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philosophy, physics, anatomy, and biology. He was a strong exponent of experimentation and **Cartesianism** and a member of the famous Société des Lanternistes.

During 1665–71, Bayle met and worked with **Pierre-Sylvain Régis**, a student of **Jacques Rohault**, who was sent from Paris to offer courses on Cartesianism. Bayle's *General Systeme of the Cartesian Philosophy* appeared in 1669 and contains the first complete statement of Descartes' system. It is adumbrated but complete; it includes topics ranging from **metaphysics** and logic to plants and **animals**. Of note, given Bayle's concern with the role of experience in science, is the inclusion of the three grades of sensory response from Descartes' Sixth Replies (AT VII 436–38, CSM II 291–95) (see **sensation**).

By 1670, Bayle habitually opened the Cartesian conferences, lecturing on curious medical cases, such as his study of a twenty-five-year pregnancy. He believed that such "freaks of nature" play an important role in the progress of science, piquing the curiosity of the scientist and motivating him to tedious study. With the publication of *Dissertationes medicae tres* in 1670, Bayle's work and merit were recognized by the Royal Society of London and the Académie des sciences in Paris.

Bayle's *Discourse on Experience and Reason* (Lennon and Easton 1992) carries the subtitle: "In which it is shown the necessity of joining the two in physics, in medicine, and in surgery." Bayle criticizes placing reason above experience and failing to draw on reason to identify **causes**. He praises Descartes' genius for identifying causes while cautioning the lack of sufficient observations for conclusions concerning the movement of the **heart** and the function of the **pineal gland**.

In addition to his activities as reformer, teacher, scientist, and physician, Bayle served as adviser to the Parlement of Toulouse in 1681 when summoned to examine multiple cases of alleged demonic possession. Against the common superstitions of the townspeople, Bayle offered a naturalistic **explanation**, which carried the day.

Much of his later writings concerned topics in physics, anatomy, and plants and **animals**, subjects treated in his most substantial work, the *Institutiones* (1700–1). He died on September 24, 1709, at his home in Toulouse, at the age of eighty-seven.

See also Cartesianism; Experiment; Explanation; Medicine; Régis, Pierre-Sylvain; Rohault, Jacques

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PATRICIA EASTON

BAYLE, PIERRE (1647–1706)

Born at Le Carla, Bayle studied **philosophy** at Puylaurens and Toulouse before teaching at the Protestant Academy of Sedan and finally at the École Illustre of Rotterdam. He is best known for his *Dictionnaire historique et critique* (1st ed., 1697; 2nd ed., 1702) and for several philosophical works: *Pensées diverses sur la comète* (1682) against superstition, *Commentaire philosophique* (1686–88) on religious toleration, and *Entretiens de Maxime et de Théophile* (1707) on the problem of evil (to which **Leibniz** responded in his *Theodicy*). Bayle died in Rotterdam.

Cartesian themes run throughout Bayle's writings, but he devoted only three early works (ca. 1680) explicitly to elements of Descartes' philosophy: the *Dissertatio* (1964–, 4:109–32), in which the account of **body** in terms of *res extensa* is defended (see **extension**); the *Theses philosophicae* (1964–, 4:132–45) on twelve diverse topics; and the *Objectiones* (1964–, 4:146–62) to Pierre Poiret's 1675 *Cogitationes rationales*, in which Poiret grounded Christian theology on Cartesian **metaphysics**. In several articles of his *Nouvelles de la république des lettres* of 1684–87 (1964–, vol. 1), Bayle also engaged in the debate between the Cartesians **Malebranche** and **Arnauld**. It is notoriously difficult to discern Bayle's intentions in these or any of his works, such that it is now common to speak of the "Bayle enigma" (see Lennon 1999). Not surprisingly, then, the literature presents various approaches to understanding the general relationship between Bayle and **Cartesianism**.

Paganini (2008) argues as follows that Bayle's skeptical arguments contributed to the demise of Cartesian metaphysics. In remark B of the article "Rimini" in the *Dictionnaire*, Bayle commented on a discussion in the **Second Replies**. Descartes was informed that the fourteenth-century theologian Gregory of Rimini taught that **God** could deceive, if only to bring about a good effect. Bayle argued that Descartes' reply effectively conceded Rimini's thesis and concluded that Descartes' metaphysics, relying on absolute divine veracity, was thereby "ruined." Moreover, in his discussions of the problem of evil (e.g., *Dictionnaire*, "Manichéens" and "Pauliciens"), Bayle sought to demonstrate the impossibility of theodicy, thereby undermining Descartes' Fourth Meditation (see **error**, **theodicies** of).

Others emphasize Bayle's debt to Descartes. Labrousse (1963–64) argued that the *Dictionnaire* represents Bayle's transposition of the Cartesian **method of doubt** from metaphysics to the domain of history. While the Cartesian metaphysician accepts only what is clearly and distinctly perceived, the Baylian historian accepts only what is contained in or derivable from documented evidence. Ryan (2009) provides specific examples of Bayle's debt to Descartes and Malebranche in metaphysics: the ontology of **substance**, the conception of matter as pure extension, **dualism**, and the Malebranchian distinction between **ideas** and sentiments. Against Bayle's self-description as an impartial reporter of debates, Ryan argues that these Cartesian theses represent strong commitments in Bayle's writings.

See also Calvinism; Cartesianism; Error, Theodicies of; Malebranche, Nicolas

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MICHAEL HICKSON

BEAUGRAND, JEAN DE (1595–1640)

Beaugrand was both a lawyer and a mathematician. Descartes had contempt for him, saying so in so many words (AT II 25, CSMK 89). Descartes' condemnation was strong, even by his own standards, referring to Beaugrand's appeal to living authorities in mathematical matters as testifying to his impudence and effrontery no less than his ignorance, and to his book on "geostatics" as so impertinent, ridiculous, and detestable as to cause wonder that anyone should have read it (those who

did so generally shared Descartes' view, if not his language in expressing it) (AT III 188–89). Indeed, in reaction to a letter of his that **Mersenne** conveyed after his death, Descartes urged that no more be sent because he already had enough toilet paper, which was the only use for Beaugrand's correspondence (AT III 437).

It is not irrelevant to these hard words that Beaugrand had accused Descartes of borrowing from Vieta, whose work Beaugrand had edited, and Harriot in his *Geometry*, which he had occasion to examine as secretary to the *chancelier* when Mersenne on Descartes' behalf submitted the *Discourse on Method* and accompanying "Essays" for the *privilege* to publish. Nor is it irrelevant that Beaugrand himself was soon accused of plagiarism. Accusations of this sort are multiply difficult to deal with, but perhaps the most relevant feature for contemporary readers of Descartes is the perception of them in the period. **Pascal's** account (unaltered in its basic features by **Baillet's** later version, which nonetheless differs in some respects) is that Beaugrand sent to **Galileo** unsigned copies of solutions to problems concerning the cycloid by **Roberval**, **Fermat**, and Descartes, and did so in such a way as to lead one to think that the solutions were his own. (The *imbroglio*, on this account, was extended when upon Galileo's death the material was passed to Torricelli.)

See also Baillet, Adrien; *Discourse on Method*; Fermat, Pierre de; Galilei, Galileo; Mersenne, Marin; Pascal, Blaise; Roberval, Gilles Personne de

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THOMAS M. LENNON

BEECKMAN, ISAAC (1588–1637)

Beeckman was born and raised in the city of Middelburg, capital of the Dutch province of Zeeland, where his father had established himself as a candlemaker. Owing to his father's difficulties with the Reformed Church in Middelburg, Isaac was sent to the Latin schools at nearby Arnemuiden and Veere, before entering Leiden University

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DENIS KAMBOUCHNER

SOUL, IMMORTALITY OF THE

The full title of the first edition (1641) of Descartes' most renowned work was *Meditations on First Philosophy in Which the Existence of God and the Immortality of the Soul Are Demonstrated*. On the basis of this title one would expect to find within that text equal effort devoted to proving the immortality of the soul and to proving the **existence of God**. Yet, while the latter is given abundant treatment in two separate meditations (3 and 5), neither the noun *immortalitas* nor the adjective *immortale* appears even once in any of the six meditations. Appropriately, the title of the second edition (1642) of the *Meditations* lacked any explicit reference to immortality and promised only to demonstrate, in addition to the existence of God, "the distinction between the human soul and the **body**."

There is good reason to ask, therefore, at least in the case of the *Meditations*, whether Descartes intended to offer any rational support for belief in the immortality of the soul. A negative response to this question is suggested by epistolary evidence that Descartes himself did not choose to mention immortality in the title of the 1641 *Meditations* but that **Mersenne** was responsible for the inclusion: "I am finally sending you [Mersenne] my work on **metaphysics**, which I have not yet put

a title to, so that I can make you its godfather and leave the baptism to you" (AT III 238–39; CSMK 158; see Fowler 1999, 35–53, for the debate on this authorship). However, it will become clear from texts undeniably penned by Descartes that he intended early in his career to prove the immortality of the soul and that he eventually believed that he had offered the strongest possible demonstration for immortality.

A decade before publishing the *Meditations*, in 1630, Descartes expressed to Mersenne his eagerness to complete a "little treatise of Metaphysics" wherein he "set out principally to prove the *existence of God and of our souls* when they are separate from the body, from which their immortality follows" (AT I 182, CSMK 29). Insofar as Descartes is here referring to a metaphysical separation of the soul – its real **distinction** from the body – then this passage is an early indication of Descartes' belief that the immortality of the soul follows from his **dualism**, a point he will raise and develop multiple times in later writings, beginning with the *Discourse on Method*.

In *Discourse V* (1637), Descartes gives a mechanistic account of several functions of the human body, thereby likening humans to both **animals** and **automata**, but then he distinguishes humans from the latter two through the use of **language** and the greater range of activities humans can perform. Descartes concludes the discussion by relating it to immortality:

When we know how much the beasts differ from us, we understand much better the arguments which prove that our soul is of a nature entirely independent of the body, and consequently that it is not bound to die with it. And since we cannot see any other **causes** which destroy the soul, we are naturally led to conclude that it is immortal. (AT VI 59–60, CSM I 141)

Because human life cannot be reduced to the sum of the **motions** of the human body in the same way that (perhaps) animal life can be, **human beings** have reason to hope that the end of their bodily life does not spell the end of the soul's life.

In November 1640, Descartes sent the manuscript of the *Meditations* to Mersenne along with a Dedicatory Letter to the Sorbonne. At the outset of the dedication, Descartes remarks that "God and soul [*anima*]" are topics for which **philosophy** ought to offer *demonstrative* proofs; that faith suffices for believers to accept immortality, but that unbelievers require rational arguments for immortality before they will accept it and before they can be motivated to act morally (see **faith, religious**). Descartes expresses his intention to satisfy the 1513 Lateran Council's injunction on Christian philosophers to refute arguments that conclude that the soul dies with the body and to prove the contrary thesis. However, toward the end of the dedication, when Descartes lists the propositions that he can prove in the *Meditations* with "such a pitch of clarity that they are fit to be regarded as very exact demonstrations,"

God exists and that the **mind** (*mens*) is distinct from the body" (AT VII 5–6, CSM II 6; see Fowler 1999, 161–75, for "mind" versus "soul" in Descartes' discussions of immortality).

Mersenne was evidently disappointed with the *Meditation's* treatment of immortality, for Descartes wrote to him on Christmas Eve, 1640:

You say that I have not said a word about the immortality of the soul. You should not be surprised. I could not prove that God could not annihilate the soul, but only that it is by nature entirely distinct from the body, and consequently it is not bound by nature to die with it. This is all that is required as a foundation for religion, and is all that I had any intention of proving. (AT III 266, CSMK 163)

To clear up any future misunderstanding of his intentions regarding this subject, Descartes promised Mersenne to write a Synopsis that would preface the *Meditations*. This short piece is the most substantial Cartesian text treating immortality.

The Synopsis (AT VII 12–16, CSM II 9–11) outlines the steps required for a rigorous demonstration of the immortality of the soul and separates the premises that are established in the *Meditations* from those that must await the development of the "whole of physics" (a reference to his later *Principles of Philosophy*). Those elements of the proof to be found in the *Meditations* are: (1) "a concept of soul which is as clear as possible and is also quite distinct from every concept of body"; (2) a demonstration "that everything that we clearly and distinctly understand is true in a way which corresponds exactly to our understanding of it"; (3) "a distinct concept of corporeal nature"; (4) a conclusion based on (1)–(3) "that all the things that we clearly and distinctly conceive of as different **substances** ... are in fact substances which are really distinct" (Descartes gives another argument for [4], independent of [1]–[3], based on the **divisibility** of matter and the indivisibility of mind, which show that these substances are "in some way opposite"). On the basis of these four points, amply treated in the *Meditations*, Descartes believes he has rigorously demonstrated "that the decay of the body does not imply the destruction of the mind," which in his view is "enough to give mortals the hope of an afterlife." But to extend this conclusion to the guarantee of an afterlife for the mind, Descartes candidly admits that two more premises are needed about which he has said nothing in the *Meditations*.

The two missing premises are (5) "that absolutely all substances ... are by their nature incorruptible and cannot ever cease to exist unless they are reduced to nothingness by God's denying his concurrence"; and (6) that the human body easily decays, but the mind is "a pure substance" and thus is "immortal by its very nature." While the *Meditations* could establish the possibility that the mind could outlive

God) could destroy the mind (or body taken generally) and that nothing internal to the soul would ever lead to its decay. The term "pure substance" here has been the subject of debate. Prendergrast (1993, 34–35) interprets the term to mark a distinction in kinds of substances, the mind being the only "pure substance." Fowler (1999, 276–300) argues that the distinction Descartes wishes to draw is not between mind and body taken generally but between mind and *particular* bodies, especially those of humans. Any particular human body has an **essence** that is constituted by the arrangement of its parts and therefore changes every time those accidents change; while the human mind, on the other hand, remains identical while its individual mental events change. The human body, therefore, is *not* immortal because its configuration, which is its essence, can easily change; but body taken generally – that is, the whole of *res extensa* – of which the human body is a part, may also be considered immortal, as Descartes effectively states in premise (5). Purity, therefore, does not restrict immortality to minds.

Four of the six sets of Objections (all but the first and third) appended to the first edition of the *Meditations* raise the issue of immortality. Again, Mersenne was Descartes' staunchest critic. He pointed out that Descartes did nothing to rule out the possibility that God gave the soul only enough life to last the duration of the body's existence. Descartes responded that God was absolutely free to destroy the soul and said, concerning whether or not he would do so, that "it is for God alone to give the answer" (AT VII 154, CSM II 109). The literature on this topic is uniform in claiming that Descartes here offered faith as the only possible foundation for belief that God would grant the soul an afterlife.

Despite his promise, Descartes does not extensively develop premise (5) or (6) outlined in the Synopsis in the later *Principles*. There is an elaboration on substance, but it is shown neither that all substances are incorruptible from without nor that they are internally pure in the way Descartes described them. Fowler (1999, 240) suggests that Descartes could not say more because of the dangerous theological implications of his view of substance. Perhaps Descartes simply believed that immortality, as opposed to the real distinction, was ultimately a matter for faith and not reason.

An alternative to the common claim that faith, and not reason, ultimately lies at the foundation of Descartes' proof of immortality is that Descartes established that foundation with moral **certainty**, which is less than the certainty of **geometry** but is still within the realm of reason distinguished from faith (Hickson 2011; Russier 1958, 133–45). Descartes responded to Mersenne, recalling a letter discussed earlier, that "we do not have any convincing evidence or precedent to suggest that any substance can perish" (AT VII 153, CSM II 109). For Descartes, a claim can enjoy moral certainty even if the absolute power of God might render that claim false; all that is required for moral certainty is that the claim be established with enough certainty

for a given practical purpose (AT VIII A 327, CSM I 289–90). And as we have seen, Descartes believed his proof was sufficient for the purposes of grounding religion and morality.

See also Certainty; Distinction (Real, Modal, and Rational); Faith, Religious; God; Human Being; Mind; Reason; Substance

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MICHAEL HICKSON

SPECIES, INTENTIONAL

In the *Dioptrics*, Descartes remarks that his theory of the instantaneous mechanical transmission of **light** will deliver "your spirit from all those tiny images flitting through the air, called intentional species, that so much exercise the **imagination** of philosophers (AT VI 85, CSM I 153–54). In this and other passages where he uses "intentional species," the tone is invariably ironic, even disdainful, and mentioning them serves as foil to his own conception of how the things of the world communicate their presence to the senses.

Intentional species was a topos in Western medieval **Scholasticism** that produced a family of theories and interpretations operating within a complex of empirical and theoretical concerns. How, within the limits of Aristotelian **metaphysics**, **physics**, and psychology, does the **sensation** of material things and their properties occur, and how does sensation prepare the intellectual apprehension of them? The paradigm example was visual, the **perception** of color. For Aristotle color is the proper object, the *proper sensible*, of the visual sense; it is accessible in principle to any **animals** with eyes. How does this quality of real-world things come to be in sensation? Aristotle, in common with most though not all ancient theorists, thought that the effect proceeded from the thing to a more or less passively receptive eye. His physics of actuality and potentiality conceived four conditions needing to be fulfilled so

that vision might occur: (1) a potentially visible material thing; (2) an eye (in a living, awake animal) with the potential for seeing; (3) a transparent medium between thing and eye; and (4) light. Light, rather than reflecting off the object and traveling to the eye, activates the medium's transparency so that it allows the active color quality in the physical thing to be communicated through the medium to the eye; in the eye, the communicated quality produces the same activity that exists in the physical object, though without that object's matter. This activation is seeing proper.

The sparseness of Aristotle's **explanation** led Western Scholastic thinkers, beginning in the thirteenth century and extending into the seventeenth, to explicate the process further, with assistance from theories and concepts worked out by Islamic Aristotelianism. *Intentional species* was the term they coined to bring these efforts to a focus. "Species" indicated an appearing form; "intentional" had the dual indication of the procession of an effect from natural source to destination, and the subsequent direction of a mind aware of the species back to the natural source. Thus, the intentional species was a psychophysical reality, and the process of transmission from object to eye was physical without the species being a physical substance. The ways in which philosophers parsed the meaning of this were so various that it is impossible to characterize simply the kind of physical reality the intentional species had. They were not, however, despite Descartes' characterization, things (or even images, though that is more arguable) that flitted about.

Intentional species also played a crucial role in Scholastic interpretations of how sensory experience leads to intellection – since, as the medieval version of another Aristotelian dictum put it, whatever is in **intellect** was originally in sense. The sensible form borne by the intentional species worked itself into the phantasms of **common sense**, **memory**, and imagination, and in that worked-up form it made possible intellectual abstraction of an intelligible species from the phantasm. Intentional species were also implicated in the medieval optical theory known as **perspectivism** (see Smith 1987, esp. 32–56). Perspectivism, like most premodern theories of **optics**, aimed to explain vision, and it did this by offering a theory of the specific rays propagated from physical objects that were properly effective in the eye. Perspectivism could further be interpreted as explaining the physical basis of the transmission and effect of intentional species. Perspectivism, in turn, had a larger metaphysical inspiration from a Platonist metaphysics of light (as developed, e.g., by Robert Grosseteste), which understood physical reality as due to lightlike emanations from higher to lower levels of being.

Borrowing concepts from philosophy of science, one might say that the intentional species represents an ad hoc attempt to shore up a degenerate program of Aristotelian **philosophy**. It existed uneasily at the crossroads of many different scientific, mathematical, and philosophical disciplines and was aimed more at resolving problems in Aristotelian philosophy than at understanding and explaining natural phenomena. Once Aristotelianism was rejected, the intentional species no longer