeply interested in what biology actually said, and why biologists, even those who were critical of the neo-Darwinian orthodoxy in evolutionary biology, had no sympathy for ID. This book is intended as much for them, to delineate the intellectual terrain of the dispute between biology and ID, as it is to provide more arguments for non-religious critics of ID. But

this book does not delve into theology. The occasionally polemical tone of this book is directed at ID creationists, not theologians or scholars of religion. There is also no claim in this book about whether religion (let alone any particular religious faith) is rational or irrational, or whether it is appropriate to practice or teach it at homes or temples. The concern that has motivated this book is about what happens in *science* classes.

The emphasis throughout this book will be on general arguments and positions, rather than on each individual variant of ID creationism. It is a book about ideas and arguments, not individuals and idiosyncrasies. It is also not about the politics of the ID movement or of the “scientific” creationism that preceded it. There are several excellent recent books mapping that important terrain.²⁷ This book does not, for instance, have anything to say about the so-called Wedge strategy, allegedly an originally surreptitious strategy formulated by ID creationists to promote their religious worldview in every aspect of our collective cultural life.²⁸ Besides this Preface, with one exception in Chapter 7, political remarks are confined to the last chapter and, even there, restricted to general principles, ignoring the particular political battles raging today. This is not to deny the importance of the political context of science but, rather, to leave it for a different book in which it can receive the full attention that it deserves. Nevertheless, this book does have an implicit political agenda: to remind the reader that ID is no credible alternative to evolutionary biology when we decide what to embrace and teach *as science* in our schools.

Acknowledgments

For discussions, sometimes over the course of years, as well as comments and criticisms of parts of this manuscript, thanks are due to Dan Bolnick, Jeff Dean, Raphael Falk, Justin Garson, the late Stephen Jay Gould, Benjamin Jantzen, Cory Juhl, James Justus, Manfred Laubichler, Richard Lewontin, Arturo de Lozanne, Antonio Madrid, the late John Maynard Smith, Stephen Menn, Alexander Moffett, Ian Musgrave, Anya Plutynski, Michael Ruse, Tom Schneider, Jeffrey Shallit, Mike Singer, Elliott Sober, John Taylor, John Wilkins, William Wimsatt, and David Wolpert. If I have inadvertently missed someone, I apologize in advance.

Material on which this book is based was presented to audiences at the Conference on Fundamentalism's Threat to Democracy (Texas Freedom Network, Dallas, Fall 2003), the American Academy of Religion (San Antonio, Fall 2004), the University of Chicago (Big Problems Lectures, Spring 2005), the University of California at Santa Cruz (Department of Philosophy, Spring 2006), and the University of Texas (Humanities Institute Free Thinking Lunch, Fall 2005; Dean's Scholar Seminar, College of Natural Sciences, Spring 2006; and during a debate organized by the Undergraduate Philosophy Association, Spring 2006). Thanks are due to the many respondents from the audiences who provided useful feedback.

Three anonymous reviewers for Blackwell provided very useful comments. Throughout, Anna Zaigraeva helped maintain my often-flagging enthusiasm for the project by feeding me with timely instances of creationist crimes and misdemeanors. Finally, this book only saw the light of the day because of Jeff Dean's initial suggestion and continued enthusiasm for the project.

Introduction

Good old-fashioned Creationism was the doctrine that the Book of Genesis is a scientific text that provides a historical record of the origin of the Earth's biota. It claimed that the world is about 10,000 years old and that the fossil record has to be reinterpreted to accommodate this chronology. Good old-fashioned Creationism was bold and fun: if the reinterpretation of the fossil record requires a change in the laws of physics, Creationism said, so be it. Creationism accepted that the Flood happened as the Bible records it. Sloths would have had to migrate from West Asia to the neotropics in the allotted time, wombats to Australia. These sloths would have to move very, very fast, something that they are physiologically not prone to do. Old-fashioned Creationism could live with all of that. Biogeography places formidable challenges to Creationism – but those who are unconstrained by the laws of physics would presumably find it child's play to alter the facts of mere biogeography. Creationism can even live with the fact, first described by Andreas Vesalius in 1543, that, very strangely, men have the same number of ribs as women.¹

But Creationism underwent a long-overdue Reformation in the 1990s in an attempt to make it more compatible with the findings of modern science. Unreformed Creationism lives on, in places such as the Creation Evidence Museum in Glen Rose, Texas. The museum sells books with titles such as *Crash Goes Darwin . . . and His Origin of Species*, *Dinosaurs by Design*, and *Noah's Ark: A Feasibility Study*;² fascinating books, but largely irrelevant as the Reformation has swept across all those institutions which urge the rejection of contemporary science and a return to an essentially fundamentalist religious view of the world. These institutions – for instance, the so-called Discovery Institute in Seattle – want to reform

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biological curricula in high schools in the United States and elsewhere to bring God back into science classrooms. But they do not want unreformed Creationism – at least that is the official story. They want Reformed Creationism.³

According to Reformed Creationism, we need no longer believe that the world is only about 10,000 years old, or that all extant animals are descended from those that jumped off Noah’s Ark on Mount Ararat some 8,000 years ago. Darwin and evolution are no longer always equated with evil and blasphemy.⁴ Instead, Reformed Creationism accepts parts of evolutionary biology, including some role for natural selection. It accepts that blind variation and natural selection – “Darwin’s law of higgledy-piggledy” as the physicist John Herschel dismissively called it⁵ – can explain phenomena such as the evolution of drug resistance in bacteria or pesticide resistance in insects. Most versions of Reformed Creationism even accept that natural selection may have modified traits such as the size and shape of bird beaks. For instance, they sometimes accept that natural selection molded the beaks of Darwin’s finches in the Galápagos Islands where the size of available seeds selected for the form of beaks.⁶ These versions of Reformed Creationism generally accept common descent: that all extant organisms are descended from a single ancestor in the recesses of deep time,⁷ presumably the first cell.

Nevertheless, Reformed Creationism urges us to reject the view that evolutionary theory, coupled with our increasing knowledge of the physics and chemistry of living organisms, will eventually explain the emergence of all biological phenomena. Moreover, to get a full theory, it claims, we will have to embrace supernatural (or at least extra-natural) mechanisms. In particular, we will have to invoke the operation of a designing intelligence guiding the process of organic change. Reformed Creationism is called Intelligent Design (ID). Its intellectual stalwarts are Philip Johnson, William A. Dembski, and Michael J. Behe and much of this book will concern their arguments, though several lesser players will also enter the stage.⁸

The Central Argument

ID creationists’ most fundamental biological claim is that complex adaptations could not have been produced by natural selection or any other natural process. Their emergence requires the intervention of an extra-natural designer. Bacterial flagella and the blood clotting cascade in

mammals are their favorite examples though there are several others (see Chapter 6). This claim of impossibility is supposed to be bolstered by some alleged mathematical results from computer science and information theory – we will examine all these issues in this book.

One central argument underpins all of ID creationism. Briefly, that argument runs as follows: *first*, evolutionary theory is supposed to allow only: (i) the inheritance of traits; (ii) the occurrence of blind variation; and (iii) natural selection. (Chapter 2 will contain a detailed examination of these assumptions.) *Second*, according to this argument, evolutionary theory cannot at present explain many natural phenomena, in particular, the evolutionary emergence of biological complexity. *Third*, this failure is so blatant that it shows that evolutionary theory does not even have the conceptual resources to explain the emergence of complexity. (This “no conceptual resources” claim is critical to the success of the argument because, without it, evolutionary biologists have an obvious response: wait and see – as our science progresses, we will resolve the present difficulties.) *Fourth*, proponents of ID go on to claim, there is good reason to believe that the required resources must include intelligent mechanisms.

The aim of this book is to examine this argument – for ease of future reference, we will call it the “Central Argument” of Intelligent Design. Though the rejection of the Central Argument is the main conclusion defended in this book, what evolutionary biology actually says – and does not say – receives just as much critical attention as the Central Argument. This is also a book about biology, its philosophy, and its history – a feature of this book which makes it different from several very competent critiques of ID that have appeared recently.⁹ However, Ken Miller’s 1999 book, *Finding Darwin’s God*, discusses a lot of the biology excellently.¹⁰ Miller’s book focuses on the ID creationists’ major claims from the late 1990s. This book concentrates on the period since 2000 and, in that sense, complements Miller’s treatment though there is some overlap (mainly in Chapter 6). Finally, this book is also a qualified defense of *naturalism*, the claim that the methods of science and their extensions are all we have to guide us through the enterprise of obtaining knowledge of the world. Here it parts company with Miller and his theological preoccupation of reclaiming God from the creationists – see Chapters 8 and 9. Naturalism, as we shall see later in the book (particularly in Chapter 9), is the real target of ID creationists and we will see how it fares under their criticisms.

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Let us return to the “no conceptual resources” claim which, as we noted earlier, is critical to ID’s Central Argument. There are two ways in which this claim can be fleshed out: (i) there is an abstract characterization of what is permitted by a theory, and a theorem or some such result that shows that some specific observed phenomenon is not permitted by the theory. This provides, essentially, a *reductio ad absurdum* argument against the theory; or, (ii) there is a body of phenomena that has proved recalcitrant to explanation over a sustained period of time, and these phenomena are better explained by some other fundamentally different theory even if that theory calls into question what was then the dominant scientific metaphysics. (Metaphysics, here, is taken to mean the most general assumptions about the world which all scientific theories must satisfy even when they disagree with each other.) ID creationists have tried both the options mentioned above. We will call the former the “inconsistency” option and the latter the “incompleteness” option.

Note that, if we accept the Central Argument, we must first give up one of the most successful scientific theories of our time – the theory of evolution by natural mechanisms. (Recall the evolutionary geneticist Theodosius Dobzhansky’s famous, though perhaps rhetorically overstated, dictum: “Nothing in biology makes sense except in the light of evolution.”¹¹) We must next give up the dominant and even more successful metaphysics that has grounded science since at least the Copernican era: naturalism. Naturalism is often taken to claim that all that exists in the universe is processes and entities knowable to us through scientific methods, that is, through logic and our senses, with no recourse to entities and processes entirely inaccessible to these methods. When formulated in this way, naturalism makes both metaphysical and epistemological claims, about what may exist and how we may come to know about them. Ultimately, naturalism is the real target of ID because it forbids the reintroduction of divinity into the empirical world. The attack on evolutionary theory is a necessary stage in this campaign because evolutionary theory claims that, not only the entire biological world, but even our most fundamental human features – our minds, our morals – should be accounted for without appeal to extra-natural intervention.

However, a defense of evolution in the present context of what constitutes *science* does not require the metaphysical component of naturalism. All it requires is a very weak form of epistemological naturalism, usually called methodological naturalism, which limits science to those facts that are accessible to naturalistic methods as defined above.

Methodological naturalism allows the possibility of a religious realm to be explored using religious practices. It merely asks that this realm be kept distinct from science. Though Chapter 9 of this book will defend a stronger form of naturalism than methodological naturalism, the weak doctrine is all that we need to defend evolutionary biology against ID creationism.

A demand that we give up a particular scientific theory is not radical: the history of science is littered with examples of highly successful scientific theories being replaced by successors that are even better. The caloric theory of heat gave way to the kinetic theory in the nineteenth century.¹² Heat turns out not to be a fluid called “caloric”; rather, it is the agitation of matter in motion as the kinetic theory demands. Darwin’s blending theory of inheritance was similarly replaced by Mendel’s particulate theory.¹³ Offspring traits are not intermediates between parental traits produced by a mingling of hereditary material. Rather, parents pass on discrete factors or “genes” (more accurately, *alleles* or versions of genes) which help specify offspring traits. Offspring traits may well be identical to those of one of the parents or even one of the grandparents. The growth of science requires the replacement of old theories and their replacement by better new ones.

The Evidence for Evolution

We can reasonably be asked to give up a theory if it fails to save the phenomena. A central claim of ID is that, indeed, there are many phenomena that evolutionary theory cannot explain. We will examine those claims in detail in later chapters of the book. Meanwhile, it will suffice here to sample some of the phenomena that evolutionary theory does explain and which, therefore, provide our evidence for evolution. This is not to suggest that evolutionary theory is complete or that there are no legitimate debates about evolution. We will discuss a host of problems in Chapter 4. But, here, we present the case *for* evolutionary theory.

Evolution means modification by common descent through a variety of natural mechanisms. Most, though not all, evolutionary biologists believe that the most important of these mechanisms is natural selection, the production of more offspring by some types over others. Assuming that some of the traits of the parental types are inherited by the offspring, these traits will spread because of the higher number of such offspring – there is nothing mysterious about natural selection. Modifications arise because of changes in the genes through which parental