Intelligent Design and Public School Policy: A Deliberative Perspective

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INTELLIGENT DESIGN AND PUBLIC SCHOOL POLICY: 
A DELIBERATIVE PERSPECTIVE

by

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This final copy of this thesis has been examined by the
signators, and we find that both the content and the form
meet acceptable presentation standards of scholarly work in
the above mentioned discipline.
Intelligent design (ID) proponents assert that the cause of the origin of complex biological systems is best explained by the agency of an unembodied intelligent designer who abiotically infuses information into physical systems. As state and local boards of education review science standards for curricula in the biological sciences, they are confronted with the claim that intelligent design is a fully scientific theory that ought to be taught as an alternative to evolutionary theory to students in public school science classrooms.

This dissertation encourages public school policymakers, especially school board members, to approach the claims of intelligent design proponents from a deliberative democratic political perspective. A deliberative perspective weighs the claims of citizens against the political principles of reciprocity, publicity, accountability, basic liberty and basic opportunity to assure that public policies are justifiable to all who are bound by them.

I argue that once the scientific claims and religious content of intelligent design are assessed from a deliberative political perspective, it is clear that intelligent design is a religious theory that should not be included in public school science curricula as an alternative to evolutionary theory. Teaching intelligent design as a scientific alternative to evolutionary theory would violate the basic liberty of students by constraining their present and future religious or anti-religious beliefs. It would
also violate the basic opportunity of students to receive an adequate education in science.

I conclude that the virtue of mutual respect promoted by a deliberative perspective requires public school policymakers to develop public school policies that respect the deep moral and religious convictions of intelligent design proponents. Intelligent design can justifiably be taught in courses that teach about religion and in civics courses which examine the central role religious convictions have in the political decisions of many citizens. Teaching about intelligent design in these courses may help resolve and reduce future disagreements among citizens over the teaching of evolutionary theory in science classes.
For my dearly loved sons,
Aidan, Ian and Colin.

"...if you would know God, be not therefore a solver of riddles. Rather, look about you and you shall see Him playing with your children."

Kahlil Gibran
I entered the doctoral program at the School of Education in Boulder without a prior commitment to a particular topic for my dissertation. I owe a special debt of gratitude to my advisor in the Philosophy Department, Carol Cleland, for suggesting that I write on the conflict over the teaching of intelligent design as an alternative to evolutionary theory in public school science classrooms. The opportunity to combine my interests in education and the philosophy of science and to read and learn from some of the finest authors in the biological sciences, theology and political theory sustained me through the long journey toward my doctorate.

I would also like to thank my advisor, Ken Howe, and dissertation committee members from the School of Education, Ron Anderson and Kevin Welner, for their wise guidance of and comments on my dissertation. I am especially grateful to Norm Pace from the UCB Molecular, Cellular and Developmental Biology Department and Fr. Edward Oakes from Mundelein Seminary for their willingness to serve on my committee. Norm’s passionate dedication to quality public school science education, especially in the biological sciences, and Fr. Oakes’ deep commitment to his vocation and his astute theological insights were reflected in the thoughtful counsel they offered me.

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From a more personal point of view, the reservoir of debts of gratitude that I owe to my friends and family is deep and wide. It would have been impossible to achieve my educational goals without their encouragement and support. Betsy Burns, Candy Cooper, Mary Jane Hewitt, Dan and Judy Morr, Marilyn and Tim Osbourn, and Marty and Cathy Waters are just a few of the fine friends I have relied on over the years. My husband’s sibling’s – including Mary A., Anne, Colette, Fray, Joan, John, Kathleen and Dorothy - and all of their spouses have provided boundless encouragement and opportunities to test my ideas. My own siblings, Susan and Becky, and my father and stepmother, Laurence and Kay Soderberg, have been constant in their love and unwavering confidence in my ability to achieve whatever goal I set for myself.

My mother, Carolyn Creel Soderberg (1927-1968), and my mother-in-law, Mary Walsh Leonard (1915-2003) loved, nourished and taught me values in ways that only mothers can. I am forever grateful for their examples of selflessness – without their influence, I could never have made the arguments I have presented in this dissertation.

Finally, my biggest debt of gratitude belongs to my husband, David Leonard. He has been my staunchest ally in spite of his misgivings about my absence from his life and the lives of our children on numerous occasions over many years. He just loved me and had faith in me, and for that, I am deeply grateful.
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PREFACE

This dissertation employs a deliberative democratic political framework for public school policy decision-making in the current conflict over intelligent design and public school science education. Since the order of the chapters may give the impression that I began my research into intelligent design with a favored political theory that I am now forcing onto contemporary conflicts over the teaching of evolutionary theory, I would like to explain why I have chosen to promote a deliberative democratic political framework for public school policy decision-making on this topic.

I began this project over three years ago with the simple intent of learning as much as possible about intelligent design. One of the first things I learned was that people perceive a wide range of valued beliefs to be at stake if intelligent design were to be placed in public school science curricula as an alternative to evolutionary explanations for the origin of complex biological systems. I resolved to write about those perceived stakes and had no intention of addressing political theory at all.

My first attempts at writing a dissertation resulted in a table of contents that included ten chapters (not including the introduction and conclusion) and a total of 39 sections within those chapters. None of the chapters or sections addressed political theoretical frameworks for decision-making. My next attempt was only slightly less inclusive of all possible topics one could address in the controversy over ID and evolutionary theory. It also did not include a political perspective for public policy decision-making. My third attempt, my prospectus, finally reflected an understanding of the fact that even if decisive scientific and theological arguments are made against
intelligent design theory, conflicts over the teaching of evolutionary theory will not end because those arguments do not address the fundamental cause for the conflicts – the competing moral values inherent in the perceived stakes. I finally realized that public school policymakers have to address the divisions in public opinion caused by deep moral disagreement about the values perceived to be at stake in conflicts over evolutionary theory.

The most promising political perspective that offers policymakers practical guidance on the process and content of fair deliberations in cases where the disagreements of citizens have moral dimensions is deliberative democratic political theory. Deliberative theory “promote[s] extensive moral argument about the merits of public policies in public forums, with the aim of reaching provisional moral agreement and maintaining mutual respect among citizens” (Gutmann & Thompson, 1996, p. 12). My prospectus reflected the history of my thinking about the topic of ID – I introduced a deliberative political framework for public policy decision-making in the final chapters of the prospectus.

The suggestion was made at my prospectus defense to begin my dissertation with a description of democratic deliberative theory and to place my entire discussion of intelligent design and public school policy within that political framework. It was a good suggestion for two reasons. First, the scientific and religious claims of intelligent design are complicated and, at times, tedious. The demands of mutual respect made by deliberative theory require that citizens seriously consider all of those claims. By discussing the obligations of citizens within a deliberative democracy first, the reader is made aware of the principled reasons why grappling
with the claims of ID is fundamental to fair public policy decisions. Second, placing a description of deliberative democratic political theory first and discussing the deliberative issues that arise for public school policymakers in each chapter of the dissertation provides a more cohesive understanding of how principled political reasoning can be applied to specific issues that divide citizens in conflicts that have moral components.

Placing a discussion of deliberative political theory first, however, also raises an important problem. It is not obvious when first investigating intelligent design that the conflict it engenders is at root a moral conflict in need of political framework for decision-making that takes seriously the moral claims of citizens. The more obvious conclusions are that it is strictly a scientific or religious debate that can be resolved if the right arguments are deployed and if citizens are “properly educated” in evolutionary theory and theological studies. The conclusion that it has fundamental moral dimensions based on deep moral disagreements is one I drew only after doing the difficult work of learning the details of the scientific and theological claims. I have attempted, therefore, to illustrate the moral content of the conflict at the beginning of chapter two by presenting a description of a recent debate in Ohio over a model lesson plan for biology teachers. A full understanding of the depth of the moral divisions can only, however, be achieved after the scientific and religious issues surrounding intelligent design are fully explored in chapters three and four.

One final happy note, this dissertation contains only five chapters, including the introduction and conclusion, and fifteen subsections.
In December, 2001, Congress adopted a Conference Committee Report on the 2001 No Child Left Behind (NCLB) education bill that provides information about the legislative history and purposes of the bill. Two sentences in that report read:

The Conferees recognize that a quality science education should prepare students to distinguish the data and testable theories of science from religious or philosophical claims that are made in the name of science. Where topics are taught that may generate controversy (such as biological evolution), the curriculum should help students to understand the full range of scientific views that exist, why such topics may generate controversy, and how scientific discoveries can profoundly affect society.¹

These apparently benign sentences reflect the radically new face of the evolution vs. creation debate in public school science education. They reflect the new strategies and tactics being employed by people intent on allowing supernatural causes in scientific explanations for the origin of biological complexity offered to children in public school science classes. Past efforts to include supernatural causes in public school biology curricula typically were transparent exercises in Biblical literalism by Christian groups promoting “creation science.” Today’s efforts are opaque requests for schools to “teach the controversy” (DeWolf, 1999) and to “teach more not less about evolution” (Nesselroade, 2004) by “intelligent design” theorists who claim to be promoting a purely scientific theory. The language in the Congressional NCLB

¹ Intelligent design theory proponent Phillip Johnson drafted these sentences for U.S. Senator Rick Santorum, R-PA (Johnson, 2002, p. 32). They were included (with slight differences in wording) in an amendment to the NCLB Act that passed in the Senate 91-8. Following intense lobbying by opponents of intelligent design, including a request by seventy-five representatives of scientific and educational organizations to delete the language from the final bill, the Joint House and Senate Conference Committee voted to move the language from the legislative text to the explanatory committee report, which is not legally binding (Wexler, 2003, p. 766).
Conference Committee Report also marked a new venue for debates over the teaching of evolution. It was the first time the United State Congress addressed the topic of teaching evolution in public schools.

The persistence of debates over the teaching of evolution in public schools and the constantly evolving contour of those debates is surprising to some, but inevitable in the minds of many American historians, cultural anthropologists and sociologists. In the same year, 1987, that the Supreme Court ruled in *Edwards v. Aguillard* that Louisiana’s “Creationism Act” was unconstitutional because it impermissibly endorses religion, a survey of American popular opinion on religion in public life revealed that seven out of every ten persons polled thought public schools should teach both evolution and the biblical account of creation of life in spite of the fact that a clear majority felt “There should be a high wall of separation between church and state” (Larson, 2003, p. 156-157). Sociologist James Davison Hunter explained the seemingly contradictory results as follows:

> The average American gives rhetorical assent to the strict separation of church and state, yet frequently approves of policies which involve considerable cooperation between church and state. Nowhere is this more clearly seen than in the conflict over public education. In this context the particular and inviolable rights of parents to see that their children are taught within the value system of their own choosing (usually religious in nature) are pitted against the needs of the state for a universal system of education. (Ibid., p. 156)

Cultural anthropologist Christopher P. Touney suggests that the enduring controversies over evolutionary theory and the ambivalence of American public opinion arises from the conflicting systems of cultural meanings that Americans attach to Biblical creation, evolutionary theory and democracy.² Historian Edward J.

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²Touney argues that modern creationism “...is a rich, complicated, and varied system of knowledge, values, and beliefs...that enable fundamentalist and evangelical Christians to come to terms with
Larson argues that whatever the source of the contradictory opinions of Americans toward evolution and creationism, as long as “the creation-evolution controversy remain[s] unresolved in popular opinion, it [can] not be settled in law” because the courts, including the Supreme Court, “never deviate too far from popular opinion” (Larson, 2003, p. 212, 5). In other words, Larson argues that controversies surrounding the teaching of evolution cannot be resolved through legal measures if it cannot be settled in public opinion. Thus, following a resounding defeat in Edwards v. Aguillard, proponents of creationism, knowing they had a solid base of public support, quickly learned from their experience and optimistically began a new movement in the hope of finally securing a place in public school science curricula under the rubric of “intelligent design.”

This dissertation examines intelligent design theory and offers public school policymakers a deliberative democratic framework for principled decision-making that promotes fair public school policy on the placement of ID in public school curricula. It explores the following important questions that public school policymakers face when confronted with requests to include design theory in school science curricula: 1) How can public school policymakers reach justifiable policy decisions that reflect the realities, anxieties, uncertainties, and changes in U. S. life.” For creationists who are local activists, creationism “is much more than a model, a theory, or a strategy. It is the existential stuff of their lives, the glue that binds together all the disparate selves of a self-respecting scientist or engineer, a righteous Christian, a dutiful parent, and a good citizen. Their creationism makes them whole” (Toumey, 1994, p. 143, 264-265).

In spite of the new label, the intelligent design movement recapitulates themes found throughout the history of religious resistance to evolutionary theory. Jon H. Roberts, for example, in his study of Protestant responses from 1859-1900 to the theory of “organic evolution,” found that prior to 1875 many Protestant intellectuals were convinced that the “partisans of unbelief were currently engaged in an all-out effort to invest a naturalistic world view with the name and prestige of science.” In addition, theologians who “accommodate[d] the Christian world view to the theory of organic evolution...[were making] an implicit capitulation to the forces of secularism” (Roberts, 2001, p. xiv-xv). See also Numbers, 1992, 1995 and 1998.
decisions on the topic of ID when citizens have deep moral disagreements about its placement in school curricula? 2) Is intelligent design theory a scientific theory? Do the scientific claims of ID merit placement in public school science classrooms? 3) Is intelligent design a religious theory? What components of ID theory are important to consider in answering questions about its religious status? and 4) Where does intelligent design belong in public school curricula? What are reasons that would justify its placement in school curricula? The aim of this dissertation is to advance public understanding of the conflict over teaching intelligent design in public schools and to encourage policymakers to reduce the range of moral disagreement among citizens on this topic by engaging in principled deliberative decision-making when formulating public school policy concerning intelligent design.

Public policy regarding public schools is formulated at local, state and federal levels by elected school board members, legislatures and judges as well as by appointed federal and Supreme Court judges. State constitutions typically include provisions that grant states ultimate responsibility for public education, yet a long history and strong tradition of "local control" of schooling ensures that public education is implemented at the local level. In fact, according to a 1999 U. S. Department of Education study, over 15,000 school districts operate across the nation providing locally governed public education to tens of millions of students (Seder, 2000, p. 1-2). As a result, it is typically in local school board meetings that controversies over teaching evolution first take place. When state legislatures and the courts address the topic of the teaching of evolution in public schools, it is normally
in response to the fact that deep divisions in local public opinion do not allow local resolutions to disputes.

This dissertation is primarily interested in the decision-making of local school boards who encounter local citizens daily regarding their children’s education and state boards of education who are currently creating or revising state science education standards. While the deliberative democratic political framework I present is just as pertinent to state legislative and judicial deliberations, my primary focus is on local and state school board deliberations for the following three reasons. First, judicial deliberations are limited to the facts of a particular case, and judges are required to listen only to the citizens involved in the case before the court. The opportunity to advance public understanding and to effect changes in or moderations of public opinion are therefore limited. At best, judicial decisions, as Edward Larson points out in his now classic Trial and Error: The American Controversy Over Creation and Evolution, provide only temporary legal relief for the winners in particular cases (Larson, 2003, p. 6). They do not address the underlying causes for the divisions in public opinion concerning the teaching of evolution and creationism. In fact, judicial decisions often stiffen resistance when they are deemed unfair by the losing side. Second, state legislative deliberations on the divisive issue of evolutionary theory often deteriorate into power politics that disregard or minimize the moral claims of one’s opponents or impugn the motives and character of citizens who hold viewpoints that differ from the people in power. While state legislatures at their best are fully capable of and sometimes do engage in principled deliberative decision-making, political debate in state legislatures on the topic of evolutionary
theory is often too polarized to advance in any meaningful way public understanding of the issues that provide the impetus for enduring evolutionary debates and rarely change or moderate public opinion. Third, and finally, the meetings of local and state boards of education offer the best opportunity to engage large numbers of citizens across the United States in deliberations that can advance public understanding of the moral issues that continue to divide Americans over the teaching of evolutionary theory and can help reduce the range of disagreement among citizens. Local and state school board meetings and hearings provide policymakers the chance to cultivate widespread mutual respect among citizens and to seek principled reasons for policy decisions that can be justified to those who are bound by those decisions but who still may morally disagree with them.

Summary of chapters

This chapter generally described some of the reasons American historians, cultural anthropologists and sociologists give for enduring conflicts over the teaching of evolutionary theory in public school science classrooms. I noted that historian Edward Larson argues that the conflict over the teaching of evolutionary theory will not be resolved through legal measures if it cannot be settled in public opinion. The fact that future legal opinions and state legislative efforts are unlikely to resolve or reduce the range of moral disagreements that divide citizens in the latest conflict between intelligent design and evolutionary theory has prompted a focus in this

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4 A quick look at the long history of state legislative debates about the teaching of evolution in states across the nation and their failure to moderate public opinion justifies this claim. The National Center for Science Education archives contain newspaper descriptions of attempts by state legislatures to affect the teaching of evolutionary theory that have taken place over the last 10 years. Go to http://www.ncseweb.org/ to access those archives. For a discussion that "calls into question" assumptions that "contrast between the principled decision-making of courts and the prudential lawmaking of legislatures" see Gutmann & Thompson, 1996, p. 45-49.
dissertation on the deliberations of local and state boards of education. I argue that if local and state boards of education employ a deliberative democratic framework for principled decision-making during public policy deliberations, their policies concerning the placement of intelligent design in school curricula are more likely to be justifiable to all who are bound by those policies and may contribute to reducing the range of disagreement among citizens.

Chapter two describes a recent conflict in Ohio over the placement of intelligent design concepts and references in a model lesson plan for tenth grade biology students and introduces the five process and content principles that constitute the substantive core of a deliberative framework for public school policy decision-making. The description of events in Ohio is primarily offered to provide evidence that citizen disagreements over the placement of intelligent design in public school science classrooms have important moral dimensions, but it also provides insight into the strategies and tactics being employed by people who are intent upon including supernatural causes in scientific causal explanations. The introduction to the process and content principles of a deliberative perspective on decision-making begins with an outline of the rationale Amy Gutmann and Dennis Thompson use in their book, *Democracy and Disagreement: Why Moral Conflict Cannot be Avoided in Politics, and What Should be Done About It*, to develop the principles of deliberative theory. It continues with a detailed description of each of the process principles (reciprocity, publicity and accountability) and content principles (basic liberty and basic opportunity), and includes a discussion of the characteristics of public policy
decisions that result from the principled political reasoning prescribed by a deliberative democratic perspective.

Chapter two ends with a retrospective assessment of the conflict in Ohio based on the deliberative principles developed by Gutmann and Thompson. The assessment demonstrates how deliberative political reasoning takes into account the moral claims of citizens and determines the extent to which the model lesson plan can be justified from a deliberative perspective. It also underlines the need for further investigation into three questions that remain unresolved in Ohio: 1) Is intelligent design a scientific theory? 2) Is intelligent design a religious theory? and 3) Do intelligent design concepts and references appear in the model lesson plan? In the conclusion to chapter two, I argue that the virtue of mutual respect requires policymakers to take the scientific and religious claims of intelligent design theorists seriously and to investigate whether ID is a scientific or religious theory for public school policy purposes. I also argue that policymakers ought to accommodate the reasonable moral claims of citizens to the greatest extent possible even if some citizens refuse to seek mutually acceptable fair terms of social cooperation.

Chapter three investigates the scientific claims of intelligent design theorists and the critical responses of evolutionary theorists to determine whether intelligent design should be treated as a scientific theory by public schools. It begins with an introduction to the principal advocates of intelligent design and the publications they have authored. It then proceeds to examine in detail the seven central scientific claims of intelligent design theory, six of which are authored entirely by intelligent design advocate William Dembski. Some critical responses of evolutionary theorists
to the claims of ID are examined next as well as rebuttals of ID proponents to their critics. I argue that the reasons ID proponents and critics give for and against the scientific claims of ID are important to public school policymakers, because it is on the basis of those reasons that policymakers must determine whether ID should be treated as a scientific theory by public schools. A deliberative perspective requires that the reasons citizens give for empirical claims in moral disputes must be based on reliable methods of inquiry that are themselves mutually acceptable. Consequently, I next assess the reasons of critics and proponents of ID in terms of the deliberative process and content principles to find to what extent their reasons meet the demands of the principles. I conclude that since intelligent design proponents reject, among other principles, the requirements of reciprocity and promote a conception of science that allows public opinion and politicians to determine the scholarly boundaries of scientific inquiry, policymakers ought to exclude intelligent design as a scientific theory from public school science classrooms. However, I also conclude that the reasons policymakers give for excluding ID as a scientific theory would be more fully justified if they seriously investigated whether or not ID is a religious theory for the purposes of public school policy.

Chapter four investigates the claim by intelligent design theorists that the characteristics and identity of the intelligent designer are beyond the scope of the science of intelligent design. Given the assertion by design theorists that the unembodied intelligent designer detected through their scientific investigations is compatible with a variety of religious and philosophical traditions except theistic evolutionary religious traditions, the question arises: Why is intelligent design theory
compatible with some religious perspectives and not others? Legal commentators note that the religious content, not the implications of intelligent design are relevant to determining whether ID should be considered a religion for First Amendment purposes. Consequently, the first section of this chapter examines the content of the idea of a supernatural intelligent designer who creates and guides life to determine if it is a religious idea. I argue that since the content of the animating idea of intelligent design theory is identical to the content of the central animating idea of traditional religions, the meaning of the idea of intelligent design is religious. Intelligent design is therefore a religious theory. The second section examines the content of two general ideas which are essential to intelligent design theory to determine if they have religious content. Those ideas are: 1) natural causes are in principle incapable of creating biological complexity and 2) the agency of the unembodied intelligent designer is empirically detectable. I argue that the meaning of the idea that natural causes are incapable of creating complex biological systems consists of necessarily implied sectarian religious ideas which exclude other religious and anti-religious views. I also argue that the idea that the agency of a supernatural designer is empirically detectable is a sectarian idea resulting from the religious literalism inherent in the defining concept of ID - theistic realism. Finally, I argue that the religious literalism inherent theistic realism results in the identification of the unembodied intelligent agent detected by design theory. That agent is the Christian God. I conclude that intelligent design is a sectarian religious theory.

5 See footnote six in chapter four for design theorist William Dembski's argument against using the term 'supernatural' when referring to intelligent causes and for my defense of the use of the term 'supernatural.'
The final section of chapter four examines, first, the effect the religious content has, from a deliberative perspective, on the arguments by design theorists for including ID in public school science classrooms. I argue that the religious content has a determinative effect on the arguments of ID proponents that appeal to fairness and freedom of thought, academic freedom, censorship and honesty. In each of those arguments, ID proponents violate the process and content principles of a deliberative democracy. Second, I briefly return to the conflict in Ohio over the model lesson plan to show where ID concepts and references occur in the plan, and I examine again those arguments by design theorists that support the model lesson plan to see the effect the sectarian religious content of ID has on those arguments. I conclude that the model lesson plan cannot be justified, from a deliberative perspective, to all citizens who are bound by it. Third, I discuss the moral stakes ID proponents perceive to be at risk in the dispute between citizens over intelligent design theory. Fourth, and finally, I argue that the virtue of mutual respect requires ID critics to practice civic magnanimity toward ID proponents. I argue that when ID critics extend civic magnanimity towards their opponents, ID critics are promoting values that can contribute to resolving the conflict over intelligent design and/or contribute to reducing the range of conflict between citizens.

In the concluding chapter to this dissertation I briefly address the question of where intelligent design can justifiably be placed in school curricula, and I defend once again the choice of a deliberative perspective by public school policymakers for weighing the claims of citizens in the conflict over intelligent design and public school science education.
An important conflict over public school science education is occurring between citizens in local and state school board meetings across the United States. The conflict is over which theory offers the best scientific explanation for the cause of the origin of complex biological systems and therefore ought to be included in public school science curricula – the theory of evolution or the theory of intelligent design (ID). Evolutionary theory asserts that the causal interaction of genetic mutation and variation with natural selection over vast expanses of time best explains the origin of complex living systems. Intelligent design theory asserts that the cause of the origin of complex biological systems is best explained by positing an unembodied intelligent designer who abiotically\textsuperscript{6} infuses information into physical systems. ID claims to be an empirical science without religious precommitments – it is consistent with the Christian God, but it is also presumably consistent with the existence of other types of unembodied intelligent causes.

The conflict is important not only because intelligent design promises to redefine scientific inquiry by rejecting a fundamental presupposition of modern science that only natural causes are considered in the search for an explanation for natural phenomena. It is also important because Americans perceive much more at

\textsuperscript{6}According to design theory, abiotic infusion is the causal mechanism an intelligent designer employs to create complex biological systems. Since “abiotic” means outside any physical, living organism and since “infusion” means “the direct introduction of novel information from outside the biological system,” abiotic infusion, for design theorists, refers to a process that does not “move [physical] particles” or “impart energy” to create complexity. Rather, it is “word-like” process that “persuasively” creates complex physical systems (William Dembski, 2002, p. 321-343).
stake in their disagreements over evolution and ID than 'just' a fundamental maxim of modern science. Valued beliefs about God, the promises of the Christian religion, the nature of reality, the nature of science, the possibility of human freedom, democratic education, the quality of American cultural life and the foundations of moral behavior appear to many Americans to be at risk of being lost. In this dissertation, I argue that the conflict over evolution and intelligent design includes deep moral disagreements. It is only partially concerned with the boundaries of science and religion. I also argue that public policy decisions on the placement of intelligent design in school curricula are best justified when the reasons for those decisions are conditioned by mutually agreed upon political principles that govern the process and content of democratic deliberations. When policy decisions result from principled reasoning that attempts to find mutually acceptable ways of resolving moral disagreement, those decisions are more likely to be justifiable to citizens who continue to disagree and may reduce the range of future disagreements.

The purpose of this chapter is to introduce evidence that citizen disagreements over the placement of intelligent design in public school science classrooms have important moral dimensions and to introduce a theoretical framework for principled political decision-making, a deliberative democratic perspective, which encourages citizens to seek fair terms of social cooperation when attempting to resolve disputes which include moral issues. Section one of this chapter describes a recent dispute in Ohio between citizens over the placement of intelligent design concepts and references in a model lesson plan for tenth grade biology classes throughout the state. Section two introduces the general outlines of a deliberative democratic political
framework for principled policy decision-making that promises to provide policy decisions that are more likely to be justifiable to citizens who continue to morally disagree and may reduce the domain of future disagreements. Section three examines in more detail five democratic deliberative principles that I suggest policymakers ought to consider as governing principles for the content and process of public deliberations that include morally divisive issues. Finally, in section four I apply a deliberative democratic perspective to the dispute in Ohio over the model lesson plan for tenth grade biology.

Presenting a description of events in Ohio first serves two purposes. First, it provides initial evidence for the claim that disagreements over ID in public schools include moral disagreements. Second, it provides a particular case against which the principles developed in the following sections of this chapter can be tested.

Ohio

In 1997 the Ohio Department of Education (ODOE) and the Ohio Board of Regents, a board that provides higher education policy advice to the governor and general assembly of Ohio, began drafting a set of “common expectations” in subject areas for students in K-12 public schools. The ODOE then requested that the Ohio State Board of Education (OSBOE) transform the “common expectations” into “academic content standards.” Early in the year 2000 the OSBOE began developing standards for science education, and soon after the deliberations of the board began, board member Deborah Owens Fink introduced a motion to include intelligent design

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7 The description of recent events in Ohio is not meant to be an exhaustive case study. It is simply a sketch of events and public reaction to those events created from documents that are easily available from internet sources with diverse points of view.
theory in the standards. It was rejected by the board at their March 2000 meeting. Proponents of ID, however, continued during ensuing deliberations to press for language in the content standards that required students to learn about intelligent design.

In March 2002, the conflict over whether to include intelligent design theory in the standards reached a high point when the OSBOE decided to hear “expert testimony” at a public hearing from two proponents of ID, Stephen Meyer and Jonathan Wells, and two opponents of ID, Kenneth Miller and Lawrence Krauss. Meyers and Wells are both Senior Fellows at the Discovery Institute, a privately funded conservative Christian think tank in Seattle, WA that funds and supports some efforts of the intelligent design movement. Miller is a professor of cell biology at Brown University, and Krauss is chairman of the physics department at Case Western Reserve University in Ohio. At that hearing, Meyer suggested a compromise with three provisions: 1) Do not require students to study the scientific evidence and arguments for ID, “at least not yet;” 2) “Teach the controversy” about “Darwinian” evolution by teaching the scientific arguments for and against it; and 3) “Permit, but not require, teachers to tell students about the arguments of scientists who advocate the competing theory of intelligent design” (Meyer, 2002a, p. 2). In October 2002 the board preliminarily adopted the following language in “Benchmark H, Indicator 23” of the science standards: "Describe how scientists continue to investigate and

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critically analyze aspects of evolutionary theory. (The intent of this indicator does not mandate the teaching or testing of intelligent design.)" According to associated press reporter Liz Sidoti "The decision [came] after weeks of behind-the-scenes talks to reach a compromise with members who wanted alternative concepts to evolution to be included in the guidelines." She reported that Michael Cochran, a board member who had lobbied for intelligent design to be included in the standards, said "In no way does this advocate for creation or intelligent design. I look upon this as a compromise." The board scheduled a final vote on the language for December.

On October 22 Lawrence Krauss wrote "For the first time...the word 'evolution' appears in the Ohio Science Standards...Unfortunately, the proposed standards also introduce language that can provide a victory for those who wish to introduce religion into [the] state science curricula..." He went on to note that "creationist author and law professor Phillip Johnson" promoted "what he called a 'wedge strategy' to bring God back into the classroom" and stated that the language in the proposed standards gave "several key board members who have been vocal in their support for intelligent design...the wedge they want..."

Debra Owens Fink, a board member who...[is a] supporter of introducing intelligent design into the curriculum, argued that evolution should be singled out because of the strong public reaction to this issue. It is true that evolution pushes many popular buttons. However, it is the business of the science standards committee to help promote scientific literacy, based on sound scientific scholarship, and not to cave in to political, religious or other popular pressures. (Krauss, 2002c, p. 1-3)

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In mid-November, Phillip Johnson who, as Krauss pointed out, is founder of the “Wedge” political strategy adopted by ID proponents, published an article in a magazine entitled *Touchstone: A Journal of Mere Christianity* in which he announced:

This is a significant breakthrough...I toured northern Ohio just after the decision...trying to wake up well-meaning people to exactly what is at stake. Darwinism is only superficially about biology...[it] is culturally important because it implies that man created an imaginary God rather than that God created man...creation is not an issue that ministers can afford to delegate to scientists. It is futile to try to teach Christian morality if you do not also teach...that God is real....I count the Ohio decision as a victory for the fact of divine creation...People who have been indoctrinated in a modernist mindset no longer believe in the final victory of Christ...Darwinists...say that they won [cultural] control in 1925 after the Scopes trial...Darwinists still dominate, but they are very worried, and they show it by their constantly shifting defensive tactics, ridiculing Christians one day and then proclaiming the harmony of religion and science the next...The ultimate triumph of He Who Is the Truth is assured, not the ultimate triumph of scientific materialism. (Johnson, 2002b, p. 1-4)

Krauss wrote again on November 29 in the *Chronicle of Higher Education*, “...the ambiguous language...gives the national movement against science education precisely the opening it wants...to bring God back into the classroom” (Krauss, 2002d, p. 2).

On December 10, 2002 the OSBOE adopted unchanged the language passed in October. Meyer immediately hailed the language as “historic.” "Ohio has become the first state to require students to learn...the full range of relevant scientific evidence. This policy will help remedy the selective presentation of evidence made by most biology textbooks today" (Meyer, 2002b, p. 1). Mark Hartwig, a “social research analyst” for the conservative Christian organization Focus On The Family,

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11 The governing goals of the wedge strategy are “1) To defeat scientific materialism and its destructive moral, cultural and political legacies and 2) To replace materialistic explanations with the theistic understanding that nature and human beings are created by God” (Wedge Document, 1999, p. 4). For more information on the wedge strategy, see Forrest & Gross, 2004.
wrote in “The Wedge Update,” a column devoted to reporting events that support the wedge strategy of the ID movement,

On Dec. 10...the Ohio board of education gave final approval to new science education standards requiring that students be able to think critically about contemporary evolutionary theory. The new standards also allow individual school districts to teach the theory of intelligent design...

Intelligent design proponents have been saying since March that science teachers should 1) be required to teach Darwin’s theory of evolution, including evidence both for and against it, and 2) be allowed to tell students about alternative scientific theories, such as intelligent design. That’s essentially what they got...Board members have repeatedly said that the new standards allow school districts to teach intelligent design.

The effect of the new standards speaks even louder than words. [Board member] Owens-Fink reports, “Many school districts have called to say they’re allowing students to openly debate it.” Previously, students didn’t know about intelligent design or didn’t feel comfortable discussing it in science classrooms. Now they are scouring the Internet and other sources to learn more about it. (Hartwig, 2002; italics in original)12

The next step in the Ohio science Academic Content Standards process was the development of a Model Curriculum, a series of model lesson plans for use by Ohio teachers. The lessons were to be based on the benchmarks and indicators in the new science standards and are considered optional for district use by the OSBOE.

The process began in the spring of 2003 with the creation of a 15 member advisory group and 40 member writing team to write the lessons for all areas of science. The committee was then divided into subgroups, one of which was assigned to write the model lesson plan for tenth grade biology. That subcommittee had seven members. By the fall of 2003 several lessons had been prepared which were then subjected to teacher field tests and a citizen review process. The first set of forty two lessons was submitted to the Standards Committee of the Ohio State Board of Education on January 12, 2004. One of these lessons was entitled "Critical Analysis of Evolution"

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which addressed "Benchmark H, Indicator 23" of the science standards: "Describe how scientists continue to investigate and critically analyze aspects of evolutionary theory. (The intent of this indicator does not mandate the teaching or testing of intelligent design.)" On February 10, 2004 the nineteen member OSBOE voted 13-4 to preliminarily adopt the set of forty two science lessons including the lesson "Critical Analysis of Evolution" with a final vote scheduled for March 9.13

According to Bob Lattimer, founder of the intelligent design activist group Science Excellence for All Ohioans (SEAO), the forty member group assigned to write the model lesson plans included only four of “their people.” But, three of them managed to be appointed to the subgroup assigned to write the tenth grade biology lessons.14 Sam Schloemer, an OBOE member, told the press that the selection of the tenth grade biology subgroup “was closed” and “controlled by the pro-creationist chair Mike Cochran.” Another OSBOE member, Martha Wise, revealed that the lesson plan itself was “written by an [intelligent design] ideologist with limited stature as a scientist.”15

A draft of the “Critical Analysis Lesson Plan” or L10H23 first became public in November. It was “leaked,” according to Lawrence Krauss and Patricia Princehouse. “The Department of Education board approved this draft in September,”

13 See the “Science Excellence for All Ohioans” or SEAO website for more historical information about the formulation of the Academic Content Standards in Ohio. This website supports the efforts of ID proponents and presents their point of view. The site is available at http://www.sciohio.org/start.htm.


wrote Krauss on November 24, “but withheld it from public scrutiny. We now understand why” (Krauss & Princehouse, 2003). The lesson included references to ID proponent Jonathan Wells’ much disputed book Icons of Evolution and referenced websites devoted to the promotion of intelligent design theory including www.origins.org and www.arn.org. In addition,

Students are required to “debate” each “challenge” as if they were in a government or English class, with some students required to take a position contradicting the results established by decades of sound science. There is little pedagogical value in requiring students to take positions that evidence has shown to be incorrect. Indeed, it is not clear that it is ethical.

...the nine supposed “challenges” to evolution come straight out of intelligent design creationism. A main source listed in the curriculum is the discredited book “Icons of Evolution,” by the Rev. Jonathan Wells, one of the Discovery Institute authors who came to Ohio to promote teaching intelligent design.

...It is unfair to our children to waste their time in science classes on unfair and disingenuous debates...Why insert such red herrings into the curriculum? The answer can only be that special-interest groups want to sneak intelligent design in the back door, because they cannot enter it the honest way, by submitting their ideas to critical analysis by otherwise disinterested scientists...Appropriate action must be taken now to ensure that they do not continue their attempts to subvert science education. (Krauss & Princehouse, 2003)

Dr. Steve Rissing, Professor in the Department of Evolution, Ecology, and Organismal Biology and Director of the Introductory Biology program at The Ohio State University, was a volunteer outside reviewer for lessons developed for indicator 23. On December 4th and 5th the subgroup met to consider all the reviews, and

16 Patricia Princehouse, a Case Western professor and founder of the anti-ID group Ohio Citizens for Science, claimed that “writing committee members could not take home documents from the meeting. They collected and counted every piece of paper they gave out before they let anybody go home.” Lynn Elfner, CEO of the Ohio Academy of Sciences, noted “The process to develop the model lessons was controlled [and] concealed, especially from scientists. The result is we have a fatally flawed model lesson that is riddled with errors both in pedagogy and scientific content “ (Robert Arons, “Professors Debate Intelligent Design,” Case Western Reserve University Observer, February 27, 2004; available at http://www.cwru.edu/orgs/observer/archive/04-02-27/stories/Head00.html; accessed 3/04).

17 See the Ohio Citizens for Science or OCS website for more information about specific contents of the draft and final model lesson plan. This website supports the efforts of anti-ID activists and presents their point of view. The site is available at http://ecology.cwru.edu/ohioscience/about-ocs.asp.
Rissing attended that meeting. On December 16 he requested to see final versions of the two lessons pertaining to indicator 23 and received those documents on January 8, 2004. The writing committee had removed references to Wells' book *Icons* but retained references to ID websites. On January 13, Rissing testified to the state board of education that "many points in L10H23 remained false and uncorrected even after the outside review process and that in general, the lesson was hopelessly flawed."  

Several board members asked Rissing to develop a new lesson that could replace the one prepared by the writing committee subgroup. Rissing agreed and prepared with the help of others an alternative lesson plan which he intended to present at the February meeting of the OSBOE. At that meeting, however, Rissing and the others were informed that the alternative plan would not be considered until fall, 2004. The delay "was attributed to a decision by the Chairman of the Standards Committee of the Ohio Board of Education," Mike Cochran, a supporter of intelligent design. As noted earlier, the board voted on February 10 to preliminarily adopt the set of forty two science lessons including the highly controversial lesson plan L10H23 and to vote on its final status March 9.

The week prior to February 10 and the weeks following until March 9, 2004 were filled with a blizzard of public comments, letters and articles from supporters of intelligent design and the controversial "Critical Analysis Lesson Plan" and also from those opposed to ID and the lesson plan. The tone was occasionally less than civil

18 Steve Rissing, Alternative Model Lesson Plan. The alternative plan is included in this dissertation as Appendix B, and Rissing's comments can be found on page 321 in the "Note regarding the development of this draft lesson."

19 This quote is from the "Important Note" found at the beginning of the alternative lesson plan and can be found in Appendix B, p. 306, of this dissertation.
and citizen remarks often contained bitter attacks on and accusations about other citizens. An article that appeared in the *Cincinnati Enquirer* on February 8 attested to the growing bitterness among citizens toward those who held opposing views. The *Enquirer* reported that OSBOE member Debra Owens Fink declared

> the over-reaction to even a modest challenge to evolution has been “very disturbing.” Most of the acrimony comes from what she calls “the whiny scientists” who oppose even a protozoa of intelligent design. “If you support this, you are labeled a Pat Robertson, fundamentalist wacko. What's so bizarre is that they never attack the science part, they just attack the people.”

Teacher, Joel Roadruck, states in the same article "We've been indoctrinated,"

Roadruck said” If you teach a generation that we all evolved from pond scum, then everything is relative. There is no truth.”

February 9, the day before the first vote on the lesson plan, Bruce Alberts, President of the National Academy of Sciences (NAS) and Chairman of the National Research Council, sent a letter to the president of the OSBOE, Jennifer Sheets.

Alberts indicated he had been contacted by several concerned members of the NAS from Ohio about the lesson plan who told him that some board of education members had publicly asked to hear from the NAS regarding the lesson plan. Alberts referred

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In a letter to the editor in the *Columbus Dispatch* published February 20, 2004, Professor Jeffrey McKee from Ohio State University noted that Owens Fink had claimed that “Some of these scientists are so paranoid, they don’t understand it.” McKee claimed that the lesson plan made “highly misleading statements...and fraudulent claims...Owen Fink’s cavalier attitude is characteristic of certain board members who would rather play political games...Michael Cochran [is] the other main perpetrator of this fraud...” Lawrence Krauss noted in a National Public Radio interview on February 6, 2004, that he and another colleague from the biology department of Case Western University were called by OSBOE member Michael Cochran “the kooks from Cleveland” when they testified before the board (Audio transcript available at [http://www.npr.org/](http://www.npr.org/)).

the matter to a biologist on his staff who reported "a number of serious problems"
with the plan which he listed. Alberts went on to say

...this document clearly includes links to websites containing information of a
religious nature...The references that appear later in this lesson plan also contain
a number of ID books...We are also concerned that the tenets of Intelligent
Design also have been introduced into other lessons dealing with the age of the
earth, the theory of continental drift, and the composition of the sun.
...What concerns us is that Intelligent Design is not scientific because
its ultimate tenet that life on Earth is the result of the work of some intelligent
being is scientifically untestable and therefore cannot be invalidated through
scientific means.
...Evolution is the time- and evidence-tested theory that integrates the
various disciplines of modern life science and ties the life sciences to the
chemical, physical, and earth sciences...The tenets of Intelligent Design do not
belong in science classrooms or lesson plans for science. (Alberts, 2004)

On February 11 the Discovery Institute issued a press release entitled "Efforts
to Sabotage Ohio's Science Lessons Deplorable, Claims Discovery Institute." The
article stated that

...efforts by Darwin-only lobbyists to misrepresent the issue by identifying it
with intelligent design were deplorable. "Intelligent design isn't even covered in
this lesson," said Bruce Chapman, President of Discovery Institute. "The
curriculum only examines the evidence for evolution and the scientific
challenges to Darwin's theory that are under debate by scientists around the
world."
...Ohio's science standards are clear that they do not mandate the
Teaching of intelligent design. (Discovery Institute, 2004a)

Writing for The Wedge Update on February 23, Paul Nesselroade said Ohio's lesson
plan is a "reaction to dogmatic Darwinism" which has the "ridiculous, unmerited
privilege of being somehow unassailable in the science classroom" (Nesselroade,
2004).

The Ohio Academy of Sciences (OAS) wrote to Governor Bob Taft on
February 23 asking that he "implore [his] appointees and other members on the State
Board not to approve [the model lesson]." Noting that a representative of one of the
board members had contacted the CEO of the Academy requesting the possibility of a compromise, the letter said that

...the nature of science demands that fully qualified peers derive consensus on scientific matters and that compromise, in the typical political sense, is not within the realm of science, especially when compromise would result in the issues of creationism or Intelligent Design creeping into either State Science Education Standards or model lessons.

Stating that “science education...should not be compromised by political or social agendas unrelated to learning contemporary science,” the letter included reasons why the model lesson plan L10H23 “is defective both scientifically and pedagogically” (Alberts, 2004).

The letter also listed six areas of significant concern to the OAS. First, the lesson is “Damaging Ohio’s image for the Third Frontier” (this refers to Ohio’s efforts to attract and retain high level scientific researchers). Not only will it be more difficult, according to the OAS letter, to recruit serious scientists who want “an intellectual environment with integrity and not political compromise,” the image of Ohio to outside scientists who hear that a member of the OSBOE regards scientists who testify at board meetings “sound to him like a couple of teenagers fussing in the back seat of a car” adds to recruiting difficulties. The second and third concerns expressed by the letter included “Advancing the Wedge of intelligent design” and “Connecting the dots to religious politics.” The fourth area of concern was the “opaque” rather than “transparent” public process that led to the model lesson plan. According to the OAS, it took “five weeks and $140 under a public records law request to secure the initial documents...[and] the process for making the model lesson

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22 OSBOE member James Turner made this statement. Turner is an ID supporter and was on the subgroup assigned to write L10H23. (OAS, 2004)
essentially was closed to the scientific community. Of the 55 members on the advisory group and writing team, the Ohio Department of Education selected only three scientists; the Department knew that two of these were creationists.

The final two concerns of the OAS included worries about “Uninspiring Science Education” and “Constitutionality Issue[s]” (Alberts, 2004).

The Discovery Institute (DI) responded to the OAS letter the day after it was sent to Gov. Taft. Bruce Chapman, President of the DI, accused the OAS leadership of launching a “scare campaign” that “is more science fiction than science.”

Regarding the claim by the OAS that “the lesson plan would result in the teaching of ‘creationism or intelligent,’” John West, a senior fellow of the DI, replied

The lesson plan does not even mention creationism. And the only time it cites intelligent design is in the following disclaimer...’The intent of this benchmark does not mandate the teaching or testing of intelligent design.’ Only in an Orwellian world could a statement about NOT mandating intelligent design be turned into the exact opposite...Regarding the OAS”s hysterical claim that the lesson plan is part of a fundamentalist plot... What will OAS leaders claim next? That the lesson plan is pushed by people who want to burn witches? Such scare-tactics only serve to discredit the OAS leadership. (Discovery Institute, 2004b)

That same day, law professor and ID proponent David DeWolf commented in another Discovery Institute press release

I hope they [the OAS] do science better than they practice law...First, they’re wrong about the facts. The proposed lesson plan says nothing about intelligent design...Additionally, they don’t seem to understand the law. The Supreme Court’s opinion in Edwards v. Aguillard made it clear that the state may require schools to teach criticisms of existing scientific theories as a part of a good science education. Moreover, even if intelligent design were on the table for discussion,...alternative scientific theories can be taught as part of a teacher’s academic freedom. But this plan...doesn’t advance intelligent design as a theory. It’s hard to understand how such a basic mistake could be made. (Discovery Institute, 2004c)

The Observer, the student newspaper of Case Western Reserve University, published on February 27 an article about a press conference held by three professors
from Case Western concerning the model lesson plan L10H23. The professors were Dr. Cynthia Beall, Dr. Lawrence Krauss and Dr. Patricia Princehouse. The article noted that

"..."A Critical Analysis of Evolution" is what has been called "a pattern of deception" by Princehouse...and "an attack on science" by Krauss. The lesson plan has been criticized for lack of clarity, false historical information, incorrect or missing footnotes, footnotes directly from books on intelligent design, false definitions, using outdated scientific information, and errors of fact. For instance, the lesson plan defines a theory as a "supposition..."

According to the article, OSBOE Vice President Richard Baker, "an avowed creationist," disagrees with the professors.

"I voted for it because I think you...need to..."critically analyze" the theory of evolution, and that...does not violate laws that separate church and state." Baker accused the scientific community of wasting time debating the plan. "We spend all this malarkey and baloney when 99 percent of all the people who are taught this have nothing to do with [it] the rest of their lives...These scientists, they don’t care about wasting their own time or anybody else’s time. In business we don’t waste time." According to Baker, the real reason scientists want to do away with the lesson plan is..."[They] think [they] know everything. [They’re] just a bunch of paranoid, egotistical scientists afraid of people finding out [they] don’t know anything."23

Late February and early March, many more people who supported intelligent design weighed in on the controversy over the Critical Analysis Lesson Plan. Focus On The Family, Charles Colson in Breakpoint, Ohio State University entomology professor Glen Needham (one of the two scientists on the 55 OSBOE advisory and writing team who is an ID supporter) and Benjamin Wiker, author of Moral Darwinism: How We Became Hedonists – all wrote articles in support of the lesson plan. Claiming that the lesson has "no hidden agenda, no reference to intelligent design or faith-based views," they called for "a balanced presentation of Darwinism."

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an "unbiased teaching of evolution," "intellectual freedom," and correctives to "simplistic presentations" of evolutionary biology." They condemned "censoring what high school students can read and discuss," "scientists [who are] against critical analysis," and the "shrill voices" of "Darwin-only activists" who are the "spokesmen for 'official science.'" In an opinion piece published by the Cincinnati Enquirer on March 7 entitled "Don't Let Dogma Censor Teaching," Wiker wrote

Rather than honestly debate the merits of the new model curriculum, opponents are trying to prevail through use of a classic red herring. They allege that the proposed lesson on the critical analysis of evolution is merely Intelligent Design (ID) theory in disguise. If so, it's a pretty good disguise. Intelligent Design proposes that some features of the natural world are best explained as the product of intelligence rather than an undirected natural process. The lesson plan in question doesn't even address this topic, let alone discuss it...Ohio students should have the right to learn...free from threats of censorship by rigid defenders of an aging scientific orthodoxy. (Wiker, 2004)

On the same day that Wiker's opinion in the Enquirer appeared Lawrence Krauss wrote one final guest column before the OSBOE vote on March 9. He asked Gov. Bob Taft "to fight to maintain science standards in his state, because it doesn't appear as if the Ohio Board of Education will." He noted that board member Owen Fink has claimed that "Ohio has set a standard for the whole nation on how to deal with these issues." Krauss called it "a lousy standard."

Fink and her colleagues Michael Cochran and James Turner...say that the group of scientists from Ohio universities, who...submitted a replacement lesson plan, are over-reacting to the board's effort to introduce what they argue are simply "scientific" objections to evolution. Actually, that doesn't capture the depth of their rhetoric. They used phrases during meetings like "whiny scientists," arrogant" and "egotistical" "kooks" who "lack perspective." But since Fink has claimed we keep criticizing people and not the facts, let's look at the facts.

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24 See Needham, 2004; Colson, 2004; Focus on the Family, 2004; and Wiker, 2004.
Krauss went on to note all the problems listed in Bruce Alberts’ NAS letter. He ended saying

These board members have made it clear that they are unwilling to listen to the scientific community. It is time for the governor...to come out and support scientists in their efforts to maintain scientific standards. If he weighs in on this issue, there is every reason to expect that the board, with eight of his appointees, will follow suit. (Krauss, 2004a)

On Tuesday, March 9 the Ohio State Board of Education voted 13-5 in favor of the “Critical Analysis of Evolution” lesson plan.25 A week after the vote, March 16, The Cleveland Plain Dealer published an article by reporter Scott Stephens that attempted to explain “how the lesson plan, castigated by mainstream groups such as the National Academy of Sciences and the Ohio Academy of Science, gained such strong support...People who observed and participated in the debate and the behind-the-scenes machinations say several factors made the plan’s adoption possible.”26 Stephens cited four factors. First, the writing team members. As noted earlier, three of the seven subgroup members were ID advocates, and they apparently had great influence on the group.27 Second, the makeup of the 19 member BOE. An amendment at the March meeting to remove the lesson from the curricula failed 10-7. One of the 10 voting against was a relatively new member to the board, Stephen


26 In addition to the NAS and OAS, the Case Western Reserve Faculty Senate and the Ohio Faculty Council (a council with members from all public Ohio universities), passed resolutions opposing lesson plan L10H23. A biologist with a PhD in biology who lives outside of Ohio wrote a letter to the board that said in part, “What I’ve found most disturbing in these latest incidents is not the actions of the IDists, but is the lack of trust displayed by [the] board of education toward their state’s own university scientists” (Gutman, 2004).

27 The person who wrote the initial draft of L10H23 was a high school biology teacher who testified in support of ID in previous OSBOE meetings. See Scott Stephens, “How State Board Thinking Evolved on Biology Lesson,” Cleveland Plain Dealer, March 16, 2004.
Millett, who is “a nationally renowned expert on technologies of the future.”

Scientists viewed him as a potential swing vote. Millet, however “saw this not as the interjection of religion into the classroom. I saw it as freedom of thought.” The third factor, according to Stephens, was leadership and “in this case, silence was golden.”

Board president Jennifer Sheets “said little,” State Superintendent Susan Tave Zelman “kept a poker face,” stanch ID advocate Michael Cochran was chairman of the entire standards committee and Gov. Bob Tate said nothing. His eight appointed members “supported the critical-analysis lesson plan. Conversely, all seven board members who voted to remove the plan from the curricula were elected to serve geographic districts.” Lynn Elfner, CEO of the NAS noted “it reflects a lack of educational leadership in Ohio, from the governor on down.” Finally, Stephens cited the Wedge. Ohio was seen by ID proponents “as a state to test ‘The Wedge Strategy’ of the Discovery Institute, a plan designed to replace the ‘destructive moral aspects’ of scientific materialism with a theistic view that human beings and nature were created by God.” Anti-intelligent design board member Rob Hovis warned the board “It is the thin edge of the wedge. It will set a precedent.”

Following the March 9 vote, Agape Press reported that SEAO founder Bob Lattimer said

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28 Lack of media attention in the fall and tight control of the lesson plan development process were also important. Bob Lattimer, the founder of the pro-ID group SEAO, said in November 2003 “The debate this year has been very quiet, it’s not been in the news, and that’s good. Hopefully, it’ll stay out of the news. We don’t really think it deserves a big flap.” Also, “Opponents of the plan complained last fall they had trouble getting copies of the proposal, and they failed to generate much media attention. By the time they were able to drum up interest, the plan was nearing a vote.” Scott Stephens, “How State Board Thinking Evolved on Biology Lesson,” Cleveland Plain Dealer, March 16, 2004.

I think over time other states will look at this lesson and develop similar ones of their own...Our opposition has been very intent to paint this lesson as something that promotes religion – intelligent design, creationism or both. It actually has no content that is religious at all. It’s totally science.

The article ended noting that “The scientist and educational excellence advocate [Lattimer] adds that the next step for his group is to get test questions pertaining to criticisms of evolution included on Ohio’s statewide assessment exams.”

As Lattimer suggested in the Agape article, the next step in the process of the development of statewide academic content standards in Ohio is the development of statewide academic assessments including statewide achievement and diagnostic tests.

The Moral Character of the Ohio Dispute over Science Education

The moral dimensions of the dispute in Ohio over the model lesson plan become apparent in the answers participants in the conflict gave to three pivotal questions. First, does the model lesson plan include intelligent design concepts and references to ID? Second, is intelligent design a scientific theory? And, third, is intelligent design a religious theory?

The first question appears to have a straightforward answer – either ID concepts and references to ID are in the lesson plan or they are not. Yet, surprisingly, citizens disagreed – some said ID concepts and references to ID are present, some said they aren’t. Even when the most prestigious science organization in the United States, the NAS, and in the state of Ohio, the OAS, indicated that ID theoretical assertions and references were contained in the lesson plan, many people remained

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unconvinced. Benjamin Wiker, for example, asserted “The lesson plan in question doesn’t even address this topic, let alone discuss it” (Wiker, 2004).

Ohio citizens also deeply disagreed over the scientific status of intelligent design. If intelligent design is a scientific theory, its presence in the model lesson plan would be unproblematic. If, however, it is not a scientific theory, then a strong argument could be made for excluding it from science lessons in public schools. Again, when the NAS and OAS stated unequivocally that intelligent design is not science because “its ultimate tenet that life on Earth is the result of the work of some intelligent being is scientifically untestable and therefore cannot be invalidated through scientific means,” many people remained unconvinced. Bob Lattimer, for example, said, “Our opposition has been very intent to paint this lesson as something that promotes religion – intelligent design, creationism or both. It actually has no content that is religious at all. It’s totally science.”

Finally, Ohio citizens are deeply divided over the religious status of intelligent design. Bob Lattimer and other members of SEAO consider intelligent design to be purely a scientific endeavor. Since, in their view, “intelligent design theory is limited to the observation and detection of design in nature, not the identification of the Designer,” and since “it draws its authority from investigation, observation and logical analysis per the scientific method - not from religious text,” then, ID is science, not religion (SEAO, 2004a). Other citizens, including OSBOE member Martha Wise, regard ID as “a shrouded way of bringing religion into the schools…

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think intelligent design is a theology." Given the reaction of some citizens to the expert opinion of the NAS and OAS, it is reasonable to assume that if distinguished theologians submitted expert opinions on the religious status of intelligent design, the result would be the same – many people would remain unconvinced no matter what the expert theologians said.

Given the apparent intractability of three pivotal questions in the Ohio dispute, other questions arise: Why do persons involved in the dispute disagree so deeply about the answers to these questions? Why do “expert” opinions fail to convince them? What would motivate citizens to disagree with or ignore what experts regard as overwhelming evidence? The answers to these questions are suggested by the values people perceive to be at stake in the conflict over Ohio’s “Critical Analysis Lesson Plan.”

Phillip Johnson, for example, regards divine creation, the reality of God, Christian moral values and the authority of Christianity in our culture to be at stake. Teacher Joel Roadruck claims that “truth” is at stake. OSBOE member Stephen Millet believes that “freedom of thought” is at stake. The Ohio Academy of Science argues that not only the “the nature of science” is at stake but also the “intellectual integrity” of the science within Ohio is at stake. Fair democratic governmental processes are also considered to be at stake. OSBOE members Schloemer and Wise


33 Indeed, as shall be shown in chapters three and four, even when compelling arguments are offered which include the opinions of distinguished theologians and demonstrate at length the lack of scientific content in ID theory and the religious content of ID, the conflict between citizens remains.
complained about the closed and controlled political process that created the model lesson plan. Krauss complained about “disingenuous debates” that “sneak” ID into science classrooms to “subvert science education. OCS president Princehouse, OAS’s Elfner and the OAS itself complained of a “pattern of deception,” a lack of publicity, governmental “secrecy,” and “opaque rather than transparent” public processes which excluded citizen participation in deliberations over the plan.

The “stakes” that citizens perceive at risk in Ohio refer to valued beliefs or assumptions that are essential for a meaningful, worthwhile, “good” or moral life, including ethical professional and civic lives. Importantly, many of the valued beliefs and assumptions are incompatible with those of others, and many therefore feel these valued beliefs and assumptions will be lost if they “lose” the conflict with others. People disagree, then, about the answers to the pivotal questions in Ohio because cherished moral values are at stake. When individual citizens are motivated by cherished moral beliefs and professional and civic assumptions, expert opinions and policy decisions that challenge those beliefs and assumptions simply have no authority.

Since the perceived stakes in Ohio reflect beliefs about values that lead to a good, i.e. moral, life, the dispute in Ohio over the model lesson plan has a deep moral dimension. It is a dispute in which citizens believe that ‘losing’ ends in severe moral consequences for their lives, the lives of their children, and the future of the nation. Clearly, the perceived moral stakes fuel the passion and vitriol which surfaced in Ohio. When deliberations among citizens begins or ends in polarized, intractable disagreement, deliberations on the merits of controversial issues usually dissolve into
what Amy Gutmann and Dennis Thompson describe as “communicating by sound bite, competing by character assassination, and resolving political conflicts through self-seeking bargaining” (Gutmann & Thompson, 1996, p. 12). In such a political environment, the reasons public policymakers give for the policies they create are rarely justifiable to citizens who must abide by those policies despite their deep disagreement with the policies. The political environment also assures that the division among citizens over values that ought to govern our lives remains deeply entrenched in public discourse.

The first section of this chapter presented evidence from recent events in Ohio that citizen disagreements over the placement of intelligent design in public school science classrooms have important moral dimensions. I argued that the inability of citizens to reach agreement on three pivotal questions, including a seemingly simple question concerning the presence or absence of certain concepts and references in a model lesson plan, results from conflicting beliefs about values that lead to morally worthy lives. The next section, section two, introduces the general outlines of a deliberative democratic political framework for principled policy decision-making that (1) promises to provide policy decisions that are more likely to be justifiable to citizens who continue to morally disagree about the teaching of evolution and intelligent design and (2) may reduce the domain of future disagreements.

Deliberative Democracy

Deliberative democratic political theory is a conception of democracy that places discussion about moral issues at the center of political life. In this section I
briefly introduce the conception of deliberative democracy developed by Gutmann and Thompson in *Democracy and Disagreement: Why Moral Conflict Cannot be Avoided in Politics, and What Should be Done About It*. It is important to note that my aim is to adapt and apply some of their central, pertinent ideas to the contemporary conflict among citizens over the appropriate placement of intelligent design in public school curricula. I generally describe deliberative democratic theory and the principled political reasoning it engenders, and I use deliberative theory and reasoning in this dissertation to critique the merits of the moral claims offered by proponents of and opponents to the inclusion of ID in public school science classrooms. I do not, however, offer a complete description and critical analysis of the conception of deliberative democracy that Gutmann and Thompson develop.

Authors Gutmann and Thompson argue that past political theory and practice have not adequately addressed the "formidable...problem of moral disagreement" in civic life. They note that when citizens disagree morally with one another, a democracy is preferable to other forms of government because "it is a conception of government that accords equal respect to the claims of each citizen...If we have to disagree morally about public policy, it is better to do so in a democracy that as far as possible respects the moral status of each of us" (Gutmann and Thompson, 1996, p. 26). But dominant conceptions of democracy, most notably procedural and constitutional conceptions, pay attention primarily to moral arguments that justify the foundations and conclusions of democratic government, not to the everyday moral politics of what Gutmann and Thompson call "middle democracy."

It is in middle democracy that much of the moral life of a democracy, for good or ill, is to be found. This is the land of everyday politics, where legislators, executives, administrators, and judges make and apply policies and laws,
sometimes arguing among themselves, sometimes explaining themselves and listening to citizens, other time not. Middle democracy is also the land of interest groups, civic associations, and schools, in which adults and children develop political understandings, sometimes arguing among themselves and listening to people with differing points of view, other times not. It is a land that democrats can scarcely afford to bypass. A democratic theory that is to remain faithful to its moral premises and aspirations for justice must take seriously the need for moral argument within these processes and appreciate the moral potential of such deliberation. (Ibid., p. 40)

Given the inability of procedural and constitutional conceptions of democracy to adequately address moral conflict in middle democracy, Gutmann and Thompson offer a conception of democracy they call “deliberative democracy” whose “core idea is simple: when citizens or their representatives disagree morally, they should continue to reason together to reach mutually acceptable decisions” (Ibid., p. 1). It is a conception that “is as much concerned with living with continual conflict as with trying to resolve it” (Macedo, 1999, p. 255).

The purpose of this section is to briefly describe why democratic deliberations are preferable to other democratic responses to moral conflict and to describe how Gutmann and Thompson identify political principles that ought to guide those deliberations. This section is divided into three parts. The first part outlines four sources of moral disagreement. Gutmann and Thompson argue that the sources of moral conflict provide compelling reasons for favoring extensive democratic deliberation when moral disputes occur over other possible democratic responses. The second part describes the characteristic features of moral arguments that people commonly employ to justify their decisions and actions. Gutmann and Thompson

34 According to Gutmann and Thompson, procedural and constitutional democrats disagree over whether “democratic procedures have priority over just outcomes or just outcomes have priority over democratic procedures. Deliberative democracy rejects this dichotomy neither the principles that define the process of deliberation nor the principles that constitute its content have priority in deliberative democracy” (Gutmann and Thompson, 1996, p. 27). See p. 26-49 for a discussion of procedural and constitutional conceptions of democracy.
argue that the characteristic features of common moral arguments provide the basis for developing three normative principles that ought to structure the process of deliberations over moral disputes. The final part presents Gutmann and Thompson’s rational for two principles that, they argue, ought to structure the content of political deliberations over moral disputes.

The Sources of Moral Conflict

Gutmann and Thompson posit four sources of moral conflict among citizens. They are: scarcity of resources, the limited generosity of human nature, incompatible values and incomplete understanding. The sources of moral conflict, Gutmann and Thompson argue, provide compelling reasons for favoring extensive deliberation when moral disputes occur.

The first source of moral conflict, the problem of scarce resources, for example, means that schools have limited time with students, limited money and a limited range of authority over students and their schooling. One compelling reason for deliberating over school policies that distribute scarce resources is that the legitimacy of policy decisions is enhanced. When policy decisions are made after extensive deliberations that seriously consider relevant conflicting moral claims to resources, the decisions of policymakers are more likely to be viewed by citizens as legitimate. Even when citizens disagree with policies, they “are likely to take a different attitude toward those that are adopted after careful consideration...and those that are adopted only after calculation of the relative strength of the competing political interests” (Gutmann & Thompson, 1996, p. 41-42).
The second source of moral disagreement, limited generosity, means that human beings are either unable or unwilling to be completely selfless toward others. Deliberation over moral disputes mitigates limited generosity by encouraging citizens to weigh the interests of others and to consider policies that include the reasonable moral claims of others. When citizens are asked to take seriously the claims of others in deliberations that respect all citizens as moral agents, they are more likely to extend the limits of their magnanimity thereby possibly reducing the domain of moral disagreement. The third source of moral conflict, incompatible moral values, also provides a reason for promoting extensive deliberations among citizens. Deliberations can reveal the perceived moral stakes in a dispute and begin to separate them from the features of the disagreement that are not related to incompatible moral values and which might be settled through “bargaining, negotiation, and compromise” (Ibid., p. 43). When incompatible values remain, deliberation “can help citizens better understand the moral seriousness of the views they continue to oppose” and encourages “and economy of moral disagreement in which citizens manifest mutual respect as they continue to disagree…” (Ibid., p. 43).

Finally, the fourth source of moral disagreement, incomplete understanding, offers another compelling reason for a deliberative conception of democracy. Humans do not have perfect understanding. That means that resolving some moral dilemmas will remain beyond the capacity of even “the most thoughtful and good-willed citizens” (Ibid., p. 25). Deliberation in these circumstances allows citizens to continue “to learn from one another, come to recognize their individual and collective
mistakes, and develop new views and policies that are more widely justifiable” (Ibid., p. 43).

Given the sources of moral conflict identified by Gutmann and Thompson, it is clear that moral disputes are a permanent fixture of public life, but, they argue, that does not mean there is no hope of fairly resolving some of them and learning to live with those we cannot resolve. According the Gutmann and Thompson, the characteristic features of moral disagreement themselves point toward a deliberative way of dealing with disagreement and support the possibility of resolution of some moral conflicts (Ibid., p. 13, 25). In the next part of this section, I demonstrate how the three normative process principles are developed by Gutmann and Thompson from the characteristic features of moral arguments.

**Characteristic Features of Moral Arguments: Developing the Process Principles**

The most prominent characteristic feature of moral argument is its generality. “Moral arguments apply to everyone who is similarly situated in the morally relevant respects” (Gutmann & Thompson, 1996, p. 13). The argument that all children in public schools ought to receive a science education that will enable them to make informed scientific choices as citizens, for example, is a moral argument – that is, it applies to all children in public schools. The argument would “impute right and wrongs, or ascribe virtue and vice” (Ibid., p. 13), to public school science policymakers in situations where they succeed or fail to provide adequate science education to students.

The criterion of generality, however, is not the only important feature of moral arguments in politics. Three other important characteristic features of moral
arguments appear in arguments that are commonly used to justify public policies to citizens who are bound by the policies. Since political policy decisions are, according to Gutmann and Thompson, “collectively binding...they should therefore be justifiable, as far as possible to everyone bound by them” (Ibid., p. 13). The characteristic features of the arguments policymakers give to justify policy decisions suggest three normative principles that allow citizens to assess the fairness of the process that led to those policies.

First, justifying policies commonly consists of offering reasons that other citizens can accept even though there may be few shared values. This means that policymakers and citizens “recognize and respect one another as moral agents, not merely as abstract objects of others’ moral reasoning” (Ibid., p. 14). Appealing to reasons that others share or might come to share is the basis for the first principle that Gutmann and Thompson argue should guide the process of public deliberations -- the principle of reciprocity. Reciprocity “is a form of mutuality in the face of disagreement” (Ibid., p. 14). It is “the capacity to seek fair terms of social cooperation for their own sake” (Ibid., p. 52-53).

Second, justification of public policies commonly takes place in public forums where citizens speak not only among themselves but, in principle, to the public at large. Justifying policies requires public forums and media coverage that allows citizens to hear and question the reasons other citizens offer for their actions. The second principle Gutmann and Thompson identify for the process of deliberation, then, is the principle of publicity. “The reasons that officials and citizens give to
justify political action, and the information necessary to assess those reasons, should be public” (Ibid., p. 95).

Third, when policymakers offer arguments that attempt to justify policy decisions, they are commonly considered to be taking responsibility for the effects of those decisions on all citizens. Public policymakers are citizens who are publicly accountable to their fellow citizens for their political activities and decisions. This is the basis of Gutmann and Thompson’s third process principle – the principle of accountability. Accountability requires policymakers to take public responsibility for the consequences of policies on all citizens. “In a deliberative forum...citizens and officials try to justify their decisions to all those who are bound by them...the reasons should...address the claims of anyone who is significantly affected by the laws and policies” (Ibid., p. 128-129).

The principles of reciprocity, publicity and accountability, then, are normative standards that Gutmann and Thompson suggest citizens adopt when they create and assess the fairness of the process that produces universally binding public policies.

*Developing the Content Principles*

Applying the process principles of reciprocity, publicity and accountability would not alone assure fair public policy deliberations when citizens morally disagree. These three principles merely set possible conditions for deliberations that are justifiable to citizens who are motivated to find fair terms of cooperation; they do not address the difficult tasks of assessing the substantive content of competing moral claims and assessing the fairness of policy decisions. Further principles are needed to govern the content of deliberations. To identify justifiable content principles,
Gutmann and Thompson first consider the political principle of utilitarianism since the “utilitarian way of thinking...pervades the public forum in middle democracy” (Gutmann & Thompson, 1996, p. 165).

Utilitarianism promotes the view that government ought to maximize the average welfare of citizens. It suggests this single principle as a way to adjudicate among competing values and as the basis for developing fair public policy decisions. Utilitarianism, in Gutmann and Thompson’s view, has some political virtues. It takes seriously the claims of all citizens, is concerned with the long-range consequences of policies, and can sometimes appropriately quantify values that help clarify policy choices (Ibid., p. 196). But, Gutmann and Thompson argue, utilitarianism creates serious problems for the three process principles of deliberation – accountability, publicity and reciprocity. And, “to the extent that it does resolve conflicts, it is at the expense of the fundamental values of liberty and opportunity, which any reciprocal perspective must recognize” (Ibid., p. 173). The reasons utilitarians give for rejecting organ lotteries that maximize the saving of human life, for example, do not address the fundamental value of basic liberty. In addition, when utilitarians choose policies that are intended to maximize average welfare, utilitarianism “says nothing about how the welfare should be distributed” (Ibid., p. 193). Thus, utilitarianism neglects the fundamental value of basic opportunity.35

The content principles of democratic deliberations should, according to Gutmann and Thompson, express basic values against which citizens can assess

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35 See Gutmann and Thompson, 1996, p. 165-198 for their complete analysis of utilitarianism as a principle for deliberation.
policy decisions. The most promising candidates for those principles are “the two values that utilitarianism neglects: liberty and opportunity” (Ibid., p. 199).

Basic liberty. The liberty principle that Gutmann and Thompson have in mind is what they call “the basic liberty principle.” Basic liberty “protects the physical and mental integrity of persons.” It assures citizens that they will “be protected from policies that would conscript their bodies for transplants and experiments, and their minds for religious and other causes” (Ibid., p. 203-204).

Gutmann and Thompson distinguish their conception of basic liberty from the claims of libertarians. Libertarians, in their view, rightly recognize the following three important points about liberty: 1) a liberty principle is essential to any mutually acceptable political perspective; 2) basic liberty protects the physical and mental integrity of persons; and 3) basic liberty does not include positive claims on society for everything one may need or want to pursue one’s way of life (Ibid., p. 203-204).

But the libertarian negative concept of liberty, i.e. freedom from interference, overextends liberty at the expense of basic opportunity. Hence, a deliberative conception of basic liberty constrains liberty when reasonable opportunity claims challenge the unconstrained negative liberty claims of libertarians.

36 See Gutmann and Thompson, 1996, p. 201-208 for their discussion of libertarianism and basic liberty.

37 Libertarians, for example, include the negative liberty of freedom from taxation without individual consent in their conception of basic liberty. In their view, taxation is an unjustified violation of the liberty of anyone who opposes taxation. Gutmann and Thompson respond as follows:

To reject any public policy that would redistribute income or wealth, libertarians must assume that the given distribution is just. But libertarians cannot justify this assumption...The present distribution of income and wealth in the world is the product of...many past actions that libertarians must consider unjustified coercion. Libertarians therefore cannot object on libertarian grounds to the use of state coercion to change this distribution in the direction of aiding the less advantaged. (Gutmann & Thompson, 1996, p. 206-207)
Basic opportunity. The principle of opportunity that Gutmann and Thompson promote is called “the basic opportunity principle.” It obligates policy makers to attempt to provide all citizens with the resources they need to lead a minimally decent life. “Basic opportunities are those goods and services that are necessary for living a good life…” (Ibid., p. 217). An adequate education, including science education, is included among the basic opportunity goods that constitute a minimally decent, good life.

Gutmann and Thompson distinguish the principle of basic opportunity from what they call “egalitarian opportunity.” Egalitarians share the moral conviction that “one’s life chances should not be determined by factors that are arbitrary from a moral point of view” (Ibid., p. 209). Egalitarians recognize the priority of basic liberty over egalitarian values, but to be free and equal, citizens must have equal opportunities. “Equal opportunity is intended to give each citizen, as far as possible, an equal chance to develop his or her natural talents and to choose among the range of good lives available within society” (Ibid., p. 210).

38 Gutmann and Thompson actually present two opportunity principles that, they argue, ought to govern the opportunities offered citizens. They are: 1) a basic opportunity principle which “obligates government to ensure that all citizens may secure the resources they need to live a decent life…” and 2) a fair opportunity principle that “governs the distribution of highly valued goods that society legitimately takes an interest in distributing fairly among individuals...[especially] skilled jobs” (Gutmann & Thompson, 1996, p. 217). For the purposes of this dissertation I only consider the basic opportunity principle. A discussion of the fair opportunity principle can be found in chapter nine of Gutmann & Thompson, 1996.

39 Gutmann and Thompson consider “health care, education, physical security, housing, food, employment, or the equivalents in income [as] goods that are especially important to living a decent life and securing other opportunities in our society” (Gutmann & Thompson, 1996, p. 217). They are obviously exploring a much wider range of moral disputes over public policy than the limited moral dispute over intelligent design and public school science education. I ignore many cogent points they make concerning opportunity goods other than education. For a full account of the range of their basic opportunity concerns, see chapters six, eight and nine in Gutmann & Thompson, 1996.

The difficulty with egalitarian opportunity, according to Gutmann and Thompson, is that it does not adequately address problems of scarcity and imperfect knowledge. The claims of equal opportunity can expand without limit and egalitarians offer few ideas on how to determine those limits fairly. The deliberative principle of basic opportunity recognizes that policy makers can legitimately place limits on the provision of opportunity goods but only within the context of extensive moral deliberations. There is no immutable standard citizens can employ to determine the level of opportunity that ought to be offered to citizens in a deliberative democracy. The basic level of public education, for example, that citizens are offered might change over time due to economic considerations and social expectations. Policy decisions that limit basic opportunity goods are, from a deliberative perspective, justifiable if they are conditioned by moral deliberations that honor basic liberty and the process principles of reciprocity, publicity and accountability.41

The basic liberty and basic opportunity principles suggested by Gutmann and Thompson are standards that citizens might mutually agree on to govern the content of their deliberations. With standards of basic liberty and basic opportunity, citizens are encouraged to make considered judgments about competing moral claims and the fairness of policy decisions.

This section briefly introduced a deliberative conception of democracy which takes into account the need for extensive moral argument when citizens morally

41 The principle of basic opportunity, then, not only shapes the content of deliberations by requiring that policymakers attend to minimal opportunity goods for a decent life, but the content of the principle itself is shaped by deliberation. In the last part of the next section of this chapter I describe how all the process and content principles Gutmann and Thompson suggest partially determine and are partially determined by deliberative moral discussion.
disagree about public policies. It explained why democratic deliberations are preferable to other democratic responses to moral conflict and described how Gutmann and Thompson developed the political principles they argue ought to guide those deliberations. The next section of this chapter describes in greater detail the content of the principles of reciprocity, publicity, accountability, basic liberty and basic opportunity. It also describes the type of moral reasoning and the characteristics of policy decisions that deliberative democracy promotes. The final section of this chapter briefly applies these deliberative democratic principles to the moral conflict in Ohio over the tenth grade model lesson plan for teaching evolution.

The Constitutional Principles of Deliberative Democracy

Public school policymakers in a deliberative democracy are asked to justify public policies by giving reasons for those policies that can be accepted by citizens who are bound by the policies. When citizens morally disagree with the decisions of policymakers, they may still be able to accept those decisions as reasonable if mutually agreed upon principles governed the process and content of the deliberations that lead to the decisions. The purpose of this section is to describe in greater detail the principles for the process and content of public deliberations suggested by Gutmann and Thompson that may be mutually acceptable to all citizens and to outline the method of principled moral reasoning that deliberative democracy depends on and promotes. This section is divided into six parts. The first five parts describe the process principles of reciprocity, publicity and accountability (Figure 1.1), and the content principles of basic liberty and basic opportunity. The final part describes the kind of political reasoning deliberative theory suggests citizens ought to engage in
and the characteristics decisions share when they are conditioned by principled political reasoning.

**Figure 1.1: The Process Principles of Deliberative Democracy**

**Reciprocity**
(Mutual respect)

Compared to prudence and impartiality

Prudence Impartiality

Two types of disagreement

Principles of accommodation:

Civic integrity
- consistency in speech
- consistency between speech and action
- integrity of principle disagreement

Civic magnanimity
- acknowledgment in speech
- open-mindedness
- economy of moral disagreement

Publicity

Four reasons for publicity
- consent to and legitimization of public policies
- broaden perspectives
- clarify disputes and express mutual respect
- moral growth and mutual understanding

Three arguments for secrecy
Necessity
Liberty and Opportunity
Deliberation

Two types of rarely justified secrets
Deceptive secrets
Deep secrets

Accountability

Two challenges
Specialization
Constituency

The problem of appointees

(Source: Gutmann & Thompson, 1996)
Reciprocity

At the heart of the process principle of reciprocity is the desire and capacity to seek fair terms of social cooperation as a valued end in itself.42 Gutmann and Thompson consider reciprocity to be the leading principle in a deliberative democracy because “it shapes the meaning of publicity and accountability and also influences the interpretation of liberty and opportunity” (Gutmann & Thompson, 1996, p. 52). Reciprocity asks citizens to engage in political reasoning that is mutually justifiable – that is, citizens offer reasons for their actions and decisions that can be accepted by others “who are similarly motivated to find reasons that can be accepted by others” (Ibid., p. 53). Reciprocity depends on the value of mutual respect which requires “a favorable attitude toward, and constructive interaction with, the persons with whom one disagrees” and recognition of others as moral agents (Ibid., p. 79).

The principle of reciprocity has, according to Gutmann and Thompson, two requirements. First, it requires citizens to be motivated to find fair terms of social cooperation.

A deliberative perspective does not address people who reject the aim of finding fair terms for social cooperation; it cannot reach those who refuse to press their public claims in terms accessible to their fellow citizens. No moral perspective in politics can reach such people, except one that replicates their own comprehensive set of beliefs. And since that perspective would entail rejecting entirely the comprehensive beliefs of their rivals, it would not help reduce, let alone resolve, moral disagreements. (Ibid., p. 55)

Second, reciprocity requires that when empirical claims are made in moral disputes, the claims should be made in terms that are “consistent with relatively reliable

42 For a thorough discussion of reciprocity in deliberative democratic theory, see Gutmann & Thompson, 1996, p. 52-94.
methods of inquiry” (Ibid., p. 56). When citizens claim, for example, that they have empirical evidence that confirms the existence of a supernatural intelligence, then that claim, according to Gutmann and Thompson, must be able to be substantiated by reliable methods of inquiry “that themselves should be mutually acceptable” (Ibid., p. 56). Empirical claims that rely on the authority of religious texts rather than mutually acceptable reliable methods of inquiry or the standards of logic fail to meet the requirements of reciprocity. Further, “any claim fails to respect reciprocity if it imposes a requirement on other citizens to adopt one’s sectarian way of life as a condition of gaining access to the moral understanding that is essential to judging the validity of one’s claims” (Ibid., p.57).

Gutmann and Thompson distinguish reciprocity from two other principles that often wrongly regulate the reasons citizens give to one another for policy decisions: prudence and impartiality. Figure 1.2 maps the differences between prudential, reciprocal and impartial reason-giving.

**Figure 1.2: Reciprocity Compared to Prudence and Impartiality**

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<thead>
<tr>
<th></th>
<th>Prudence</th>
<th>Reciprocity</th>
<th>Impartiality</th>
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<tr>
<td>Justification</td>
<td>mutually advantageous</td>
<td>mutually acceptable</td>
<td>universally justifiable</td>
</tr>
<tr>
<td>Motive</td>
<td>self-interest</td>
<td>desire to justify to others</td>
<td>altruism</td>
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<tr>
<td>Process</td>
<td>bargaining</td>
<td>deliberation</td>
<td>demonstration</td>
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<tr>
<td>Goal</td>
<td>modus vivendi</td>
<td>deliberative</td>
<td>comprehensive view</td>
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<td></td>
<td></td>
<td>agreement/disagreement</td>
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(Source: Gutmann & Thompson, 1996, p. 53)

43 In chapter three I assess the scientific claims of ID proponents and ID critics in terms of a deliberative perspective. Deliberative theory requires that when citizens make empirical claims, those claims must conform to the demands of reciprocity, i.e., they must conform to mutually acceptable, reliable methods and standards of scientific inquiry.
Prudence. Prudential reasons attempt to demonstrate that a policy is mutually advantageous rather than mutually acceptable. Citizens who offer prudential reasons are motivated by self-interest, not a desire to justify a policy to others on moral grounds. Prudence suggests reaching compromises through bargaining rather than deliberating to reach agreement. Gutmann and Thompson argue that prudential bargaining has a place in a deliberative democracy when no important moral values are at stake or when disagreements are not over values but the means to achieve them. But using prudence to regulate moral disagreements in a democracy has two pernicious consequences. First, it tolerates citizens who “try to maximize their own or their group’s advantage even at the expense of the well-being of other citizens” (Ibid., p. 58). And second, some citizens have access to far greater bargaining power than others, thus making it likely that the claims of less advantaged citizens will be ignored or minimized.

In the case of Ohio, it can be argued that Stephen Meyer’s suggested compromise of “teaching the controversy” is an example of a prudential response to a moral conflict and that it illustrates the pernicious consequences of bargaining over moral disputes. The fact that many citizens felt that political compromise is morally wrong when setting standards for scientific inquiry means that, in their view, the “compromise” advantaged ID proponents at the expense of mutually accepted science standards adopted by the larger scientific community. The “compromise” also, in the view of citizens who morally disagreed with it, demonstrated the lack of access they had to bargaining power on the state board of education – a fact, they argued, that
resulted from the appointment of eight members of the BOE by the governor who was apparently sympathetic to the claims of ID proponents.

**Impartiality.** Another principle that might regulate the reasons policymakers give for their policy decisions is the principle of impartiality. The principle of impartiality, like the reciprocal view, prescribes that moral reasons should be offered to justify public policies that are morally disputed, but it does not require those reasons to be mutually justifiable. The reasons are justified because they are the only correct moral view. Impartialists regard moral disputes as errors in moral reasoning that can be corrected by demonstrating the truth of a comprehensive moral view that “include[s] a single set of assumptions about the foundation of morality and understanding of human nature” (Ibid., p. 59). Gutmann and Thompson argue that a deliberative democracy can accommodate some of the claims of impartial moralists under the principle of basic liberty, but note that impartiality is unable to adequately address the fact that citizens in a pluralist society hold competing, reasonable comprehensive moral views. At worst, citizens with impartial moralist perspectives attempt to kill one another or treat each other with intolerance, contempt and/or antipathy; at best they tolerate one another. Mere toleration, though, “locks into place the moral divisions in society and makes collective moral progress far more difficult” (Ibid., p. 62-63).

Gutmann and Thompson distinguish between two types of moral disagreement in a deliberative democracy - nondeliberative disagreement and deliberative disagreement.
Non-deliberative disagreement. When citizens are unwilling or unable to offer reciprocal reasons – i.e., reasons that can be accepted by others who are similarly motivated to find fair terms of social cooperation – for rejecting a moral argument, they are locked in a nondeliberative disagreement. An example of nondeliberative disagreement would be when a local public school board adopts a policy that requires science teachers to teach the Gospel of John in the Bible as scientifically true. The board of education would be unable to offer reciprocal reasons for the policy to their Jewish, Moslem and atheistic, among others, constituents. The prudential compromise adopted by the Ohio SBOE is also an example of a non-deliberative disagreement. The reasons that the board of education gave for the compromise were not moral reasons based on mutually accepted fair terms of social cooperation that opponents of ID could in principle accept.

Deliberative disagreement. A deliberative disagreement, on the other hand, "places some citizens in opposition to others who are no less committed to finding fair terms of cooperation, and who are offering reasons that cannot be shown to violate those terms" (Ibid., p. 78). Gutmann and Thompson regard one construal of the abortion debate as a paradigmatic case of deliberative disagreement.

Pro-life and pro-choice advocates can agree that innocent people should not be killed, and that women have a basic liberty to live their own lives and control their own bodies. But they arrive at radically different conclusions about abortion because they cannot agree on whether the fetus is a full-fledged constitutional person, whether a woman’s right to control her body takes priority over any claims the dependent fetus may have, and what responsibility a woman has to realize the human potential of a fetus that lacks consciousness and sentience. The claims on both sides of all these disagreements fall within the range of what reciprocity respects. (Ibid., p. 74)\textsuperscript{44}

\textsuperscript{44} See Gutmann & Thompson, 1996, p. 73-79 for their discussion of the abortion conflict.
From the impartialist perspective, the best citizens could hope for in the abortion debate would be mere toleration of the opposing moral positions with the promise of entrenched moral divisions among citizens. A reciprocal perspective offers more. The value of mutual respect which “requires a favorable attitude toward, and constructive interaction with, the persons with whom one disagrees” that grounds reciprocity also promotes practices of accommodation.

Gutmann and Thompson extend the principle of reciprocity to include two principles of accommodation that, they argue, ought to guide practical practices of mutual respect. The two principles are: civic integrity and civic magnanimity.

Civic integrity. Civic integrity requires citizens to affirm the moral status of their political claims. Citizens demonstrate civic integrity in three ways. First, civic integrity is shown through consistency in speech. Citizens are expected to speak consistently about their moral views in all venues of their lives as “a sign of political sincerity” (Ibid., p. 81). If, for example, intelligent design proponents say one thing in one setting, e.g. in books they write, and another in another setting, e.g. school board meetings, they would not be regarded as demonstrating civic integrity. Second, civic integrity is demonstrated through consistency between speech and action, i.e., through what citizens do as well as what they say. A public school administrator, for example, who claims that science classes are not teaching certain religious beliefs as true yet quietly allows teachers to present Biblical creationism as a true scientific theory is not demonstrating civic integrity. Finally, civic integrity requires what Gutmann and Thompson call an “integrity of principle,” which “consists in the acceptance of the broader implications of the principles presupposed by one’s moral
positions” (Ibid., p. 81). If a citizen, for example, opposes the teaching of the Gospel of John as scientifically true in science classes, he or she should also oppose the teaching of atheism as scientifically true in science classes.\(^4^5\)

**Civic magnanimity.** The second principle that, according to Gutmann and Thompson, ought to ground practical practices of mutual respect is civic magnanimity. Civic magnanimity requires citizens to “acknowledge the moral status of the positions they oppose” (Ibid., p. 82). When citizens disagree over moral issues, they should demonstrate respect for opposing moral views by acknowledging in speech the seriousness of their opponent’s claims. Too often in public policy disagreements, people disparage the moral views of others by belittling, ignoring or making fun of opposing views. Gutmann and Thompson point out that a favored way of “impugning the moral status of an opponent’s position” is to claim that is it “politically motivated,” which “is an all-purpose argument which can be used to discredit any position, whatever its moral merits. What all such arguments have in common is a refusal to give moral reasons for rejecting the position” (Ibid., p. 83).

A second way in which citizens demonstrate civic magnanimity is by practicing the “simple virtue of open-mindedness.” This consists of citizens remaining open to the possibility that they might be convinced by the moral claims of others and, therefore, are willing to change their minds. "Both the political mind and the political forum should be kept open to reconsideration of decisions already made and policies already adopted” (Ibid., p. 83). Open-mindedness does not mean that

\(^4^5\) Philosopher of science Robert Pennock makes this point by stating, “Science excludes appeal to supernatural entities as a point of method, and thus it is improper to draw directly the atheistic conclusion that God is ontologically unreal from evolution or any other scientific conclusion. Such questions are not scientific and must be left to the theologian and the philosopher” (Pennock, 1999, p. 335-336)
firm convictions are ruled out; rather it means that a citizen is prepared to change or modify a moral position “when one encounters objections that, on reflection, one cannot answer” (Ibid., p. 84).

Finally, practicing mutual respect through civic magnanimity asks citizens to seek an “economy of moral disagreement.” This means that citizens should seek reasons for public policies that minimize rejection of opposing views. Citizens who practice an economy of moral disagreement “avoid unnecessary conflict in characterizing the moral grounds or drawing out the policy implication of their positions” and search for ways in which moral views converge (Ibid., p. 85).

Gutmann and Thompson point out that this means that citizens ought to seek an “economy of factual disagreement” when citizens disagree about empirical claims in moral disputes.

The value of mutual respect and the practices of accommodation that it suggests require citizens to attempt to minimize the domain of their public disagreement through the promotion of policies that embrace values they hold in common. In this way, citizens maximize the areas in which they politically and morally agree and minimize the range of their disagreements. Practices of moral accommodation will not end serious moral conflict or provide a comprehensive common good, but they do allow citizens to “affirm that they accept significant parts of the substantive morality of their fellow citizens to whom they may find themselves deeply opposed in other respects” (Ibid., p. 89).

In summary, the principle of reciprocity asks citizens to seek fair terms of social cooperation that allow them to offer mutually justifiable reasons for public
policies. It offers a deliberative alternative to prudential bargaining and the impartial imposition of a comprehensive moral view when citizens morally disagree about public policy. Reciprocity includes principles of accommodation - civic integrity and civic magnanimity – that suggest how citizens ought to present the moral content of their political views and how they ought to regard the moral content of the views of others. Importantly, the principle of reciprocity and its attendant accommodating principles are substantive moral principles that encourage the cultivation of civic virtues which can lead the way to resolution of moral disputes and allow citizens to live together in an environment of mutual respect when they cannot resolve their disagreements.

**Publicity**

The second deliberative process principle developed by Gutmann and Thompson is the principle of publicity (see Figure 1.1., p. 50). Publicity requires that citizens give reasons for public policies in public forums and that when secrecy is deemed essential to the deliberative process, the reasons for the secrecy should be publicly deliberated. Only those policies that have been publicly justified should be adopted in a deliberative democracy.

Gutmann and Thompson give four reasons why publicity is essential to deliberative processes. First, citizens can consent to and therefore legitimize public policies only when they are publicly justified. Second, public reason giving offers citizens the chance to broaden their moral and political perspectives through listening to the public justifications of others. Third, public justifications help clarify the nature of moral disputes and allow citizens to express mutual respect for the moral
seriousness of the moral positions of others. Fourth, and finally, if the reasons for policies are not openly discussed, citizens are not encouraged to change their minds or modify their positions. In that case, the potential for moral growth and mutual understanding that deliberation can foster is undermined (Gutmann & Thompson, 1996, p. 100-101).

The value of publicity, however, is not unlimited. Certain reasons for secrecy may be mutually justifiable to all citizens. Gutmann and Thompson explore three arguments for secrecy – necessity, liberty and opportunity, and deliberation – to determine the extent to which publicity might be justifiably limited.

**Necessity.** Arguments for the necessity for secrecy rely on the claim that secrecy is necessary in those cases when publicly discussing the policy would defeat the purpose of the policy. A paradigm case is that of the Open Market Committee of the Federal Reserve Board which is exempt from sunshine laws. The chairman of the Federal Reserve Board has argued that “greater publicity would make monetary policy ‘suffer, and the economy along with it’” (Ibid., p. 101). Gutmann and Thompson point out that there are several problems with this argument. First, it assumes that one group of officials is able to choose the most beneficial policies. This contradicts the reasonable view that “independent review and criticism of the reasoning that led to the policy may reveal alternative policies that would produce better results in the future” (Ibid., p. 102). Second, this argument does not take into account the possibility that the primary reason for the secrecy is that many citizens would object to the policy and attempt to change it if they knew what the policy was going to be. This raises questions in the case of Ohio where the proceedings of, and
the documents developed by, the committee designing the model lesson plan were secret (they were not publicly discussed) until only a few weeks before the plan was adopted. Are the reasons for secrecy in this case dependent on the fact that there might have been deep objections to the lesson plan and attempts by citizens to change the process leading to the lesson plan and to alter its content? A third problem with the argument from necessity for secrecy is that secrecy does not allow citizens to understand the reasoning that leads to policies and to judge for themselves the merit of that reasoning. Fourth, and finally, citizens are prevented from judging the competence of elected and appointed officials if they are not allowed to hear the reasoning of those officials.

Despite these problems, however, cases like the Open Market Committee of the Federal Reserve Board or the Ohio model lesson plan committee may be justifiable if citizens are able to deliberate over the reasons for secret proceedings and policies. Holding officials publicly accountable for the secrecy itself limits the scope of secrecy and supports the principle of publicity. “Publicity about secrecy...is the only form in which a deliberative perspective can accept the necessity of secrets” (Ibid., p. 105).

*Liberty and opportunity.* Arguments for secrecy based on the values of liberty and opportunity fall, according to Gutmann and Thompson, into two categories – arguments for general secrets and arguments for particular secrets. General secrets refer to information about indeterminate groups and categories of people while particular secrets are primarily concerned with information associated with specific individuals. For an example of general secrecy, consider the case of a rural
superintendent in Oklahoma who commented in a newspaper article that “If the state legislature would just leave us alone, we will go on doing what we have always done. We teach creationism in our science classes.” This argument for remaining quiet and not publicly discussing the merits of school policies shares a few assumptions in common with other generally secret public policies. First, it assumes that the basic liberty of individuals is better protected by suppressing publicity. In this case, the liberty of the district and teachers to teach creationism is better protected if legislative bodies don’t bring the topic up. Second, it assumes that the morally correct public policy already is in place. The superintendent assumes that teaching creationism is the correct moral policy. This subverts not only the principle of publicity which maintains that only those policies which have been publicly deliberated can be justifiably adopted, but also the principle of reciprocity which requires policymakers to offer mutually acceptable reasons for policies when there are deep moral disagreements.

Arguments for secrets concerning information about particular persons that are based on the values of liberty and opportunity usually include the claim that politically irrelevant information or misleading information can violate a person’s opportunity to be given fair and equal consideration for public service. Gutmann and Thompson argue that the standard for secrecy in this case should be “that only information relevant to the performance of one’s office should be publicized.”

46 The example of an argument from liberty and opportunity for keeping general policies secret that Gutmann and Thompson use is the case of abortion. Critics of publicity about abortion issues argue that publicity has confounded the basic liberty of women to have access to abortions. Prior to reform movements in the 1960’s, these people argue, abortion was quietly available at the discretion of individual doctors and was quietly funded for government employees and members of the military. This was, in their view, preferable to the restrictions that are now imposed by many states and the federal government on women seeking abortions. See Gutmann & Thompson, 1996, p. 107-109 for their discussion of this aspect of abortion issues.
However, "What otherwise might be a publicly irrelevant part of a politician's private life becomes relevant when the politician uses [secrecy about] the information to gain political advantage" (Ibid., p. 110). An example of this would occur when people who believe certain portions of the Bible are scientifically true run for boards of education with the secret desire to overturn policies concerning the teaching of evolution in public schools. In this case, publicity concerning the private religious beliefs and religious activities of the school board candidate would be relevant to his or her future performance on the board of education.

**Deliberation.** Finally, Gutmann and Thompson note that one of the strongest arguments for secrecy rests on the claim that secrecy in certain cases would promote democratic deliberation. This claim recognizes the fact that publicity can discourage officials from making bold decisions or addressing controversial issues. Gutmann and Thompson label secrets kept for purposes of encouraging bold leadership deliberative secrets. Deliberative secrets, properly constrained, can "encourage deliberation in which officials may take more risks at the earlier stages of the formulation of policy, and therefore reduce the chance that a well-grounded policy that could later survive public scrutiny will be rejected because it is now unpopular" (Ibid., p. 115). To be justified, however, deliberative secrets must be allowed only in cases where citizens and their representatives first deliberate over the question of whether secrecy would promote deliberation. "A fully justified secret is in this way doubly deliberative" (Ibid., p. 117).
Gutmann and Thompson argue that two types of secrets are rarely justified—deceptive secrets and deep secrets—because they do not allow citizens to hold officials accountable for their views and actions.

**Deceptive secrets.** A citizen who conceals information with the purpose of causing others to believe something the citizen knows is false is creating a deceptive secret. The few times secrets like these might be justified are in the case of war or to capture criminals. Usually, however, citizens create deceptive secrets to shield themselves from the consequences of mistakes they have made or to conceal intentions and activities that they know would cause some policies to be scrutinized and criticized, perhaps even reversed if the public knew about the intentions and activities. Persons who create deceptive secrets are not necessarily promoting their own self-interest. Rather, and more insidiously, according to Gutmann and Thompson, they are more likely acting on principles that they believe are “higher causes” that justify their deceptions.

If it is true in the case of Ohio that 1) intelligent design concepts and references are included in the model lesson plan; 2) the persons who created those lesson plans purposely and secretly worked with intelligent design activists to include those concepts and references; and 3) the persons creating the lesson plan denied that ID concepts and references are in the lesson plan and that they were working with ID activists; then the persons who created the lesson plans are creating deceptive secrets and deceiving the public. They also would be likely to defend their actions, if found out, on the grounds that they were acting for a higher cause—i.e., the cause of theistic religious belief. “High-minded” deceptive secrets like these, argue Gutmann and
Thompson, are “insidious precisely because [they are] more apt to be effective than the blatantly self-interested kind. Acting on principle for what they believe to be higher causes perpetrators are better able to enlist the help of others in their plans” (Ibid., p. 119).

Deep secrets. Deep secrets refer to information that is kept entirely from the public; they are never acknowledged to exist and never discussed publicly. Governor Taft in Ohio might be said to be harboring deep secrets. His refusal to discuss the state board of education’s model lesson plan and the process and content of the deliberations that led to its development in public at any time even after very public pleas from the scientific community in Ohio demonstrates an unwillingness to be held accountable and an unwillingness to engage in serious deliberation with citizens on important moral disputes. Deep secrets seriously erode public trust and confidence in governmental leadership.

Deep secrets and deceptive secrets are particularly grave affronts to a deliberative democracy, Gutmann and Thompson argue, because they block accountability and destroy the possibility of honest deliberation on serious political differences.47

In summary, the second process principle suggested by Gutmann and Thompson for democratic deliberations is the principle of publicity. Publicity requires that citizens give reasons for public policies in public forums and that when

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47 Gutmann and Thompson contend that deceptive secrets are so corrosive to a deliberative democracy that the “makers and keepers of deceptive secrets” ought to be held responsible through criminal legal proceedings. Punishment through criminal proceedings based on carefully constructed laws against political deception “should not be seen as criminalizing political differences,” rather it is “a means – perhaps a necessary means – of ensuring that serious political differences are debated in open political processes” (Gutmann & Thompson, 1996, p. 119).
secrecy is deemed essential to the deliberative process, the reasons for the secrecy
should be publicly deliberated. Only those policies that have been publicly justified
should be adopted in a deliberative democracy. While there may be justified
arguments for secrecy from the viewpoints of necessity, liberty and opportunity, and
deliberation itself, the arguments justifying the need for that secrecy should be
publicly debated. Deceptive and deep secrets are likely never justified.

**Accountability**

The third process principle suggested by Gutmann and Thompson is the
principle of accountability (see Figure 1.1, p. 50). In a deliberative democracy
citizens and their elected representatives are expected to give mutually justifiable
public reasons based on mutually arrived at fair terms of social cooperation for their
decisions to citizens who are bound by those decisions. Accountability, according to
Gutmann and Thompson, presents two challenges – the challenge of specialization
and the challenge of constituency.

*Specialization.* The challenge of specialization occurs because some citizens
are elected to represent other citizens in deliberations. Political representation is a
practical response to the important fact that most citizens do not have the time needed
to engage in serious and sustained moral argument. Representation, though, creates a
tension between a representative and his or her constituents. A representative may
reach conclusions after extensive research and deliberation about policy decisions that
are at odds with the opinions of constituents, and the representative may decide that
certain reasons not shared by his or her constituents are more important than others.
“Should representatives use the reasons that they find compelling or those that appeal to constituents?” (Gutmann & Thompson, 1996, p. 128).

Gutmann and Thompson argue that in a deliberative democracy, where the content principles of basic liberty and opportunity constrain majority will, the principle of accountability requires representatives to resist policies that violate these principles even if their constituents would not agree. By offering moral reasons consistent with basic liberty and basic opportunity in public forums, listening to the reasons of constituents and accommodating those aspects of the views of citizens that can be accepted from a reciprocal perspective, representatives account for their decisions to the public who elected them. In situations where opposing moral views each appeal to basic liberties and basic opportunities, each claim must be consistent with the principle of reciprocity and have good grounds for arguing that the liberty or opportunity is basic. The principle of accountability would allow a representative to exercise his or her best judgment in cases of deliberative disagreement, seeking accommodation in relevant public policies through the practice of an economy of moral disagreement. Finally, in situations that do not involve basic liberties or opportunities, the principle of accountability permits a representative to decide whether to defer to the opinions of a majority of constituents, to decline to follow the majority after sustained deliberations, and/or to engage in prudential political bargaining conditioned by the principle of reciprocity. In all of these cases, Gutmann and Thompson argue that the “reiteration of deliberation,” i.e., the ongoing process of deliberation between representatives and their constituents over time on various moral
topics, as well as periodic elections offer "the best hope for the principle of accountability" (Ibid., p. 144).

Constituency. The second challenge presented by the principle of accountability is the challenge of constituency. The principle of accountability requires that "representatives justify their actions from a moral point of view, which implies that they owe an account not only to their electoral constituents but also to what we may call their moral constituents – citizens in other states...and citizens yet to be born" (Ibid., p. 144-145). In the case of Ohio's model lesson plan, it is clear that the moral dispute has consequences that reverberate beyond the boundaries of Ohio. If the lesson plan withstands judicial scrutiny in the Supreme Court, and if the lesson plan includes concepts of and references to intelligent design, then school children, including future generations, across the nation could be taught ID concepts and shown references to ID in science classes. Following the decision on March 9, 2004 to adopt the model lesson plan, Ohio SBOE member Debra Owens Fink appeared to concur with the claim that representatives have obligations to citizens outside their electoral boundaries. She stated, "Ohio has set a standard for the whole nation on how to deal with these issues" (Krauss, 2004a).

The case of Ohio, though, raises accountability issues not addressed by Gutmann and Thompson. Eight members of the SBOE were appointed by the governor. To whom are the appointees accountable? Are they accountable to the governor or to the citizens in the state of Ohio or the nation? Even if the oath of

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48 Gutmann and Thompson include citizens of other nations and groups of disadvantaged citizens in the realm of moral constituents. While the argument might be made that the dispute in the United States over the teaching of intelligent design in public school classrooms has moral relevance for citizens in other nations and for disadvantaged citizens, I do not address that argument in this dissertation.
office of state board members were to mention that board members are accountable to the citizens of Ohio, the special relationship of board members to the governor complicates their allegiances – presumably, the governor could ask any one of his appointees to step down for any reason. The fact that the governor refused to participate in public discussions of any of the moral issues surrounding the model lesson plan and the fact that all of his appointees voted for the lesson plan raises questions about his influence on board members, questions that, from a deliberative perspective, the governor should have answered publicly. It also underscores the observation of Gutmann and Thompson that the principle of accountability, just as deliberative democracy as a whole, “depends on the capacity of citizens and their representatives to take a moral point of view.” It appears that Governor Taft, and perhaps also his appointees, either lacked the capacity or refused to approach the disputes over the model lesson plan from a genuinely moral point of view.

In summary, the principle of accountability asks citizens and their elected representatives to give mutually justifiable public reasons based on mutually arrived at fair terms of social cooperation for their decisions on public policies. All citizens and their representatives in a deliberative democracy are required to take into account the basic principles of liberty and opportunity when they justify their actions, and they should seek to account for their decisions to all their moral constituents.

As noted earlier, the three process principles of reciprocity, publicity and accountability set the conditions for fair deliberations, but they do not address the difficult tasks of assessing the substantive content of competing moral claims and the fairness of policy decisions. The content principles of basic liberty and basic
opportunity are values citizens ought to apply in deliberations that weigh competing moral claims and the mutual justifiability of policy decisions (see Figure 1.3). Public policies that are consistent with these principles are likely to be justifiable to citizens who cooperate in seeking fair terms of social cooperation even though they may continue to morally disagree with the policies.

**Figure 1.3: The Content Principles of Deliberative Democracy**

- **Basic Liberty**

  **Purpose:** to protect the mental and physical integrity of persons

  **Includes some moralist and paternalist claims**

  **The claims must be consistent with:**

  1. The mental and physical integrity of persons.
  2. Moral values that can be mutually accepted.

- **Basic Opportunity**

  **Purpose:** to help create the background circumstances that are necessary for adequate deliberation itself.

  **Requirements:** The basic opportunity principle requires policymakers to provide citizens with an adequate level of goods that are necessary for living a decent life, and among those goods is an adequate science education.

  - The basic opportunity principle recognizes that policy makers can legitimately place limits on the provision of opportunity goods (e.g., science education).
  - Policy decisions that limit basic opportunity goods (e.g., science education) are justified only if they are conditioned by deliberations that honor basic liberty and the process principles of reciprocity, publicity and accountability.

  (Source: Gutmann & Thompson, 1996)

**Basic Liberty**

At the core of the principle of basic liberty in a deliberative democracy is the idea of personal integrity – basic liberty protects the physical and mental integrity of
citizens. While easy to state, delineating the boundaries of the principle of basic liberty is a difficult task. To gain some perspective on the scope of basic liberty, Gutmann and Thompson present paradigmatic cases that clearly violate personal integrity and then consider less clear cases. Clear cases of violations of the physical integrity of persons include compulsory organ donations and involuntary clinical trials, and clear cases of violations of the mental integrity of persons include those that place constraints on the religious beliefs or deepest moral convictions of citizens. Reasoning from these cases that are clear and asking how less clear cases are analogous to the clear ones, Gutmann and Thompson find that “the borders of basic liberty are irregular, sometimes following the lines set by libertarians, but often expanding or contracting its domain” (Gutmann & Thompson, 1996, p. 204).

Importantly, they argue that basic liberty includes some values that moralists and paternalists promote. “The challenge for deliberative democracy is to find ways to recognize the legitimate claims of moralism and paternalism while maintaining the priority of basic liberty” (Ibid., p. 231).

Gutmann and Thompson contrast their conception of basic liberty with the principle of liberty espoused by John Stuart Mill in his 1859 essay On Liberty. Mill argued that “Over himself, over his own body and mind, the individual is sovereign” and that “The only part of the conduct of any one, for which he is amenable to society, is that which concerns others. In the part which concerns merely himself, his independence is, of right, absolute” (Ibid., p. 230, 233). From the perspective of Mill, the government may intervene in the liberty of a citizen only if his or her actions harm other people. The government may never intervene when the actions of a

49 Charles Darwin published the Origin of Species in the same year, 1859.
citizen are merely wrong and never when the actions harm only the citizen conducting them. Moralists, on the other hand, argue that the government may intervene in the liberty of citizens when they think it is right or wise to do so, and paternalists argue that intervening is justified when they think it is in the best interests of the citizen to do so. Gutmann and Thompson argue that

An adequate principle of basic liberty should accommodate these claims by recognizing that some wrongs that are not definite harms, and some definite harms to oneself, may be legitimately regulated by law...These claims deserve a place in a deliberative perspective, but if and only if (1) they are consistent with personal integrity; and (2) they express important moral values that can be mutually accepted at least as much as the alternative of Millian liberty. (Ibid., p. 237)

**Moralism.** Legal moralists argue that when a practice or action is immoral, citizens not only should criticize it, they should regulate it or prohibit it through legislation. Importantly, the ranks of moralists include not only political conservatives but many politically liberal citizens. Some of the actions that moralists seek to regulate or prohibit are: “adultery, sodomy, incest, fornication, prostitution, pornography, public nudity, desecration of shrines and sacred symbols, cruelty to animals, mistreatment of corpses, and commercial sale of bodily organs” (Ibid., p. 249). Gutmann and Thompson argue that many people who do not in general regard themselves as “moralists” would agree that some moralist claims are defensible; the difficult task is developing criteria for identifying those moralist claims that are mutually justifiable from those that are not.

Moralist arguments usually include three parts. First, moralists claim that immoral actions are wrong even if they do not cause harm. Gutmann and Thompson argue that the fact that most people can agree that public nudity is wrong stems from a fundamental value that even “nudists of principle” cannot reasonably object to – the
value of human intimacy. Public nudity does not respect the value of human intimacy. Violation of a shared fundamental value, however, is not enough to justify regulation. Moralists, second, demonstrate that regulation is relevant to the purposes of public policy. Public nudity, for example, "commands public attention" in a way that not fulfilling a promise does not. Finally, moralist arguments demonstrate that governmental regulation or prohibition will not cause create a greater wrong than that which they seek to regulate or prohibit. No important harm is done, for example, when public nudity is regulated – that is, the basic liberty of citizens to protect their personal integrity is not challenged by laws that prohibit public nudity.50

Moralist arguments offered by intelligent design proponents in the case of the Ohio model lesson plan can be constructed in the following way. First, it is morally wrong not to teach scientific criticisms of "Darwinian" theory in public school science classrooms. It violates the fundamental value of honesty in education. In defense of his appeal to "compromise" by "teaching the controversy," Stephen Meyer stated

Honest education requires it...If students are to be required to master the case for Darwinian evolution (as we think they should), shouldn't they also know some of the difficulties described in such scientific literature?...Shouldn't they know that some scientists now question previously stock Darwinian arguments from embryology and homology? And shouldn't they also know that many scientists now question the ability of natural selection to create fundamentally new structures, organisms and body plans? Last fall 100 scientists, including professors from institutions such as M.I.T., Yale and Rice, published a statement questioning the creative power of natural selection. Shouldn't students know why? (Meyer, 2004a, p. 2-3)

Second, requiring "critical analysis" of evolution through public school policies is important because one of the purposes of public school policy is to ensure that educational materials and lessons are not censored and that students are not

50 See Gutmann and Thompson, 1996, p. 248-254 for their discussion of moralism and public nudity.
indoctrinated in “scientific orthodoxy.” Ohio resident Benjamin Wiker made this point as follows

If the Ohio Board of Education removes the critical analysis lesson plan, it will be misrepresenting the current scientific discussion about evolutionary theory. The critiques addressed in the lesson plan exist in the current peer-reviewed scientific literature. Ohio students should have the right to learn about these currents of scientific thought, free from threats of censorship by rigid defenders of an aging scientific orthodoxy. (Wiker, 2004, p. 3)

Third, and finally, public school policies which allow critical analysis of “Darwinian” theory will not harm students because: 1) Constitutional law permits it; 2) federal education policy requires it; 3) citizens want it; 4) good pedagogy requires it; and 5) the intellectual freedom and religious freedom of students are enhanced.51

Assessing this moralist argument from a deliberative perspective requires answering two questions: Is the argument consistent with personal integrity? and Does it express moral values that can be mutually accepted? As noted in the first section of this chapter, the question of whether the model lesson plan included references to intelligent design theory and the question of whether ID is a scientific or religious theory were deeply disputed. Yet, answers to those questions are essential in assessing the moralist claims of ID proponents. If intelligent design is a religious theory and if it is included in the “scientific” criticisms, then it would clearly not be consistent with personal integrity to include the model lesson plan in tenth-grade biology classes. If ID is a religious theory, then the lesson plan also would not be consistent with the fundamental value of honesty in education since ID is treated as a scientific theory in that plan. In the final section of this chapter, I discuss the need for more information about the religious status of intelligent design for public school

51 The first four reasons why the model lesson plan in Ohio would not harm students are from Meyer, 2002a, p. 3-4. The last reason is found in Colson, 2004, p.1 and Needham, 2004, p. 1.
policy purposes, and whether or not ID concepts and references are included in the model lesson plan.

*Paternalism.* The principle of basic liberty in a deliberative democracy not only allows some moralist claims but also some paternalistic claims. Many contemporary laws inhibit absolute liberty in an attempt to protect the welfare of citizens. Among those laws are safety laws and regulations; health regulations; criminal law; and general social policies such as the licensing of professionals (Gutmann & Thompson, 1996, p. 262). Legal paternalism, according to Gutmann and Thompson, “is the restriction by law of an individual’s liberty for his or her own good” (Ibid., p. 261).

Most citizens agree that paternalism towards children is justified because the capacity to make reasonable or rational decisions develops over time under adult supervision. But paternalism toward children raises an important question: Do parents have an exclusive right to exercise paternal authority over children? Some parents would argue that they have the exclusive right to educational authority over their children including the right to pass on their sectarian beliefs and values unimpeded by the state. In their view, any democracy committed to the freedom of individuals must recognize the absolute freedom of parents to teach their children to adopt the parent’s way of life.

In response to this argument, Gutmann points out in *Democratic Education* that “States that abdicate all educational authority to parents sacrifice their most effective and justifiable instrument for securing mutual respect among their citizens” (Gutmann, 1987, p. 33). If parents exercise exclusive educational authority over
children, they are free to teach their children religious and racial intolerance which are inimical to participating in a deliberative democracy.

The same principle that requires a state to grant adults personal and political freedom also commits it to assuring children an education that makes those freedoms both possible and meaningful in the future. A state makes choice possible by teaching its future citizens respect for opposing points of view and ways of life. It makes choice meaningful by equipping children with the intellectual skills necessary to evaluate ways of life different from that of their parents. History suggests that without state provision or regulation of education, children will be taught neither mutual respect among persons nor rational deliberation among ways of life. (Ibid., p. 30-31)

Since neither the educational authority of parents or governments can be considered infallible, Gutmann argues that "the educational authority of parents and of polities has to be partial to be justified" (Ibid., p. 30).52

To justify paternalism, including paternalism toward children, governments, according to Gutmann and Thompson, should satisfy two sets of conditions. The first set of conditions places limits on the scope of paternalism, and the second set insures that it remains consistent with basic liberty.

To limit the scope of paternalism, policymakers should first demonstrate that some action or practice that citizens might take is not in their own best interests and that they would be better off if they were not allowed to do it, e.g., skipping school. Second, policymakers must show that government has an obligation to regulate the questionable action or practice and the citizens do not have a right to resist

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52 Gutmann illustrates this point by noting the experiences of Catholic children in public schools in the nineteenth century.

Catholic children who attended [school] were often humiliated, sometimes whipped for refusing to read the King James version of the Bible. Imagine that instead of becoming more respectful, public schools had been abolished, and states had subsidized parents to send their children to the private school of their choice. Protestant parents would have sent their children to Protestant schools, Catholic parents to Catholic schools...The religious prejudices of Protestant parents would have been visited on their children, and the social, economic, and political effects of those prejudices would have persisted, probably with considerably less public protest, to this very day. (Gutmann, 1987, p. 31)
government regulation, e.g., states are ultimately responsible for public education and truancy laws insure that children attend school. Third, policymakers must demonstrate that regulating or prohibiting the behavior in question will not cause more harm than is prevented, e.g., truancy laws support the formation of a literate and informed citizenry (Gutmann & Thompson, p. 263-264).

To insure that paternalistic laws protect basic liberty, policymakers, according to Gutmann and Thompson, should adhere to another set of conditions. These conditions are "defended on the grounds that a person's future liberty is enhanced by the paternalistic restriction on his present liberty" (Ibid., p. 265). First, policymakers must establish that the decision a citizen would choose is impaired by lack of information, emotional distress, or some other important deficiency. Second, the least restrictive regulations ought to be adopted. And, third, the harm that the regulation is trying to prevent is one most people desire to avoid. These conditions assure citizens that even though their present choices might be limited and their freedom restricted, their future basic liberty is protected and, perhaps, enhanced (Ibid., p. 264-267).

In the case of the Ohio model lesson plan, an argument can plausibly be made that public high school science investigations should be restricted to naturalistic causal explanations for paternalistic reasons. The argument can be constructed in the following way. First, intelligent design allows supernatural causes in scientific explanations. Supernatural causal explanations necessarily imply certain sectarian

53 The word 'sectarian' can refer to any religious idea or system of ideas, e.g., religion in general is 'sectarian.' However, 'sectarian' also refers to specific religious groups or sects who share religious convictions that are not shared by other religious groups or sects. The word 'sectarian' in this
Second, it is not in the best interest of children to teach sectarian religious views as true in science classes. To do so would violate the present and future mental integrity of students, i.e., it would constrain their present and future religious beliefs. Third, public school policymakers have an obligation to protect the basic liberty of all school children. Fourth, restricting scientific explanations to natural causes places fewer constraints on religious belief than teaching certain sectarian religious beliefs as true in science classes. Fifth, and finally, since most people would resist compulsory sectarian religious belief, and children are less able to understand and resist sectarian religious beliefs that are presented as true, public school policymakers should limit scientific explanations offered in public school science classes to natural causal explanations.

Assessing this paternalistic argument requires a defense of the claim that the supernatural causal explanations offered by intelligent design necessarily imply sectarian religious beliefs. It also requires, as did the moralist argument by ID proponents, an investigation not only into whether or not ID concepts and references are included in the model lesson plan, but also into the scientific status of intelligent design theory for public school policy purposes. Finally, it requires a defense of the paternalistic authority of public school policymakers over the authority of parents who might want sectarian religious views taught in science classes as scientific causal

dissertation refers to religious groups who share religious views which logically exclude competing religious understandings.

54 I argue in chapter four that the supernatural causes associated with intelligent design necessarily imply certain sectarian religious beliefs. The argument can also be made that other ostensibly scientific theories that allow supernatural causal explanation would necessarily imply other sectarian religious beliefs.
explanations. In the final section of this chapter I discuss the need for further information about intelligent design theory.

In summary, the principle of basic liberty protects the physical and mental integrity of citizens. It demands that citizens begin their deliberations over the content of public policies by asking which policy best respects the basic liberty of citizens. Policies that include moralist and paternalist claims are justified if and only if they are consistent with personal integrity and they express moral values that can be mutually accepted.

*Basic Opportunity*

The principle of basic opportunity is the second content principle of deliberative democracy, and its purpose is to “help create the background circumstances that are necessary for adequate deliberation itself” (Gutmann & Thompson, 1996, p. 349). The basic opportunity principle requires policymakers to provide citizens with an adequate level of goods that are necessary for living a decent life, and among those goods is an adequate education. In their discussion of the basic opportunity principle, Gutmann and Thompson are primarily concerned with economic opportunities, not educational opportunities. Since the conflict over intelligent design and public school science education involves education, the discussion which follows focuses only on how the requirements of basic opportunity might affect deliberations over the appropriate placement of ID in public school science curricula.55

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55 I do not address the issue of whether including intelligent design in public school science classes might violate the basic opportunity principle by limiting the economic opportunities of students. The argument could be made that students who are taught ID in the place of evolutionary theory will not be adequately educated in science and therefore will be unable to compete for jobs on an equal basis with
Three areas of educational opportunity are relevant to the conflict over intelligent design in public schools—education in the biological sciences, education about religion and civic education. Education in the biological sciences is obviously relevant because an adequate education in biology is likely deemed by most citizens as essential to living a minimally decent life. Daily decisions, for example, about nutrition, health care, birth control and drugs, to name a few, often depend on an understanding of basic biology. Participation in deliberations about and voting on important social issues such as stem cell research and cloning also requires a basic education in the biological sciences. The relevancy of educating about religion may be less obvious, but no less important. The conflict between supporters of ID and those who argue that it does not belong in sciences classes is widely viewed as a religious conflict. An adequate education about religion and its importance in American history and in the public and private lives of citizens may foster mutual respect and an attitude of reciprocity among citizens thereby reducing the vitriol so often associated with the conflict. It is not implausible to argue that a minimally decent life is one in which the value of mutual respect inhibits human antipathy toward religious belief or anti-religious belief. The relevancy of civic education in the conflict over ID is apparent in the need for citizens who are willing to seek fair

other students who learned evolutionary theory. While it might be the case that students who are taught only intelligent design in college science classrooms are likely to have limited job possibilities in science fields once they leave college, it is not clear that the same would be the case for high school graduates.

The distinction between teaching religion and teaching about religion is an important one. Teaching religion generally refers to the inculcation of specific religious beliefs. Teaching about religion generally refers to the study of a variety of religious traditions with the purpose of understanding their effects on a range of social concerns. In 1963 the Supreme Court ruled in Abington v. Schempp that public schools could teach about religion when it is done "objectively as part of a secular program of education" (Nord & Haynes, 1998, p. 46).
terms of social cooperation and to offer reasons for policy decisions that are justifiable to all citizens. Understanding the potential of a deliberative political perspective and the obligations it places on citizens is essential not only to the conflict over ID and science education, it is also essential to other moral conflicts that deeply divide citizens. An adequate civic education can contribute to a minimally decent life by reducing deep social strife.

Providing for an adequate level of public education in science, religious issues and civics, i.e., a level that allows citizens to live a good or decent life and to participate in a deliberative democracy, however, is fraught with difficulty, especially in the atmosphere surrounding the conflict over ID. Prior to determining and providing for "adequate levels" of education in these areas, a difficult task in and of itself, policymakers confronted with the conflict over ID are squarely faced with one of the primary sources of moral conflict in public life: incomplete understanding. The status of intelligent design as either scientific or religious theory is deeply disputed, yet applying the principle of basic opportunity, just as applying the principle of basic liberty, requires knowing what kind of theory it is. Given the conflicting views about the status of ID and the unwillingness of policymakers to accept expert opinion, policymakers committed to a deliberative political perspective and the value of mutual respect have an obligation to inform themselves about the detailed claims of intelligent design proponents and their critics and to reach a conclusion about its status as either scientific or religious theory for public school policy purposes. Only then can they weigh the claims of intelligent design against the constitutional principles of a deliberative democratic perspective and offer mutually acceptable
reasons for public school policies on its appropriate placement in school curricula.

In summary, the principle of basic opportunity requires policymakers to provide citizens with an adequate level of goods that are necessary for living a minimally decent life and to participate in a deliberative democracy. The goods most relevant to the conflict over intelligent design are an adequate education in the biological sciences, an adequate education about religion and an adequate education in civics. Since an adequate education in these areas is dependent on determining the scientific and religious status of intelligent design, policymakers committed to the principle reciprocity and the value of mutual respect are obligated to investigate the claims of intelligent design and to reach conclusions about its status.

The first five parts of this section have discussed in detail the constitutional principles of a deliberative democracy. The final part of this section describes the kind of political reasoning the principles encourage and the general characteristics of policy decisions that result from that reasoning.

**Principled Political Reasoning in a Deliberative Democracy**

The case for a deliberative perspective on democratic politics arises, according to Gutmann and Thompson, from the inability of past conceptions of democracy to account for and address the persistence of moral conflict in the civic life of "middle democracy" in the United States. The deliberative conception of democracy developed by Gutmann and Thompson suggests normative principles or standards for moral deliberations that arise from the characteristics of moral arguments themselves and from the inability of other approaches to moral conflict,
especially utilitarian approaches, to adequately protect basic liberties and opportunities. Importantly, the arguments that support a deliberative conception of democracy and its process and content principles do not begin or end with the assumption that we all share a common morality, i.e., a shared comprehensive set of valued ends. While a deliberative conception of democracy does not assume a shared comprehensive morality, the principles it promotes are substantive as well as procedural – that is, they “presuppose and express substantive moral values” (Gutmann & Thompson, 1996, p. 349). These moral values, furthermore, are principles that might become part of a public morality thereby creating a partial conception of a common morality or common good. Thus, Gutmann and Thompson argue,

Theoretically, a deliberative perspective expresses as complete a conception of a common good as is possible within a morally pluralistic society. Recognizing that politics cannot be purged of moral conflict, it seeks a common view on how citizens should publicly deliberate when they fundamentally disagree. Practically, this perspective encourages the cultivation of a set of civic virtues that can guide citizens through the maelstroms of moral controversy in a pluralistic society. It can help citizens resolve moral conflict with fairness and, when they cannot resolve it, enables them to work together in a mode of mutual respect… (Ibid., p. 93-94)

Importantly, Gutmann and Thompson rely upon a method of moral reasoning to develop the process and content principles that is commonly employed by citizens when they attempt to morally justify their decisions and actions to others. They begin with moral arguments that present clear cases of considered judgments and reflect on the principles and values those judgments presuppose or express. They then apply those same principles and values to other cases and modify their judgments and/or the
principles giving reasons that can be accepted in principle by others. The principles they develop through this process, then, not only partially determine deliberations, the principles themselves are in turn partially determined by deliberative moral discussions about actual cases.

The set of process and content principles that emerge from this kind of moral reasoning have three important characteristics. First, they act as standards that constrain deliberations. This means that they are not neutral toward all conceptions of good or moral lives. They rule out certain kind of policies and certain kinds of reasons if the policies or reasons cannot be justified to people who seek fair terms of social cooperation. The principles, in effect, help citizens distinguish between justified and unjustified reasons for public policy decisions. Second, they are provisional. All of the principles can and should be modified in light of new information and better arguments that emerge from reiterated deliberations. Significantly, the provisional nature of the principles suggests that "Responsible citizens should...regard many of their own moral claims as provisional." Thus, "Even when citizens have good reason to be confident about their own moral views, and even when those views legitimately prevail in the democratic process, citizens should act so as to ensure that the results remain open to correction." Gutmann and Thompson regard this capacity for change as

...one of the important virtues of deliberative democracy. Its self-correcting capacity cultivates the possibility of moral progress in democratic politics. It

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57 Gutmann and Thompson describe the method of reasoning they promote in the following way: This method posits a process in which deliberators move back and forth between general principles and considered judgments about particular circumstances, successively modifying each in light of an appraisal of the other...the method is...a pattern of argument that many people use when they try to justify to others in moral terms the positions they take and the decisions they make. (Gutmann & Thompson, 1996, p. 5)
contains the means of its own alteration. Deliberation proceeds through stages, as citizens and officials propose, respond, revise, and react. The promise of deliberative democracy depends on the political learning that reiterated deliberation makes possible. (Ibid., p. 356)

Third, and finally, the deliberative process and content principles encourage citizens to seek common ground in moral disputes. The principles accommodate competing moral views when they are mutually justifiable and allow citizens to affirm the inherent moral worth of individuals with whom they disagree. Accommodating the views of others through an economy of moral disagreement enhances the possibility of reducing the range and depth of current and future moral disputes.

Public policy decisions that result from the principled political reasoning prescribed by a deliberative political perspective also have important characteristics. First, they are not necessarily just. Theoretically, just decisions would result if all of the principled conditions of a deliberative democracy were met. Practically, though, actual deliberations usually do not conform to all the principles required by a deliberative democracy. But, as Gutmann and Thompson point out, "we can say that the more nearly the conditions are satisfied, the more nearly justifiable are the results likely to be" (Ibid., p. 17). Second, the policy decisions are provisional, as are the principles that condition those policies. Public policymakers have limited understanding, and the policies they create are merely the best that can be crafted according to the best understanding policymakers have at any particular time (Ibid., p. 229). As a result, policy decisions are always open to revision given new or revised moral understandings of the principles guiding deliberations or the circumstances that policy decisions address. One of the primary aims of democratic deliberations, then, is to reach provisional moral agreement. Finally, deliberative policy decisions are
justifiable to all citizens who are bound by them. While policy decisions in a deliberative democracy may not be fully just and are provisional, they are justifiable to all citizens because the reasons for those decisions are conditioned by mutually accepted fair terms of social cooperation. Thus, even though the process and content principles may not be fully or perfectly realized in deliberations, the fact that citizens mutually agree to conduct deliberations according to those principles makes the policy decisions, however imperfect, justifiable to all.\(^{58}\)

In summary, principled political reasoning in a deliberative democracy is a form of moral reasoning. It begins by identifying principles and values that are presupposed or expressed in clear, considered moral judgments about particular circumstances and proceeds to develop and refine those principles and values as they are applied in new, more difficult circumstances. The substantive values promoted by the principles constitute a mutually agreed upon common view of how citizens ought to deliberate when they fundamentally disagree. The principles themselves are not morally neutral; they are provisional, and they can accommodate competing moral views. The policy decisions they engender are not necessarily just and are also provisional, but they are justifiable to all who are bound by them. An important virtue of principled political reasoning in democratic deliberations is that it encourages citizens to give a moral response to deep moral disagreements.

\(^{58}\) If the reasons public policymakers give for a policy are conditioned by mutually acceptable fair terms of social cooperation, i.e., the deliberative process and content principles, then the policy is justifiable even if the fair terms of cooperation were not interpreted or applied in a fully just way. This means a policy can be justifiable even if it is not fully morally justified.

To put this point another way, it can be argued that all policy decisions are morally imperfect, but some are more justifiable than others. Policies are justifiable to the extent that the deliberations leading to them were conducted according to mutually acceptable fair terms of social cooperation. Even if the fair terms of social cooperation are imperfectly applied or followed, the terms themselves offer future opportunities for improving on policies later when citizens have a better understanding.
The third section of this chapter described in detail the constitutional principles of a deliberative democracy and the kind of moral reasoning and decisions a deliberative perspective promotes. The principle of reciprocity asks citizens to engage in political reasoning that is mutually justifiable – that is, citizens are asked to offer reasons for their actions and decisions that can be accepted by others who are similarly motivated. Reciprocity depends on the value of mutual respect and promotes the virtues of civic integrity and civic magnanimity. The principle of publicity requires citizens to present reasons for public policies in public forums and, when secrecy is deemed essential, to publicly deliberate over the reasons for secrecy. Accountability asks policymakers to take responsibility for and to justify the consequences of public policies on all citizens, including those who continue to disagree with the policies. The principle of basic liberty protects the physical and mental integrity of citizens and accommodates some of the claims of moralists and paternalists. The final constitutional principle, basic opportunity, asks policymakers to create the background circumstances necessary for living a minimally decent life, and among the goods that are necessary is an adequate education. When citizens mutually agree to conduct their deliberations over public policy according to these principles, they engage in principled political reasoning that may resolve some moral disagreements and allow citizens to live with those that cannot be resolved on terms that are mutually acceptable.
The final section of this chapter briefly brings a deliberative democratic perspective to the conflict in Ohio over the tenth grade model lesson plan for teaching evolution.

Ohio: A Deliberative Perspective

This section retrospectively assesses the process and content of the public deliberations in Ohio over the “Critical Analysis of Evolution” model lesson plan according to the deliberative principles developed by Gutmann and Thompson. The assessment demonstrates how deliberative political reasoning takes into account the moral claims of persons involved in the dispute and articulates the reasons policymakers might give for decisions that result from that reasoning. The purpose of this assessment is to determine the extent to which the model lesson plan can be justified from a deliberative perspective and to explore how future deliberations might help resolve the deep moral conflicts that remain and/or reduce the range of moral disagreement.

The following questions are addressed in this section: What are the moral claims of persons involved in the dispute in Ohio? How do the principles of a deliberative democracy suggest policymakers reason about those claims? and What questions do deliberators need to answer to more fairly address the moral claims of citizens in future deliberations?

Since one of the primary virtues of a deliberative approach to conflict in politics is the fact that it considers the merits of moral claims, I begin the assessment by first clarifying the primary moral claims of the supporters of the model lesson plan
and those who were against it. The moral claims address the following broad topics: political compromise in science education; critical analysis of evolutionary theory; and the political practices of policymakers. After identifying the moral claims that are made about these topics, I weigh the claims against the process and content principles suggested by a deliberative democratic political perspective. The first principle I consider is reciprocity followed by others that emerge as pertinent to the claims being made. Finally, I identify issues that policymakers ought to investigate to ensure that future policies are more fairly justifiable to citizens who are bound by those policies.

*Political Compromise in Science Education*

As noted earlier, the model lesson plan and the academic content standard it addressed were the products of a political compromise. Proponents of intelligent design offered the Ohio state board of education a “compromise” that included the following provisions:

1) Do not require students to study the scientific evidence and arguments for ID, “at least not yet.”

2) “Teach the controversy” about “Darwinian” evolution by teaching the scientific arguments for and against it.

3) “Permit, but not require, teachers to tell students about the arguments of scientists who advocate the competing theory of intelligent design.”

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59 This assessment does not offer an exhaustive study of the moral claims made in the dispute in Ohio over the model lesson plan. It merely presents those claims that emerge from easily accessed media coverage found on websites that tracked the events in Ohio.

60 In the deliberative conception of democracy outlined by Gutmann and Thompson, the process and content principles are equally important and intimately interdependent. Thus, any investigation into the reciprocal nature of the reasons citizens give for their decisions will lead to discussion of the other pertinent principles. For their discussion of the interdependent nature of the process and content principle, see Gutmann & Thompson, 1996, p. 349-357.

61 When I place quotes around statements in this section and do not cite those quotes, it means that the statements were quoted and the source was cited in the first section of this chapter. For ease of
This proposal by ID proponents became the basis for the Ohio content standards for
tenth grade biology and the model lesson plan.

The political compromise policymakers forged in Ohio was a prudential
response to political disagreement. The best reasons policymakers could give to
justify the model lesson plan are reasons that demonstrate that the policy is mutually
advantageous. Opponents to the plan, however, remain deeply opposed to it not
because the compromise is not mutually advantageous, they remain opposed because
they regard it as wrong. The political bargaining that took place over the Ohio lesson
plan did not resolve much less reduce the scope of the dispute over the plan because
the bargaining did not address the moral claims of citizens. The merits of the claim,
for example, that political compromise over scientific matters destroys the integrity of
science and the scientists who engage in such compromises were not seriously
addressed on terms that could be accepted by opponents to the plan. The model
lesson plan, then, remains thoroughly unjustified to opponents who are still bound by
its terms.\textsuperscript{62}

Proponents offered the following reasons for accepting the compromise. The
compromise is "fair." It allows for "unbiased teaching" of "the full range of relevant
scientific evidence" and avoids "censoring" alternative views to evolutionary theory
through "selective presentation of evidence." In addition, the compromise promotes
"intellectual" and "academic" freedom. Teaching scientific criticisms of evolutionary

\textsuperscript{62} It should be noted that the model lesson plan is 'optional.' Teachers in Ohio do not have to
incorporate its contents into their own lesson plans. But, since statewide academic assessment tests are
based on the academic content standard that the lesson plan addresses, and since this plan is considered
to be a 'model' plan that addresses the content standard, it is reasonable to assume that most teachers
will consider themselves to be bound by the requirements of the lesson plan.
theory promotes "freedom of thought," and when those criticisms are part of an alternative theory to evolution, that theory "can be taught as part of a teacher's academic freedom."

Opponents to the compromise objected for the following reasons. First, political compromise in science education destroys the "intellectual integrity" of science and the professional integrity of scientists who accept political compromise. Science is not "fair" or "democratic" and "communicating that fact is a vital part of teaching what science is all about" (Krauss, 2002d, p. 3). The "nature of science" requires that "fully qualified peers derive consensus on scientific matters;" democratic voting is outside the realm of science. Second, political compromise over the teaching of evolution deprives children of the opportunity to receive an adequate science education. It teaches children that a theory that has survived "the repeated test of experiment[s]" conducted according to mutually accepted science standards adopted by the larger scientific community must, in the end, conform to narrow political and religious interests (Krauss & Princehouse, 2003, p. 3). Such an education will diminish the ability of children to "function and flourish in our modern technological society" (Krauss, 2002a, p. 1). Third, suggesting a compromise is wrong because "there is no [scientific] controversy about evolution." Evolution is a "time- and evidence-tested theory that integrates the various disciplines of modern life science and ties the life sciences to the chemical, physical, and earth sciences;" it "is as central to modern biology as Newton's laws are to physics" (Krauss, 2002d, p. 1-2). Finally, the compromise suggested in Ohio allows the "false" and "unscientific" theory of intelligent design to be taught as science in public school classrooms.
Intelligent design, opponents claim, is "scientifically untestable" and "cannot be invalidated through scientific means." It is therefore wrong to include it as science in science classrooms.

The leading deliberative principle, the principle of reciprocity, has two requirements. First, citizens are asked to engage in political reasoning that is mutually justifiable – that is, citizens are asked to give reasons to one another that are conditioned by mutually accepted fair terms of social cooperation. Second, it requires that when empirical claims are made, the claims should be made in terms that are "consistent with relatively reliable methods of inquiry" that are "themselves mutually acceptable." Do the reasons offered for support of and opposition to political compromise in science education meet the requirements of reciprocity?

*Fairness and intellectual freedom.* The appeals by supporters of the lesson plan to fairness and intellectual freedom certainly appear to be reciprocal in nature. They are appeals to values that can be mutually accepted by all citizens.

Questions arise, however, when the claims of the opponents to the plan are considered. If science is inherently "unfair," i.e., undemocratic, and requires adherence to methods and standards that are mutually agreed to by the larger scientific community but not necessarily agreed to by citizens without scientific expertise, then appeals to fairness and freedom of thought would not be appropriate in science education. Empirical claims that are conditioned by mutually accepted methods and standards within the larger scientific community meet the reciprocal demand that empirical claims must to be consistent with "reliable methods of inquiry" that are "themselves mutually acceptable." Teaching children science lessons that
violate the methods and standards set through the consensus of scientists over decades of scientific research would be inappropriate. It would be more appropriate to teach students the methods and standards of science and the body of knowledge that has been acquired through them. There is, after all, a difference between unfettered “intellectual freedom” where “freedom of thought” allows a student to “think freely” and inquiry that is disciplined by the norms of science. Unfettered freedom of thought is unlikely to lead to an adequate education in science, i.e., one that enables citizens to make knowledgeable decisions in their private lives and to participate knowledgeably in public policy decisions that concern scientific issues. In that case, it would be wrong to deprive students of an opportunity to receive an adequate education.

To the extent, then, that science is not democratic and is conducted according to methods and standards that are mutually agreed to by the larger community of scientists, the reasons offered by proponents of the lesson plan for accepting the compromise are not reciprocal reasons. The principle of opportunity which requires students to receive an adequate education constrains appeals to fairness and intellectual freedom.

Academic freedom. Proponents of the lesson plan also suggest that academic freedom is an important reason for accepting the compromise. Fully qualified, credentialed scientists have demonstrated that the criticisms of evolutionary theory suggested in the model lesson plan are valid. Academic freedom allows teachers to teach criticisms of evolutionary theory that are based on scientific evidence offered
by fully qualified, credentialed scientists. If teachers are not allowed to teach scientific evidence against evolution, their academic freedom will be violated.

This appears to be a thoroughly reciprocal claim. It promotes a value, academic freedom, which apparently can be accepted by all citizens.

Opponents argue, however, that the scientific evidence against evolution that the proponents of the lesson plan have in mind is false and part of an unscientific theory, intelligent design, which cannot be invalidated through scientific means. Academic freedom does not include the freedom to teach alternative theories in science classes that do not adhere to the scholarly standards of inquiry required by the discipline of science. Academic freedom is more restricted than the general freedom of citizens to "think, speak, and publish their ideas. If academic freedom knew no scholarly bounds, the freedom of [teachers] would be indistinguishable from these more general freedoms... [Teachers] must recognize a duty to observe scholarly standards of inquiry as a condition of their social office" (Gutmann, 1987, p. 175).

Teachers who present false and unscientific information as credible criticisms of evolutionary theory step outside the boundaries of scholarly inquiry thereby calling into question their integrity as teachers and the integrity of science education. To maintain their professional integrity and the integrity of science education, teachers should not present demonstrably false and unscientific propositions as valid criticisms of evolutionary theory.

Opponents to the model lesson plan could argue that the principle of accountability constrains appeals to unrestricted academic freedom. The argument could be constructed as follows. First, the integrity of science and the professional
integrity of teachers who teach science depends upon adhering to methods and standards mutually accepted by the wider scientific community that create scholarly boundaries for scientific inquiry. Second, teachers are held accountable for maintaining the scholarly boundaries of inquiry associated with the discipline of science through licensing regulations. Third, policies based on unrestricted academic freedom that require teachers and scientists to deny the methods and standards accepted by the wider scientific community violate the professional integrity of teachers and the integrity of science. Fourth, the principle of accountability protects the professional integrity of teachers and the integrity of science by protecting them from policies that require them to violate methods and standards that have been mutually agreed to by the wider scientific community. The principle of accountability, then, which requires teachers to maintain the scholarly boundaries of inquiry associated with the discipline of science, constrains appeals to unrestricted academic freedom.

The appeal to academic freedom as a reason for supporting the model lesson plan in Ohio crucially depends on the scientific status of the evidence offered against evolutionary theory and the scientific status of the alternative theory that supports the critical evidence. If, indeed, the evidence is fully relevant and fully scientific, i.e., it adheres to mutually accepted methods and standards of science; and if the alternative theory to which that evidence points is also thoroughly scientific; then appeals to academic freedom meets the requirements of accountability. The integrity of the teachers presenting the evidence and the integrity of science would remain fully intact. However, if the critical evidence is false and the theory that supports that
evidence is unscientific, then the appeal to academic freedom is an appeal to unrestricted academic freedom and it fails to meet the test of accountability. The professional integrity of teachers and the integrity of science would be compromised.

In summary, the model lesson plan and the academic content standard it addressed resulted from a political compromise. An assessment of the moral claims of both proponents of and opponents to the political compromise suggests that 1) appeals to fairness and intellectual freedom are constrained by the principle of opportunity and 2) the principle of accountability constrains appeals to unrestricted academic freedom. The model plan cannot currently be justified from a reciprocal perspective. To meet the requirements of reciprocity, future deliberations about the model lesson plan must include information about the scientific status of intelligent design, investigation into the question of whether ID concepts and references to ID are contained in the lesson plan, and information about the religious status of intelligent design theory.

**Critical Analysis of Evolutionary Theory**

The academic content standard for tenth grade biology in Ohio states:

"Describe how scientists continue to investigate and critically analyze aspects of evolutionary theory." Not surprisingly, then, the model lesson plan developed to meet this standard is entitled “Critical Analysis of Evolution.” While the requirement to critically analyze evolutionary theory appears to be thoroughly reasonable expectation not only for evolutionary theory but all scientific theories, public discussions surrounding the model lesson plan in Ohio revealed deep divisions among
citizens concerning the meaning of "critical analysis" and whether or not critical analysis of evolutionary theory by tenth graders is appropriate.

Proponents of critically analyzing evolutionary theory claim that evolutionary science censors evidence for the design of living things by imposing a "Rule" - the rule of methodological naturalism\(^\text{63}\) - that "declares design inferences invalid by definition."

Instead of promoting an objective search for the truth, [the rule] abandons an objective approach and censors any evidence that does not support the predetermined conclusion...This censorship violates the rights of teachers, students and parents to have science education conducted without discrimination against various viewpoints relevant to the subject matter being taught." (SEAO, 2004b)

Critical analysis of evolutionary theory will stop the censorship, according to proponents, because it will allow students to learn the "evidence that does not support biological evolution (the theory of common descent)" (Ibid., p. 1). Proponents of the critical analysis of evolutionary theory, then, claim that censorship of "design inferences" violates the rights of teachers, students and parents by discriminating against "relevant viewpoints" and that critical analysis will overcome that censorship.

Opponents to the model lesson plan argue that the requirement to "critically analyze" evolutionary theory introduces ambiguous language that dishonestly 1) suggests that evolutionary theory is a controversial topic among scientists; 2) allows false criticisms based on the religious theory of intelligent design to appear as if they are "scientific;" 3) requires students engage in "disingenuous," and perhaps unethical, debates over ideas rejected "by decades of sound science;" and 4) "sneaks" intelligent

\(^{63}\) 'Methodological naturalism' refers to the practice by scientists of assuming only natural causal explanations for natural phenomena. It is distinguished from 'ontological naturalism' which declares that the universe is a closed system of material causes and effects and material phenomena are all that exist. Ontological naturalism rules out the existence of supernatural beings, including God.
design creationism “in the back door” of science classrooms because it “cannot enter...the honest way, by submitting their ideas to critical analysis by otherwise disinterested scientists.”

Before assessing the extent to which the claims of supporters of and opponents to the “critical analysis” of evolutionary theory meet the requirements of reciprocity, it is important to first examine what is meant by “critical analysis.”

*The concept of ‘critical analysis.’* There are three definitions of the concept ‘critical analysis’ that appear relevant to this discussion – common dictionary definitions of ‘critical’ and ‘analysis,’ the definition found in the model lesson plan and a definition offered by Gutmann and Thompson.

‘Analysis,’ according to *Webster’s New World Dictionary*, refers to the process of “separating or breaking up of any whole into its parts, especially with an examination of these parts to find out their nature, proportion, function, interrelationship, etc.” The word ‘critical’ “implies an attempt at objective judging so as to determine both merits and faults, but it often connotes emphasis on the faults or shortcomings.”A dictionary definition of the concept ‘critical analysis’ would presumably consist, then, of the union of the meanings of the separate words ‘critical’ and ‘analysis.’ It is precisely this type of definition that the model lesson plan adopts.

The model lesson plan defines ‘critical analysis’ as follows: “The separation of an intellectual idea into its constituent parts for the purpose of a careful, exact

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64 *Webster’s New World Dictionary of the American Language*, 2nd college ed., s.vv. “Analysis” and “Critical.”
evaluation and judgment about those parts and their interrelationships in making up a whole. (This definition combines the definition for critical and analysis.)^65

Both the dictionary definitions of ‘critical’ and ‘analysis’ and model lesson plan definition of ‘critical analysis’ include 1) the separation of something (in this case, evolutionary theory) into parts and 2) making judgments about the thing taken apart.

While Gutmann and Thompson do not address the concept of ‘critical analysis,’ it is informative to consider their description of ‘critical reasoning.’ Gutmann and Thompson regard the skill to reason critically as a crucial prerequisite for principled political reasoning about moral issues in a deliberative democracy. In their view, critical reasoning consists of “the ability to justify one’s own actions, to criticize the actions of one’s fellow citizens, and to respond to their justifications and criticisms” (Gutmann and Thompson, 1997, p. 65).

The first thing worth noting about Gutmann and Thompson’s definition of critical reasoning is that it requires making judgments about three things: one’s own actions, the actions of others, and the responses of others. Importantly, Gutmann and Thompson offer a framework of mutually agreed upon principles against which judgments can be made – the process and content principles of a deliberative democracy. Without this mutually agreed upon framework of fair terms of social cooperation, the reasons for the judgments one makes cannot be justified to others. There is no reciprocal basis for accepting the judgments of others if you cannot agree on standards that identify the relevant basis for decision-making.

^65 See Appendix A, Ohio’s “Critical Analysis of Evolution” Model Lesson Plan, p. 280.
Neither the dictionary definitions nor the model lesson plan definition indicate the relevant basis for (1) judging how to break a whole into parts (what are the reasons one would offer for separating evolutionary theory into ‘parts’ in one particular way over another?), and (2) judging the merits and faults of the parts and the whole (what are the reasons one would offer for the evaluations and judgments one makes about the “constituent parts” of evolutionary theory and evolutionary theory as a whole?). Unless specific, mutually accepted methods and standards for reasoning about the scientific worth of ideas and concepts are provided to students, their basis for making judgments about scientific claims and the judgments themselves are likely to be irrelevant to an adequate science education.

The second item worth noting about Gutmann and Thompson's definition of critical reasoning is that making reciprocal claims, i.e., making claims that can be accepted by others who are similarly motivated to find reasons that can be accepted by others, is at the heart of critical reasoning.

Similarly, it can be argued that making reciprocal claims is at the heart of critical analysis. Critical analysis relies on the capacity of persons to make claims based on standards that can be accepted by others even though they may continue to disagree with the claims. Reciprocal claims are based on mutually agreed upon fair terms of cooperation. It follows that, in the case of critical analysis lesson plan, critical claims about evolutionary theory, to be justified, must be conditioned by mutually agreed upon methods and standards of scientific research.

Do the reasons offered for support of and opposition to the “critical analysis” of evolutionary theory meet the requirements of reciprocity?
Censorship. Proponents of the model lesson plan assert that the practice of methodological naturalism, i.e., the assumption that natural causal explanations are sufficient for natural phenomena, censors design inferences through ruling them out by definition. They also claim that critical analysis of evolutionary theory will correct that censorship. There are several important questions raised by these claims. First, what are “design inferences?” Are design inferences an essential element of intelligent design theory? Second, if “design inferences” are ruled out by the assumption of methodological naturalism, what kind of causes do design inferences allow? Would design inferences allow supernatural causes in scientific explanations? Third, is it “censorship” if mutually accepted methods and standards of science assume supernatural causes are not needed to explain natural phenomena? Fourth, if methodological naturalism is a mutually accepted standard in the larger scientific community for scientific explanations, and critical analysis of evolutionary theory by tenth graders using the model lesson plan violates that standard, are students receiving an adequate science education? Would their basic liberty be violated?

The first two questions can only be answered through a thorough investigation into the claims and status of intelligent design theory. The assumption of methodological naturalism is a mutually accepted standard of modern science established by the wider scientific community over the last three centuries. If the critical analysis lesson presents intelligent design theory as an appropriate standard for criticizing evolutionary science, and if intelligent design allows supernatural causes in scientific explanations, then the critical analysis lesson violates the standard established by the scientific community. From a deliberative perspective, allowing
supernatural causes in scientific explanation can only be justified if the reasons for doing so can be accepted publicly by scientists who are motivated to find fair terms of cooperation. If the model lesson suggests or requires a standard that violates mutually agreed upon methods and standards of scientific investigation and the plan does not explicitly state the new standard, then the principles of publicity and accountability are violated. When the fundamental assumptions and purposes of public policy are disguised or hidden from the public, the policy cannot be justified from a deliberative perspective. The model lesson plan also would not meet the requirements of reciprocity because students would be offering reasons for their criticisms of evolutionary theory based on the standards of intelligent design theory which are not mutually agreed to by the wider scientific community. Students would be unable to offer reciprocally acceptable reasons to the wider scientific community for critical claims against evolutionary theory.

The answer to the third question (does disallowing supernatural causes in scientific explanations “censor” science?), depends on the reasons scientists give for not considering supernatural causes in their scientific research. Importantly, scientists and philosophers of science give a variety of reasons for the absence of supernatural explanations in scientific explanations.

Philosopher of science Robert Pennock argues that the requirements of scientific evidence rule out supernatural causal explanations.

Empirical testing relies fundamentally upon the lawful regularities of nature which science has been able to discover and sometimes codify in natural laws...Without the constraint of lawful regularity, inductive evidential inference cannot get off the ground. Controlled, repeatable experimentation, for example,...would not be possible without the methodological assumption that supernatural entities do not intervene to negate lawful natural regularities.

(Pennock, 1999, p. 194-195)
In addition, hypotheses that include supernatural causes are immune from disconfirmation. "Any pattern (or lack of pattern) of data is compatible with the general hypothesis of the existence of a supernatural agent unconstrained by natural law" (Ibid., p. 195). Evolutionary biologist, paleontologist and zoologist Stephen Jay Gould argues that supernatural causes are properly associated with religious belief, and that religion and science are two separate, non-overlapping "magisteria."

"...science covers the empirical realm: what is the universe made of (fact) and why does it work this way (theory). The magisterium of religion extends over questions of ultimate meaning and moral value" (Gould, 1999, p. 6). Philosopher of science Michael Ruse agrees with Gould that supernatural causal explanations are religious explanations, and he agrees with Pennock that there are certain criteria that demarcates science from religion. Ruse argues that science has certain characteristics that set it apart from religion and that those characteristics are nicely summed up by Judge Overton's 1982 ruling in *McLean v. Arkansas*, a federal court case which held that the "balanced treatment" of "creation-science" and "evolution-science" violated the Establishment Clause of the U.S. Constitution (Ruse, 1982, p. 38-45).  

Philosopher of science Larry Laudan forcefully argues against Pennock, Gould and Ruse stating that

...it is probably fair to say that there is no demarcation line between science and non-science, or between science and pseudo-science, which would win assent from a majority of philosophers...If we would stand up and be counted on the side of reason, we ought to drop terms like..."pseudo-science" and

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66 Judge Overton wrote:  
...the essential characteristics of science are: (1) It is guided by natural law; (2) It has to be explanatory by reference to natural law; (3) It is testable against the empirical world; (4) Its conclusions are tentative, i.e., are not necessarily the final word; and (5) It is falsifiable. (Laudan, 1982, p. 48)
"unscientific" from our vocabulary; they are just hollow phrases which do only emotive work for us." (Laudan, 1983, p. 338, 349)

In his view, the reason why supernatural causes are not found in, for example, evolutionary biology is because “the existing evidence provides stronger arguments for evolutionary theory than for Creationism” (Laudan, 1982, p. 52). Whether one agrees with any one of these arguments for why supernatural causes are not included in scientific explanations, the common denominator is an assumption based on past and present evidence that natural causes are sufficient to explain natural phenomena.

From a deliberative perspective, the assumption of methodological naturalism as a fair term of social cooperation among scientists means that the reasons scientists give to one another for critical claims against evolutionary science are justified only if they meet this standard. It does not mean that the standard cannot be changed. To change the standard and allow supernatural causal explanations into scientific explanations, defenders of the change would have to offer compelling evidence that could be accepted by the wider scientific community. So far, it appears no one has offered compelling evidence that supernatural causes are the best explanation for natural phenomena. Only a thorough investigation into the scientific claims of intelligent design can reveal if ID theory offers compelling evidence.

Does the assumption of methodological naturalism “censor” “design inferences?” From a deliberative perspective, it does not. If an inference to a supernatural cause was warranted by evidence, supernatural causes could be accepted by the wider community of scientists.

The fourth and final question that arises from the claims of proponents of the model lesson plan asks whether critical analysis of evolutionary theory by tenth
graders using standards that include supernatural causes violates the basic liberty and basic opportunity of students. This question depends on whether or not critically analyzing evolutionary theory according to the lesson plan introduces supernatural causal explanations and whether those explanations necessarily imply sectarian religious ideas. If supernatural causal explanations necessarily imply religious ideas, then the basic liberty of students would be violated. In addition, if students reach conclusions about evolutionary biology that contradict "decades of sound science" and those conclusions impair the ability of students to make appropriate personal and civic decisions concerning science, then the basic opportunity of students would be violated.

Dishonesty. Opponents to the model lesson plan claim that the term “critical analysis” is ambiguous and dishonestly suggests that modern evolutionary theory is controversial among scientists, allows false criticisms to appear relevant to criticizing evolutionary theory, requires students to debate ideas long ago rejected by scientists and sneaks intelligent design into science classrooms.

Assessing these claims from a deliberative perspective requires policymakers to spend time investigating the following questions: 1) Is evolutionary theory in crisis? Are there widely recognized alternatives theories that solve problems evolutionary theory has not solved? 2) Does the lesson plan include false criticisms? 3) Are students required to debate ideas demonstrated to be false by the wider scientific community? and 4) Does the lesson plan include intelligent design concepts and references to ID? Without an investigation into these questions, the “Critical Analysis of Evolution” model lesson plan cannot be justified to all citizens who are
bound by it terms. Clearly, the principle of accountability requires policymakers to take responsibility for mounting investigations into outstanding questions raised by the moral claims of citizens. If an investigation does not take place, not only the plan but the actions and decisions of policymakers cannot be justified to citizens bound by the plan.

In summary, 'critical analysis' in education requires mutually agreed upon standards for students that identify the relevant basis for making critical judgments. Scientists, including evolutionary scientists, generally assume a standard of methodological naturalism. Since this standard can be changed if evidence demonstrates to the wider scientific community that a change is warranted, then, from a deliberative perspective, methodological naturalism does not censor other possible standards. If the model lesson plan implicitly endorses the standard of intelligent design theory, the principles of publicity and accountability are violated. The principles of basic opportunity and basic liberty are also violated if the supernatural causes in intelligent design necessarily imply sectarian religious ideas. Since answers to pressing questions about the scientific and religious status of ID and the presence of ID in the lesson plan are still outstanding, the lesson plan cannot be justified from a reciprocal perspective. For the plan to be justified, the principle of accountability requires policymakers to engage in a thorough investigation into those questions.

The Political Practices of Policymakers

The Ohio State Board of Education and the Ohio Department of Education were accused by opponents of the “Critical Analysis of Evolution” lesson plan of engaging in unfair political practices. Among the things they objected to were: the
selection of subcommittee members who wrote the lesson plan; lack of easy public
access to and participation in subcommittee meetings; lack of easy public access to
and timely availability of information about the lesson plan; and the lack of
accountability from all levels of state government.

Opponents to the model lesson plan claimed that the chairman of the standards
committee who appointed the seven member subcommittee in charge of writing the
lesson plan, and who was an ID supporter, “pointedly excluded” (P. Princehouse,
personal communication, May 6, 2004) a prominent Ohio biologist from the committee.
Dr. Steve Rissing, director of the introductory biology program at Ohio State
University and a member of the 15 member writing advisory group for all the
standards, had indicated his interest in serving and was told by a staff person at the
ODE that the reason he was not chosen is “because they wanted to spread the pain
around” (S. Rissing, personal communication, May 7, 2004). Excluding a
prominent biologist from the subcommittee for a frivolous reason was wrong,
according to opponents, not only because the committee did not have a member who
represented introductory college biology professors, but also because the committee
did not have members with extensive expertise in evolutionary theory. It was also
wrong to ignore the good faith efforts of Rissing and others by dismissing without
discussion the alternative plan they developed at the request of some board members.

67 When Rissing was given this reason why he was not chosen to serve on the subcommittee, he replied
that he felt “blackballed.” While he had the opportunity to critique the lesson plan, he said that the
forms he had to fill out created “institutional barriers on giving real feedback.” Instead of giving the
reviewer an opportunity to give a substantive critique, the forms asked such questions as “Is the lesson
plan grammatically correct?” and “Is the lesson plan easy to read?” (S. Rissing, personal
communication, May 7, 2004).
Opponents also claimed that easy public access to and participation in subcommittee meetings was thwarted by lack of announcements about the time and place of meetings. Subcommittee member John Neth claims that the meeting times and locations were never advertised, and that if a citizen did attend, he or she was told to quietly observe and not speak at any time during the meeting. In addition, documents used at the meetings could not be taken home or shared with the public thus excluding another avenue for citizens to learn about the work of the subcommittee (J. Neth, personal communication, May 8, 2004). Opponents to the plan claim that the meetings of and documents created by the subcommittee were intentionally concealed from the scientific community. Concealing the committee’s efforts “especially from scientists” resulted, according to OAS’ Lynn Elfner, in a “fatally flawed model lesson that is riddled with errors both in pedagogy and scientific content.”

It was also wrong, according to opponents, for the Ohio Department of Education to fail to release the lesson plan for public perusal once the ODOE accepted it for field testing in September. The unwillingness of the ODOE to allow citizen perusal of the lesson plan was also apparent when it later required three official requests through the Freedom of Information Act and $140 before the Ohio Academy of Sciences could receive an official copy of the lesson plan from the Ohio Department of Education. By the time interested citizens had full access to the plan

68 Neth also noted that the scientific community “dropped the ball” and did not seriously track the work of the subcommittee until teachers who were testing the lesson plan in field tests began calling the anti-ID group, OCS, to complain about the presence of ID material in the plan (J. Neth, personal communication, May 8, 2004).

69 Neth also states that when he strongly disagreed with the first draft of the lesson plan which was “filled with ID material,” he was “called in” by a staff member at the ODE and told to “tone down” his efforts to “influence the committee” (J. Neth, personal communication, May 8, 2004).
in December 2003, they were told they were too late to affect the contents of the plan (P. Princehouse, personal communication, May 6, 2004).

Finally, opponents to the plan claimed that educational leaders “from the governor on down” were not listening or responding to the scientific community. The lack of response of government leaders to the concerns of scientists displayed, according to Lawrence Krauss, “a frightening level of divergence between government and the scientific community” and “blatant disregard for scientific integrity.”

For better or worse, we live in a technological society, and almost all important issues of public policy have a scientific component... The results of scientific investigations should not be withheld from our children. Nor should science be divorced from the development of sound public policy, independent of politics. If science is treated as the enemy, ultimately everyone in our democracy suffers... (Krauss, 2004b, p. 3)

Proponents of the model lesson plan responded to the claims of opponents with skepticism and derision. Bob Lattimer of the pro-ID SEAO said he thought that since “The debate this year has been very quiet [and] not in the news... that’s good.” He added that

...a fair representation of intelligent-design advocates on the subgroup was not improper because it represented the majority opinion of Ohioans. “The last I heard, three out of seven is not a majority, so I’m not sure what the complaint is... After all, 75 percent of Ohioans in the 2002 public input phase said they wanted this kind of lesson.”

OSBOE member Debra Owens Fink regarded the complaints of opponents as “whiny,” and OSBOE Vice President Richard Baker felt that scientists were merely wasting everyone’s time because what they do is irrelevant and they don’t know

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everything. "[They're] just a bunch of paranoid, egotistical scientists afraid of people finding out [they] don't know anything."

To what extent do the reasons opponents give for their objections to the political practices of policymakers meet the requirements of the principle of reciprocity? To what extent do the reasons proponents give for discounting the claims of opponents meet the requirement of reciprocity?

The requests of opponents to have a prominent biology educator serve on the committee and to have his suggested alternative plan fairly considered by the SBOE appear to meet the demands of reciprocity. They appeal to the purpose of the principle of basic opportunity – that is, to “help create the background circumstances that are necessary for adequate deliberation itself” (Gutmann & Thompson, 1996, p. 349). While each person ought to be given fair and equal consideration for public service, an argument could be made that persons with an expertise not readily available in the community that is relevant to specific public policies could be given higher priority to serve on public service committees. As long as the reasons for including or excluding certain citizens are publicly deliberated and are reciprocal in nature, giving priority to persons with expertise could be justified from a deliberative perspective. Similarly, the request for public discussion of the alternative lesson plan offered by Rissing and others is consistent with the principle of opportunity. If a citizen is denied service yet is still is given the chance to provide information to policymakers to respond to the need for education.

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71 Rissing is, arguably, the most influential undergraduate science educator in Ohio. He directs the largest undergraduate program in introductory biology in the state. The Introductory Biology Program (IBP) which he directs offers two quarter, 100 level sequences in non-major, major and honors biology. Within the IBP, he often teaches more introductory biology classes (generally two per year) than any other faculty member at Ohio State; he also manages approximately 70 graduate teachers per quarter. The IBP program enrolls approximately 8,500 students per year (R. Rissing, personal communication, May 8, 2004).
members of the board who then publicly deliberate over the information, then the
demands of opportunity are better fulfilled.

The reasons opponents give for objecting to the lack of easy public access to
and participation in subcommittee meetings and for lack of easy and timely access to
information about the contents of the lesson plan also appear to meet the requirements
of reciprocity. The principle of publicity asks policymakers to deliberate publicly so
that citizens, among other things, can 1) judge the competence of elected and
appointed officials, 2) broaden their moral and political perspectives through listening
to the public justifications of others, and 3) change their minds or modify their
positions after hearing the views of others. When citizens are denied full and easy
access to public meetings and timely access to information about the decisions of
policymakers, the principle of publicity is violated and the policies created under
those conditions cannot be justified to all who are bound by those policies.

Finally, the requirements of reciprocity appear to be met in the reasons
opponents of the plan give for objecting to a lack of governmental leadership. Their
reasons appeal to the principles of reciprocity, accountability and basic opportunity.
The common interest that all citizens have in protecting our democratic way of life, in
protecting the personal and professional integrity of persons and in providing an
adequate education to children requires policymakers and the scientific community to
be motivated to find mutually accepted fair terms of social cooperation. The refusal
or inability of appointed and elected policymakers to respond to the moral claims of
the scientific community in terms that scientists could accept not only violates the
professional integrity of scientists, but also threatens the basic opportunity of children

to receive an adequate education in science.

The reasons proponents of the model lesson plan give for dismissing the
claims of opponents do not meet the demands of reciprocity. Noting that it was
“good” that the debate over the lesson plan was “very quiet” and “not in the news”
implies that the principle of publicity was intentionally thwarted in the hope that
citizens who were against the plan would not be aware of the work of the
subcommittee. It also implies that policymakers were attempting to keep the work of
the committee secret for reasons of necessity. In that case, policymakers were aware
that many citizens would object to the policy and attempt to change it if they knew
what the policy was going to be. From a deliberative perspective, the necessity of
secrecy is justified only if the reasons for the secrecy are deliberated.

The reasons proponents of the plan give for a “fair representation of intelligent
design advocates on the subgroup” were also not reasons that could be accepted by
those opposed to the plan. Arguing that public opinion polls ought to determine
whether or not intelligent design concepts and references should be in the model
lesson plan violates the professional integrity of teachers who are held accountable
for maintaining the scholarly boundaries of inquiry established by the wider scientific
community. The methods and standards of science are not decided democratically;
they are arrived at through the consensus of scientists over centuries of scientific
investigations. To justify the alteration of the methods and standards of science
mutually accepted by the wider scientific community, ID advocates must present
evidence that warrants the acceptance of new methods and standards.
Finally, the derisive reasons two OBOE members give for discounting the moral claims of opponents to the plan obviously do not meet the requirements of reciprocity. In fact, appeals to "whininess," paranoia, and egoism signal a rejection of the aim of finding fair terms for social cooperation. In that case, citizens are locked in non-deliberative disagreement where political power prevails over moral argument and public policies cannot be justified to all citizens who are bound by those policies. It also signals that proponents of the model lesson plan may perceive more to be at stake in the conflict over the plan than they are publicly revealing. As noted earlier in this chapter, when cherished values are perceived to be at stake in moral conflicts, deliberations over the merits of moral claims often descend into "communicating by sound bite, competing by character assassination, and resolving political conflicts through self-seeking bargaining" (Gutmann and Thompson, 1996, p. 12).

In summary, opponents of the "Critical Analysis of Evolution" lesson plan objected to the political practices of policymakers and their appointees as they deliberated over and wrote the model lesson plan. An assessment from a deliberative perspective of their moral claims and the responses of others to those claims suggests, first, that the reasons opponents gave for their objections meet the demands of reciprocity. The principles of publicity, accountability, basic liberty and basic opportunity were properly appealed to in their objections. Second, proponents of the lesson plan and public school policymakers in Ohio did not address the merits of the moral claims of opponents, and their reasons for not doing so did not meet the requirements of reciprocity. The principles of publicity and accountability were
violated by the reasons they gave. In fact, proponents of the lesson plan and some policymakers appear to reject altogether the aim of finding mutually acceptable fair terms of social cooperation. Third, and finally, the conflict in Ohio is currently characterized by non-deliberative disagreement and a possible failure to fully address all of the perceived stakes in the conflict over the model lesson plan.

The final section of this chapter retrospectively assessed the process and content of the public deliberations in Ohio over the “Critical Analysis of Evolution” in terms of the deliberative principles developed by Gutmann and Thompson. I identified the primary moral claims of the proponents of and opponents to the lesson plan found in three topics in the dispute: political compromise in science education; critical analysis of evolutionary theory; and the political practices of policymakers. I then weighed those claims against the process and content principles suggested by a deliberative democratic political perspective. The assessment suggested eight general conclusions about the conflict in Ohio: 1) appeals to fairness and intellectual freedom in science education are constrained by the principle of opportunity; 2) the principle of accountability constrains appeals to unrestricted academic freedom; 3) critical analysis requires mutually agreed upon standards that identify the relevant basis for making critical judgments; 4) the political practices of policymakers in Ohio cannot be justified from a deliberative perspective; 5) proponents of the lesson plan may not be revealing in public deliberations the primary moral values they perceive to be at stake; 6) the model plan cannot currently be justified from a deliberative perspective; 7) the conflict in Ohio is currently characterized by non-deliberative disagreement;
and 8) to justify the model lesson plan from a deliberative perspective, policymakers in future deliberations must address and reach consensus on answers to the three pivotal questions that remain deeply disputed in the conflict.

**Conclusion to Chapter Two**

The purpose of this chapter was to provide evidence that citizen disagreements over the placement of intelligent design in public school science classrooms are rooted in moral disagreements and to introduce a theoretical political framework, a deliberative democratic perspective, which encourages citizens to seek fair terms of social cooperation when attempting to resolve moral disputes. I suggested that when public school policy makers adopt a deliberative perspective and conduct public deliberations over school policy according to the process and content principles a deliberative perspective promotes, school policies are more likely to be justified to all citizens who are bound by those policies. I also suggested that a deliberative perspective could help identify those areas of disagreement which might be resolvable and help citizens live in mutual respect when they continue to fundamentally disagree.

The conflict in Ohio ended in nondeliberative disagreement. Proponents of the plan – including citizen activists, politicians, and policymakers – were unable or unwilling to address the moral claims of opponents and to offer reciprocal reasons for rejecting the claims. In deliberative theory, nondeliberative disagreements are contrasted with deliberative disagreements where all citizens are committed to finding fair terms of cooperation and all are offering reasons that cannot be shown to violate those terms, yet they continue to disagree. What does a deliberative perspective have
to say about how to proceed when citizens nondeliberatively disagree or
deliberatively disagree? How can you resolve any disagreements or live in mutual
respect with persons who prefer "power politics" and refuse to seek mutually
accepted fair terms of social cooperation?

Interestingly, Gutmann and Thompson state that

When a disagreement is not deliberative...citizens do not have any obligations
of mutual respect toward their opponents. In a deliberative disagreement....
citizens should try to accommodate the moral convictions of their opponents to
the greatest extent possible, without compromising their own moral convictions.
We call this kind of accommodation an economy of moral disagreement, and
believe that, though neglected in theory and practice, it is essential to a morally
robust democratic life. (Gutmann & Thompson, 1996, p. 3)

In Gutmann and Thompson's view, then, citizens are to "act differently" toward their
opponents when they disagree (Ibid., p. 79). In one case, nondeliberative
disagreement, citizens do not need to fulfill the obligations of mutual respect which
include "accommodate[ing] the moral convictions of their opponents to the greatest
extent possible." In the other case, deliberative disagreement, citizens are to fulfill all
the obligations of mutual respect included in the accommodation principles -- civic
integrity and civic magnanimity.

It appears, then, that when citizens are locked in a non-deliberative
disagreement in a deliberative democracy, there is no possibility of resolving some
areas of disagreement and of living together in mutual respect.

I reject that view, and it is not clear that Gutmann and Thompson would fully
embrace the consequences of completely discarding the obligations of mutual respect
when citizens non-deliberatively disagree. If the dispositions required by civic
integrity (consistency in speech, consistency between speech and action, and the
integrity of principle) do not need to be fulfilled, public policies are guaranteed to be
forged only through the power politics of self-interest. And, if the dispositions required by civic magnanimity (acknowledging in speech the moral views of others, open-mindedness, and seeking convergence through an economy of moral disagreement) do not need to be fulfilled, individual and collective moral growth will never occur. Indeed, if the virtue of mutual respect which “requires a favorable attitude toward, and constructive interaction with, the persons with whom one disagrees” is considered unnecessary toward persons with whom one nondeliberatively disagrees, it is difficult to imagine how a society can remain civil, much less peaceful.

The virtue of mutual respect and the dispositions it promotes are, as Gutmann and Thompson rightly point out, indicative of “an excellence of character.”

It is the character of individuals who are morally committed, self-reflective about their commitments, discerning of the difference between respectable and merely tolerable differences of opinion, and open to the possibility of changing their minds or modifying their positions some time in the future if they confront unanswerable objections to their present point of view. (Ibid., p.79-80)

As a fundamental virtue associated with “excellent character,” it hardly seems likely that persons who demonstrate mutual respect towards others would embrace it in one instance and discard it in another.

In fact, I argue that mutual respect is a fundamental virtue that, once embraced and integrated into one’s character, must be maintained toward others even when there is nondeliberative disagreement. That does not mean that abhorrent views such as legalizing discrimination against persons based on race or sex or legalizing the practice of eugenics deserve respect, rather the person who expresses that view deserves respect as a human being with dignity and worth in spite of his or her
abhorrent views. When an attitude of mutual respect is maintained toward persons with whom one nondeliberatively disagrees, the possibility remains open for one’s opponent to discover the value of seeking mutually agreed on fair terms of social cooperation and to learn how to integrate them in one’s disagreements with others. The possibility of identifying areas of disagreement which might be resolvable and of living in mutual respect in the future also remains open. If one’s opponent continues to refuse to seek mutually acceptable fair terms of social cooperation, the person who maintains an attitude of mutual respect can justify his or her actions to others who are also committed to finding reciprocal reasons for public policies.

In my view, when citizens end in deliberative disagreement, they should continue to reason together and accommodate the moral claims of their opponents to the greatest extent possible, without compromising their own moral convictions. And, when citizens end in nondeliberative disagreement, the persons who are willing to seek reciprocal reasons for policies should continue to reason together and accommodate the reasonable moral convictions of their opponents to the greatest extent possible in spite of their unwillingness or inability to reason reciprocally.

In the case of Ohio, the possibility of identifying areas of disagreement which might be resolvable and of living in mutual respect in the future depends upon citizens who are uncertain or who disagree with the lesson plan maintaining a reciprocal attitude and the virtue of mutual respect. Mutual respect demands that policymakers take the scientific claims of ID seriously and investigate those claims to determine their scientific merit. It also demands that the religious claims of intelligent design theorists be taken seriously and investigated to determine whether
or not ID is a religious theory for the purposes of public school policy. Importantly, mutual respect and the principle of accountability require policymakers to make judgments about the scientific and religious claims of ID consistent with the principles of basic liberty and opportunity. As noted earlier, the principle of accountability requires representatives to resist policies that violate these principles even if their constituents would not agree. An investigation of the scientific and religious claims of ID not only would yield judgments about its scientific and religious status for public school policy purposes, but also areas of possible agreement that could resolve some aspects of the dispute thereby reducing the range of citizen disagreement and contributing to the possibility of living together with some measure of mutual respect.

The next chapter, chapter three, examines in detail the scientific claims of intelligent design theory and some of the critical responses of evolutionary theorists to those claims. It intends to answer, from a deliberative perspective, the question: Should intelligent design be treated as scientific theory in public schools? Chapter four, in turn, addresses the question: Should intelligent design be treated as a religious theory in public schools? These questions are important to answer not only because they are central to the dispute in Ohio, but also because they bear on any future state or local school board deliberations that consider placing intelligent design in science curricula as a scientific alternative to evolutionary theory. Since national proponents

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72 In my view, there is a difference between the mutual respect offered toward a person one deliberatively disagrees with and the mutual respect offered toward those one nondeliberatively disagrees with. In the case of deliberative disagreement, the mutual respect is extended not only toward the dignity and worth of the person making the claim, but also toward the claim itself. In the case on nondeliberative disagreement, mutual respect is extended only toward the dignity and worth of the person making the claim.
of ID are likely to promote Ohio's lesson plan as a template for public school policies around the nation, chapter four also investigates the extent to which ID concepts and references are contained in the model lesson plan "Critical Analysis of Evolution."

The chapters which follow are the result of my own investigations. I am not an expert in evolutionary science or religious studies. I do, however, have experience as a public school policymaker, and I am committed to reaching judgments about the scientific and religious status of intelligent design on the basis of mutually acceptable fair terms of social cooperation. The reasons for the conclusions I reach about the scientific and religious status of ID for public school policy purposes are conditioned by the principles promoted by a deliberative political perspective.
CHAPTER III

INTELLIGENT DESIGN (ID) THEORISTS AND THEIR SCIENTIFIC CLAIMS

Contemporary intelligent design theory is the recent creation of a group of evangelical orthodox\textsuperscript{73} Christians of varying denominations who are also credentialed academics. They are all associated with The Center for Science & Culture (formally known as The Center for the Renewal of Science and Culture or CRSC), a subsidiary of the Discovery Institute which is a privately funded\textsuperscript{74} conservative Christian think tank and political action group located in Seattle, Washington. Until its recent removal, the main web page for The Center for Science & Culture (CSC) featured a paragraph at the bottom of the page indicating its mission: "to challenge materialism on specifically scientific grounds...[by] pioneer[ing] alternative scientific theories and research methods that recognize the reality of design and the need for intelligent agency to explain it. This new research program [is] called ‘design theory’…"

"Design theory," according to the CSC, "recognize[s] mind, as well as matter, as a

\textsuperscript{73} Orthodox’ interpretations of Christian doctrine conform to the early creeds and confessions of the Christian faith. ‘Evangelical’ interpretations focus on the New Testament, especially the Gospels, and emphasize the salvation of humankind by faith in the atonement of Jesus. Many design proponents also identify with ‘Reformed’ theological interpretations of Christian doctrine. Reformed interpretations refer to Protestant doctrine, especially the "...doctrine of inerrancy of the Word of God, and ultimate authority of Scripture over the Church, rather than Church leaders, i.e., it is self-evident that following God means following God’s Word rather than following the words of men" (Tony Warren, “What is Reformed Christianity?” Available at http://members.aol.com/twarren10/articles/reformed.html. Accessed 2/5/04.).

\textsuperscript{74} The Discovery Institute is funded in part by three Christian foundations whose history and mission statements indicate their support for orthodox evangelical and reformed Christian activities. The foundations are: The Stewardship Foundation, The Maclellan Foundation and Howard F. Ahmanson’s Fieldstead & Company. For more information on funding for the Center for Science and Culture and for the Discovery Institute, see Forrest & Gross, 2994, p. 264-267.
causal influence in the world" and promises “to reverse some of materialism’s destructive cultural consequences.”

The purpose of this chapter is to investigate the scientific claims of intelligent design theorists and the critical responses of evolutionary theorists to determine whether intelligent design should be treated as a scientific theory by public schools. The chapter is divided into four sections. Sections one introduces the principal advocates of contemporary design theory and their publications. Section two details seven primary scientific claims of intelligent design theorists. Section three summarizes some of the numerous critical responses of evolutionary theorists to those claims and the rebuttals of ID theorists to their critics. Finally, in section four I consider the question, from a deliberative perspective, of whether or not intelligent design theory ought to be considered a scientific theory for public school policy purposes.

75 ‘Materialism,’ ‘naturalism’ and ‘physicalism’ are, according to design theorists, equivalent terms that refer to the view that the universe is a closed system of material causes and effects and that material or physical phenomena are all that exist. They do not distinguish between ‘methodological naturalism’ and ‘ontological naturalism.” In their view, methodological naturalism entails ontological naturalism. The entire paragraph that was recently removed from the CSC website states:

Design Theory: A New Science for a New Century

Materialistic thinking dominated Western culture during the 20th century in large part because of the authority of science. The Center for the Renewal of Science and Culture seeks, therefore, to challenge materialism on specifically scientific grounds. Yet Center Fellows do more than critique theories that have materialistic implications. They have also pioneered alternative scientific theories and research methods that recognize the reality of design and the need for intelligent agency to explain it. This new research program - called “design theory” - is based upon recent developments in the information sciences and many new evidences of design. Design theory promises to revitalize many long-stagnant disciplines by recognizing mind, as well as matter, as a causal influence in the world. It also promises, by implication, to promote a more holistic view of reality and humanity, thus helping to reverse some of materialism’s destructive cultural consequences (Available at http://www.discovery.org/crsc/. Accessed September 18, 2002.)
The Principal Texts and Primary Advocates of Contemporary Design Theory

Intelligent design theorists have written secondary school texts for use in schools, general texts for a public readership, theological texts for Christians, scholarly texts for university academics and legal texts for public policy makers and the legal community. Most have been published by InterVarsity Press, "the book-publishing division of InterVarsity Christian Fellowship, a student movement active on campus at hundreds of universities...and a member movement of the International Fellowship of Evangelical Students." Since a certain amount of academic respect and credibility accrues to texts published by mainstream publishers for academics, i.e. those that are not primarily associated with religious issues, ID theorists now attempt to have their more scholarly books published elsewhere. The following summary of major texts reflects the work they have published or have in print through spring of 2004.

Three contemporary texts for use in schools have been published by design theorists to introduce intelligent design to students. The first is a high school biology text

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76 Importantly, written texts are not the only materials ID theorists have created for students, the general public and religious organizations. Videos, DVDs, slide shows, and classroom curriculum guides promoting design theory are available at many websites funded and operated by non-profit Christian interest groups. Most are available through Access Research Network or ARN (http://www.arn.org) which is a primary clearinghouse for all news and information concerning the activities of design theorists and for the purchase of promotional materials, articles and books related to intelligent design. It provides links to many other websites including the International Society for Complexity, Information and Design (ISCID) which is directed by its founder, William Dembski (http://www.iscid.org); the Intelligent Design Undergraduate Research Center which promotes student study of and writing about ID theory (Dembski is chief editor) (http://www.idurc.org); and Real Science for Kids which advocates teaching primary school children ID theory and provides materials for classroom use http://www.realscience-4-kids.org/.

77 This information is provided in every book published by InterVarsity Press on the page that informs the reader of the book's publishing history. For example, see the publisher's page in Dembski's Intelligent Design: The Bridge Between Science & Theology. Downers Grove, IL: InterVarsity Press, 1998.
Of Pandas and People: The Central Question of Biological Origins. Published in 1989 and written by Percival Davis and Dean H. Kenyon, this text introduces high schoolers to the most recent arguments design theorists use against evolution and for intelligent design as scientific explanation. The second is Defeating Darwinism by Opening Minds. Authored by Phillip Johnson and published in 1997, this book is written for students in their "late teens – high-school juniors and seniors and beginning college undergraduates, along with the parents and teachers of such young people." The purpose of the book is to "protect [young people] against the indoctrination in naturalism that so often accompanies [public] education. Textbooks…assume the wrong answer to the most important question we face: Is there a God who created us and cares about what we do? Young people need to be prepared for the indoctrination…" (Johnson, 1997, p. 9-10). The third book is What's Darwin Got to Do with It?: a Friendly Conversation about Evolution by Robert C. Newman, John L. Wiester and Jonathan and Janet Moneymaker. It was published in 2000, and its cartoon design and simple presentation appeal directly to young adolescents. The purpose of this book is to question the power of evolutionary theory to explain the origin of biological complexity and to suggest a supernatural intelligence is required to account for the origin of complex organisms. It attempts to

78 The historical roots of "intelligent design theory" lie in ancient arguments from design for the existence of God that were extended by Christian natural theologians in the seventeenth, eighteenth and nineteenth century to arguments from design for the Christian God's divine creation of life on earth. It is also a direct descendant of the "creation science" movement in the United States during the twentieth century. While creation scientists straightforwardly based their claims on the literal truth of Genesis in the Bible and not on arguments from design, they are related to design theorists in, among other things, promoting the inclusion of supernatural causation in scientific explanation. See John Hick, 1964; Loren Eisley, 1958; Ernan McMullin, 1985; Ronald Numbers, 1991; and, Robert T. Pennock, 1999.
accomplish this purpose by teaching students about the structure of simple arguments and selective strategies for defeating the logic of those arguments.

Most of the books about intelligent design that are written for the general public and for religious organizations are authored by Philip Johnson. Johnson is a Senior Advisor at the Discovery Institute's Center for Science and Culture (CSC) and a professor emeritus of law, having taught for over thirty years at the University of California, Berkeley. Johnson apparently became interested in re-evaluating Christian challenges to the theory of evolution and Christian attempts to have "creation science" taught in public school science classrooms following his conversion to Christianity when he was 38 years old (Forrest, 2001, p.6). He is widely regarded as the progenitor and chief proponent of the basic philosophical foundations of intelligent design theory and as the primary architect of the legal and political strategies of design proponents. Johnson, an evangelical Presbyterian (Dembski & Richards, 2001, p. 7), regards Christian theology as the "queen of the sciences" and argues that Christian theology should be the source of general principles for governing all rational activity (Johnson, 1995, p. 104-105). A prolific writer, Johnson has written numerous articles and books on a variety of subjects surrounding intelligent design theory. In addition to Defeating Darwinism, his books include Darwin On Trial (1991), Reason In the Balance: The Case Against Naturalism in Science, Law & Education (1995), Objections Sustained (1997), The Wedge of Truth: Splitting the Foundations of Naturalism (2000) and The Right Questions: Truth, Meaning & Public Debate (2002). He also instituted a weekly internet column, The Weekly Wedge Update, which informs readers of the progress
being made on design theorists' strategic plan for garnering public acceptance of intelligent design theory and public demand for its inclusion in the curriculum of public school science classrooms.79

Three other people figure prominently in the intelligent design movement and their texts are written largely for the academic community. Michael Behe, Senior Fellow at the CSC, a professor of biochemistry at Lehigh University and a Catholic, is the author of Darwin’s *Black Box: The Biochemical Challenge to Evolution* (1996). He is responsible for the phrase "irreducibly complex" which, he argues, refers to biological systems that would cease to function if one of its interacting parts were removed. According to Behe, irreducibly complex systems are incapable of originating through gradual evolutionary processes.

Jonathan Wells, Senior Fellow at the CSC with Ph.D.'s in divinity and molecular biology and a Unification Church minister, is the author of *Icons of Evolution: Why Much of What We Teach About Evolution is Wrong* (2000). Wells notes in a Unification Church sermon that “Father’s words, my studies, and my prayers convinced me that I should devote my life to destroying Darwinism” (Wells, n.d.). Wells’ primary claim is that the use of certain "icons" of evolution – e.g., the study of finches in the Galapagos Islands, vertebrate limb homology, and Haeckel's embryos – in science education classes systematically misinforms students about the strength of evidence for evolution.

Finally, William Dembski, also a Senior Fellow at the CSC and assistant research professor in the conceptual foundations of science at Baylor University's

79 Johnson retired in April 2002 from writing this column due to ill health. It is now called “The Wedge Update” and has had various authors since Johnson’s departure. It can be accessed at http://www.arn.org.
Institute for Faith and Learning, is the author of four books on intelligent design: *The Design Inference: Eliminating chance Through Small Probabilities* (1998); *Intelligent Design: The Bridge Between Science and Theology* (1999); *No Free Lunch: Why Specified Complexity Cannot be Purchased Without Intelligence* (2002); and *The Design Revolution: Answering the Toughest Questions About Intelligent Design* (2004). He also has edited and contributed to a range of other volumes including *Mere Creation: Science, Faith and Intelligent Design* (1998); *Sex and Character* (1998); *Unapologetic Apologetics: Meeting the Challenges of Theological Studies* (2001); *How Blind is the Watchmaker?: Nature’s Design and the Limits of Naturalistic Science* (2001); *Signs of Intelligence: Understanding Intelligent Design* (2001); *Are We Spiritual Machines?: Ray Kurzweil vs. The Critics of Strong AI* (2002); *Debating Design: From Darwin to DNA* (2004); *What Darwin Didn’t Know* (2004); and *Uncommon Dissent: Intellectuals Who Find Darwin Unconvincing* (2004). Dembski holds a Ph.D. in mathematics from the University of Chicago, a Ph.D. in philosophy from the University of Illinois at Chicago and a M.Div. from Princeton Theological Seminary. He notes in *No Free Lunch* that "as an associate research professor with no teaching responsibilities" in Baylor's Institute for Faith and Learning, he devotes his time to developing the substantive arguments that support the scientific claims of intelligent design in the hope of "bring[ing] intelligent design into the academic mainstream" (Dembski, 2002a, p. xxiii).  

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80 Dembski was initially hired by Baylor in late 1999 as a director of a newly created "think tank" focused on science and religion, The Michael Polanyi Center. He was removed from that position following a year of protest by Baylor faculty over the existence of the Center and the actions of Dembski as a director. See "Baylor demotes director of Polanyi Center," *Waco News* at http://www.accesswaco.com/auto/feed/news...2000/10/19/972011133,23516,7215,0112.html (accessed 3/22/01); "Polanyi Center's Future is Unclear: Director's removal arises from email," *Baylor Lariat* at http://www.baylor.edu/Lariat/Archives/2000/20001024/art-front02.html (accessed 2/2/04);
identified "evangelical mathematician" (Dembski & Richards, 2001, p. 53) and "singularist" who thinks "Christianity makes exclusive truth claims that are binding on the world at large" (Ibid., p. 50).

The final four influential texts of the contemporary design movement are written for public policymakers and the legal community; these publications present the political and legal arguments of design theorists for including intelligent design in public school biology curricula. Three are authored by David DeWolf, Stephen Meyer and Mark DeForrest. Those texts include two booklets published in 1999 by The Foundation for Thought and Ethics: Teaching the Controversy: Darwinism, Design and the Public School Science Curriculum and Intelligent Design in Public School Science Curricula: A legal Guidebook. The third text is a Utah Law Review article published in 2000 entitled Teaching the Origins Controversy: Science, Or Religion, Or Speech? DeWolf is a Senior Fellow at the Discovery Institute's CSC where he also leads teacher training and is a professor at Gonzaga University Law School; Stephen Meyer is a Senior Fellow at the Discovery Institute and the Director of and a Senior Fellow at the CSC; and, Mark DeForrest is an instructor at Central Washington University. The fourth text written for public policymakers and the legal community is Law, Darwinism, and Public Education: The Establishment Clause and the Challenge of Intelligent Design (2003) by Francis J. Beckwith. Beckwith is associate director of the J. M. Dawson Institute of Church-State Studies, an associate

professor of Church-State Studies at Baylor University, and a fellow at the Discovery Institute's Center for Science and Culture.  

Scientific Claims

The scientific claims of design theorists can be summarized into seven central propositions. While ID theorists indicate that their theory is important to all the sciences, arts and humanities, the focus of their published texts is on the cause of the origin of complex biological organisms. Therefore, the defense of these seven claims by design theorists constitutes the central scientific arguments for including design theory in public school biology classrooms. It is important to note that mathematician and philosopher William Dembski is the primary architect of intelligent design's central scientific claims even though he has no educational degrees in biology. The only scientific claim among their central propositions that is authored by a scientist is the first -- Behe's claim that "Darwinism" is unable to account for "irreducible complexity." However, even that claim is significantly altered by Dembski.

Claim #1: "Darwinism" is unable to account for the "irreducible complexity" of biological systems.

Irreducibly complex systems are defined by Michael Behe in Darwin's Black Box as systems that cannot function if one small part of the system is removed;

81 In September 2003 twenty nine members of the J.M. Dawson family signed a letter requesting Beckwith's removal as associate director of the Dawson Institute of Church-State Studies at Baylor University. The letter stated that Beckwith promotes church-state ideas contrary to the strong stand for separation advocated by J.M. Dawson. Baylor administrators refused to remove Beckwith citing the need to promote a climate of intellectual freedom by allowing a diversity of views to be represented at the various institutes associated with the university. For more information see http://www.ethicsdaily.com/article_detail.cfm?AID=3125 (accessed 2/5/04).

82 Intelligent design theorists refer to modern evolutionary theory as "Darwinism." Phillip Johnson argues that adding an "ism" to a word indicates an ideology. By referring to modern evolutionary theory as "Darwinism," ID theorists promote Johnson's view that evolutionary theory is a pervasive cultural ideology (Phillip Johnson, 1997, p. 125; also 2000, p. 65).
function is attained only when all components of the system integrate simultaneously in one place. A bacterial flagellum is, according to Behe, an example of an irreducibly complex system. He argues that a bacterial flagellum "cannot be produced directly by slight, successive modifications of a precursor system, because any precursor to [a bacterial flagellum] that is missing a part is by definition nonfunctional...Since natural selection can only choose systems that are already working," evolutionary explanations cannot explain the origin of the bacterial flagellum. According to Behe, a biological system that cannot be produced gradually by evolutionary processes has "to arise as an integrated unit, in one fell swoop" (Behe, 1996, p. 39).

William Dembski in *No Free Lunch* significantly alters Behe's general definition of irreducible complexity to expand the scope and range of the objects and systems that would meet its requirements. Dembski defines irreducible complexity in the following way:

A system performing a given basic function is *irreducibly complex* if it includes a set of well-matched, mutually interacting, nonarbitrarily individuated parts such that each part in the set is indispensable to maintaining the system's basic, and therefore original, function. The set of these indispensable parts is known as the *irreducible core* of the system. (Dembski, 2002a, p. 285, italics in original)

In addition to expanding the scope and range of Behe's definition, Dembski adds two auxiliary conditions that create what he calls an "effective invariant," i.e., an insurmountable obstacle or "vise" which "rule out any substantial simplification of an irreducibly complex system" thus preventing evolutionary processes "from exploiting

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83 Appendix C contains a glossary of intelligent design terms found in this chapter.
the functional intermediates [they] would need to account for the [origin of the] system." Those auxiliary conditions are:

1) **Numerous and Diverse Parts.** If the irreducible core of an irreducibly complex system consists of one or only a few parts, there may be no insuperable obstacle to the Darwinian mechanism explaining how that system arose in one fell swoop. But as the number of indispensable will-fitted, mutually interacting, nonarbitrarily individuated parts increases in number and diversity, there is no possibility of the Darwinian mechanism achieving that system in one fell swoop.

2) **Minimal Complexity and Function.** Given an irreducibly complex system with numerous and diverse parts in its core, the Darwinian mechanism must produce it gradually. But if the system needs to operate at a certain minimal level of function before it can be of any use to the organism and if to achieve that level of function it requires a certain minimal level of complexity already possessed by the irreducible core, the Darwinian mechanism has no functional intermediates to exploit. (Ibid., p. 286-287)

Dembski further describes an irreducibly complex system as a "discrete combinatorial object," i.e., an object that is composed of building blocks that must converge in one location and be configured simultaneously in a particular arrangement to form the object (Ibid., p. 290). In other words, biological phenomena which conform to Dembski's definition of irreducible complexity and meet his two auxiliary conditions are considered to be discrete combinatorial objects (DCO's) that must be integrated in their particular form all at once in one location in order to establish and maintain their function. Since "Darwinism," according to design theorists, allows only for the gradual formation of complex biological phenomena, it is unable to explain the appearance of irreducibly complex discrete combinatorial objects.

Dembski states in a recent article that to refute this claim, Darwinists must propose and then demonstrate "detailed, testable, step-by-step proposals for how [Darwinian mechanisms] could actually produce irreducibly complex biochemical systems." Since "the scientific literature shows a complete absence" of this "causal
specificity,” Dembski agrees with cell biologist Franklin Harold who said “there are presently not detailed Darwinian accounts of the evolution of any biochemical or cellular system, only a variety of wishful speculations” (Dembski, 2004a, p. 26).

Claim #2: Intelligent causes are empirically detectable, and these causes are necessary to explain irreducibly complex biological structures.

When intelligent agents act, Dembski argues, they leave behind a characteristic trademark or signature, “specified complexity,” which renders intelligent causes empirically detectable. The irreducible complexity of certain biological objects is a special case of "specified complexity," and specified complexity is the "key to detecting [intelligent] design"(Dembski, 2002a, p. 116).

In the language of design theory, an object exhibits specified complexity if it is contingent (not the outcome of any deterministic natural law), sufficiently complex (its probability of natural actualization is less than the probability bound of $10^{-150}$), and specified (exhibits a distinctive pattern that is detachable from the particular object itself). For example, a long sequence of randomly strewn Scrabble pieces is complex without being specified, and a short sequence spelling the word "the" is specified without being complex, but a sequence corresponding to a Shakespearean sonnet is both complex and specified; thus, a Shakespearean sonnet exhibits specified complexity.

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84 The remaining scientific claims are entirely the result of Dembski's theorizing.

85 Dembski notes that complexity and probability are correlative notions so that higher complexity corresponds to smaller probability. The question of how complex an object must be in order to implicate intelligent cause, then, is reformulated probabilistically into: How small does a probability have to be so that in the presence of a specification it reliably implicates design? (Dembski, 2002a, p. 18-19). Dembski states that the answer to this question depends on the “probabilistic resources” that comprise the number of relevant ways an event might occur. After taking into account the number of elementary particles in the observable universe, the duration of the observable universe until heat death or collapse, and the Planck time which determine the probabilistic resources available in the observable universe, Dembski concludes that anything that demonstrates a probability less than the universal probability bound (UPB) of $10^{-150}$ reliably indicates intelligent design. For a demonstration of how Dembski reaches this conclusion see Dembski, 2002a, sections 1.5 and 2.8.
complexity and therefore had an intelligent cause (an intelligent being, Shakespeare, created the sonnet). The presence, then, of the specified complexity within the sonnet allows us to empirically detect the presence of an intelligent cause for the origin of the sonnet.

Intelligent design theory extrapolates from detecting intelligently caused human artifacts to detecting intelligently caused physical systems. If specified complexity is a reliable marker of intelligent agency in the origin of human artifacts, it is also a reliable marker of intelligent agency in the origin of physical systems. Just as intelligent causes are necessary to explain the origin of Shakespeare's sonnet, intelligent causes are necessary to explain the specified complexity exhibited by physical systems.

Claim #3: The "complexity-specification criterion" empirically determines when an inference to design is warranted.

Specified complexity is detected by employing a "rigorous" criterion – the complexity-specification criterion (Dembski, 2002a, p. 6). Dembski claims that when the complexity specification criterion empirically detects the presence of specified complexity, an inference to design is warranted. The criterion, also known as 'the explanatory filter,' is an algorithm or fixed procedure that determines which type of causal explanation is appropriate given a certain event or thing that needs to be explained (see Figure 2.1). In his 1998 book, *The Design Inference*, Dembski argues that there are

...three competing modes of explanation. These are *regularity, chance, and design*. To attribute an event to a regularity is to say that the event will (almost) always happen. To attribute an event to chance is to say that probabilities characterize the occurrence of the event, but are also compatible with some
other event happening. To attribute an event to design is to say that it cannot reasonably be referred to either regularity or chance. (Dembski, 1998, p. 36)

**Figure 2.1: Dembski’s Explanatory filter**

![Diagram of Dembski's Explanatory filter](image-url)
In his later book, *No Free Lunch*, Dembski argues that the criterion results from applying statistical probability theory to what Dembski characterizes as the "general scheme" for recognizing intelligent agency -- choosing, ruling out and specifying. If it can be established that the object is contingent ("chosen," i.e., not the outcome of any deterministic natural law), complex ("ruling out" chance circumstances, i.e., its probability of natural actualization is less than $10^{-150}$), and specified (exhibits a distinctive pattern that is detachable from the particular object itself), then an inference to intelligent causes is warranted. Conceptually, the criterion consists of a flow-chart with three decision nodes that correspond with the three parts of specified complexity and, as noted before, is also known as Dembski's Explanatory Filter (Dembski, 2002a, p. 12). Thus, the "general scheme for recognizing intelligent agency is but a thinly disguised form of the complexity-specification criterion" (Ibid., p. 30).

In practice, discovering whether a particular biotic system exhibits specified complexity and therefore is a discrete combinatorial object requires two steps: showing that the system is specified and calculating its probability (Ibid., p. 289). Dembski argues that "specification is never a problem" when it comes to biotic systems because they are always functional. "In virtue of their function, [biotic] systems embody patterns that are objectively given and can be identified independently of the systems that embody them" (Ibid., p. 148.; see also Dembski, 2004a, p. 28). Hence, they are specified in the relevant sense.

Calculating its probability is another matter. Determining whether a biotic system is intelligently caused and therefore is a discrete combinatorial object (DCO)
requires that one calculate the probability of the building blocks that compose the object randomly converging on a location and integrating "in one fell swoop" or "all at once" by chance into the arrangement that forms the complete object.

Consequently, three probabilities figure into the equation: $P_{\text{orig}} = \text{the probability of originating the building blocks for that object;}$ $P_{\text{loc}} = \text{the probability of locating the building blocks in one place once they are given;}$ and $P_{\text{config}} = \text{the probability of configuring the building blocks once they are given and in one place.}$ The probability that a given object is intelligently caused, then, equals the product of these three probabilities: $P_{\text{dco}} = P_{\text{orig}} \times P_{\text{loc}} \times P_{\text{config}}.$ If $P_{\text{dco}} < 10^{-150},$ then an inference to design is warranted.\(^{86}\)

In *No Free Lunch* Dembski applies his probability calculations to a bacterial flagellum to determine if it is a discrete combinatorial object and therefore intelligently caused. He describes the probability of a flagellum evolving by chance as equivalent to the probability of baking a cake "entirely by chance."

First there is the $P_{\text{orig}},$ the probability that the ingredients (i.e., building blocks) for your cake will arise by chance and show up at your supermarket. Next there is $P_{\text{loc}},$ the probability that by going through a supermarket and randomly picking items off the shelf, you just happen to select the right ingredients for your cake and put them in your shopping cart. Finally there is $P_{\text{config}},$ the probability that randomly configuring the ingredients in your shopping cart – even if they are the right ones for your cake – will produce the desired cake. (Dembski, 2002a, p. 291)

Since the result of the probability calculations for baking a cake "by chance" falls below the universal probability bound, he predicts that the probability that the

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\(^{86}\) In a January 2004 article entitled "Irreducible Complexity Revisited," Dembski refines his formula for calculating the probability of the "chance" formation of irreducibly complex (IC) biological systems. He identifies seven "daunting probabilistic hurdles" that chance "Darwinian" evolutionary processes must overcome to create an IC system. Those are: availability, synchronization, localization, interfering cross-reactions, interface compatibility, order of assembly and configuration. Dembski's rational for his new formula and the formula itself can be found in Dembski, 2004a, p. 30-39.
flagellum assembles itself through random processes and randomly attaches to a bacterial cell will be even smaller because of the number of proteins that constitute the building blocks of a flagellum. Not surprisingly, his calculations demonstrate that the probability of "the chance formation" of a bacterial flagellum is so small that an intelligent cause for the flagellum can be reliably inferred (Ibid., p. 290-302).

The statistical justification of the inference to intelligent design from applying the specified-complexity criterion to highly complex biotic systems is, according to Dembski, "so compelling as to demand assent" (Dembski, 1999, p. 149). And once we understand the pivotal significance of the criterion in warranting the inference to design, several things follow immediately:

(1) Intelligent agency is logically prior to natural causation and cannot be reduced to it (2) Intelligent agency is fully capable of making itself known against the backdrop of natural causes (3) Any science that systematically ignores design is incomplete and defective (4) Methodological naturalism, the view that science must confine itself solely to natural causes, far from assisting scientific inquiry, actually stifles it (5) The scientific picture of the world championed since the Enlightenment is not just wrong but massively wrong. Indeed entire fields of inquiry, especially in the human sciences, will need to be rethought from the ground up in terms of intelligent design. (Ibid., p. 223-224)

Claim #4: Intelligent design theory is a theory of information.

Information theory was first formulated by Claude Shannon in a 1948 paper entitled "A Mathematical Theory of Communication." Shannon, a mathematical engineer at Bell Telephone Laboratories in the 1940's, was interested in the efficient

Indeed, Dembski predicts that if origination, localization and configuration probabilities were calculated on biological systems at all levels of "complexity and organization," we would find "save at the lowest level for the very simplest building blocks (i.e., amino acids and nucleotide bases), these probabilities will be extremely small and regularly fall below the universal probability bound of $10^{-150}$" (Dembski, 2002a, p. 302). Intelligent design, then, "offers one obvious prediction, namely, that nature should he chock-full of specified complexity" (Ibid., p. 362). This prediction, however, is at odds with Dembski's contention that a bacterium without a flagellum does not exhibit specified complexity while one with a flagellum does (Ibid., p.331). Certainly, if "even the simplest cell requires vast amounts of specified complexity," then a bacterium without a flagellum would also require it (Ibid., p. 329).
transmission of electronic signals across communication channels. He noted that if information is viewed as the actualization of one out of two simple alternatives, (e.g., “yes” or “no”), multiplied many times (e.g., answering “yes” or “no” in the game Twenty Questions), then Boolean two-digit binary algebra could be employed to mathematically determine 1) the rate at which information is produced at a source, 2) the average amount of information in a message and 3) the capacity of a communications channel for handling information. 88

Dembski notes that despite the importance of the transmission of signals across communication channels in modern communications, Shannon’s fundamental concept of information and its mathematical formulation can be separated from the science of communications and applied to the theory of intelligent design. The fundamental intuition underlying information is, according to Dembski, contingency - that is, “the actualization of one [contingent] possibility to the exclusion of others... For there to be information, there must be a multiplicity of distinct [contingent] possibilities, any one of which might happen. When one of these possibilities does happen and the others are ruled out, information becomes actualized.” Since “the principal characteristic of intelligent causation is directed

88 Three aspects of Shannon’s treatment of information are worth noting. First, the view that information is conveyed by the instantiation of one of two (or more) alternatives corresponds to the view that information arises from a reduction in uncertainty. For example, prior to a coin toss, we are uncertain whether the coin will land on “heads” or “tails.” After the coin is tossed, we not only gain information about how the coin lands, we also have a reduction in our uncertainty about the results of the toss. Second, “Shannon information” excludes redundancy. A coin toss that uses a coin with two heads has a predictable outcome and conveys little information to observers. Also, a book consisting only of the letter “S” repeated 500,000 times contains lots of redundancy and little Shannon information. Third, and finally, the binary digits, 1 and 0, which Shannon referred to as ‘bits’ continue to express the fundamental units of information in modern communications. For more information about Shannon and his work see Tomas D. Schneider’s website at http://www.lecb.ncifcrf.gov/~toms/; the Lucent Technologies/Bell Labs webpage http://www.lucent.com/minds/infotheory/docs/history.pdf and Gell-Mann, 1994, p. 37, 223. For more information about how Shannon information relates to design theory see articles in the archives of the www.arn.org website.
contingency, or what we call choice,” Dembski argues, intelligent design theory can be formulated as a theory of information (Dembski, 2001a, p. 554, 565).

As noted earlier, the complexity-specification criterion in design theory claims that if a phenomena is contingent ("chosen," i.e., not the outcome of any deterministic natural law), complex ("ruling out" chance circumstances, i.e., its probability of natural actualization is less than \(10^{-150}\)), and specified (exhibits a distinctive pattern that is detachable from the particular object itself), then specified complexity is detected and an inference to design is warranted. Since contingency signals the presence of information, and contingency is an essential element in the complexity-specification criterion, it follows, according to Dembski, that the complexity-specified criterion not only detects specified complexity, it also detects complex specified information or CSI. “To infer design by means of the complexity-specification criterion is equivalent to detecting complex specified information (CSI). All the elements in the complexity-specification criterion that lead us to infer design find their counterpart in the detection of complex specified information…It follows that the complexity-specification criterion attributes design if and only if it detects CSI.” Intelligent design, then, according to Dembski, is a theory of information and the central problem of biology for design theorists is the origin of complex specified information (Dembski, 2002a, p. 145, 149).

Two factors appear to motivate Dembski’s reframing of design theory into a theory of information. The first is indicated by Dembski in Intelligent Design. "…intelligent design can be formulated as a scientific theory having empirical consequences and devoid of religious commitments. Intelligent design can be
unpacked as a theory of information...Intelligent design thereby becomes a theory for detecting and measuring information, explaining its origin and tracing its flow" (Dembski, 1999, p. 17-18). Thus, by presenting design theory as a theory of information, Dembski hopes to divest the theory of any religious commitments.

Second, reframing design theory within information theory allows Dembski to test mathematically the power of evolutionary algorithms to produce novel information. Evolutionary biologists rely on the cumulative power of natural selection over vast expanses of geologic time to explain the origin of novelty in biotic systems and often describe that power as "algorithmic." The purpose of Dembski's book *No Free Lunch* is to mathematically assess the cumulative power of evolutionary algorithms to determine if they are capable of generating the complex specified information exhibited in irreducibly complex physical systems (Dembski, 2002a, p. xix).

**Claim #5: Intelligent design is the sole source of complex specified information.**

In chapters three and four of *No Free Lunch*, Dembski presents mathematical arguments that he claims demonstrates that natural causes and evolutionary algorithms are in principle incapable of explaining the origin of complex specified information. The arguments rely not only on Dembski's universal probability bound

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89 Dembski's claim in *Intelligent Design* that formulating ID as a theory of information divests it of any religious commitments contradicts his claim in *Signs of Intelligence* that "...intelligent design is just the Logos theology of John's Gospel restated in the idiom of information theory" (Dembski & Kushner, 2001, p. 192). In fact, it contradicts many statements by design proponents that "information" is merely another name for the divine Logos in the Christian Gospel of John. Nancy Peary, for example, states "The great confrontation in science today is between those who say life can be explained without recourse to...intelligence, and those who say life embodies information – the Word [Logos] – and must be explained as the product of an intelligent agent" (Johnson, 2002, p. 16). Philip Johnson writes "Only the Word [the divine Logos found in John 1:1] creates...That is why no natural mechanism has been discovered for the creation of new complex genetic information. No such mechanism exists" (Johnson, 2000, p. 153).
(UPB) but also on what Dembski refers to as the universal complexity bound (UCB).

As noted earlier (footnote 13), probability and complexity are correlative notions—that is, lower probability corresponds to higher complexity. Dembski argues that his UPB of less than $10^{-150}$ corresponds to 500 bits of specified information. The universal complexity bound (UCB) for CSI, then, is equivalent to 500 bits of information. This means, according to Dembski, that when an object contains more than 500 bits of information and is specified, an inference to intelligent design is warranted (Dembski, 2002a, p. 156).90

Natural causes, according to Dembski, are characterized by necessity (natural laws), chance (randomness) or a combination of the two (nondeterministic natural laws). Since natural laws (represented mathematically by nonstochastic functions) are deterministic, he argues, they generate highly probable events that “cannot yield contingency, and without contingency there can be no information” (Ibid., p. 155).

Chance, or randomness (represented mathematically by random sampling from a probability distribution), according to Dembski, can generate contingency but not sufficient complexity (500 bits of information). Finally, nondeterministic natural laws (represented mathematically by stochastic processes) can mathematically be reduced, according to Dembski, to a necessary (deterministic) nonstochastic function and to a random function (contingent). Since neither nonstochastic functions nor random functions can generate the contingency and complexity required for CSI, it follows that a combination of natural laws and chance cannot generate CSI (Ibid., p. 150-159).91 "Since chance, necessity, and their combination characterize natural

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90It should be noted that Dembski's UCB is strictly a Shannon measure.
causes, it now follows that natural causes are incapable of generating CSI” (Ibid., p. 159).

Dembski argues that natural causes cannot generate CSI because they are subject to a “Law of Conservation of Information” which he claims to formulate for the first time. He argues that it is the “elusive fourth law of thermodynamics” (Ibid., p. 159-173). This law, however, is “highly abstract,” and is therefore, according to Dembski, not very helpful in attempting to understand whether a specific natural cause can generate CSI. Since natural selection is the specific natural cause for biological complexity proposed by Darwin, and since evolutionary algorithms express the mathematical power of natural selection, Dembski next investigates evolutionary algorithms to find if they can generate CSI.

Dembski applies the “No Free Lunch” mathematical theorems developed by David Wolpert and William Macready in 1996 to evolutionary algorithms to track

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91 The reduction of stochastic processes (representing nondeterministic natural laws and therefore the combination of “chance and necessity”) into a random and deterministic component is, according to Dembski “mathematically legitimate and involves no loss of generality” (Dembski, 2002a, p. 175-176, n. 48). Indeed, according to Dembski, “stochastic processes and random functions are mathematically equivalent” (Ibid., p. 158).

92 Evolutionary algorithms refer to computerized simulations of evolutionary processes which claim to show that genetic systems gain information through evolution. Dembski cites the work of Thomas D. Schneider and argues that the No Free Lunch Theorems demonstrate that Schneider is wrong. Schneider responds that Dembski “misunderstood the No Free Lunch Theorems.” His response can be accessed at http://www.lecb.ncifcrf.gov/~toms/paper/ev/.

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Schneider is a Research Biologist in the Laboratory of Experimental and Computational Biology, National Cancer Institute. He received his Ph.D. in 1984 from the University of Colorado, Department of Molecular, Cellular and Developmental Biology. An abstract of a paper on his “Ev Program” states:

How do genetic systems gain information by evolutionary processes? Answering this question precisely requires a robust, quantitative measure of information. Fortunately, fifty years ago Claude Shannon defined information as a decrease in the uncertainty of a receiver. For molecular systems, uncertainty is closely related to entropy and hence has clear connections to the Second Law of Thermodynamics. These aspects of information theory have allowed the development of a straightforward and practical method of measuring information in genetic control systems. Here this method is used to observe information gain in the binding sites for an artificial ‘protein’ in a computer simulation.
the success the algorithms have in creating CSI. These theorems are "bookkeeping" tools that determine how well evolutionary algorithms "optimize fitness functions over a phase space" (Ibid., 212).93 After applying these theorems and, after reviewing possible objections to his mathematical analysis, Dembski concludes "all the specified complexity we get out of an evolutionary algorithm has first to be put into its construction and into the information that guides the algorithm. Evolutionary algorithms...merely harness already existing specified complexity" (Ibid. p. 207).94

The No Free Lunch theorems demonstrate, according to Dembski, that natural selection is subject to the Law of Conservation of Information as formulated by Dembski. "This conclusion implies that naturalistic explanations are incomplete and that design constitutes a legitimate and fundamental mode of scientific explanation" (Ibid., xiii).

The inability of natural algorithmic processes to produce complex specified information (CSI) coupled with the statistical justification of inferring design from

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93 David Wolpert has criticized Dembski’s application of the No Free Lunch Theorems to biological evolution. Wolpert states that Dembski’s “arguments are fatally informal and imprecise” because “the values of the factors arising in the NFL theorems are never properly specified in his analysis.” In addition, “there is a marked elision of the formal details of the biological processes under consideration” including co-evolutionary processes. Importantly, he continues, the “NFL results do not hold in co-evolution” (Wolpert, 2002, p. 2-3).

Dembski now claims that the No Free Lunch Theorems were merely used to create a No Free Lunch principle that states “if you have some naturalistic process whose output exhibits specified complexity, then that process was front-loaded with specified complexity” (Dembski, 2004, p. 257). Needless to say, Dembski is backpedaling from his statement in his book No Free Lunch that “The No Free Lunch theorems show that for evolutionary algorithms to output CSI they had first to receive a prior input of CSI” (Dembski, 2002, p. 223).

94In his discussion of evolutionary algorithms, Dembski fails to distinguish between the information and complexity measures associated with Shannon information theory (statistical probability measures) and the information and complexity measures associated with Chaitin-Kolmogorov-Solomonoff algorithmic information theory (measures of the length and compressibility of computer programs).
the specified-complexity criterion leads Dembski to conclude that intelligence is the sole source of specified complexity — "information...can never be entirely mind-independent or concept free" (Ibid., p. 137). Importantly, this means human intelligence, because it is located in a physical body that exhibits specified complexity, cannot be explained by reference to purely natural causes. "...intelligent agency, even when conditioned by a physical system that embodies it, cannot be reduced to natural causes without remainder...specified complexity is precisely the remainder that remains unaccounted for" (Ibid. xiv).

Claim #6: An unembodied intelligence abiotically infuses exogenous information into the physical world to create complex biological phenomena.

Attributing the complex specified information (CSI) exhibited by biotic systems to intelligence results in, according to Dembski, the following general conclusions: 1) specified complexity originates outside any physical system — i.e., it is exogenous information; 2) the source of the exogenous information is unembodied (Dembski, 2002a., p. 333); 3) specified complexity or CSI is infused into the physical world abiotically (Ibid. p.321); 4) the unembodied designer "impart[s] information into the universe without inputting any energy at all" (Ibid., p. 336); 95 and, 5) the

95 If the unembodied designer imparted energy, Dembski argues, it would be moving physical particles; something natural causes are fully capable of doing. So, the unembodied designer must infuse information without imparting energy. In order to impart information without imparting energy, the world must be indeterminate, and Dembski believes the "best place to locate indeterminism" is quantum theory. The indeterminacy of the world as described by quantum theory "means that an unembodied designer can substantively affect the structure of the physical world by imparting information without imparting energy" (Dembski, 2002a, p. 335-336).

The conclusion that quantum theory describes an indeterminate universe, however, differs radically from the emerging consensus among quantum physicists that quantum mechanics describes a completely deterministic universe. According to physicists such as Stephen Hawking, "the state function of quantum mechanics does not characterize a probability distribution -- we only interpret it as a probability distribution from our limited vantage. Instead, the state function describes an ensemble of universes...in which all possible histories or worlds consistent with quantum mechanics get lived out" (Ibid., p. 337). In Dembski's view, the "historical priority of probabilities in the
information is "word-like" -- that is, the designer imparts information persuasively to a receptive medium (Ibid., p. 343). Thus, a reconceptualization of biology in information-theoretic terms (where "information" is the central unifying concept in the biological sciences) poses the abiotic infusion of "word-like" exogenous information by an unembodied supernatural designer into a nondeterministic universe that is open to novel information as the greatest mystery confronting modern biology (Ibid., p. 321).

The picture of the universe that emerges from the information-theoretic foundations of intelligent design reveals the universe as an "information processing system that is responsive to novel information" (Ibid., p. 335). It is a universe in which "we do not understand how an unembodied designer imparts specified complexity...but we can know that such a designer imparts specified complexity..." (Ibid., p. 343, italics in original).

Claim #7: Intelligent design offers a rigorous scientific research agenda for the life sciences.

In No Free Lunch Dembski outlines fifteen problems that can be pursued as part of a research program. They are:

1. Detectability Problem – Is an object designed?
2. Functionality Problem – What is a designed object’s function?
3. Transmission Problem – What is the causal history of a designed object?
4. Construction Problem – How was a designed object constructed?
5. Reverse-Engineering Problem – In the absence of a reasonably detailed causal history, how could the object have come about?
6. Constraints Problem – What are the constraints within which the designed object functions optimally?

formulation of quantum mechanics suggests to me a conceptual and ontic priority: quantum mechanics is fundamentally a probabilistic theory describing an indeterministic world, and only with considerable finagling can it be interpreted as a completely deterministic theory” (Ibid., p. 339).
7. Perturbation Problem – How has the original design been modified and what factors have modified it? This requires an account of both the natural and intelligent causes that have modified the object over its causal history.
8. Variability Problem – What degree of perturbation allows continued functioning? Alternatively, what is the range of variability within which the designed object functions and outside of which it breaks down?
9. Restoration Problem – Once perturbed, how can the original design be recovered? Art restorers, textual critics, and archeologists know all about this.
10. Optimality Problem – In what sense is the designed object optimal?
11. Separation of Causes Problem – How does one tease apart the effects of intelligent causes from natural causes, both of which could have affected the object in question?
12. Ethical Problem – Is the design morally right?
13. Aesthetic Problem – Is the design beautiful?
14. Intentionality Problem – What was the intention of the designer in producing a given designed object?
15. Identity Problem – Who or what is the designer? (Dembski, 2002a, p. 312-313.)

Dembski acknowledges that the last four questions are not scientific questions (Ibid., p. 313) but notes that they do arise within the framework of an ID research program. Importantly, he says, the unembodied intelligence associated with intelligent design is compatible with pantheism, panentheism, Stoicism, Neoplatonism, deism, and theism. Obviously, it is incompatible with naturalism (Ibid., p. 334). So, intelligent design is "not the study of intelligent causes per se but of informational pathways induced by intelligent causes...Intelligent design is theologically minimalist. It detects intelligence without speculating about the nature of the intelligence" (Dembski, 1999, p. 107). Dembski argues that the ethical and metaphysical questions raised by ID, particularly the ontological status of the designer, should be addressed by philosophers and theologians.
In his 2004 book *The Design Revolution* Dembski offers further suggestions for a design theoretic biological research program. The ten research themes he suggests in this book incorporate or reconceptualize the fifteen research problems offered in *No Free Lunch*. The most important new twist to the design research program in his latest book is a focus on the themes of “*methodological engineering,*” *technological evolution,* and *steganography.* Methodological engineering is, according to Dembski, a fundamental regulative principle for understanding biological systems. It requires that biotic systems be understood as engineering systems and in engineering terms. *Technological evolution* notes the parallel between the “Theory of Inventive Problem Solving,” or TRIZ, and the evolution of living systems. Technologies, according to TRIZ, can emerge suddenly from major conceptual, inventive leaps or, by contrast, be modified by trial and error. Visualizing biological systems as engineering systems subject to technological evolution could lead to new breakthroughs in intelligent design theory, according to Dembski. The final new area of research suggested by Dembski is called *steganography.* Steganography emerges from the field of digital data embedding technologies. It seeks “efficient (i.e., high data rate) and robust (i.e., insensitive to common distortions) algorithms that can embed a high volume of hidden message bits within a cover message without their presence being detected” (Dembski, 2004c, p. 316). Steganalysis, on the other hand, seeks statistical tests that detect the presence of hidden messages in cover messages. Intelligent design research into steganalysis

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96 These suggestions were first outlined by Dembski in a October 2002 paper entitled “Becoming a Disciplined Science: Prospects, Pitfalls, and a Reality Check for ID.”

97 It also leads to a new conception of the intelligent designer as “intelligent engineer.”
would focus on constructing statistical tests to detect the presence of hidden messages in biological systems that would act as hidden operating manuals for the growth and development of those systems. Dembski's suspicion is "that biological systems do steganography much better than we...not because natural selection is so clever, but because the designer of these systems is so adept at steganography" (Ibid., p. 316-317). The dense, multi-layered embedding of information in physical systems is a prediction of ID, according to Dembski, and the detection of "second-order" steganography through steganalysis would provide "decisive confirmation for ID" (Ibid., p. 317).

In addition to the new research themes, Dembski's 2004 book presents five practical suggestions for turning ID into a disciplined science. (1) Compose a Catalog of Fundamental Facts that would contain a catalog of irreducibly complex biological objects and processes. The catalog would be something like the star cluster catalogs found in astrophysics and would mention nothing about intelligent design or naturalism. (2) Compose a Catalog Correcting Misinformation that would expose examples of faulty evidence and faulty reasoning given in evolutionary explanations for biological complexity. It would "unmask" and help defeat the "anti-design bigotry" prevalent in biology. (3) Create a Network of Researchers and Resources to concentrate and coordinate research efforts and to more efficiently and effectively utilize resources. This will eventually lead to the possibility of "setting the intellectual agenda for academic departments and even whole academic institutions." (4) Begin Building a Design Curriculum that would include writing basic biology texts for high schoolers and college undergraduates and research monographs for
professors and graduate students. It would also require the development of CD ROMs, videos, DVD’s, computer animation, 3-learning websites, etc. And, (5) develop *Objective Measures of Progress* to determine if ID is advancing as a science. The measures would gauge progress in areas such as intellectual vitality, intellectual standards, attracting talent and whether ID has “exited the ghetto” of marginalization from mainstream science (Dembski, 2004c, p. 318-325).

Critical Responses to the Scientific Claims of Intelligent Design

Critical responses to the claims of ID theory abound. Critiques have been written by distinguished evolutionary scientists, philosophers of science, mathematicians, physicists and theologians. The purpose of this section is not to offer new critical analyses of the claims of ID. Rather, the purpose is to examine some of the reasons critics give for denying the claims of ID theorists and to examine the reasons ID theorists give in rebuttal to critics to prepare to determine in the next section, from a deliberative perspective, whether intelligent design should be treated as a scientific theory by public schools.

Since the number of topics addressed by critics is quite large and are often quite technical in nature, and since cataloguing the scores of critical responses on all the issues raised by the claims of ID is beyond the scope of this dissertation, I have chosen to address a few of the more accessible ones. The topics that I address in this section are: irreducible complexity, discrete combinatorial objects, causal specificity, the complexity specification criterion, and science by definition. While many critical responses on the topics of probability theory, information theory and evolutionary

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98 See Rosenhouse, 2002; Shallit, 2002; and Wolpert, 2002.
algorithms, for example, are excluded, the general content and tenor of the critical responses on the excluded topics as well as the rebuttals of ID theorists, especially those of Dembski, can be gleaned from the topics I do address.

Irreducible complexity (IC).

In “The Flagellum Unspun,” Brown University cell biologist Ken Miller critiques Behe’s claim that the bacterial flagellum exhibits the property called “irreducible complexity.” He begins by noting that all living cells are filled with complex structures whose detailed evolutionary history remains unknown to scientists. That does not mean, of course, that science will never understand the evolutionary origins of those structures. In fact, Miller claims, recent studies on the genes and proteins associated with the flagellum “have now established that the entire premise by which this molecular machine has been advanced as an argument against evolution is wrong – the bacterial flagellum is not irreducibly complex” (Miller 2003a, p. 5).

When Behe asserts that the bacterial flagellum is irreducibly complex, he means that a minimum number of proteins must come together all at once in “one fell swoop” to create the function of motility. The logic of irreducible complexity argues, according to Miller, that the approximately thirty individual protein components that

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99 See Edis, 2001; Roche, 2001; and Forrest & Gross, 2004, p. 138-140.

100 See Schneider, 2001.

101 An irreducibly complex biotic system is, according to design theory, a case of specified complexity. In addition, specified complexity signals the presence of complex specified information (CSI). It follows that anything that is irreducibly complex exhibits specified complexity and contains CSI. It also follows that if specified complexity and CSI depend upon the existence of irreducibly complex systems and if irreducibly complex systems are demonstrated not to exist, then examples of specified complexity and CSI are also demonstrated not to exist. Hence, critical responses that address the notion of irreducible complexity also indirectly address the notions of specified complexity and CSI.
contribute to bacterial motility have no function until they come together. Recent studies have demonstrated, however, that a specialized protein secretory system know as the type III secretory system (TTSS) has proteins that “are directly homologous to the proteins in the basal portion of the bacterial flagellum” (Ibid., p. 5). Because of these homologies, researchers have argued that the flagellum should be regarded as a type III secretory system. This research has shown, then, “that a smaller sebset of the full complement of proteins in the flagellum makes up the functional transmembrane portion of the TTSS...the TTSS is indeed fully-functional, even though it is missing most of the parts of the flagellum” (Ibid., p. 5-6). This conclusion is hardly surprising, states Miller, because evolutionary process are opportunistic – they mix and match proteins to produce new and novel functions.

Arguments, then, from the irreducible complexity of the bacterial flagellum for the intelligent design of molecular machines fail to provide evidence that evolutionary processes are unable to produce biological complexity. Instead of evidence, Miller argues, ID theorists only offer a chain of reasoning far removed from experimental evidence. That chain of reasoning proceeds as follows:

1. Observation: The cell contains Biochemical Machines in which the loss of a single component may abolish function.

Definition: Such machines are therefore said to be “irreducibly complex.”

2. Assertion: Any irreducibly complex structure that is missing a part is by definition non-functional, leaving natural selection with nothing to select for.

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102 Homology refers to “the similarity of biological features in different species or groups because of their descent from a common ancestor. Homologous features may include those found in development, structure, and morphology, although similarity on the genetic level probably provides a more reliable estimate of common descent” (Strickberger, 2000, p. 644).

103 Miller refers to the research of Heuck (Heuck, 1998), McNab (McNab, 1999), and Aizawa (Aizawa, 2001, p. 163).
3. Conclusion: Therefore, irreducible complex structures could not have been produced by natural selection.

4. Secondary Conclusion: Therefore, such structures must have been produced by another mechanism. Since the only credible alternate mechanism is intelligent design, the very existence of such structures must be evidence of intelligent design. (Miller, 2003b, p. 11; emphasis in original)

Miller states that since the assertion of non-functionality in the second statement is demonstrably false, “both the conclusions are falsified” (Ibid., p. 12). Consequently, “the claim of ‘irreducible complexity’ is scientifically meaningless” (Ibid., p. 13).

In short, Miller concludes, the scientific community rejects intelligent design arguments because not only the scientific claims but the reasoning “of the intelligent design movement are contradicted time and time again by the scientific evidence” (Miller, 20031, p. 12).

In reply to Miller’s argument Behe notes that through “tendentious reasoning” Miller is creating his own definition of irreducible complexity to “wage a PR battle.”

The evident purpose of Miller and others is to make the concept of IC so brittle that it easily crumbles. However, they are building a straw man. I never wrote that individual parts of an IC system couldn’t be used for any other purpose...Quite the opposite, I clearly wrote in Darwin’s Black Box that even if the individual parts had their own functions, that still does not account for the irreducible complexity of the system...[I wrote] ‘The reason why a separate function for the individual parts does not solve the problem of IC is because IC is concerned with the function of the system...The system can have its own function, different from any of the parts. Any individual function of a part does not explain the separate function of the system.’” (Behe, 2004, p. 1-2)

Anyone looking at a drawing of a flagellum, Behe states, immediately sees its design. “Since the flagellum is such an embarrassment to the Darwinian project, Miller tries to distract attention from its manifest design by pointing out that parts of the structure can have functions other than propulsion.” But, Behe argues, Miller doesn’t show how natural selection can produce a flagellum.
...he doesn’t cite experiments showing that such a thing is possible; he doesn’t give a theoretical model. He just points to the greater-than-expected complexity of the flagellum (which Darwinists did not predict or expect) and declares that Darwinian processes could produce it. This is clearly not a fellow who wants to look into the topic too closely.” (Ibid., p. 3)

Since the function of a pump has nothing to do with the function of a rotary propulsion device, Behe argues, the existence of the pump proteins doesn’t address at all the question of how the rotary propulsion function could be developed by Darwinian means. Consequently, “The irreducible complexity of the flagellum remains unaltered and unexplained by any unintelligent process, despite Darwinian smoke-blowing and obscurantism.” According to Behe, the only way “Darwinists” can demonstrate that their theory can account for irreducible complexity is to do so “by relevant experiments and detailed model building – not by wordplay and sleight-of-hand” (Ibid., p. 3-4).

In summary, the reasons Miller gives for rejecting the concept of irreducible complexity are: 1) just because science cannot currently explain the evolutionary origin of cellular systems does not mean they will not be explained through future research; 2) current studies in fact demonstrate that the bacterial flagellum is not irreducibly complex; 3) the reasoning of design theorists is contradicted by scientific evidence; and 4) the scientific community rejects the concept of irreducible complexity and the reasoning that leads to it because it is “contradicted time and time again by the scientific evidence.” The reasons Behe gives for rejecting Miller’s criticisms are: 1) Miller is creating a definition of IC that Behe in fact does not subscribe to for “PR” purposes; 2) Miller is distracting attention away from the design of the flagellum by pointing out the functionality of parts of a functioning system; 3) pointing out the functionality of parts of a system does not explain how the
functioning system was constructed; 4) Darwinists like Miller engage in “tendentious reasoning,” “smoke-blowing,” “obscurantism,” “wordplay,” and “sleight-of-hand” tactics; they do not offer “relevant experiments and detailed model building.”

*Discrete combinatorial object.*

Howard Van Till, emeritus professor of physics and astronomy at Calvin College, regards Dembski’s characterization of the bacterial flagellum as a discrete combinatorial object as “a totally unrealistic caricature of how the flagellum is actualized and an approach that totally ignores the role of the bacterial genome in coding for all of the structures and functions that contribute to the nature of E. coli” (Van Till, 2002, p. 23).

...no biologist has ever taken the bacterial flagellum to be a discrete combinatorial object that self-assembled in the manner described by Dembski. Dembski has not defeated any actual biological proposition. He has slain nothing more than an imaginary dragon – a fictitious adversary that Dembski himself has fabricated from a tall stack of rhetorical straw (Ibid., p. 18; italics in original)

Ken Miller agrees. No one in the scientific community has ever found evidence that the flagellum or any other complex biotic system has ever evolved or originated in the manner described by Dembski. “Dembski, therefore, has constructed a classic ‘straw man’ and blown it away...” (Miller, 2003a, p. 9).

Dembski replies that regardless of Van Till’s and Miller’s objections, a bacterial flagellum is a discrete combinatorial object. The fact that no biologist has ever taken that view is “beside the point” because “that’s what it is.” “The bacterial

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104 Mathematician David Rosenhouse has this to say about the probabilistic computations Dembski performs in *No Free Lunch* to demonstrate that a bacterial flagellum is a discrete combinatorial object: “The text soon becomes a dazzling congeries of binomial coefficients, perturbation probabilities, and sundry mathematical notation, all in the service of a computation that may as well have been written in Klingon for all the connection it has to reality. Modeling the formation of complex structures via a three-part process of atomization, convergence, and assembly is terribly unrealistic” (Rosenhouse, 2002).
flagellum is indeed a discrete combinatorial object, and the self-assembly that I describe is the one we are left with and can compute on the basis of what we know” (Dembski, 2002d, p. 9). In his view, the only reason biologists refuse to give credence to his description is because they think that only an “indirect” Darwinian pathway could have produced a flagellum. But, as Behe has demonstrated through the discovery of irreducible complexity, indirect Darwinian pathways are not “causally specific” and therefore Darwinian explanations are “wishful thinking.” “Design theorists are closing off possible mechanistic routes for biological evolution. Van Till’s biologists, by contrast, handwave at mere conceptual possibilities” (Ibid., p. 9).

In summary, the reasons Van Till and Miller give for rejecting the claim that complex biological systems are discrete combinatorial objects are: 1) it is a caricature Dembski has fabricated from “rhetorical straw” and 2) it ignores the role of the genome in coding for all the structures and functions of a bacterial cell. The reasons Dembski gives for rejecting Van Till’s criticisms are 1) the opinions of biologists are beside the point; 2) the flagellum is a DCO and configures the way it does because “that is what it is;” 3) ID is “closing off” evolutionary pathways; and 4) Darwinians “handwave” at mere conceptual possibilities.

Causal specificity.

Van Till notes that Dembski requires that evolutionary explanations for biological complexity must be “causally specific.” “Causal specificity,” in Dembski’s view, “means specifying a [natural] cause sufficient to account for the effect in question...Lack of causal specificity leaves one without the means to judge whether a
transformation can or cannot be effected” (Van Till, 2002, p. 8). Full causal specificity is, according to Van Till, the goal of all scientific explanations, but it is very difficult to achieve not only in the historical sciences but others as well. If, in the absence of full causal specificity, we were to allow “the possibility of occasional form-conferring interventions by an unembodied intelligent agent” a serious problem occurs – highly plausible explanations for certain structures and processes that are only partially understood would be removed from further consideration and replaced by an inference to design simply because they are not “causally specific.” That, in Van Tills view, is unacceptable because it would impede scientific research (Ibid., p. 8).

University of Rochester biologist H. Allen Orr finds the requirement of causal specificity “more than a little annoying.” Since Behe’s assertion that the bacterial flagellum “turned out to be dead wrong,” the argument has now shifted to “historical concreteness.” Dembski calls his requirement “causal specificity” but this is a category mistake of the first magnitude. His point has nothing to do with causation. It’s got to do with historical narrative. Which gene begat which protein in which order? Dembski’s bait and switch here is transparent and puerile...The causal specificity argument is also an exercise in nerve...It is the height of hypocrisy for Dembski to complain that Darwinism lacks causal specificity when his own theory lacks any specificity, including one atom of historical concreteness. Dembski may not have much of an argument, but you’ve got to admit he’s got chutzpah. (Orr, 2002, p. 7-8)

Dembski responds to Van Till’s concerns by asserting that the argument that evolutionary explanations are credible even though historical pathways can never be completely reconstructed is “an argument from ignorance.” Darwinian evolutionary pathways will always have an “absence of evidence.” “The only way to test whether material mechanisms are capable of driving biological evolution is by placing it in
competition with something like intelligent design.” Unfortunately, according to Dembski, Van Till’s “naturalism” prevents him from considering ID (Dembski 2002d).

In Dembski’s view, Orr proclaimed Behe “dead wrong” not because “Orr provided detailed, testable, causally specific instances of the Darwinian mechanism producing irreducible complexity, but because he can imagine a Darwinian scenario that gives rise to IC. Orr’s criterion for possibility is conceivability.” Orr’s substitution of the “weaker demand” of “historical narrative” for causal specificity means

Darwinism degenerates into fictive reconstructions with little, if any, hold on reality. The subtext of Orr’s review, though unintended, is that Darwinism is not a solution to the problem of biological complexity but an exercise in delusion by which evolutionary biologists convince themselves that they’ve solved the problem when in fact we [sic] haven’t. (Dembski, 2002b, p. 2)

Furthermore, according to Dembski, causal specificity is a problem for Darwinism because it is a theory about process; it is not a problem for intelligent design because ID “is not a theory about process but about creative innovation.” As a process theory, Darwinism is committed to finding a series of steps that gradually transforms one biological organism into another. As a theory about creative innovation, intelligent design is concerned with creative acts.

Creative innovation can occur in a process, but even then it is a process where each step constitutes an individual creative act (a micro-innovation, as it were). In our experience with intelligences, creative innovation is a unifying conceptual act that ties together disparate elements into a purposeful whole. The act can occur over time in a process or it can occur in one fell swoop. But in either case, creative innovation is not reducible to a causal chain where one step “causes” the next...intelligences are free. In the act of creation they violate expectations. They create as they choose to create...And there’s no way to have predicted these creative innovations. Consequently, causal specificity applies secondarily,
not primarily, to creative innovation and therefore to intelligent design. (Dembski, 2002c, p. 15)\textsuperscript{105}

The "bottom line," according to Dembski, is that "Darwinism has a burden of proof that intelligent design does not have" (Ibid., p. 15).

Importantly, Dembski notes that although Darwinists aren’t convinced they need to provide all the causal details, “skeptical outsiders do, and those outsiders constitute the bulk of the American population (hence Kansas, Ohio, Cobb County, etc.).” Despite the century-and-a-half Darwinism has had “to prove itself” and despite having “all the research moneys you could want,” Dembski argues, Darwinists cannot explain the origin of biological complexity. In his view, the intelligent design movement is new, with few researchers and no government funding, but “that will change. Interest is mounting. And George W. is after all my neighbor” (Ibid., p. 14, 16).

In summary, the reasons Van Till and Orr give for rejecting the demand for “causal specificity” include: 1) the demand for causally specificity is inappropriate for the historical sciences; 2) scientific research would be impaired by removing highly plausible scientific explanations that are only partially understood from further consideration because they are not “causally specific;” 3) the call for causal specificity is a category mistake; it is not about causation, rather it calls for “historical

\textsuperscript{105} On the topic of the predictive power of ID, Dembski notes elsewhere To require prediction fundamentally misconstrues design...Innovation, the emergence of true novelty, eschews predictability. Designers are inventors. We cannot predict what an inventor would do short of becoming that inventor. Intelligent design offers a radically different problematic for science than a mechanistic science wedded solely to undirected natural causes. Yes, intelligent design concedes predictability. But this represents no concession to Darwinism, for which the minimal predictive power that it has can readily be assimilated to a design-theoretic framework (Dembski, 2001f, p. 8).
The reasons Dembski gives for denying the criticisms of Van Till and Orr are: 1) the absence of evidence (causal specificity) in evolutionary explanations renders Darwinism an argument from ignorance; 2) Darwinian historical narratives are fictive reconstructions and exercises in delusion; 3) Darwinism and intelligent design have differing burdens of proof; 4) Darwinism is a theory of process and therefore must demonstrate causal specificity; 5) intelligent design is a theory of creative innovation which cannot be reduced to a causal chain or required to predict creative innovations; and 6) even if Darwinists don’t accept the burden of causal specificity, the American public does. Dembski also implies that the intelligent design movement might be able to gain the support of his neighbor, the President of the United States, George W. Bush.

The Complexity Specification Criterion (“The Explanatory Filter”)

In response to Dembski’s tripartite causal scheme of necessity, chance or design, critic Howard Van Till asks “Are there really only three possible modes of explanation for the set of all events? How can this be? The answer is: By definition” (Van Till, 1999, p. 668). This strategy is similar, Van Till argues, to declaring that all objects are colored yellow, purple or brown, where ‘brown’ is defined to be ‘neither yellow nor purple.’ Importantly, in Van Till’s view, Dembski could have used the word ‘muffnordled’ instead of the label ‘design.’ Why didn’t he use muffnordled? Van Till argues that Dembski chose design because he intends it to take on a specific operative meaning. Just as the word brown has a prior meaning, design also has prior
meaning. Since Dembski states that "in practice, to infer design is typically to end up with an intelligent agent," Van Till argues that Dembski’s choice of design for the “catchall remainder category was clearly not arbitrary for Dembski but was intended to convey a judgment regarding the character of most events in that category,” i.e., they were designed by an intelligent agent (Ibid., p. 668-669). “...could it be that this category label is intended to convey a more substantial meaning that could further another agenda, such as that of the “Intelligent Design” movement?” (Ibid., p. 670). Given Dembski’s close association with members of the ID movement, the legitimacy and adequacy of Dembski’s tripartite causal scheme is, in Van Till’s view, questionable. Until Dembski and the ID movement in general “are willing to place [their] theological and philosophical cards on the table so that [their] foundational presuppositions may be opened to public scrutiny and evaluation,” and until they “explain with candor exactly what they think it means to be ‘intelligence designed,’” Dembski’s tripartite causal scheme, Van Till argues, is unconvincing (Ibid., p. 675).

In a review of Dembski’s No Free Lunch Van Till also finds Dembski’s statement that a bacterium without a flagellum “does not exhibit an instance of specified complexity” (Dembski, 2002a, p. 331) while a bacterium with a flagellum does unbelievable.

Suppose...the flagellum comprises 2% of the whole [flagellum]...If, as Dembski claims to have demonstrated, the flagellum is intelligently designed (even though the rest of the bacterium is not) then are we to conclude that the other 98%...could have come to be actualized without the aid of a designer? Does it not seem odd that the flagellar 2% needed supplementary designer-action while the other 98% did not? (Van Till, 2002, p. 19-20)

Many critics have responded to Dembski’s characterization of natural selection as equivalent to the probability of baking a cake “entirely by chance" or
“randomly” with deep concern. Barbara Forrest and Paul Gross, for example, note that “[Natural] selection is the very opposite of chance.”

Selection, a metaphor Darwin himself used to mean the environmental preservation of an individual genotype, is determined by environment, by environmental opportunities and constraints in each generation, and therefore by how, and how often, the environment changes, either by its own laws or because the population relocates...The selecting environmental pressures are in effect “regularities,” that is, temporary, local laws of nature, which have a discernible, determinative effect on which phenotypes reproduce and pass their genes to their offspring...Regardless of which genotypes are preserved by their environment or why, the fact remains that immediately subsequent to the variations, the determinative factors of an organism’s environment begin to operate as nonrandom elements in the process of natural selection. (Forrest & Gross, 2004, p. 129; italics in original)

Dembski, in their view, “knows better” than to promote the idea that natural selection requires biotic phenomena to assemble themselves “purely spontaneously, by ‘chance,’ at random.” To actively encourage “the scientifically naive to confuse chance and randomness with [natural selection]” is, in the view of Forrest and Gross, “dishonest” (Ibid., 128 -130).

Dembski responds to criticisms of his tripartite causal scheme by stating that the choices of regularity (or necessity), chance and design “faithfully represents our ordinary human practice of sorting through events” (Dembski, 1998, p. 47).

Scientists who practice forensic science, cryptography and archeology, for example, usually approach problems in their fields by, first, determining if an object or event is the result of natural law or, second, the result of chance. If both of those causes can be ruled out, then these scientists infer design. Necessity, chance and design, Dembski asserts, are the only logically possible causes for any event or object; they represent a “mutually exclusive and exhaustive class” of possible causes (Dembski, 2002d, p. 6). And, contrary to suggestion by Van Till that the choice of the word ‘design’ was motivated by Dembski’s religious beliefs or the beliefs of other design
theorists, intelligent design has nothing to say about the characteristics or identity of the designer. "Intelligent design does not try to get into the mind of a designer or speculate about the characteristics of a designer...[While] one may be able to infer something about what a designer is like from the designed objects that a designer produces[,]...the identity and characteristics of a designer lie outside the scope of intelligent design" (Dembski, 2004b, p. 7).

Furthermore, Dembski claims, Van Till "attributes an argument to me that I never made...I argue that the bacterial flagellum is designed because it exhibits specified complexity. But such an argument says nothing about the design or absence of it in the rest of the bacterium" (Dembski, 2002d, p. 10). Dembski admits that Van Till's question concerning the design of 2% of a bacteria with a flagellum while 98% is not designed is odd, but "the oddness here is of Van Till's own doing, attributing to me a position that I don't hold and for which I never argued" (Ibid., p. 10).

Finally, in reply to the charge that he has misrepresented the evolutionary mechanism of natural selection by failing to account for the joint action of chance and necessity, Dembski points out that that "is not correct."

I approach chance and necessity as a probabilist for whom necessity is a species of chance in which probabilities collapse to zero and one. Chance as I characterize it thus includes necessity, chance (as it is ordinarily used), and their combination...Suffice it to say, there is no easy refutation of the Explanatory Filter. (Dembski, 2002a, p. 15)

In summary, the reasons critics give for objecting to the complexity specification criterion (or explanatory filter) are: 1) the criterion is unconvincing because it is created "by definition;" 2) the criterion is suspect because of the prior meaning of design and Dembski's association with the intelligent design movement; 3) Dembski does not reveal "with candor" his foundational presuppositions for public
scrutiny and evaluation; 4) his claim concerning the lack of design of a bacterium and the design of a flagellum is simply unbelievable; 5) Dembski dishonestly promotes a false understanding of natural selection by characterizing it as purely spontaneous 'chance'.

The reasons Dembski gives to rebut his critics include: 1) the criterion represents ordinary human reasoning about the causes of events; 2) the tripartite causal scheme is a mutually exclusive and exhaustive class of possible causes; 3) questions concerning the identity and characteristics of the designer are outside the scope of intelligent design; 4) Dembski never argued that a bacterium did not exhibit specified complexity; 5) necessity is a species of chance; chance includes necessity as well as necessity and chance working together.

*Science by Definition*

Critics of intelligent design are uniformly critical of the practice by ID theorists of “science by definition.” Intelligent design proponents, according to critics, define scientific terms in idiosyncratic ways that are not accepted by the larger scientific community, and they assume in their definitions the very things they are claiming to set out to ‘prove.’ In addition, with each rebuttal to critical reviews, ID theorists, especially Dembski, attempt to create a logical moat around their claims by slightly modifying their definitions to meet the objections.

Howard Van Till, for example, notes that Dembski treats the term ‘biological function’ as a detachable pattern that is somehow independent of the organism being studied. “For Dembski, biological function is one of the qualities of a complex organism that only intelligent intervention could produce.” In biology, Van Till
argues, biological function is understood completely differently. "For biology, on the other hand, biological function plays nearly the opposite role. It is the very capacity of an organism that gives it the ability to respond to its environment in the manner described by a fitness function, a phenomenon that lies at the heart of evolutionary dynamics" (Van Till, 2002, p. 24). Van Till notes that Dembski also employs the term ‘complexity’ differently than biologists. For Dembski, the ‘complexity’ is a property of the “means by which it became actualized” – that is, he judges complexity on the basis of the probability of its coming to be actualized ‘by chance.’ For biologists, ‘complexity’ refers to a property or quality of a biotic system. Van Till argues that these are not the only terms Dembski and other ID theorists endow with unorthodox meanings. In fact, the rhetorical case for ID “relies on a web of words that have been assigned extraordinarily unusual meanings.” Dembski is therefore guilty, in Van Till’s view, of the practice of equivocation which Dembski himself defines as “the deliberate confusing of two senses of a term, using the sense that’s convenient to one’s agenda” (Ibid., p. 24-25).

Critic Ken Miller accuses Dembski of “a priori” reasoning. Dembski’s “method” is to "assume what he is trying to prove." He “assume[s] the absence of an evolutionary pathway leading to [an] object, followed by a calculation ‘proving’ the impossibility of spontaneous assembly” (Miller, 2003a, p. 9; italics in original). This “method,” Miller argues, is “scientifically insupportable.”

Robert Pennock agrees with Miller. When Dembski asserts 1) that complex biological systems cannot in principle originate from purposeless material processes, 2) that intelligent agency is required to explain their origination and 3) that biological
change has occurred only within strict limits, "he is not giving us the conclusions of [ID] scientific research, if such could be found...he is starting with his conclusions already in place" (Pennock, 2000, p. 17).

Barbara Forrest and Paul Gross note that the constant "tinkering" with and "hedging" of definitions and arguments by Dembski and other ID theorists has created what they call "the ID critic's treadmill." Once technical critiques by respected scholars appear, ID proponents respond with rebuttals that release "torrents of words on the peripherals of major critiques, or add new arguments to their old ones without addressing fully the identified problems of the original. Then they refer to an obscure, or even better, a still-forthcoming book or article by one of them in which the full answer is supposedly already given or is about to appear." Significantly, however, they have not published yet "in the appropriate place: the scientific journals" (Forrest & Gross, 2004, p. 115-116). This is largely because, Forrest and Gross maintain, Dembski and other ID proponents have no empirical evidence for the intelligent design of biological systems. They have only abstract "logical, mathematical [and] statistical" definitions that are hedged and qualified with each new article or book they publish (Ibid., p. 122).

Unsurprisingly, ID proponents respond their critics by leveling the very same accusations. In a recent paper, William Dembski asserts that evolutionary theory defines science "as the study of material processes that, by logical necessity, disqualify design and that, again by logical necessity, ensure that some materialistic account of evolution must be true" (Dembski, 2004d, p. 21). Furthermore, our critics have, in effect, adopted a zero-concession policy toward intelligent design. According to this policy, absolutely nothing is to be conceded to intelligent design and its proponents. It is therefore futile to hope for
concessions from critics...Substantive objections are bypassed. Irrelevancies are stressed. Tables are turned. Misrepresentations abound. One’s competence and expertise are belittled. The [ID theorist] comes back, reframes the argument, clarifies key points, attempts to answer objections, and encounters the same treatment. The problem is not with the argument but with the context of discourse in which the argument is made. The solution, therefore, is to change the context of discourse. (Ibid., p. 9)

How are ID theorists supposed to change the context of discourse? By “control[ling] the terms of engagement.” Remarkably, Dembski does not deny the objections of critics who accuse him of assigning unorthodox, unusual meanings to terms and using the sense that’s convenient for his agenda. In fact, he claims the best way to change the context of discourse is “by developing our own vocabulary and ideas that set the agenda for the debate over biological origins” (Ibid., p. 28). He points out that the terms irreducible complexity, specified complexity, design inference, explanatory filter, and empirical detectability of design have become concepts and phrases that “the other side now spends an enormous amount of time discussing...” (Ibid., p. 29). In their replies to critics, Dembski urges proponents of ID to express the meaning of these terms with “clarity and consistency” and to “stay on topic” and “always return to the main point at issue, which is that material mechanisms lack the creative capacity to bring about the complexity and diversity of living forms and that intelligent design is helping to elucidate this central issue in biology” (Ibid., p. 25).

Dembski argues that the last thing ID proponents ought to do is “get bogged down in a war of words with people who are sold out to the old [naturalistic] way of thinking” (Ibid., p. 7). In one of Thomas Schneider’s critical responses to ID theory, for example, Schneider “engaged in hair-splitting that could only look ridiculous to outsider [sic] observers...This hair-splitting made it into my book and made for
amusing reading, though not at my expense” (Ibid., p. 13). Schneider and other evolutionary scientists are not, in Dembski’s view, going to change their minds because they are wedded to “a failing paradigm” and “suffer from...misconceptions, blindspots, and prejudices...This, in turn, limits their usefulness as conversation partners” (Ibid., p. 7). The questions of whether “design theorists have published their ideas in the right places [and] whether the scientific community is accepting intelligent design in sufficient numbers to render it credible” are, according to Dembski, “peripheral issues” (Ibid., p. 22).

So, our job is not to try to justify to such critics why intelligent design has a right to exist, but rather to justify to the outsiders listening in on our debate why intelligent design has more going for it than the hardcore critics are willing to concede. The proper answer to the critics’ zero-concession policy is therefore a there-might-be-something-to-it-after-all policy. In other words, it is enough to indicate to nonpartisans listening to the debate that there’s more going on here than meets the eye. Often it suffices to plant in the minds of nonpartisans a reasonable doubt suggesting that the critic’s blanket dismissal of intelligent design is less than credible. (Ibid., p. 11, italics in original)

Who are the outside, nonpartisans listening in on the debate? They are the “unwashed masses” (Ibid., p. 15) of “the undecided middle” of America who regard “evolution [as] an implausible and controversy-riven theory of biological origins, one that gives comfort to atheists and undermines religious faith” (Ibid., p. 29). In Dembski’s view, the most effective approach to critical reviews is “to respond to those that are troublesome to the undecided middle...In line with our there-might-be-something-to-it-after-all policy, it’s usually enough to indicate that there’s more to the story than the other side lets on” (Ibid., p. 25). In addition, it is important “to appeal to the undecided middle’s sense of fairness and justice, especially its tendency to root for the underdog and its predilection for freedom of expression” (Ibid., p. 26).
This sits especially well with young people, who thrive on rebelling against the status quo and don’t like it when an authoritarian elite tells them what they must think and believe. And these young people are the scientists of tomorrow. (Ibid., p. 35-36)

In summary, the reasons critics give for objecting to the practice of “science by definition” include: 1) it is a deliberate attempt to promote one’s agenda through definition alone; 2) ID definitions are scientifically insupportable; 3) the definitions do not represent conclusions of scientific research; rather they represent presupposed conclusions; 4) ID definitions have not been subjected to peer review in scientific journals; and 5) the definitions of ID theorists are merely abstractions lacking empirical support.

The reasons Dembski gives to rebut the objections of critics include; 1) evolutionary theory rules out design theory by definition; 2) since evolutionary scientists assume naturalism, design theorists have no other option but to develop their own vocabulary; 3) evolutionary scientists engage in hair-splitting and will not change their minds under any circumstances; 4) the issues of peer review and acceptance by the wider scientific community are peripheral issues; 5) the issues that concern the undecided middle of America are the issues ID theorists should address; 6) appeals to fairness, justice and freedom of expression are most effective with the undecided middle of America; and 7) young people don’t like it when an authoritarian elite tell them what to think and believe.

This section outlined some of the critical responses of evolutionary theorists to the scientific claims of ID and some of the rebuttals of ID theorists to their critics. The scientific claims of intelligent design depend crucially on, among other things,
the concepts of irreducible complexity, discrete combinatorial objects, causal specificity, and the complexity specification criterion. Critics who have examined these concepts and the claim that they support an "inference to design" by an unembodied intelligent designer who abiotically infuses information into physical systems have universally rejected them for the following general reasons:

- Studies that present scientific evidence for the existence of irreducible complexity in biological systems and for the claim that physical systems are discrete combinatorial objects have not been published in peer reviewed scientific journals.

- Current published studies in scientific journals demonstrate that the bacterial flagellum is not irreducibly complex and is therefore not a discrete combinatorial object as defined by ID theorists.

- Causal specificity is not a standard that is mutually agreed upon by the scientific community for evolutionary science. Accepting that standard would destroy the possibility for fruitful scientific research on issues that are only partially understood.

- Studies that present scientific evidence for the viability of the complexity specification criterion have not been published in peer reviewed scientific journals. The criterion promotes a definition of natural selection not accepted by the scientific community.

- The definitions of terms by intelligent design theorists are not recognized or accepted by the scientific community.

- The foundational assumptions and presuppositions of ID theory are not presented candidly for public evaluation.

Michael Behe, William Dembski and other proponents of intelligent design reject the objections offered by critics of ID for the following general reasons.

- Evolutionary theory rules out an inference to design by definition. Critics create their own definitions of ID terms that ID theorists do not subscribe to.

- Intelligent design has its own vocabulary because it does not assume or presuppose naturalism.
• Peer review and acceptance by biologists who presuppose naturalism are irrelevant to ID.

• Evolutionary theory has a burden of proof that differs from ID. Design theory is not required to predict creative innovations.

• The American public expects causal specificity from evolutionary theory. The issues the American public is concerned with are the issues ID should address.

• Appeals to the democratic political principles of fairness, justice and freedom of expression as well as appeals to political figures are effective with the public, especially young people who don't like to be told what to think by scientists.

• The identity and characteristics of the unembodied designer are outside the scope of intelligent design.

The reasons design theorists and their critics give for and against the scientific claims of intelligent design are important to public school policymakers because it is on the basis of these reasons that policymakers must make a decision about whether or not it is appropriate to include ID in science classes. In short, policymakers must determine whether intelligent design is a scientific theory for public school policy purposes based on the reasons ID theorists and evolutionary scientists give for and against the scientific claims of ID. In the next section I consider whether, from a deliberative perspective, ID ought to be included in public education science curricula as a scientific alternative to evolutionary theory.

A Deliberative Perspective on the Scientific Claims of Intelligent Design

Public school policymakers make decisions about science education curricula that are collectively binding on all students. To the extent that it is, therefore, possible the decisions of policymakers should be justifiable to everyone bound by them. As I argued earlier, a deliberative democratic perspective which promotes
principled political decision-making on the basis of the principles of reciprocity, publicity, accountability, basic liberty and basic opportunity is more likely to result in policies which are justifiable to all citizens bound by those policies. The decision, then, about whether or not intelligent design ought to be considered a scientific theory for public school policy purposes is more likely to justifiable if the reasons for that decision are conditioned by the principles promoted by a deliberative perspective.

In this section I consider whether intelligent design, from a deliberative perspective, should be treated as a scientific theory by public schools. The section is divided into two parts. First, I weigh the general reasons critics and proponents of ID have for objecting to or supporting the scientific claims of ID against the principles in deliberative democratic theory. And, second, I argue that those principles suggest that intelligent design theory should not be treated as a scientific theory in public schools. I also argue, however, that the religious status of design theory must be investigated to reach a more completely justified conclusion.

Deliberating Over the Reasons of Critics and Proponents

The general reasons critics and proponents offer in objection to and support of the scientific claims of intelligent design arise from three related basic concerns. First, each side is concerned with who establishes the methods and standards of scientific research. In the view of critics, the nature of science demands that fully qualified peers derive consensus on the methods and standards of science. In the view of proponents of ID, it is appropriate to take into consideration the opinions of the American public and to appeal to political figures when setting the methods and standards of science and to disregard the opinions of scientists who practice
methodological naturalism. Second, each side is concerned with the assumption of methodological naturalism. In the view of critics of ID, methodological naturalism is a reasonable, mutually acceptable methodology that results from centuries of evidential and experimental support. In the view of ID proponents, methodological naturalism dogmatically and unfairly rules out design inferences and the evidence that supports those inferences. Third, and finally, each side is concerned with the legitimacy of scientific explanations that include supernatural causes. In the view of critics, appeals to a supernatural cause in design theory is inconsistent with disciplined scientific research and raises questions about the religious content of intelligent design theory. In the view of proponents of ID, it is perfectly reasonable to infer design by an unembodied intelligent designer. The fact that the identity and characteristics of the unembodied designer are, according to design theorists, outside the scope of intelligent design means that an inference to design is a fully scientific inference.

Do the reasons given by critics and proponents of ID that are associated with these concerns meet the demands of reciprocity, publicity, accountability, basic liberty and basic opportunity? To answer this question I begin with the leading deliberative principle – reciprocity – and then consider the others. As noted earlier, the principle of reciprocity has two requirements. First, citizens are asked to engage in reasoning that is mutually justifiable – that is, citizens are asked to give reasons to one another that are conditioned by mutually accepted fair terms of social cooperation. Second, it requires that when empirical claims are made, the claims

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106 See footnote six in chapter four for design theorist William Dembski’s argument against using the term ‘supernatural’ when referring to intelligent causes and for my defense of the use of the term ‘supernatural.’
should be made in terms that are consistent with relatively reliable methods of inquiry that are themselves mutually acceptable. Hence, assessing the empirical or scientific claims of intelligent design in terms of the demands of the process and content principles of deliberative theory is essential to determining if public school policies based on those claims can be justified to all citizens who are bound by those policies.

_Establishing the methods and standards of science._ In the view of critics of ID, the nature of science demands that fully qualified peers derive consensus on the methods and standards of science. From a deliberative perspective, it appears that the practice by scientists of reaching consensus on scientific matters generally meets the demand of reciprocity. Reaching a consensus means that scientists offer reasons to one another in terms that others can accept to reach general agreement on questions of importance to science, including what counts as acceptable methods and standards of research. Importantly, however, the principle of reciprocity does not include language that excludes citizens who are not "fully qualified peers." How do critics of ID justify excluding general public opinions from deliberations over the normative methods and standards of the discipline of science?

Critics of intelligent design argue that the practice of science is not a democratic process. Laurence Krauss notes, "All ideas are not treated equally. Only those that have satisfied the test of experiment or can be tested by experiment have any [scientific] currency" (Krauss, 2002b, p. 2). Ideas and practices based on personal opinions and desires, religious beliefs or other biases are not accepted as 'scientific' simply because they do not result from publicly accessible, communally
evaluated procedures and practices that are publicly defended in mutually recognized scientific venues.

In addition, critics argue, methods and standards suggested by the public have no evidential or experimental support just as the definitions of science and scientific terms proposed by ID theorists do not. Teaching students methods and standards of science determined entirely by public opinion and political leaders would mislead students about the nature and explanatory reach of science and would inhibit their ability as citizens to make informed choices about the merit of scientific claims that impact their private lives and social policy. Pursuing projects in science according to "majority vote" would reduce science, according to ID critic and philosopher of science Philip Kitcher, to a "vulgar democracy."

Only a moment's reflection is needed to see that the most likely consequence of holding inquiry to the standard of vulgar democracy [majority vote] would be a tyranny of the ignorant, a state in which projects with epistemic significance would often be dismissed, perceptions of short-term benefits would dominate, and resources would be likely to be channeled toward a few 'hot topics.'" (Kitcher, 2001, p. 117)

The basic opportunity of students to receive an adequate education in science would be impossible to achieve, according to critics, if all ideas were treated as equal in science.

Critics of the scientific claims of ID justify the exclusion of general public opinions from deliberations over the normative methods and standards of science based on reasons that are consistent with the basic opportunity principle. In addition, their reasons appear to meet the demands of publicity and accountability since the deliberations of the scientific community on scientific matters include all qualified peers who make communal decisions on practices and procedures in public venues.
From a deliberative perspective, then, the reasons critics give for objecting to the scientific claims of ID are generally consistent with the principles of reciprocity, publicity, accountability and basic opportunity.

According to the reasons the proponents of ID give for their scientific claims, it is appropriate to take into consideration the opinions of the American public and to appeal to political leaders when setting the methods and standards of science and to disregard the opinions of scientists who promote methodological naturalism. In their view, it is a matter of fairness, justice and freedom of thought to allow citizens and politicians to set standards for scientific inquiry in science education.

The values of fairness, justice and freedom of thought appear to reflect mutually accepted fair terms of social cooperation, but the exclusion of the majority of practicing scientists from deliberations over methods and standards that are appropriate for science and science education simply because they practice methodological naturalism reveals a troubling lack of regard for the principle of reciprocity. It is troubling not only because it signals an unwillingness to pursue the claims of ID on terms that are acceptable to practicing scientists, it also suggests that intelligent design proponents are disguising their true motivations beneath a veneer of patriotic appeals. When William Dembski indicates that “most people” find the theory of evolution an “implausible” theory that comforts “atheists and undermines religious faith” and indicates that those same people should on the grounds of fairness, justice and freedom of thought determine the methods and standards of science and science education, he is disguising a religious agenda beneath false appeals to moral principles. It suggests that the moral claims of ID proponents in
Ohio, for example, are not genuine moral appeals, but carefully calculated rhetoric designed to play on the scientific ignorance and religious fears of Americans.

Appealing to the opinions of the majority of Americans and to political leaders when setting the methods and standards of science superficially appears to be consistent with the principles of publicity and accountability. Openly calling for public opinion in public meetings and holding scientists accountable to the opinions of the American public appear to meet these process principles. To the extent, however, that the arguments of fairness, justice and freedom of thought disguise a religious agenda, ID proponents are creating deceptive secrets and violating the principle of publicity. They are concealing the religious agenda of intelligent design while making others believe the conflict over ID is a conflict over fairness.

Accountability requires policymakers to resist policies that violate basic liberty and basic opportunity even if the majority of their constituents find the claims of ID appealing. If intelligent design is a religious theory in the garb of science, public policies that permit ID to be taught in public schools violate the basic liberty of students by constraining their present and future religious beliefs. Public school policymakers would violate the principle of accountability if they promoted school policies which entailed sectarian religious belief.

*Methodological Naturalism.* In the view of critics of ID, methodological naturalism is a reasonable, mutually acceptable methodology that is tempered by centuries of evidential and experimental support. Assuming that natural causes are sufficient to explain natural phenomena is justified simply because that assumption is supported by past and present evidence. As a method of inquiry, methodological
naturalism assures scientists that hypotheses are accessible to the demands of empirical testing. Importantly, the assumption is always open to change if compelling evidence is offered in appropriate scientific venues and that evidence has been reviewed by the wider community of fully qualified peers who reach a consensus on the merits of the conclusion.

The worry that the wider scientific community willfully and dogmatically excludes certain views, including supernatural causal explanation, is unjustified, according to critics of the scientific claims of ID. Dogmatism results from the authoritarian imposition of a single point of view that is impervious to the claims of others. The communal and public practice of peer review, the provisional nature of scientific knowledge and the requirement that theories be revised if new evidence warrants revision protect science from intolerant ideological stances and assures an appropriate amount of genuine intellectual tolerance. This view is supported by many philosophers of science who note that the larger community of scientists is able to establish and maintain through inclusive methodology and practices an objectivity that minimizes ideological prejudice.\textsuperscript{107}

The reasons ID critics give for the assumption of methodological naturalism appear to meet the demands of reciprocity. Scientists offer evidence, based on mutually agreed on standards, for the adequacy of methodological naturalism. The principles of publicity and accountability also appear to be met through the public practice of peer review and the understanding that the conclusions of science are provisional. The principles of basic liberty and opportunity also do not appear to be violated by the practice of methodological naturalism.

\textsuperscript{107} For an example in the social sciences, see Longino, 1993 and Harding, 1993.
ID proponents contend that methodological naturalism dogmatically and unfairly rules out design inferences and the evidence that supports those inferences. In their view, scientists have adopted a “philosophy of naturalism” which, they assert, entails ontological naturalism thereby negating through definition the possibility of ever finding evidence for design by an intelligent designer. Since science promotes a philosophy of naturalism, the central objective of science education, ID proponents argue, is to instill a naturalistic way of thinking which tells children that the natural world is all that exists or ever will exist.

In response to what they view as an unfair ruling out of design inferences by the wider scientific community, ID proponents are developing their own “science of origins” founded on the theory of intelligent design which includes methods and standards that allow for supernatural causes in scientific explanations. They are attracting sympathetic scientists, philosophers, political activists and university students who are developing their own set of mutually agreed upon standards of evidence, definitions of terms, research agenda, journals, websites, books, conferences, etc. In addition, they have launched a political effort called the Wedge Strategy108 to gain public acceptance and support for intelligent design that includes efforts to persuade state and local school boards that ID is a genuine scientific alternative to the theory of evolution.

Do the reasons ID proponents give for rejecting methodological naturalism meet the demands of reciprocity? The assertion that methodological naturalism necessarily entails ontological naturalism, thereby ruling out design inferences by definition is not supported by evidence or argument. The fact that scientists leave

open the possibility for supernatural causal explanations in science if compelling
evidence warrants such explanations contradicts the claims of dogmatism. And, the
fact that many scientists embrace supernatural causes in their religious belief
contradicts the claim that practicing a naturalistic methodology in science rules out
supernatural causal explanations in other areas of one's life. The unwillingness of ID
proponents to offer reasons for objecting to methodological naturalism based on
mutually agreed upon rules of evidence and argument accepted by the wider scientific
community does not meet the demands of reciprocity. In addition, the decision of ID
theorists to create their own "science of origins" apart from the wider community of
scientists signals a complete rejection of the principle of reciprocity itself. While
design proponents might argue that they offer reasons for the methods and standards
of origins science that are accepted by others in their group, they are refusing to press
their public claims in broader scientific venues and school board rooms in terms that
are acceptable to the wider scientific community.

By refusing to offer reasons in public forums for their objections to the
practice of methodological naturalism that are based on mutually agreed upon
standards of evidence and logic that are accepted by the wider community of
scientists, ID proponents not only violate the principle of reciprocity, they also violate
the principle of accountability. Accountability requires citizens to take responsibility
for the consequences of their actions and decisions on all citizens. If ID proponents
fail to support their claims in terms that are accessible to the community of scientists,
then ID proponents are failing to address the claims of those who would be
significantly affected by the inclusion of ID in the discipline of science and in science classrooms.

_Supernatural Causal Explanation._ Critics of the scientific claims of ID argue that appeals to supernatural causes are inconsistent with disciplined scientific research and raise questions about the religious content of intelligent design theory. Unembodied supernatural agents are by definition outside of or beyond the natural world and are therefore not constrained by the natural world. Among the many reasons that ID critics have for questioning the legitimacy of supernatural causes in scientific explanations is the argument that science is a discipline that requires hypotheses to be tested through controlled experimentation that holds certain variables constant as others are manipulated. Since scientists have no control over supernatural entities or forces, critics of ID argue, they cannot be scientifically tested. In fact, according to ID critics, all empirical investigation would be suspect if supernatural causes could be appealed to when a difficult scientific question arose. While it is logically possible that a supernatural agent created biological complexity, the evidence of science so far, critics contend, overwhelmingly supports the theory of evolution.

Importantly, critics of ID are suspicious of the appeal of ID theorists to a supernatural cause for biological phenomena. Not only is the reduction of possible causes for biological complexity to necessity, chance and design suspect because of the associations of ‘design’ with Christian arguments from design for the existence of God, but also because orthodox evangelical Christians are ID’s most ardent supporters. The lack a candor identified by ID critic Van Till concerning the

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foundational presuppositions of ID proponents renders, in the eyes of critics, appeals to supernatural causes by ID proponents into appeals to sectarian religious belief.

The reasons critics give for questioning the legitimacy of supernatural causal explanations appear to meet the requirements of the principle of reciprocity. To the extent that mutually agreed upon methods and standards of science require manipulation of variables in scientific experiments, and to the extent that the results of research overwhelmingly supports evolutionary theory, questioning the legitimacy of appeals to supernatural causes is consistent with reciprocity. Suspicions about the religious status of intelligent design also meet the demands of reciprocity. If intelligent design is a sectarian religious theory, then questions about violations of other deliberative principles become paramount.

Proponents of intelligent design contend it is perfectly legitimate to infer design by an unembodied intelligent designer. They reason that since the identity and characteristics of the unembodied designer are outside the scope of intelligent design and since their evidence supports the inference, an inference to design is a fully scientific inference.

The reasons ID proponents give for appealing to the agency of an unembodied supernatural designer continue to violate the demands of reciprocity. As noted earlier, the methods and standards for origins science developed by ID proponents were not arrived by through a consensus of fully qualified peers in the wider scientific community. Consequently, any conclusions ID theorists reach concerning the agency of a supernatural unembodied intelligent designer in the origin of biological complexity are not justifiable to the wider scientific community. In addition,
claiming that the identity and characteristics of the unembodied designer are outside the scope of intelligent design appears to violate the principle of accountability. Supernatural causes are most commonly associated with religious belief, and if it is the case, as Dembski has often stated, that “the implications of intelligent design for religious belief are profound,” then the question of who the unembodied designer is become paramount (Dembski, 2003b, p. 10). The principle of accountability requires public school policymakers to resist any policies that violate the basic liberty of students. Public school science classes that claim science is able to empirically detect a supernatural being which is commonly associated with sectarian faith would raise serious questions about the basic liberty of students to resist compulsory sectarian religious belief.

The Scientific Status of ID for the Purposes of Public School Policy

The reasons ID critics give for objecting to the scientific claims of ID appear to meet the demands of the process and content principles of a deliberative democracy. In contrast, the reasons ID proponents give in support of their scientific claims and in rebuttal to the criticisms of critics appear to be completely unjustifiable from a deliberative perspective. Consequently, it is an unavoidable conclusion that it would be inappropriate, from a deliberative perspective, to include intelligent design in public school science classrooms as a scientific alternative to evolutionary theory. Importantly, state and local school board members usually lack expertise in the academic disciplines that constitute the substantive content of public education. As political representatives of the communities in which they live, they share authority over the education of local children with parents who also usually lack
expertise in most of the academic disciplines found in public education. Public school policymakers, therefore, rely on educational and academic experts to formulate content standards that meet the scholarly boundaries of the disciplines found in school curricula. When experts and those who are perceived as experts disagree, and when parents and the general public also disagree over the content of academic standards, I have argued that principled political decision-making based on the process and content principles found in deliberative democratic theory offers the best chance of formulating policies that are justifiable to all who are bound by those policies. I have also argued that a deliberative perspective can help identify those areas of disagreement which might be resolvable and help citizens live on terms that all can respect when fundamental disagreements persist.

Determining the scientific status of intelligent design theory from the perspective of a philosopher of science or a practicing scientist would be inappropriate for policymakers given their lack of expertise in philosophy or science. Policymakers are, without extensive education, unable to determine if intelligent design qualifies as "science" based on the standards of philosophy or practicing scientists. But, as political representatives who must make political decisions about the scientific status of intelligent design for public school policy purposes, a deliberative perspective offers an appropriate basis for decision-making. If the reasons policymakers give for excluding intelligent design from public school science classrooms as a scientific theory meet the requirements of reciprocity, publicity, accountability, basic liberty and basic opportunity, policymakers are justified in
declaring that intelligent design is not a scientific theory for public school policy purposes.

The complete rejection of the principle of reciprocity by intelligent design proponents, the development of a conception of science that allows public opinion and politicians to determine the scholarly boundaries of scientific inquiry, the refusal of ID proponents to candidly discuss the fundamental presuppositions of ID theory and the suspicion that intelligent design proponents are disguising a religious agenda beneath false appeals to moral principles provide justifiable reasons for policymakers to exclude intelligent design as a scientific theory from public school classrooms. However, their reasons would be more fully justified if they continued to pursue the obligations of mutual respect discussed in chapter two.

The view of mutual respect that I promote requires policymakers to take seriously not only the scientific claims of intelligent design theorists, but also their religious claims. When ID proponents claim that determining the identity and characteristics of the unembodied supernatural intelligent agent is outside the scope of intelligent design, policymakers are obligated to investigate that claim despite the fact that ID proponents reject the principle of reciprocity. The purpose behind such an investigation is not only to determine if ID theory is a religious theory for public school policy purposes, it is also to find areas of possible agreement among citizens. Finding areas of agreement would allow policymakers to accommodate some of the claims of ID advocates thereby reducing the range of citizen disagreement and contributing to the possibility of living together in some measure of mutual respect. The next chapter, chapter four, therefore investigates the claim by
intelligent design proponents that determining the characteristics and identity of the unembodied intelligent designer is beyond the scope of ID.
Intelligent design (ID) theory asserts that the cause of the origin of complex biological systems is best explained by the agency of an intelligent, unembodied designer who abiotically infuses\textsuperscript{110} information into physical systems. Design theorists justify this assertion through two general claims. First, they claim to have a rigorous criterion, the "specified-complexity criterion" (also known as the "explanatory filter") that empirically detects the presence of complex specified information in complex biological systems thus warranting an inference to design by an intelligent agent. Second, they claim to demonstrate mathematically that natural causes are in principle incapable of creating biological complexity. Since, according to design theorists, embodied intelligent agents are limited to natural causal processes and since intelligent design theory demonstrates that natural causal processes are incapable of creating biological complexity, the intelligent designer empirically identified through the specified-complexity criterion must therefore be unembodied and act through the non-physical causal process of abiotic infusion.\textsuperscript{111}

Importantly, intelligent design theory purports to have nothing to say about the characteristics or identity of the unembodied intelligent designer. "Intelligent

\textsuperscript{110}As noted in chapter one, footnote 4, abiotic infusion is the causal mechanism an intelligent designer employs to create complex biological phenomena. Since "abiotic" means outside any physical, living organism and since "infusion" means "the direct introduction of novel information from outside the biological system," abiotic infusion, for design theorists, refers to a process that does not "move [physical] particles" or "impert energy" to create complexity. Rather, it is "word-like" process that "persuasively" creates complex physical systems (William Dembski, 2002, p. 321-343).

\textsuperscript{111}See William Dembski, 2002a, p. xiv; chapters three and four; and p.320-343.
design does not try to get into the mind of a designer or speculate about the characteristics of a designer...[While] one may be able to infer something about what a designer is like from the designed objects that a designer produces[,]...the identity and characteristics of a designer lie outside the scope of intelligent design” (Dembski, 2004b, p. 7). Design theorists confidently note that the unembodied intelligent designer detected through their “specified complexity criterion” and mathematical formulas is compatible with a variety of religious and philosophical traditions including Stoicism, Platonism, Neoplatonism, pantheism, Buddhism, Hinduism, New Age religions, Jungian beliefs, parapsychology, vitalism, deism, panentheism, agnosticism and the three widely practiced monotheistic traditions of Islam, Judaism and Christianity (Dembski, 2002a, p. 334; 2003a, p. 12-13). Design theorists, however, also confidently note that the designer identified by ID is not compatible with theistic evolution – i.e., the view that theistic religious convictions about God are compatible with and can even be enriched by modern evolutionary ideas (Dembski & Richards, 2001, p. 228) In fact, William Dembski, arguably the most influential intelligent design theoretician, considers theistic evolution to be design theory’s “most implacable foe” (Dembski, 2002d, p. 1).

Given the statement by design theorists that the characteristics and identity of the intelligent designer responsible for biological complexity cannot be determined by intelligent design theory, the question arises: Why is intelligent design theory compatible with some religious perspectives and not others? Why is intelligent design, for example, compatible with parapsychology and not Jewish, Islamic,
Catholic and Protestant religious convictions that view God and evolutionary science in harmonious relationship?

The purpose of this chapter is to examine the religious content of intelligent design theory and to analyze, from a deliberative political perspective, the consequences the religious content of ID has for public school policy. The “religious content” of intelligent design theory refers to religious ideas, including sectarian religious ideas, which constitute the essential meaning of the theory. I argue that the reason why intelligent design is compatible with some religious perspectives and rules out others is because sectarian religious ideas constitute the essential meaning of the theory – that is, intelligent design is not only a religious idea, it is a sectarian religious idea that logically excludes other religious convictions.

This chapter is divided into three sections. In section one I argue that the concept of an unembodied intelligent designer who abiotically infuses information into physical systems to create and guide living organisms is a religious idea so central to traditional religious belief that this concept alone establishes ID as a religious theory. In section two I argue that the idea in intelligent design theory that natural causes cannot in principle be the cause of the origin of complex biological systems and the idea that the agency of an unembodied designer is empirically detectable are sectarian religious ideas associated with certain sectarian religious groups. I also argue that the texts of design theorists clearly identify the designing agent found through the specified-complexity criterion thereby confirming that ID is a sectarian religious theory. In the final section I examine the consequences the

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112 As noted in footnote 48 in chapter two, the word ‘sectarian’ in this dissertation refers to religious groups who share religious views which logically exclude competing religious understandings.
religious content of ID has for the process and content of democratic public school policy deliberations.

Before proceeding, it is important to note two essential assumptions I make in this chapter. First, this chapter ignores the logical and empirical problems surrounding the “specified-complexity criterion” and the problematic mathematical formulations that ostensibly demonstrate the inability of natural causes to create biological complexity that were discussed in chapter three. In fact, for the purposes of this chapter, the claims of intelligent design are granted – that is, for the purposes of this chapter, it is assumed that design theory can reliably empirically detect the intelligent design of complex biological organisms and that the mathematical formulations of design theory clearly demonstrate that natural causes are in principle incapable of creating biological complexity. Since design theorists readily engage in theological arguments once they feel they have demonstrated the validity of their claims, granting the claims of ID theory allows the religious content of intelligent design theory to clearly emerge.

Second, as noted above, the “religious content” of intelligent design theory refers to religious ideas which constitute the essential meaning of the theory. Legal scholars argue that it is the religious content, not the religious implications, of intelligent design that are relevant to whether it should be considered a religion for First Amendment purposes. Jay D. Wexler, for example, points out “...all types of government action and messages have [implications for religious belief], such as the message that war is justified, that the free market is appropriate, or even that all men and women are created equal” (Wexler, 2003, p. 819). David K. Dewolf, et. al., state
"The content of a scientific theory, and not its implications, determines its legal status in public school science classrooms...incidental harmonies with religious practices and beliefs do not disqualify secular concepts under the First Amendment" (Dewolf, 1999, p. 16). If ‘implications’ refer merely to incidental effects or “incidental harmonies” that intelligent design might have with some religious beliefs, then it is clear that defining something as religious theory simply because of those incidental effects on religion would be inappropriate. If, however, ‘implications’ refer to a stronger, logical relationship where the relationship between scientific theory and religious belief is logical necessity, e.g. if the implications of intelligent design means that certain religious beliefs are ruled out through logical necessity, then the implications of intelligent design are fundamental to determining its sectarian religious content. In this chapter, I argue that the sectarian religious content of intelligent design includes the logically necessary religious implications of ID. In other words, I argue that the religious implications of ID that are logically necessary are among the sectarian religious ideas that constitute the essential meaning or content of intelligent design theory.113

Religious Content

Once design theorists are granted the claim that the specified complexity criterion empirically detects the actions of an intelligent unembodied designer who

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113It is worth noting that ID proponent and legal theorist Francis Beckwith argued in a 1991 book The Mormon Concept of God that, based on the “logical implications of the argument from design,” the “God of Mormon finite theism...is fundamentally irrational.” He and co-author Stephen Parrish claim “that if the argument from design is valid, then its logical implications] will lead us eventually to the God of classical theism” (Beckwith & Parrish, 1991, p. 81,103). Beckwith and Parrish’s book underscore the relevance and importance of logical necessity in theological reasoning, no less than in scientific, philosophical or legal reasoning. Dembski defines logical necessity as “the logic of entailment. Once A is given, anything logically entailed by A must be accepted as well” (Dembski, 1999, p. 201).
abiotically creates and guides life, it is difficult to reconcile design theory with the statement that "the...characteristics of a designer lie outside the scope of intelligent design." After all, the designer is deemed to be an "intelligent," "unembodied," "designer/creator" who creates and guides all life through supernatural ("abiotic") means. In fact, the designer described by design theory not only exhibits specific characteristics, those characteristics are regarded by most persons – philosophers, theologians, scientists, lawyers, judges and design theorists alike – to comprise the core idea of religious belief in theistic religious traditions. The core religious idea common to traditional theistic religious beliefs is that an unembodied intelligent designer created and guides life through supernatural means.

Boston Law School professor Jay D. Wexler, for example, argues in “Darwin, Design, and Disestablishment: Teaching the Evolution Controversy in Public Schools” that “the idea that a designer created the universe in an intelligent fashion is such a central aspect of traditional [theistic] religions that it itself should be considered an inherently religious idea...” Wexler notes that a simple exercise

114 As Michael Behe notes, “[The] theory of intelligent design...holds implicitly that there is a designer capable of planning and executing the phenomenal intricacies of life on earth” (Behe, 2001, p. 100). ID proponents propose intelligently “guided” abiotic infusion as the only causal mechanism capable of creating biological complexity. “Blind,” “unguided” natural processes are, according to ID, incapable of producing complex biological systems.

115 Dembski argues that people should “forget about the term supernatural.” Equating ‘unembodied’ and ‘abiotic infusion’ with ‘supernatural’ is, he argues, “the wrong contrast. The proper contrast is between undirected natural causes on the one had and intelligent causes on the other. Intelligent causes can work with natural causes and help them to accomplish things that undirected natural causes cannot...Whether an intelligent cause operates within or outside nature is a separate question from whether an intelligent cause has acted within nature” (Dembski, 2004c, p. 189; see also Dembski, 2001b, p. 223; italics in original). However, Dembski also states “An unembodied intelligence retains no physical entity through which the intelligence is expressed...Thus by an unembodied intelligence or designer I mean an intelligence whose mode of operation cannot be confined to a physical entity located within spacetime” (Dembski, 2002a, p. 333-334). By any reasonable construal, non-physical entities outside of space-time that employ non-physical means outside of spacetime to create physical systems are supernatural (“superphysical”) entities that employ supernatural (“superphysical”) means of creation. In this chapter, therefore, unembodied intelligent designers are considered to be supernatural entities and abiotic infusion is considered to be a supernatural means of creation.
demonstrates the centrality of the belief in an intelligent designer to traditional theistic religious beliefs. First, ask whether a person who does not believe a supernatural intelligent designer created the universe and mankind would be considered, by a reasonable person, to be a believing Jew, Muslim, or Christian even though he attended religious services. Next, consider a Christian who said she believed that an intelligent supernatural designer created the universe, but she also did not believe in going to church. Which person would most reasonable people consider to be a true believer? "It is hard to imagine that most reasonable people would say that [the first] person was a true believer" in one of the major theistic religious traditions," but "most reasonable people...would probably be willing to call the latter person a true believer." That is because, argues Wexler, "the idea that the universe was created by a designer is the central animating idea of the major theistic Western religious traditions" (Wexler, 2003 p. 817).

Wexler points out that not only religious history and common sense support the view that belief in a supernatural creator of life is the essence of religious belief, language from United States Supreme Court decisions also support that view. Throughout the Court's history, Wexler argues, Supreme Court decisions have referred to belief in a "Creator" or "Supreme Being" who created humanity as constituting the essence of religious belief.116 As recently as Edwards v. Aguillard, a decision that found Louisiana's 1982 "Creationism Act" unconstitutional, the Court stated that "the preeminent purpose of the Louisiana legislature was clearly to advance the religious viewpoint that a supernatural being created humankind." The

court later stated unequivocally that creation science "embodies the religious belief that a supernatural creator was responsible for the creation of humankind" (Ibid, p. 818; italics in original).

A sampling of philosophers, theologians and scientists who have written recently about intelligent design agree that the substantive content of traditional Western religious belief consists of the idea that an intelligent supernatural designer created and guides the universe. Philosopher Alvin Plantinga, for example, states "[A] Christian (naturally) believes that there is such a person as God, and believes that God has created and sustains the world" (Pennock, 2001, p. 206). Theologian John Haught notes in God After Darwin "The notion that God creates the world is, of course, central to the faith of millions" (Haught, 2000, p. 37). Cell biologist and practicing Catholic Ken Miller writes "...the three great Western religion share a core of belief...first...Judaism, Christianity, and Islam all believe in a genuine, personal God who created the universe...Second, we exist as the direct result of God’s will...Third, God has revealed himself to us" (Miller, 1999, p. 222; see also p. 249). Howard van Till, professor emeritus of physics and astronomy at Calvin College, notes that "historic Christian theology sees the existence of the universe to be radically dependent on God’s creative action at all times...In the context of a theistic worldview, the evidence of divine creative action is both obvious and undeniable..." (Pennock, 2001, p. 491).

In addition to the informed opinions of participants in the debates surrounding ID, the texts of intelligent design theorists themselves support the view that belief in an intelligent designer who supernaturally creates and guides life is the essence of
traditional Western religious belief. William Dembski notes that “Historically in the West, design has principally been connected with Judeo-Christian theism. The God of Judaism and Christianity is said to introduce design into the world by intervening in its causal structure” (Pennock, 2001, p. 642). “Theism (whether Christian Jewish, or Muslim),” Dembski states, “holds that God by wisdom created the world. The origin of the world and its subsequent ordering thus results from the designing activity of an intelligent agent – God” (Dembski, 2003a, p. 9). “Christians,” in particular, points out Dembski, “accept that God by wisdom created the world and that therefore God is a designer and the world is designed” (Dembski, 1999, p. 17). In Dembski’s latest work, he states again “…the God of Christianity is a designer. To be sure, Christianity’s God is not merely a designer. But he is at least a designer” (Dembski, 2004c, p. 176). Nancy Pearcey, a Center for Science and Culture Senior Fellow and design proponent, agrees. Pearcey states that in the Christian tradition “Design, especially as it relates to God creating the world, lies at the heart of all that Christians believe” (Pearcy, 2001, p. 50). Phillip Johnson, a legal scholar and a founder of the intelligent design movement, adds that not only Christians, but also “observant Jews” agree on “the most fundamental issue – the reality of God as our true Creator” (Johnson, 1997, p. 92). “In the broadest sense,” Johnson notes, Christians and Jews are “creationists” who “believe that the world (and especially mankind) was designed, and exists for a purpose” (Johnson 1993, p. 115, italics in original). Importantly, he says, “…the vast majority of Americans are theists, which means they believe…that we were created by God, a supernatural being who cares about what we do and has a purpose for our lives…” (Johnson, 1995, p. 7). Finally, ID proponent Francis
Beckwith, an associate professor of Church-State Studies at Baylor University, states “Classical theism...is the theism that is believed by most churches and religious bodies in the West...[including] Christianity, Islam, and Judaism...The God of traditional theism can be described as personal and disembodied [and] the creator and sustainer of all contingent existence...” (Beckwith, 1991, p. 7).

In spite of their claim to the contrary, ID theory does describe the basic characteristics of the designer identified through the specified-complexity criterion of ID, and close inspection of those characteristics clearly reveals the religious content of intelligent design theory. As noted above, the “religious content” of intelligent design theory refers to religious ideas that constitute the essential meaning of the theory. In the case of traditional Western religions, the essential content of traditional religion consists of the idea that an intelligent, supernatural designer created and guides life – that is, the meaning of the idea that an intelligent supernatural designer created and guides life is religious. Since the content of the animating idea of intelligent design theory is identical to the content of the central animating idea of traditional religions, ID is undeniably a traditional religious idea. The “religious content” of intelligent design theory consists of its assertion of the religious idea that an intelligent supernatural designer created and guides life – that is, the meaning of the idea of intelligent design is religious. Intelligent design is, therefore, a religious theory.

117 According to Webster's New World Dictionary, the word “content” refers to the “essential meaning” or “substance” of something. The substantive content of an idea or a discrete system of ideas, then, constitutes the meaning of that idea or system of ideas. Since the substantive content of Western religious traditions consists of the idea that an intelligent, supernatural designer created life, that idea is a religious idea. Webster’s New World Dictionary of the American Language, 2nd college ed., s.v. “Content.”
Sectarian Religious Content

Just as granting the claim of ID theorists that an intelligent, supernatural designer creates biological complexity clarifies the religious content of intelligent design theory, granting the claims that natural causes are in principle incapable of creating biological complexity and that the agency of the supernatural designer is empirically detectable clarifies the sectarian religious content of ID. "Sectarian religious content" refers to religious ideas in design theory that logically exclude competing religious understandings. As noted earlier, logically necessary religious ideas implied by intelligent design that exclude other religious understandings are included in the sectarian religious content of intelligent design theory.

This section is divided into three parts. First, I present the reasons design theorists give in their texts for ruling out religious views that allow natural causes to create biological complexity. I argue that the reasons they give are religious reasons that necessarily exclude competing religious convictions, and they demonstrate that the idea in ID theory that natural causes cannot in principle create complex organisms is a sectarian religious idea. Second, I examine the religious concept of theistic realism that design theorists consider to be the defining concept in intelligent design theory. I argue that the idea in intelligent design that the agency of the supernatural designer is empirically detectable is a sectarian idea resulting from the religious literalism inherent in theistic realism. Finally, I argue that the texts of design theorists clearly identify the designing agent found through the specified-complexity criterion. The intelligent designer is the Christian God described in the Gospel of
John as understood by orthodox evangelical Christians who read the Bible literally. I conclude that the sectarian content of intelligent design clearly indicates that intelligent design theory is a sectarian religious theory.

*Natural Causes Are In Principle Incapable of Creating Biological Complexity*

Modern evolutionary research and theory rely on scientific methodologies that assume natural causes can explain the origin of complex biological systems. Many practicing evolutionary scientists and theorists are religious believers who find no contradiction between their work and their religious beliefs. Those evolutionary scientists and theorists who are theists, i.e., they believe in a God or gods, are called by intelligent design theorists “theistic evolutionists.” Theistic evolution refers to the view that theistic religious convictions are compatible with and can even be enriched by modern evolutionary ideas.

Evolutionary biologists who are devout theists and theologians who embrace the science of evolution argue that design theorists refuse to distinguish between the methodology of modern science which necessarily confines itself to natural causes and metaphysical inquiry which allows for the possibility of supernatural causes. According to Christian theologian John Haught, evolutionary science’s “methodologically godless way of reading nature is uncontroversial and justifiable... Natural science, for the sake of its own integrity, has to leave out all appeals to divine explanation...Science is a method, not a metaphysics” (Haught, 2003, p. 17, 112).119

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118 As noted in footnote 1 in chapter three, ‘orthodox’ interpretations of Christian doctrine conform to the early creeds and confessions of the Christian faith. ‘Evangelical’ interpretations focus on the New Testament, especially the Gospels, and emphasize the salvation of humankind by faith in the atonement of Jesus.

119 Haught labels the conflation of metaphysical inquiry with scientific inquiry a “hybrid reading” of the natural world. Haught notes that “hybrid reading” is not unique to intelligent design; scientists are
Consequently Haught and other theists consider themselves able, in good conscience, not only to regard evolutionary explanations for biological complexity as fundamentally correct, they are also able to mine evolutionary biology and cosmology for religious insight into “ultimate” metaphysical questions concerned with the nature of God, the meaning of human existence, the nature of evil and the foundations of moral behavior.

Not surprisingly, intelligent design theorists regard theistic evolutionary ideas such as Haught’s with deep concern. Theistic evolutionary ideas held by many, if not most, Jewish, Catholic, and Protestant believers challenge the fundamental claim of design theory that natural causes are in principle incapable of creating biological complexity. They challenge William Dembski’s assertion that “Logically, naturalistic evolution and intelligent design are...mutually exclusive and exhaustive possibilities, one of these positions has to be correct” (Dembski, 2001b, p. 236).

Ignoring the claims of evolutionary theorists that intelligent design theory does not distinguish between uncontroversial naturalistic methodologies and metaphysical inquiry, design theorists assert that methodological naturalism is an epistemological commitment that logically entails ontological materialism (Beckwith, 2003. p. 56; also p. 8, 21, 151 & 157). Ontological materialism (also called naturalism or

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1 Theologian Edward T. Oakes labels this forced choice “the fallacy of the false dilemma.” See Oakes, 2001b, p. 17-18, for his critique of this fallacious dilemma in Phillip Johnson’s book The Wedge of Truth.
materialism) is “the view that the natural universe is all that exists and all the entities in it can be accounted for by strictly material processes without resorting to any designer, Creator, or non-material entity…” (Ibid, 2003, p. 151). Since the religious view of evolutionary theists includes belief in the existence of a God or gods who interact causally with the natural world in ways that are harmonious with natural causes creating biological complexity, the mere existence of widespread theistic evolutionary religious convictions poses a particularly sticky problem for ID theorists.

In fact, once the fundamental claim that natural causes are incapable of creating biological complexity is granted, design theorists do not hesitate to offer reasons why theistic evolutionary religious convictions are necessarily incompatible with intelligent design. As noted earlier, Dembski considers theistic evolution to be design theory’s “most implacable foe,” and incompatible with intelligent design. “Intelligent design is incompatible with what typically is meant by theistic evolution…When boiled down to its scientific content, theistic evolution is no different from atheistic evolution, treating only undirected natural processes in the origin and development of life” (Dembski, 2001b, p. 228). Since science is considered “the only universally valid form of knowledge” in our culture, he argues,

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121 Beckwith does not offer an argument supporting his contention that the methodological naturalism logically entails ontological materialism other than listing evolutionary theorists who conflate scientific inquiry with metaphysical inquiry — e.g., Richard Dawkins, Daniel Dennett, and George Gaylord Simpson. Theologian John Haught regards assertions such as Beckwith’s as statements of faith. “…evolutionary biology neither requires a materialist metaphysics nor provides ultimate explanations. The claim that evolution entails materialism is a statement of faith…” (Haught, 2003, p. 92). Edward Oakes points out that “In almost every regard except their theistic conclusions…advocates of Intelligent Design share the metaphysical presuppositions of their opponents…” (Oakes, 2001b, p. 18). Hence, if the claim that evolution entails materialism is a statement of faith, it is a faith shared by scientists who conflate science with religious inquiry.
the methodological naturalism of evolutionary theism "become[s] functionally
equivalent" with metaphysical naturalism and "religion...is seen as making no
universal [knowledge] claims that are obligatory across the board... [N]aturalistic
evolution...remains[s] the only intellectually respectable option for the explanation of
life" (Ibid, p. 236-237). In Dembski's view, then, theistic evolutionary religious
convictions are necessarily ruled out by intelligent design because: 1) theistic
evolution allows "undirected" natural causes to explain the origin of life; 2) theistic
evolution is indistinguishable from atheistic evolution; 3) theistic evolution privileges
naturalistic explanations for the origin of life and does not recognize religion as
making knowledge claims that are universally obligatory.

Francis Beckwith argues that just because theistic evolutionists profess belief
in the compatibility of evolution and religion does not mean that they are indeed
compatible. People's subjective perception of their beliefs in evolutionary science
and religion as compatible with one another is, Beckwith contends, at odds with the
content of those beliefs. In fact, Beckwith claims, since the methodological
naturalism of evolutionary science logically entails ontological materialism, the God
or gods inherent in the religious views of evolutionary theists is only a logical
possibility, not a God that actually exists. According to Beckwith, "belief in the
existence of God is not logically inconsistent with materialism, but the existence of
God...is inconsistent with materialism...to say [then] that belief in God's existence is
not inconsistent with naturalistic evolution is to imply that God is not really an object
of knowledge" (Beckwith, 2003, p. 151-152; italics in original). In other words, only
materialistic evolution counts as knowledge in evolutionary theism; non-materialist
claims are merely beliefs, not knowledge. Since, in Beckwith's view, the non-
material (unembodied) intelligent designer identified in ID theory exists as an object
of knowledge, it follows that evolutionary theism is incompatible with intelligent
design. Evolutionary theistic religious convictions, then, are necessarily incompatible
with ID, according to Beckwith, because 1) evolutionary theistic religious beliefs are
inconsistent with the existence of God; 2) God is not an object of knowledge in
evolutionary theism; and 3) evolutionary theists do not regard the non-material
intelligent designer identified by ID as an object of knowledge.

Phillip Johnson notes "Theistic evolutionists generally accept the entire
Darwinian scientific picture, but say that God was invisible and undetectably behind
it. For them God's participation is known only by faith and not by anything
detectable by scientific investigation" (Johnson, 2000, p. 65). He regards theistic
evolutionary views simply as "bogus intellectual systems" that read the Bible
"figuratively rather than literally" (Johnson, 1997, p. 111). "Theistic evolution" is a
"disastrous accommodation" to "Darwinism" that provides "a veneer of biblical and
Christian interpretation...to camouflage a fundamentally naturalistic creation story"
(Johnson, 2002, p. 137). "Once...scientists have discovered something about how the
world works," he argues, theistic evolutionists "baptize it and invent some theological
principle to cover it...Hence, one finds [theistic evolutionists] embracing [naturalism]
not with reluctance but with enthusiasm on the theory that it describes a humble God
who left nature to do its own creating" (Ibid, p. 67-68; see also p. 65). He regards
educated Christians who "accept docilely" the naturalism of science as having a
"cowardly faith" (Ibid, 97). The reasons Johnson gives, then, for the necessity of the
incompatibility of ID with theistic evolution include: 1) evolutionary theists do not read the Bible literally; and 2) evolutionary theists accept a naturalistic creation story.\footnote{For more of Johnson’s views about theistic evolution (also labeled by Johnson as “liberalized Christianity” and “theistic modernism”) see Johnson, 1995, p. 97-103; Johnson, 1997, p. 100-101; and Johnson, 2000, p. 89-95.}

Jay Wesley Richards, Vice President of the Discovery Institute, argues that theologians who offer theological justifications for methodological naturalism “seek to avoid conflict...fear being ridiculed or simply...succumb to the groupthink to which all humans are susceptible...” (Richards, 2001, p. 103). He contends that naturalism in all its forms “contradicts essential Christian beliefs...Christian belief is a type of ‘supernaturalism,’ which connotes at least that nature is not the fundamental reality” (Ibid, p. 95, 98; italics in original). Further, “...if some Christian biblical scholar affirms the reality of Christ’s resurrection, he or she will deny the truth of any historical reconstruction that does not accommodate it...” (Ibid, p. 103). Richards, then, rejects theistic evolutionary religious convictions because: 1) they deny the reality and truth of essential Christian beliefs; 2) they do not affirm the fundamental reality of a supernatural realm.

Howard Van Till, Professor Emeritus of Physics at Calvin College and a devout Christian, embraces theistic evolutionary views.\footnote{In his book \textit{Intelligent Design} Dembski labels Christian evolutionary theism “naturalized Christianity” (Dembski, 1999, p. 51).} In a response to Van Till’s critical review of William Dembski’s book \textit{No Free Lunch}, Dembski notes that although Van Till’s criticism is “rhetorically shrewd...[it] is hardly the only way to...
spin intelligent design theologically” (Dembski 2002a, p. 327). Dembski takes him to task for being “steeped in process theology.”

For the theist (though not for the panentheist of process theology), nature is not a self-subsisting entity but an entirely free act of God. Nature thus becomes a derivative aspect of ultimate reality – an aspect of God’s creation...Hence, for the theist attempting to understand nature, God as creator is fundamental, the creation is derivative, and nature as the physical part of creation is still further downstream. (Dembski, 2002d, p. 2)

According to Dembski, process theology endows “nature with purely natural capacities that then are on their own to work themselves out in natural history.”

“But,” Dembski contends, “all such talk is empty. Absolutely anything that happens in the world is compatible with such divine guidance (the process God always bows to the freedom of creation; by contrast, within classical theism, creation always bows to divine freedom)....Unlike Van Till’s theology, intelligent design is not compatible with any sort of world” (Ibid, p. 3). Dembski’s reasons, then, for necessarily rejecting Van Till’s theistic evolutionary views include: 1) Van Till promotes a panentheistic theology which allows natural causes (capacities) to account for natural history; 2) Van Till does not regard “God as fundamental” because he allows natural causes to work freely to create their own natural history; and 3) Van Till makes God “bow” or be subservient to the freedom of natural causes.124

124 Dembski has recently modified his name for theistic evolution and his views concerning its incompatibility with ID. In his 2004 book The Design Revolution, Dembski renames theistic evolution as “antisupernaturalist naturalism” (he notes “religious naturalism” and “theistic naturalism” are synonyms). He describes antisupernaturalist naturalism (AS) as “at once compatible with intelligent design but incompatible with Christian theism” (Dembski, 2004c, p. 173). AS is not compatible with Christian theism because it does “not allow supernatural intervention” in the world thereby not allowing, for example, “raising a man from the dead.” Also, “its doctrines of God and creation are totally unacceptable” (Ibid., 173-174). AS is, in Dembski’s convoluted new view, compatible with ID because it “leaves nature open to real teleology.” It is impossible, however, to square Dembski’s newfound compatibility theory with his contention that AS naturalism “views nature as the ultimate reality and one that is complete in itself” and the fundamental claim of ID that “design implies giving
Significantly, Dembski’s criticisms of Van Till exclude panentheistic religious views from intelligent design thereby directly contradicting the claim that panentheism is compatible with ID (Dembski, 2002a, p. 334; also Beckwith, 2003, p. 149). In fact, the idea that natural causes are in principle incapable of creating biological complexity necessarily excludes other supposedly compatible religious views as well.

Hinduism, for example, is, according to Dembski, “religious naturalism.” The cosmic order or law pervading the universe found in the Vedic literature of Hinduism is “embedded in nature and undergirds nature” thus supplanting divine creation. “There can be no transcendent God within such a framework. These gods of the Vedas are not prior to nature but intrinsic to it...These gods are pathetic because nature’s fundamental laws can always overrule them.” Hinduism, according to Dembski, is an idolatrous religion inimical to intelligent design because it invests nature “with a significance it does not deserve” (Dembski, 1999, p. 100-102).

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125 Dembski’s further expresses his contempt for the panentheism of process theology by noting that panentheism regards God as acting “merely as some all-enveloping mushy influence” instead of “as an agent who makes a difference in space and time and takes responsibility for features of the world” (Dembski, 2003a, p. 12).

126 It should be noted that the idea that natural causes are incapable of creating biological complexity also rules out notions that the designer might be “embodied” space aliens. “Although there are, at least in theory, some exotic candidates for the role of designer that might be compatible with materialist philosophy (such as space aliens or time travelers), few people will be convinced by these and will conclude that the designer is beyond nature” (Behe, 2001, p. 101).

127 In addition to these objections to Hinduism, Dembski notes disapprovingly elsewhere that once “the logical outworkings” of their beliefs are examined, one finds that not only Hinduism but Buddhism “make the self rather than God the center of their attentions. In both Hinduism and Buddhism ‘the chief end of man’(to use a phrase from the Westminster Catechism) is not to ‘glorify God and enjoy him forever’ but to have the self absorbed into Brahman or annihilated in the Void so that it can escape the weary cycle of reincarnation” (Dembski & Richards, 2001, p. 55).
Dembski’s view, then, Hinduism is necessarily incompatible with intelligent design because: 1) the cosmic order described by Hindu religious texts supplants divine creation; 2) natural causes can overrule the Hindu gods; 3) Hinduism does not allow for a transcendent God.

Design theory also rules out deism because, Dembski claims, “front loading” the entire universe at, for example, the moment of the “Big Bang” with all the design found in the universe is “an entirely ad hoc restriction.” Deism is a “logical possibility,” but “there is no evidence for it,” and interactive design where a designer imparts information over the course of natural history better fits the evidence design theorists have found that “information tends to appear discretely at particular times and places.” Deism “restricts design to structuring the laws of nature and thereby precludes design from violating those laws and thus violating nature’s causal structure.” Deism, in other words, is an “unsatisfactory halfway house between theism...and naturalism...” It is, according to Dembski, “entirely artificial to require that science...treat all design in the world as front-loaded just because methodological naturalism requires it or because it remains a bare possibility that design was front-loaded after all” (Dembski, 2002a, p. 344-347). Furthermore,

Theists know that naturalism is false. Nature is not self-sufficient. God created nature as well as any laws by which nature operates. Not only has God created the world, but God upholds the world moment by moment...The world is in God’s hand and never leaves his hand. Theists are not deists. God is not an absentee landlord. (Dembski, 1999, p. 104)\(^\text{128}\)

The reasons Dembski gives for the incompatibility of the religious view of deism with intelligent design are: 1) design theorists have found evidence that the

\(^{128}\) For an argument that intelligent design theologically ends up as "Deism put under a stroboscope," see Edward T. Oakes, 2001b, p. 15-16.
designer imparts information at particular times and places throughout natural history; 2) deism precludes the intelligent designer from violating nature's causal structure; 3) it is artificial to assume deism just because the methodology of science requires it or it has the bare possibility of being true; and 4) Theists are not deists.

The idea in intelligent design theory that natural causes are in principle incapable of creating biological complexity leads design theorists to give reasons for rejecting certain religious convictions. Those reasons necessarily imply:

- divine creation
- supernatural guidance of the physical world
- a fundamentally transcendent, omnipotent God who exists and is an object of knowledge
- Christianity
- biblical literalism
- religion makes universally obligatory knowledge claims about reality and truth
- science offers evidence that supports particular religious viewpoints

The reasons design proponents give for rejecting certain religious convictions once design theory is granted its claim that natural causes are in principle incapable of creating biological complexity are religious reasons - that is, they depend on the religious idea that an intelligent, supernatural designer created and guides life. They are also sectarian religious reasons - that is, they are religious ideas that necessarily exclude competing religious understandings. Divine creation, belief in an omnipotent God existing in a transcendent supernatural reality that can be known, and
supernatural guidance of the physical world are common religious ideas compatible with many of the world’s religions but necessarily incompatible with the commonly held anti-religious view of atheism. Religious belief in a God that allows no freedom for the natural world to create biological complexity and requires belief in Christianity are sectarian religious ideas that necessarily exclude other religious convictions. Literal belief in the Bible and the belief that science provides evidence for specific religious understandings are sectarian religious ideas that necessarily exclude even further competing religious convictions.

The reasons design theorists give for rejecting certain religious views clearly indicate the sectarian religious content of intelligent design theory. The sectarian content of the idea in intelligent design theory that natural causes are in principle incapable of creating biological complexity consists of necessarily implied religious ideas such as divine creation, the Christian God and literal interpretation of biblical text. If natural causes are in principle incapable of creating biological complexity, then intelligent design necessarily implies sectarian religious ideas such as divine creation, supernatural guidance of the physical world, the Christian God and biblical literalism. In other words, the meaning of the idea in intelligent design theory that natural causes are in principle incapable of creating biological complexity consists of necessarily implied sectarian religious ideas that exclude other religious and anti-religious views.

*The Agency of the Intelligent Unembodied Designer Is Empirically Detectable*

In William Dembski’s critique of Van Till’s arguments against intelligent design, Dembski states “Unlike Van Till’s theology, intelligent design is not
compatible with any sort of world.” Dembski goes on to note that “A world in which natural capacities can provide no empirical evidence of anything other than chance and necessity and additionally can do all of nature’s design work is not a world in which intelligent design holds” (Dembski, 2002d, p. 3). The idea that the agency of an intelligent supernatural designer is empirically detectable is, therefore, not only fundamental to intelligent design theory, it also necessarily rules out any religious view of the world in which the intelligent design of nature through abiotic infusion cannot be detected by science. Clearly, once the claim of intelligent design theory that the agency of an intelligent unembodied designer can be detected through scientific inquiry is granted, all religious and anti-religious convictions that deny or methodologically rule out the possibility that the agency of a supernatural designer can be detected scientifically are logically excluded.

In this part of my discussion of the sectarian religious content of intelligent design, I examine the religious concept that design theorists consider to be the defining concept in intelligent design theory – theistic realism. Theistic realism includes the idea of ‘objective reality’ and the idea of ‘objective truth.’ I argue, first, that the ideas of objective reality and objective truth in theistic realism lead design theorists to conflate scientific inquiry with religious metaphysical inquiry. I argue, second, that the conflation of scientific inquiry with religious metaphysical inquiry results in religious literalism – i.e., the view that science literally can detect and study the divine. Finally, I argue that the idea in intelligent design that the agency of the supernatural designer is empirically detectable is a sectarian idea resulting from the religious literalism inherent in theistic realism.
Phillip Johnson in *Darwin on Trial* states that one of his goals as an intelligent design theorist is to “legitimate the assertion of a theistic worldview in the secular universities” (Johnson, 1991, p. 165). This goal, apparently, is shared by fellow design theorists because they share in common, according to Johnson, a religious perspective called “theistic realism.” “My colleagues and I speak of ‘theistic realism’...as the *defining concept* of our [intelligent design] movement. That means that we affirm that God is objectively real as Creator, and that the reality of God is tangibly recorded in evidence accessible to science, particularly in biology” (Johnson, 1996, p. 5). Theistic realism

...assumes that the universe and all its creatures were brought into existence for a purpose by God. Theistic realists expect this “fact” of creation to have empirical, observable consequences that are different from the consequences one would observe if the universe were the product of nonrational causes... (Johnson, 1995, p. 208-209)\(^{129}\)

Because they are theistic realists, Johnson and his fellow design theorists “assert that God is real and that the evidence [of science] reflects the truth that nature was created by God...” (Ibid, p. 202); “...the point of the intelligent design...movement [is],” according to Johnson “…to remind us of our roots...We come from creation by God, not from unguided nature...” (Dembski & Kushiner, 2001, p. 9-10). In Johnson’s view, then, the reason why the agency of the unembodied intelligent designer in design theory is empirically detectable is because the defining concept, theistic realism, underlying intelligent design assumes that the designer is an *objectively real* God and that the biological sciences provide evidence of the *objective truth* that nature was created by God.

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\(^{129}\) For more of Johnson’s views about theistic realism see Johnson, 1997, p. 91-92, and 95-96.
The theistic realism Dembski subscribes to mirrors that of Johnson’s.

Dembski states “...I am a theist and believe that God created the world” (Dembski, 2000a, p. 1). “Within theism God is the ultimate reality...Within theism divine action is not reducible to some more basic mode of causation” (Dembski, 1999, p. 214). Additionally, for Dembski, just as it is for Johnson, “God is the God of truth...” (Ibid, p. 225) which means the reality of God is “true – objectively true” and “objective truths...by their nature are obligatory across the board...” (Dembski & Kushiner, 2001, p. 12). In Dembski’s view, “God’s act of creating the world is...the prime instance of intelligent agency” (Dembski, 1999, p. 224). Three things follow from Dembski’s theistic realism: first, divine intelligence “is an irreducible feature of reality” (Dembski, 2000a, p.15); second, “intelligent design is...a way of understanding divine agency” (Dembski, 1999, p. 13); and third, intelligent “design in nature is empirically detectable” (Ibid, p. 2). Again, as it was for Johnson, Dembski’s adoption of the defining concept of the intelligent design movement, theistic realism, establishes the reason why the agency of the intelligent supernatural designer posited by design theory is empirically detectable – theistic realism assumes that there is an objectively real God and that nature provides evidence of the objective truth that God is its creator.

The concepts found in theistic realism of ‘objective reality’ and ‘objective truth’ (also referred to simply as ‘reality’ and ‘truth’ or ‘real’ and ‘true’) figure prominently in ID texts because they are the basis for the reasons design theorists

130Dembski’s penchant for speaking for all theists (“Theists know that naturalism is false;” “Theists are not deists;” “For the theist, nature is not a self-subsisting entity...”; etc.) is, I would argue, evidence of his religious orthodoxy. Many theologians would be surprised to find that, according to Dembski, they are not true theists.
give for the empirical detectability of supernatural design. They also demonstrate the sectarian religious content of the idea that supernatural design is empirically detectable. Consequently, understanding their idiosyncratic meaning within the context of theistic realism is essential.

The first important feature to note is that within the ‘theistic realism’ espoused by design theorists, ‘truth’ and ‘reality’ are conflated, i.e., they refer to the same thing. The ‘truth’ in theistic realism is that which is “in accord with objective reality” (Johnson, 1995, p. 124), and ‘reality’ is that which is in accord with objective truth. What is true is what is real and what is real is what is true. So, for example, Johnson says “If God as Creator exists [is objectively real] and cares about what human beings do, then metaphysical realism is true…” (Ibid, p. 124), and “…if Darwinism is true, Christian metaphysics is fantasy” (Johnson, 2000b). He also states “…to follow the truth to the end is to assert that God is real and that the evidence reflects the truth that nature was created by God” (Ibid, 202).

The three statements just quoted by Johnson also demonstrate the second important feature to note: the word ‘reality’ within theistic realism refers to that which exists not only in the natural world but also in the metaphysical or supernatural realm. The ontology of theistic realism, then, consists not only of natural objects and entities but also of metaphysical or supernatural objects and entities. For a theistic realist, the natural world and the supernatural world are filled with objectively real fully interacting entities that are all, in principle, empirically
detectable because they are objectively ‘real’ and ‘true.’\textsuperscript{131} Thus, when design theorists refer to the ‘objective reality’ of the unembodied designer or God, they are referring to the actual presence of a supernatural being in the natural world who we may not see but whose actions leave empirically detectable evidence of the designer’s existence. William Dembski, for example, states that “Theism gives you not only nature, but also God and anything outside of nature that God might have created. The ontology of theism is far richer than that of naturalism” (Dembski, 1999, p. 212). “Nature,” according to Dembski, “points beyond itself to a transcendent reality” (Dembski, 2000a, p.1).\textsuperscript{132} He also claims intelligent design is “a new vision that captures our imagination and at the same time is grounded in reality” (Dembski, 2004c, p. 28). Phillip Johnson claims that “Design is reality considered in its entirety; materialist reductionism is truncated reality, reality with the mind [intelligence] cut out” (Johnson, 2001, p. 1).

The third important feature to note is: the word ‘truth’ within theistic realism means \textit{that which is unquestionably, eternally and universally the case in the natural world and the metaphysical or supernatural realm}. Theistic realism does not distinguish between scientific ‘truth’ and religious ‘truth.’ To be taken seriously, scientific ‘truth’ must, according to theistic realists, be equivalent to religious ‘truth.’ Dembski, for example, states “...objective truth and meaning have no legitimate place within a pure [scientific] naturalism” (Dembski, 1999, p. 227), and “...objective

\textsuperscript{131} Dembski notes that “theists typically ascribe to God the creation of an invisible world that is inhabited among other things by angels” (Dembski, 2002d, p. 2). Hence, the ontology of theistic realism includes objectively ‘real’ and ‘true’ angels.

\textsuperscript{132} In Dembski’s view, the “reality” of a blade of grass “derives not from its particulate constituents but from its capacity to communicate with other entities in creation and ultimately with God himself” (Dembski, 1999, p. 232).
truths by their nature are obligatory across the board...the fundamental claims of Christianity [and theistic realism] are objectively true” (Dembski & Kushner, 2001, p. 13). Phillip Johnson states “Darwin’s theory unquestionably has impressive explanatory power, but how are we to tell if it is true?” (Johnson 1993, p. 66, italics in original), and “Claiming to have knowledge is not a triumph for science unless it is true knowledge...” (Johnson, 2000, p. 168). He also declares “...the evidence of science shows that ‘in the beginning was the Word’ is as true scientifically as it is true theologically, scripturally and in every other way...The very Word through whom all things were created lived on earth as a man, and this is not a statement merely of ‘religious belief’ but of fact” (Johnson, 2002, p. 141, italics in original). Finally, Johnson claims “Christianity is True (the initial capital letter signifying a universal truth on the level of a scientific fact)…” (Ibid, p. 78).

The identification of (‘objective’) reality with (‘objective’) truth and the (‘objective’) reality of natural world with the (‘objective’) reality of a supernatural world are, arguably, common religious ideas. Traditional religious belief includes the conviction that God actually exists, that religion is a response to something real that is apart from the surface of the natural world, and that faith leads people toward a truthful understanding of all that exists. The conflation, however, of scientific inquiry with religious inquiry in theistic realism is not a common contemporary religious idea. In fact, it is a ‘premodern’ religious idea that intelligent design theorists share with sectarian religious groups who read religious texts literally. William Dembski nicely summarizes how the idea that scientific inquiry reveals religious truth operated
in 'premodern' times and how he hopes to incorporate that view in intelligent design theory.

For modernity the world is a closed nexus of cause and effect. Thus God cannot act within the world as by giving [empirically detectable] signs...Premodernity denotes that epoch before the rise of modern science with Copernicus, Kepler and Galileo...premodernity had one thing going for it that neither modernity nor postmodernity could match, namely, a worldview rich enough to accommodate divine agency...Premodernity...allow[s] God sufficient room to act in the world and specifically to act as [an empirically detectable] signgiver. How so?...Premodernity always maintained that the natural causes described by natural laws were fundamentally incomplete and that intelligent causes had free play in the world as well...Within the premodern worldview the world is not under the grip of natural laws but is a stage in which natural causes form the backdrop and intelligent causes perform the primary action...Indeed, since the world is a divine act, freely created apart from any law, natural causes constitute a derivative mode of causation, dependent on divine action. Moreover the natural laws that govern natural causes are themselves contingent, dependent on the divine will...My aim [in articulating the theory of ID]...is to take the premodern logic of [empirical] signs and make is rigorous. In doing so, I intend to preserve the valid insights of modern science as well as the core commitments of the Christian faith. (Dembski, 1999, p. 44-47)

The conflation of the notions within theistic realism of objective reality and objective truth leads intelligent design theorists to conflate scientific inquiry with religious inquiry. This in turn leads to religious literalism. Intelligent design theorists claim that the theory of intelligent design is not related to the biblical literalism associated with 'creationism' and, therefore, is not 'stealth creationism.' Biblical literalism, however, is only one manifestation of religious literalism. Theologian John Haught argues that religious literalism consists of reading not only the Bible, but also the physical universe at a "plain or literal level of understanding."

It is equivalent to the "shallow perusal" of any text (Haught, 2003, p. 18, 31). In

133 See Dembski, 2000a, p. 1; also West, 2003. I am arguing here that the idea in intelligent design that the agency of the supernatural designer is empirically detectable is a sectarian idea resulting from the religious literalism inherent in theistic realism. However, I argue in the next section that in spite of the denials of design theorists, intelligent design theory also results from sectarian biblical literalism. For an analysis of past and present continuities and commonalities between creationism and intelligent design, see Forrest & Gross, 2004, p. 273-296.
Haught’s view, “Conflating metaphysical with scientific inquiry is one of the most characteristic features of contemporary literalism” (Ibid, 20).

It is both scientifically and theologically fatal...to take refuge in ultimate explanations too early in our attempts to understand the natural world. One of the great lessons theology has learned from modern science is to postpone such metaphysical gratification. To introduce ideas about God as the “cause” of natural phenomena at soft points in our scientific inquiries is intellectually inappropriate and theologically disastrous...Postponing metaphysics, however, is a tough assignment...One way of manifesting this metaphysical impatience is to paste the fact of life’s complexity directly onto the cozy idea of divine intelligent design... (Ibid, p. 86-87)

When the theistic realism of design theorists conflates scientific inquiry with metaphysical inquiry in the ‘science’ of intelligent design, empirical investigations literally become investigations of the divine. Divine agency is not only empirically detectable within the literalism of theistic realism, divine agency can literally be actively investigated by science. The ‘premodern’ view of the world inherent in the theistic realism of intelligent design, then, literally demonstrates through design theory that “The scientific picture of the world championed since the Enlightenment is not just wrong but massively wrong. Indeed entire fields of inquiry, especially in the human sciences...need to be rethought from the ground up in terms of intelligent design” (Dembski, 1999, p. 224).

Haught, as noted in footnote 10, criticizes not only intelligent design theorists for hastily rushing to “premature metaphysical gratification.” He also roundly criticizes “evolutionary materialists” for “dressing the scientifically proper, but still relatively abstract, idea of natural selection in the apparel of metaphysical finality” and thereby leading science “to an unnecessarily premature climacteric” (Haught, 2003, p. 87). Haught labels the literalism of evolutionary materialists who conflate science with metaphysics “cosmic literalism.” Importantly, Haught also recognizes that scientific theorizing is not entirely divorced from metaphysics.

There can be no objection, of course, to placing science within a metaphysical setting. This is unavoidable. But in order to prevent any amalgamating of science with belief it should be done carefully, self-consciously and, above all, patiently. For the sake of science itself, our beliefs about the ultimate nature of reality should not be alloyed in a hasty way with scientific explanations. Otherwise, before long our metaphysics will be doing the work of science. (Ibid., p. 92-93)
In summary, once the idea in intelligent design theory that the agency of the unembodied designer is empirically detectable is granted, the concepts of 'objective reality' and 'objective truth' within the theistic realism assumed by ID theory provide the reason why the supernatural agency is detectable. They also demonstrate the sectarian religious content of the idea that supernatural design is empirically detectable.

Theistic realism is considered by design theorists to be the defining concept of intelligent design. Theistic realism is a religious idea. The religious content of theistic realism consists of the religious idea that an intelligent, supernatural designer created and guides life. The conflation of the notions within theistic realism of objective reality and objective truth leads intelligent design theorists to conflate scientific inquiry with religious inquiry. The conflation of science with religious metaphysical inquiry results in religious literalism where science is deemed literally able to detect and investigate divine agency.

The idea that divine agency is empirically detectable is not a religious idea commonly shared by all religions; it is a sectarian religious idea fundamental to theistic realism that necessarily excludes other religious and anti-religious convictions. The sectarian content of the idea in intelligent design theory that the agency of the intelligent supernatural designer is empirically detectable consists of the sectarian religious idea that science literally can detect and investigate divine agency. In other words, the meaning of the idea in intelligent design theory that divine agency is empirically detectable consists of the sectarian religious idea that science is literally able to detect and investigate divine agency. If the agency of the
intelligent unembodied designer identified by design theory is empirically detectable, then, intelligent design necessarily rules out competing religious and anti-religious convictions that declare religious inquiry to be fundamentally different from scientific inquiry. The sectarian religious literalism inherent in theistic realism is an essential element of the sectarian religious content of intelligent design.

The Identity of the Unembodied Intelligent Designer

The religious literalism of theistic realism not only requires that the actions of a divine designer be empirically detectable, it necessitates forced choices. The religious literalism inherent in intelligent design theory, for example, forces a choice between evolutionary naturalism and Christian supernaturalism.

...the conflict between the naturalistic worldview and the Christian supernaturalistic worldview goes all the way down. It cannot be papered over by superficial compromises...It cannot be mitigated by reading the Bible figuratively rather than literally. From a modernist perspective, biblical Christianity is just as wrong figuratively as it is literally. The story of salvation by the cross makes no sense against a background of evolutionary naturalism...There is no satisfactory way to bring two such fundamentally different stories together, although various bogus intellectual systems offer a superficial compromise to those who are willing to overlook a logical contradiction or two. A clear thinker simply has to go one way or another. (Johnson 1997, p. 111)

Religious literalism declares that “If modernism (naturalism) is True (the initial capital letter signifying that the claim is one of objective or universal truth), then Jesus did not rise from the tomb…” (Johnson, 2002, p. 117). “The opposition between the biblical and naturalistic stories is fundamental, and neither side can compromise over it. To compromise is to surrender” (Johnson, 1995, p. 108).

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135 It is important to note that the religious literalism inherent in the theistic realism of design theory does not allow design theorists to distinguish between the methodological naturalism of science and philosophical naturalism.
In this part of my discussion of the sectarian content of intelligent design I argue that, contrary to the assertion by William Dembski that “the identity...of [the] designer lie[s] outside the scope of intelligent design,” his texts and the texts of other design theorists clearly identify the designing agent found through the specified-complexity criterion. The intelligent designer is the Christian God described in the Gospel of John as understood by orthodox evangelical Christians who read the Bible literally. The religious literalism inherent in the theistic realism of intelligent design theory results in transparent sectarian biblical literalism that identifies the unembodied intelligent designer as “Jesus Christ...the incarnate Word of God...through whom all things came into existence” (Johnson, 2000, p. 158). Since the religious literalism of theistic realism assumed by intelligent design identifies the intelligent designer as the Christian God, I conclude that the sectarian religious content of intelligent design includes the religious idea that the Christian God supernaturally created and guides all life.

I argued above that the conflation of the notions within theistic realism of objective reality and objective truth leads intelligent design theorists to conflate scientific inquiry with religious metaphysical inquiry and this, in turn, leads to religious literalism. I noted that within the religious literalism inherent in intelligent design theory, empirical investigations literally become investigations of the divine. The religious literalism of design theory, however, also necessarily implies biblical literalism. When truth and reality are conflated in the theistic realism of intelligent design theory, a person is forced to choose between that which is literally ('objectively') true (real) and that which is false (unreal or fantasy). Phillip Johnson,
for example, states either “God is our true Creator” and “really exist[s]” or “God is an invention of human culture” and is “a fantasy like Santa Claus” (Johnson, 1997, p. 22-23). Also, if the “Christian doctrines [of] supernatural creation and the resurrection...are true, then materialism, as a general worldview, isn’t true” (Ibid, p. 118; emphasis in original.) It follows that the Bible is either literally true or it is false. Johnson asks about the first verse of the Gospel of John, “‘In the beginning was the Word.’ Is that true or false? Is it fact or pious platitude?” (Johnson, 2002, p. 63). “If only matter existed in the beginning, then the first verse of the Gospel of John – and the worldview of the Bible – is false” (Johnson, 1997, p. 71).

The texts of design theorists clearly indicate which side of the forced choice between the truth and falsity of the Bible intelligent design theory comes down on – the Bible is true, literally true. According to Johnson, “Christianity makes sense only if its factual [Scriptural] premises are true...” (Johnson, 1995, p. 204), and “John 1:1-14 is really True” (Johnson, 2002, p. 78; capital letter in original).136 Because they are “True,” Johnson argues that the Gospel of John and Romans 1 from the Bible provide “the foundation of reality” (Johnson, 2000, p. 152). The Gospel of John states:

In the beginning was the Word, and the Word was with God, and the Word was God. He was in the beginning with God; all things were made through him and without him was not anything made that was made. (Jn1:1-3 RSV; cited in Johnson, 2000, p. 151)137

136 The “Truth (with a capital T),” according to Johnson, “is truth as God knows it” (Johnson, 1997, p. 89).

137 Johnson argues that the Gospel of John not only provides the foundation of reality, it also provides the “first premise” from which all reasoning begins. “…the ultimate premise, the beginning point from which logic should proceed” is the “Word” or the divine “Logos.” “That word encompasses both the human activity of reasoning and the divine foundation from which logic must begin” (Johnson, 2002, p. 88-89)
Romans 1 states:

Ever since the creation of the world his invisible nature, namely, his eternal power and deity, has been clearly perceived in the things that have been made. (Romans 1:20 RSV; cited in Johnson, 2000, p. 153)

According to Johnson, “These passages from John 1 and Romans 1 provide the [proper] metaphysical basis for... science...By the Word, God created a rational and contingent cosmos, and he created human beings in his image” (Ibid, 154). Since “Only the Word creates,” science will not discover a natural mechanism “for the creation of new complex genetic information. No such mechanism exists. God created us” (Ibid, p. 153).

William Dembski agrees. According to Dembski, God literally created the world as described in the Gospel of John: “…as John’s Gospel informs us, it is the divine Logos, the Word that in Christ was made flesh...through whom all things were created” (Dembski, 1999, p. 225). “The Christian faith is stable and unchanging...This faith is grounded in the truth of the gospel, a truth that must itself

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138The cited text reads more fully: “These passages from John 1 and Romans1 provide the metaphysical basis for a Christian understanding of both science and pseudoscience. By the Word, God created a rational and contingent cosmos, and he created human beings in his image...The proper metaphysical basis for science is not naturalism or materialism...” Johnson might argue that I have misrepresented his meaning since he clearly says the biblical passages provide a “Christian understanding” of science. It is important to remember, however, that for the purposes of this paper, I have granted design theorists their central claims. Since Johnson, as a theistic realist, conflates scientific inquiry with religious inquiry, the “Christian understating of science” becomes the foundation of science once ID theorists are granted their central claims. In other words, once it is granted that: 1) an unembodied intelligent designer created and guides life; 2) natural causes in principle incapable of creating biological complexity; and 3) the agency of the unembodied intelligent designer is empirically detectable; then, the religious literalism inherent in the theistic realism of design theory necessitates that John 1 and Romans1 become the proper metaphysical basis for all science, not just a “Christian understanding” of science. This conclusion is reinforced by another quote from Johnson, “…I predict that the foundations of modernism will be profoundly shaken in the twenty-first century as the public...learns that the best metaphysical platform, even for science, lies in divine creation rather than the fantasy that the human mind is the product of irrational forces” (Johnson 2002, p. 119).

139“We might say that the point of Darwinism is to refute the otherwise compelling teaching of Romans 1:20, which is that God’s eternal power and deity have always been evident from the things that were created” (Johnson 1997, p. 113).
be stable and unchanging” (Dembski, 2001d, p. 32). The stable and unchanging truth, the literal truth, of the fact that “God speaks the divine *Logos* to create the world,” Dembski points out has “profound implications” (Dembski, 1999, p. 230-231). It means that “God’s act of creating the world [through the divine *Logos*] is the prototype for all intelligent agency...God’s act of creating the world makes possible all of God’s subsequent interactions with the world, as well as all subsequent actions by creatures within the world...God’s act of creating the world is thus the prime instance of intelligent agency” (Ibid, p. 224). “...God through the divine Logos acts as an intelligent agent to create the world...” (Ibid, p. 229).

The move by both Johnson and Dembski from the literal truth of the biblical passages in the Gospel of John and Romans to the “proper” metaphysical foundations for science and the identification of God as an intelligent agent who creates the world is a logical move. Once the Bible is deemed literally (“objectively”) true and naturalism is deemed false, it is logically necessary, from the point of view of a design theorist who is a theistic realist, that the Bible provide the metaphysical foundation for science and that God’s agency creates the world “through the divine Logos.” Thus, when the specified-complexity criterion in the science of intelligent design detects complex specified information (CSI) in complex biological systems, it is detecting “transcendent design” (Ibid, p. 233) – i.e., the divine *Logos* or Word through which God created the world. Biologists who participate in the information theoretic research of intelligent design are “simply retracing God’s thoughts” (Ibid, p. 234). “Information,” Dembski confidently notes, “is just another name for *logos*” (Ibid, 233; emphasis in original). “Intelligent design is just the Logos theology of
John’s Gospel restated in the idiom of information theory” (Dembski, 2001c, p. 192).

“The crucial breakthrough of the intelligent design movement has been to show that this great theological truth – that God acts in the world by dispersing information –... has scientific content” (Dembski, 1999, p. 233). It logically follows from the biblical literalism inherent in the theistic realism of design theory that the identity of the unembodied intelligent designer detected by design theory is the Christian God described in the Gospel of John.

Biblical literalism is associated with orthodox evangelical interpretations of Christian doctrine. ‘Orthodox’ interpretations of Christian doctrine conform to the early creeds and confessions of the Christian faith. ‘Evangelical’ interpretations focus on the New Testament, especially the Gospels, and emphasize the salvation of humankind by faith in the atonement of Jesus. Biblical literalism is also associated with ‘reformed’ theological interpretations of Christian doctrine. Reformed interpretations refer to Protestant doctrine, especially the “…doctrine of inerrancy of the Word of God, and ultimate authority of Scripture over the Church, rather than Church leaders, i.e., it is self evident that following God means following God’s Word rather than following the words of men. The essence of Reformed theology is a willingness to constantly conform all of life to the Word of God” (Warren, 2004, p.1). Importantly, prominent intelligent design theorists self-identify as orthodox evangelical Christians. And, while most do not mention their reformed Christian biases, it is clear many embrace reformed interpretations of Christian doctrine. In the following brief discussion I merely note the orthodox evangelical and reformed Christian religious prejudices of leading design theorists and suggest that the theistic
realism inherent in intelligent design theory results from their sectarian religious convictions.\(^{140}\)

In the book *Unapologetic Apologetics* William Dembski describes himself as an "evangelical mathematician" (Dembski & Richards, 2001, p. 53) and "singularist" (Ibid, p. 50) who believes that Christianity is "humanity's ultimate truth" (Ibid, p. 17) and that "Christianity makes exclusive truth claims that are binding on the world at large" (Ibid, p. 50). According to Dembski, the Christian faith consists of a core of non-negotiable objectively real truths that are "stable and unchanging." Those are:

To the physical core of the Christian faith belong the virgin birth, the crucifixion and the resurrection. To the theoretical core belong the incarnation, the redemption through Christ and the Trinity. To the regulative core belong the reliability of Scripture, the preeminence of Christ and a commitment to truth. (Ibid, p. 38)

To violate or repudiate the objective reality of core Christian truths is to deny Christianity (Ibid, p. 40). Christianity is not a "sociologically constructed faith or a historicized faith or a demythologized faith or a politicized faith or any other enculturated faith" (Ibid, p. 32). “...the truth of Christ is humanity's chief truth...It follow that Christians have a mandate to declare the truth of Christ. This mandate consists of bringing every aspect of life under the influence of this truth” (Ibid, p. 18). In Dembski’s view, evolutionary explanations for the origin of biological complexity that exclude the possibility of empirically detectable supernatural causation deny the objective reality and truth of Christianity. Intelligent design theory, on the other hand, allows for the objective reality of the Christian God and the objective truth of

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\(^{140}\)Barbara Forrest and Paul Gross in *Creationism's Trojan Horse* document the influence of religious organizations with orthodox evangelical and reformed Christian prejudices that provide essential financial support as well as essential political and media access for ID proponents. See chapter nine of Forrest & Gross, 2004.
core Christian doctrine through its two central assumptions: 1) natural causes are in principle incapable of creating biological complexity, and 2) the agency of the intelligent unembodied designer is empirically detectable.

Phillip Johnson is an evangelical Christian (Dembski & Richards, 2001, p. 7) who is attempting to teach ordinary orthodox Christians (Johnson, 2002, p. 11) how they “can more effectively engage the secular world on behalf of the gospel” (Johnson, 2000, p. 16) by uniting around the biblical passage “that is most relevant to the evolution controversy...the opening of the Gospel of John” (Ibid, p. 151).

Johnson recognizes that “Genesis is not the best place to start when considering the truth of the Bible as a whole...” (Johnson, 2002, p. 143), because Genesis tends “to direct attention on the age of the earth rather than on the Darwinian mechanism. Starting with Genesis also tends[s] to give people the impression that [the truth of] only the first chapters of the Bible [are] threatened...” by Darwinian naturalism. In fact, according to Johnson, naturalistic assumptions “negate the entire Bible from the first word to the last” (Ibid, p. 137). Once intelligent design theory demonstrates, however, that “...the evidence of science shows that ‘in the beginning was the Word’ is as true scientifically as it is true theologically, scripturally and in every other way” (Ibid, 141), then it is possible to “take seriously the possibility” that the claims in Genesis are really true.141 For example, Johnson states,

With the fall of Darwinism now in prospect, it is time to invite unprejudiced scientific investigation into the possibility that human beings thousands of years ago may have had longer life spans than they do now...All that is necessary to research the lifespans in Genesis 5 is to put aside the philosophical dogma of

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141 It is important to note that establishing the truth of the Bible by first establishing the truth of the Gospel of John denies the truth of Jewish religious convictions. The sectarian religious content of intelligent design necessarily rules out Judaism.
uniformitarianism [and naturalism] and proceed instead on the assumption that the basic ‘constants’ of physics may have changed over time. (Ibid, p. 146-147)

In Johnson’s view, once the claims of intelligent design theory are granted, research into the literal truth of the Bible becomes a scientific project. Johnson’s orthodox evangelical and reformed Christian prejudices clearly drive the religious literalism of his theistic realism. Those prejudices are without doubt an essential element in his authorship and promotion of the theory of intelligent design.

Finally, William Dembski and Jay Wesley Richards associate intelligent design with the task of orthodox evangelical Christian apologetics.142 “At stake in apologetics is the question whether Christianity is true – objectively true.” Since, in their view, “the fundamental claims of Christianity are objectively true...Christian apologists must... engage the secular world, reproving, rebuking and exhorting it, pointing to the truth of Christianity and producing strong arguments and valid criticisms that show where secularism has missed the mark” (Dembski & Richards, 2001, p. 12, 15). Central to the task of apologetics is the “rooting out” of false ideas. Importantly, according to Dembski and Richards, “Darwinism” is a “false idea” (Ibid, chapters 13 and 14) that “prevents Christianity from being regarded as anything more that a harmless delusion” and so it must be replaced with a theory that will bring biology (and science in general) “under the authority of Christ.” Only when the "false idea" of “Darwinism” has been "analyzed, evaluated and refuted... will Christ’s authority over the life of the mind be reestablished and the doors of faith

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142 “Apologetics” is a branch of theology that interprets proofs of and defends the Christian faith. Dembski and Richards describe apologetics as “rational argument on behalf of the Christian faith...throughout Scripture, Christians are enjoined to defend the faith through rational argument” (Dembski & Richards, 2001, p. 11).
reopened" (Ibid, p. 19-21).\(^{143}\) Indeed, in his book *Intelligent Design* Dembski asserts that "...all disciplines find their completion in Christ and cannot be properly understood apart from Christ...any view of the sciences that leave Christ out of the picture must be seen as fundamentally deficient" (Dembski, 1999, p. 206; see also Johnson, 1995, p. 103-105).

The undeniable conclusion to be drawn from Dembski's and Richards' work is that the theory of intelligent design is an exercise in orthodox evangelical Protestant Christian apologetics. Richards reinforces this view in his article "Proud Obstacles and A Reasonable Hope: The Apologetic Value of Intelligent Design."

...intelligent design...is a valuable resource for Christian apologetics. Positively, not only can intelligent design become – by extension – an apologetic argument, but it also proposes a view of natural science compatible with the Christian doctrine of creation. Negatively, it not only provides a more empirically adequate framework for natural science than scientific materialism, but also presents a much-needed critique of this contemporary adversary of Christian belief. (Dembski & Kushiner, 2001, p. 51-52)

The texts of design theorists leave no doubt about the identity of the unembodied intelligent designer detected through the complexity-specification criterion of intelligent design theory. The intelligent designer is the Christian God described in the Gospel of John as understood by orthodox evangelical Christians who read the Bible literally. When truth and reality are conflated in theistic realism, religious literalism dissolves into transparent sectarian biblical literalism which forces a choice between the literal truth and falsity of the Bible. Design theorists are confident the Bible is true, literally true. Consequently, the unembodied intelligent

\(^{143}\) Remarkably, Dembski and Richards view Christian apologetics as a “call to martyrdom – perhaps not a martyrdom where we spill or blood (although this too may be required) but a martyrdom where we witness to the truth without being concerned about our careers, political correctness, the current fashion or toeing the party line. We are not called to please the world; we are called to proclaim the truth...” (Id., p. 15).
designer who creates and guides life is the Christian God who “speaks the divine Logos to create the world” (Dembski, 1999, p. 230). The religious content of intelligent design, therefore, necessarily includes the sectarian religious idea that the Christian God supernaturally created and guides all life.

The first two sections of this chapter examined the religious content of intelligent design, including its sectarian religious content. I argued, first, that the religious content of intelligent design theory consists of its assertion of the religious idea that an intelligent supernatural designer created and guides life. The essential meaning of the idea that an unembodied intelligent designer created and guides life is religious. Intelligent design, therefore, is a religious theory. I argued, second, that the reasons design theorists give for rejecting certain religious convictions once design theory is granted its claim that natural causes are in principle incapable of creating biological complexity include sectarian religious ideas such as divine creation, the Christian God and literal interpretation of biblical text. The sectarian reasons offered by design theorists necessarily exclude competing religious understandings. The meaning of the idea in intelligent design theory, then, that natural causes are incapable of creating complex biological systems consists of necessarily implied sectarian religious ideas which exclude other religious and anti-religious views. Third, I argued that the idea in intelligent design theory that the agency of the supernatural designer is empirically detectable is a sectarian idea resulting from the religious literalism inherent in the defining concept of ID – theistic realism. The sectarian content of the idea in ID theory that supernatural intelligent
agency is empirically detectable consists of the sectarian religious idea that science literally can detect and investigate divine agency. Finally, I argued that the religious literalism of the theistic realism assumed by intelligent design theory forces a choice between the truth and falsity of the Bible. The biblical literalism of design theorists results in the identification of the unembodied intelligent agent detected by design theory. That agent is the Christian God. The sectarian religious content of intelligent design includes the religious idea that the Christian God supernaturally created and guides all life. Intelligent design theory, then, is not only a religious theory; it is a sectarian religious theory that necessarily excludes competing religious and anti-religious convictions.

In the final section of this chapter I examine, from a deliberative democratic political perspective, the consequences the religious content of intelligent design has for public school policy decision-making.

A Deliberative Perspective on the Religious Content of Intelligent Design

The religious content of intelligent design has, from a deliberative perspective, a determinative effect on the process and content of deliberations over the appropriate placement of ID in public school curricula. I have argued that policymakers can justifiably exclude intelligent design from science classrooms as a scientific alternative to evolutionary theory, but I have not considered if it might appropriately be placed elsewhere in the curriculum. Clarifying the religious content of ID allows me to now consider ways in which the deep concerns of ID proponents might be accommodated in other areas of public school curricula.
This section demonstrates how the religious content of ID settles, from a deliberative perspective, past questions over whether it belongs in public school science curricula and discusses ways in which citizens might affirm some of the concerns of ID proponents thereby contributing to the possibility of reducing the range of future disagreements over the teaching of evolutionary theory. This section is divided into four parts. First, I review past arguments based on the moral claims of ID proponents for including intelligent design in public school science classes as a scientific theory and show how those arguments are affected by the religious content of ID. Second, I briefly return to the conflict in Ohio over the model lesson plan to show where ID concepts and references occur in the plan and to resolve the arguments that depended on knowing the scientific and religious status of ID. Third, I discuss the moral stakes ID proponents perceive to be at risk in the dispute between citizens over intelligent design theory. Finally, I suggest that respect for the dignity and worth of ones opponents requires ID critics to practice civic magnanimity toward ID proponents. I argue that when ID critics extend civic magnanimity towards their opponents, ID critics are promoting values that can contribute to resolving the conflict over intelligent design and/or contribute to reducing the range of conflict between citizens.

The Effect of the Religious Content of ID on the Moral Arguments

The central arguments based on the moral claims of intelligent design proponents have been documented in the preceding chapters. Assessments of those arguments from a deliberative perspective were often inconclusive because the
scientific and religious status of ID had not been determined. I now return to those arguments to see the effect the religious content of ID has on them.

*Fairness and freedom of thought.* Intelligent design proponents in Ohio and in rebuttals to critics have claimed that it is only fair to allow the unbiased teaching in science of the full range of relevant scientific evidence both for and against evolutionary theory, including the evidence that supports an inference to design. I previously noted that this argument is not justifiable from a deliberative perspective for the following reasons. First, the principle of reciprocity requires empirical claims to be conditioned by methods and standards mutually accepted by the wider scientific community. Teaching students alternative theories that reject the methods and standards of modern science that have been arrived at by a consensus of practicing scientists over the past three centuries violate the basic opportunity of students to receive an adequate education in science. Second, rejecting the methods and standards of modern science and the opinions of scientists who support them demonstrates that ID proponents reject the principle of reciprocity. A rejection of the principle of reciprocity by citizens ends in non-deliberative disagreement. I also noted that the refusal to pursue the scientific claims of ID in terms that are acceptable to practicing scientists signals the possibility that ID proponents are disguising a religious agenda.

Clarifying the religious content of intelligent design supports the conclusion that ID proponents are pursuing a religious agenda under the guise of arguments for fairness and freedom of thought. ID proponents are violating the principle of publicity by deceptively pursuing an agenda that takes advantage not only of the
scientific ignorance and religious fears of Americans, but also their commitment to
democratic moral values. In addition, the religious content of ID ensures that the
basic liberty of students would be violated by teaching ID as a scientific theory. It
would constrain the present and future religious beliefs of students by teaching certain
sectarian religious beliefs as true in science classes.

*Academic freedom.* Proponents of intelligent design argue that academic
freedom allows teachers to teach criticisms of evolutionary theory that are based on
scientific evidence offered by fully qualified, credentialed scientists. I noted earlier
that this argument depends crucially on the scientific status of the evidence offered
against evolutionary theory and the scientific status of the alternative theory that
supports the evidence, intelligent design.

The lack of scientific support for the critical evidence offered against
evolutionary theory and the sectarian religious content of ID theory demonstrates that
appeals to academic freedom are appeals to unrestricted freedom that fail to meet the
requirements of the principle of accountability. The principle of accountability
requires teachers to maintain the scholarly boundaries of inquiry associated with the
discipline of science. Teaching conclusions that have proven to demonstrably false,
e.g., that natural causes can be proven mathematically to be incapable of creating
biological complexity, based on mutually accepted methods and standards adopted by
the wider scientific community violates the professional integrity of teachers and the
integrity of science. The principle of accountability constrains appeals to academic
freedom.
Censorship. Proponents of intelligent design assert that the methodological naturalism practiced by scientists necessarily entails ontological naturalism, thereby censoring design inferences from science through definition. I noted earlier that this argument is not justifiable from a deliberative perspective because design proponents offer neither compelling evidence nor argument for their assertion that methodological naturalism necessarily entails ontological naturalism. The refusal of design theorists to offer reasons for objecting to methodological naturalism based on mutually agreed upon rules of evidence and argument violates the principle of reciprocity. However, I also pointed out that the argument depends on knowing if design inferences refer to supernatural causes and knowing if ID theory offers compelling evidence for design inferences. To change the methods and standards of science to allow supernatural causes in scientific explanations, design proponents must offer compelling evidence that can be accepted by the wider scientific community.

The investigation into the scientific claims and religious content of ID revealed that design inferences refer to supernatural causes associated with sectarian religious belief and that ID proponents do not offer compelling evidence for the supernatural causation of biological phenomena based on mutually agreed upon scientific standards. Intelligent design proponents therefore continue to violate the principle of reciprocity. They also violate the principle of accountability by failing to address the claims of scientists, in terms they can accept, who would be significantly affected by the inclusion of supernatural causes in scientific explanations.
Honesty. Intelligent design proponents argue that failure to teach the criticisms of evolutionary theory found in intelligent design texts violates the fundamental value of honesty in education. They argue that students ought to know that many scientists question the ability of natural selection to create biological complexity. I argued earlier that this argument depends on whether intelligent design is a religious theory.

The religious content of intelligent design clearly demonstrates that teaching criticisms of evolutionary theory based on the methods and standards of ID would not be consistent with the fundamental value of honesty in education. Honesty demands that public school policymakers acknowledge the sectarian religious content of ID and that policies that require scientific theories to be critically judged based on religious standards violates the basic liberty of students. Students in public schools are less able to identify and to resist sectarian religious beliefs when they are taught as true in science classrooms.

Ohio Revisited.

Some arguments in the conflict over the model lesson plan in Ohio depended on the answers to three questions: Is intelligent design a scientific theory? Is intelligent design a religious theory? and, Are intelligent design concepts and references in the model lesson plan? Answers to the first two questions have been provided, but I have yet to address the last. In this part of this section I will briefly suggest areas in the model lesson plan where ID concepts and references can be
I also return to those arguments that required answers to the three questions to determine the effect of the answers on the arguments.

The first trace of the influence of intelligent design on the model lesson plan occurs in the fact that the lesson exists at all. The very idea of a “critical analysis of evolution” is central to the efforts of ID proponents to achieve a presence in public school science classrooms. The fact that the model lessons in the other sciences do not include “critical analysis” components indicates a connection between ID proponents and the existence of the plan. Historically, creationists have relied heavily on negative arguments against evolutionary theory to create doubts in unsophisticated minds about the power of natural selection to create biological complexity. The lesson plan appears to be just one more instance in a historical chain of creationist attempts at negative argumentation against evolutionary theory.

The presence of intelligent design concepts occurs most clearly in the definitions that are given for scientific terms and in the misleading text, with often unsupported claims, that accompanies the “Five Aspects of Evolution.” One of the signature traces ID theorists leave behind when they have been theorizing is, as Van Till pointed out, a “web of words that have been assigned extraordinarily unusual meanings” and misleading or false characterizations of evolutionary terms (Van Till, 2002, p. 24-25). A theory is, for example, described as a “supposition,” and an “anomaly” is described as an idea rather than an observation or datum inconsistent with a theory. The lesson on homology contains misleading and false claims in the

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144 I rely on some analyses provided by OCS, an anti-ID group in Ohio. It should be noted that this is a cursory review of the content of the lesson plan. My purpose is merely to establish the fact that intelligent design concepts and references do occur in the lesson plan. A more thorough review is beyond the scope of this dissertation.
"challenging answer." The lesson on the fossil record contains misleading text in
the "supporting answer" and unsupported claims, misrepresentations and a term not
found in the technical vocabulary of biology ('forms') in the "challenging answer."
The lesson on antibiotic resistance includes an appeal to the ID standard of "causal
specificity" by noting that the "speciation of bacteria has not been observed." The
lesson on peppered moths does not include recent research and makes a false claim in
the "challenging answer." And, finally, the lesson on endosymbiosis also contains an
appeal for the intelligent design standard of "causal specificity" – "scientists have not
observed these cells changing into organelles such as mitochondria or chloroplasts."

Direct references to intelligent design sources, including references to
Jonathan Wells' book *Icons of Evolution* and to websites devoted to disseminating ID
ideas, were deleted from the final lesson plan. However, the plan suggests that
students do research on the web which includes looking up certain vocabulary words,
and that research is likely to lead students directly to intelligent design sources,

Given the fact that the lesson plan "critically analyzes" only evolutionary
theory and includes false definitions, misleading text, errors of fact, and unsupported
claims that are associated with the negative arguments of intelligent design theorists,
it is clear that the lesson plan is intended to indirectly and subtly promote ID as a
scientific alternative to evolutionary theory. How, then, are the arguments in Ohio
affected by the presence of intelligent design in the model lesson plan?

145 Case Western University professor Patricia Princehouse claims that the lesson plan "lies outright
about the current content of scientific literature" in the lessons on the fossil record and peppered
moths. In addition, the challenging answer in the lesson on homology is, in her view, "a clear
argument for 'special creation'" (P. Princehouse, personal communication, March, 2004).
I argued earlier that if the model lesson plan presents intelligent design theory as an appropriate standard for criticizing evolutionary theory, and if intelligent design allows supernatural causes in scientific explanations, then the lesson plan violates several deliberative principles. The lesson plan does, indirectly, through negative argumentation, present ID methods and standards as appropriate standards for criticizing evolutionary theory. And, as was argued earlier, ID does allow supernatural causes in scientific explanations. Consequently, the following principles are violated by the lesson plan. First, the principle of reciprocity is violated since the lesson plan indirectly requires students to apply a standard that is not mutually accepted by the wider community of scientists. Students would offer reasons for their criticisms of evolutionary theory based on the standards of intelligent design theory which are not mutually agreed to by the wider scientific community. Second, the principle of publicity is violated by the lesson plan because the lesson plan fails to state explicitly that the methods and standards of ID are indirectly promoted by the lesson. Third, the principle of accountability is violated because policymakers failed to give mutually acceptable reasons for indirectly adopting the methods and standards of ID in the lesson plan to all constituents who are affected by the plan. Fourth, and finally, the principle of basic opportunity is also likely violated because students are likely to reach conclusions about evolutionary biology that contradict the conclusions of decades of sound science. To the extent that those conclusions impair their ability to make sound scientific judgments in their personal and civic decisions, the basic opportunity of students to receive and adequate science education is violated.
I also argued earlier that if critically analyzing evolutionary theory according to the lesson plan introduces supernatural causal explanations as appropriate for science and if the supernatural explanations of ID necessarily imply sectarian religious ideas, then the basic liberty of students would be violated. Since the lesson plan indirectly supports the introduction of supernatural causal explanations in scientific explanation for biological complexity, and since the supernatural explanations of ID necessarily imply sectarian religious beliefs, then the lesson plan violates the basic liberty of students by constraining their present and future religious beliefs.

The conflict over the Ohio model lesson plan and the conflict over the inclusion of intelligent design as an alternative scientific theory in school board rooms across the nation continue to be marked by nondeliberative disagreement even when the scientific and religious claims of ID are thoroughly investigated. I suggested earlier that taking the scientific and religious claims of ID proponents seriously and investigating those claims would not only yield judgments about ID’s scientific and religious status, but also illuminate areas of possible agreement. It appears, however, that there is no possibility of coming to any agreement since the claims of ID proponents appear to be corrupted by the deceptive pursuit of a religious agenda. The question now occurs: Why? Why are intelligent design proponents disguising their religious intent to “legitimate the assertion of a theistic worldview” behind unsupportable appeals to fairness, academic freedom, and honesty in education and through model lesson plans that indirectly introduce ID? I argue next
that the answer to the question "Why?" lay in the perceptions ID proponents have about what is at stake in the conflict over ID.

**The Perceived Stakes**

The remarkable candor intelligent design theorists demonstrate in their early texts and public appearances about the religious consequences of ID is in marked contrast to their recent public pronouncements in school board meetings and in the content of their most recent texts. The notable difference between their religious pronouncements in certain venues and recent denials of any religious content in other venues is obvious. William Dembski, for example, described intelligent design in 1999 as "a way of understanding divine action" (Dembski, 1999, p. 13); in 2001 as "...the Logos theology of John's Gospel restated in the idiom of information theory" (Dembski, 2001c, p. 192); and in 2002 as "a design-theoretic research program" that reconceptualizes biology "in information-theoretic terms" and considers "abiotic infusion of exogenous information [by an unembodied designer] as the great mystery confronting modern" biology (Dembski, 2002a, p. 324, 321). Now Dembski describes intelligent design in minimal terms. In 2003 he described ID as "the science that studies how to detect intelligence" (Dembski, 2003c, p. 1) and in 2004 as

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146 In 1999 Dembski was also quite open about the scope of the effect he hoped intelligent design would have on the intellectual world.

"The implications of intelligent design are radical in the true sense of this much overused word. The question posed by intelligent design is not how we should do science and theology in light of the triumph of Enlightenment rationalism and scientific naturalism. The question rather is how we do science and theology in light of the impending collapse of Enlightenment rationalism and scientific naturalism. These ideologies are on the way out. They are on the way out not because they are false (although they are that) or because they have been bested by postmodernity (they haven't) but because they are bankrupt. They have run out of steam. They lack the resources for making sense of an information age whose primary entity is information and whose only coherent account of information is design" (Dembski, ID, 1999, p. 14-15).
“the science that studies signs of intelligence” (Dembski, 2004c, p. 1). This sharp excision of religious pronouncements is not only further evidence of an attempt to deceptively insert sectarian religious ideas into public school science classes, it is also, I contend, evidence of what ID proponents perceive to be at stake in the conflict over ID – proof of the truth of their sectarian religious ideas and the comprehensive moral understandings that accompany it.

Mark Kelly, author of *Proof Beyond Reasonable Doubt: The End of Christian Apologetics*, is an intelligent design supporter who does not hesitate to state exactly what is at stake if intelligent design can’t prove that Christianity is true.

The truth is religion and morals cannot be matters of personal opinion. They must be matters of fact that can be proven, or there is no way to create a society that is just and good. If no one can say what is true for others, then our world’s slide into moral chaos cannot be stopped...Science leads us to the conclusion that Creator God is real...The fact...is that the scientific evidence for intelligent design and historical evidence for the resurrection of Jesus prove beyond reasonable doubt that Christianity is true. (Kelly, 2004, p. 1, 2)

Kelly is not alone among ID proponents who fear that the truth of Christianity and Christian morality are at stake. Nancy Pearcey, for example, states “...people sense instinctively that there is much more at stake here than a scientific theory – that a link exists between the material order and the moral order...the question of origins determines our destiny...In God’s revelation we have a solid basis for morality, purpose and dignity” (Pearcey, 2001, p. 45). Discovery Institute Senior Fellow John G. West claims “intelligent design concerns the defense of traditional morality...it may provide a powerful way to check the moral relativism spawned by scientific materialism, especially in the areas of family life and sexual behavior” (West, 2001,

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147 Nathalie Des Rosiers, President of the Law Commission of Canada noted in a speech that “a war of definitions designed to minimize [the] complexity [of an issue] does not provide a service in a deliberative society: it is merely a brutal exercise of power. Reducing a complex problem to its simplest expression deprives society of the benefits of deliberation...” (Des Rosiers, 2001, p. 9).
p. 67). And, as noted earlier, Phillip Johnson and William Dembski also hold that the truth of Christianity and the basis for Christian morality depend on the defeat of "Darwinism" by intelligent design.

Intelligent design proponents appear to realize that if they state their religious intentions clearly and publicly, they risk losing the opportunity to prove the scientific truth of their sectarian religious beliefs in public schools. Hence, their public appeals for ID consist of calls for "fairness," "freedom of thought," and "honesty" instead of "the truth of Christianity" and "the truth of Christian morality." Minimal definitions of intelligent design serve the same purpose. Providing complete definitions and descriptions of ID would clarify the religious content of the idea of intelligent design and risk the exclusion of ID from science curricula.

Again, it appears that there is no possibility of finding common ground between ID proponents and opponents to ID. The perceived stakes in the minds of ID supporters are unlikely to resonate with those opposed to it. In the final part of this section, I suggest that there are values that citizens might come to hold in common in this conflict, and I suggest areas of the public school curricula where these common values could be promoted.

Accommodating Values

The virtue of mutual respect, I argued earlier, requires citizens to maintain an attitude of respect for the dignity and worth of one's opponents even when they refuse to seek reasons for public policies that can be accepted by all citizens bound by those policies. In my view, when conflicts among citizens end in nondeliberative disagreement, citizens who are willing to seek reciprocal reasons for policies ought to
continue to reason together and, without compromising their own moral convictions, accommodate the values of their opponents to the greatest extent possible. Citizens who continue to reason reciprocally after a nondeliberative disagreement ought to, in my view, extend the principles of accommodation, civic integrity and civic magnanimity, toward their opponents. The principle of civic integrity would require ID opponents to maintain consistency in their speech and actions and to accept the broader implications of the moral principles they espouse. But, since civic integrity requires individual citizens to affirm the moral status of their own political views, the principle of magnanimity which asks citizens to acknowledge the moral status of the positions they oppose has wider implications following nondeliberative disagreement. Applying the principle of magnanimity to the conflict over intelligent design would have the following consequences.

First, intelligent design opponents should acknowledge the deep religious and moral convictions of ID proponents. This does not mean that the ID critics ignore the false appeals ID supporters make to moral values such as “honesty” and “fairness.” Rather, it means that ID opponents acknowledge the deeper religious and moral convictions of ID proponents as worthy of respect even though there are justifiable reasons for not promoting those religious and moral convictions through public school policies and even though ID opponents may regard those convictions as wrong. If, as cultural anthropologist Christopher Tourney points out, advocating for intelligent design by proponents is “the existential stuff of their lives, the glue that binds together all the disparate selves of a self-respecting scientist or engineer, a righteous Christian, a dutiful parent, and a good citizen,” then the religious and moral
convictions of ID proponents are more than just strategic or political attitudes that can easily be changed or discarded (Toumey, 1994, p. 264-265). Their convictions are, for them, the source of their dignity and worth, and, therefore, are worthy of respect by all citizens even though the arguments and tactics ID proponents engage in are not worthy of respect.

Second, extending civic magnanimity means that ID opponents ought to maintain an attitude of open-mindedness toward ID proponents by being willing to be convinced by some of the claims of ID advocates if they prove to be well grounded. The claim by ID advocates, for example, that some scientists, and perhaps some public school teachers, teach atheism as true because they believe evolutionary theory proves atheism is true may be a claim worth investigating. If methodological naturalism does not entail ontological naturalism, then teachers and scientists should not teach religious or anti-religious conclusions as true in public school science classrooms. Maintaining an open mind, then, can contribute to resolving some areas of concern to ID proponents thereby reducing the range of citizen disagreement and contributing to the possibility of living together in some measure of mutual respect.

Third, magnanimity asks citizens to provide rationales for public policies that minimize the rejection of the position they oppose. This is what Gutmann and Thompson call the disposition to seek an “economy of moral disagreement.” This means that ID critics should avoid unnecessary conflict in characterizing their own positions.

148 Interestingly, Gutmann and Thompson state in a footnote that “the economy of moral disagreement supports mutual respect of conflicting moral perspectives as an end in itself, not just as a means for achieving agreement on political questions or promoting public reason” (Gutmann & Thompson, 1996, p. 378, n44). It is interesting because it appears to contradict their earlier claim that, in the case of nondeliberative disagreement, citizens are not obligated to fulfill the obligations of mutual respect. If an economy of moral disagreement supports mutual respect of conflicting moral perspectives as an end in itself, then it would seem that it is a disposition one would extend to one’s opponents in both nondeliberative and deliberative disagreements.
position or the position of ID proponents and that ID critics should search for areas of agreement with ID proponents. ID critics, for example, should restrain themselves from characterizing intelligent design as "a load of horseshit" and "worthless crap" as was done recently on a weblog devoted to, among other things, the integrity of science and science education (Dembski, 2004d, p. 4). Importantly, seeking rationales for policies that require minimizing the differences of citizens and encourages the search for common ground helps reveal those values that may be acceptable to all and worth pursuing in other areas of the curriculum.

In the remainder of this part, I briefly explore three possible values that may come to be held in common and be practiced by ID opponents and proponents alike, thereby helping to resolve and reduce the range of disagreement between them. I also suggest possible areas of the curriculum where the values could be promoted. The values are: the dignity and worth of individuals, humility and charity.

These three values appear to be required for the extension of civic magnanimity toward one's opponents. I argue, then, that by extending civic magnanimity towards their opponents, ID critics are promoting values that can contribute to resolving the conflict over intelligent design and/or contribute to reducing the range of disagreement between citizens involved in this conflict. By embracing and modeling these values, ID critics signal their continued willingness to seek reasons for policies concerning intelligent design that can be accepted by all citizens bound by those policies.

149 Of course, if ID proponents were willing to seek reciprocal reasons for public school science education policies, they too should refrain from saying such things as "Darwin perpetrated the greatest intellectual swindle in the history of ideas" and that scientists "keep the propaganda mills running overtime, inflating Darwinism's paltry successes" (Dembski, 2004e, p. 1, 3).
Dignity and worth of individuals. Respecting the dignity and worth of individuals means that citizens recognize the deepest moral and religious convictions of others as worthy of respect even if those convictions are not shared by all. One important way of manifesting respect for the moral and religious convictions of others is to acknowledge in public school curricula their role in the past and present life of the United States, especially U.S. civic life. Unfortunately, public education in the United States has, according to many scholars, failed to teach students about religion and its important role in our history and civic life. Consequently, public schools, including public universities, are accused of tacitly undermining or disparaging religious belief and of helping create and sustain religious controversies.

Cell biologist and ID critic Ken Miller notes that when his students ask about his religious convictions and find out that he is a practicing Catholic, students are courteous, but surprised. How could he believe in God and be an ardent proponent of evolutionary theory? According to Miller

> It is simply taken for granted that smart, modern, well-informed people have risen above the level of petty superstition, which is exactly how any serious faith is regarded. Religion as culture...may be grudgingly accorded obligatory respect – just enough, I am sure, to evade the nasty charge of cultural imperialism. But religion itself, genuine belief, just doesn’t belong. (Miller, 1999, p. 19; italic in original)

Yale Law School professor Stephen L. Carter adds that many educational, legal and political leaders “refuse to accept the notion that rational, public-spirited people can take religion seriously.” He sees a trend

...toward treating religious beliefs as arbitrary and unimportant, a trend supported by a rhetoric that implies that there is something wrong with religious devotion. More and more, our culture seems to take the position that believing deeply in the tenets of one’s faith represents a kind of mystical irrationality, something that thoughtful, public-spirited American citizens would do better to

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avoid If you must worship your God, the lesson runs, at least have the courtesy to disbelieve in the power of prayer; if you must observe your Sabbath, have the good sense to understand that it is just like any other day off from work. (Carter, 1993, p. 6-7)

Miller and Carter both agree that the lack of understanding and respect for the important role religion plays in the lives of Americans helps fuel the conflict over evolution. Miller argues that "public acceptance of evolution...doesn't turn on the logical weight of carefully considered scientific issues." Rather, in Miller's view, it hinges on the effect the acceptance of evolution would have on their view of the meaning and purpose of life itself.

In one sense, the popular culture embraces evolution just as it has the rest of science...But in another sense it rejects that premise soundly. Less than half of the US public believes that humans evolved from an earlier species. The reason, I would argue, is not because they aren't aware of the strength of the scientific evidence behind it. Instead, it is because of a well-founded belief that the concept of evolution is used routinely, in the intellectual sense, to justify and advance a philosophical worldview that they regard as hostile and even alien to their lives and values. (Miller, 1999, p. 167)

Carter argues that the "perception of creationists as backward, irrational, illiberal fanatics - not too smart and not too deserving of respect" is unwise given the fact that scores of millions of Americans may actually approve of teaching creationism in biology classrooms. These Americans are not "utterly stupid," they just do not draw "a neat line between the religious and the secular, either on questions of politics and morality or on questions about the natural world" (Carter, 1993, p. 159-160).

It certainly appears that fostering the value of the dignity and worth of individuals through a deeper understanding of and respect for their moral and religious convictions could contribute to resolving some areas of the conflict over ID and/or to reducing the range of disagreement. Boston Law School professor Jay D. Wexler argues that the remedy to the conflict over intelligent design is "not to reform
science education but rather to teach students more about religion and, specifically, about religious views on the origins of life" (Wexler, 2003, p. 759-760; italics in original). In his view, teaching about religion ought to occur in social science classrooms as part of a general civics program that prepares students for citizenship. “If public education is best conceived of as ‘civic education’...then the omission of religious studies is harmful because it is simply impossible to understand the public life of the nation (or the world) without understanding something about religion. (Wexler, p. 778). Wexler further argues that a strong case can be made for including religious views on origins as a way to achieve civic goals. One goal of civic education that can be furthered by teaching religious views on origins is the goal of understanding how government laws affect religious belief. The conflict between religious views on origins and evolution “represents a paradigmatic and accessible example of how government action can burden religious believers...students...will gain insight into how believers feel when they are forced to study something that violates their basic beliefs” (Ibid, p. 783). Another goal of civic education that can be furthered by teaching religious views on origins is the goal of understanding how religious and nonreligious people think about important civic questions.

...citizens who are deeply religious will often think about public issues differently from those who are not...for a great many Americans, religious claims about origins simply take precedence over conflicting scientific claims. This is because those religious citizens have a different way of understanding the world; their epistemology is at odds with those that consult science

151 Phillip Johnson, for example, writes Creationists are disqualified from making a positive case, because science by definition is based upon naturalism. The rules of science also disqualify any purely negative argumentation designed to dilute the persuasiveness of the theory of evolution. Creationism is thus out of court and out of the classroom - before any consideration of evidence. Put yourself in the place of a creationist who has been silenced by that logic, and you may feel like a criminal defendant who has just been told that the law does not recognize so absurd a concept as “innocence” (Johnson, 1990, p. 9).
first...For those who take science as their starting point...this just seems completely incomprehensible. As a result, meaningful discourse over origins and origins education becomes impossible, and the discourse often turns uncivil and hostile. (Ibid, p. 784-785)

In Wexler’s view, teaching about religion and religious views on origins as part of civic education could lead citizens to treat each other with greater “empathy, tolerance, and mutual respect” (Ibid, p. 786).

Respecting the deepest moral and religious convictions of ID proponents may not solve the conflict over intelligent design, but knowledge that their dignity and worth as individuals is recognized by ID critics and promoted by public school curricula may encourage them to begin to seek reasons for public policies on ID that are mutually acceptable to all who are bound by those policies.

Humility. Civic magnanimity asks citizens to remain open to the possibility that some of the views or claims of their adversaries may have merit. Gutmann and Thompson point out that institutional and personal habits can discourage citizens from modifying their views in the direction of their opponents or from accepting their opponents’ position in the future if the facts of a case change (Gutmann and Thompson, 1996, p. 83). To break out of those institutional and personal habits and to begin to be open minded toward one’s opponents means that one must, I argue, embrace the value of humility. Embracing the value of humility does not mean that one cannot affirm one’s own moral and religious or anti-religious views strongly and consistently. Rather, it means that people ought to “seek a balance between holding
firm convictions and being prepared to change them when one encounters objections that, on reflection, one cannot answer" (Ibid, p. 83-84).¹⁵²

Intelligent design proponents have the firm conviction that their religious understandings have great epistemic worth, i.e. that their religious convictions count as ‘knowledge.’ That conviction is shared by many religious people who are not ID supporters. In fact, many religious people place such great value on their religious knowledge that they use that knowledge to inform every facet of their lives, including their political lives. Some opponents to ID reject the view that religious understandings result in any sort of meaningful knowledge and, in fact, are epistemically worthless. This is an example, I would argue, of a place where the value of humility and virtue of open-mindedness can be brought to bear in the conflict over intelligent design.

Some scholars argue that religious convictions are an appropriate basis for developing the reasons one gives for voting and for supporting public policies and those reasons do not necessarily need to be conditioned by secular concerns. Notre Dame philosopher Paul Weithman, for example, argues that “citizens may rely on religious arguments and vote their religious convictions even if they are not prepared to make good their arguments or justify their votes by appeal to reasons of other kinds” (Weithman, 2002, p. 212). U.S. Naval Academy philosophy professor Christopher Eberle agrees. He argues that

A citizen has an obligation sincerely and conscientiously to pursue a widely convincing secular rationale for her favored coercive laws, but she doesn’t have an obligation to withhold support from a coercive law for which she lacks a widely convincing secular rationale. (Eberle, 2002, p. 10)

¹⁵² Gutmann and Thompson do not mention the value or virtue of humility. I am arguing that humility is necessary for the practice of civic magnanimity.
Of course other scholars take exception to the views of Weithman and Eberle and argue that religious reasons for political actions and decision-making must be tempered by secular standards of ethics. Philosopher Robert Audi, for example, argues that

...where religious considerations appropriately bear on matters of public morality or of political choice, religious people have a prima facie obligation - at least insofar as they have civic virtue - to seek an equilibrium between those considerations and relevant secular standards of ethics and political responsibility. (Audi, 2000, p. 136)

Importantly, Audi does not dismiss the value of religious reasons for political decisions; he only argues they must be conditioned by secular concerns.

By remaining open to the possibility that there can be good arguments for relying on religiously grounded moral beliefs when giving reasons for political actions and decisions, and by remaining open to being convinced or partially convinced by those arguments, intelligent design critics may help create an atmosphere of mutual cooperation among citizens. Such an atmosphere could encourage ID proponents to seek reciprocal reasons for public policies on ID; it also could contribute to reducing the range of disagreements among citizens over intelligent design. Importantly, it is humility that makes possible the virtue of open-mindedness which is required for the extension of civic magnanimity.

Charity. The final component of civic magnanimity is the disposition to seek an economy of moral disagreement where citizens attempt to provide reasons for public policies that minimize the rejection of opposing positions. Simply put, it means that citizens are charitable in their characterizations of their opponents and their views and charitable in affirming those aspects of the moral views of their
opponents that are acceptable to all. ID critics must embrace the value of charity in order to seek an economy of moral disagreement with intelligent design proponents.

It is obviously difficult to act charitably toward others who refuse to seek mutually acceptable reasons for public policies and who may unjustly vilify those who do. Acting charitably, however, can defuse and redirect the often hostile context of discourse that occurs between ID proponents and opponents thereby creating an opening for the search for common ground. Of course, this does not mean that those aspects of the claims and actions of intelligent design proponents that are unacceptable and pernicious should be ignored. Rather, extending charity towards one’s opponents may create an atmosphere in which moral growth can occur in both ID proponents and those who oppose them thereby increasing the possibility of finding ways in which the domain of public disagreement over intelligent design may be reduced.

An example of another, more contentious and dangerous, public conflict in which the extension of charity helped diffuse and redirect, but not excuse or ignore, unacceptable claims and behavior is the Truth and Reconciliation Commission in South Africa following the defeat of the policy of apartheid. While that situation was far more extreme and more deeply unjust than the conflict over intelligent design and public school science curricula, there are lessons critics of ID can learn from those who were able to acknowledge the humanity of their oppressors despite the deep injustices the oppressors inflicted on South Africans. It also helps to put the conflict over ID in perspective. Too often the overwrought claims of ID proponents and opponents create the impression that the conflict over teaching evolutionary theory
focuses on the primary injustice in public schooling today. While it is a great injustice to withhold an adequate science education from public school students and to violate their basic liberty to resist compulsory religious belief, there are arguably much greater injustices that take place in public schools every day. ID critics would be wise to embrace the value of charity and seek an economy of moral disagreement with those who oppose them so that the difficult task of reducing the range of moral disagreement among citizens over science education can begin.

This chapter began with an investigation into the claim by ID proponents that determining the characteristics and identity of the unembodied intelligent designer who abiotically infuses information into physical systems to create and guide life is beyond the scope of ID. I argued that when design theorists claim that intelligent design is compatible with many religious traditions but not with theistic evolutionary religious convictions, they begin to reveal the sectarian religious content of intelligent design theory. The religious content of ID refers to religious ideas that constitute the essential meaning of the theory. I argued that since the content of the animating idea of intelligent design theory is identical to the content of the central animating idea of traditional religions, ID is undeniably a traditional religious idea. I also argued that the meaning of the idea in intelligent design theory that natural causes are incapable of creating complex biological systems necessarily implies sectarian religious ideas. In addition, the idea in ID theory that supernatural intelligent agency is empirically detectable is a sectarian idea resulting from the religious literalism inherent in the defining concept of ID – theistic realism. I concluded that intelligent design theory is

not only a religious theory; it is a sectarian religious theory that necessarily excludes competing religious and anti-religious convictions.

In the final section of this chapter I investigated, from a deliberative perspective, the effect the religious content has on the arguments by design theorists for including ID in public school science classrooms. I argued that the religious content has a determinative effect on the arguments that appealed to fairness and freedom of thought, academic freedom, censorship and honesty. In each of those arguments, ID proponents violated in some way the process and content principles of deliberative democratic theory. I also revisited the conflict over the model lesson plan in Ohio to determine if ID concepts and references are included in the plan. I concluded that the model lesson plan indirectly promotes the methods and standards of intelligent design theory thereby violating the principles of reciprocity, publicity, accountability, basic liberty and basic opportunity. The model lesson plan cannot be justified, from a deliberative perspective, to all citizens who are bound by it.

Clearly, ID proponents perceive the truth of their religious faith and the moral understandings which accompany it to be at stake in the conflict over intelligent design. I argued at the end of this chapter that even though ID proponents refuse to candidly reveal their religious fears and intentions and even though they continue to offer reasons for including ID theory in science classrooms that cannot be justified from a deliberative perspective, ID critics should extend the accommodating principles, especially civic magnanimity, to their opponents. By extending civic magnanimity, ID critics promote values that can contribute to resolving the conflict
over intelligent design and/or contribute to reducing the domain of the conflict between citizens.

In the concluding chapter to this dissertation I briefly address the question of where intelligent design can justifiably be placed ID in school curricula, and I reflect on the promise a deliberative perspective brings to the conflict over ID and public school science education.
On May 15, 2004 the Minnesota legislature adopted new science standards for Minnesota public schools. Included in the science standards for the ninth through twelfth grades is a “benchmark” under the “History and Nature of Science” that reads in part, “The student will be able to explain how scientific and technological innovations as well as new evidence can challenge portions of or entire accepted theories and models including...[the] theory of evolution....”\textsuperscript{154} The associated press reported on May 17 that it was “critical” for the Minnesota legislature to adopt new science standards this year “because the [state] education department is in the process of designing three new science exams pegged to the standards. They are required under the federal No Child Left Behind law.”\textsuperscript{155}

In a press release issued on the same day as the AP story, the Discovery Institute announced that “Minnesota has become the second state to require students to know about scientific evidence critical of Darwinian evolution in its newly adopted science standards.” Noting that the Discovery Institute “supports teaching students more about evolutionary theory including introducing them to mainstream, peer-reviewed scientific debates over key aspects of modern evolutionary theory,” John West, associate director of the Discovery Institute’s Center for Science and Culture, stated


This is a significant victory for the vast majority of Americans who favor teaching evolution but who want it taught fully, including scientific criticisms of the theory…Undoubtedly some Darwin-only supporters will claim that the standard doesn’t really mean what it says, or that schools don’t really need to follow it. Minnesotans who support the standard will need to make sure that it is actually implemented in Minnesota schools. (Discovery Institute, 2004d)

John West’s comments and the comments of Bob Lattimer from Ohio regarding the need for questions on state science exams that cover “critical analysis” of evolution indicate that battles over the teaching of evolutionary theory and the introduction of intelligent design in public school science classrooms in the United States will continue to endure. The aim of this dissertation has been to advance public understanding of the conflict over teaching intelligent design in public schools and to encourage policymakers to reduce the range of moral disagreement among citizens on this topic by engaging in principled deliberative decision-making when formulating public school policy concerning intelligent design. I have addressed three of four important questions that public school policymakers face when they are confronted with requests to include, either directly or indirectly, design theory in school science curricula: 1) How can public school policymakers reach justifiable policy decisions on the topic of ID when citizens have deep moral disagreements about its placement in school curricula? 2) Is intelligent design theory a scientific theory? and 3) Is intelligent design a religious theory? The fourth question this dissertation set out to answer – Where does intelligent design belong in public school curricula? – has only partially been addressed.

In this conclusion I briefly address the question of where public school policymakers can justifiably place ID in school curricula, and I defend once again the choice of a deliberative perspective by public school policymakers for weighing the
claims of citizens in the conflict over intelligent design and public school science education.

**Justifiable Public School Policies on Intelligent Design**

A deliberative perspective on public policy decision-making asks policymakers to weigh the content of public policies against the principles of basic liberty and basic opportunity. Earlier in this dissertation I suggested that a plausible paternalistic argument could be made for excluding ID as a scientific theory in public school science classes and for restricting public school science investigations to natural causal explanations based on the principle of basic liberty. I also suggested that three areas of educational opportunity are relevant to the conflict over ID—education in the biological sciences, education about religion and civic education. In the discussion that follows, I return to the paternalistic argument to consider whether it is justifiable from a deliberative perspective. I also offer reasons based on the principle of basic opportunity for including ID in classes that teach about the history and philosophy of science, in classes that teach about religion and in civics classes.

**Basic Liberty – A Paternalistic Argument**

A paternalistic argument for excluding ID from science classes as a scientific theory and for restricting public school science investigations to natural causal explanations can be made as follows. First, intelligent design allows supernatural causes in scientific explanations. The supernatural causes associated with ID necessarily imply certain sectarian religious understandings. Second, it is not in the best interest of children to teach sectarian religious views as true in science classes. To do so would violate the present and future mental integrity of students, i.e., it
would constrain their present and future religious beliefs. Third, public school policymakers have an obligation to protect the basic liberty of all public school children. Fourth, restricting scientific explanations to natural causes places fewer constraints on religious belief than teaching certain sectarian religious beliefs as true in science classes. Fifth, and finally, since most people would resist compulsory sectarian religious belief and children are less able to understand and resist sectarian religious beliefs that are presented as true in public school science classes, public school policymakers should exclude ID from science classes as a scientific theory and limit scientific explanations offered in public school science classes to natural causal explanations.

An objection to this paternalistic argument could be made by parents who claim to have the exclusive right to educational authority over their children, including the right to pass on their sectarian beliefs and values unimpeded by the state. They could argue that schools who teach evolutionary theory in public school science classes are violating the absolute freedom of parents to teach their children that their sectarian religious beliefs are scientifically true. In their view, their sectarian religious beliefs are not a matter of “free choice;” their religious beliefs are an inescapable obligation that follows from the truth of their religious convictions.

At least two responses can be made to this objection from a deliberative perspective. First, when public schools protect the present and future basic liberty of children, the schools are exercising their duty to educate children in good citizenship. Good citizenship requires all citizens to respect the basic liberty of others to resist compulsory sectarian religious belief. When parents insist that schools must teach the
sectarian views of their family to all children in public schools, they are claiming to have unconditional authority not only over their own children, but also over all future citizens. That claim cannot be accepted by others as a basis for resolving disagreements about school policies. Schools and parents share authority over the education of future citizens, and “no citizen can fairly claim that what constitutes good citizenship is whatever happens to conform to his or her particular religion” (Gutmann and Thompson, 1996, p. 67). The claim of unconditional authority over the education of future citizens by parents who want their sectarian religious beliefs taught as true in public school science classes does not meet the requirements of reciprocity.

Second, when public schools protect the present and future basic liberty of students, they are teaching future citizens the value of mutual respect. Mutual respect is essential for making reciprocal claims and, therefore, for principled deliberative political reasoning and for the principles of accommodation. Parents who want their sectarian religious beliefs taught as true in public schools deny the value of mutual respect and thereby signal their rejection of the principle of reciprocity and the principled political reasoning and accommodating principles reciprocity supports. To criticize or reject the value of mutual respect and the principles it supports, parents must propose some other basis for cooperation among citizens who disagree other than merely arguing that their religious beliefs are true. In the absence of justifiable alternatives to reciprocity and the value of mutual respect, public schools can justifiably, based on the paternalistic argument from basic liberty, exclude intelligent
design as a scientific theory from public school science classes and limit scientific explanations offered in public school science classes to natural causal explanations.

**Basic Opportunity and Public School Policy on ID**

The basic opportunity principle requires public school policy makers to provide students with an adequate education, i.e. an education that allows citizens to live a good or decent life and to participate in a deliberative democracy. The purpose of the basic opportunity principle is to "help create the background circumstances that are necessary for adequate deliberation itself" (Gutmann and Thompson, 1996, p. 349). Three areas of educational opportunity are relevant to the conflict over intelligent design in public schools – education in the biological sciences, education about religion and civic education. In the paragraphs that follow, I offer brief reasons, based on the opportunity principle, for including ID in classes that teach about the history and philosophy of science, in classes that teach about religion and in civics classes.

*History and philosophy of science.* Supernatural causal explanations for natural phenomena were, for millennia, common among people who sought to explain those phenomena. Even after the advent of modern science, appeals to supernatural causes for the origin of complex biological systems were accepted as plausible explanations among naturalists for hundreds of years. It is understandable, then, that the theory of evolution created a furor among religious believers one hundred and fifty years ago when it claimed to demonstrate that natural causes alone can create biological complexity. The theory of evolution was perceived as a threat to religious belief by many, especially by biblical literalists, and efforts immediately
were undertaken to rebut the claims of evolutionary theorists. From an historical perspective, the intelligent design movement is only the latest in a long line of attempts by religious literalists to refute the theory of evolution and to reinstate religious explanations for the origin of complex biological systems, especially the origin of human beings.

Given the long history of religious attempts to reinstate supernatural causal explanations for biological phenomena in scientific explanations, it is plausible to argue that an adequate education in science would be lacking if students were unable to locate the conflict over intelligent design within the history and philosophy of science and to understand why the wider community of scientists now practice methodological naturalism. The ability to place the conflict over ID within the broad context of the history and philosophy of science and to appreciate the reasons why scientists practice methodological naturalism could contribute to reducing one of the sources of moral conflict in the dispute over ID - incomplete understanding.

*Teaching about religion.* Teaching about the conflict over intelligent design in classes that teach about religion can contribute to the basic opportunity of students to receive an adequate education in two ways. First, as I noted earlier, it is not implausible to argue that a minimally decent life is one in which the value of mutual respect inhibits human antipathy toward religious belief or anti-religious belief. Teaching about the religious content of ID and the significance of religious belief in the lives of ID proponents in classes that teach about religion can lead to a deeper understanding of and respect for the religious grounds of their convictions. Specifically, it may contribute to reducing vitriolic attacks on the religious beliefs of
ID proponents and focus attention on the fact that those beliefs provide, in the view of ID proponents, the basis of their dignity and worth as individuals. A reduction in the antipathy some ID critics have toward ID proponents through the recognition of their religious beliefs as the source of their dignity and worth may contribute to a minimally decent, more civil life for all citizens.

Second, teaching respect for the religious grounds of the convictions of ID proponents in classes that teach about religion may promote the value of humility thereby enabling future citizens to practice civic magnanimity toward others with whom they nondeliberatively disagree. Civic magnanimity asks citizens to remain open to the possibility that some of the views or claims of their adversaries may have merit. By teaching respect for the religious views of others in classes that teach about religion, students may learn to remain open-minded when considering the claims of ID proponents.

Civic education. A deliberative perspective on the conflict over intelligent design depends on the ability and willingness of citizens to seek fair terms of social cooperation for their own sake. Civics courses that teach the value of offering reasons for political actions based on principles that can be accepted by others contribute to the basic opportunity of students to participate in democratic deliberations, including deliberations over the appropriate placement of ID in school curricula. Importantly, teaching students about other political frameworks for decision-making that are available to citizens and applying them to the conflict over ID can help students learn the advantages of a deliberative perspective when disagreements among citizens have deep moral dimensions.
The Promise of a Deliberative Perspective on Intelligent Design

Deliberative democratic political theory promotes a conception of democracy that seriously attempts to address moral conflicts in American civic life. The core idea of a deliberative democracy consists of the simple notion that “when citizens or their representatives disagree morally, they should continue to reason together to reach mutually acceptable decisions” (Gutmann and Thompson, 1996, p. 1). In this dissertation I have adapted and applied the deliberative democratic political framework for decision-making that Amy Gutmann and Dennis Thompson developed in their book *Democracy and Disagreement* to the conflict over intelligent design and public school science education. I have argued that the conflict over ID is rooted in deep moral disagreement over values that are perceived to be at stake in this conflict, and that a deliberative approach to public school policy decision-making offers the best possibility for resolving and/or reducing the range of disagreements among citizens over the appropriate placement of ID in school curricula. When the decisions of public school policy makers are conditioned by the process and content principles promoted by a deliberative perspective, the policies that result from their decisions are more likely to be justifiable to all citizens who are bound by them.

A deliberative perspective on the conflict over intelligent design, as I have developed and applied it, encourages not only policymakers but all citizens to maintain an attitude of respect for the dignity and worth of ID proponents even when they refuse to seek reasons for public school policies that can be accepted by all persons bound by those policies. The virtue of mutual respect, in my view, requires people who are willing to continue to reason reciprocally even in the face of
nondeliberative disagreement to extend the accommodating principle of civic magnanimity toward ID proponents. By 1) acknowledging the moral status of the views they oppose, 2) maintaining an attitude of open-mindedness, and 3) seeking reasons for public policies that minimize the rejection of opposing views, citizens promote values that may come to be held in common and practiced by ID opponents and proponents alike, thereby promoting moral learning.

That is the promise of a deliberative perspective on the conflict over intelligent design – it supports a political process that promotes moral learning. In a deliberative democracy, “citizens put their moral beliefs to the test of public deliberation, and strengthen their convictions or change their minds in response to the arguments presented in a politics governed by reciprocity” (Gutmann and Thompson, 1996, p. 93). Importantly, a deliberative perspective does not require people to change their first order moral beliefs, but it does “encourage them to discover what aspects of those beliefs could be accepted as principles and policies by other persons with whom they fundamentally disagree” (Ibid., p. 93). Thus, when public school policy makers engage in deliberative democratic political decision-making in the conflict over ID, they encourage all citizens to learn the most defensible way they can attempt to gain collective acceptance of individual moral beliefs.


_____ (2000b). Intelligent Design in Public School Science Curricula: A Legal
**Guidebook.** Richardson, TX: Foundation for Thought and Ethics.


Kelly, Mark. (2004). What's at Stake if We Can't Prove Christianity is True? 
*LifeWay Christian Resources*. Available at
http://www.lifeway.com/lwc/lwc_cda_article/0,1643,A%253D156449%2526X%253D1%2526M%253D50088,00.html. Accessed 5/04.

Kitcher, Philip. (1982). *Abusing Science: The Case Against Creationism* 
Cambridge, MA: The MIT Press.


______. (2002). E. Coli At The *No Free Lunchroom*: Bacterial Flagella and Dembski's Case for Intelligent Design. Posting to the American Association for the Advancement of Science. Available at


Lesson Summary:
This lesson allows students to critically analyze five different aspects of evolutionary theory. As new scientific data emerge, scientists' understandings of the natural world may become enhanced, modified or even changed all together. Using library and Internet sources, groups of students will conduct background research for one of the aspects of evolution in preparation for a critical analysis discussion. Students also will listen to, and take notes on, their classmates' critical analyses of evolution theory.

Estimated Duration: Four to six hours

Commentary:
This lesson should be used midway or toward the end of a unit on evolution. This will allow students to “carry over” their knowledge of basic evolutionary concepts into this lesson. The strength of this lesson lies in having students research topics that interest them about evolutionary biology. Students are encouraged to consider the research and discuss their findings with fellow students.

Pre-Assessment:
- The following items can be used to stimulate dialogue with the students.
- Instruct students to copy the following items from the chalkboard in their science lab notebook.
  1. Describe anomalies and explain why they exist.
  2. Are there any benefits to exploring scientific anomalies?
  3. How do scientists make and test predictions?
  4. How do scientists critically analyze conflicting data?
  5. Define the following terms in your own words:
     - Theory
     - Critical analysis
     - Natural selection
     - Biological evolution
     - Macroevolution
     - Microevolution
- Direct students to respond to the questions in their science notebook in as much detail as possible leaving space to record information from the ensuing dialogue to add to their notes.
response to criticism and open communication are integral to the process of science.

Indicator 3
Recognize that science is a systematic method of continuing investigation, based on observation, hypothesis testing, measurement, experimentation, and theory building, which leads to more adequate explanations of natural phenomena.

Scoring Guidelines:
Collect pre-assessments and evaluate for indication of prior knowledge and/or misconception. Sample definitions for question five in the pre-assessment include, but are not limited to, the following:

- **Theory**
  A supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained.

- **Critical analysis**
  The separation of an intellectual idea into its constituent parts for the purpose of a careful, exact evaluation and judgment about those parts and their interrelationships in making up a whole. (This definition combines the definition for critical and analysis.)

- **Natural selection**
  The principle that in a given environment, individuals having characteristics that aid survival will produce more offspring, and the proportion of individuals having such characteristics will increase with each succeeding generation.

- **Biological evolution**
  Changes in the genetic composition of a population through successive generations.

- **Macroevolution**
  Large-scale evolution occurring over geologic time that results in the formation of new taxonomic groups.

- **Microevolution**
  Evolution resulting from a succession of relatively small genetic variations that often cause the formation of new subspecies.

Post-Assessment:
- **Describe why scientific critical analysis of evolution is important.**
- **Describe one major piece of evidence used to support evolution and explain why it is important.**
Critical Analysis of Evolution – Grade 10

- Describe one piece of evidence used to challenge evolution and explain why it is important.
- Compare and contrast the supporting and challenging information regarding the aspect of evolution you studied.
- Evaluate the scientific data supporting and challenging areas of evolution in light of the scientific method. In other words, is the data that is used to support or challenge evolution consistent or inconsistent with the scientific method? Are there any limitations? (NOTE: steps of scientific method: Observation, hypothesis, test, retest and conclusion)

Instructional Procedures:
Instructional Tip:
Scientists make a distinction between two areas of evolutionary theory. First, scientists consider mutation, natural selection, genetic drift and gene flow (immigration and emigration) as the processes that generate evolutionary changes in organisms and populations. Second, the theory of universal common descent describes the historical pattern of biological change. This theory maintains that all living forms have descended from earlier living forms and ultimately from a single common ancestor. Darwin envisioned the theory of universal common descent as a necessary result of evolutionary changes in organisms and populations, and represented it in his branching tree of life. Students will investigate and analyze these two areas of evolutionary theory in this lesson.

In addition to the distinctions between different areas of evolutionary theory, scientists also find it helpful to distinguish amounts of biological change or evolution. Microevolution refers to evolution resulting from a succession of relatively small genetic variations that often cause the formation of new subspecies. Macroevolution refers to large-scale evolution occurring over geologic time that results in the formation of new taxonomic groups. These terms are helpful distinctions in the course of analyzing
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evolutionary theory. These terms have appeared in OhioLink research databases, numerous Internet sites, and biology and evolution textbooks. Though “micro” and “macro” are prefixes, it is quite clear that the scientific community recognizes and acknowledges the distinction between the words. To help ensure academic clarity, this lesson distinguishes between microevolution and macroevolution. Teachers may need to provide support to students to help them understand this distinction throughout the lesson.

Student Engagement

1. Write the following statement on the chalkboard or overhead:
   Anomalies are observations in science that depart from the general consensus of the time. Many anomalies occur in science. Scientists create hypotheses to explain these anomalies and then carry out experiments to try to disprove their hypotheses. Disproven hypotheses are rejected and those that are not disproven are subjected to further testing.

2. Ask students to think through the following science topics and discuss where anomalies led to the collection of data that further explained the phenomena and contributed to changing scientific understandings.

   • Spontaneous generation versus biogenesis
     Several pieces of data could be used. One example is Francesco Redi’s observation that flies must contact meat in order for maggots to appear on the meat.

   • Geocentric versus Heliocentric
     Several pieces of data could be used. One example is the observed phases of Venus.

3. Ask students to cite additional areas where critical analysis is needed by the scientific community.

Teacher Presentation
APPENDIX A

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4. Present supporting and challenging information for five aspects of evolution found in Attachment A. This will give students background information concerning both supporting and challenging evidence. Students can use this information to focus their research.

Instructional Tip:
Alternative strategies for beginning this lesson could be to engage students in a Socratic discussion or a mini-lecture. See the Web site for student research at the Los Alamos National Laboratory for guidelines on the Socratic method. The Web address is listed in the Technology Connections section.
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Student Research

5. Form groups consisting of two to four students. Assign each group a number to help monitor their activities and assignments during the lesson.

6. Allow the groups to pick (or assign) one of the five aspects of evolutionary theory. Assign two groups to research each aspect. The aspects are:
   - Aspect 1: Homology (anatomical and molecular)
   - Aspect 2: Fossil Record
   - Aspect 3: Anti-Biotic Resistance
   - Aspect 4: Peppered Moths
   - Aspect 5: Endosymbiosis

7. Distribute Attachment B, Investigative Worksheet, to help guide research. Allow time for the two groups assigned the same aspect to research their topic by answering questions on the Investigative Worksheet. Have groups use the worksheet as a guide to help them research supporting and challenging data on their particular aspect of evolution. The worksheet will help students organize their ideas and facilitate their critical analysis.

Instructional Tip:
Attachment B, Investigative Worksheet, has questions that can be applied to all five aspects. This will help students become familiar with the data, and therefore be able to critically analyze the evidence for either the supporting side or the challenging side. As they complete the worksheet, the group members may all work together on each question, or divide the questions among themselves and then share their findings as a group.

8. After the groups have completed their research, collect the Investigative Worksheets and review them. Return the worksheet to them prior to the next step of the instructional procedures; the critical analysis activity. The Investigative Worksheet is a formative assessment which will enable the teacher to check the student work and if necessary, assist in any way to help
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ensure student success on his or her critical analysis activity.

**Critical Analysis Activity**

9. Allow the students to spend time researching and preparing for the critical analysis activity on both the supporting and challenging information. Prior to the activity, randomly determine which of the two groups will present supporting information and which will present challenging information. You may have groups draw cards to help objectively determine if they will research the supporting or challenging information.

**Instructional Tip:**

Encourage all students to participate in the critical analysis activity because the experience will be a learning opportunity. Be prepared, however, to distribute alternate assignments to students who do not want to participate.

10. Hand out Attachment C, Critical Analysis Rubric, to help students understand the materials they need to prepare and how they should conduct their presentations.

11. Ask each group to write out their introduction, outline their presentations and write their conclusions. Have students practice their presentations to be sure that they are concise.

12. Have two pairs of students address each aspect. Have one group present the data that support an aspect and the other group present the data that challenge the aspect. Flip a coin to decide which group begins the critical analysis activity. Instruct each side to present its research. The teacher will serve as facilitator to assure that the groups remain on task and on time. There are no winners or losers
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in this critical analysis activity. This is a sharing of the results of their research concerning evolution.

13. Encourage students to actively participate as they critically analyze their assigned aspect. To ensure that they remain engaged as they watch and listen to the other groups, distribute copies of Attachment D, Critical Analysis Worksheet, and have them take notes. At the conclusion of the lesson, this worksheet will be turned in for a grade.

14. Use Attachment C, Critical Analysis Rubric, to evaluate each group’s presentation.

15. Proceed to the post-assessment to evaluate students’ understanding.

Differentiated Instructional Support:
Instruction is differentiated according to learner needs, to help all learners either meet the intent of the specified indicator(s) or, if the indicator is already met, to advance beyond the specified indicator(s).

- Make a copy of the post-assessment available to all students at the beginning of the lesson. This will allow students to clearly understand what is expected from them.
- Have students submit an outline of their presentation, including introductory remarks and conclusion, to assist in their organizational skills. This allows the teacher to give feedback to the students and to help prepare them for the critical analysis activity.

Extension:
Have students consider other aspects of evolutionary biology that are critically analyzed by scientists. Possible topics include:

- Hox (homeotic) genes
- Biogeography
- Vestigial organs
- Four winged fruit fly
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- Galapagos finches

**Interdisciplinary Connections:**

**Social Studies Skills and Methods Standard**

**Benchmark A** Evaluate the reliability and credibility of sources.

**Indicator 1** Determine the credibility of sources by considering the following:
   a. The qualifications and reputation of the writer;
   b. Agreement with other credible sources;
   c. Recognition of stereotypes;
   d. Accuracy and consistency of sources;
   e. The circumstances in which the author prepared the source.

**English Language Arts Research Standard**

**Benchmark B** Evaluate the usefulness and credibility of data and sources.

**Indicator 3** Determine the accuracy of sources and the credibility of the author by analyzing the sources’ validity (e.g., authority, accuracy, objectivity, publication date and coverage, etc.).

**Benchmark C** Organize information from various resources and select appropriate sources to support central ideas, concepts and themes.

**Indicator 2** Identify appropriate sources and gather relevant information from multiple sources (e.g., school library catalogs, online databases, electronic resources and Internet-based resources).

**Indicator 4** Evaluate and systematically organize important information, and select appropriate sources to
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support central ideas, concepts and themes.

**Materials and Resources:**
The inclusion of a specific resource in any lesson formulated by the Ohio Department of Education should not be interpreted as an endorsement of that particular resource, or any of its contents, by the Ohio Department of Education. The Ohio Department of Education does not endorse any particular resource. The Web addresses listed are for a given site's main page, therefore, it may be necessary to search within that site to find the specific information required for a given lesson. Please note that information published on the Internet changes over time, therefore the links provided may no longer contain the specific information related to a given lesson. Teachers are advised to preview all sites before using them with students.

*For the teacher:* attachments, resource materials such as the Internet, World Wide Web, library resources

*For the student:* attachments, resource materials such as the Internet, World Wide Web, library resources

**Vocabulary:**
- Biological evolution
- Critical analysis
- Evolutionary theory
- Macroevolution
- Microevolution
- Natural selection
- Theory
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Technology Connections:
- Access the Web site for student research at the Los Alamos National Laboratory, at http://set.lanl.gov, for guidelines to the Socratic Method. From the homepage, navigate to Programs, and then Critical Issues Forum.

Research Connections:

- Identifying similarities and differences enhances students’ understanding of and ability to use knowledge. This process includes comparing, classifying, creating metaphors and creating analogies and may involve the following:
  - Presenting students with explicit guidance in identifying similarities and differences.
  - Asking students to independently identify similarities and differences.
  - Representing similarities and differences in graphic or symbolic form.

- Summarizing and note taking are two of the most powerful skills to help students identify and understand the most important aspects of what they are learning.

General Tips:
- Students should use school library resources such as InfOhio's Access Science to locate information on aspects of evolutionary theory.

- See the following resources for information that supports or challenges different aspects of evolution.

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**Attachment A**

**Attachments:**
Attachment A, Five Aspects of Evolution
Attachment B, Investigative Worksheet
Attachment C, Critical Analysis Rubric
Attachment D, Critical Analysis Worksheet

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**Homology**

In the context of evolution, homology refers to the shared structural similarities between different parts of organisms. This suggests that these structures share a common ancestor and which may have evolved to serve similar functions in different species. For example, the human hand and the bird wing are homologous structures, both serving the function of grasping objects, despite their evolutionary origins.

**Fossil Record**

The fossil record provides a starting point for understanding evolution, suggesting that organisms exhibit transitional stages or intermediates as part of their development across geologic time. The fossil record, along with comparative anatomy and molecular evidence, supports the concept of common ancestry among species.

**Brief Suggested Lab Activity**

The lab activity should focus on exploring the complexity of living forms by comparing simple structures to the more complex plants and animals. Activities can include the use of microscopes to observe and compare cellular structures, or engaging in experiments that illustrate evolutionary processes. This approach helps students develop a more comprehensive understanding of the diversity and unity of life.
Aspect 1: Homology

Citations in the General Tips Section may provide a starting point for student research. It is suggested that students employ additional resources in their research.

**Brief Supporting Sample Answer:** Different animals have very similar anatomical and genetic structures. This suggests that these animals share a common ancestor from which they inherited the genes to build these anatomical structures. Evolutionary biologists call similarities that are due to common ancestry "homologies." For example, the genes that produce hemoglobin molecules (an oxygen carrying protein) in chimps and humans are at least 98% identical in sequence. As another example, bats, humans, horses, porpoises and moles all share a forelimb that has the same pattern of bone structure and organization. The hemoglobin molecule and the "pentadactyl limb" provide evidence for common ancestors. Also, the genetic code is universal, suggesting that a common ancestor is the source.

**Brief Challenging Sample Answer:** Some scientists think similarities in anatomical and genetic structure reflect similar functional needs in different animals, not common ancestry. The nucleotide sequence of hemoglobin DNA is very similar between chimps and humans, but this may be because they provide the same function for both animals. Also, if similar anatomical structures really are the result of a shared evolutionary ancestry, then similar anatomical structures should be produced by related genes and patterns of embryological development. However, sometimes, similar anatomical structures in different animals are built from different genes and by different pathways of embryological development. Scientists can use these different anatomical structures and genes to build versions of Darwin family trees that will not match each other. This shows that diverse forms of life may have different ancestry.

Aspect 2: Fossil Record

Citations in the General Tips Section may provide a starting point for student research. It is suggested that students employ additional resources in their research.

**Brief Supporting Sample Answer:** The fossil record shows an increase in the complexity of living forms from simple one-celled organisms, to the first simple plants and animals, to the diverse and complex organisms that live on Earth today. This pattern suggests that later forms evolved from earlier simple forms over long periods of geological time. Macroevolution is the
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large-scale evolution occurring over geologic time that results in the formation of new taxonomic groups. The slow transformations are reflected in transitional fossils such as Archaeopteryx (a reptile-like bird) and mammal-like reptiles. These transitional fossils bridge the gap from one species to another species and from one branch on the tree of life to another.

Brief Challenging Sample Answer: Transitional fossils are rare in the fossil record. A growing number of scientists now question that Archaeopteryx and other transitional fossils really are transitional forms. The fossil record as a whole shows that major evolutionary changes took place suddenly over brief periods of time followed by longer periods of “stasis” during which no significant change in form or transitional organisms appeared (Punctuated Equilibria). The “Cambrian explosion” of animal phyla is the best known, but not the only example, of the sudden appearance of new biological forms in the fossil record.

Aspect 3: Antibiotic Resistance

Citations in the General Tips Section may provide a starting point for student research. It is suggested that students employ additional resources in their research.

Brief Supporting Sample Answer: The number of strains of antibiotic resistant bacteria, such as of Staphylococcus aureus, have significantly increased in number over time. Antibiotics used by patients to eliminate disease-causing bacterial organisms have facilitated this change. When some bacteria acquire a mutation that allows them to survive in the presence of antibiotics, they begin to survive in greater numbers than those that do not have this mutation-induced resistance. This shows how environmental changes and natural selection can produce significant changes in populations and species over time.

Brief Challenging Sample Answer: The increase in the number of antibiotic resistant bacterial strains demonstrates the power of natural selection to produce small but limited changes in populations and species. It does not demonstrate the ability of natural selection to produce new forms of life. Although new strains of Staphylococcus aureus have evolved, the speciation of bacteria (prokaryotes) has not been observed, and neither has the evolution of bacteria into more complex eukaryotes. Thus, the phenomenon of antibiotic resistance demonstrates microevolution.

Aspect 4: Peppered Moths (Biston betularia)

Citations in the General Tips Section may provide a starting point for student research. It is suggested that students employ additional resources in their research.
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**Brief Supporting Sample Answer:** During the industrial revolution in England, more soot was released into the air. As a result, the tree trunks in the woodlands grew darker in color. This environmental change also produced a change in the population of English peppered moths (scientifically known as *Biston betularia*). Studies during the 1950s have suggested a reason for this change. It was observed that light-colored moths resting on dark-colored tree trunks were readily eaten by birds. They had become more visible by their predators compared to their dark-colored counterparts. This different exposure to predation explained why the light-colored moths died with greater frequency when pollution darkened the forest. It also explained why light-colored moths later made a "comeback" when air quality improved in England. This whole situation demonstrates how the process of natural selection can change the features of a population over time.

**Brief Challenging Sample Answer:** English peppered moths show that environmental changes can produce microevolutionary changes within a population. They do not show that natural selection can produce major new features or forms of life, or a new species for that matter—i.e., macroevolutionary changes. From the beginning of the industrial revolution, English peppered moths came in both light and dark varieties. After the pollution decreased, dark and light varieties still existed. All that changed during this time was the relative proportion of the two traits within the population. No new features and no new species emerged. In addition, recent scientific articles have questioned the factual basis of the study performed during the 1950s. Scientists have learned that peppered moths do not actually rest on tree trunks. This has raised questions about whether color changes in the moth population were actually caused by differences in exposure to predatory birds.

**Aspect 5: Endosymbiosis** (formation of cellular organelles)

Citations in the General Tips Section may provide a starting point for student research. It is suggested that students employ additional resources in their research.

**Brief Supporting Sample Answer:** Complex eukaryotic cells contain organelles such as chloroplasts and mitochondria. These organelles have their own DNA. This suggests that bacterial cells may have become established in cells that were ancestral to eukaryotes. These smaller cells existed for a time in a symbiotic relationship within the larger cell. Later, the smaller cell evolved into separate organelles within the eukaryotic ancestors. The separate organelles, chloroplast and mitochondria, within modern eukaryotes stand as evidence of this evolutionary change.
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Brief Challenging Sample Answer: Laboratory tests have not yet demonstrated that small bacteria (prokaryotic cells) can change into separate organelles, such as mitochondria and chloroplasts within larger bacterial cells. When smaller bacterial cells (prokaryotes) are absorbed by larger bacterial cells, they are usually destroyed by digestion. Although some bacterial cells (prokaryotes) can occasionally live in eukaryotes, scientists have not observed these cells changing into organelles such as mitochondria or chloroplasts.
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Attachment B
Investigative Worksheet

Name: 

This activity will help you to prepare for the critical analysis activity. Complete the following table by addressing the following points when you record supporting and challenging data for one aspect of evolution. Record your responses on the appropriate space on the chart.

- Write a brief summary of what you have read and discovered regarding your particular aspect and how it supports evolutionary theory.

- Write a brief summary of what you have read and discovered regarding your particular aspect and how it challenges evolutionary theory.

- Were any scientific tools, instruments or other forms of technology used by scientists to support this evidence and how it supports a key aspect of evolutionary theory? Briefly explain your answer.

- Were any scientific tools, instruments or other forms of technology used by scientists to challenge this evidence and how it challenges the key aspect of evolutionary theory? Briefly explain your answer.

- How do scientists critically analyze this aspect of evolution?

- Is the information you found supported by using the scientific method? Are there any limitations?

- Are there any other type(s) of research that scientists need to do in order to critically analyze evolution? Briefly explain your answer.
APPENDIX A

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Attachment B (cont’d)

<table>
<thead>
<tr>
<th>Aspect of Evolution</th>
<th>Supports</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

What comparisons can be made between the supporting and challenging information you have found? Briefly explain.
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A. In the space below, write your introduction for the critical analysis activity.

B. In the space below, outline the body of your informational presentation.

C. In the space below, write your conclusion.
APPENDIX A

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Attachment C
Critical Analysis Rubric

1. Group was able to articulate and demonstrate knowledge of the aspect of evolution they presented.
   
   3 2 1 0

2. Students were courteous and respectful toward their fellow students.
   
   3 2 1 0

3. Students were able to effectively use research (scientific data) to support their presentation.
   
   3 2 1 0

4. Students were logical in presenting their information.
   
   3 2 1 0

5. Students used visual aids (e.g., graphs, tables, pictures, etc. displayed on posters, transparencies, chalkboard or presentation software) effectively.
   
   3 2 1 0

6. Provide an opportunity for all group members to speak. Allowing for all group members to speak is very important for it will enable the students to verbally engage in the analysis of evidence.
   
   3 2 1 0

| 18 – 16 | = | Excellent (mastery) |
| 15 - 13 | = | Good (acceptable) |
| 12 - 9  | = | Poor (needs revision) |
| 8 - 0   | = | Not acceptable (remediation required) |
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Attachment D
Critical Analysis Worksheet

Directions: Fill in the following worksheet with information you have learned from the groups.

<table>
<thead>
<tr>
<th>Aspects of Evolution</th>
<th>Supports</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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APPENDIX A

Attachment D (cont’d)

Student Reflection:
1. Why is it important for scientists to critically analyze evolution?

2. How has the information presented by the various groups added to your understanding of evolutionary theory? Cite examples.
APPENDIX B

ALTERNATIVE MODEL LESSON PLAN

Important Note: Dr. Steve Rissing, Professor in the Department of Evolution, Ecology, and Organismal Biology and Director of the Introductory Biology program at The Ohio State University, Dr. Patricia Princehouse of Case Western Reserve University's multidisciplinary program in Evolutionary Biology, and others prepared this draft Lesson Plan aligned to Benchmark H, Indicator 23, at the request of President Sheets and other members of the Ohio State Board of Education present January 13th, at 5 p.m., for consideration as a replacement lesson for the problematic "Critical Analysis" lesson originally submitted to the Board. At the February meeting of the Board, the authors of this alternative lesson were informed that it would not be considered until next Fall. This delay was attributed to a decision by the Chairman of the Standards Committee of the Ohio Board of Education. Also see Dr. Rissing's comments at the end of this Lesson Plan.

As noted, the Lesson Plan is still in draft form and needs finishing touches. However, even in this unfinished form it clearly shows how the letter and spirit of the Indicator can be met in a scientifically responsible and rigorous way. It treats a genuine scientific issue in evolutionary biology, speciation, and links it to practical concerns in the economy of Ohio, thus illustrating the relevance of the issue to both science and our concerns as citizens.

Lesson Title: How do new species form? A critical analysis of current evolutionary concepts

Ohio Standards Connection:

Grade: 10

Standard(s): Life Science

Benchmark(s): H Describe a foundation of biological evolution as the change in gene frequency of a population over time. Explain the historical and current scientific developments, mechanisms and processes of biological evolution. Describe how scientists continue to investigate and critically analyze aspects of evolutionary theory. (The intent of this benchmark does not mandate the teaching or testing of intelligent design.)
Indicator(s): 23. Describe how scientists continue to investigate and critically analyze aspects of evolutionary theory. (The intent of this benchmark does not mandate the teaching or testing of intelligent design.)

Lesson Summary

This lesson presents examples with experimental data that suggest alternative methods of species formation. The standard "textbook" model of speciation requires some form of geographic isolation of one population into two or more for a long period of time. This standard model is compared with the more controversial explanation that under some circumstances a single population may give rise to one or two new species without geographical isolation and in a short period of time.

A "learning cycle" pedagogical approach is used. Students are presented the standard model of species formation with data to support it. Then a counter-example and data are presented which suggest that new species can and do form within a single population. Finally, data suggesting possible formation of new species of economically important insects in Ohio (corn rootworms) are presented for student consideration of the concept of species and discussion of corn rootworm population changes underway in Ohio constitute speciation.

Optional/extended applications of this lesson permit discussion of genetic modification of corn in light of material presented regarding speciation processes possibly underway currently in this major Ohio industry.

Estimated Duration:

Pre-assessment:

- Ask students to write and explain the definition of a species in their own words
- It is commonly known that a horse can breed with a donkey resulting in an offspring that is a mule. Do all mules in the US constitute a species? Why or why not?
- Gregor Mendel demonstrated some of his early insights into the mechanisms of genetics by working with populations of purple-flowered and white-flowered pea plants. Did Mendel consider/demonstrate that such populations were of the same or different species? How or how not?
- Consider the following statement: "There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved."
  - Who might have written this statement?
  - Are the "forms" referred to in the above statement different species?
Direct students to respond to the questions in their science notebook in as much detail as possible leaving space to record information from the ensuing dialogue to add to their notes.

**Scoring Guidelines:**

A student should show one or more of the following points.

- "Textbook answer": Individuals of two different species cannot mate and have viable, fertile offspring.
- Common experience suggests that the two organisms mentioned by the student (e.g. a bluegill vs a perch; a daisy vs a violet; a monarch butterfly vs. a luna moth; an ant vs a wasp) simply cannot interbreed.
- The "species concept" is arbitrary, defined by humans not nature.
- The "species concept" is much looser in plants. For example, cabbage, broccoli, kale and Brussels sprouts are all one species.
- The organism must be part of an interbreeding population in nature.
- It must be able to produce fertile offspring.
- It must have DNA, which is similar to other members of the proposed species and different from other similar species.
- There should be some mechanism which prevents it from interbreeding with similar species.


---

**Instructional Procedures:**

**The Standard Theory for the Formation of New Species:**

The commonly theory for the formation of new species suggests that individuals in a single population of interbreeding organisms must become isolated into two or more separate populations usually over a long period of time. These separate populations then experience different effects of various evolutionary mechanisms (natural selection, genetic drift, gene flow, mutation) sometimes resulting in the development of new species.

If the populations are isolated geographically for a very long time, they may undergo so many physical and behavioral changes that individuals of the two populations may not even recognize each other as possible mates. Even if they do recognize each other as possible mates, they may have accumulated so many genetic changes that they cannot produce any live offspring, or their offspring would not be able to
reproduce as, for example, in the case of horses mating with donkeys to produce sterile mules.

Diagrammatically, textbooks often present this standard model of speciation like this:

(a) Single interbreeding population

(b) Geographic isolation between populations

(c.1) Genetic divergence increases

(c.2) Selection for reproductive isolation

(d) Two species
Figure adapted from Strickberger, M. W. 1996. Evolution. Jones and Barlett Publishers, Sudbury, Mass. 670pp (see Fig. 23-8, p. 558).

Darwin's finches and many other species are widely considered to have arisen through such processes.

**Student Engagement**

A. Consider (or find) two very similar organisms that you think represent different species. How can you tell they are different species?

*Teacher tip: You may want to have students answer this question after they have taken a (brief?) field trip outside where they may collect different leaves (oak and maple or white oak versus black oak). Students might use field guides (available in libraries) to pick two similar species of flower, insect or bird. Students in agricultural areas could cite the differences between wheat and oats. Hunters, birdwatchers, and other outdoor enthusiasts could cite differences in Ohio fish species or game such as gray vs red squirrels or Canada goose versus snow goose.*

B. How do you suppose they can tell they are different species?

C. What kind of cellular mechanisms might be involved in plants that appear to result in only pollen from a few individuals (usually in the same species) fertilizing eggs?

D. What kinds of things in nature might cause geographic isolation for some populations?

**Instructional Procedures:**

Divide students into groups (2-4 individuals)

*Teacher tip: Be sure to follow standard guidelines for cooperative learning. Students should not normally be permitted to form groups haphazardly on their own.*

1. However students have chosen at least two similar species to conduct pre-assessment (e.g. a brief field trip on or near school grounds), have each student explain to his/her cooperative group how they consider these two samples to represent different species.

2. Have each student describe how the above "textbook" illustration of the process of speciation may apply to their pair of individuals.

3. Have each group of students read the following textbook passages. *(Teacher tip: students might also be able to locate their own textbook passages in a local library or on the internet by searching for the term "speciation."*


"While sympatric speciation has not been widely accepted, Bush (an evolutionary biologist) has made the strongest case for its existence; it is far from proven." (Powell, J. R. 1982. In: Barigozzi, C.(Ed.) Mechanisms of speciation. Alan R. Liss, New York, 546 pp; see p. 70.

"While allopatric speciation (speciation with geographical isolation) is undisputed, whether sympatric speciation is likely and common, or can only occur under restrictive conditions has been controversial." Stearns, S. C. and R. F. Hoekstra. 2000. Evolution: An introduction. Oxford University Press, 381 pp; see p. 222.

Answer these questions:

1. Why don't scientists all agree that geographical isolation is required for the formation of new species through natural selection or genetic drift?

2. What does it mean for students taking biology in high school or college to realize that all evolutionary biologists do not agree that all speciation must occur with geographical isolation?

3. Can you or someone in your group consider a circumstance in which a new species may form from another without geographical isolation?

Consider this graphical representation of speciation with and without geographical isolation:

(a) Single interbreeding population
While sympatric speciation is generally considered highly unlikely, evolutionary biologist Guy Bush has suggested exactly this type of model for the evolution of the apple maggot fly, an agricultural pest in Ohio and elsewhere in the US.

The apple maggot fly originally was found only on wild hawthorn trees. Adult flies mate, and females lay eggs on adult trees. The fly larvae ("maggots" but also called "caterpillars" in moths and butterflies) feed on the wild haw apples and eventually fall off the tree and enter the ground. They spend the winter in the ground as pupae (just like moths and butterflies) and re-emerge from the ground the next year; the cycle then starts all over again.

About 160 years ago some flies began to emerge from the ground at a slightly earlier time of the year when no haw apples were available. They began to feed and lay eggs on apples that were available at that time of the year. This resulted in establishment of an annual cycle with different seasonality and dependent upon apple
trees not haw thorn trees. This change in annual cycle that influences which flies in the formerly single interbreeding population came to breed at different times of year and on a different species of tree, appears to result from a single mutation in the flies.

Even though haw maggot flies and apple maggot flies occurred in the same geographical region, the preference for different hosts by the two populations appears to have provided sufficient isolation for speciation to proceed resulting in a new species (the apple maggot fly found on introduced apples) and the original haw apple maggot fly. Bush argues these represent two separate species that formed without geographical isolation.

But under some laboratory conditions individuals of the two species can sometimes mate and produce offspring that are able to reproduce on their own. Because of this, others have argued that while the process of speciation is occurring right before our eyes in these two populations, they are not yet fully separate species.

**Optional application 1**

**Pre-assessment questions**

E. Are genes found in all corn plants?

F. Have you ever eaten any genetically modified food? If so, what and when?

**Instructional Procedures (optional application 1):**

Every major agricultural crop, not just apples, are vulnerable to some kind of organism(s) that we consider "pests" although biologically it might be more appropriate to consider them competitors. In Ohio, corn contributes almost $1 billion in annual revenues. Not surprisingly, corn has an array of pests that compete with farmers for the food value of corn crops.

Many agricultural pests, like the apple maggot fly and a number of corn pests, display a natural history trait such as over-wintering in the soil as a pupa and emerging the next growing season to feed on another corn crop planted in the same field. One environmentally safe and economic weapon in Ohio corn growers arsenal to fight such pests is **crop rotation**: corn is grown in a field one year and a different crop, often soybeans (another billion dollar crop in Ohio), is grown in the same field the next year. Emerging corn pests can't eat soybeans just as soybean pests emerging in alternate years can't eat corn plants. Further, most corn and soy pests don't fly far if at all making crop rotation in a given field even more effective.

Alas, like any other method designed to combat crop pests, such efforts always result in the development of resistance in the target pest(s) through natural selection. As far as farmers are concerned, pest resistance is inevitable. If they
weren't competing with us for our food and livelihood, we might call some instances of resistance brilliant; understandably, farmers consider them devious at best.

**Corn root worm**, a common and sometimes serious pest for Ohio corn growers, has developed a number of resistance traits to farmers’ attempts to control them. Perhaps the most surprising is the spontaneous appearance of a strain of rootworms that take two years instead of the normal one year to emerge as adults from the soil. This means they stay underground as soybeans are grown in the field above them only to emerge the next year when corn is grown in the field once again. The insects have developed resistance to crop rotation.

Questions:

1. Discuss the ability of pest/competitor insects to develop resistance to agricultural practices such as crop rotation and spraying standard pesticides from the perspectives of what you have learned about natural selection acting on populations of pest insects.

   NOTE: If introduced in the lesson on natural selection, above answer should include: 1.) there must be variance in the trait (resistance), 2.) Some of that variance must be heritable, i.e. be of genetic origin, 3.) Because of that variation, some individuals are more likely to survive and reproduce.

2. In the table below compare and contrast the modified life history traits and other aspects of the haw apple maggot discussed above with that of the crop rotation resistant corn root worm discussed here.

<table>
<thead>
<tr>
<th>Life history trait</th>
<th>Haw maggot fly</th>
<th>&quot;Normal&quot; corn rootworm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in time to emerge from the soil</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Change in preferred &quot;host&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in likely mates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results from genetic change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improves chances of surviving and reproducing in current environment</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Source of economic loss for growers and income for the state</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Scoring guideline:

<table>
<thead>
<tr>
<th>Life history trait</th>
<th>Haw maggot fly</th>
<th>&quot;Normal&quot; corn rootworm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in time to emerge from the soil</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Change in preferred &quot;host&quot;</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>Change in likely mates</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Results from genetic change</td>
<td>Yes</td>
<td>Not currently known (hypothesized)</td>
</tr>
<tr>
<td>Improves chances of surviving and reproducing in current environment</td>
<td>Apparently (population is growing)</td>
<td>Apparently (population is growing)</td>
</tr>
<tr>
<td>Source of economic loss for growers and income for the state</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3. Does your discussion group consider the new, crop rotation resistant, corn rootworm population to represent the formation of a new species?

4. What difference, if any, does your answer to the question immediately above make to a corn farmer in Ohio?

Scoring guideline: Answers should address the question of whether or not the two possible species are capable of interbreeding and producing viable, fertile offspring. At this point, we don’t know the answer to this question, but there can be pedagogical value in raising questions for which we have no current answers. Students in this class addressing this question may someday answer it.

**Instructional Procedures** (optional application 2):

Many, if not most, life history traits that can change resulting in the process of speciation often change subtly and slowly. This often occurs because the trait itself is under the control of many genes. In these situations, slight changes in a life history trait likely do not cause speciation. Nonetheless, over many generations and many small changes, dramatic difference can develop between populations of organisms. Not too surprisingly, these have been documented best in agriculturally important crops where farmers and agricultural researchers can select over many generations for individuals that produce the most useable amounts of materials most economically important to their growers and the rest of the society.

Once again, we can turn to corn and the economic importance of this crop to address this question about possible speciation. Economic value of most corn crops increases with their oil content. The following graph displays the results of 76 (annual) generations of selection to increase oil content of corn; a simultaneous effort to decrease oil content of corn was also done for comparison:
Consider these questions:

1. In 1896 were the high and low oil content populations of corn different species?
   Scoring guideline: Obviously not; all corn plants are part of one interbreeding population

2. By 1972 are the high and low oil content populations separate species?
   Scoring guideline: Can't tell until we find out if individuals of the two populations can still interbreed and give rise to offspring corn plants that are viable and fertile. Likely, they are all one species.

3. Could similar selection experiments generate similar results for time for emergence from soil for haw maggot flies and corn rootworms?
   Scoring guideline: Yes.

4. If oil content can be selected, can sugar content (used to make ethanol) be selected similarly?
   Scoring guideline: Yes. The ability to use corn grown in Ohio for the production of ethanol as a gasoline additive/substitute has emerged recently as a major economic opportunity for Ohio corn growers. This also may preserve Ohio coal supplies.

5. Why might corn farmers be interested in harvesting more oil in their corn crops?

Instructional Procedures (optional application 3):

Another way for a genetic change to occur within a population is for a "foreign" gene to be inserted into one or more individuals in that population. "Jumping genes" are an
example of this process occurring naturally and possibly causing major changes, even speciation, in the recipient individual(s).

Recently, we have learned how to insert genes from one species into another. Often the two species can be from different Kingdoms of life (e.g. from bacteria [prokaryotes] to corn or soy bean plants [eukaryotes]). Once again, agricultural economics have driven research and development in this area. Perhaps the best-known example of this technological advancement is the insertion of a single gene from the bacterium *Bacillus thuringiensis* (*Bt*) into crop plants including corn and soybeans. "Bt" is a common bacterium that infects larvae (caterpillars) of butterflies and moths; the bacterium completes its life cycle on the dead body of the caterpillar. A Bt produced toxin kills the caterpillar; a single gene in the bacterium is responsible for the production of this poison. Many corn and soybean pests are moths and butterflies (often called "worms" because their caterpillars appear worm-like.)

We can now identify and cut out this gene from the Bt genome; it can then be inserted to another organism, especially corn and soybeans. The gene once inserted into a corn or soybean seed acts just as it did in the original bacterium producing a molecule that can kill pest moths or butterflies. Moth or butterfly larvae eating the corn or soybean plant will ingest the molecule produced by the Bt gene inserted into the corn or soybean plant and die. This results in less dependence by soybean and corn growers on chemical pesticide spraying and more economical production of their crops. But these crops are now classified as "genetically modified (GM)," a term that concerns many consumers. Indeed, most of these crops are not eaten directly by people. While only about 9% of the corn grown in Ohio in 2003 was "GM" almost 75% of the soybeans grown in Ohio in 2003 were GM (see following map and table).
### 2001-2003 TOTAL ACRES VS. GM ACRES IN TOP GM SOYBEAN PRODUCING STATES (in 1,000's)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>2,000</td>
<td>1,740 (80%)</td>
<td>2,950</td>
<td>2,006 (68%)</td>
<td>2,900</td>
<td>2,436 (84%)</td>
</tr>
<tr>
<td>Illinois</td>
<td>10,700</td>
<td>6,648 (64%)</td>
<td>10,300</td>
<td>7,313 (71%)</td>
<td>10,600</td>
<td>8,162 (77%)</td>
</tr>
<tr>
<td>Indiana</td>
<td>5,600</td>
<td>4,268 (78%)</td>
<td>5,700</td>
<td>4,731 (83%)</td>
<td>5,400</td>
<td>4,752 (88%)</td>
</tr>
<tr>
<td>Iowa</td>
<td>11,000</td>
<td>8,030 (73%)</td>
<td>10,700</td>
<td>8,025 (75%)</td>
<td>10,400</td>
<td>8,736 (84%)</td>
</tr>
<tr>
<td>Kansas</td>
<td>2,850</td>
<td>2,280 (80%)</td>
<td>2,800</td>
<td>2,324 (83%)</td>
<td>2,700</td>
<td>2,349 (87%)</td>
</tr>
<tr>
<td>Michigan</td>
<td>2,150</td>
<td>1,286 (59%)</td>
<td>1,950</td>
<td>1,404 (72%)</td>
<td>2,100</td>
<td>1,533 (73%)</td>
</tr>
<tr>
<td>Minnesota</td>
<td>7,300</td>
<td>4,599 (63%)</td>
<td>7,000</td>
<td>4,970 (71%)</td>
<td>7,600</td>
<td>6,004 (79%)</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1,160</td>
<td>731 (63%)</td>
<td>1,470</td>
<td>1,176 (80%)</td>
<td>1,360</td>
<td>1,210 (89%)</td>
</tr>
<tr>
<td>Missouri</td>
<td>4,950</td>
<td>3,416 (69%)</td>
<td>4,700</td>
<td>3,384 (72%)</td>
<td>4,950</td>
<td>4,109 (83%)</td>
</tr>
<tr>
<td>Nebraska</td>
<td>4,950</td>
<td>3,762 (76%)</td>
<td>4,900</td>
<td>4,165 (85%)</td>
<td>4,700</td>
<td>4,042 (86%)</td>
</tr>
<tr>
<td>North Dakota</td>
<td>2,150</td>
<td>1,054 (49%)</td>
<td>2,450</td>
<td>1,495 (61%)</td>
<td>3,100</td>
<td>2,294 (74%)</td>
</tr>
<tr>
<td>Ohio</td>
<td>4,600</td>
<td>2,944 (64%)</td>
<td>4,700</td>
<td>3,431 (73%)</td>
<td>4,400</td>
<td>3,256 (74%)</td>
</tr>
<tr>
<td>South Dakota</td>
<td>4,500</td>
<td>3,600 (80%)</td>
<td>4,200</td>
<td>3,738 (89%)</td>
<td>4,100</td>
<td>3,731 (91%)</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>1,600</td>
<td>1,008 (63%)</td>
<td>1,450</td>
<td>1,131 (78%)</td>
<td>1,600</td>
<td>1,344 (84%)</td>
</tr>
<tr>
<td>US Total</td>
<td>74,105</td>
<td>50,391 (68%)</td>
<td>72,993</td>
<td>54,745 (75%)</td>
<td>73,653</td>
<td>59,659 (81%)</td>
</tr>
</tbody>
</table>


Consider the following questions:

1. Do non-GM corn and soybean plants have genes?
2. Are GM corn and soybean populations different species from non-GM corn and soybean plants?

Learning how to isolate bacterial genes and insert them into agriculturally important plants like corn and soybeans has required years of research at great expense. Not
surprisingly, one gene has been developed and inserted into GM plants to cause their seeds, while still nutritious, to be infertile. This acts as a "patent" of sorts on the genetically modified seeds and protects the research costs invested into them. A grower who buys GM seeds from a producer cannot simply save some of this year’s "seed corn" (or seed soybeans) to plant next year—they won’t grow. This gene and the technology to develop it has been given the name of "the terminator gene."

Consider these questions:

1.) Are two fields of GM soybeans planted next to each other with all plants in both populations containing the "terminator" gene separate species?

Scoring guideline: Technically, yes because by definition none of the individual plants are capable of producing offspring at all with any other individual of their "species." This question takes the arbitrary definition of the concept of a "species" to the ultimate limit and shows the useful limits of species concept in some areas of biology.

2.) Is it ethical to sell GM plants containing terminator genes?

Scoring guideline: This is a wide open question designed for student appreciation of the complexities and opportunities deriving from our ongoing revolution in understanding of the molecular genetics of the speciation process and bioagricultural techniques of identifying and inserting genes from one organism (or biological kingdom) into another. Most bioethicists seem to think that the marketing of terminator gene seeds in developed countries is acceptable, while their position regarding the sale of GM plants with terminator genes in third world countries where people produce crops just to subsist and may not understand the implications of growing GM and "terminator" is much less clear.

Additional questions for possible discussion or expansion of this lesson:

1. The genetic changes described above in apple maggot flies and corn rootworm are likely the result of single point mutations in the genome of the insects. Mutations can also occur from gene duplication, deletion, translocation, polyploidy and other mechanisms. How might one or more of these kinds of genetic changes result in reproductively isolated populations, possibly leading to speciation?

2. There are a number of "living fossil" species such as the coelacanth (80 million year old fish recently rediscovered off Madagascar and India) and hermit crab (xx million year old arthropod common along the east coast of North America and the Gulf of Mexico). Would you expect an individual of these species alive today to be able to mate and have fertile offspring with an individual of the same "species" from 80 million years ago? Why or why not?

3. In the San Joaquin Valley of southern California seven closely related species of Ensatinasalamanders form a distributional "ring" around the mountain
sides of the valley. Each "species" of salamander can mate and reproduce with the species next to it on either side of this ring. No species, however, can mate successfully with species that occur on the other side of the valley. How might this pattern of species distribution have developed according to the various models of speciation presented above?

NOTE: Identify science indicator that discusses the impact of technological advances on all aspects of society?

As a conclusion, point out that most research creates more questions, and scientists rarely learn all the answers. Understanding the process scientists use to determine how a specific organism evolved and by what mechanisms is the scientific goal behind the indicator "Describe how scientists continue to investigate and critically analyze aspects of evolutionary theory."

This is still an unresolved issue in 2003.

Web links cited in this lesson (NOTE: All websites are *.edu, *.oh)

Darwin's finches:
http://www.rit.edu/~rhrsbi/GalapagosPages/DarwinFinch.html#anchor725315

Ohio fish species:
http://www.dnr.state.oh.us/dnap/rivfish/default.htm

Red vs. gray squirrels in Ohio:
http://www.dnr.state.oh.us/news/jan02/0125squirrelcolumn.htm

Canada goose:

Snow goose:

Apple maggot fly:

Hawthorn trees:
http://ohioline.osu.edu/b700/b700_40.html

Economic impact of corn:
http://ohioline.osu.edu/eso-fact/2578/2578_3.html

Soy bean crop rotation:
http://www.soyohio.org/agro/nematode.cfm

Corn rootworm in Ohio:
http://ohioline.osu.edu/ent-fact/0016.html

Crop rotation resistant corn rootworms:
www.soils.wisc.edu/extension/FAPM/approvedppt2003/

Jensen_Rootworm.pdf
Economic value of corn oil content:
http://www.oardc.ohio-state.edu/hocorn/hoc_index.htm

Ethanol from corn in Ohio:
http://www.state.oh.us/agr/Ethanol/ethanoloped.htm

Jumping genes:
http://biocrs.biomed.brown.edu/Books/Essays/JumpingGenes.html

Ensatina salamanders (ring species)
http://www.pbs.org/wgbh/evolution/library/05/2/1_052_05.html

Note regarding the development of this draft lesson.

In early 2000 I was asked to join the advisory committee for the development of the Ohio science content standards. In that capacity I was involved directly in the preparation of the tenth grade indicators for evolutionary theory. When those indicators were considered and modified by the Ohio state board of education, I testified against having students understand that scientists critically analyze aspects of evolutionary theory only. Rather, I argued that such understanding should be expected for all scientific theories. Since this did not occur and evolution was the only theory in science treated thusly in the indicators, I decided to follow the development of model lessons aligned to this indicator (# 23 in the 10th grade life sciences standards).

In Fall 2003 I volunteered to act as an outside reviewer for lessons developed for indicator 23. I eventually received two draft lessons not associated with this indicator and requested all lessons associated with it specifically. I then received two additional lessons: L10H20 (Scientists, wolves and the United States government) and L10H23 (Critical analysis of evolution) and provided complete reviews for them and one of the first pair I was sent as well.

I observed the writing committee meeting on 4-5 December where all outside reviews were considered. I made a public request for records to see final versions of the two lessons pertaining to indicator 23 on 16 December and received those documents on 8 January 2004.

On 13 January I testified to the state board of education that many points in L10H23 remained false and uncorrected even after the outside review process and that in general, the lesson was hopelessly flawed. I was asked by board members (Hovis and others) during my testimony and after to develop a new lesson that might better prepare teachers and students to meet the requirements of indicator 23.

I have used the general format and some of the materials of lesson L10H20 and L10H23 as presented to the board as my starting document for the draft lesson presented above.

Dr. Steve Rissing
APPENDIX C

A Glossary of Intelligent Design Terms

Specified Complexity - the mark of intelligent agency; it renders intelligent causes empirically detectable. An object exhibits specified complexity if it is contingent, sufficiently complex (its probability is less than $10^{-150}$) and specified (exhibits a distinctive, detachable pattern).

Irreducible Complexity - a special case of specified complexity. An irreducibly complex biological system cannot function if one small part of the system is removed.

Discrete Combinatorial Object (DCO) - a biological object with numerous and diverse parts that must converge in one location and configure all at once in a particular arrangement to establish and maintain a function. A DCO is irreducibly complex.

Complexity-Specification Criterion ('The Explanatory Filter') - a series of questions and probability calculations that determine if an inference to intelligent design is warranted. The criterion detects the probability of the presence of specified complexity in a biotic system.

Complex Specified Information (CSI) - novel information created by an unembodied intelligent agent; natural processes cannot generate CSI. When the complexity specification criterion detects specified complexity, it detects CSI.

Abiotic Infusion - the causal process an unembodied intelligence employs to introduce exogenous information into a physical system.
APPENDIX D

Scientific Claims of Intelligent Design

1. "Darwinism" is unable to account for the irreducible complexity of biological systems.
   - Irreducibly complex biological systems are systems that cannot function if one small part of the system is removed; function is attained only when all components of the system integrate simultaneously in one place.
   - An irreducibly complex system is a discrete combinatorial object (DCO).
   - The irreducible core of a DCO consists of a set of diverse parts that are indispensable to maintaining a minimal level of the DCO's function.
   - "Darwinian" theory requires the gradual formation of complex biological systems by exploiting functional intermediates.
   - The diverse parts of an irreducible core have no functional intermediates that can maintain the minimal function and complexity of a DCO.
   - To refute this claim, Darwinists must provide detailed, step-by-step, testable proposals for how Darwinian mechanisms could produce irreducible complexity.

2. Intelligent causes are empirically detectable, and these causes are necessary to explain the origin of irreducibly complex biological structures.
   - Intelligent causes create specified complexity (e.g. Shakespeare's sonnets).
   - Irreducible complexity is a special case of specified complexity.
   - Irreducibly complex biotic systems have an intelligent cause.

3. The complexity-specification criterion empirically determines when an inference to design is warranted.
   - If an object is contingent and specified, then a probability calculation determines if an object is sufficiently complex to infer intelligent design.
   - The relevant equation is: \( P_{dco} = P_{orig} \times P_{local} \times P_{config} \)
     a. \( P_{dco} \) = the probability that a biotic object is irreducibly complex
     b. \( P_{orig} \) = the probability of originating the diverse parts of the object
     c. \( P_{local} \) = the probability of locating the parts in one spot all at once
d. \( P_{\text{config}} = \) the probability of configuring the parts all at once

- If \( P_{\text{dco}} < 10^{-150} \), then an inference to design is warranted.

4. **Intelligent design theory is a theory of information**
   - The fundamental intuition underlying information is contingency.
   - Information arises when one contingent possibility occurs out of many possible occurrences.
   - Since the principal characteristic of intelligent causation is directed contingency or choice, intelligent design theory can be formulated as a theory of information.
   - Since contingency signals the presence of information, and contingency is an essential element in the complexity-specification criterion, then the complexity-specified criterion not only detects specified complexity, it also detects complex specified information or CSI.
   - To infer design by means of the complexity-specification criterion is equivalent to detecting complex specified information (CSI).

5. **Intelligent design is the sole source of complex specified information.**
   - Evolutionary biologists rely on the cumulative power of natural selection over vast expanses of time to explain the origin of novelty in biotic systems and describe that power as "algorithmic."
   - Computer simulations of evolutionary algorithms merely harness the specified complexity inherent in their construction and are therefore incapable of generating CSI.
   - Since natural algorithmic processes fail to produce CSI and since the complexity specification criterion indicates when an inference to design is warranted, intelligent design is the best explanation for the origin of CSI.

6. **An unembodied intelligence abiotically infuses exogenous information into the physical world to create complex biological phenomena**
   - Specified complexity originates outside physical systems – it is exogenous information.
   - An unembodied intelligent designer abiotically infuses CSI in a persuasive, non-energy producing, "word-like" fashion to a receptive medium to create complex biological phenomena.
Intelligent design offers a rigorous scientific research agenda for the life sciences.

- Detectability Problem – Is an object designed?
- Functionality Problem – What is a designed object’s function?
- Transmission Problem – What is the causal history of a designed object?
- Construction Problem – How was a designed object constructed?
- Reverse-Engineering Problem – In the absence of a reasonably detailed causal history, how could the object have come about?
- Constraints Problem – What are the constraints within which the designed object functions optimally?
- Perturbation Problem – How has the original design been modified and what factors have modified it? This requires an account of both the natural and intelligent causes that have modified the object over its causal history
- Variability Problem – What degree of perturbation allows continued functioning? Alternatively, what is the range of variability within which the designed object functions and outside of which it breaks down?
- Restoration Problem – Once perturbed, how can the original design be recovered? Art restorers, textual critics, and archeologists know all about this.
- Optimality Problem – In what sense is the designed object optimal?
- Separation of Causes Problem – How does one tease apart the effects of intelligent causes from natural causes, both of which could have affected the object in question?
- Ethical Problem – Is the design morally right?
- Aesthetic Problem – Is the design beautiful?
- Intentionality Problem – What was the intention of the designer in producing a given designed object?
- Identity Problem – Who or what is the designer?

(Source: Dembski, 2002a, p. 312-313.)