



# Delight in Creation

Scientists Share Their Work with the Church

## 14 The Science and Faith of Robert Boyle

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by Edward B. Davis

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**R**obert Boyle (1627–1691) was an English chemist who made fundamental discoveries about physiology and the physical properties of matter (especially air, other fluids, and the atmosphere). A superb experimentalist who helped establish modern laboratory methods, he also contributed to matter theory and the philosophy of science. At the same time, he wrote lengthy tomes about the Bible, morality, and theology, with particular attention to the relationship between science and religion. Here he speaks to contemporary Christians, with assistance from Edward B. Davis, who has borrowed heavily and without attribution from Boyle's writings, especially from *The Christian Virtuoso* (1690) and *A Free Enquiry into the Vulgarly Received Notion of Nature* (1686).

*Note: Before the nineteenth century, “science” usually meant “knowledge” more broadly, rather than natural science more narrowly. In Boyle’s day, “science” was often called “natural philosophy,” and people who studied nature were typically called “natural philosophers,” or even more specifically astronomers, mathematicians, alchemists, or anatomists, depending on their areas of expertise. The word “scientist” was not used until 1834. Boyle sometimes used “virtuoso” as a synonym for “scientist,” although that word also had other meanings. Here the modern terms “science” and “scientist” have been used.*

## Conversion and Calling

I became a scientist partly because I loved getting soot all over my hands. The rapture I felt in my twenty-third year, when I discovered the profound joys of the chemical laboratory, is deeply embedded in my memory. The fire of my furnace so transported and bewitched me, that the delights I tasted there made me fancy my laboratory a kind of Elysium, where I would enjoy eternal bliss. At the very same time, however, I realized that the contemplation of the creatures contributes to the glory of their Author. And, I imagined that I could do something to improve our mortal condition and ameliorate suffering, by the application of experimental natural philosophy to medicine—a dream that remained mostly out of our reach in my lifetime, but has today been partly accomplished.

I had become a Christian several years earlier, in Geneva, where my brother Francis and I lived with our tutor, Isaac Marcombes, a French

IMAGE CREDIT: PURCHASED WITH FUNDS FROM EUGENE GARFIELD AND THE PHOEBE W. HAAS HERITABLE TRUST CHEMICAL HERITAGE FOUNDATION COLLECTIONS. PHOTO BY WILL BROWN.

*Robert Boyle*

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gentleman who was a very nice critic of both words and men. Mr. Marcombes' wife was a niece of the famous theologian Jean Diodati, and we went to church twice a week. Our tutor read to us every day four chapters from the Bible and two sections from Calvin's Catechism, explaining points that we did not understand.

There happened one midsummer night at Mr. Marcombes' house the most considerable accident of my whole life. That same Christ, who had long lain asleep in my conscience as he once did in the ship upon the lake of Galilee, must now (as then) be awakened by a storm. It was about that time of night that adds terror to such accidents, when I was suddenly awakened in a fright by such loud claps of thunder that I thought the earth itself must be ill. Every clap was preceded and attended with flashes of lightning so numerous and so dazzling, that I imagined them the sallies of that fire that must someday consume the world. The winds were so loud that they almost drowned the noise of the thunder, and the showers were so hideous that they almost quenched the lightning before it could reach my eyes. All of this confirmed my apprehension that the Day of Judgment was at hand—whereupon considering how unprepared I was to welcome it, and the hideousness of being surprised by it in such an unfit condition, I vowed that if my fears were that night disappointed, all further additions to my life should be more religiously and watchfully employed. Come morning, with a more serene and cloudless sky, I ratified my determination so solemnly that from that day I dated my conversion.

Thus, this happy storm had upon me an operation resembling that it had upon the ground: for the thunder did but terrify, but with it fell such kind and genial showers, as watered my parched and almost withered virtues; reviving their greenness, it soon rendered them flourishing and fruitful. Piety is to be embraced not only to gain heaven with, but to serve God with. It pleased God to make science my Christian vocation, my way of serving God not only as a priest in the temple of nature but also as a servant of my fellow human beings. Whatever talents the great God of heaven and earth has given us, they must not be buried in the soil or wasted on useless things. Someday each of us will be called on to account for what we did with what we had, in our brief time on earth. We must never venture to wander far from God, upon the presumption that

death is far enough from us. Rather, in the very height of our jollities, we should endeavor to remember that they who feast themselves today, may themselves prove feasts for the worms tomorrow.

Idleness is the mother of vices, and having a calling is a sovereign preservative against it. Anyone who avoids an honest calling that does not in some way cooperate with and contribute to the common good, is but a useless and wasteful drone, unworthy of the benefits of human society. Far too many “gentlemen” spend their whole stock of precious time in carding, dicing, hunting, reveling, seeing plays, reading romances, powdering their hair, staring upon looking-glasses, courting ladies that they mean not to marry (not to mention what is worse), and in sum making vacation their only vocation. One must have more charity than judgment to believe that God intended only this for their calling.

## Pious Meditations

Even before I became a scientist, I had already written several things about God and morality, including two essays against swearing. It was my habit always to venerate the name of God, and I would pause before saying that blessed name. Not to have an awe upon us when the name of God is spoken of in company is a sign of want of grace. Another of my youthful writings, *The Martyrdom of Theodora, And of Didymus*, was based on the story of St. Theodora, the virgin who suffered for her faith under the wicked emperor Diocletian by being forced into prostitution. She and Didymus, the soldier who tried to rescue her, were beheaded together. I'm told that Samuel Johnson said this was the first religious romance, and Georg Friedrich Handel liked it enough to make it into an opera, *Theodora*. One more early effort, *Occasional Reflections Upon Several Subjects*, proved to be the most popular book I ever wrote; printers were still publishing it almost two hundred years later. My friend Richard Baxter, the Presbyterian divine, told me that my “pious Meditations & Reflections, do call to me for greater Reverence in the reading of them, and make me put off my hat, as if I were in the Church.” It was Mr. Baxter who had me made governor of the Corporation for the Propagation of the Gospel in New England, calling me “a worthy person of learning and a public spirit,” even though

we sometimes differed on matters of religious or scientific opinion. As part of my work for the Corporation, I underwrote John Eliot's translation of the Bible into the Algonquin language, spoken by the native people of New England.

Isaac Watts also appreciated my meditations, for he wrote a hymn based upon one that I wrote after recovering from a fever. The frail carcass of the human body is subject to so many distempers. My curiosity for dissection has shown me that the body is made up of many bones, muscles, veins, arteries, gristles, ligaments, nerves, membranes, and juices. It is no surprise that so curious an engine, consisting of so many pieces whose harmony is requisite to health, should have some of them out of order. It would be no more strange that a man's body should be subject to pain or sickness, than that an instrument with above a thousand strings should frequently be out of tune—especially since the bare change of air may as well discompose the body of a man as un-tune some of the strings of such an instrument. Even the inimitable structure of our bodies is scarcely more admirable than the fact that such curious and elaborate engines can be so contrived, as not to be out of order more often than they are. The preservation of so nice and exact a frame is almost as wonderful as its workmanship.

That was the subject of the meditation that Watts liked enough to base a four-line hymn upon it:

Our Life contains a thousand Springs,  
And dies, if one be gone:  
Strange! that a Harp, of thousand Strings,  
Should keep in tune so long.

They tell me this was later set to music by William Billings, in his anthem, *Creation*, from *The Continental Harmony*. That pleases me, for I was very musically given and liked to play *ex tempore* diverse tunes I had not learned on several instruments.

I only wish I had been less subject to distempers myself, but (God be praised) I was blessed with healthier discourse from my dear sister Katherine than I ever had from any other person. It was she who nursed me so often when I was sick, and she would as soon nurse a sick soul as a

broken body. We often had holy discourse together. Her mind was as sharp as a dagger; she could write out a sermon verbatim after coming home from church. She liked to have great men visit her home, where I spent so many years. John Milton tutored her son for a season. A greater woman I have never known. She poured blessings and tangible help on so many others, without regard to differences of opinion, at a time when differences mattered so much to so many; and she did this with the greatest zeal and the most success that I have ever known. I cannot begin to say how much I owed her.

## The Great Value of the Mechanical Hypothesis for Science and Theology

It was in Katherine's house that I set up my biggest laboratory, after I moved from Oxford to London in my forty-second year. There I took in servants to help with the diverse tasks that must be done in service to science: fetching instruments, glassware, and other supplies from the tradesmen; keeping the furnace hot and the air-pump sealed; writing down my thoughts and copying my books for the printers; recording testimony about their experiences and observations of nature from the soldiers, sea captains, and gentlemen who frequented my rooms and who had traveled to distant lands. So many wanted to visit me, that I had a sign put over the door advertising that I would receive them only at certain times. The work I did covered many topics—chemistry, medicine, the properties of air and other forms of matter, natural history, physiology, and the doing of successful and unsuccessful experiments. I gave much attention to phenomena such as cold, colors, the oceans, the atmosphere, and measuring the purity of water and various mineral ores. Above all, I sought to advance the mechanical hypothesis, the notion that the properties of matter are best explained in terms of corpuscles of matter that move around and interact with one another in various ways.

The mechanical hypothesis, in my opinion, is vastly superior to the concept of nature held and defended by those who had more reverence for Aristotelian forms and qualities than for the independence of mind that had made their master so profound. If they had thought more *for* themselves,



instead of thinking so much *of* themselves, they might have done more to advance the empire of man over the creatures. If they had only embraced the mechanical hypothesis, they would accustom themselves to speak and think of how nature does really and sensibly appear to work; and not to acquiesce in notions and explications of things which, strictly examined, are not intelligible.

What does it really tell us, to say that “nature abhors a vacuum” or that “nature does nothing in vain?” As long as men allow themselves so general and easy a way of rendering accounts of things that are difficult, as to attribute them to “nature,” shame will not reduce them to a more industrious scrutiny into the reasons of things and curiosity itself will not move them to it. We have a clear and eminent example in water pumps: what causes the water to rise up in them? The true physical cause—the weight of the air, pressing down on the water and forcing it to ascend into the vacuum created by the pump—would never have been found, if we had acquiesced (as our predecessors did) in that *imaginary* cause, that the world was governed by a watchful being called “Nature,” and that she abhors a vacuum and consequently is still ready to do whatever is necessary to prevent it.

What is more, the older notion of nature was actually idolatrous and prejudicial to the glory of God, for it placed an intelligent, purposive agent, much like a kind of goddess, between God and the creation. I do not find that for many ages the Israelites—who then were the only people and church of God—made use of the word “nature” in the common notion of it. Moses, in the whole history of the creation, where it had been so proper to mention it, has not a word of “nature.” I have not met with any one Hebrew word that properly signifies “nature” in the sense we mean here. Though Job, David, Solomon, and other Israelite writers do on diverse occasions many times mention the corporeal works of God, yet they do not take notice of “nature,” which our Aristotelian philosophers would imagine to be God’s great vicegerent. It is better, then, both for understanding the world and for worshiping its Creator, to think of “nature” as a mechanical contrivance, with properties and powers given to it by God, than to imagine some semi-divine “Nature” that always knows what to do.

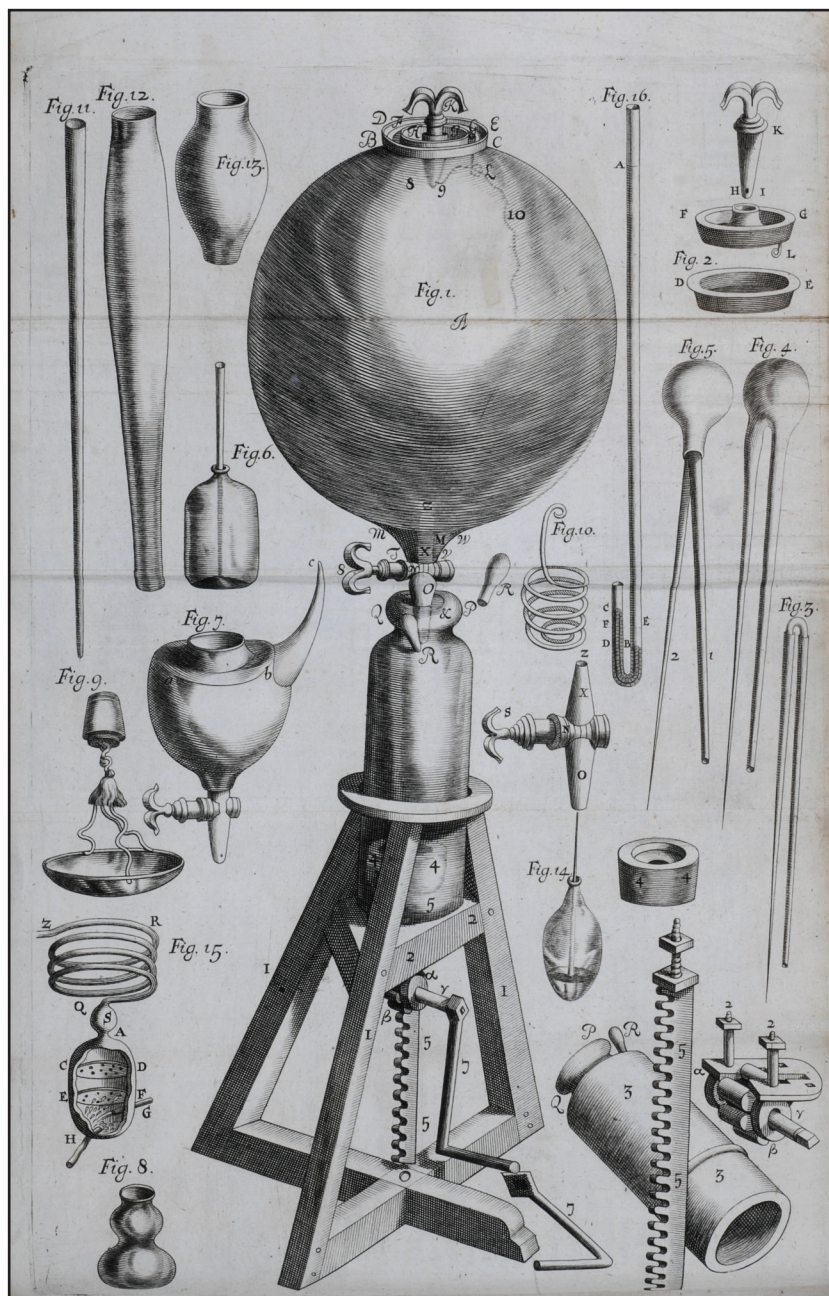


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## A Clearer Picture of the Divine Handiwork

The book of nature, however, is only one of God's books. I also read and studied another one, the Bible, as much as anyone—it is a great book, revealing God's purposes for all the ages and disclosing God's thoughts and deeds—but it was meant to teach divinity, not philosophy, and I never confused the book of scripture for the book of nature. Together with the book of conscience, these are the three books in our library, and none of them should be neglected. For the Christian, especially, the book of nature holds many wonders, showing us in sharp relief the marvelous works of the great Author who created and upholds all things. Some say that danger lies in too much devotion to this book, but I say that we are born to be priests in the temple of nature, bound to return thanks and praises to our Maker, not only for ourselves but also on behalf of the whole creation. Through our voices, all creatures answer the solemn invitation given to them in Psalm 148: to praise the name of the Lord from the heavens, in the heights, from the earth, and in the depths.

No one is better equipped for this glorious task than the Christian scientist. Far from being hindered by the study of nature, the scientist actually becomes a better Christian from the experience. Doing science gives the scientist a clearer picture of the divine excellence displayed in the fabric and conduct of the universe and its creatures than can be obtained from any other activity. To ascribe such admirable effects to so incompetent and pitiful a cause as blind chance, or the tumultuous jostling of atoms of senseless matter, is sheer folly. Those who pervert science to countenance atheism speak only for themselves.

We scientists find much in our course of study to settle in our minds a firm belief in the existence of God. In considering the vastness, beauty, and regular motions of the heavenly bodies, the excellent structure of animals and plants, and a multitude of other natural phenomena, we conclude that this admirable system of things was framed by an Author supremely powerful, wise, and good. One doesn't need to be a scientist to share in this delight; the divine handiwork is plainly seen by everyone. All the greater, however, is the delight of the scientist, for the works of God are so worthy of their Author that, besides the impresses of his wisdom and goodness

that are left as it were on the surfaces of things, there are a great many more curious and excellent tokens and effects of divine artifice in the hidden and innermost recesses of them—and these are not to be discovered by the perfunctory looks of casual beholders. They require and deserve the most attentive and prying inspection of inquisitive and well-instructed students of nature. The true naturalist, who brings not only common curiosity and attention but also a competent knowledge of anatomy, optics, cosmology, mechanics, and chemistry, will discover so much more of the exquisiteness lying hitherto unseen in the visible works of God.

Belief in divine providence is also enhanced by the scientist. The most potent Author of the world does not abandon a masterpiece so worthy of him. He still maintains and preserves it, so regulating the stupendously swift motions of the great globes and other vast masses of matter that they do not, by any notable irregularity, disorder the grand system of the universe and reduce it to a kind of chaos, or confused state of shuffled and depraved things. Nor is it above the ability of the divine Author of things, though he is a single being, to preserve and govern all his visible works, as great and numerous as they are. Nor is it below his dignity and majesty to extend his care and beneficence to particular bodies, and even to the least of the creatures, providing not only for the nourishment but also for the propagation of spiders and ants. If he can do that, who can deny that God's providence may reach even to us, the noblest of God's visible works? As animals, we are fearfully and wonderfully made. As rational creatures endowed with an intellect, we alone can contemplate the works of nature and by them acquire a conviction of the existence of their supremely perfect Author. Thus, we ought to adore God, the Lord and Governor of the world. We ought to express our sentiments by venerating his excellencies, in gratitude for his benefits, with humility before his greatness and majesty, in awe of his justice, relying on his power and goodness; and by endeavoring to serve and please him.

## Disposed to Christian Virtue

Furthermore, the scientific course of study accustoms one to value and delight in abstract truths, truths that do not gratify ambition, sensuality, or



other inferior passions and appetites. The dedicated scientist is accustomed to pursue, esteem, and relish many truths that entertain the understanding with that spiritual satisfaction that comes naturally from the attainment of clear and noble truths. Someone who is accustomed to prize truths of an inferior kind, simply because they are truths, will be much more disposed to value divine truths, which are of a much higher and nobler order and of inestimable and eternal advantage.

The studious searcher of truth in the laboratory and the observatory is also more willing and fit to search out and discover deep and unobvious truths. Many who live licentiously are like Pontius Pilate: when he had scornfully asked, “What is truth?” he would not stay for an answer. Such people are superficial and desultory wits, who go no further than the outside of things without penetrating into the recesses of them. Tired of contemplating one thing, they pass quickly on to another, which they just as lightly consider. Such people do almost as seldom make good scientists as good Christians. But the person who is addicted to prosecute discoveries of truths, not only by serious meditation but also by intricate and laborious experiments, will not easily be deterred from the hard work of acquiring solid arguments for natural and revealed theology. In short, the superficial wit may be compared to an ordinary swimmer, who can reach only such things as float upon the water; the experimental scientist may be compared to a skillful diver, who can not only fetch those things that lie upon the surface of the sea, but can dive all the way to the very bottom of it, to fetch up pearls, corals, and other precious things that lie concealed in the depths, out of the sight and reach of others.

More than this, several core values embedded in the practice of science are actually Christian values: personal honor and trustworthiness; devotion to one’s work as if it were a divinely ordained vocation; and the pursuit of truth over personal gain. Most of all, scientific work is very hard. Even the most exhausting efforts can lead to little or no progress, as I have found more often than I care to say. Behold, I tell you a mystery: among the religious virtues which the contemplation of God’s creatures encourages, I reckon humility. For the Christian in science, the hard work of explicating natural phenomena does insensibly produce a great modesty of mind. The experimental life may justly teach us humility.

Ultimately, I think it is a duty our reason owes to its Author, to endeavor to vindicate his manifold wisdom in this libertine age, wherein too many people with more wit than philosophy or piety have labored to depreciate the wisdom of God. I desire that my reader should not merely observe the wisdom of God, but be in some measure *affectively convinced of it*. The excellent contrivance of the great system of the world, and especially the curious fabric of the bodies of animals, have in all ages induced philosophers to acknowledge a Deity as the Author of these admirable structures. For my part, there is no better way to give us so great a wonder and veneration for the divine wisdom, than by knowing and considering the admirable contrivance of the particular works of that immense wisdom, which cannot reasonably be ascribed to any other than a most intelligent and potent Being. In this way, we may be brought upon the same account, both to *acknowledge* God, to *admire* him, and to *thank* him.

## Further Reading

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