SOUL MACHINE

THE INVENTION OF THE MODERN MIND

GEORGE MAKARI

Prologue

IMAGINE A TIME in the future when your mind might travel. Perhaps it would enter a different torso or a foreign face. Would you still possess the same self, the same being? Our minds, most of us would agree, define us; they carry our personhood, and where they go, we go too. In Western culture, much depends upon this belief; it underpins a great deal of our literature, art, politics, and jurisprudence. It is the foundation of the commonsense psychology so crucial to social life. The concept of the mind is everywhere, and yet at the same time, it is strangely nowhere. The most powerful arbiter of truth in contemporary life, natural science, refuses to ratify this belief. While our own psyches seem abundantly clear to us, attempts to objectively establish their existence have been mired in seemingly insoluble problems. And so, while the mind remains central to 21st-century Western thought, a number of prominent neuroscientists and philosophers inform us that it surely does not exist.

Soul Machine is an attempt to untangle these contradictions by returning to their origins, the beginning of the modern age, when religious beliefs, philosophy, medicine, science, and political power were all in flux. The emergence of the mind as a formative, if always embattled, belief, cannot be understood outside this historical context; it was never the result of a timeless debate in which Plato, Kant, and Wittgenstein argued over dinner. Instead, this book recovers a lost lineage, parts of which have been long discarded as embarrassing, wrongheaded, or irrelevant. This collective forgetting has led to impoverished, skewed discussions among different specialists, and no broad, historical account of how the modern mind emerged.

The invention of the mind was not the result of sedate academic debate. The mind was a radically destabilizing, heretical idea that grew out of intense, often violent, conflict. Far from being a story of scholarship alone, this history begins and ends in bloodshed. Characters in this account include thinkers writing at their desks, but also wild-eyed prophets, doctors whose spare rooms were littered with carcasses, political spies, bitter refugees, witches, quacks, and pornographers. This story takes place in universities, courts, hospitals, London coffeehouses and Paris salons, but also on battlefields, in lunatic asylums, poorhouses, and prisons. For better or worse, advocates and enemies of the mind were not sequestered in their studies. Often they could be found at the barricades.

Any history of the modern mind must begin with its ancient origins. By the time Socrates lifted the chalice of poison to his lips, over two centuries of thought about the immortal soul had preceded him. Later, when ancient Greek thought merged with the Christianity of the Church Fathers, a soul-based view of human nature became one of the ruling conceptions of Western belief. In Christendom, the soul was the "knot of the universe," the unifying link between nature, man, and God, and the single most prized human attribute. It provided believers with universal dignity, repose before a bewildering, brutal world, and consolation in the face of death.

By the middle of the 17th century, however, these same beliefs were seen as a rich source of corruption, unceasing strife, terrorism, and cruelty of vast dimensions. For decades, Christian sects waged war with each other over competing claims regarding the

soul and its salvation. Emerging challenges from natural science combined with long-standing political instability to create a crisis. While the soul and the psyche were once understood to be synonymous, some thinkers now advanced a radical idea. What if the mind was not so much spirit as it was bodily? What if thinking matter existed *within* human flesh? An object, this mind would still somehow house human subjectivity. Endowed by God, it still would be material, and therefore sicken and die. A naturalized mind first emerged wrapped in these enigmas.

Once modernity gave birth to the theory of an embodied mind, the implications were grave. If it wasn't the soul but rather a fallible mind that made men and women think, choose, and act as they did, then long-standing beliefs were erroneous. Convictions regarding truth and illusion, innocence and guilt, health and illness, the rulers and the ruled, and the roles of the individual in society would need to change. Not surprisingly, therefore, from its inception this concept was considered scandalous. Early advocates surrounded themselves in clouds of ambiguity; they published anonymously and when discovered, quickly fled from red-faced censors and mobs. Monarchs and theologians decried these heretics and roused their forces against them. Most natural scientists also opposed this bizarre notion. For if human agency and intention emerged from within matter, then their own mechanistic beliefs about the natural world were surely wrong.

Considered both heretical and unscientific, this idea still did not die. After 1700, the mind took hold among thinkers in England, Scotland, Holland, France, Switzerland, the American colonies, and the Austrian and German territories. Over the next century, as the feudal order crumbled, theories of mental life bloomed along with liberalism, egalitarianism, hedonistic ethics, individualism, political toleration, and the rational logic of the Enlightenment.

During the second half of the 18th century, a further shift took place in this emerging, often clandestine discourse. If our mental activities were truly part of bodily processes, then they needed to be studied not just by ethicists and philosophers, but also physiologists, anatomists, and doctors. Hybrid discourses began to appear as medically sophisticated *philosophes* and philosophical physicians offered bio- and psychopolitical theories for their rapidly changing world. New experts generated novel, if highly unstable, fields of inquiry, such as animal magnetism, phrenology, anthropology, human science, psychology, mental medicine, and psychiatry.

As the general prestige of science rose, these would-be Newtons of mental life sought to link data from experience and introspection with revelations about anatomy—nerves, twitching muscles, and brain structures. New taxonomies for mental differences and diseases were created. Once the province of theology, ethical and behavioral norms began to be codified in medical terms, a process that continues to this day. As these beliefs spread through the broader population, alongside Christians who feared for their souls, there now stood those jittery moderns who faced the terror of losing something that not long ago they did not know they possessed, their minds.

During the 18th century, the idea of an embodied mind supported belief in the rule of reason, liberty of conscience, the contingency of human knowledge, self-governance, and the personal pursuit of happiness, as well as man's vulnerability to bias, error, mania, and delusion. With the French Revolution, these notions burst out into the open and were freely pursued more than ever before.

Only a few decades later, this era ended. After the defeat of Napoleon, the first wave of mentalism receded and a period of reaction began. Nonetheless, between 1640 and 1815, a tradition had been created that would not be fully lost. Humans, it had been said, possessed something that was part soul and part machine, but fully neither. It was a strangely active kind of thinking and willing interior entity called a mind. For decades during the middle of the 19th century, that conception of humankind fell quiet, a bomb with a long fuse. When it blew again, the second great wave of debates over the mind commenced, and since then, they have never ceased.

THE MODERN MIND was constructed during the Enlightenment, a defining if now controversial period of Western history. Some have questioned whether such an epoch ever existed and have argued instead for numerous, different national enlightenments. This book moves from the English and Scottish enlightenments to the French and German ones, but as we shall see, these varied intellectual communities were deeply intertwined. While powerfully influenced by local differences, their theories of the mind also represent chapters in one interconnected European story.

In addition, the meaning of this historical period has been challenged. Once hailed as a great epoch of human progress, the Enlightenment has lost much of its luster. For critics, like the widely cited Michel Foucault, this period became one of insidious social control, brute prejudice masked as science, bureaucratically normalized terror, and internalized censorship. While these scholars cannot be wholly discounted, this book does not follow their lead. Writing in the wake of the Holocaust, many of these thinkers overreached in their attempts to find the origins of, not the Enlightenment, but rather the horrors of 20th-century totalitarianism. At the same time, it would be impossible to return to the cheery narratives promulgated by earlier historians, who created a timeline of steady advancement and dismissed the pernicious aspects of this era.

In an effort to integrate these opposed narratives, this history departs from the influential, now much criticized trajectory mapped out by Foucault, while at the same time adopting some of his assumptions. There can be no question that the rise of faith in the mind, in rational citizenry, and in individuals as moral and political agents, necessarily became linked to deep concerns about the potential for irrationality and mental instability. The Age of Reason, as Foucault aptly noted, was also the Age of Unreason. I have sought to grasp these and other complexities, historical conflicts in which toleration necessarily begat new prohibitions, where radical materialism inadvertently sustained spiritual belief, and where reason and madness, like shadow and light, defined each other.

However, to follow Foucault and argue that the phenomena associated with the modern mind were always, only constructed as a means of social and political control, would be—as historian Roy Porter and others have shown—wrong. It would also close off the very debates that animate this work. What do we mean by the mind? Is it a necessary theory, a physical thing, a language game, or a deep-seated prejudice? I have used the term "invention" in my title to frame these questions, for along with its contemporary meaning, that word once denoted a process of uncovering. In this dual sense, then, the invention of the mind allows us to freely consider what was made and what was found.

Such openness is required because *Soul Machine* is a history of critical contests that helped define modern Western culture, not because they came to any decisive conclusion but because they did not. Modernity has answered many questions, but it has never found a way to fully reconcile the complex triumvirate of body, soul, and mind. Instead, it has left us haunted, divided, with competing histories, values, and rationales that have been at odds ever since.

PART I

THE LOST SOULS OF MODERNITY

For what shall it profit a man,
if he shall gain the whole world
and lose his own soul?

—ST. MARK

Dare to know.

—HORACE

CHAPTER

1

A Soirée with Mr. Spirit and Mr. Flesh

ON MAY 29, 1660, King Charles II rode into London, the capital he had fled as a boy after the decapitation of his father. The streets were thick with welcoming crowds, tired of Puritan rule. Two or three days later, by the gate of Little Salisbury House, Charles tipped his hat to an aged well-wisher in the throngs; it was his old math tutor from Paris, one of the oddest fellows he had ever met, a Mr. Thomas Hobbes.

The melancholic, timorous Hobbes had been urged by his hard-drinking buddy, John Aubrey, to hasten in from Derbyshire, greet his former student, and perhaps win his favor. Protection of this sort was something old Hobbes could badly use. At seventy-two years of age, his longevity was already astonishing given the fearlessness of his pen: by all odds, his ideas should have left him dangling under a gallows tree years earlier. Hobbes had survived thanks to some fancy footwork, a quick dash to Paris when he infuriated English parliamentarians, then a sprint back to London when his writings enraged French Catholics.

Hobbes's trip into London proved fortuitous: he was awarded a pension and free access to the king. With Charles II enthroned, this infamous philosopher, whose name was routinely spat out as a curse, would run no more. His disturbing beliefs would need to be rebutted by words, not the tip of a sword. He would be scorned, lampooned, and refuted, but through it all he would remain free, and serve as a symbol of the fledgling kind of tolerance for moderate, "rational" dissent that marked Restoration England and led to the staging of some of the great debates that would begin to forge the modern world.

By the time of the Restoration, over two decades had passed since Hobbes had taken up a crisis that lingered over Western Christendom. Centuries of certitude—about nature, ethics, medicine, law, politics, and God—had become shaky. Thomas Hobbes was one of a loose confederation of 17th-century wanderers who moved about in search of a safe haven where they could freely consider long-forbidden, but increasingly critical new problems. Outcasts, freethinkers, libertines, and itinerant natural philosophers, they were members of an invisible tribe, the Republic of Letters, as they were dubbed by Pierre Bayle. These men made their way without support from clerically dominated universities; those that were not independently wealthy got by as tutors, doctors, clerics, and minor officials. Clandestinely, they passed about their unsigned tracts that questioned long-standing beliefs about Nature and God; political, social, and ethical life; art; math; the heavens; and the body. And at the heart of many of these controversies lurked this question: what was the human soul?

A TRANSLATION OF the Greek *psyche,* the Latin *anima*, and the Hebrew *nepesh*, the soul was an Old English word that carried a complex history. Its origins in the Western world dated back to the Homeric epics of 8th century B.C., in which a dead man's psyche was said to take up residence in Hades as a ghostly double, a shade. In this way, the soul became entwined with notions of the spirit (Greek *pneuma,* Latin *spiritus*), which referred to the wind or breath of life. Two hundred years later, pre-Socratic philosophers began to add attributes to the psyche, including an infinite capacity for understanding. By the 5th century B.C., the Greeks had amassed other, often contradictory, beliefs about the soul. Orpheus and his cult believed it was one's essence, imprisoned in the body and in need of liberation. Followers of Pythagoras considered the psyche to be a daemon cast out of heaven, sentenced to subsist in a chain of material bodies.

For Plato, the soul was our immortal, spiritual essence. The rational component was like a charioteer that drove a cart pulled by two winged horses—one noble, the courageous soul, and the other wild, the passionate soul. All thought, feeling, and passion were in *psyche*'s realm, beyond the natural world. However, as the heated debates around Socrates' death demonstrated, controversy existed over this belief. Various philosophers claimed that the soul was made of fire or air, water or blood. In that case, what Socrates and Plato both deemed eternal would perish.

Aristotle took stock of these wide-ranging positions and presented a powerful synthesis in *De anima*. By then, Greek thought included beliefs that the soul was the vital spark, the eternal being of the afterlife, the source of human reason, and the cause of bodily motion. To integrate all these meanings, Aristotle divided the soul into two forms that were material and one that was immortal. The vegetative soul was required for all life and passed away with it. The sensitive soul was the force that caused animal movement and action; it too was of matter. Only the rational soul, equated with the intellect, was eternal and divine.

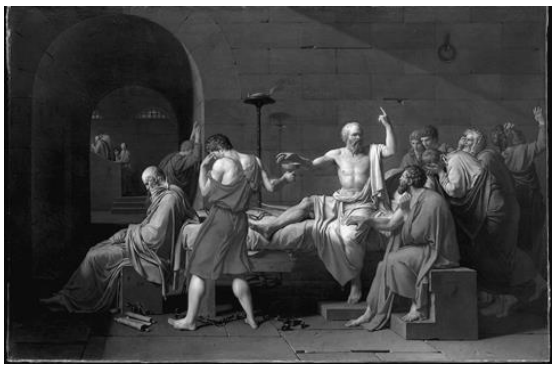

Figure 1. Jacques Louis David's *The Death of Socrates* portrays the philosopher preparing to die after beating back arguments against the soul's immortality.

Some of Aristotle's complex assemblage of meanings overlapped with the revealed truths of the Judaeo-Christian tradition. In Genesis, the soul was that which gave life to man. However, biblical notions of life after death included eternal judgment and therefore placed the battle over one's soul firmly at the center of Christian ethics and metaphysics. It

was not until the 13th century that a full integration of ancient Greek and Christian notions was created by the Dominican friar Thomas Aquinas. The masterful Aquinas unified Christian theology with Aristotle, as well as that of Ptolemy and Galen. For four centuries, his integration mostly held.

At the center of the Thomist vision was a conception of the soul that proved malleable enough for classical Greek and Christian worldviews. There were three souls (or perhaps one split in three parts—the distinction kept metaphysicians up at night). Living things like trees were distinguished from dead matter by the possession of a nutritive soul. The appetitive or sensitive soul allowed for movement and was the source of the driven hungers found in animals alone. Lastly, the rational soul was exclusively human; while authors argued about its faculties, they were most often considered to be memory and reason. Throughout much of the Renaissance, this highly theorized soul united scholars and theologians. For university students, the final step in their training was the study of Aristotle's *De anima* as recontextualized by Christianity.

In Aquinas's hands, Aristotle's rational soul happily meshed with the Christian one; it distinguished humans from those they might enslave and kill, like pigs and cows. It linked men and women to the afterlife and wedded the material with the immaterial.

Thanks to these three different souls, everything from stones to beasts to angels had a place in the order of things. The medieval hierarchy known as the Great Chain of Being ranked each of God's creations. Nature began with the soulless and dead—things like rocks. Next came the most primitive living beings, plants from lowly green fungi to many-armed oaks. Animals with their striving appetites rose in complexity from oysters to lions and elephants, the reputed kings of the animal world. Lastly, above all these things, living and dead, towered one. Humans alone possessed a soul that granted them reason and thus a taste of godly power.

Reason. The capacity to think and freely act. That lifted men above passion-ridden beasts. It made humans half planted in the earth and half hovering with the seraphim. Made of flesh, torn by desire, humans alone held some of that heavenly power to think and not be ruled by their passions.

And so for the orthodox, all that was needed to be known was known. Everything had its place in the deep order willed by the Creator. Nature was as it should be, the angels and devils and stars were in place, and so too was man, from his inner being down to his social, ethical, and political world. For among humans, there was a God-given hierarchy of souls. The divinely chosen king was closest to God, followed by nobles, then lastly, the peasantry. Society and the divine were in concert, pieces of one grand system hinged on different inner essences.

Then starting almost imperceptibly in the middle of the 16th century, the scholastics' mansion of universal knowledge began to crack and fall down. And hammering away at the fissures were a growing band of rebels who called themselves modern, men such as the king's old tutor, Mr. Thomas Hobbes.

HOBBES WAS WIDELY detested. However, the task he took upon himself was acknowledged to be a great one. He was among a tiny group of intellectuals who believed the past could no longer be relied on, that tradition, orthodoxy, and the word of their venerated fathers had failed them. Some, like Bernard de Fontenelle, dared to dismiss all scholastic learning as no more than a mass delusion. A new way of conceptualizing nature, man, and society was needed, one that allowed for God, but was not solely based on the dictums of the Ancient World. For the truths that had long given meaning to men and women as they stared up at the stars and watched the seasons change, those secure beliefs that succored them as they faced illness and sought direction in their everyday lives, this revered net of meaning seemed to possess a growing defect: it was wrong.

Or rather, traditional claims of Aristotle, Aquinas, and their stalwart students increasingly faced contradictory factual assertions. And since the schoolmen's system was so deeply interconnected, one false note, it was feared, would spread far and wide. Doubt on a miniscule matter might raise questions regarding Aristotelian logic, Galenic medicine, Ptolemaic cosmology, human exceptionalism, transsubstantiation, baptism, miracles, angels, witches, Heaven, Hell, and lastly, God Himself. Scholastics became known for dogmatically defending even the most trivial metaphysical matters. For those intent on preserving this interdependent structure, no argument was too small.

At the same time, throughout the 16th century, scholastic thinkers repeatedly failed to accommodate these challenges. Famously, Nicolaus Copernicus and Galileo Galilei refuted Ptolemy's claims about the movement of the heavens, thus upsetting God's resting place. While this may have disturbed the repose of some elites, many others glimpsed the failure of the old beliefs when they grew ill. When Galenic doctors arrived with their lancets, many poor beings quaked with fear and prepared to witness firsthand the failures of tradition.

Around 1600, Western medicine was still a by-the-book affair, and its authority was in serious decline. The grand humoral tradition established in the 2nd century A.D. by Galen had resisted any significant reform for an astonishing period, over 1,300 years. However, as the 17th century commenced, throughout Europe everyday impotence before the galloping rampages of disease led to an increasingly popular belief that doctors were know-nothings and money-hungry frauds, and that their traditional remedies only hastened one's doom. In addition, since the Renaissance, anatomists like Vesalius and then William Harvey had found serious errors in Galen's anatomy. With the Greek physician's loss of prestige, competition emerged from untrained empirics, barber-surgeons, apothecaries, clergymen, midwives, and alternative healers who employed astrology, folk herbal methods, magic, alchemy, and secret potions.

Alongside this uncertainty in traditional Galenic medicine, the physicians of the soul had also fallen into discord and confusion. After the Reformation, the realm of the soul had been a bloody one. Religious warfare throughout Christendom was almost unending. Challenges to papal authority led one holy truth to cross swords with another revealed truth, grossly demonstrating that earthly power alone would decide which truth prevailed. In 1648, the Peace of Westphalia put an end to the Thirty Years War. The conclusion reached was simply that there could be no real conclusion in the violent struggle for supremacy among Christian sects. Which elect, which vision of redemption, and which caste of holy men were the true ones?

When Charles II returned to England to oust the Puritans and reestablish Anglican rule, he faced a Babel of contrary beliefs. Any one creed stood in opposition to a swarm of others, ranging from radical Protestants to Jansenists, Jesuits, and Ultramontanes. Without certainty regarding the one true and Holy Word of God, political authority itself was shaken, since monarchs across Europe took their authority from divine right. As monarchs from opposite camps claimed *their* divine right, Europe itself seemed like a madhouse where a host of inmates all claimed to be Christ. While some, like Charles II, would vainly attempt to hold together this crumbling order, others like his ambitious tutor would recognize that the Old World had already shattered. Hobbes would sift through the fragments, so as to build a different system, which unified matter, man, and society. Turning away from the scholastics and the Ancients, this was a new worldview that would be called modern.

Grandiose ambition of this sort should not have been expected from Thomas Hobbes. True, he studied at Oxford and befriended the illustrious founder of empiricism, Sir Francis Bacon, for whom he took dictation. However, during his early years, Hobbes failed to originate much. After publishing a translation of Thucydides, he fell silent for decades. However, during this period of quiescence, new ideas were building inside him. By the late 1620s, Hobbes had discovered geometry and became obsessed with the idea that mathematics might be the key to . . . well, everything. Traveling along with his aristocratic patron William Cavendish to Paris in 1634, Hobbes fell in with a circle of French thinkers who were also committed to using mathematics and other methods to create a new, comprehensive, and unified view of the world.

At the center of this community was the unlikely impresario of early modern thought, the erudite, inquisitive monk Marin Mersenne. Far from taking a vow of silence, Father Mersenne kept up a tireless chatter as he promoted modern views through gatherings and incessant correspondence. He became the unofficial secretary of the Republic of Letters and formed the link between otherwise scattered thinkers like Galileo, Descartes, Hobbes, and Pascal. However, Mersenne was not just a facilitator, a conduit for others. Having studied with the Jesuits at La Flèche, he was a fierce defender of the faith who concluded that Aristotle and Aquinas no longer served that purpose. They were crumbling idols. To the circle of freethinkers who gathered around him at the Minim Friars' convent off the Place Royale, Father Mersenne communicated his conviction that the dogmas of old, so violently defended in universities and churches, were done. They had failed and could not withstand the assaults of skeptics or, worse, the heretical doctrines of Renaissance naturalists.

The receding authority of scholasticism, Mersenne believed, exposed Christianity to the risk that the void left behind would be filled by notions of Nature that were laced with occult mystery and magic, a bevy of Platonic, Cabalistic, alchemical, and esoteric ideas, all heresies that replaced the central authority of God with a world soul or a God-like force in Nature. Renaissance "animists"—those who believed the spiritual world existed within the material one—were the heretics he most despised. For over a century, Italy had produced a number of such thinkers: Pietro Pomponace, a doctor condemned by the Inquisition, claimed miracles were simply hard-to-fathom natural occurrences. Girolamo Cardano, a physician and mathematician, believed the stars could dictate human actions. The most famous of these pagan challengers, the Dominican Giordano Bruno, was burned at the stake

in 1600 for his pantheism. In England, fears of such conjurers had been stoked by the English playwright Christopher Marlowe's *The Tragical History of Dr. Faustus*, in which he retold the story of a scholar, astrologer, and magician, whose intense desire to know the powerful magic within nature led him to trade his soul to the Devil. Over the next three decades, legends accrued about this play, and it was said that during its performance, members of the audience saw demons, while others simply became mad.

Marin Mersenne loathed these heresies. And he feared them. By 1624, the friar began to search for a new way to replace scholasticism and simultaneously discredit those animistic naturalists, those Cabalists who placed the soul in the stars and in potions, and in the whole of the Earth. An alternative was needed that preserved the categorical distinction between man's soul and Nature, a line heretics like Bruno blurred or denied. Mersenne found his answer in the emerging new philosophy based on an improbable prototype: machines.

Figure 2. Marin Mersenne sat at the center of early modern debates on the soul and Nature.

Nature could be conceived of as a grand machine, a mechanism that yielded its secrets if one simply analyzed it as bodies in motion. This mechanical philosophy did not originate with the Minim friar. A number of early 17th-century thinkers had also fastened on mathematics, geometry, and physics to develop a mechanistic understanding of Nature. The most famed, Galileo Galilei, conducted decisive studies of mass in motion on the Earth, the seas and in the skies. Mersenne became a great supporter of the embattled Italian even after the Inquisition condemned him to house arrest. In Paris, the friar dared to promote Galileo's work and became his French translator. Mersenne added his own commentary

and published *The Mechanics of Galilei* in 1634, then four years later *The New Thought of Galilei*.

Thereafter, Mersenne took up an almost evangelical belief in mechanics as the science of appearances, the outer dance of Nature. And his campaign would be so effective that a few decades later one of his former acolytes, Christiaan Huygens, now the leader of French science, proclaimed that the only true philosophy of nature was mechanical.

Father Mersenne was excited by both the strengths *and* the failings of this new philosophy. Mechanics disrupted the tired dogmas and allowed for an exciting, skeptical investigation of Nature. At the same time, this view undermined animistic and magical beliefs. While Renaissance naturalism had undercut biblical ideas of divinity and Christian ethics by making all of the soul, even the rational soul, a part of living, breathing Mother Nature, mechanics did precisely the opposite. It yanked the soul out of the Earth, the stars, and our bodies. Magical spirits and life forces were nonsense. Matter in motion explained Nature's workings. Mechanics dictated a cool analysis of actions and reactions in matter. By this reasoning, astrology eventually would become astronomy, and alchemy would transform into chemistry.

At the same time, Mersenne's Christian soul could rest easy. For machines, even glorious, ingenious machines, could only do so much. If Nature was a clock, as the common analogy declared, then something would always be missing. No clock built itself: it required a watchmaker. Moving matter could not decide or will or think. The springs and gears of a machine might record time. However, gears could never, ever contemplate time. Thus, the limits of mechanics happily made way for God. Mechanics required higher properties of human experience, which would rest on biblical revelation. If Nature was only matter in motion, then the soul would remain in another realm, forever divine.

Once he envisioned this forked path forward, Marin Mersenne promoted it tirelessly. As his Minim convent became renowned as the center of debate on the new natural philosophy, Mersenne entertained a wide array of anti-Aristotelian skeptics. He displayed no tolerance for animistic naturalists, whom he believed were blasphemers. When Tommaso Campanella, an astrologer who defended Galileo, fled Italy for France, he presented himself at the Minim convent. Father Mersenne turned him away. Astrologers were sinners and false prophets. Nature was not the realm of the miraculous, but rather the merely mechanical.

As he was waging this battle to redefine the boundaries of science and religion, Mersenne met the brilliant Pierre Gassendi. A Catholic priest who counted one of France's great libertines as a friend, Gassendi's thought was never easy to pigeonhole, a problem that may have contributed to his relative disappearance from history. Nonetheless, in the 17th century, Pierre Gassendi was a giant, a thinker whose efforts to redefine Nature and the soul would be greatly influential, if often unacknowledged.

A young prodigy born in Provence, Gassendi received his doctorate, became ordained, and seemed destined to devote his life to the Church. However, in 1617 he applied for and received a professorship in philosophy at Aix-en-Provence, where he was entrusted with passing on the Aristotelian dogmas he had already grown disenchanted with, thanks to his reading of classical sources like Cicero, Horace, and Lucretius, as well as modern authors like Michel de Montaigne. While Gassendi dutifully trained his students in scholastic

thought, he also developed numerous stinging critiques of his forebearers. Not surprisingly, this questioning scholar was sacked after Jesuits took over the university in 1622.

Figure 3. Pierre Gassendi, the French anti-scholastic thinker.

Two years later, the former professor let out a howl of protest. *Exercitationes paradoxicae adversus Aristoteleos* was a no-holds-barred assault on the status quo. This scathing attack included the promise of seven more books to come, each intended to be another nail in old Aristotle's coffin. This first book would take up the philosopher's dogmatism, the second his dialectic, the third his physics, and so on. The fifth volume, he announced, would tear up false beliefs regarding the nature of life, as well as erroneous notions of reason and the soul. Following volumes would rewrite metaphysics and moral philosophy. In short, the blustery Gassendi announced a revolution. And he gave his enemies advanced warning of his battle plans.

In 1625, the provincial author traveled to Paris and discovered the old order was ready to greet him. Two months before Gassendi's arrival, the powerful theology faculty at the Sorbonne instigated legal changes in the Parlement that criminalized the promulgation of anti-Aristotelian ideas. Three renegade thinkers had been fingered and one arrested. As the scholastics clamped down, the young priest introduced himself to Father Mersenne, who took the young man in and urged him to let the diseased Aristotle die of his own accord. Attacking the flailing schoolmen was foolhardy and unnecessary. However, the times badly required the creation of a new foundation for the study of nature, one that would also be a bulwark for Christianity.

Gassendi took Mersenne's advice to heart; the next volume of his proposed polemic against the scholastics would only appear after its author's death. The other volumes would never be written. In 1630, when asked why he discontinued his criticism of Aristotle,

Gassendi confessed it had become a matter of safety; the publication of the first volume almost led to what he vaguely referred to as a "tragedy," no doubt his own.

Nonetheless, while he would be careful about what he published, Pierre Gassendi did not fully retreat. Instead, he adopted a credo from Horace that would come to be a calling card for the self-proclaimed enlightened over the next 150 years: "*Sapere aude*"—Dare to know. He left Paris and for the coming years scraped by as an itinerant scholar who relied on wealthy patrons. And though he called off his duel with the Sorbonne theologians, Pierre Gassendi did boldly propose a new worldview. If Thomas Aquinas wove together Aristotle with the Scriptures, this priest believed the ancient philosopher Epicurus could provide a more stable foundation for our understanding of the natural world, ethics, and Christianity.

The choice was inexplicable, horrifying, and outrageous. A reviled heretic despised by Church Fathers, Epicurus never had been reconciled with Christianity. Widely believed to be an atheist and a lowdown hedonist, he won a special spot deep down in Dante's *Inferno*:

> *In this dark part are entombed*
> *Epicurus and all his followers,*
> *who made the soul die with the body.*

Epicurus's conception of Nature meant terrible things for a Christian. Nature, *in toto*, was made of atoms, the material *minima* of the world, thus there was no Providence. And since these infinite bits of matter made everything, that included man's soul, which meant that the soul would suffer the same rotten fate.

To make matters worse, Epicurus ascribed to hedonistic principles that were scandalous: ethics, he had argued, were based on the human search for pleasure and the avoidance of pain. Some have called the tradition of philosophy a history of creative or polemical misunderstandings; this was clearly Epicurus's fate. For upon inspection, a reader easily discovers that for him, the serenity of the soul was the highest pleasure of all. Thus, the Greek philosopher was skeptical about immediate kinds of hedonistic and sexual abandon, for he thought those spasms of joy might roil the soul for years to come. Epicurus and his followers actually were said to live rather ascetic lives. Nonetheless, their ethic was caricatured by rivals from the Stoics to the early Christians, as nothing more than a pig philosophy devoted to wild, orgiastic gratification. The Church Fathers denounced Epicureans, such as the brilliant Lucretius, as lechers, heathens, and anarchists. This was the Epicurus that Pierre Gassendi had nominated to be the bedrock of a new Christian worldview. Dare to know, indeed.

And yet, Gassendi saw that this ancient Athenian philosopher and his followers offered something important. The view that Nature was made up of small atoms in motion cohered nicely with the study of matter and motion, the mechanical philosophy the priest had adopted thanks to his reading of Galileo and the urging of Mersenne. Gassendi himself took up serious observation of the stars and planets, and sought to contribute to this field. And like Mersenne, he sought to discredit Renaissance naturalists with their animistic spirits, and even wrote a diatribe against the English astrologer Robert Fludd. In this struggle, Epicurus was a powerful ally, for he envisioned Nature as solid matter, which made no space for heretical notions like world souls, mystical natural forces, Platonic *anima mundi*, or other such heresies.

Still, any Christian follower of Epicurus faced deep trouble, for his philosophy suggested that the soul's rewards or punishments in Heaven and Hell were based on a lie. Souls made of atoms must perish. Undeterred, the Catholic priest hoped to rehabilitate a modified Epicurus and penned a glowing biography, a project that then grew into a full exposition of the man's thought. Rather than accept a universe of random atoms in motion, Gassendi argued that God had given atoms their first push. Since the Heavenly Father originated all motion, His presence and care hovered over all.

AS PIERRE GASSENDI began to work on a modern version of Epicurean thought, Thomas Hobbes arrived in Paris. Mersenne likely introduced the Englishman to Gassendi's belief in atomism and materialism. Soon, Hobbes returned to his homeland intent on pressing these ideas into his own fearless *summa*, a complete, universal mechanistic and materialist philosophy of nature and man. Like Epicurus, whose philosophy covered physics, logics, and ethics, Hobbes divided his unified theory into three: physics and the universe, psychology and the workings of inner man, and finally the political order. All these would be woven into a grand tapestry. If the scholastic vision had cracked, Hobbes planned to reunify all knowledge through his use of the same, simple building blocks—matter and motion. And so, he ruthlessly followed mechanics to quite shocking conclusions. There were no supernatural forces, no shift in kind from inert object to human beings to the divine. Matter structured the natural world, and it made man, his soul, and his God. Ghosts, angels, immaterial thoughts, and ethereal spirits were delusions, a kind of communal nightmare.

Hobbes hoped that his first volume of mechanics would demonstrate that the physical world was based entirely on lawful motion. The second would take up the soul and its passions "from their original causes," by which he meant their material basis. Memory, dreams, ideas, and hallucinations would not be accounted for by the soul, but would be understood as mechanical disturbances in the brain. The connection between soul and body would also be explained; ideas from the brain generated action in the heart, which made for pleasure or pain. Sad imaginations could affect the spleen, and strong spleens in turn could cause fearful dreams. In the third and final volume of this work, Hobbes would detail the way his materialist framework unveiled the true nature of ethics. He would create a science of politics, based on underlying mechanics of the natural world and the inner being of man.

In 1640, a draft of this unified worldview was completed; Hobbes was fifty-two years old. But as he continued work on his magnum opus, England began to teeter on the edge of civil war. His country began to "burn with questions of Sovereignty and the due obedience of citizens." As a defender of the Stuart monarchy, long in the employ of the wealthy polymath William Cavendish, the Earl of Newcastle-upon-Tyne, Hobbes took time out from his loftier ambitions to write an anonymous pamphlet filled with Royalist convictions. When unmasked, Hobbes became a marked man. He fled to Paris and there seemed to abandon his dream of a unified synthesis of physics, psychology, and ethics.

Hobbes rejoined Father Mersenne's illustrious group at the Minim friars' convent, a vibrant community of doctors, aristocrats, and clergymen who shared a passion for geometry, mechanics, and a rational rewriting of Nature. By 1641, Hobbes had befriended Gassendi. The two developed a close bond, which was only heightened by a common enemy. Both thinkers had become embroiled in bitter quarrels with another luminary in Mersenne's circle, another man who aspired to be the modern answer to Aristotle, the vain, brilliant, and reclusive René Descartes.

Born in 1596, the son of a minor French noble, René studied at La Flèche, the same rigorous Jesuit academy that produced Mersenne. Afterward, he embraced military life and volunteered for battle. In the course of his adventures, the young man met Isaac Beeckman, a devotee of natural philosophy, who introduced the swashbuckler to the beauties of geometry and thereby ignited his dream of using mathematics to create an "opus infinitum." One cold November night, Descartes had a series of three dreams that fostered an epiphany of how spatial problems could become algebraic, which crystallized a vision of a natural world underwritten by mathematical laws. It was the sort of insight that had the power to change a man's life, and it did. Over the next decade, Descartes devoted himself to this grand, unifying project.

In 1628, during a public lecture in Paris in which an alchemist critiqued Aristotle, Descartes publicly revealed some of the fruits of this labor. He rose from the audience to dispute the veracity of this theory. His belief was that better methods and principles must be used to establish sound knowledge. Skepticism could be coupled with a process of breaking down problems into their smallest parts and building up conclusions from there. In the audience, Cardinal de Bérulle immediately grasped the power of Descartes's proposals. He became the patron of the thirty-two-year-old in the hope that his ideas would lead to practical advances and reform old fields, such as one close to Descartes's heart, medicine.

After he secured the cardinal's support, René took off for Holland, where he lived in seclusion for all but the last two years of his life. His destination was no accident. By the 17th century, the Dutch had won a reputation for harboring freethinkers and minorities from the Marrano Jews of Spain and the French Huguenots to whoever happened to be out of power in England. Descartes needed that freedom, but he also wanted to disappear. A loner who never married, he moved periodically from village to village so as to ensure his solitude; Mersenne was one of very few to reliably know the thinker's whereabouts. Deeply devoted to his studies, Descartes's quarters included a garden to observe plant life and a room suitable for dissections. And through these studies, he sought to establish a new view of the cosmos and man, all to be put forth in a book he planned to call simply, stunningly, *The World*.

An ardent believer, Descartes sought to remake the study of Nature while upholding the Christian faith. And following Mersenne, he had a ready solution. One could rid oneself of dogmatic scholasticism with all its unproven, hairsplitting doctrines by viewing Nature as a massive mechanical object. Thus, everything under and above the sun would be open for skeptical inquiry. At the same time, there would be an impassable boundary. Mechanical explanations would be helpless before questions regarding any higher-level actions, anything directed, willful, and purposeful. Hence, this framework liberated science to discover all it could about the Nature-machine, while preserving God's necessary place in

human life. Nature was passive matter buzzing about in motion, but the Deity and his representative in humans, the soul, remained the Prime Mover, the only active force of life. By 1628, Descartes shared his views with Mersenne, whose powerful advocacy would soon be his.

The World would cover nature, the human body, and the soul. In the first section, Descartes, like Hobbes, accounted for nature as simple matter in motion. He proposed a theory of corpuscles in which different-sized objects moved in vortices and complex geometric patterns that made up the celestial world. Nature from the stars to the smallest pebble could be explained through predictable, lawful, interrelated causal actions.

By late 1632, Descartes moved on to the second section, which would be published as *Treatise of Man*. Here he dismissed the scholastic division of three souls animating plants, animals, and man and declared all of creation, every wiggling and purposeful thing, to be soulless except for mankind. Dogs and tigers were machines like the automata Descartes witnessed in the water fountains of the royal gardens of Saint-Germain-en-Laye. There an ingenious Italian craftsman had created hydraulically powered statues that whirled, slayed dragons, and to the audience's great astonishment, blared on trumpets. Impressed by this display, Descartes began to consider animals as machines of a similar sort.

Could the same be true of the human body? Descartes had been seriously studying anatomy and physiology for years; in Amsterdam in 1635, he was delighted to rent a home near the local butchers, where he often watched the slaughter and rescued discarded cow organs to dissect in peace at home. He devoured William Harvey's revolutionary book on blood circulation, another blow to Galen. And he began to imagine a mechanical physiology that did away with the humors.

The philosopher's entry into medicine was not unusual. In the 17th century, universities had only three realms of advanced study—theology, law, and medicine. Thus, the study of human nature fell to gentlemen trained in medicine as well as educated amateurs. Descartes was of the latter group, though one dead serious about his research. At the conclusion of his revolutionary 1637 *Discourse on the Method of Properly Conducting One's Reason and of Seeking Truth in the Sciences*, the Frenchman confided that his ardent desire was to secure pragmatic knowledge of a specific sort. The rest of his days, he announced, would be devoted to acquiring "some knowledge of Nature, which may be such as to enable us to deduce from it rules in medicine." This overriding interest would guide him to the exclusion of "all other sorts of projects."

Figure 4. This 16th-century automaton played the zither,
and turned its head as it moved.

Descartes considered himself a doctor of sorts. The grandson of two physicians, he knew the most potent form of proof for his own physiological theories was whether they cured or prevented illness. Not burdened by modesty, he declared that despite his own weak constitution—as a child, doctors had predicted his early demise—he would live more than a century, as long he perfected his medical theories. A few years later, Descartes revealed his investigation into the erroneous ways that people lived; from these studies, he promised to construct a medical compendium that would serve as his own "stay of execution." He let it slip that he considered the life span of the biblical patriarchs, recorded in the Book of Genesis as over nine centuries, within his grasp. Among the cognoscenti of Europe, word spread that Descartes had solved the riddle of mortality. Letters began to arrive that asked him for medical advice, and Descartes did not hesitate to prescribe treatments. In the end, he was confident that a radically new Cartesian medicine would prove its merits.

Next, Descartes prepared to write the last section of *The World* on the soul. In November of 1633, however, he was stunned to discover that Galileo had been condemned by the Inquisition for his heliocentric views. Frightened, he contemplated burning all his papers. He put aside *The World* forever.

SEVEN YEARS LATER, on November 11, 1640, Descartes informed Mersenne that a Dutch emissary, Constantijn Huygens, would be arriving in Paris with an untitled manuscript. Descartes hoped the friar would distribute this short series of meditations to both the conservative Theology Faculty at the Sorbonne as well as those freethinkers within his circle. When the pages arrived, Mersenne opened them and discovered *Meditations on the First Philosophy in Which the Existence of God and the Real Distinction Between the Soul and*

the Body of Man Are Demonstrated. The work adopted the literary conceit of following a philosopher during six straight days of contemplation. The association with Genesis was perhaps inadvertent, but readers throughout Europe would conclude that during those six days, Descartes had done something astonishing.

First published in Latin in 1641, the *Meditations* were translated and published in French in 1647, alongside a number of objections orchestrated by the Minim maestro, written by him as well as Pierre Gassendi, Thomas Hobbes, and others. Despite the many contradictions and doubts these interlocutors hurled in its way, Descartes's tour de force quickly won devotees. For while dismissing the Old Order in favor of skepticism, freedom of inquiry, and a mathematical, rule-based approach to natural philosophy, the *Meditations* absolutely affirmed Christianity. The thinker had lifted the skeptics' sword and at the last moment turned it against them, thereby cutting a path for devout, natural philosophers.

In solitude, Descartes had struggled with the terrible problem that faced the moderns and what was called their *philosophie nouvelle*. In his *Discourse on Method*, he told his own coming-of-age story, one that rang true for many early savants. He had devoted himself to garnering knowledge at the Collège de La Flèche, one of the great educational institutions in Europe, and at the end of his rigorous studies, concluded that he knew nothing. He expected little more from books, for now he could see that the best minds created nothing more than opinions. Thus, the graduate set out to study the book of the world; he traveled, went to war, and discovered to his dismay that under the guise of common sense and custom, much that passed for truth was absurd. Surrounded by a rotting orthodoxy, many of his educated readers would have agreed.

Descartes sought to subject everything to doubt, and as he did so, he wondered where it would end. If received wisdom was little more than misguided custom, if reason was stuffed full of false ideas, one should be skeptical of one's own thought. While Aristotle compared perception to the faithful imprint an object made on wax, for Descartes, like Hobbes and Gassendi, that was quite naïve. Perception was often demonstrably false, and therefore clearly not based on a direct imprint. Seeing and hearing and feeling only led to mediated and questionable information. And once such doubt resided within perception, absolute truth vanished.

However, in the *Discourse on Method*, the narrator had proposed a solution that he had developed in the *Meditations*. Of all that he might doubt, one reality seemed indubitable if ironic: he was now doubting. Famously in 1637 he wrote: "Cogito, ergo sum"—I think, therefore I am. In the *Meditations*, Descartes returned to the bottom floor, the solid place from which other undeniable truths might be built. Only one reality could not be questioned. "I am, I exist." I am therefore a "thing that thinks."

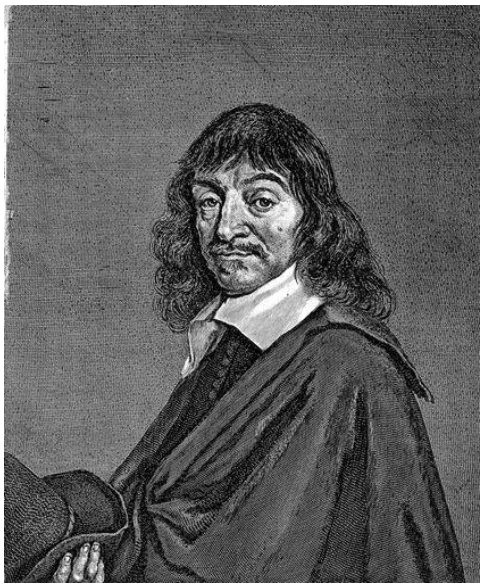

Figure 5. The brilliant, reclusive René Descartes, 1649.

With this, Descartes expressed something that could not but resonate powerfully with his readers: inner experience was immediate, unquestionable, and utterly unique. Knowledge of our own thoughts was not like knowing whether the sun rose in the east or if all frogs were green. Thought presented itself with certainty; its immediacy and wholeness seemed to be a foothold in an otherwise shadowy world of perceptions and inferences, the dark world of Plato's cave.

In the *Meditations*, Descartes reached this philosophical terra firma by pushing his skepticism as far as it could go. Say the world was a dream, or God's cruel deception, or a massive delusion created by an evil demon. Even so, our own thought could not be unreal. To some of his contemporaries, Descartes's logic was odd, even a bit perverse. Pierre Gassendi urged his colleague to drop the rhetorical games. However, this Jesuit-trained thinker was quite serious: he believed he had embraced skepticism and then—almost magically—turned that traditional weapon against faith into a bulwark for believers. By relying on nothing more than questioning and analysis, he seemed to have proven that thought was the absolute foundation of being and knowledge.

And not just abstract thought, but a "thing that thinks," which must be the soul. Descartes dispensed with the other souls from Aquinas that he could not justify philosophically. He restricted that term to that immaterial aspect of human beings that can think. He dismissed sensitive and vegetative souls, dismissed a soul that gave life, and left only one. The soul thinks.

Thus, long histories attached to powerful words collapsed and became confused. The Latin *anima* and its French cognate, *âme*, were words that naturally referred to the "animating," life-giving soul. The Latin *mentis* from the Greek *menos*, was "mind" in English, a widely used synonym for not the entirety of the soul, but just the rational soul. It had no equivalent in French. One could refer to *mentalité* as an adjective, but the closest noun in French was *esprit*—spirit, which was loaded with religious connotations. For this term

primarily denoted the immaterial spirit, the third part of the Trinity, and the spirit of angels and demons. Only secondarily did it refer to the soul's faculties of thought; a 1611 French-English dictionary gave those as the sixth and seventh possible meanings.

In early sections of the French translation of the *Meditations* that Descartes carefully revised and authorized, these same traditional, if shaky, distinctions remain. *Mentis* is rendered *esprit*, or mind, and *anima* becomes *âme*, or soul. However, later, especially in the Sixth Meditation, Descartes collapsed these distinctions. He approved the translation of the Latin word for "mind" with the French word for "soul," then zigzagged back and forth interchangeably using words for mind and soul. This was no error. Descartes exploited the ambiguity in French to unify the indisputable thinking being with that eternal life force and distinguish both from the material body. *Esprit* and *âme*, *mentis* and *anima*, mind and soul: all were one. The complex Thomist soul was sheared of its material and animal realms, and left to stand as pure, immaterial consciousness, God's gift to humankind, the very opposite of the body. After speaking at length of his mind, he concluded: "It is certain that this me, that is my soul, by which I am what I am, is entirely and truly distinct from my body." Before the razor of radical skepticism, only that remained. Like a modern Aquinas, Descartes believed he had found a way to merge the demands of skeptical naturalism with those of Christian belief. Through logic and doubt, he secured the immortal soul. Conscious thought, doubt, and reason stood at the center of what made us human.

Despite grave problems with this synthesis, the Cartesian split between the soul and Nature would spread. In part, it was old wine in a new bottle. Descartes preserved the most critical aspect of Thomist inner life, the rational soul, while he jettisoned the rest of scholastic biology along with its accounts of what distinguished the living from the dead, what made for action and will, what separated animals from man. He preserved the rational soul for believers who now reconciled themselves to life in an otherwise mechanical world. It was not folly for Descartes to hope that the Theology Faculty in Paris, to whom he dedicated this work, would be delighted.

However, to save the soul, Descartes had performed a radical amputation. And as with all such surgeries, there were grave side effects. The unified schema of Aquinas, honed over centuries, answered many questions that were now left in doubt. Though Descartes preserved the rational soul, he ripped up the Chain of Being and segregated humans from the rest of creation. In his view, there were two utterly divided domains: Nature was composed of passive matter and ruled by mechanical actions. Though its substance never fully disappeared, its elaborate constructions broke down and died. The soul, however, never decayed. It was linked to the realm of Heaven, and its sole function was the intellect, understanding, thought. Mankind was half matter and half spirit, part machine and part divine reason.

Mersenne had faith that mechanics required a place for God and this was his reward. Everything but the soul was mechanized, even life. With a few strokes of his pen, Descartes had desacralized the pulsing, hungry, and buzzing world. Only humans possessed a force capable of will and directed action. No *anima* made sense of flowers, bees, and bears. In Descartes's new model, the sky, the earth and all that lay in it comprised a grand, whirring machine. While his body remained part of that Nature-machine, man's Cogito stood outside of it; it was the children of God's sign of distinction, proof of their holy origins.

IN 1648, DURING a rare visit to Paris in which he hoped—in vain, it turned out—to win a pension from the Court, Descartes attended a gathering at the home of Thomas Hobbes's patron William Cavendish, the exiled Earl of Newcastle-upon-Tyne. There he came face-to-face with his two great rivals, Thomas Hobbes and Pierre Gassendi. The meeting could not have been comfortable. While Gassendi and Hobbes shared a loathing for Descartes, he felt contempt for his rivals. The Englishman and his sniping—which included a fifty-six page riposte attacking the *Discourse*—greatly annoyed him. Other than the publication *De cive*, this haughty English fellow had little to support such arrogance, though he could be congratulated on recently becoming the math tutor of his country's banished prince, the young Charles. In his letters, Descartes deemed Hobbes to be pernicious, childish, and ridiculous. His notions of a corporeal soul and a corporeal God were absurd.

Hobbes had been relatively gentle in his published criticisms of Descartes's *Meditations*, but even that did not mask their mutual dislike. Hobbes insisted that there could be no innate idea of the soul; furthermore, Descartes had not proven that the soul was incorporeal. In the end, Hobbes asserted that Descartes's soul, his basis for our very being, divorced as it was from the senses, rested solely on the conviction that the Heavenly Father would not delude his children. Hobbes mischievously added that a beneficent Lord might delude us for our own good. Descartes's attempt to know God and the soul through reason was risible, absurd. He would later tear into Cartesian phrases like "immaterial substance" and conclude they were ludicrous oxymorons.

With Pierre Gassendi, the quarreling was worse. His snide objections to Descartes's *Meditations* quickly descended into name-calling, finger-pointing, and bitter recriminations. Both thinkers were pushed to justify their differences: Gassendi would publish a rebuttal, which at over 300 pages was far longer than the book he would rebut. Descartes, in a later edition of *Meditations*, floated the accusation that the priest was behind a clandestine conspiracy against him.

Bubbling beneath Hobbes and Gassendi's anger was the belief that Descartes had sold out. He had pandered to ecclesiastic authority. His attempts to justify the Catholic belief that the bread and wine of communion were literally transformed into the body and blood of Jesus, Hobbes privately concluded, was simply an act of bad faith, a rationalization that revealed how badly this thinker strove to be the Jesuits' intellectual savior. Hobbes complained that both he and Gassendi had been forced to beat back Descartes's ghosts and had in the process paid a heavy price.

For Gassendi, the cost of the fight was greatest. Around 1637, as he went about integrating Catholicism with Epicurus, busily preparing a chapter on fate and causality, he fell into a personal crisis. Materialism had led him down a path and now he saw what lay ahead: atheism, heresy. When Gassendi read Hobbes's *De cive*, his ally's materialism seemed to dictate that we lived in a world in which God did not intercede. Hobbes had created a system in which corpuscular physics made human fate nothing more than motion and matter.

While Pierre Gassendi fought to be free from dogma, he was also deeply committed to the freedom of individuals to pursue serenity and pleasure. A free God had made the world

and passed this capacity for liberty on to his children. His patron Nicolas-Claude Fabri de Peiresc had introduced Gassendi to some of the great *libertins érudits* of France, skeptics who pursued moral freedom like Gabriel Naudé, Elie Diodati, and the tutor of Louis XIV, François de La Mothe le Vayer. While scholars have suggested Pierre himself was secretly a libertine, Gassendi's pursuit of liberty never overrode his faith. Instead, the clash of these two imperatives created intense tension and paralysis, as he struggled to find a way to accommodate contradictory beliefs.

In 1645, thanks to the brother of Minister Richelieu, Gassendi garnered a professorial post in mathematics at the Collège Royal. However, endless revisions and hesitancy continually held him back from publishing. In 1647, he finally released his grip on a ten-year-old manuscript, his admiring portrait of Epicurus. Then two years later, after endless rewrites and a great deal of pressure from frustrated admirers, the reluctant philosopher released *Animadversione*, a three-volume work of more than 1,700 pages. Purported to be a translation of Diogenes, these books held reams of commentary. And smuggled into this wild tangle were hints of the philosopher's long-awaited synthesis. However, it was only in 1655, after his death, that the fruit of Pierre Gassendi's terrible inner struggles emerged.

Syntagma philosophicum was written during the last six years of Gassendi's life. In it, he reconciled doubt and faith, materialism and immortality, in a way that rejected the dogmas of the past as well as the modern dogmas of René Descartes. At the heart of his proposals was the conviction, expressed years earlier in his critique of the scholastics, that human knowledge was a highly limited enterprise. Knowledge was based solely on sensations and experience and therefore its truths were fallible and unsure. The professors at the Sorbonne eliminated uncertainty with doctrine. So too did Descartes with his creed that clear and evident ideas led to certain knowledge. Gassendi brushed aside Descartes's assertion that God would not delude us and acidly asked how Monsieur Descartes knew *that*?

Instead of such false certainty, Gassendi embraced epistemic modesty, the limits of human knowledge, and probability. If knowledge came from the processing of sensations, humans could know only so much. Claims that went beyond these boundaries were mere vanity. Where Descartes wrote "I am then absolutely a thing that thinks, that is to say a spirit, a soul, an intelligence, a reason," Gassendi found nothing but pomposity and a string of increasingly empty words.

Humans lived in an atomistic world, where sensations registered in the soul led to only highly partial, contingent understanding. Despite living in a mechanical world, human beings, as moral agents, were liberated to think and choose not between right and wrong, but rather between possibilities. If knowledge was partial, it could never be absolute or support tyranny. Skepticism led to liberty in thought and action. In this, Gassendi went far, though not as far as some skeptics like La Mothe le Vayer, who believed nothing could be truly known and therefore everything was permitted.

Readers had a right to be confused by some of these conclusions. If Gassendi claimed that the immortal soul registered half-truths and faulty impressions, how could it be God's gift to man? To solve this dilemma, Gassendi split the soul in half. Passive sensation was registered in a material soul, one common to brutes and humans. That soul performed tasks like simple apprehension, inference, and judgment, all of which were frail and imperfect. Another soul, however, was divine. This logic was transparently a matter of

convenience; it covered the philosopher's flank. However, its results upset centuries of doctrine. For against Descartes and his immaterial Cogito, Pierre Gassendi had asserted that in some ways, *matter could think*.

With that, Gassendi pushed open a door that had been locked. He cleared the way for natural philosophers to consider a material, thinking soul. Still, he did not believe man was nothing but flesh. His second soul was also a seat of rationality, one that allowed for volition, abstract thought untied to sensation, and universal kinds of understanding. *That* soul could not be known through Descartes's cunning sophistry, but only through faith. And as for this soul's nature, its relation to the body, its substance and faculties, all those things were impossible to fathom.

While these positions were not fully in print until the priest had left this world, many of them had burst forth in his angry quarrel with Descartes. Gassendi mocked Descartes's claim to know the soul by tricks and derided his pretension of doubting everything and pretending reality was a dream. Did Descartes walk off cliffs without apprehension, since the cliff was a dream? He did not. To speak like this was ridiculous. Fed up, Gassendi addressed his foe as "Spirit, (or whatever name you want to go by!)" The comment enraged Descartes, who retorted that such a comment could only come from a being made only of matter, "Flesh (or whatever name you want to go by!)?"

As the exchange grew even more heated, the two men consolidated their positions and mocked each other with these new nicknames. Mr. Spirit and Mr. Flesh relentlessly struggled over great questions regarding how exactly the Moderns, advocates of the new natural philosophy, would define the soul, inner being, thought, and the body. Mr. Flesh sarcastically congratulated Mr. Spirit on his great discovery, *the mind thinks*! However, he adamantly rejected as utterly unproven the assertion that animals were unable to think, and that the body contributed nothing to thought. Committed to a broader notion of the soul, Gassendi pressed Descartes: "Stop right there, Spirit!" he demanded. Are you just a thinking thing? And if you are a mind, aren't you part matter? Descartes dismissed many of Gassendi's questions, but to this he replied that the meaning of the soul had grown so dirty that it needed a good bath. He himself had cleansed the word of many false meanings: it meant only one thing—thought. *Anima* was *mentis*, *esprit* was *âme*, the soul was the mind, and the mind was the immortal, rational soul.

The battle between Mr. Spirit and Mr. Flesh was nasty, and a prelude to centuries of argument to come. In this exchange, Pierre Gassendi pointed out Descartes's Achilles heel. Gassendi demanded to know how an immaterial soul could possibly affect a material body and vice versa. With this, Descartes fell silent. In a letter to a colleague, he quipped: "Ignorant people can in fifteen minutes ask more questions of *this* kind than a wise man could answer in a lifetime, and that's why I am not answering either of them."

COMPETING MODERN VISIONS of the soul swirled about at the soirée hosted by the Marquess of Newcastle in 1647. For centuries, it seemed, humans had been deceived by Aristotle, Galen, and Ptolemy. The moderns believed they needed to be a new foundation for knowledge, one that took into account this lesson regarding false beliefs, and the imperfections of perception. Thus, new worldviews would end up resting rather perilously

on fine points regarding how one knew and thought. By placing such weight on the workings of what was the rational soul, these moderns were forced to closely reconsider not just its immortality, but also functions like understanding, imagination, and thought as well as their shadows, illusion, hallucination, and delusion.

This dinner party would be the first and last time these three titans of early modernity would meet. Only a year later, the conductor of these great debates, Marin Mersenne, died with Father Gassendi by his side. Thus ended one of the most extraordinary intellectual communities of the time. A number of informal scientific groups rose up to fill the void. For example, two supporters of Hobbes and Gassendi, Samuel Sorbière and Abraham du Prat, created a salon for physicians, philosophers, and experimentalists in the home of Henri-Louis Habert de Montmor, which formed the nucleus that founded the Académie des Sciences in Paris in 1666.

By then, however, the two other titans who tried to pull together a modern synthesis for Nature, man, and God, also had ended their days. In 1650, René Descartes developed a fever, rejected the bleedings of a court physician, one of his personal enemies, and relied on his own medication, wine flavored with tobacco. When that failed, the patient who had hoped his research would grant him the life span of Abraham and Methuselah, consented to be bled and soon thereafter became nothing but Cogito. In 1655, Father Pierre Gassendi also left this earth; he too was hurried into God's arms by the bloodletting of his doctor.

Unlike the others, however, Thomas Hobbes was granted the gift of a long life. He used his extra time well. A year after that evening with Descartes and Gassendi, at the ripe age of sixty, Hobbes finally sat down to write a work that would justify the admiration he had won from a wide circle of savants. In 1651, *Leviathan; or, The Matter, Forme, and Power of a Common-wealth, Ecclesiasticall and Civill* appeared: it offered a view of Nature and man that was materialist and mechanistic in the extreme. Matter made up humans, the brain, and consciousness alike; individuals coalesced like particles to form the body politic. There was no such thing as immaterial substance.

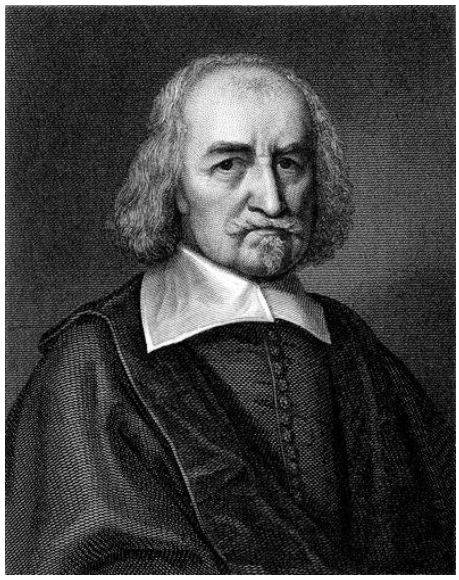

Figure 6. The author of *Leviathan*, Thomas Hobbes.

Setting aside his earlier ambitions, *Leviathan* left physics and biology to the side and elaborated the author's views on human nature and social life. Distressed by continual religious warfare, Hobbes's aim was to create a science of politics, one in which natural law established legitimate political authority. Often intended to undermine divine right, natural law was developed by, among others, the Dutch jurist Hugo de Groot, who was horrified by the "orgy of bloodshed" shed by warring sects in Western Christendom.

After completing *Leviathan*, Hobbes presented a copy to his young charge, the exiled Charles II. The future King of England, as well as his cousin, Louis XIV of France, should have been delighted, for Hobbes had turned materialism to their use. He constructed an exhaustive case for absolute monarchy as the natural political order, one where the king was the guiding consciousness of the people. However, even this fidelity did not prevent Hobbes from nearly being imprisoned. The author of *Leviathan* had placed the state above the church and railed violently against the superstitions that elevated ecclesiastic authority. Hobbes scampered across the Channel, a step ahead of Catholic authorities.

And so, in the end, the dream of unified knowledge died. A number of 17th-century thinkers set out to replace Thomas Aquinas and erect a comprehensive worldview, but no one could seamlessly bridge atoms, body, mind, the universe, the sociopolitical world, and the spiritual one. Instead, different savants devised ways of dividing these domains, not because they were unconnected, but because no one could determine how to connect them. Thomas Aquinas's idea of the soul, which once united classical Greece and the Vatican, Aristotle and Christ, gave way. Among a small band of modern thinkers, attracted to materialism and mechanics but also firm believers in God, the old ties no longer held. The soul's vast imperium came undone and in the resultant fragmentation, its pieces would be fought over, renamed, and, in newer guises, reemerge somewhere between science and ethics, matter and society.

Once the "knot of the universe," the soul transformed from an all-purpose answer into a series of nearly impenetrable problems. Books, pamphlets, and lectures on the soul, from the vantage point of metaphysics, history, and theology proliferated in the last decades of the 17th century. Most of these works were apologetics intended to defend the disintegrating order, but the very need, felt by so many, to pen these defenses spoke volumes about a growing anxiety and confusion.

Among these many commentators, there stood three giants whose fates all differed. For the next century, Thomas Hobbes and his radical materialism became a dark symbol of atheism, a charge he steadfastly denied. Among the Anglican elite, the horror inspired by his philosophy outweighed his staunch monarchism. His dangerous beliefs would be spoken of in whispers, rarely cited, and considered blasphemous, even Satanic. Still, he remained *de rigueur* reading for forward-thinking men and women of the Republic of Letters.

Hobbes faced another source of resistance. His proposed solution for consciousness and free will in a deterministic world depended on a dogmatic faith in the superiority of the sovereign, a common if increasingly challenged belief. Ordinary men, made of matter, had no free will and were compelled to jostle and push each other so as to seek out their own urgent wants, making life a horror show of conflict. Plebeians could not manage ethics at all, but the sovereign, usually a monarch, could and therefore should act for all. God-anointed leaders were the rational soul in the body politic. Only they could think, will, and

create. Hobbes's reliance on kings and princes to solve the problem of higher-order mental functions in a mechanical world would soon seem concrete, reactionary, and vacant. Even in the court of Charles II, the elderly philosopher was treated like a bear to be baited and tormented but not taken seriously. And if the philosopher expected the universities to alter his reputation after the Restoration, he would be disappointed. In 1683, four years after his death, Oxford paid homage to Thomas Hobbes by burning his books.

The reception of Pierre Gassendi in his home country was no less troubled. His rehabilitation of Epicurean hedonism encountered repulsion and disbelief. Furthermore, the great payoff for adopting Gassendi's philosophy—probability and uncertainty—was not exactly a full meal for those raised on scholastic certitude. With his hybrid notion of the soul, Gassendi seemed the lesser Christian in his debates with the more orthodox Descartes. And he didn't help himself. As a propagandist for his own cause, this ponderous scholar stuck to Latin and was no match against the sharp rhetoric of his adversary, whose powerful arguments found their way into the vernacular and transfixed French readers.

While in Montpellier and Paris Gassendi's philosophy of probability attracted a smattering of followers, they never coalesced into a devoted community. After the priest's death, Gassendi's reputation sagged, especially after 1656, when his personal physician and most ardent promoter, the Montpellier doctor François Bernier, took a job in the court of the Great Mogul of India and effectively dropped off the map.

Bernier shipped off as committed Cartesians in France and the Netherlands were massing. As early as 1637, a number of learned men began to take Descartes as their master. A professor of medicine in Utrecht, Dr. Henrick de Roy or "Regius" can be counted as one of the first diehard Cartesians. His promotional efforts helped get his hero's work banned in his hometown, but Regius would not be deterred and eventually recruited more followers. In France, Cartesianism became fashionable as the view of opposition aristocrats, those who rebelled against Louis XIV. In salons, religious orders, and schools, Descartes's writings began to be read. A papal edict against his works in 1663 and a royal decree a few years later could not hold back a rising tide that made this compromise popular.

René Descartes's dualism would move to the foreground in Catholic France. For while his thought ceded Nature to mechanical science, he preserved enough of the old soul to be theologically safe. With this doctrine, believers did not need to change their core views, for their immortal soul was left intact. As for Descartes's transformation of lions and elephants into machines, that mattered little, for his Cogito contained the supernatural beliefs of his creed. Counter-Reformation Catholics could embrace this version of modernity without losing faith. His soul was packaged for the Catholic conscience, for it was the product of one. Increasingly, many adopted the Cartesian compromise with its red line between Nature and thought, mechanized bodies and immortal souls.

In scientific salons around France, Gassendi gave Descartes more of a fight. Epicurean notions were admired at Montmor's illustrious academy, and when Henry Oldenburg, the secretary of the Royal Society in England visited Paris, he reported that the academies seemed tilted toward the priest from Provence. For a short while, the Sun King's own Academy of Sciences in Paris took an anti-Cartesian stance; however, by 1700, the Academy followed the schools in France and became Cartesian.

For some skeptics, the early 18th century ascent of Descartes signified the victory of one dogma over another. The rise of this new Cartesian philosophy with its logical certainties continued despite stinging critiques that Cartesians never could answer. As Pierre Gassendi pointed out, no one could adequately explain how an immaterial Cogito could control a material body. In Cambridge, Henry More's enthusiasm for Descartes waned as he encountered this problem, and grew concerned that this philosophy made a mess of the soul's agency. Others mocked his notion that animals were machines. The French poet Jean de La Fontaine took up his pen and wrote fables with sophisticated animal characters that satirized Descartes's belief that beasts were windup toys. Nonetheless, the master's divisions continued to win ground. His segregations of Nature and the soul became a new faith, a new common sense. There could be no natural home for inner life and no Baconian study of the inner world. Mr. Spirit, it seemed, had won.

However, across the Channel in Oxford and London, Pierre Gassendi found a few converts in a small community of Protestant scientists, "natural philosophers" as they were then called, whose influence would become increasingly profound. While victorious French Cartesians drove a stake in Mr. Flesh, they would find his ideas rising up to challenge them thanks to a new generation armed with scalpels and glass tubes filled with chemicals, men wrist-deep in brains and nervous juices who were not guided by the logic of "Cogito, ergo sum," but who rather eagerly pursued the anatomy of the soul compelled by the haunting proposition that matter alone could think.

CHAPTER

4

A Crisis of Conscience

THE 17TH-CENTURY discourses on witchcraft, melancholia, and enthusiasm manifested a shift in the old divisions between the soul and the body. These phenomena, once clearly defined theologically, now had become controversies that existed in the nebulous border region between religion and medicine. While Robert Boyle confidently pursued natural science and reserved the realm of spirits for his faith, early modern physicians entered a murky borderland where the claims for the soul were in direct conflict, not just with a mechanized or chemical natural world, but also with social and political demands.

This medicalization of some soul phenomena was not simply a collective turn to reason. Rather a crisis had settled over Western Christendom as heterodoxy undermined claims of authority based on divine knowledge. The sacred miracles of one community were decried as the Devil's work by other sects. If, for some, the Pope was a holy, revered figure, for others, he was a possessed Antichrist. Hence, the debates of a few philosophers—who argued over the realm of the soul and the material claims of the brain, the body, and Nature—became implicated in the religious wars of the many. Was a witch truly possessed, or melancholic? Was George Fox a prophet or a terrorist twisted by enthusiasm? In the face of these volatile questions, a growing number turned to answers from earthly sources.

To confront these disruptive problems, a few doctors began to suggest that the faculty of reason, that defining function of the rational soul, itself could become sick. Medical explanations expanded to take up the soul's perturbations. Even devout citizens were eager to accept the notion that claims for possession or commands at insurrection heard from God were not real, but rather madness. Exhausted from decades of bloodshed, the authority of the competing Christian churches lost sway and such secular conceptions inched forward.

However, these often theatrical and explosive controversies like that of James Nayler or the nuns of Loudun were but the most visible demonstrations of a deeper and more ubiquitous problem that troubled the feudal order. The rise of Christian heterodoxy and the simultaneous ascent of scientific materialism undercut the very basis for ethical conduct.

During the Classical Age, moral life was predicated on a balance between the passions and reason. Plato considered reason powerful enough to control these desires. The Stoics agreed. Passions, they believed, were simply false judgments that reason could correct. During the late 16th century and early 17th century, a revival of Stoicism emerged in France and the Netherlands led by thinkers like Justus Lipsius and Guillaume du Vair. In their own way, each highlighted the famous Delphic injunction, "Know Thyself," for they insisted that rational insight could serve as a regulator of behavior and work as a moral compass.

Aristotle was never persuaded of reason's power, and a long line of theologians from St. Augustine to Thomas Aquinas agreed. Passions were not errors, but rather fixed parts of human nature. These urges could be managed, but never vanquished. In the Thomist view, unruly passions were common to all beasts, including mankind. However in humans, these cravings traveled to the stately home of reason where they were subdued. When passions overtook the rational soul, illness and vice ensued. Aristotle counseled men to reign in these inner forces, while Stoics sought their elimination. Throughout Christianity, this was an organizing drama of daily existence. Passion-driven sins and temptations must be controlled, but thanks to the God-given soul, humans were up to the task.

Figure 12. This 1641 frontispiece shows reason as a divine grace that chained the passions.

As Protestant sects grew, the importance of the individual conscience expanded. Without a priest to offer confession and absolution, each man was left alone to judge his own inner world and guess his everlasting fate. After his conversion to Calvinism, Cromwell himself fell into despair, tormented by the worry that he was not one of the Elect destined for Heaven. In 1678, John Bunyan wrote: "How can you tell if you are elected? . . . My thoughts were like masterless hell-hounds; my soul like a broken vessel, driven into the winds, and tossed sometimes headlong into despair." With the stakes being no less than eternal torture, the reliability of one's conscience became central to Protestants.

However, by the late 17th century, early modern thinkers like Descartes, Gassendi, and Boyle had sought to alter these old views. The passions would be renamed: those who

considered them the result of inner motion spoke of "emotions." As a mechanical and chemical human body assumed the functions of the sensitive souls, only an immaterial spirit stood in the way. For modernists, the battle for salvation now seemed to pit a clanking machine against something holy. In 1681, Andrew Marvell in his poem "A Dialogue Between the Soul and the Body," captured this weird mix of metal and spirit:

Oh who shall, from this dungeon, raise
A soul enslaved so many ways?
With bolts of bones, that fettered stands
In feet, and manacles in hands. . . .
A soul hung up, as 'twere, in chains
Of nerves, and arteries, and veins. . . .

Could pumps of flesh be contained by a spirit? How was it even possible for matter and its opposite to intersect? Some quickly recognized the profundity of this challenge to the divided world of science and faith that the moderns had fashioned; one of them was the philosopher most responsible for that division, René Descartes.

GALENIC MEDICINE WAS primarily a closed system in which alterations in the body's fluids caused disease. However, Galen and his followers did allow for six environmental disturbances that might disrupt these inner workings. These "non-naturals" remained a part of medical logic until at least 1800. For Robert Burton, the list included diet, air quality, exercise, sleep patterns, bodily intake and evacuation, and, lastly, excess passion. With this last of the nonnaturals, Galenic medicine held a small place for illness that might be considered moral.

In ancient Greece, intense passion played a critical role in theories of madness. Influenced by the Stoics, Galen considered unruly feeling to be an assault on the body. It shook one by the shoulders, sent fumes flying about, and rattled the soul. The heart—which he believed to be the seat of all passions—when disrupted, made noxious vapors that traveled through secret channels to the brain, where the result was melancholia or frenzy. Never at a loss for support from the classical canon, Robert Burton supported this logic with lines from Horace, who wrote:

By yesterday's excesses still oppressed,
The body suffers not the mind to rest.

Most doctors agreed that excess passion caused disease, but the descriptions of those passions varied widely. Burton himself employed old terminology that divided feelings into the "irascible," which were complex and powerful, and the simpler "concupiscible," which were desirous. Some classical authorities believed the four wheels on the human chariot were love, hope, hate, and fear. Others substituted joy for love, or added desire and sorrow to the inventory. Aquinas was not satisfied until he distinguished eleven passions. And it

did not stop there, as other authors sought to construct complex entities out of simpler ones and thereby account for shame, envy, malice, vengeance, ambition, and covetousness.

And so, this single nonnatural cause opened the floodgates for Galenic doctors to imagine emotionally based illness and consider ways to reign these in. Primitive forms of psychotherapy focused on Stoical philosophy. Galenic doctors counseled patients to avoid long and extreme feelings of grief or anger or jealousy. Such admonishments pervaded Elizabethan theater, such as Shakespeare's *All's Well That Ends Well*, where a girl mourning her father was counseled to snap out of it, before excessive grief unhinged her.

Furthermore, such perturbations might not just make one mad; they also might undo a whole people. In 1601, the English author Thomas Wright opened his extensive work on the passions by observing their importance for the body, the soul, and the nation. First, passions altered the humors. Second, they "trouble wonderfully the soule" for good Christians; they induced vice, corrupted judgment, and seduced the will. When out of control, individuals, then communities, become frenzied. Wright told of a "Christian Orator" who could "effectuate strange matters in the minds of his Auditors." This preacher could twist his audience into tears, then turn them to laughter. He had the power to make his listeners lose their senses and run riot.

Thanks to his Jesuitical convictions, Wright was repeatedly imprisoned and finally banished from England. He dedicated *The Passions of the Minde in Generall* to Shakespeare's patron, the Earl of Southampton, in the hopes that his famously pugnacious lord would be delivered from his own fervors. However, the moralist in Wright insisted on a broader point. The passions were naughty servants who tried to defy their master. Bathed in corporeality, they could not defeat the ethereal ruler on her throne. The almighty soul was to govern the body and guide the passions as "subjects and vassals." As God reigned over man, and a king ruled his subjects, so did the soul control the passions. Passions could rebel against reason; similarly, a nation could be caught up by revolts or general sedition and be torn apart by its wild-eyed members. Perturbations of the soul led to madness, vice, and warfare.

Like many tracts on the passions that began to appear during this tumultuous time, Wright sought to keep his feet planted firmly in the Old World: for him, Nature, Christian ethics, and monarchist politics were three pillars of the same civilization. *A Treatise of the Passions and Faculties of the Soul of Man* written in 1640 by Edward Reynolds held the same assumptions. The prince was the "soul of the Commonwealth." In the same way that the body politic could send its passions and false reports to the prince, the body machine could misdirect the soul. Those called good or evil were made so by their passions. For the disturbed and tormented, Reynolds recommended moderation along with Christian repentance. Faith, education, and good habits strengthened the rational soul against its sometimes frenzied invaders.

Reynolds's *A Treatise of the Passions* was dedicated to Princess Elisabeth, daughter of the Queen of Bohemia, a reader eager to consider such matters. Around that time, however, the brilliant, multilingual, dark-haired beauty, so astute that she was nicknamed the "Grecian" by her siblings, had fallen under the sway of another counselor. In 1643, she had commenced an intense correspondence with Descartes, in which she pressed this thinker to more fully address the problems *he* had created, the same problems René had disdained when his nemesis, Pierre Gassendi, had raised them.

Cartesian metaphysics always suffered from a grave difficulty. Challengers asked how two different substances, one immaterial and the other material, could affect each other? Among the growing band of Cartesians, "occasionalists," most famously the ingenius Nicolas Malebranche, rose up to defend the belief that no such interactions took place, thereby further segregating the immortal Christian soul from the body. This, however, only raised more questions and prompted endless metaphysical duels.

Descartes had little patience for all this. However, the pressing queries from the princess were different. In May of 1643, she asked, if the mind had no extension, how could it propel the body? Under her persistent queries, the philosopher confessed that he had no idea. He called for a new "Human Science" to solve this problem, but he didn't just drop the subject. For Elisabeth's questions were not merely academic; the princess suffered from severe melancholia. And so the intense devotion between the Frenchman and the free-thinking Princess steered away from loftier considerations to discuss her passions and the burden they placed on her. After 1643, in these intimate exchanges, Descartes worked out the details of a new theory, which he put into practice. Elisabeth dubbed him the best doctor for her soul.

In 1649, Descartes's last work, *The Passions of the Soul*, was published with a dedication to the princess. In it, the author distinguished himself from those of his followers that denied consciousness and the body ever mixed. During his years immersed in animal dissections, Descartes had told Mersenne that he hoped to locate imagination and memory somewhere in the flesh of the brain. "I doubt whether there is any doctor who has made such detailed observations as I," he declared. During these studies, he stumbled upon a small olive-sized structure at the center of the brain known as the pineal gland. In his unpublished "Treatise on Man," written in 1637, Descartes had constructed a theory in which that little protuberance held enormous significance. It was the precise place where the immaterial Cogito attached to the body. We see only one image with two eyes, hear one sound through two ears. Therefore, the soul must unify our senses. The pineal gland might be, no it *was* the center of that unification. Thereafter, it also became the precise location of the rational soul.

A dozen years later, Descartes further developed this idea. The pineal gland was the meeting place between the soul and the mechanical disruptions that came from memories, sensory information, passions, appetites, and bodily forces. Passions did not originate in the heart and work through their way to the head through vapors. Passions were forces in the brain communicated to the Cogito through this little gland. Descartes imagined that the pineal gland must vibrate back and forth to convey desire. For example, the impulse to run would spur the little gland into rotary action. The soul, in turn, sought to push and pull the pineal gland as it saw fit. The struggles of conscience, the dark night of the soul now seemed to have been reduced to the swirling of a little bulb in the brain.

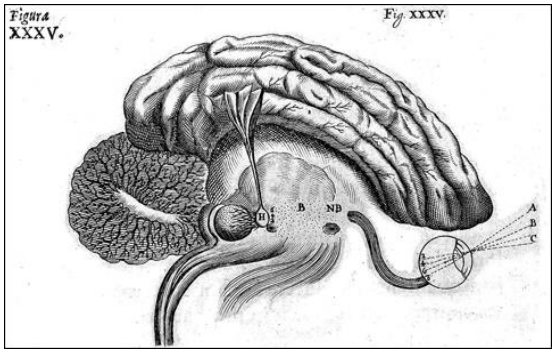

Figure 13. Descartes concluded that the pineal gland (labeled "H") was the seat of the soul.

This model had important medical applications. In 1645, the princess wrote Descartes to complain of a fever and cough. He promptly informed her that this was due to sadness. He advised her that great souls do not abandon themselves to their passions; their reason must subdue such affects. Elisabeth thanked him for this advice. Encouraged, Descartes elaborated further. Imagine a man who constantly immersed himself in pitiful tragedies, and another who despite his share of misfortune, directed his imagination toward things that could furnish him with contentment and joy. This exact psychic treatment was the one he had imposed upon himself, when after his mother died days after his birth, his own weak constitution and lingering ills often made others think he was not long for this earth.

This Stoical cure was echoed in *The Passions of the Soul.* The soul must hold on during great commotions. Weak souls fail to resist and become prey to hatred, desire, sadness, and love; they become enslaved and unhappy. For while positive passions fortify good thoughts and feelings, negative passions harm us by prolonging bad ideas and feelings. One's pineal gland was groomed in "our earliest years," but it could be reeducated and linked to new thoughts and new capacities, much like an animal can be trained. The goal was to have an "absolute empire over all the passions."

Descartes's theory meshed with traditional Christian ethics. While passions could drive the will of a man as in the case of melancholic desperation, human beings possessed the capacity to control these feelings. Virtue and happiness were predicated on the soul's management of the mechanical disruptions from the body-machine. However, Descartes's call for a human science perched between the soul and the body-machine was novel. In his attempts to bridge inner experience and bodily input, his efforts were no longer traditionally Christian, but something stranger.

Descartes's *The Passions of the Soul* was widely debated. Its most lasting innovation was to relocate passions from the heart to the nervous system. All Descartes needed to make his neural machine mesh with thought and rise into being, was that pineal nub in the center of the brain. News of the Frenchman's claims regarding that pineal gland spread. While welcomed by dedicated Cartesians like Regius, this discovery proved to be a disaster. While Henry More attacked this notion as nothing more than speculation, Nicholas Steno's 1666 lecture in Paris, which questioned some of Thomas Willis's assertions about the brain,

saved special contempt for Descartes's pineal gland theory. Steno's criticism made its way to Huygens and the Academy of Sciences and raised doubt with French anatomists. However, the most lethal rejoinder came from Thomas Willis. In his *The Anatomy of the Brain*, Willis let it be known that animals of all sorts, including the most cruel and brutish, had supremely well-endowed pineal glands. The celestial soul of humans did not reside there. By the 1670s, according to Spinoza, such theories provoked only ridicule and disgust.

WHILE DELIVERING a crushing blow to Descartes's theory of soul-brain interaction, Thomas Willis did not have a better solution. Like the Frenchman, he had done much to naturalize much of the Thomist vegetative and sensitive souls, while carefully preserving an immaterial place for reason and the rational soul. Nonetheless, if the pineal gland was an absurd suggestion, Willis had no better one for how an immaterial soul could interface with nervous matter and contain the passions.

As the basis for ethical conduct was debated, civic strife reigned. After the Restoration of Charles II, Anglicans and moderate Dissenters both longed for a way to preserve social stability, by creating individuals whose liberty of conscience could be protected, because their passions were in check. With that goal in mind, Thomas Hobbes proposed a radical solution.

In *Leviathan*, Hobbes was remorselessly, single-mindedly materialistic. He argued that Heaven and Earth, as well as God and the soul, were made of matter. This stance was in part the result of "the disorder of the present time," phenomena like the Thirty Years War, decades of religious extremism, and sanctified terrorism, in which competing spiritual groups ravaged the body politic. Only through a dry-eyed analysis of individual conduct could one comprehend this "madness in the multitude."

Passion and reason, for Hobbes, were both matter in motion. However, the frenetic movement inspired by lust or joy or hate led Hobbes to conclude that reason provided a rather weak restraint. Given the dominance of animal feeling, individuals were doomed to be the playthings of their passions, easily provoked by their own selfish desires and in constant conflict with each other. Their dearest pleasure—power—drove them. Reason and ethics were slaves to this tyrant. Things that were vehemently desired always seemed to be ratified as noble. That which was despised just as easily was rationalized as vicious. Men never could peacefully coexist, for their natural state was selfishness, all versus all, a life, in his famous phrase, "solitary, poor, nasty, brutish and short."

Passion made men not just rapacious, but also crazy. Vainglorious or dejected feelings led to insanity, as was clearly evident from religious enthusiasts, whose folly of believing themselves inspired allowed them to rage against the laws of the nation and pursue their own selfish ends. Troubled minds of this sort were far from rare; Catholics who accepted transubstantiation and the Pope's infallibility were lunatics. So were many criminals, possessed demoniacs, and an array of modern Protestant prophets. These disturbed individuals created and sustained superstitions:

> From the ignorance of how to distinguish dreams, and other strong fancies from vision and sense, did arise the greatest part of the religion of the Gentiles in time past, that worshipped satyrs, fawns, nymphs and the like, and now-a-days the opinion that rude people have of fairies, ghosts, and goblins, and of the power of witches.

Liberty of conscience meant such unhinged believers could freely declare that their folly was inspired. In a society where everyone was a prophet, no one was safe. To live in peace within such a dangerous, deluded tribe, Hobbes could see only one choice: individuals must give up some personal liberty and hand it over to an absolute monarch. What others might call a tyrant, Hobbes called a sovereign whose job was to regulate a population filled with brutes and fanatics.

Unlike those early moderns who placed their faith in the power of the rational soul, Hobbes considered that faculty to be a machine quite prone to error. All around as he surveyed his brethren, he found false beliefs, bad logic, and imaginings taken as reality. In this, he mirrored the conclusions of Sir Thomas Browne, whose 1646 *Pseudodoxia epidemica, or Vulgar Errors* detailed volumes of absurdities that reasonable folk accepted, from belief in griffins, phoenixes, unicorns, and mermaids, to myths about biblical times. For Hobbes, reason was frail and fallible. The sole assurance that we did not exist in a dream came from our senses, our brains, and our minds. And thought disorders—not just passions overrunning reason—but illnesses in the rational faculty itself, must be "rightly numbered amongst the many sorts of madness."

If the intellect could be ill, it was also our only hope. A nominalist who leaned heavily on the universal meaning of words, Hobbes placed great weight on "mental discourse," the natural processes by which the perceptual, naming, logical, and imaginative functions churned together to make for human understanding. Names linked into general affirmations, then syllogisms, to make up thought. Such was the process that men called being conscious. Reasoning for Hobbes was computation, a kind of logical accretion and subtraction of meaning. By this account, one could discern which kinds of mental discourse added up, and which ones veered off into lunacy. Therefore, the claims of conscience were analyzable. It was not the word of God written in men's hearts, but another mental operation, that could be evaluated. Logical grounds existed to declare some acts of conscience legitimate and others folly.

Anticipating a storm of criticism, the author of *Leviathan* ruthlessly critiqued defenders of ethics who based their analysis on the rational soul. What, he asked, could a Cartesian phrase like "immaterial substance," or "free will" or "free subject" possibly mean? Any examination revealed nothing more than a descent into meaningless self-contradiction. Wills and subjects were by definition not free. Substances were material.

Hobbes dared to go further and explain how functions previously attributed to the soul operated. The inner world began as an empty warehouse. Outward turbulence provoked nerve activity from the senses that was then formulated by our imagination. Information was strung together and unified into what he called "associations." These secretly connected thoughts "run over all things, holy, profane, clean, obscene, grave and light, without shame or blame. . . ." When supercharged with passion, associations transform into zealous beliefs. For those who heard voices from the other world, the passions had been victorious.

Safely ensconced in Paris, Thomas Hobbes watched as war ripped at his homeland. Without the soul, without a unified Church, the tutor of the future King of England believed there was only one solution. The monarch must protect the general Commonwealth from waking dreamers, ranting zealots, and the rabble. In a world of matter and motion, where passion so easily took hold of reason, where warring religions justified ethical injunctions to kill, social order would need to rest with the state. An absolute monarch could act as ethical reason for the body politic, reigning in its wild desires. There was no other way, or so Thomas Hobbes concluded.

THE BREAKDOWN OF scholasticism and the religious wars in Europe led to grave concern about a linchpin of the Old World, the human soul. By the second half of the 17th century, philosophers such as Descartes, Hobbes, and Gassendi sought to find a place for this human essence in a mechanical world. Scientists and anatomists pushed the boundaries by exploring the brain and searching for that impossible space, a home for reason and eternal consciousness. As competing claims to absolute truth polarized and in part undermined religious authority, doctors and clerics renegotiated the boundaries of the natural and the supernatural, madness and soul sickness, when considering diseases that traditionally resided between body and soul, such as enthusiasm. Some worried about the nature of ethics in an increasingly natural world, one where nothing divine held back a man's animal cravings, a fallen world where the rewards of Heaven and the pains of Hell did not backstop law and order.

All this meant that between 1650 and 1700, a torrent of writings appeared focused on the anatomy of the soul and the brain, the perturbations caused by the passions of inner life, novel models of consolation for the tormented and disturbed, articulations of politics, rhetoric, and logic that analyzed and situated the intellect anew, and medical works on madness that took stock of an array of disturbances once considered soul disorders.

To be sure, much of this work was apologetic in nature. Many authors wrote with the hope that they would keep the Old World from breaking apart. A growing minority, however, took steps toward the profane idea that the rational soul and its highest functions might be material, prone to illness and errors, and not divinely endowed. No one went as far as Thomas Hobbes in making these claims. However, the strained refutations and partial calls for reform would lead to a break and a new theory for human reason that would be of monumental consequence.