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Eseje / Essays

Giordano Bruno: The Cosmic Perspective

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GIORDANO BRUNO: KOSMICKÁ PERSPEKTIVA

ABSTRAKT Giordano Bruno (1548–1600) se v průběhu italské renesance etabloval jako nejvýznamnější filozof své doby. Odvážil se zpochybnit tehdy hluboce zakořeněný aristotelský světonázor. Bylo to díky síle jeho představivosti, která mu umožnila zajít ve svém hloubání až k úvahám o podstatě reality mimo naši Zemi. Jeho kosmická vize představovala náš vesmír jako nekonečný, obsahující nekonečné množství hvězd a planet, a dokonce uvažovala o možnosti existence inteligentních bytostí na jiných světech. V tomto byly Brunovy odvážné představy daleko před objevy Galilea, Koperníka, Keplera či Mikuláše Kusánského a dalších předních renesančních astronomů a filozofů. Právě Brunův úžasný vhled do metafyzické sféry položil základy dnešnímu vědeckému přístupu k pátrání po exoplanetách, neznámých formách života, sebeuvědomělých bytostech nebo i civilizacích, které mohou existovat někde v nedozírných hlubinách kosmického prostoru.

KLÍČOVÁ SLOVA Kosmologie; věčnost; exoplanety; nekonečno; metafyzika; filozofie; renesance; spekulace; vesmír; světonázor

ABSTRACT During the Italian Renaissance, Giordano Bruno (1548-1600) emerged as the most significant philosopher of that time. He boldly challenged the deeply entrenched Aristotelian worldview by using his powerful imagination in order to speculate on the nature of reality beyond our earth. His cosmic vision claimed that this universe is eternal and contains an infinite number of stars and planets; it even held that intelligent beings exist on other worlds. As such, Bruno's own daring ideas were far ahead of those discoveries that were made by Cusanus, Copernicus, Kepler, and Galileo (among other astronomers and philosophers of that age). In fact, it was his awesome metaphysical outlook that paved the way for our modern scientific search for those exoplanets, life forms, sentient creatures, and even civilizations that may exist elsewhere throughout the sidereal depths of outer space.

KEY WORDS Cosmology; Eternity; Exoplanets; Infinity; Metaphysics; Philosophy; Renaissance; Speculations; Universe; Worldview

INTRODUCTION: COSMIC SPECULATIONS

The great Italian Renaissance natural philosopher Giordano Filippo Bruno (1548-1600) was born in Nola, near Naples, in the Campania. As a young scholar, he studied philosophy and literature, and later theology; like the Pre-Socratic thinkers, he marveled at the starry heavens above and speculated on the size and nature of this universe. His inquisitive mind was aided by both an extraordinary intellect and a tenacious memory. In 1572, Bruno took the vows of priesthood. Yet, only four years later, doubting many of the teachings of Christianity and therefore suspected of heresy, this Dominican monk

Fig. 1. Ever since the Pre-Socratic thinkers, cosmologists in both science and philosophy have speculated on the essential makeup and ultimate structure of this material universe, as well as on the place of humankind within it (Illustration).

with unorthodox opinions abandoned his religious order and, subsequently, was forced to flee to the more secular Northern Italy in order to escape both the Neapolitan Inquisition and the Holy Office of Rome. Fearing for his own safety and seeking freedom of expression, the restless Bruno wandered for years as a solitary figure throughout several countries: Bohemia, England, France, Germany, and Switzerland. For the self-unfrocked priest, this was a time for writing, studying, lecturing, reflecting, and speculating.

Bruno had rejected the Aristotelian worldview and, as he enjoyed the geography of the different environments he experienced while journeying from country to country, he undoubtedly speculated on the landscapes of other possible planets in this cosmos. What might mountains and forests, oceans and deserts, look like on these other worlds? Of course, for him, there was also the possible existence of life forms and intelligent beings on other planets throughout this universe. What might organic creatures and rational aliens look like on distant worlds far from our earth? Bruno was speculating in the footsteps of the Roman philosopher Lucretius. In general, Bruno's incredible imagination had glimpsed the subject matter of our modern interests in the emerging sciences of both exogeography and exobiology (astrobiology). In particular, he was developing a truly cosmic perspective for understanding and appreciating the nature of reality.

With steadfast determination, Bruno's creative thoughts and controversial books boldly challenged the entrenched beliefs of the Roman Catholic faith, the Peripatetic biases of his contemporary astronomers and physicists, and the unrelenting authority given to the Aristotelian worldview. Unfortunately, Bruno as an ingenious freethinker had a personality that aggravated both the general populace and serious scholars to such a degree that he could never claim a permanent home anywhere during his lifetime. Nevertheless, he no doubt saw himself as a citizen of the entire universe.

During a two-year period in London (1583-l585), the autodidactic Bruno lectured at Oxford University and both wrote and published six strikingly brilliant Italian dialogues: *On the Cause, Principle, and Unity*; *On the Infinite, the Universe, and Worlds*; *The Ash Wednesday Supper*; *The Cabala of the Horse Pegasus*; *The Expulsion of the Triumphant Beast*; and *The Heroic Frenzies*. He had rigorously rejected the geostatic, geocentric, anthropocentric, and finite-because-spherical model of the cosmos which was found in those writings of Aristotle that were still dogmatically supported by the Roman Catholic Church. Taken together, these six volumes contained the essential elements of his daring cosmology and new epistemology, as well as his bold statements on ethics, religion, and theology. He viewed everything within the framework of eternity and infinity.

Bruno's cosmology ushered in a new anthropology. He saw the human animal as a product of, dependent upon, and totally within the flux of reality. As such, our species is merely a fleeting fragment of our earth, which in turn is only a temporary speck within cosmic history. Furthermore, Bruno's sweeping vision considered the seemingly endless potentiali-

Fig. 2. The young Giordano Bruno boldly challenged the earlier Aristotelian worldview and bravely presented his own interpretation of this material universe (Illustration).

ties of the human animal; our species is that critically-thinking animal for which there are no *a prior* limits to its thoughts, feelings, and actions. And, through its intellect, our species is capable of living in harmony with the cosmos. Moreover, in this eternal and infinite universe (as he saw it), Bruno taught that the uniqueness of each person is actually heightened within a community of individuals that mirrors the plurality of worlds. Although from the cosmic perspective the human animal appears to be insignificant, within a planetary framework it is nevertheless of great importance. And the human animal can grasp, at least in part, the cosmic perspective.

Bruno also wrote poems in which he ridiculed, with caustic sarcasm and bitter satire, both the dogmatic clergymen and the superstitious beliefs of his age. In 1591, his last books and poems were published at Frankfurt in Germany. They included *On the Monad*, *On the Immense*, and *On the Triple Minimum*.

ON A TRAGIC ENDING

With reckless abandon, the courageous but naive Giordano Bruno returned to Italy with optimistic hope of convincing the new Pope, Clement VIII, of the truth of at least some of his controversial ideas. As a result, a tricked Bruno fell into an entrapment that had been set by a young nobleman Giovanni Mocenigo. The monk was subsequently trialed and condemned twice: first by the Venetian Holy Inquisition in 1592, and later by the Roman Holy Inquisition in 1593. Unfortunately, Bruno's creative and critical writings, which had pointed out the hypocrisy and bigotry within the Church, along with his tempestuous personality and undisciplined behavior, easily made him a victim of the pervasive religious dogmatism and entrenched philosophical intolerance of the 16th century. As a result, because of his heretical ideas, Bruno had been swiftly excommunicated from the Catholic, Lutheran, and Calvinist churches. In fact, the Catholic hierarchy had found him guilty of both religious infidelity and doctrinal errors.

Even so, Bruno stubbornly refused to disclaim his own beliefs and lofty vision. Consequently, he was handed over to the Italian state, which determined his final fate. The philosopher was imprisoned in the dungeons of the Holy Inquisition in Rome for seven years, where he was denied pen and paper, as well as books and visitors; he was relentlessly interrogated and probably tortured. After enduring this living tomb, Bruno was subsequently sentenced to death under the influence of the Jesuit Cardinal Roberto Bellarmino. Obstinate to the very end, Bruno never recanted any of the ideas of his heretical worldview.

In the eternal city of Rome, on 17 February 1600, at the age of 52, the rebellious Giordano Bruno was bound and gagged and burned alive upside-down at the stake in the center of the Campo de' Fiori, not far from the Vatican, while priests chanted their litanies. Three years later, the bold writings of the apostate monk and intrepid thinker were placed on the Index. In June 1889, during the reign of Pope Leo XIII, contri-

Fig. 3. On Ash Wednesday, 17 February 1600, at the Campo de' Fiori in Rome, Giordano Bruno was burned alive at the stake for his unorthodox ideas by the Catholic Inquisition; an impressive statue now stands in the center of this plaza, marking the very spot where Bruno was tortured and executed (Illustration).

butions from anticlerical groups around the world enabled an impressive bronze statue of Giordano Bruno, made by Ettore Ferrari, to be erected by the public on the very spot where this freethinker had been tortured and executed. (The great German evolutionist Ernst Haeckel, himself a material monist and religious critic, wrote a hard-hitting address about this egregious event.) Of course, one is unlikely to ever know all of the facts surrounding Bruno's complex trial and his inevitable death.

THE UNITY OF REALITY

Using his profound imagination, Giordano Bruno had ushered in a strikingly new cosmology. Boldly, he held this universe to be eternal in time, infinite in space, and endlessly changing. In the history of Western philosophy, his daring metaphysical speculations were a lasting and significant contribution to the emergence of our modern conceptualization of this dynamic and expanding universe. In retrospect, the awesome Brunian worldview was a remarkable interpretation of this material cosmos; his unique vision far surpassed the closed cosmological frameworks that had been held by Cusanus, Copernicus, Kepler, and Galileo. Essentially, Bruno's incredible ideas were a result of his freedom from both the fixed philosophical worldview of nature that had been taught by Aristotle and the dogmatic theological belief-system that was still being taught by the Roman Catholic Church.

In fact, during the Italian Renaissance, Bruno had stood utterly alone in foreshadowing our modern understanding of and appreciation for time, space, change, and matter in terms of science and reason (particularly in his grasping the insignificant place of humankind within the cosmic flux of all things). For this thinker, no longer did the heavens and the earth represent two separate but different realms of matter and motion, as Aristotle had claimed. For Bruno, this endless universe represented a quintessential unity.

During the tumultuous Italian Renaissance, it was Bruno who had critically reflected upon the heavens and, as a result, seriously considered the far-reaching implications and inevitable consequences that his own unique vision of material reality held for determining the true place that our own species occupies within this dynamic universe. Because he was neither a mathematician like Kepler nor a scientist like Galileo, Bruno relied upon both rational speculations and his powerful imagination, as well as a rigorous use of analogies (along with magic and mysticism), in order to develop and support his cosmic model for this changing universe. Going beyond observations and mathematics, he argued for a worldview that dared to undermine all the finite and closed conceptual frameworks that were offered by the physicists, astronomers, philosophers, and theologians before and during his time.

Bruno was especially indebted to the cosmic visions of the Roman philosopher Lucretius and the Renaissance theologian Cusanus; their interpretations of this universe went far beyond those conceptual limitations of all earth-bound and human-centered views of this cosmos. However, in sharp contrast to Copernicus's model of the world, Bruno's vision of this universe even went beyond a heliocentric model of the cosmos. Bruno was aware of those limitations that will result from a strictly mathematical approach in any attempt to comprehend the size and makeup of material reality. Consequently, he stressed that the use of symbolic logic and discrete geometry merely supplements the more significant findings as a result of using rational speculations grounded in intuition and the imagination. Reminiscent of those cosmologists during the Pre-Socratic period, Bruno gladly extrapolated new ideas and a vast perspective from his own critical observations of nature and a rigorous use of his powerful imagination. Ultimately, Bruno's reflections resulted in his maintaining that material reality is a living and divine universe, i.e., he grounded his cosmic vision in pantheism; God and this universe represent a dynamic unity, as both are one and the same existing being. In short, for Bruno, the eternal and infinite God is this eternal and infinite universe.

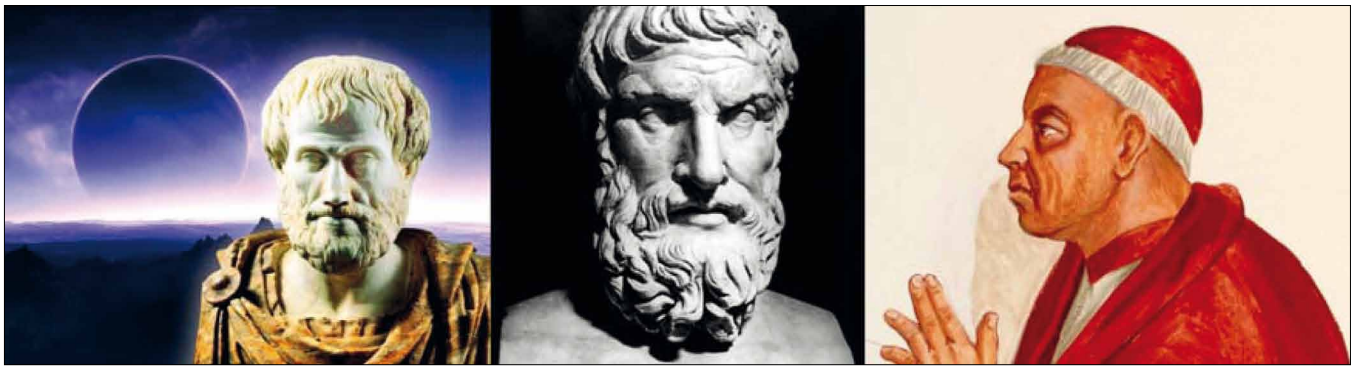

Fig. 4. The cosmic ideas of Aristotle, Lucretius, and Cusanus were greatly superseded by Giordano Bruno, whose daring speculations on sidereal reality angered the Roman Catholic Church in Italy (Illustrations).

IMAGINING A NEW COSMOLOGY

Breaking new ground in cosmology, Giordano Bruno offered a philosophy of nature that depended upon the metaphysical concepts of plurality, uniformity and cosmic unity, along with the logical principle of sufficient reason. He ruthlessly criticized all geocentric, zoocentric, anthropocentric, and heliocentric views of reality. His worldview repudiated the Peripatetic terrestrial/celestial dichotomy and, instead, it maintained that the same physical laws and natural elements of our earth exist throughout this eternal and infinite universe. In doing so, Bruno was able not only to correct but also to surpass the planetary perspective expounded by Aristotle and other natural philosophers. He even advanced beyond the sun-centered cosmology advocated by some of the Renaissance astronomers, e.g., Copernicus, Kepler, and Galileo; Bruno's cosmology has no center. His own model of this universe is free from any fixed point of reference, reminding one of Einstein's general theory of relativity. In retrospect, it may be argued that Bruno's pioneering thoughts actually ushered in the modern cosmic perspective in science and philosophy.

In essence, Bruno's vision had replaced a finite cosmos with an infinite universe. His insights are free from the moribund scholastic prejudices and the overbearing restrictive beliefs of the established religion and philosophy of his time. Without ignoring the value of but limitations of reason (mathematics and logic), Bruno had used his own intuitive insights in order to synthesize both perceptual experience and the critical intellect into a daring worldview that grasps the basic features of cosmic reality. For him, such rigorous reflections also lead to humanistic actions. Unable to demonstrate his metaphysical claims scientifically, Bruno relied upon thought-experiments to glimpse the ramifications of his sweeping philosophical vision (just as Einstein had done in the last century in order to understand and appreciate the extraordinary implications and startling consequences of his scientific theory of special and general relativity).

Foreshadowing the philosopher Friedrich Nietzsche, Bruno taught that there are an infinite number of perspectives, with there being no privileged or fixed frame of reference: as such, human experience may be unified in religious or scientific or philosophical concepts. Nevertheless, he realized that religious positions are inevitably doomed as a result of an ongoing use of the scientific method and the resultant accumulation of empirical evidence in order to unravel the nature of reality. And, just like Nietzsche's own interpretation of reality, Bruno's cosmic perspective is ultimately a bold expression of philosophical atheism.

FROM FINITUDE TO INFINITY

Not restricting himself to the concept of finitude, Giordano Bruno was thrilled with the idea of infinity. He was not willing to set limits to those possibilities, as well as those probabilities, that are inherent in this universe (as he saw it). His very own imagination thrived on the plausibility of extending the concept of infinity to embrace all aspects of cosmic reality. For this infinity-intoxicated philosopher, the universe is infinite in both potentialities and actualities, and its creative power is both endless and unbounded. As such, no fixed ceiling of a finite number of stars sets a spherical boundary to the physical cosmos and, moreover, no dogmatic system of ideas or beliefs or values should imprison that open inquiry in a free society that is so vital and necessary for both human progress and fulfillment.

For Bruno, there are no real separations (only logical distinctions) within the unity and harmony of dynamic nature. He overcame the myopic earth-centered framework of his time with a challenging but liberating sidereal view on the nature of things: for him, in this cosmos, there are an infinite number of stars and planets (as well as an infinite number of comets and moons) that are more or less analogous to the sun and our earth. He even envisioned an infinite number of solar systems, cosmic galaxies, and island universes strewn throughout this boundless reality.

Clearly, Bruno was in step with scientific and philosophical progress in his attempt to overcome all those dogmatically closed belief-systems that were preoccupied with merely this planet and only our species. He affirmed the essential homo-

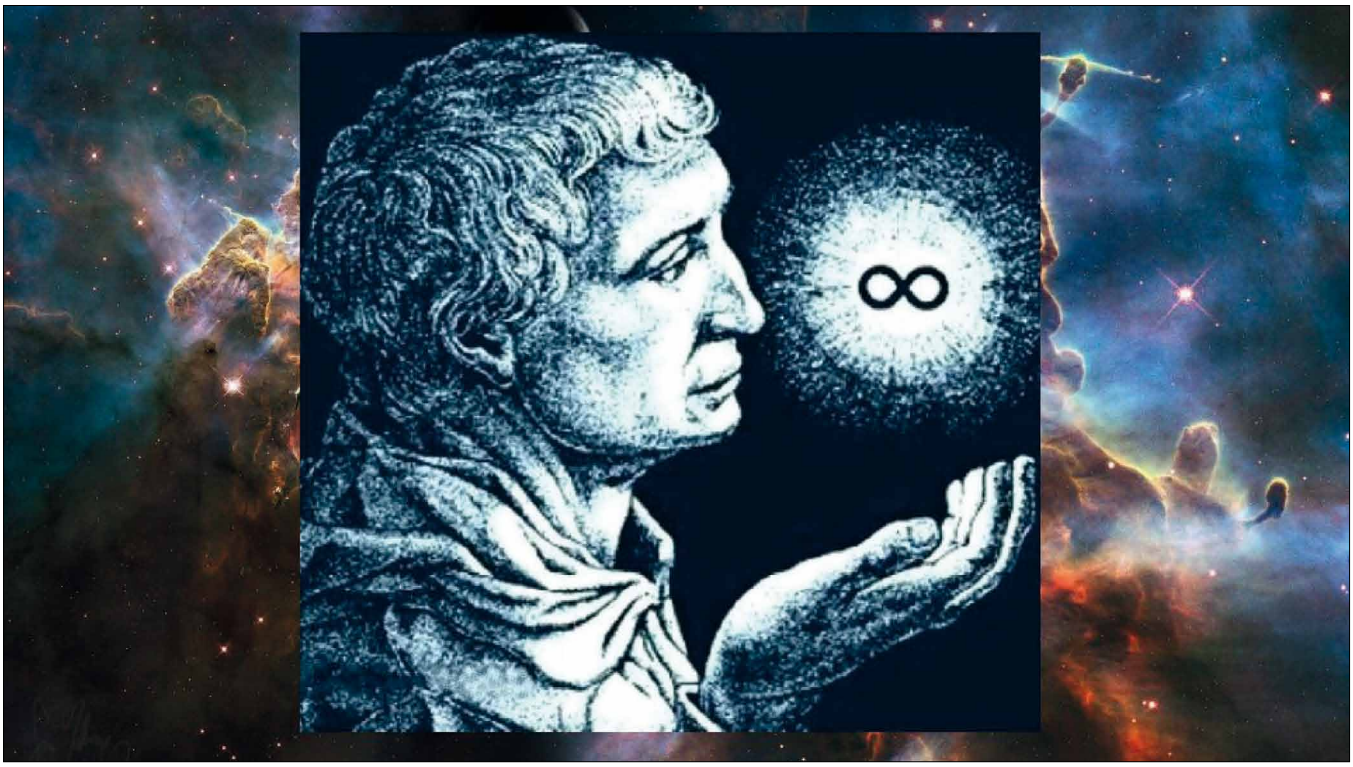

Fig. 5. In his writings on cosmology, Giordano Bruno held that our universe is eternal in time, infinite in space, and endlessly changing, as well as atomistic and divine. Illustration by James S. Arthur; Collection of H. James Birx.

Fig. 6. Besides discovering nearly 2000 exoplanets to date, the further scientific exploration of deep space will very likely also result in the discovery of exomoons that may be the possible habitats of life forms beyond our own solar system (Illustrations).

geneity of this cosmos, teaching an atomistic philosophy that maintains all things both inorganic and organic to be composed of monads as the ultimate units of process reality: the physical unit is the atom, the mathematical unit is the point, and the metaphysical unit is the monad. Foreshadowing the philosopher Gottfried Wilhelm Leibniz, Bruno taught that the infinitesimal and irreducible monads mirror this dynamic and infinite universe in accordance with the dialectical principle of the unity of the microcosm with the macrocosm. Furthermore, Bruno claimed that this continuous universe had no beginning and will have no end in either space or time, and that there are life forms (including intelligent beings) on countless other worlds.

Bruno argued for an infinite number of inhabited planets. Hence, he conceived of life forms and intelligent beings existing on other worlds throughout this universe. As such, his infinity-inspired cosmology anticipated the emerging sciences of exogeography and exobiology: neither this planet nor our

Fig. 7. The scientific discoveries of Copernicus, Kepler, and Galileo have altered forever how one understands and appreciates this material universe (Portraits).

Fig. 8. The scientist Nikola Tesla, among other significant thinkers, held the red planet Mars to be inhabited by intelligent beings; this same idea inspired the visionary H.G. Wells to write his famous science-fiction classic work *The War of the Worlds* (1898) (Illustrations).

species is unique within the sidereal vastness of cosmic reality. In the final analysis, humankind is merely a fleeting fragment of the earth, while our planet is only a temporary speck of this solar system

LIFE WITHIN THIS UNIVERSE

In 1609, nine years after the death of Giordano Bruno, the astronomer/physicist Galileo was the first scientist to use the telescope for cosmic inquiry; he discovered that the heavenly bodies do, in fact, resemble our earth in their makeup and motion. In this same year, the astronomer/mathematician Johannes Kepler demonstrated that the planets move in elliptical (not circular) orbits around the sun. As a result, the Aristotelian dichotomy between our imperfect terrestrial world and the alleged perfect celestial realm was forever abolished. With the probability of countless earth-like planets and moon-like satellites in this universe, the possibility of life forms and intelligent beings existing on them becomes almost a certainty. Although only once, even Charles Darwin himself envisioned life forms existing on other worlds. In fact, this universe may be filled with exoplanets, exomoons, living creatures, sentient beings, and even civilizations.

The red planet Mars has fascinated humans since antiquity; the ancient Romans referred to this planet as the god of war. It is not surprising, then, that some thinkers would imagine that this mysterious world might support intelligent beings with an advanced civilization. The scientist Nikola Tesla even attempted to communicate with these alleged Martians. However, these aliens did visit our earth in the classic science-fiction horror story *The War of the Worlds* (1898) from the gifted writer and prophetic visionary H.G. Wells. In fact, on 30 October 1938, a radio dramatization of Wells' book by Orson Welles is said to have terrorized the listeners, who thought that this alien invasion was actually taking place! Within the framework of modern exogeography, both unmanned and manned explorations of Mars will disclose the geological his-

Fig. 9. The great philosopher Immanuel Kant took seriously the probability that rational beings exist elsewhere in outer space; the renown scientist Carl Sagan rigorously advocated an ongoing scientific/technological search for intelligent life forms existing on other worlds throughout this cosmos (Portraits).

Fig. 10. In MGM's Kubrick-Clarke film *2001: A Space Odyssey* (1968), arguably the greatest science-fiction motion picture ever made, the astronaut Dr. Dave Bowman (Keir Dullea) has an unexpected and eerie encounter with super-intelligent aliens existing 'beyond the infinite' (Illustration). The year 2018 marks the 50th anniversary of this extraordinary cinematic achievement.

tory and material nature of this planet, consequently determining how probable it is for humans to successfully inhabit this unearthly world in the distant future.

In recent thought, critical thinkers like the great philosopher Immanuel Kant and the visionary scientist Carl Sagan have taken the possibility of exobiology seriously. Unlike during those

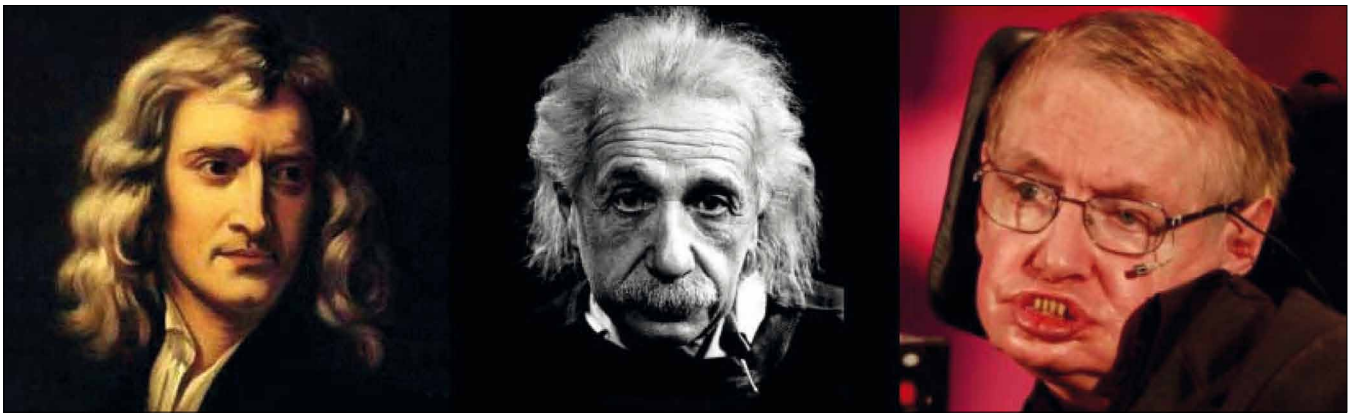

Fig. 11. Theoretical physicists Newton, Einstein, and Hawking (among many other thinkers) have made quintessential contributions to the development of modern cosmology in terms of science and mathematics (Portraits).

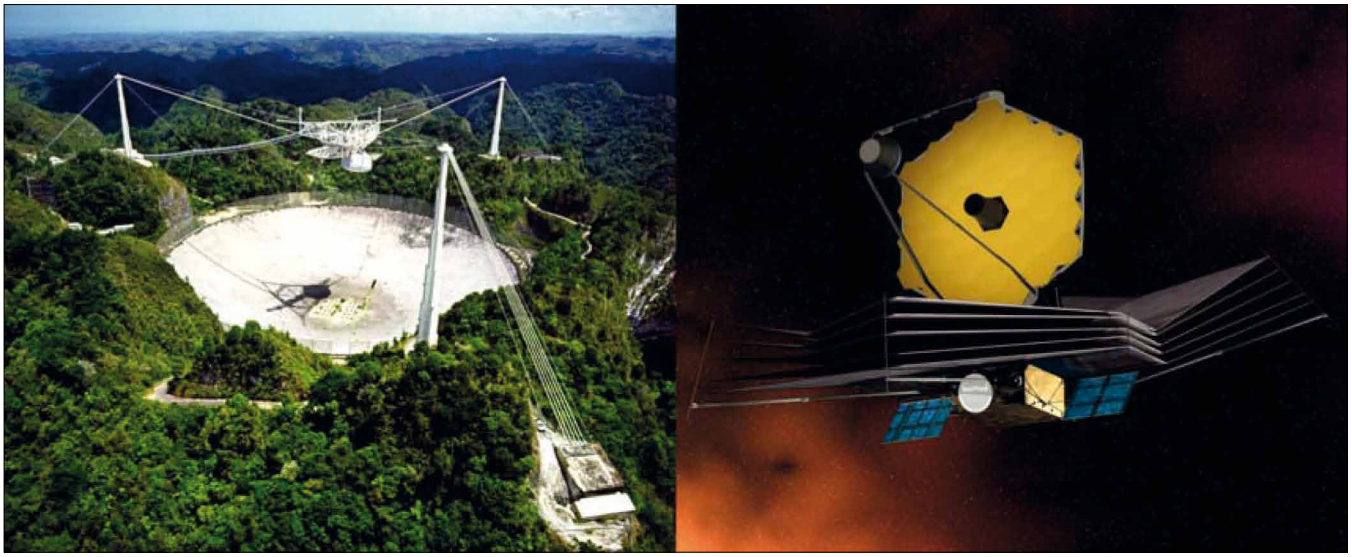

Fig. 12. With ongoing advancements in science and technology, the modern search for life forms, intelligent beings, and even civilizations elsewhere in this vast universe continues through the use of both planetary and extraterrestrial telescopes, e.g., the Arecibo Observatory's radio telescope and the forthcoming James Watt space telescope (Illustrations).

times of Giordano Bruno, modern science and technology are now actually able to search for the existence of life and intelligence and civilization in deep space through the use of both radio telescopes and space telescopes. Surely, the speculative Bruno would be thrilled with such modern developments in physics and astronomy, which might in time actually verify at least some of his own cosmic speculations. Nevertheless, it is very unlikely that Bruno himself ever imagined our planet earth being visited by intelligent extraterrestrials from other worlds.

In 1968, millions of movie enthusiasts were introduced to the existence of superior extraterrestrials in the now-classic MGM film *2001: A Space Odyssey* from director Stanley Kubrick and writer Sir Arthur C. Clarke. Sweeping in its evolutionary scope and profound in its philosophical stance, this motion picture took seriously the possible future encounter of human beings with cosmic aliens. One wonders what Giordano Bruno would have thought of this epic cinematic presentation of many of his bold ideas (although this film is usually associated with Nietzsche's engaging worldview).

In 1969, the astronaut Neil Armstrong became the first human being to walk on the surface of our moon; the planets were now suddenly within the reach of our species. No doubt, Giordano Bruno would have been thrilled with this lunar conquest and its implications for the future.

THOUGHT-EXPERIMENTS & PERSPECTIVISM

Giordano Bruno had offered a cosmology that anticipated Einstein's theory of relativity; he argued that, in a universe of infinite space and endless time, size and weight and motion, as well as change and events and relationships, are always relative to any particular but temporary frame of reference. For him as a critical observer, from a mountain near the village of Nola

Fig. 13. Erected on 09 June 1889, a huge bronze statue of Giordano Bruno stands conspicuously in the center of the Campo de' Fiori in Rome; with appropriate irony, it faces the Vatican. Sculpture: Ettore Ferrari; Photo Credit: Branko Milićević; Figure Preparation: Alexander V. Tenodi.

the volcano Vesuvius looked like it was devoid of all life; and yet, from the slopes of Vesuvius, it was now the mountain near the village of Nola that looked lifeless. In fact, both geological formations support life. This experience impressed upon Bruno's mind the relativity of perspectives and the crucial distinction between appearance and reality. Therefore, he concluded that obtaining both knowledge and wisdom required that one's limited senses be aided by the application of mathematics and especially by the use of rational speculations.

More striking, in a thought-experiment, Bruno imagined himself floating above the earth and then beyond it. As he drifted closer and closer to the moon, it got ever-larger, while our planet got ever-smaller. From the lunar perspective, it was now the earth that seemed to be a satellite, while the moon itself looked as if it were the size of our planet. If Bruno had drifted far enough beyond the moon, then he would have seen that both our earth and the moon first became merely specks of light and then eventually they would both disappear into the blackness of deep space. Using his powerful imagination, this philosopher once again demonstrated the principle of relativity and stressed the crucial difference between the appearance of things (epistemology) and their true reality (ontology).

In another thought-experiment, within his limitless framework of eternal time, the Nolan philosopher also imagined himself walking among the endless number of stars and planets strewn throughout infinite space. For him, the traditional Aristotelian-Ptolemaic cosmology was never an accurate model of physical reality. In fact, the Brunian outlook had even far surpassed the controversial Copernican heliocentric interpretation of our physical universe!

In Bruno's cosmological model, the center of this infinite universe is everywhere and its circumference is nowhere. His cosmic framework is free from any absolutes in science or philosophy or theology. Furthermore, despite the pervasive decay and continuous generation occurring everywhere, the universe itself is always striving for novelty and perfection (as he saw it). Thus, both the dynamic unity of cosmic reality itself and the evolving nature of human existence within it represent an ongoing creative process.

GOD & THE WORLD

Giordano Bruno maintained that the multiplicity of natural things originates out of a single substance, which is eternal in time and infinite in space. This dynamic cosmos is quintessentially a metaphysical unity. Rejecting deism and theism and panentheism, Bruno himself held to a pantheistic interpretation of all reality. He taught that the supreme single necessary substance is God or nature itself; this ultimate substance encompasses every particular object, relationship, and event that exists both potentially or actually in this infinite universe. Consequently, God is the cause, the principle, and the unity of all that has ever existed, exists now, or ever will exist throughout space and time. During his entire life, Bruno never wavered from his comic perspective, pantheistic orientation, and passion for infinity.

As a mystic, Bruno experienced God as this world itself, an idea that transcended both the empirical sciences and the traditional theology of his time. Therefore, it is not surprising that his mysticism seriously threatened the rigid and closed politico-religious establishment of Rome; this same dogmatic outlook by the Roman Catholic Church would, years later, force Galileo to recant all of his discoveries in descriptive astronomy and, in more recent times, silence the geo-paleontologist and Jesuit priest Pierre Teilhard de Chardin for his commitment to the fact of evolution and a metaphysical panentheistic worldview.

Beyond his contributions to science and mathematics, Sir

Fig. 14. On 02 March 2008, evocative of flames, this unique statue of an upside-down Giordano Bruno was placed at Potsdamer Platz in Berlin, Germany. Sculpture: Alexander Polzin; Figure Preparation: Alexander V. Tenodi.

Isaac Newton wrote volumes on theology; he held that absolute space is the sensorium of God. Even so, a clear and final exposition from him on his belief in the existence of a personal God does not exist. In sharp contrast, Albert Einstein clearly did not believe in the existence of a personal God; his position as a pantheist is, at best, merely a polite form of atheism, reminiscent of the metaphysical position that had been held by Baruch Spinoza. Furthermore, the philosopher Alfred North Whitehead offered a cosmology that, on a metaphysical level, saw God and the world directly interrelated in a dynamic reality of endless creativity. As such, Giordano Bruno's pantheism is far closer to the positions of Einstein and Spinoza than it is to the metaphysical views of Newton and Teilhard and Whitehead. The theoretical physicist Stephen Hawking (1942-2018) found no need to include a personal God in his scientific explanation for and philosophical interpretation of this material reality that consists for him of multiple dimensions, multiple histories, and multiple alternate universes with different laws (a multiverse); in the footsteps of Bruno, Hawking has offered a cosmology that is quintessentially the worldview of an unabashed atheist. Consequently, theologians cannot claim either Albert Einstein or Stephen Hawking to be a theist.

CONCLUSION: A VISION TO REMEMBER

If Giordano Bruno were alive today, then he would no doubt be thrilled with the use of radio telescopes and space telescopes in the search for life forms, intelligent beings, and even civilizations elsewhere in this universe. In general, he had paved the way for the new cosmology of our own time. To his lasting credit, the most recent empirical discoveries in astronomy and the new rational speculations in philosophy (including the emerging sciences of exogeography and exobiology) support many of Bruno's brilliant insights and fascinating intuitions about this material universe. Appropriately, a lunar crater with spectacular geographical features has been named after Giordano Bruno.

In his speculations on this universe, the unique theoretical physicist Stephen Hawking had been delving into the existence of singularities and black holes, as well as the nature of time itself. He had offered a model of the cosmos that even Bruno himself would find strange and perplexing.

Finally, as a daring and profound thinker, Giordano Bruno had presented both a provocative and inspiring vision of this universe that still remains both relevant and significant for

our ever-expanding scientific inquiry and ever-open philosophical framework. In his bold quest, he alone had ushered in modernity in terms of offering a new natural philosophy that is grounded in a cosmic perspective that embraces a dynamic and atomistic, eternal and infinite universe.

NOTES

During my trips to Rome, I make it a point to visit the impressive statue of Giordano Bruno; on one of our recent vacations to the eternal city, my dear friend Prof. Branko Milićević took the excellent photograph of this statue that is used in Fig. 13. Some of the thoughts and opinions that are given by me in this entry were first expressed in lectures that I have presented for the Faculty of Philology at the University of Belgrade; I remain very grateful to Prof. Dr. Ljiljana Marković for graciously making those academic opportunities available to me during my stays at this university with the permanent status of a distinguished visiting professor.

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AUTHOR

Prof. Dr. Dr. H. James Birx is an emeritus professor of anthropology at Canisius College and a permanent distinguished visiting professor in the Faculty of Philology at the University of Belgrade. He received both an M.A. in anthropology and a Ph.D. *with distinction* in philosophy, under Distinguished Professor Marvin Farber, from the State University of New York-University at Buffalo. Dr. Birx has been an invited visiting professor at the University of Cambridge and twice at Harvard University, and was recipient of the 2003 Professional Achievement Award from the State University of New York-College at Geneseo. For SAGE Publications, he both edited and contributed to the two-volume *21st Century Anthropology: A Reference Handbook* (2010), the three-volume *Encyclopedia of Time: Science, Philosophy, Theology, & Culture* (2009), and the award-winning five-volume *Encyclopedia of Anthropology* (2006). Dr. Birx has authored six books, which include both *Human Evolution* (1988) and the award-winning *Theories of Evolution* (1984) for Charles C Thomas, Publisher. His over 400 academic publications also encompass essays, chapters, articles, monographs, book reviews, book introductions, and encyclopedia entries. Recently, Dr. Birx gave an invited paper at the University of Chicago, the Imperial College London, and the University of California-Berkeley. On 22 November 2016, he gave an invited presentation on 'Interpreting Evolution: Darwin, Nietzsche, & Teilhard de Chardin' for Darwin College at the University of Cambridge. His honors include being elected into the Royal Academy of Scientists & Artists (*SKANU*) in Belgrade and consequently being designated a royal academician.

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Fig. 15. Prof. Dr. Dr. H. James Birx, anthropologist and philosopher. This photograph was taken at the Charles Darwin Down House/Museum in Downe, near Bromley in Kent, England. Photo Credit: Branko Milićević.

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