Giordano Bruno

Giordano Bruno (/dʒɔːrˈdɑːnoʊ ˈbruːnoʊ/; Italian: [dʒorˈdaːno ˈbruːno]; Latin: *Iordanus Brunus Nolanus*; born **Filippo Bruno**, January or February 1548 – 17 February 1600) was an Italian philosopher, poet, cosmological theorist and esotericist.[1] He is known for his cosmological theories, which conceptually extended to include the then-novel Copernican model. He proposed that the stars were distant suns surrounded by their own planets (exoplanets), and he raised the possibility that these planets might foster life of their own, a cosmological position known as cosmic pluralism. He also insisted that the universe is infinite and could have no center.

While Bruno began as a Dominican friar, he embraced Calvinism during his time in Geneva.[2] He was later tried for heresy by the Roman Inquisition on charges of denial of several core Catholic doctrines, including eternal damnation, the Trinity, the divinity of Christ, the virginity of Mary, and transubstantiation. Bruno's pantheism was not taken lightly by the church,[3][4] nor was his teaching of metempsychosis regarding the reincarnation of the soul. The Inquisition found him guilty, and he was burned alive at the stake in Rome's Campo de' Fiori in 1600. After his death, he gained considerable fame, being particularly celebrated by 19th- and early 20th-century commentators who regarded him as a martyr for science. However, most historians agree that his heresy trial was not a response to his cosmological views but rather a response to his religious and afterlife views,[5][6][7][8][9] although some still contend that the main reason for Bruno's death was indeed his cosmological views.[10][11][12] Bruno's case is still considered a landmark in the history of free thought and the emerging sciences.[13][14]

In addition to cosmology, Bruno also wrote extensively on the art of memory, a loosely organized group of mnemonic techniques and principles. Historian Frances Yates argues that Bruno was deeply influenced by the presocratic Empedocles, Neoplatonism, Renaissance Hermeticism, and Book of Genesis-like legends

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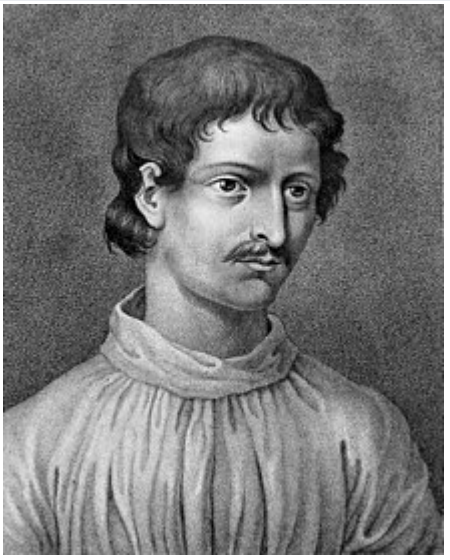


Portrait from *Opere di Giordano Bruno*, published in 1830

Born	Filippo Bruno January or February 1548 Nola, Kingdom of Naples
Died	17 February 1600 (aged 51–52) Rome, Papal States
Cause of death	Execution by burning at the stake
Era	Renaissance
School	Renaissance humanism Neopythagoreanism
Main interests	Cosmology
Notable ideas	Cosmic pluralism

surrounding the Hellenistic conception of Hermes Trismegistus.[15] Other studies of Bruno have focused on his qualitative approach to mathematics and his application of the spatial concepts of geometry to language.[16]

Life

Early years, 1548–1576

Born Filippo Bruno in Nola (a *comune* in the modern-day province of Naples, in the Southern Italian region of Campania, then part of the Kingdom of Naples) in 1548, he was the son of Giovanni Bruno (1517- c. 1592), a soldier, and Fraulissa Savolino (1520-?). In his youth he was sent to Naples to be educated. He was tutored privately at the Augustinian monastery there, and attended public lectures at the Studium Generale.[17] At the age of 17, he entered the Dominican Order at the monastery of San Domenico Maggiore in Naples, taking the name Giordano, after Giordano Crispo, his metaphysics tutor. He continued his studies there, completing his novitiate, and ordained a priest in 1572 at age 24. During his time in Naples, he became known for his skill with the art of memory and on one occasion traveled to Rome to demonstrate his mnemonic system before Pope Pius V and Cardinal Rebiba. In his later years, Bruno claimed that the Pope accepted his dedication to him of the lost work *On The Ark of Noah* at this time.[18]

While Bruno was distinguished for outstanding ability, his taste for free thinking and forbidden books soon caused him difficulties. Given the controversy he caused in later life, it is surprising that he was able to remain within the monastic system for eleven years. In his testimony to Venetian inquisitors during his trial many years later, he says that proceedings were twice taken against him for having cast away images of the saints, retaining only a crucifix, and for having recommended controversial texts to a novice.[19] Such behavior could perhaps be overlooked, but Bruno's situation became much more serious when he was reported to have defended the Arian heresy, and when a copy of the banned writings of Erasmus, annotated by him, was discovered hidden in the monastery latrine. When he learned that an indictment was being prepared against him in Naples he fled, shedding his religious habit, at least for a time.[20]

First years of wandering, 1576–1583

Bruno first went to the Genoese port of Noli, then to Savona, Turin and finally to Venice, where he published his lost work *On the Signs of the Times* with the permission (so he claimed at his trial) of the Dominican Remigio Nannini Fiorentino. From Venice he went to Padua, where he met fellow Dominicans who convinced him to wear his religious habit again. From Padua he went to Bergamo and then across the Alps to Chambéry and Lyon. His movements after this time are obscure.[21]

In 1579, Bruno arrived in Geneva. As D. W. Singer, a Bruno biographer, notes, "The question has sometimes been raised as to whether Bruno became a Protestant, and there is evidence he joined a Calvinist church."[23][24][25][26] During his Venetian trial, he told inquisitors that while in Geneva he told the Marchese de Vico of Naples, who was notable for helping Italian refugees in Geneva, "I did not intend to adopt the religion of the city. I desired to stay there only that I might live at liberty and in security."[27] Bruno had a pair of breeches made for himself, and the Marchese and others apparently made Bruno a gift of a sword, hat, cape and other necessities for dressing himself; in such clothing Bruno could no longer be recognized as a priest. Things apparently went well for Bruno for a time, as he entered his name in the Rector's Book of the University of Geneva in May 1579.[28] But in keeping with his personality he could not long remain silent. In August he published an attack on the work of Antoine de La Faye, a distinguished

The earliest depiction of Bruno is an engraving published in 1715 in Germany, presumed based on a lost contemporary portrait.[22]

professor. Bruno and the printer, Jean Bergeon, were promptly arrested.[29] Rather than apologizing, Bruno insisted on continuing to defend his publication. He was refused the right to take sacrament.[30] Though this right was soon restored, he left Geneva.[31]

He went to France, arriving first in Lyon, and thereafter settling for a time (1580–1581) in Toulouse, where he took his doctorate in theology and was elected by students to lecture in philosophy.[32] He also attempted at this time to return to Catholicism, but was denied absolution by the Jesuit priest he approached.[33] When religious strife broke out in the summer of 1581, he moved to Paris.[34] There he held a cycle of thirty lectures on theological topics and also began to gain fame for his prodigious memory.[35] His talents attracted the benevolent attention of the king Henry III; Bruno subsequently reported:

> "I got me such a name that King Henry III summoned me one day to discover from me if the memory which I possessed was natural or acquired by magic art. I satisfied him that it did not come from sorcery but from organized knowledge; and, following this, I got a book on memory printed, entitled *The Shadows of Ideas*, which I dedicated to His Majesty. Forthwith he gave me an Extraordinary Lectureship with a salary."[36]

In Paris, Bruno enjoyed the protection of his powerful French patrons. During this period, he published several works on mnemonics, including *De umbris idearum* (*On the Shadows of Ideas*, 1582), *Ars memoriae* (*The Art of Memory*, 1582), and *Cantus circaeus* (*Circe's Song*, 1582; described at Circe in the arts § Reasoning beasts). All of these were based on his mnemonic models of organized knowledge and experience, as opposed to the simplistic logic-based mnemonic techniques of Petrus Ramus then becoming popular. Bruno also published a comedy summarizing some of his philosophical positions, titled *Il Candelaio* (*The Candlemaker*, 1582). In the 16th century dedications were, as a rule, approved beforehand, and hence were a way of placing a work under the protection of an individual. Given that Bruno dedicated various works to the likes of King Henry III, Sir Philip Sidney, Michel de Castelnau (French Ambassador to England), and possibly Pope Pius V, it is apparent that this wanderer had risen sharply in status and moved in powerful circles.

England, 1583–1585

In April 1583, Bruno went to England with letters of recommendation from Henry III as a guest of the French ambassador, Michel de Castelnau. Bruno lived at the French embassy with the lexicographer John Florio. There he became acquainted with the poet Philip Sidney (to whom he dedicated two books) and other members of the Hermetic circle around John Dee, though there is no evidence that Bruno ever met Dee himself. He also lectured at Oxford, and unsuccessfully sought a teaching position there. His views were controversial, notably with John Underhill, Rector of Lincoln College and subsequently bishop of Oxford, and George Abbot, who later became Archbishop of Canterbury. Abbot mocked Bruno for

supporting "the opinion of Copernicus that the earth did go round, and the heavens did stand still; whereas in truth it was his own head which rather did run round, and his brains did not stand still",[37] and found Bruno had both plagiarized and misrepresented Ficino's work, leading Bruno to return to the continent.[38]

Woodcut illustration of one of Giordano Bruno's less complex mnemonic devices

Nevertheless, his stay in England was fruitful. During that time Bruno completed and published some of his most important works, the six "Italian Dialogues", including the cosmological tracts *La cena de le ceneri* (*The Ash Wednesday Supper*, 1584), *De la causa, principio et uno* (*On Cause, Principle and Unity*, 1584), *De l'infinito, universo et mondi* (*On the Infinite, Universe and Worlds*, 1584) as well as *Lo spaccio de la bestia trionfante* (*The Expulsion of the Triumphant Beast*, 1584) and *De gli eroici furori* (*On the Heroic Frenzies*, 1585). Some of these were printed by John Charlewood. Some of the works that Bruno published in London, notably *The Ash Wednesday Supper*, appear to have given offense. Once again, Bruno's controversial views and tactless language lost him the support of his friends. John Bossy has advanced the theory that, while staying in the French Embassy in London, Bruno was also spying on Catholic conspirators, under the pseudonym "Henry Fagot", for Sir Francis Walsingham, Queen Elizabeth's Secretary of State.[39]

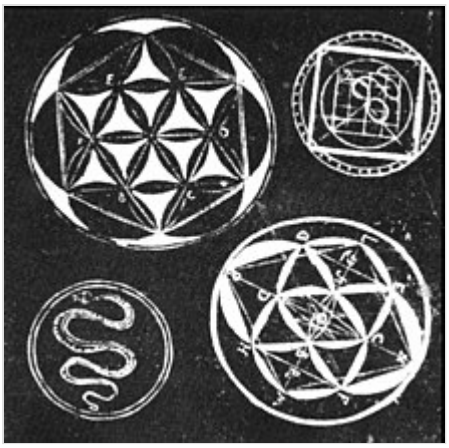
Bruno is sometimes cited as being the first to propose that the universe is infinite, which he did during his time in England, but an English scientist, Thomas Digges, put forth this idea in a published work in 1576, some eight years earlier than Bruno.[40] An infinite universe and the possibility of alien life had also been earlier suggested by German Catholic Cardinal Nicholas of Cusa in "On Learned Ignorance" published in 1440 and Bruno attributed his understanding of multiple worlds to this earlier scholar, who he called "the divine Cusanus".[41]

Last years of wandering, 1585–1592

In October 1585, Castelnau was recalled to France, and Bruno went with him.[42] In Paris, Bruno found a tense political situation. Moreover, his 120 theses against Aristotelian natural science soon put him in ill favor. In 1586, following a violent quarrel over these theses, he left France for Germany.[43]

In Germany he failed to obtain a teaching position at Marburg, but was granted permission to teach at Wittenberg, where he lectured on Aristotle for two years.[44] However, with a change of intellectual climate there, he was no longer welcome, and went in 1588 to Prague, where he obtained 300 taler from Rudolf II, but no teaching position.[45] He went on to serve briefly as a professor in Helmstedt, but had to flee again in 1590 when he was excommunicated by the Lutherans.[46]

During this period he produced several Latin works, dictated to his friend and secretary Girolamo Besler, including *De Magia* (*On Magic*), *Theses De Magia* (*Theses on Magic*) and *De Vinculis in Genere* (*A General Account of Bonding*). All these were apparently transcribed or recorded by Besler (or Bisler) between 1589 and 1590.[47] He also published *De Imaginum, Signorum, Et Idearum Compositione* (*On the Composition of Images, Signs and Ideas*, 1591).



Woodcut from "Articuli centum et sexaginta adversus huius tempestatis mathematicos atque philosophos", Prague 1588

In 1591 he was in Frankfurt, where he received an invitation from the Venetian patrician Giovanni Mocenigo, who wished to be instructed in the art of memory,[48] and also heard of a vacant chair in mathematics at the University of Padua. At the time the Inquisition seemed to be losing some of its strictness, and because the Republic of Venice was the most liberal state in the Italian Peninsula, Bruno was lulled into making the fatal mistake of returning to Italy.[49]

He went first to Padua, where he taught briefly, and applied unsuccessfully for the chair of mathematics, which was given instead to Galileo Galilei one year later. Bruno accepted Mocenigo's invitation and moved to Venice in March 1592.[50] For about two months he served as an in-house tutor to Mocenigo, to whom he let slip some of his heterodox ideas.[51] Mocenigo denounced him to the Venetian Inquisition, which had Bruno arrested on 22 May 1592.[52] Among the numerous charges of blasphemy and heresy brought against him in Venice, based on Mocenigo's denunciation, was his belief in the plurality of worlds, as well as accusations of personal misconduct.[53] Bruno defended himself skillfully, stressing the philosophical character of some of his positions, denying others and admitting that he had had doubts on some matters of dogma. The Roman Inquisition, however, asked for his transfer to Rome.[54] After several months of argument, the Venetian authorities reluctantly consented and Bruno was sent to Rome in January 1593.[55]

Imprisonment, trial and execution, 1593–1600

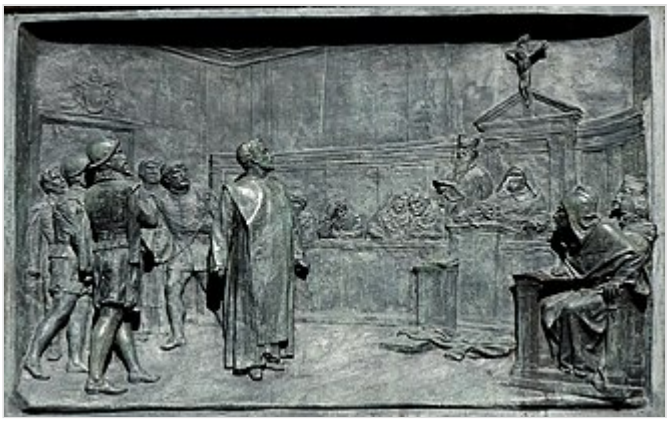
During the seven years of his trial in Rome, Bruno was held in confinement, lastly in the Tower of Nona. Some important documents about the trial are lost, but others have been preserved, among them a summary of the proceedings that was rediscovered in 1940.[56] The numerous charges against Bruno, based on some of his books as well as on witness accounts, included blasphemy, immoral conduct, and heresy in matters of dogmatic theology, and involved some of the basic doctrines of his philosophy and cosmology. Luigi Firpo speculates the charges made against Bruno by the Roman Inquisition were:[57]

- holding opinions contrary to the Catholic faith and speaking against it and its ministers;
- holding opinions contrary to the Catholic faith about the Trinity, the divinity of Christ, and the Incarnation;
- holding opinions contrary to the Catholic faith pertaining to Jesus as the Christ;
- holding opinions contrary to the Catholic faith regarding the virginity of Mary, mother of Jesus;
- holding opinions contrary to the Catholic faith about both Transubstantiation and the Mass;
- claiming the existence of a plurality of worlds and their eternity;
- believing in metempsychosis and in the transmigration of the human soul into brutes;
- dealing in magics and divination.

Bruno defended himself as he had in Venice, insisting that he accepted the Church's dogmatic teachings, but trying to preserve the basis of his cosmological views. In particular, he held firm to his belief in the plurality of worlds, although he was admonished to abandon it. His trial was overseen by the Inquisitor Cardinal Bellarmine, who demanded a full recantation, which Bruno eventually refused. On 20 January 1600, Pope Clement VIII declared Bruno a heretic, and the Inquisition issued a sentence of death. According to the

correspondence of Gaspar Schopp of Breslau, he is said to have made a threatening gesture towards his judges and to have replied: *Maiori forsan cum timore sententiam in me fertis quam ego accipiam* ("Perhaps you pronounce this sentence against me with greater fear than I receive it").[58]

He was turned over to the secular authorities. On 17 February 1600, in the Campo de' Fiori (a central Roman market square), naked, with his "tongue imprisoned because of his wicked words", he was burned alive at the stake.[59][60] His ashes were thrown into the Tiber river.



The trial of Giordano Bruno by the Roman Inquisition. Bronze relief by Ettore Ferrari, Campo de' Fiori, Rome.

All of Bruno's works were placed on the *Index Librorum Prohibitorum* in 1603. The inquisition cardinals who judged Giordano Bruno were Cardinal Bellarmino (Bellarmine), Cardinal Madruzzo (Madruzzi), Camillo Cardinal Borghese (later Pope Paul V), Domenico Cardinal Pinelli, Pompeio Cardinal Arrigoni, Cardinal Sfondrati, Pedro Cardinal De Deza Manuel and Cardinal Santorio (Archbishop of Santa Severina, Cardinal-Bishop of Palestrina).[61]

The measures taken to prevent Bruno continuing to speak have resulted in his becoming a symbol for free thought and speech in present-day Rome, where an annual memorial service takes place close to the spot where he was executed.[62]

Physical appearance

The earliest likeness of Bruno is an engraving published in 1715[63] and cited by Salvestrini as "the only known portrait of Bruno". Salvestrini suggests that it is a re-engraving made from a now lost original.[22] This engraving has provided the source for later images.

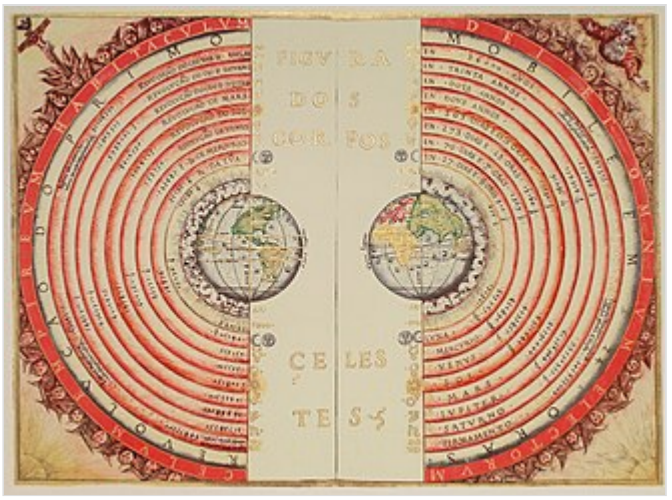
The records of Bruno's imprisonment by the Venetian inquisition in May 1592 describe him as a man "of average height, with a hazel-coloured beard and the appearance of being about forty years of age". Alternately, a passage in a work by George Abbot indicates that Bruno was of diminutive stature: "When that Italian Didapper, who intituled himselfe Philotheus Iordanus Brunus Nolanus, magis elaboratae Theologiae Doctor, &c. with a name longer than his body...".[64] The word "didapper" used by Abbot is the derisive term which at the time meant "a small diving waterfowl".[65]

Cosmology

Contemporary cosmological beliefs

In the first half of the 15th century, Nicholas of Cusa challenged the then widely accepted philosophies of Aristotelianism, envisioning instead an infinite universe whose center was everywhere and circumference nowhere, and moreover teeming with countless stars.[66] He also predicted that neither were the rotational orbits circular nor were their movements uniform.[67]

In the second half of the 16th century, the theories of Copernicus (1473–1543) began diffusing through Europe. Copernicus conserved the idea of planets fixed to solid spheres, but considered the apparent motion of the stars to be an illusion caused by the rotation of the Earth on its axis; he also preserved the notion of an immobile center, but it was the Sun rather than the Earth. Copernicus also argued the Earth was a planet orbiting the Sun once every year. However he maintained the Ptolemaic hypothesis that the orbits of the planets were composed of perfect circles—deferents and epicycles—and that the stars were fixed on a stationary outer sphere.[68]



Illuminated illustration of the Ptolemaic geocentric conception of the universe. The outermost text reads "The heavenly empire, dwelling of God and all the elect."

Despite the widespread publication of Copernicus' work *De revolutionibus orbium coelestium*, during Bruno's time most educated Catholics subscribed to the Aristotelian geocentric view that the Earth was the center of the universe, and that all heavenly bodies revolved around it.[69] The ultimate limit of the universe was the *primum mobile*, whose diurnal rotation was conferred upon it by a transcendental God, not part of the universe (although, as the kingdom of heaven, adjacent to it[70]), a motionless prime mover and first cause. The fixed stars were part of this celestial sphere, all at the same fixed distance from the immobile Earth at the center of the sphere. Ptolemy had numbered these at 1,022, grouped into 48 constellations. The planets were each fixed to a transparent sphere.[71]

Few astronomers of Bruno's time accepted Copernicus's heliocentric model. Among those who did were the Germans Michael Maestlin (1550–1631), Christoph Rothmann, Johannes Kepler (1571–1630); the Englishman Thomas Digges (c. 1546–1595), author of *A Perfit Description of the Caelestial Orbes*; and the Italian Galileo Galilei (1564–1642).

Bruno's cosmological claims

In 1584, Bruno published two important philosophical dialogues (*La Cena de le Ceneri* and *De l'infinito universo et mondi*) in which he argued against the planetary spheres (Christoph Rothmann did the same in 1586 as did Tycho Brahe in 1587) and affirmed the Copernican principle.

In particular, to support the Copernican view and oppose the objection according to which the motion of the Earth would be perceived by means of the motion of winds, clouds etc., in *La Cena de le Ceneri* Bruno anticipates some of the arguments of Galilei on the relativity principle.[72] Note that he also uses the example now known as Galileo's ship.

> Theophilus – [...] air through which the clouds and winds move are parts of the Earth, [...] to mean under the name of Earth the whole machinery and the entire animated part, which consists of dissimilar parts; so that the rivers, the rocks, the seas, the whole vaporous and turbulent air, which is enclosed within the highest mountains, should belong to the Earth as its members, just as the air [does] in the lungs and in other cavities of animals by which they

> breathe, widen their arteries, and other similar effects necessary for life are performed. The clouds, too, move through accidents in the body of the Earth and are in its bowels as are the waters. [...] With the Earth move [...] all things that are on the Earth. If, therefore, from a point outside the Earth something were thrown upon the Earth, it would lose, because of the latter's motion, its straightness as would be seen on the ship [...] moving along a river, if someone on point C of the riverbank were to throw a stone along a straight line, and would see the stone miss its target by the amount of the velocity of the ship's motion. But if someone were placed high on the mast of that ship, move as it may however fast, he would not miss his target at all, so that the stone or some other heavy thing thrown downward would not come along a straight line from the point E which is at the top of the mast, or cage, to the point D which is at the bottom of the mast, or at some point in the bowels and body of the ship. Thus, if from the point D to the point E someone who is inside the ship would throw a stone straight up, it would return to the bottom along the same line however far the ship moved, provided it was not subject to any pitch and roll."[73]

Bruno's infinite universe was filled with a substance—a "pure air", aether, or *spiritus*—that offered no resistance to the heavenly bodies which, in Bruno's view, rather than being fixed, moved under their own impetus (momentum). Most dramatically, he completely abandoned the idea of a hierarchical universe.

> The universe is then one, infinite, immobile... It is not capable of comprehension and therefore is endless and limitless, and to that extent infinite and indeterminable, and consequently immobile.[74]

Bruno's cosmology distinguishes between "suns" which produce their own light and heat, and have other bodies moving around them; and "earths" which move around suns and receive light and heat from them.[75] Bruno suggested that some, if not all, of the objects classically known as fixed stars are in fact suns.[75] According to astrophysicist Steven Soter, he was the first person to grasp that "stars are other suns with their own planets."[76]

Bruno wrote that other worlds "have no less virtue nor a nature different from that of our Earth" and, like Earth, "contain animals and inhabitants".[77]

During the late 16th century, and throughout the 17th century, Bruno's ideas were held up for ridicule, debate, or inspiration. Margaret Cavendish, for example, wrote an entire series of poems against "atoms" and "infinite worlds" in *Poems and Fancies* in 1664. Bruno's true, if partial, vindication would have to wait for the implications and impact of Newtonian cosmology.

Bruno's overall contribution to the birth of modern science is still controversial. Some scholars follow Frances Yates in stressing the importance of Bruno's ideas about the universe being infinite and lacking geocentric structure as a crucial crossing point between the old and the new. Others see in Bruno's idea of multiple worlds instantiating the infinite possibilities of a pristine, indivisible One,[78] a forerunner of Everett's many-worlds interpretation of quantum mechanics.[79]

While many academics note Bruno's theological position as pantheism, several have described it as pandeism, and some also as panentheism.[80][81] Physicist and philosopher Max Bernhard Weinstein in his *Welt- und Lebensanschauungen, Hervorgegangen aus Religion, Philosophie und Naturerkenntnis* ("World

and Life Views, Emerging From Religion, Philosophy and Nature"), wrote that the theological model of pandeism was strongly expressed in the teachings of Bruno, especially with respect to the vision of a deity for which "the concept of God is not separated from that of the universe."[82] However, Otto Kern takes exception to what he considers Weinstein's overbroad assertions that Bruno, as well as other historical philosophers such as John Scotus Eriugena, Nicholas of Cusa, Mendelssohn, and Lessing, were pandeists or leaned towards pandeism.[83] *Discover* editor Corey S. Powell also described Bruno's cosmology as pandeistic, writing that it was "a tool for advancing an animist or Pandeist theology",[84] and this assessment of Bruno as a pandeist was agreed with by science writer Michael Newton Keas,[85] and *The Daily Beast* writer David Sessions.[86]

Retrospective views of Bruno

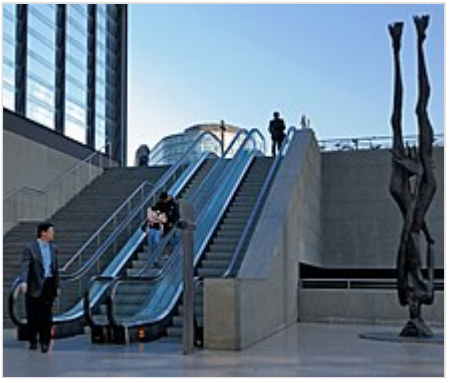
Late Vatican position

The Vatican has published few official statements about Bruno's trial and execution. In 1942, Cardinal Giovanni Mercati, who discovered a number of lost documents relating to Bruno's trial, stated that the Church was perfectly justified in condemning him. On the 400th anniversary of Bruno's death, in 2000, Cardinal Angelo Sodano declared Bruno's death to be a "sad episode" but, despite his regret, he defended Bruno's prosecutors, maintaining that the Inquisitors "had the desire to serve freedom and promote the common good and did everything possible to save his life".[87] In the same year, Pope John Paul II made a general apology for "the use of violence that some have committed in the service of truth".[88]

The monument to Bruno in the place he was executed, Campo de' Fiori in Rome

A martyr of science

Some authors have characterized Bruno as a "martyr of science", suggesting parallels with the Galileo affair which began around 1610.[89] "It should not be supposed," writes A. M. Paterson of Bruno and his "heliocentric solar system", that he "reached his conclusions via some mystical revelation....His work is an essential part of the scientific and philosophical developments that he initiated."[90] Paterson echoes Hegel in writing that Bruno "ushers in a modern theory of knowledge that understands all natural things in the universe to be known by the human mind through the mind's dialectical structure".[91]



Monument to Giordano Bruno at Potsdamer Platz in Berlin, Germany, referencing his burning at the stake while tied upside down.

Ingegno writes that Bruno embraced the philosophy of Lucretius, "aimed at liberating man from the fear of death and the gods."[92] Characters in Bruno's *Cause, Principle and Unity* desire "to improve speculative science and knowledge of natural things," and to achieve a philosophy "which brings about the perfection of the human intellect most easily and eminently, and most closely corresponds to the truth of nature."[93]

Other scholars oppose such views, and claim Bruno's martyrdom to science to be exaggerated, or outright false. For Yates, while "nineteenth century liberals" were thrown "into ecstasies" over Bruno's Copernicanism, "Bruno pushes Copernicus' scientific work back into a prescientific stage, back into Hermeticism, interpreting the Copernican diagram as a hieroglyph of divine mysteries."[94]

According to historian Mordechai Feingold, "Both admirers and critics of Giordano Bruno basically agree that he was pompous and arrogant, highly valuing his opinions and showing little patience with anyone who even mildly disagreed with him." Discussing Bruno's experience of rejection when he visited Oxford University, Feingold suggests that "it might have been Bruno's manner, his language and his self-assertiveness, rather than his ideas" that caused offence.[95]

Theological heresy

In his *Lectures on the History of Philosophy*, Hegel writes that Bruno's life represented "a bold rejection of all Catholic beliefs resting on mere authority."[96]

Alfonso Ingegno states that Bruno's philosophy "challenges the developments of the Reformation, calls into question the truth-value of the whole of Christianity, and claims that Christ perpetrated a deceit on mankind... Bruno suggests that we can now recognize the universal law which controls the perpetual becoming of all things in an infinite universe."[97] A. M. Paterson says that, while we no longer have a copy of the official papal condemnation of Bruno, his heresies included "the doctrine of the infinite universe and the innumerable worlds" and his beliefs "on the movement of the earth".[98]

Michael White notes that the Inquisition may have pursued Bruno early in his life on the basis of his opposition to Aristotle, interest in Arianism, reading of Erasmus, and possession of banned texts.[99] White considers that Bruno's later heresy was "multifaceted" and may have rested on his conception of infinite worlds. "This was perhaps the most dangerous notion of all... If other worlds existed with intelligent beings living there, did they too have their visitations? The idea was quite unthinkable."[99]

Frances Yates rejects what she describes as the "legend that Bruno was prosecuted as a philosophical thinker, was burned for his daring views on innumerable worlds or on the movement of the earth." Yates however writes that "the Church was... perfectly within its rights if it included philosophical points in its condemnation of Bruno's heresies" because "the philosophical points were quite inseparable from the heresies."[100]

According to the *Stanford Encyclopedia of Philosophy*, "in 1600 there was no official Catholic position on the Copernican system, and it was certainly not a heresy. When [...] Bruno [...] was burned at the stake as a heretic, it had nothing to do with his writings in support of Copernican cosmology."[101]

The website of the Vatican Apostolic Archive, discussing a summary of legal proceedings against Bruno in Rome, states:

> "In the same rooms where Giordano Bruno was questioned, for the same important reasons of the relationship between science and faith, at the dawning of the new astronomy and at the decline of Aristotle's philosophy, sixteen years later, Cardinal Bellarmino, who then contested Bruno's heretical theses, summoned Galileo Galilei, who also faced a famous inquisitorial trial, which, luckily for him, ended with a simple abjuration."[102]

In art and literature

Artistic depictions

Following the 1870 Capture of Rome by the newly created Kingdom of Italy and the end of the Church's temporal power over the city, the erection of a monument to Bruno on the site of his execution became feasible. The monument was sharply opposed by the clerical party, but was finally erected by the Rome Municipality and inaugurated in 1889.[103]

A statue of a stretched human figure standing on its head, designed by Alexander Polzin and depicting Bruno's death at the stake, was placed in Potsdamer Platz station in Berlin on 2 March 2008.[104][105]

Retrospective iconography of Bruno shows him with a Dominican cowl but not tonsured. Edward Gosselin has suggested that it is likely Bruno kept his tonsure at least until 1579, and it is possible that he wore it again thereafter.[106]

An idealized animated version of Bruno appears in the first episode of the 2014 television series *Cosmos: A Spacetime Odyssey*. In this depiction, Bruno is shown with a more modern look, without tonsure and wearing clerical robes and without his hood. *Cosmos* presents Bruno as an impoverished philosopher who was ultimately executed due to his refusal to recant his belief in other worlds, a portrayal that was criticized by some as simplistic or historically inaccurate.[107][108][109] Corey S. Powell, of *Discover* magazine, says of Bruno, "A major reason he moved around so much is that he was argumentative, sarcastic, and drawn to controversy...He was a brilliant, complicated, difficult man.[107]

References in poetry

Poems that refer to Bruno include:

- "The Monument of Giordano Bruno" (1889) by Algernon Charles Swinburne, written when the statue of Bruno was constructed in Rome.[110]
- "Campo Dei Fiori" (1943) by Czesław Miłosz, which draws parallels between indifference to the fate of Bruno and indifference to the victims of the then-ongoing Occupation of Poland.[111]
- "The Emancipators" (1958) by Randall Jarrell, which addresses Bruno, along with Galileo and Newton, as an originator of the modern scientific-industrial world.[112]
- "To Giordano Bruno" (1990) by Louis L'Amour, published in *Smoke From This Altar*.
- "What He Thought" (1994) by Heather McHugh, a (possibly autobiographical) poem about a group of American poets who visit Italy and are lectured about Bruno and the nature of poetry

by a local arts administrator. The poem was published in the collection *Hinge & Sign*, a nominee for the National Book Award.[113]

Appearances in fiction

Bruno and his theory of "the coincidence of contraries" (*coincidentia oppositorum*) play an important role in James Joyce's 1939 novel *Finnegans Wake*. Joyce wrote in a letter to his patroness, Harriet Shaw Weaver, "His philosophy is a kind of dualism – every power in nature must evolve an opposite in order to realise itself and opposition brings reunion".[114] Amongst his numerous allusions to Bruno in his novel, including his trial and torture, Joyce plays upon Bruno's notion of *coincidentia oppositorum* through applying his name to word puns such as "Browne and Nolan" (the name of Dublin printers) and "'brownesberrow in nolandsland".[115]

In 1934 Marjorie Bowen published *The Triumphant Beast*, a novel about Bruno's life. An electronic edition of the work appears at Project Gutenberg Australia (http://gutenberg.net.au/plusfifty-a-m.html#bowen)

In 1963 Soviet writer Alexander Volkov published *The Wandering*, a novel about the childhood and youth of Bruno.

In 1973 the biographical drama *Giordano Bruno* was released, an Italian/French movie directed by Giuliano Montaldo, starring Gian Maria Volonté as Bruno.[116]

Bruno is a central character, and his philosophy a central theme, in John Crowley's *Aegypt* (1987), renamed *The Solitudes*, and the ensuing series of novels: *Love & Sleep* (1994), *Daemonomania* (2000), and *Endless Things* (2007).

The Last Confession by Morris West is an unfinished, posthumously published fictional autobiography of Bruno, ostensibly written shortly before Bruno's execution.[117]

Bruno features as the hero of the *Giordano Bruno* series of historical crime novels by S.J. Parris (a pseudonym of Stephanie Merritt). The series consists of the novels *Heresy* (2010),[118] *Prophecy* (2011), *Sacrilege* (2012), *Treachery* (2014), *Conspiracy* (2016), *Execution* (2020) and *Alchemy* (2023) along with three prequel novellas.

Appearances in music

Hans Werner Henze set his large scale cantata for orchestra, choir and four soloists, *Novae de infinito laudes* to Italian texts by Bruno, recorded in 1972 at the Salzburg Festival reissued on CD Orfeo C609 031B.[119]

The album *Numen Lumen* (2011) by neofolk group Hautville tracks Bruno's lyrics and is dedicated to the philosopher.

The Italian composer Francesco Filidei wrote an opera, based on a libretto by Stefano Busellato, titled *Giordano Bruno*. The premiere took place on 12 September 2015 at the Casa da Música in Porto, Portugal.[120][121][122][123]

The 2016 song "Roman Sky" by heavy metal band Avenged Sevenfold focuses on the death of Bruno.[124]

Bruno is the central character in Roger Doyle's *Heresy - an electronic opera* (2017).[125]

Legacy

Giordano Bruno Foundation

The Giordano Bruno Foundation (German: Giordano-Bruno-Stiftung) is a non-profit foundation based in Germany that pursues the "Support of Evolutionary Humanism". It was founded by entrepreneur Herbert Steffen in 2004. The Giordano Bruno Foundation is critical of religious fundamentalism and nationalism.[126]

Giordano Bruno Memorial Award

The SETI League makes an annual award honoring the memory of Giordano Bruno to a deserving person or persons who have made a significant contribution to the practice of SETI (the search for extraterrestrial intelligence). The award was proposed by sociologist Donald Tarter in 1995 on the 395th anniversary of Bruno's death. The trophy presented is called a Bruno.[127]

Astronomical objects named after Bruno

The 22 km impact crater Giordano Bruno on the far side of the Moon is named in his honor, as are the main belt Asteroids 5148 Giordano and 13223 Cenaceneri; the latter is named after his philosophical dialogue *La Cena de le Ceneri* ("The Ash Wednesday Supper") (see above).

Other remembrances

Radio broadcasting station 2GB in Sydney, Australia is named for Bruno. The two letters "GB" in the call sign were chosen to honor Bruno, who was much admired by Theosophists who were the original holders of the station's licence.

Works

- *De umbris idearum* (*On the Shadows of Ideas*, Paris, 1582)
- *Cantus circaeus* (*The Incantation of Circe* or *Circe's Song*, Paris, 1582)[128]
- *Ars memoriae* (*The Art of Memory*, Paris, 1582)
- *De compendiosa architectura et complento artis Lulli* (*A Compendium of Architecture and Lulli's Art*, 1582)[129]
- *Candelaio* (*The Torchbearer* or *The Candle Bearer*, 1582; play)
- *Ars reminiscendi* (*The Art of Memory*, 1583)
- *Explicatio triginta sigillorum* (*Explanation of Thirty Seals*, 1583)[130]
- *Sigillus sigillorum* (*The Seal of Seals*, 1583)[131]
- *La cena de le ceneri* (*The Ash Wednesday Supper*, 1584)
- *De la causa, principio, et uno* (*Concerning Cause, Principle, and Unity*, 1584)
- *On the Infinite Universe and Worlds* (*De l'infinito universo et mondi*, 1584)
- *Spaccio de la bestia trionfante* (*The Expulsion of the Triumphant Beast*, London, 1584)
- *Cabala del cavallo Pegaseo* (*Cabal of the Horse Pegasus*, 1585)

- *De gli eroici furori* (*The Heroic Frenzies*, 1585)[132]
- *Figuratio Aristotelici Physici auditus* (*Figures From Aristotle's Physics*, 1585)
- *Dialogi duo de Fabricii Mordentis Salernitani* (*Two Dialogues of Fabricii Mordentis Salernitani*, 1586)
- *Idiota triumphans* (*The Triumphant Idiot*, 1586)
- *De somni interpretatione* (*Dream Interpretation*, 1586)[133]
- *Animadversiones circa lampadem lullianam* (*Amendments regarding Lull's Lantern*, 1586)[133]
- *Lampas triginta statuarum* (*The Lantern of Thirty Statues*, 1586)[134]
- *Centum et viginti articuli de natura et mundo adversus peripateticos* (*One Hundred and Twenty Articles on Nature and the World Against the Peripatetics*, 1586)[135]
- *De Lampade combinatoria Lulliana* (*The Lamp of Combinations according to Lull*, 1587)[136]
- *De progressu et lampade venatoria logicorum* (*Progress and the Hunter's Lamp of Logical Methods*, 1587)[137]
- *Oratio valedictoria* (*Valedictory Oration*, 1588)[138]
- *Camoeracensis Acrotismus* (*The Pleasure of Dispute*, 1588)[139]
- *De specierum scrutinio* (1588)[140]
- *Articuli centum et sexaginta adversus huius tempestatis mathematicos atque Philosophos* (*One Hundred and Sixty Theses Against Mathematicians and Philosophers*, 1588)[141]
- *Oratio consolatoria* (*Consolation Oration*, 1589)[141]
- *De vinculis in genere* (*Of Bonds in General*, 1591)[140]
- *De triplici minimo et mensura* (*On the Threefold Minimum and Measure*, 1591)[142]
- *De monade numero et figura* (*On the Monad, Number, and Figure*, Frankfurt, 1591)[143]
- *De innumerabilibus, immenso, et infigurabili* (*Of Innumerable Things, Vastness and the Unrepresentable*, 1591)
- *De imaginum, signorum et idearum compositione* (*On the Composition of Images, Signs and Ideas*, 1591)
- *Summa terminorum metaphysicorum* (*Handbook of Metaphysical Terms*, 1595)[144][145]
- *Artificium perorandi* (*The Art of Communicating*, 1612)

Collections

- *Jordani Bruni Nolani opera latine conscripta* (*Giordano Bruno the Nolan's Works Written in Latin*), Dritter Band (1962) / curantibus F. Tocco et H. Vitelli

See also

- Fermi paradox
- List of Roman Catholic scientist-clerics

Notes

1. Gatti, Hilary. *Giordano Bruno and Renaissance Science: Broken Lives and Organizational Power*. Cornell University Press, 2002, 1, ISBN 0-801-48785-4
2. "Giordano Bruno | Biography, Death, & Facts | Britannica" (https://www.britannica.com/biography/Giordano-Bruno). 19 February 2024.

3. Birx, H. James. "Giordano Bruno" (http://www.theharbinger.org/xvi/971111/birx.html) Archived (https://web.archive.org/web/20190516084317/http://www.theharbinger.org/xvi/971111/birx.html) 16 May 2019 at the Wayback Machine *The Harbinger*, Mobile, AL, 11 November 1997. "Bruno was burned to death at the stake for his pantheistic stance and cosmic perspective."
4. Collinge, William J. (2012). *Historical Dictionary of Catholicism* (https://archive.org/details/historicaldictio0000coll_2ndedi/page/188/mode/2up?view=theater&q=pantheism). Scarecrow Press. p. 188. ISBN 978-0-8108-5755-1. Archived from the original (https://books.google.com/books?id=LR0Nyt3bi_MC) on 1 August 2024.
5. Frances Yates, *Giordano Bruno and the Hermetic Tradition*, Routledge and Kegan Paul, 1964, p. 450
6. Michael J. Crowe, *The Extraterrestrial Life Debate 1750–1900*, Cambridge University Press, 1986, p. 10, "[Bruno's] sources... seem to have been more numerous than his followers, at least until the eighteenth- and nineteenth-century revival of interest in Bruno as a supposed 'martyr for science.' It is true that he was burned at the stake in Rome in 1600, but the church authorities guilty of this action were almost certainly more distressed at his denial of Christ's divinity and alleged diabolism than at his cosmological doctrines."
7. Adam Frank (2009). *The Constant Fire: Beyond the Science vs. Religion Debate*, University of California Press, p. 24, "Though Bruno may have been a brilliant thinker whose work stands as a bridge between ancient and modern thought, his persecution cannot be seen solely in light of the war between science and religion."
8. White, Michael (2002). *The Pope and the Heretic: The True Story of Giordano Bruno, the Man who Dared to Defy the Roman Inquisition,* p. 7. Perennial, New York. "This was perhaps the most dangerous notion of all... If other worlds existed with intelligent beings living there, did they too have their visitations? The idea was quite unthinkable."
9. Shackelford, Joel (2009). "Myth 7 That Giordano Bruno was the first martyr of modern science". In Numbers, Ronald L. (ed.). *Galileo goes to jail and other myths about science and religion*. Cambridge, MA: Harvard University Press. p. 66. "Yet the fact remains that cosmological matters, notably the plurality of worlds, were an identifiable concern all along and appear in the summary document: Bruno was repeatedly questioned on these matters, and he apparently refused to recant them at the end.14 So, Bruno probably was burned alive for resolutely maintaining a series of heresies, among which his teaching of the plurality of worlds was prominent but by no means singular."
10. Gatti, Hilary (26 October 2012). "Why Giordano Bruno's "Tranquil Universal Philosophy" Finished in a Fire" (https://books.google.com/books?id=1Jo3hYavTpkC&pg=PA116). In Lavery, Jonathan; Groarke, Louis; Sweet, William (eds.). *Ideas under Fire: Historical Studies of Philosophy and Science in Adversity*. Fairleigh Dickinson. pp. 116–118. ISBN 978-1-61147-543-2. "One of the first and most notable developments consisted in a growing awareness that earlier commentators had indeed been right to consider Bruno's trial as being closely linked to that of Galileo (...) Jean Seidengart underlined the particular emphasis to be found throughout the trial on Bruno's doctrine of a plurality of worlds." and "Bruno, however, by admitting so candidly his distance from the Catholic theology, was indirectly questioning such a system of law, which imposed on his conscience views different from his own. (...) he was doing it in the name of a principle of religious pluralism which derived directly from his cosmology."
11. Martínez, Alberto A. (2018). *Burned Alive: Giordano Bruno, Galileo and the Inquisition* (https://press.uchicago.edu/ucp/books/book/distributed/B/bo28433424.html). University of Chicago Press. ISBN 978-1780238968.
12. Koyré, Alexandre (1980). *Estudios galileanos* (in Spanish). México D.F.: Siglo XXI Editores. pp. 159–169. ISBN 978-9682310355.

13. Gatti, Hilary (2002). *Giordano Bruno and Renaissance Science: Broken Lives and Organizational Power* (https://books.google.com/books?id=9cYumhwTQP8C). Ithaca, NY: Cornell University Press. pp. 18–19. ISBN 978-0801487859. Retrieved 21 March 2014. "For Bruno was claiming for the philosopher a principle of free thought and inquiry which implied an entirely new concept of authority: that of the individual intellect in its serious and continuing pursuit of an autonomous inquiry… It is impossible to understand the issue involved and to evaluate justly the stand made by Bruno with his life without appreciating the question of free thought and liberty of expression. His insistence on placing this issue at the center of both his work and of his defense is why Bruno remains so much a figure of the modern world. If there is, as many have argued, an intrinsic link between science and liberty of inquiry, then Bruno was among those who guaranteed the future of the newly emerging sciences, as well as claiming in wider terms a general principle of free thought and expression."
14. Montano, Aniello (2007). Gargano, Antonio (ed.). *Le deposizioni davanti al tribunale dell'Inquisizione*. Napoli: La Città del Sole. p. 71. "In Rome, Bruno was imprisoned for seven years and subjected to a difficult trial that analyzed, minutely, all his philosophical ideas. Bruno, who in Venice had been willing to recant some theses, became increasingly resolute and declared on 21 December 1599 that he 'did not wish to repent of having too little to repent, and in fact did not know what to repent.' Declared an unrepentant heretic and excommunicated, he was burned alive in the Campo dei Fiori in Rome on Ash Wednesday, 17 February 1600. On the stake, along with Bruno, burned the hopes of many, including philosophers and scientists of good faith like Galileo, who thought they could reconcile religious faith and scientific research, while belonging to an ecclesiastical organization declaring itself to be the custodian of absolute truth and maintaining a cultural militancy requiring continual commitment and suspicion."
15. The primary work on the relationship between Bruno and Hermeticism is Frances Yates, *Giordano Bruno and The Hermetic Tradition*, 1964; for an alternative assessment, placing more emphasis on the Kabbalah, and less on Hermeticism, see Karen Silvia De Leon-Jones, *Giordano Bruno and the Kabbalah*, Yale, 1997; for a return to emphasis on Bruno's role in the development of Science, and criticism of Yates' emphasis on magical and Hermetic themes, see Hillary Gatti (1999), *Giordano Bruno and Renaissance Science*, Cornell.
16. Alessandro G. Farinella and Carole Preston, "Giordano Bruno: Neoplatonism and the Wheel of Memory in the 'De Umbris Idearum'", in *Renaissance Quarterly*, Vol. 55, No. 2, (Summer, 2002), pp. 596–624; Arielle Saiber, *Giordano Bruno and the Geometry of Language*, Ashgate, 2005
17. Dorothea Waley Singer (1950), *Giordano Bruno, His Life and Thought*, New York.
18. This is recorded in the diary of one Guillaume Cotin, librarian of the Abbey of St. Victor, who recorded recollections of a number of personal conversations he had with Bruno. Bruno also mentions this dedication in the Dedicatory Epistle of *The Cabala of Pegasus* (*Cabala del Cavallo Pegaseo*, 1585).
19. Gargano (2007), p. 11
20. Gosselin has argued that Bruno's report that he returned to Dominican garb in Padua suggests that he kept his tonsure at least until his arrival in Geneva in 1579. He also suggests it is likely that Bruno kept the tonsure even after this point, showing a continued and deep religious attachment contrary to the way in which Bruno has been portrayed as a martyr for modern science. Instead, Gosselin argues, Bruno should be understood in the context of reformist Catholic dissenters. Edward A. Gosselin, "A Dominican Head in Layman's Garb? A Correction to the Scientific Iconography of Giordano Bruno", in *The Sixteenth Century Journal*, Vol. 27, No. 3 (Autumn, 1996), pp. 673–678.

21. Dorothea Waley Singer, *Giordano Bruno, His Life and Thought*, New York, 1950 "Following the northern route back through Brescia, Bruno came to Bergamo where he resumed the monastic habit. He perhaps visited Milan, and then leaving Italy he crossed the Alps by the Mont Cenis pass, and came to Chambéry. He describes his hospitable reception there by the Dominican Convent, but again he received no encouragement to remain, and he journeyed on to Lyons. Bruno's next movements are obscure. In 1579 he reached Geneva."
22. Virgilio Salvestrini, *Bibliografia di Giordano Bruno*, Firenze, 1958
23. "Giordano Bruno | Biography, Death, & Facts | Britannica" (https://www.britannica.com/biography/Giordano-Bruno). 19 February 2024.
24. "Giordano Bruno - Biography" (https://mathshistory.st-andrews.ac.uk/Biographies/Bruno_Giordano/).
25. "No. 241: Giordano Bruno" (https://www.uh.edu/engines/epi241.htm).
26. Dorothea Waley Singer, *Giordano Bruno, His Life and Thought*, New York, 1950; Singer points out in a footnote that Bruno's name appears in a list, compiled one hundred years later, of Italian refugees who had belonged to the Protestant church of Geneva. However, she does not find this evidence convincing.
27. Singer, Dorothea Waley (1968). *Giordano Bruno: His Life and Thought*. Greenwood Press. p. 12. ISBN 978-0-8371-0230-6.
28. Boulting, William (1914). *Giordano Bruno: His Life, Thought, and Martyrdom* (https://archive.org/details/giordanobrunohis00boul_0). London: Kegan Paul, Trench, Trübner. p. 42.
29. Boulting 1914, pp. 44–45.
30. Boulting 1914, pp. 46–47.
31. Boulting 1914, p. 48–49.
32. Boulting 1914, pp. 49–52.
33. Boulting 1914, p. 51.
34. Boulting 1914, p. 53.
35. Boulting 1914, pp. 56–57.
36. Boulting 1914, pp. 57–58.
37. Weiner, Andrew D. (1980). "Expelling the Beast: Bruno's Adventures in England". *Modern Philology*. **78** (1): 1–13. doi:10.1086/391002 (https://doi.org/10.1086%2F391002). JSTOR 437245 (https://www.jstor.org/stable/437245). S2CID 161642786 (https://api.semanticscholar.org/CorpusID:161642786).
38. Hannam, James. *God's Philosophers: How the Medieval World Laid the Foundations of Modern Science*. Icon Books Ltd, 2009, 312, ISBN 978-1848310704
39. Bossy, John (1991). *Giordano Bruno and the Embassy Affair*. New Haven: Yale University Press. ISBN 978-0-300-04993-0.
40. John Gribbin (2009). *In Search of the Multiverse: Parallel Worlds, Hidden Dimensions, and the Ultimate Quest for the Frontiers of Reality*, ISBN 978-0470613528. p. 88
41. Sgarbi, Marco (2022). *Encyclopedia of Renaissance Philosophy*. New York: Springer International Publishing. ISBN 978-3-319-141695.. p. 255
42. Boulting 1914, pp. 112–113.
43. Boulting 1914, pp. 189–194.
44. Boulting 1914, pp. 196–197.
45. Boulting 1914, pp. 207–213.
46. Boulting 1914, pp. 214–219.
47. Giordano Bruno, *Cause Principle and Unity, and Essays on Magic*, Edited by Richard J. Blackwell and Robert de Lucca, Cambridge, 1998, xxxvi

48. Boulting 1914, pp. 224–225.
49. "Giordano Bruno" (https://www.britannica.com/EBchecked/topic/82258/Giordano-Bruno/883/Final-years). *Encyclopædia Britannica*. Retrieved 8 May 2014. "At the time such a move did not seem to be too much of a risk: Venice was by far the most liberal of the Italian states; the European tension had been temporarily eased after the death of the intransigent pope Sixtus V in 1590; the Protestant Henry of Bourbon was now on the throne of France, and a religious pacification seemed to be imminent."
50. Boulting 1914, p. 249.
51. Boulting 1914, pp. 253–257.
52. Boulting 1914, pp. 257–258.
53. Boulting 1914, p. 259.
54. Boulting 1914, pp. 287–288.
55. Boulting 1914, p. 292.
56. "Il Sommario del Processo di Giordano Bruno, con appendice di Documenti sull'eresia e l'inquisizione a Modena nel secolo XVI", edited by Angelo Mercati, in *Studi e Testi*, vol. 101.
57. Luigi Firpo, Il processo di Giordano Bruno, 1993.
58. This is discussed in Dorothea Waley Singer, *Giordano Bruno, His Life and Thought*, New York, 1950, ch. 7, "A gloating account of the whole ritual is given in a letter written on the very day by a youth named Gaspar Schopp of Breslau, a recent convert to Catholicism to whom Pope Clement VIII had shown great favor, creating him Knight of St. Peter and Count of the Sacred Palace. Schopp was addressing Conrad Rittershausen. He recounts that because of his heresy Bruno had been publicly burned that day in the Square of Flowers in front of the Theatre of Pompey. He makes merry over the belief of the Italians that every heretic is a Lutheran. It is evident that he had been present at the interrogations, for he relates in detail the life of Bruno and the works and doctrines for which he had been arraigned, and he gives a vivid account of Bruno's final appearance before his judges on 8 February. To Schopp we owe the knowledge of Bruno's bearing under judgement. When the verdict had been declared, records Schopp, Bruno with a threatening gesture addressed his judges: "Perchance you who pronounce my sentence are in greater fear than I who receive it." Thus he was dismissed to the prison, gloats the convert, "and was given eight days to recant, but in vain. So today he was led to the funeral pyre. When the image of our Savior was shown to him before his death he angrily rejected it with averted face. Thus my dear Rittershausen is it our custom to proceed against such men or rather indeed such monsters."
59. Fitzgerald, Timothy (2007). *Discourse on Civility and Barbarity* (https://books.google.com/books?id=b67p1VdF_OoC&pg=PA239). Oxford University Press. p. 239. ISBN 978-0-19-804103-0. Retrieved 11 May 2017.
60. "Il Sommario del Processo di Giordano Bruno, con appendice di Documenti sull'eresia e l'inquisizione a Modena nel secolo XVI", edited by Angelo Mercati, in *Studi e Testi*, vol. 101; the precise terminology for the tool used to silence Bruno before burning is recorded as *una morsa di legno*, or "a vise of wood", and not an iron spike as sometimes claimed by other sources.
61. Valentinuzzi, Max E. (4 October 2019). "Giordano Bruno: Expander of the Copernican Universe" (https://doi.org/10.1109%2FMPULS.2019.2937244). *IEEE Pulse*. **10** (5): 23–27. doi:10.1109/MPULS.2019.2937244 (https://doi.org/10.1109%2FMPULS.2019.2937244).
62. Rowland, Ingrid D. (26 April 2016). *Giordano Bruno: Philosopher/Heretic* (https://books.google.com/books?id=C-q8CwAAQBAJ&pg=PT8). Farrar, Straus and Giroux. p. 8. ISBN 978-1-4668-9584-3.
63. Edward A. Gosselin, "A Dominican Head in Layman's Garb? A Correction to the Scientific Iconography of Giordano Bruno", in *The Sixteenth Century Journal*, Vol. 27, No. 3 (Autumn, 1996), p. 674

64. Robert McNulty, "Bruno at Oxford", in Renaissance News, 1960 (XIII), pp. 300–305
65. The apparent contradiction is possibly due to different perceptions of "average height" between Oxford and Venice.
66. Hopkins, Jasper (1985). *Nicholas of Cusa on learned ignorance : a translation and an appraisal of De docta ignorantia* (2nd ed.). Minneapolis: A.J. Benning Press. pp. 89–98. ISBN 978-0938060307. OCLC 12781538 (https://www.worldcat.org/oclc/12781538).
67. Certeau, Michel De; Porter, Catherine (1987). "The Gaze Nicholas of Cusa". *Diacritics*. **17** (3): 15. doi:10.2307/464833 (https://doi.org/10.2307%2F464833). ISSN 0300-7162 (https://www.worldcat.org/issn/0300-7162). JSTOR 464833 (https://www.jstor.org/stable/464833).
68. Koyré, Alexandre (1943). "NICOLAS COPERNICUS". *Bulletin of the Polish Institute of Arts and Sciences in America*. **1**: 705–730.
69. Blackwell, Richard (1991). *Galileo, Bellarmine, and the Bible* (https://books.google.com/books?id=MHnwAAAAMAAJ). Notre Dame: University of Notre Dame Press. p. 25. ISBN 978-0268010249.
70. See e.g. Cosmography by Peter Apian, Antwerp 1539 and its outer sphere
71. Russell, Henry Norris (1931). "Tidying Up the Constellations". *Scientific American*. **144** (6): 380–381. Bibcode:1931SciAm.144..380R (https://ui.adsabs.harvard.edu/abs/1931SciAm.144..380R). doi:10.1038/scientificamerican0631-380 (https://doi.org/10.1038%2Fscientificamerican0631-380). ISSN 0036-8733 (https://www.worldcat.org/issn/0036-8733).
72. Alessandro De Angelis and Catarina Espirito Santo (2015), "The contribution of Giordano Bruno to the principle of relativity" (https://web.archive.org/web/20160126194011/http://www.narit.or.th/en/files/2015JAHHvol18/2015JAHH...18..241D.pdf) (PDF), *Journal of Astronomical History and Heritage*, **18** (3): 241–248, arXiv:1504.01604 (https://arxiv.org/abs/1504.01604), Bibcode:2015JAHH...18..241D (https://ui.adsabs.harvard.edu/abs/2015JAHH...18..241D), doi:10.3724/SP.J.1440-2807.2015.03.02 (https://doi.org/10.3724%2FSP.J.1440-2807.2015.03.02), S2CID 118420438 (https://api.semanticscholar.org/CorpusID:118420438), archived from the original (http://www.narit.or.th/en/files/2015JAHHvol18/2015JAHH...18..241D.pdf) (PDF) on 26 January 2016, retrieved 19 January 2016
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79. Max Tegmark, Parallel Universes (https://wayback.archive-it.org/all/20081217134224/http://www.hep.upenn.edu/~max/multiverse.pdf), 2003
80. Biernacki, Loriliai; Clayton, Philip (2014). *Panentheism Across the World's Traditions* (https://books.google.com/books?id=NY0zAQAAQBAJ&q=bruno+panentheistic&pg=PA72). OUP USA. ISBN 9780199989898.
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82. Max Bernhard Weinsten, *Welt- und Lebensanschauungen, Hervorgegangen aus Religion, Philosophie und Naturerkenntnis* ("World and Life Views, Emerging From Religion, Philosophy and Perception of Nature") (1910), p. 321: "Also darf man vielleicht glauben, daß das ganze System eine Erhebung des Physischen aus seiner Natur in das Göttliche ist oder eine Durchstrahlung des Physischen durch das Göttliche; beides eine Art Pandeismus. Und so zeigt sich auch der Begriff Gottes von dem des Universums nicht getrennt; Gott ist naturierende Natur, Weltseele, Weltkraft. Da Bruno durchaus ablehnt, gegen die Religion zu lehren, so hat man solche Angaben wohl umgekehrt zu verstehen: Weltkraft, Weltseele, naturierende Natur, Universum sind in Gott. Gott ist Kraft der Weltkraft, Seele der Weltseele, Natur der Natur, Eins des Universums. Bruno spricht ja auch von mehreren Teilen der universellen Vernunft, des Urvermögens und der Urwirklichkeit. Und damit hängt zusammen, daß für ihn die Welt unendlich ist und ohne Anfang und Ende; sie ist in demselben Sinne allumfassend wie Gott. Aber nicht ganz wie Gott. Gott sei in allem und im einzelnen allumfassend, die Welt jedoch wohl in allem, aber nicht im einzelnen, da sie ja Teile in sich zuläßt."

83. Review of *Welt- und Lebensanschauungen, Hervorgegangen aus Religion, Philosophie und Naturerkenntnis* ("World and Life Views, Emerging From Religion, Philosophy and Perception of Nature") in Emil Schürer, Adolf von Harnack, editors, *Theologische Literaturzeitung* ("Theological Literature Journal"), Volume 35, column 827 (1910): "Dem Verfasser hat anscheinend die Einteilung: religiöse, rationale und naturwissenschaftlich fundierte Weltanschauungen vorgeschwebt; er hat sie dann aber seinem Material gegenüber schwer durchführbar gefunden und durch die mitgeteilte ersetzt, die das Prinzip der Einteilung nur noch dunkel durchschimmern läßt. Damit hängt wohl auch das vom Verfasser gebildete unschöne griechisch-lateinische Mischwort des 'Pandeismus' zusammen. Nach S. 228 versteht er darunter im Unterschied von dem mehr metaphysisch gearteten Pantheismus einen 'gesteigerten und vereinheitlichten Animismus', also eine populäre Art religiöser Weltdeutung. Prhagt man lieh dies ein, so erstaunt man über die weite Ausdehnung, die dem Begriff in der Folge gegeben wird. Nach S. 284 ist Scotus Erigena ein ganzer, nach S. 300 Anselm von Canterbury ein 'halber Pandeist'; aber auch bei Nikolaus Cusanus und Giordano Bruno, ja selbst bei Mendelssohn und Lessing wird eine Art von Pandeismus gefunden (S. 306. 321. 346.)." *Translation*: "The author apparently intended to divide up religious, rational and scientifically based philosophies, but found his material overwhelming, resulting in an effort that can shine through the principle of classification only darkly. This probably is also the source of the unsightly Greek-Latin compound word, 'Pandeism.' At page 228, he understands the difference from the more metaphysical kind of pantheism, an enhanced unified animism that is a popular religious worldview. In remembering this borrowing, we were struck by the vast expanse given the term. According to page 284, Scotus Erigena is one entirely, at p. 300 Anselm of Canterbury is 'half Pandeist'; but also Nicholas of Cusa and Giordano Bruno, and even in Mendelssohn and Lessing a kind of Pandeism is found (p. 306 321 346.)".
84. Powell, Corey S., "Defending Giordano Bruno: A Response from the Co-Writer of 'Cosmos' (http://blogs.discovermagazine.com/outthere/2014/03/13/cosmos-giordano-bruno-response-steven-soter/#.Uy-qafldUdl) Archived (https://web.archive.org/web/20191116095835/http://blogs.discovermagazine.com/outthere/2014/03/13/cosmos-giordano-bruno-response-steven-soter/#.Uy-qafldUdl) 16 November 2019 at the Wayback Machine, *Discover*, March 13, 2014: "Bruno imagines all planets and stars having souls (part of what he means by them all having the same "composition"), and he uses his cosmology as a tool for advancing an animist or Pandeist theology."
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- Online Galleries, History of Science Collections, University of Oklahoma Libraries (https://web.archive.org/web/20120324053652/http://hos.ou.edu/galleries//01Ancient/HeroOfAlexandria/1575//15thCentury/Vespucci//16thCentury/Bruno/) High resolution images of works by and/or portraits of Giordano Bruno in .jpg and .tiff format.
- Works by Giordano Bruno (https://www.gutenberg.org/ebooks/author/8901) at Project Gutenberg
- Works by Giordano Bruno (https://librivox.org/author/11519) at LibriVox (public domain audiobooks)
- Works by or about Giordano Bruno (https://archive.org/search.php?query=%28%28subject%3A%22Bruno%2C%20Giordano%22%20OR%20subject%3A%22Giordano%20Bruno%22%20OR%20creator%3A%22Bruno%2C%20Giordano%22%20OR%20creator%3A%22Giordano%20Bruno%22%20OR%20creator%3A%22Bruno%2C%20G%2E%22%20OR%20title%3A%22Giordano%20Bruno%22%20OR%20description%3A%22Bruno%2C%20Giordano%22%20OR%20description%3A%22Giordano%20Bruno%22%29%20OR%20%28%221548-1600%22%20AND%20Bruno%29%29%20AND%20%28-mediatype:software%29) at Internet Archive