

Huxley's Church and Maxwell's Demon

*From Theistic Science to
Naturalistic Science*

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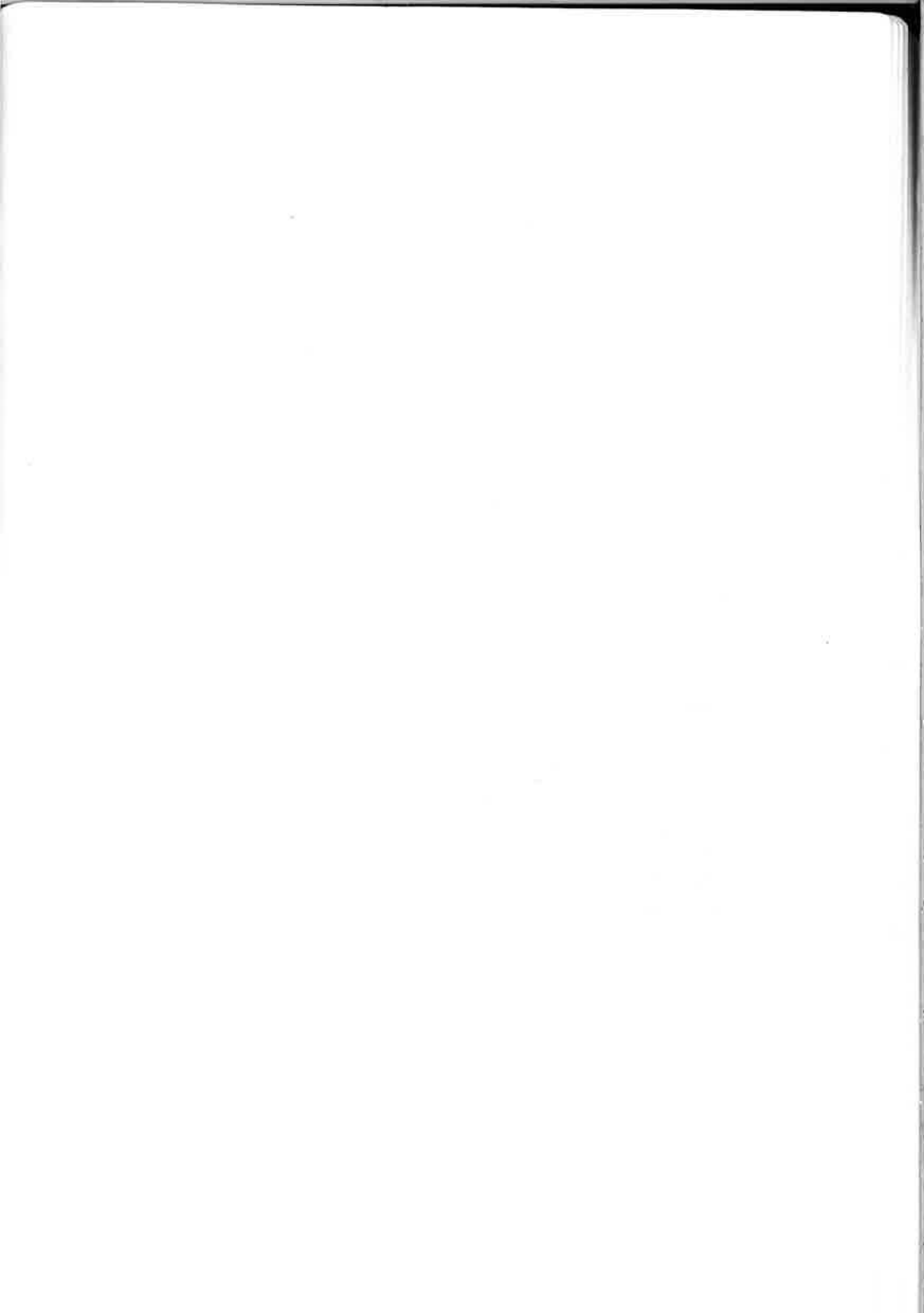
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Introduction

Every now and then, enemies agree. The philosopher of biology and anticreationist crusader Michael Ruse describes the practice of science thus: “Inasmuch as one is doing science, one avoid[s] all theological or other religious references. In particular, one denies God a role in creation.”¹ Phillip Johnson, the U.C. Berkeley law professor and intellectual leader in the intelligent design (ID) community, says that if considerations of the divine were brought in, science would look “quite different.”² While clashing over whether this is good or bad, they share a fundamental assumption: the practice of modern science is defined by the absence of religious considerations. Science is only recognizable insofar as God is nowhere to be seen. Adding the divine to science would change it in a profound way—again, for better or worse. The defining characteristic of science is its *naturalism*—broadly meaning the exclusion of supernatural or religious matters.³ Both naturalists and antinaturalists say that for as long as there has been science, it has been naturalistic.⁴ This book is about how we came to believe that.

The intelligent design movement targets naturalism for elimination, explicitly saying that modern science would go with it. The ID adherents’ proposed alternatives bear little resemblance to what scientists do today, and are essentially completely different enterprises. Science proponents agree that without naturalism, there is nothing recognizable as science. The 2005 *Kitzmiller v. Dover* court decision in the United States equated naturalism with science to justify keeping intelligent design out of science classrooms, a move consistent with years of judicial precedent.⁵ The decision declared that naturalism was “a ‘ground rule’ of science today which requires scientists to seek explanations in the world around us based upon what we can observe, test, replicate, and verify.”⁶

Naturalism's prohibition of religious matters was immediately linked to the very ability to observe the world and test ideas. This is not at all unusual. Ruse and other philosophers such as Robert Pennock assert that basic empiricism and even the use of hypotheses requires a naturalistic approach.⁷ Naturalistic science, it seems, is the only way to investigate the universe. Naturalism has provided "fantastic dividends."⁸ It works better than anything else.

But it was not always this way. Naturalism has a history. The existential connection of naturalism with science is a relatively recent development. Further, naturalism has a specific birthplace. Despite naturalism's high profile in modern American courts, its roots are in Victorian Britain. It was not until the end of the Victorian period (1837–1901) that naturalism became a common way to think about science, and it was a distinctively British creation. Regardless of this late and local appearance, naturalistic science has come to be seen as universal and eternal. Somehow the long-standing practice of nonnaturalistic science has been forgotten. Science that was developed, considered, and evaluated in deeply religious contexts became sanitized of its divinity. We have come to think of science as *obviously* naturalistic, without even the possibility of an alternative. Examining the history of how we came to this point will help us understand the meaning and role of naturalism in modern America.

The use of the term itself is usually traced back to Thomas Henry Huxley—Charles Darwin's bulldog. In fact, *scientific naturalism* was originally used by American evangelicals in the mid-nineteenth century as a pejorative term to describe science practiced without reference or deference to religious matters. Huxley appropriated the term for his own purposes to indicate expertise rather than scandal. His first public use of it was in the prologue to his 1892 *Essays upon Some Controverted Questions* to indicate the form of science that he and his allies had been practicing for decades.⁹ Bernard Lightman and Gowan Dawson suggest that Huxley began using the term after he had lost control of his earlier label—*agnosticism*—to Herbert Spencer. So while *scientific naturalist* was only used for self-identification at the end of the century, it is still a helpful label for values that had been in use since the 1850s by a particular group. These Victorian scientific naturalists desired a science that would be conducted in a "wholly secular temper." There could be no appeals to the supernatural or religious considerations brought into science. Frank Turner described their views as based on the tripod of atomic theory, evolution, and the conservation of energy.¹⁰ These theories, with energy

physics in particular, were presented by the scientific naturalists as showing that the universe was closed to external forces. Matter and force were posited to be the basic elements of science, not spirit or divine will. From these foundations the scientific naturalists launched attacks against theology and religious institutions, battling for power and cultural prestige. The naturalists had to fight for their definition of science.

The history of naturalism in a broader conceptual sense is more controversial.¹¹ It is complicated by a frequently drawn distinction between “methodological” naturalism and “metaphysical” or “ontological” naturalism. Methodological naturalism (what ID dismisses as “provisional atheism”) states that science should be done *without reference to or consideration of* the supernatural or the divine.¹² This is to be distinguished from metaphysical naturalism, “the belief that there is nothing other than nature as we can see and observe it (in other words, that atheism is the right theology for the sound thinker).”¹³ That is, that no supernatural or divine forces *exist*.

This distinction is offered by modern scientific naturalists as a way to provide space for religious belief even while doing science without God.¹⁴ One could, it is suggested, be a methodological naturalist while also a metaphysical theist. However, there are difficulties. Even if one accepts the proposal of such a split between belief and practice, it is not always clear how to distinguish them.¹⁵ Indeed, the combatants on both sides of the ID controversies regularly accuse each other of carelessly switching between the methodological and metaphysical varieties of naturalism.¹⁶

The purpose of the distinction, though, is a valuable one. It draws attention to how the *practice* of science distinguishes it from ID, rather than relying on specific claims about the physical world. The methodological principles that underlie science are essential to its function. And both ID and its opponents agree that those principles as they operate in science today are distinct from religion.

There were, however, alternatives to this view. In the Victorian period, naturalism was only one possibility of how to practice science. Because science today is naturalistic, it is easy to overestimate the influence of scientific naturalists in the past.¹⁷ Frank Turner has documented a group of British men of science who were hesitant to fully embrace naturalistic scientific practice: “They would not tolerate the curtailment of curiosity and the limitation of moral horizon that acceptance of scientific naturalism seemed to require.”¹⁸ But these figures were somewhat marginal and idiosyncratic. Far more central was the tradition of practic-

ing science in close embrace with Christianity. This had been the standard in Britain since the days of Robert Boyle and Isaac Newton.

I will refer to this tradition as “theistic science.” Its practitioners were overwhelmingly Christian (and largely Protestant), but the term *Christian science* would be confusing for obvious reasons. One could easily divide theistic science into many subcategories, such as Catholic, voluntarist, scriptural, and so forth. However, this would rapidly grow confusing. This book will instead focus on the common traits of theistic science, and how that methodological community functioned despite its internal diversity. It is also important to note that theistic science was quite distinct from what the ID community imagines its adherents’ version of science to be. Theistic science, like naturalistic science, should be considered in terms of methodology, not in terms of particular theoretical allegiances. Theistic science was a way to *do* science. This is not a story about science versus religion. All parties discussed here, theist and naturalist, cared deeply about science and wanted it to thrive. Rather, the question was about how religious ideas and values should appear in scientific practice, if at all.

The core of this book explores the relationship between the methodological values of theistic and naturalistic science: that is, the foundational principles on which scientific researchers were expected to base their work. As already discussed, our modern expectation is that theism should dramatically change the way science is done. Here I will argue that this was not the case in Victorian Britain, the birthplace of scientific naturalism. Instead, both theistic and naturalistic science held virtually identical methodological values. While this is remarkable on its own, it is even stranger when we see that each group argued that proper scientific methodology could only be justified in their worldview. That is, naturalistic men of science thought science could only be done naturalistically; theistic men of science thought science could only be done theistically. Despite this split, the foundations of their practices were extremely similar, and they were able to function smoothly (if loudly) as members of the same intellectual communities.

This strange pairing is illuminated by the concept of “valence values,” which I have developed elsewhere. At times, the same values are found in different groups, disciplines, or traditions. These shared, or valence, values help bond those sources together despite deep-seated differences.¹⁹ Here, the valence values are a number of assumptions and expectations about scientific practice. So a theist and naturalist might

disagree on the age of the Earth, or even the results of a particular experiment, but they share the value of (for example) empirical investigation that makes the debate possible in the first place. There were real fractures and splits within the Victorian scientific community; nevertheless, it held together due to powerful shared values regarding the foundations of science. This could also be considered as one of Peter Galison's trading zones, where groups are able to collaborate despite significant differences in training and goals.²⁰ Such groups retain their distinctness, but "can nonetheless coordinate their approaches around specific practices."²¹ In this case those practices were the basic methodological assumptions and goals of science itself.

To explore these issues, this book will focus on one major representative from each of the theist and naturalist camps, with supporting figures appearing as necessary. A close view of this sort allows for deep analysis of specific critical points where naturalism and theism touched scientific practice, and how the details of biography and local context helped shape those intersections. Naturalistic science will be represented by T. H. Huxley (1825–95), pioneering biologist, iconoclastic science educator, and public spokesman for science. He was one of the major figures in creating and propagating naturalistic science, and was closely involved with virtually all the strategies, forces, and social developments that eventually led to the dominance of naturalism. Theistic science will be examined through James Clerk Maxwell (1831–79), the physicist whose work revolutionized electricity, magnetism, thermodynamics, and optics. Maxwell's contributions to science have survived the test of time, and as a conservative evangelical, he cannot be dismissed as someone who was not genuinely religious. He was a product of the long-standing tradition of theistic science that Huxley sought to overthrow, and helps demonstrate the powerful social, cultural, and intellectual forces that made that tradition productive. A surprising absence from this story is Charles Darwin. While Darwin's work became central to the worldview of the scientific naturalists, he rarely participated in the struggles to validate naturalistic science. This is not to say that he was not an important figure in Victorian science, only that he is not the best lens through which to examine the rise of naturalistic science.²²

Chapter 1 situates us in Victorian Britain. Despite precedents in France, scientific naturalism in the modern sense was a peculiarly Victorian creation, and we need to understand the particulars of religion and science that made it possible. These will be addressed through overviews

of Maxwell's and Huxley's careers, particularly with respect to the existing institutions of religion. The established Church of England dominated intellectual and educational life in many ways, both propagating theistic science and providing the impetus for the development of naturalistic science. Despite Anglican power, this was an age of increasing religious diversity, which provided important resources for the growth of naturalistic science. The scientific naturalists sought not only to battle established religion, but also to set up their worldview as an alternative framework for a full intellectual and cultural life. Huxley wanted not only a new science, but a new church.

Chapter 2 examines the concept of the uniformity of nature—the claim that the laws of nature are constant and never violated. Uniformity is a bedrock principle of modern scientific naturalism, and was similarly embraced as the core of what it meant to do Victorian science. In an important sense, all the other issues discussed in this book flow from this basic principle. By the 1850s, uniformity had already been established as a foundation of theistic science. The argument was that uniformity only made sense in a universe with a caretaker deity. This was embraced by both clerics and men of science, with very few protesters in the scientific community. This chapter will investigate Maxwell's electromagnetic theory to show how closely the theistic version of uniformity was tied to his scientific practice. Huxley needed to make the case that his worldview could also support a lawful universe, and he worked hard to reinterpret unity and uniformity as being naturalistic. He posited that one could only assume uniformity if there was *no* active deity able to disrupt natural processes. Uniformity was closely tied to concerns regarding how to think scientifically about miracles, and the chapter closes with a discussion of those concerns.

The correct understanding of what kind of knowledge science provides was a major concern for the Victorians, and remains so today. The crux of the issue is whether science provides certainty, and where the limits of speculation and theory lie. Pennock and Philip Kitcher attack ID supporters for desiring absolute truth and being unable to handle unknowns; the ID philosopher Alvin Plantinga accuses naturalists of being “wildly mistaken” for thinking their ideas are “*certain*.”²³ Chapter 3 looks at the Victorian origin of these debates over the nature of provisional knowledge and the limits of scientific explanation. Huxley's agnosticism and Maxwell's models provide useful entry points for understanding the way they dealt with these concerns. Both theists and naturalists

agreed that scientific knowledge was uncertain, subject to revision, and that science could only address phenomena insofar as they connected with the unity of nature. This led to their surprising agreement about the inability of science to discuss the beginning of the universe.

The science classroom was as important an issue for scientific naturalists in the nineteenth century as it is today. Chapter 4 shows how theists and naturalists were deeply involved with science education, and how they worked with similar goals and principles in their teaching. The focus of the chapter is on the case study of F. D. Maurice's Working Men's College, a Christian Socialist organization that saw science as a critical part of educating the working classes. Both Maxwell and Huxley taught at the Working Men's College, and their strong views on how science should be taught demonstrates how theists and naturalists saw science education as critical to the propagation of their own views and values. Maxwell followed the tradition of teaching science in a fundamentally theistic way, and Huxley pushed for wholly naturalistic science teaching. However, they agreed on enough of the foundations of science education that they both volunteered to teach at the same institution, in similar ways. In particular, theists and naturalists agreed on the moral and intellectual value of learning about natural laws, which was supposed to be of particular value to workers as they became part of the British polity.

Closely related to science education is the question of intellectual freedom. In the twenty-first century it is common for both naturalists and antinaturalists to accuse the other side of dogmatism and trying to impose their views on others.²⁴ Naturalism as a concept has been entangled with these issues from the start, and chapter 5 explores how freedom of belief played into Victorian ideals of how science should be done. The scientific naturalists vocally presented themselves as rebels against theological oppression, arguing that only their worldview allowed true freedom of inquiry. But theistic men of science also saw themselves as champions of intellectual freedom. The key overlap was both groups' suspicion of sectarianism and dogma. Everyone agreed that forced belief in any form was a profound threat to the practice of science. Huxley channeled this value into his attacks on the established Church, but Maxwell's embrace of it was shaped by his evangelicalism. This shared value of intellectual freedom was critical for the functioning of a scientific community that included both theists and naturalists.

The tapestry of shared values of theistic and naturalistic science begins to fray in chapter 6. The emerging science of psychology raised the

difficult question of whether the processes of the mind were included within the uniformity of nature. The mind seemed to be quite different from other natural phenomena, and it was unclear how to treat it. Huxley appropriated William Carpenter's theistic physiology to argue for a fully naturalistic approach to mind and body—automatism. This chapter focuses on free will, a particularly controversial aspect of automatism. The naturalists insisted on determinism, while theistic scientists such as Maxwell struggled to maintain a view of mind compatible with Christian visions of the soul. Maxwell sought to retain the validity of both his evangelicalism and uniformity of nature, which required deep introspection into the reach of science and the nature of scientific explanation. Many of these issues found their way into his scientific practice through his investigations of the second law of thermodynamics and his eponymous "demon." In the end, theists and naturalists were unable to reconcile their different assumptions about the scientific analysis of the mind: was consciousness a fact upon which one could build science, or an epiphenomenon that needed to be explained away?

Despite this growing split, the victory of naturalistic science did not emerge from any demonstration of its methodological superiority. By the end of the nineteenth century, theistic and naturalistic science had been functioning side by side for decades, and it was only due to deliberate strategic choices that Huxley and his allies came to triumph. Chapter 7 argues that their key strategy was to make naturalistic science seem obvious and unique. Their chief tactics were to gain control of science education in the long term, and work to reframe concepts (such as uniformity) as solely naturalistic despite their theistic roots. The core of the plan was to reinterpret the history of science to erase its theistic past, and make science look as though it had always been naturalistic. These moves all required that naturalistic science largely share the same values as the theistic science it sought to replace, and led to a gradual generational change rather than a sudden revolution. Naturalism was given a long history, to make it seem impossible that science was ever practiced any other way. All of these strategies were critically enabled by large-scale social transitions in Britain, and were successfully brought to America as well. The Victorian scientific naturalists were so successful in telling their new story about science that today it is accepted by both naturalists and their enemies in the ID camp.

At the beginning of the Victorian period, it was expected that men of science take religious considerations into account. By the end, it seemed

impossible that they would do so. *Huxley's Church and Maxwell's Demon* argues that this shift was, surprisingly, due largely to the deeply shared assumptions between theists and naturalists about how to do science. Unlike ID's choice to reject the basic elements that make science work, Victorian theists found harmony between scientific methodology and Christian belief. And it was the scientific naturalists' embrace of these same methodologies that led to their eventual victory.