Biographical Encyclopedia of Astronomers

Whitehead, Alfred North

Born Ramsgate, Kent, England, 15 February 1861

Died Cambridge, Massachusetts, USA, 30 December 1947

Alfred Whitehead was a leading mathematician and philosopher of the 20th century, whose works addressed theoretical physics and cosmology. Whitehead's early education was obtained at Sherborne in Dorset, a school founded in the 8th century. In 1880, he was admitted to Trinity College, Cambridge University, where two centuries earlier, Isaac Newton had laid down what he thought were the fundamental laws of the Universe. Upon his graduation in 1884, Whitehead was elected a fellow of his college. Although he held strong interests in both mathematics and philosophy, he chose the former because, as he said, "Mathematics must be studied; philosophy should be discussed." One of Whitehead's most important contributions to both disciplines was achieved through his collaboration with former student Bertrand Russell, on their three-volume *Principia Mathematica* (1910–1913), in which the pair took on the gargantuan task of translating all of mathematics into logic. In 1890, Whitehead married Evelyn Willoughby Wade; the couple had three children.

Whitehead resigned his post at Cambridge in 1910 and relocated to London. The following year, he obtained a position at University College, but in 1914 was appointed to the chair of applied mathematics at the Imperial College of Science and Technology

In 1924 (at the age of 63), Whitehead left England to join the philosophy department at Harvard University. He had, in previous years (e.g., *The Concept of Nature*, 1920), already turned his attention to the conceptual analysis typical of philosophers of science. At Harvard, however, he began work on his own great system of process philosophy, a theory according to which all things—even atoms, which Newton had conceived as being most real—are but intellectual abstractions that have no mind-independent existence. This aspect of Whitehead's philosophy resembles the idealist views of George Berkeley and Josiah Royce, but especially William James's radical empiricism and, even more so, the phenomenalism of physicist Ernst Mach.

The main difference is that Whitehead conceives of the cosmos in terms of fundamental units of existence, instead of the inert atoms represented in the tradition of Leucippus, Democritus, and Epicurus According to Whitehead's viewpoint, the ultimate atomic constituents of the Universe exist, like Leibnizian monads, as processes derived in relation to, and out of, the "now" of consciousness. But this is not to say that they are merely phenomenal or representational. As actual entities, that is, "actual occasions," they are not subject to the sort of mind-body problem as conceived in Cartesian dualism. The Universe according to Whitehead is one insubordinate substance that exists in a chaotic sort of Heraclitan perpetual flux. What immediately appears here and now is real; beyond that is nothing. The Universe, which exists without any static substances, must therefore be understood without the use of any static concepts typical of science and philosophy. The cosmos as a whole must be

understood as an interconnected network of individually independent, but mutually complementary, events.

This revolutionary aspect of Whitehead's philosophy, though still poorly understood and not widely accepted today, was well ahead of its time Events, as conceived by Whitehead, are themselves spatio-temporal units; they exist as actual extensions, and they are what give rise from within the cosmic flux to individual organisms capable of being aware of themselves and of others. What we define as consciousness, he argues, consists of the relationships between events; and, more significantly, every entity consists of all its active relations with all others in a cosmic synchronicity. This Whitehead calls "prehensive occasion." And perhaps most significant of all, Whitehead's fundamental (i.e., process) units of existence do not persist with identity over time. They have no permanent identity, and no history; they exist in a perpetual process of becoming. That is, the annihilation of one set of entities is, itself, the result of the creation of the Universe moving on to the next momentary birth in which each event loses its uniqueness, preserving thereby nothing but the flow of process.

The upshot of this rather extraordinary aspect of Whitehead's cosmology is that since the Universe exists in virtual flux, it cannot be completely understood: not ever, not by anyone. According to Whitehead, the single greatest error made by scientists and philosophers has been the mistaking of intellectual abstractions for actual entities, or what he calls "the fallacy of misplaced concreteness." Moreover, the truly permanent aspects of the Universe do not exist within the realm of *actuality* but only within the realm of *possibility*, and it is the possibilities themselves—not the momentary actualities—that constitute the "eternal objects" of the Universe. The virtual flux of creation and annihilation makes possible the existence of the Universe as a whole, which is necessarily incomplete and unknowable, except as momentary influxes into the process of existence

Anyone who recognizes certain similarities between Whitehead's cosmic architecture and quantum mechanics and quantum cosmology should not be surprised that he was singularly unimpressed with Albert Einstein's general theory of relativity. He wrote:

> ...in the 1880s... nearly everything that could be known about physics was supposed to be known—except for a few spots, such as electromagnetic phenomena, which remained (or so it was thought) to be coordinated with the Newtonian principles. But, for the rest, physics was supposed to be nearly a closed subject. By the middle of the 1890s, there were a few tremors, a light shiver as if it weren't quite certain, but no one sensed what was coming. By 1900, Newtonian physics was demolished, done for! This had a profound effect on me; I have been fooled once, and I'll be damned if I'm fooled again! There is no more reason to suppose that Einstein's relativity is anything final than Newton's Principia. The danger is dogmatic thinking; it plays the devil with religion, and science is not immune from it.

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