Science in The Time Machine

The Fourth Dimension and Space-time

The Time Traveler proceeded, 'and real body must have extension in four directions: it must have Length, Breadth, Thickness, and - Duration... There are really four dimensions, three of which we call the planes of Space, and a fourth, Time. There is, however, a tendency to draw an unreal distinction between the former three dimensions and the latter, because it happens that our consciousness moves intermittently in one direction along the latter from the beginning to the end of our lives (Welles, 5).

One of the most important theories, the basis for the possibility of the time machine to function, is the theory of a fourth dimension that exists not spatially, but temporally. Interestingly enough, H. G. Well's mention of the fourth dimension comes several years before Hermann Minkowski's famous 1895 paper on space-time [1]. While the history of the fourth dimensional theory can be traced back to the mid-18th century, The Time Traveler credits Simon Newcomb with the idea. Newcomb was a prominent Canadian-American astronomer with little formal education. The paper or speech Wells was referring to was given before the New York Mathematical Society on December 28th, 1893 and was titled "Modern Mathematical Thought." [1] Newcomb, however, stressed that the physical existence of a fourth dimension could not be proven, and that all scientific methods used to prove a fourth dimension would work against it. He entertained the ideal only in mathematical terms, not physical. In his speech, Newcomb referred to the fourth dimension as a spatial dimension, never raising the possibility of the dimensional existing temporally. [1]

The notion of space-time was with Wells years before the Newcomb speech, as he uses the same theory in the earlier rendition of his time travel tale, "The Chronic Argonauts." Wells admitted that he heard about the possibility of space time from a school debate in the 1880s. [1]

The theory of space time is often attributed to Einstein's theory of relativity, that there are three dimensions humans can actively work through, the dimensions of space, and the fourth dimension of time, one that human can only observe passively.

Through space-time and Einstein's theory, there are two main ways time travel is possible:

1. Regressive Time Travel - Traveling back in time, thought highly unlikely using the Relativity theory. It would require the time traveler to re-experience time that has already happened. This theory of time travel requires the aid of space phenomena such as black holes or worm holes to travel back through time. While it's generally believed that black holes are destructive in nature, attracting matter with a strong gravitational pull, and destroying the matter that reaches it's center, there are different types of black holes in existence, some of which may act as worm holes, allowing what passes through them voyages through time. [8] Kerr black holes in particular are chosen as possibilities in time travel, as the center contains rings of rotation neutrons, and not the destructive singularity contained in the center of other, destructive, black holes. [6]

2. Progressive Time Travel - This is considered much more likely for humans to encounter than Regressive time travel. Using the model of relativity, the time traveler's experience of time would slow, allowing him to experience the future. As we approach the speed of light, our experience of time slows, thus the need for an extremely fast vehicle or machine would be needed. [8]

http://en.wikipedia.org/wiki/Spacetime

Darwinism

But with this change in condition comes inevitable adaptations to the change. What, unless biological science is a mass of errors, is the cause of human intelligence and vigour? Hardship and freedom: conditions under which the active, strong, and subtle survive and the weaker go to the wall: condition that put a premium upon the loyal alliance of capable men, upon self-restraint, patience, and decision. (Wells, 27)
Though Charles Darwin’s On the Origin of Species wasn’t the first to promote the idea of evolution and natural selection, many people beginning in the 19th century (and today) continue to connect evolution and Darwinism together. The term Darwinism originated in Thomas Henry Huxley’s review of the book in 1860, and Darwinism has been used to define social and biological principles.

Darwin’s time spent on the Galapagos Island had him studying many different types of animals species found nowhere else on Earth. He focused his interest especially in range of Finch species found on the islands, thirteen in all. He noted that the difference species has different beak sizes and subsisted on different foods, leaving him to conclude that the finches must had adapted to different environments to survive, and over time changed biologically to accommodate their respective environments. The quote “survival of the fittest” is also associated with Darwin, though it was taken to mean the survival of the strongest by Social Darwinists in the 19th century, the term really referred to an individual with the traits needed to survive in its environment and mate.

Wells was an ardent supporter of Darwinism and studied under Thomas Huxley at the Royal College of Science. His belief in Darwinism and class equality was the basis for writing The Time Machine, and his views on Darwinism are seen in the Eloi and the Morlocks. The Eloi and the Morlocks are both distant descendants of humanity, both adapting to their differing environments. The Morlocks, the laborer class, adapted to subterranean conditions by having larger eyes hypersensitive to light. The Eloi, the remnants of the aristocratic leisure class, grew smaller and slighter, adapting to life without struggle or labor. Over time the labor class and the overworld Eloi were just just separated by socioeconomic class, but as time progressed, they also split biologically, forming two distinct anatomical beings.

Wells didn’t just stop with biological evolution in the Morlocks, he showed the decline, and later, the extinction of the last traces of humanity as the Time Traveler ventured further into the future and witnessed the total extinction on life on Earth, and the extinction of the Earth, the Sun, and the entire solar system.

The Linnean Society

That I remember discussing with the Medical Man, whom I met on Friday at the Linnaean (Wells).

The Time Traveler mentions membership within the Linnean Society, an organization based in London devoted to Natural Science and Taxonomy. Founded in 1788 by Swedish naturalist Carl Linnaeus, the father of modern taxonomy and ecology, the society gives out a number of awards to outstanding scientists focusing on taxonomy, biodiversity, evolution, and sustainability. The Linnean Society has a massive collection of specimens ranging from 14,000 types of plants, 1,564 shells, 3,198 insects, 1,600 books, 158 fish, 1,564 shells, 3,198 insects, 1,600 books and 3,000 different documents and letters.

Paleontology

I recognized by the oblique feet that it was some extinct creature after the fashion of the Megatherium. The skull and upper bones lay beside it in the thick dust...Further in the gallery was the huge skeleton of a Brontosaurus. (Wells)

In the mid-to-late 19th century, special attention was focused on the science of extinct life, both plant and animal, and especially in paleontology. Some of the most respected scientists of the Victorian period, Robert Owens and Louis Agassiz, were paleontologists who worked with fossils of extinct plant, mammal, and marine life. After the release of Darwin’s 1859 On the Origin of Species, paleontology was at the forefront of the discussion of evolution. While there were continual discoveries of fossils from extinct life forms dating back centuries before the Victorian era, it was Darwin’s experience with the fossils of giant sloths (Megatherium), giant llamas, and giant armadillos – extinct animals he believed related to current sloths and llamas in South America – led him to believe that an evolutionary process was at work.
The Victorian Era saw a rise in interest in paleontology. In The Time Machine, Wells makes a reference to the Brontosaurus (now known as Apatosaurus). The original incomplete skeleton of the Apatosaurus was uncovered in the U.S. state of Wyoming in 1877. In 1879, a second skeleton was uncovered, though due to differences in size, it was believed to have belonged to a different species, and was subsequently named Brontosaurus excelsior. In The Time Machine, there is also reference to the ichthyosaurus, an ancient marine animal that lived in the Jurassic period. Though first discovered in the late 17th century, the first complete skeleton of the Ichthyosaur was discovered in 1822, and three different species of the ichthyosaur were uncovered during the late Victorian era in the 1880s.

Theories of human evolution soon followed, with the discovery of Neanderthal remains in 1856 and the skeleton of the Java man in Indonesia in 1891. Human evolution is central to the story of The Time Machine, as the Eloi and Morlocks are, according the Time Traveler, distant descendants of mankind, split into two separate species.

Sources


