TIMELINE – CHAPTER 9

THE HUMAN ORGANISM AND THE DIMENSIONS OF SPACE

2006 Launch of the probe *New Horizons* (bound for Pluto)

The first probe bound for Pluto was launched in January 2006. The main objectives of this NASA space mission: better knowledge of Pluto and its moon Charon in terms of geology and morphology and the mapping of their surface. After flying by Jupiter in February 2007, the probe continued its voyage toward the limits of the solar system, scheduled to pass by Pluto and Charon in July 2015, then proceed to the Kuiper Belt.

2003 Discovery of dwarf planet Eris

First known temporarily as **2003 UB313**, the dwarf planet Eris was officially discovered in 2005 by American astronomer Michael Brown (and his colleagues Chad Trujillo and David Rabinowitz) following photographs taken in 2003 by the Oschin telescope in California. Eris is the largest dwarf planet in the solar system—bigger than Pluto and Ceres, also classified as dwarf planets since 2006 by the International Astronomical Union. The name *Eris* comes from Greek mythology: Eris is the goddess of discord. Only three dwarf planets were recognized in 2007. However, other celestial bodies may also be designated in the years to come.

1990 Launch of the space telescope *Hubble*

The *Hubble* space telescope is named in honour of the American astronomer Edwin Hubble, who proved in 1929 that the universe is expanding with formulation of a law also bearing his name. The law states that the rate at which galaxies move away from each other is proportional to their distance. Since the space telescope's launch, scientists have made some extraordinary discoveries about the universe. There have been different missions to maintain the telescope, installation of new instruments and correction of flaws in the central mirror causing blurred images. The last exploration mission for the *Hubble* telescope began in 2008. A new *James Webb Space Telescope* (JWST), is slated to replace *Hubble* in 2013.

1930 Discovery of dwarf planet Pluto

Pluto, named for the Roman god of the underworld, was discovered by U.S. astronomer Clyde Tombaugh after a year of intense observation. It was the first object in space beyond Neptune to be identified. Pluto is part of the Kuiper Belt and was considered the ninth planet in the solar system for 76 years. In August 2006 the International Astronomical Union revised its definition of *planet*, resulting in Pluto's reclassification as a dwarf planet. Pluto is the second largest dwarf planet after Eris.

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1917 Confirmation of our solar system's place in the galaxy

Contradicting what was generally believed in the 18th century, American astronomer Harlow Shapley demonstrated that the Sun is not at the centre of the galaxy but exists somewhere between the centre and the edge. In 1930 Swiss-born American astronomer Robert Jules Trumpler continued this research and mapped out the galaxy's spiral shape.

1846 Discovery of planet Neptune

Neptune, the outermost planet of the solar system, was discovered by German astronomer Johann Galle and named for the Roman god of the sea. Galle's research was based on earlier calculations by English astronomer John Adams and French astronomer Urbain Le Verrier, who had projected the location in the sky of this planet by analyzing the divergences between the orbit of Uranus and Kepler's laws of thermodynamics and universal gravitation.

1801 Discovery of dwarf planet Ceres

Ceres was discovered by Italian astronomer Giuseppe Piazzi while observing a star between Mars and Jupiter. Piazzi at first thought it was a comet, then on reconsideration an asteroid (the first to be discovered). It was finally classified among the dwarf planets in 2006, together with Pluto and Eris. Ceres is named for the Roman goddess of agriculture and fertility.

1785 First description of our galaxy's structure

Our galaxy—the Milky Way—was observed by Galileo in 1610. Galileo described it as a dense cloud of stars. Its shape was first defined in 1785 by German-born English astronomer William Herschel, assisted by his sister Caroline, as they were counting stars in certain parts of the sky. At the time, the solar system was thought to be at the centre of a flat galaxy, a theory supported at the start of the 20th century by Dutch scientist Jacobus Kapteyn who placed the solar system at the centre of an elliptical galaxy.

1781 Discovery of planet Uranus

Uranus, the seventh planet in the solar system and named for the Roman god of the sky, was discovered by German-born English astronomer William Herschel. He initially believed that Uranus was a comet, but then observed that it orbited the Sun and fit the description of a planet. This celestial body had been observed near the end of the 17th century, but the planet was mistaken for a star. The planet was initially called *Georgium Sidus* (*George's planet*) in honour of King George III; others called it *Herschel*. The name *Uranus* was made official around 1850. Uranus has 13 known rings, 11 of which were discovered between 1977 and 1986. The last two rings were discovered in 2005 by the *Hubble* space telescope.

1718 Discovery of the movement of stars

Until the 18th century, scientists were mostly interested in the movement of the Sun; other stars seemed immobile and were too far away to be studied. Interest in the stars grew after Edmund Halley (the English astronomer and physicist who discovered the comet of the same name) described the movement of the stars by comparing their positions with those measured in ancient times by Ptolemy.

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1655 Discovery of Saturn's rings

The name for the planet Saturn comes from the Roman god of agriculture. Saturn has been recognized since the beginning of humanity, but it was only in 1610 that Galileo observed this planet and its rings (which he mistook for moons) for the first time with his astronomical telescope—without really understanding what he was seeing. In 1655 Dutch mathematician, physicist and astronomer Christiaan Huygens described the rings of Saturn, made of countless particles of rock dust and ice, and also discovered Titan, the largest of the planet's moons. It was not until 1977, a full two centuries later, that rings were also discovered around Uranus—and a few years later around Jupiter as well as Neptune.

1609 Discovery of the Sun's rotation on its own axis

Thanks to perfection of his astronomical telescope, Italian physicist and astronomer Galileo discovered that the Sun is not motionless, as was commonly believed, but rotates on its axis. His discoveries were not accepted by his peers, and he was obliged to defend, then refute his findings. In 1633 Galileo was condemned to life imprisonment (served as house arrest).

1543 Publication of the theory that planets revolve around the Sun

The principle of heliocentrism, a world view that places the Sun at the centre of planetary movement, is attributed to Polish astronomer Nicolaus Copernicus. This view shook scientists of the time who still believed that Earth was the centre of the universe—as Ptolemy had claimed nearly 1400 years earlier. Copernicus also stated that Earth is not motionless and rotates on its own axis as well as revolving around the Sun like other planets. He explained the apparent reverse movement of planets.

CIRCA 150 Spread of belief that the Sun revolves around Earth

Before the current understanding of our solar system, Earth was believed to be motionless and at the centre of a universe around which other celestial bodies revolve. Greek astronomer, mathematician and geographer Claudius Ptolemy proposed this geocentric model in his treatise *The Algamest*, which was accepted until the 16th century. It influenced the system proposed by Aristotle, a great thinker of the fourth century B.C.

CIRCA –1500 Construction of first sundials

The sundial was one of the first objects that humans made to measure time. The oldest known sundial was constructed in Egypt. At first the sundial was simply a flat surface into which a stick with engraved markings was planted. The first sundials were called *gnomons*, a term also used to indicate their style, and had no markings to measure hours. Later the graduation scale of the sundial was perfected into 12 hours. In the 16th century Muslim scholars were able to bend a pointer according to the latitudinal location of the sundial. This made the instrument an accurate tool for measuring time using sunlight, which can differ by as much as 16 minutes from the hour given by a modern timepiece. In the 20th century sundials were still sought by art collectors and astronomers, and many versions have been found around the globe—from simple to monumental obelisks.

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CIRCA **–3300**

First descriptions of the constellations

The first descriptions of the constellations in the northern hemisphere were found in Mesopotamia—including Leo, Taurus and Scorpius. In Egypt, and later in Greece, more constellations were identified. In his treatise on astronomy, which dates to the second century, Ptolemy lists 48 constellations grouping 1022 stars, including the 12 constellations of the zodiac. Since 1930 the International Astronomical Union recognizes 88 constellations, including those in the southern hemisphere, which were discovered near the end of the 16th century in the course of expeditions to that part of the world.

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