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THE ORIGIN AND DEVELOPMENT OF ASTRONOMICAL TERMINOLOGY

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Abstract: This article explores the historical development, sources, and classification of astronomical terminology from ancient civilizations to the present. It outlines the early observational practices in both Eastern and Western traditions, focusing on the contributions of Greek philosophers and medieval Islamic scholars to the foundation of astronomy. Furthermore, the article provides a classification of the main branches of astronomy and discusses the linguistic factors involved in the formation of astronomical terms. This comprehensive review underscores the interdisciplinary and international nature of astronomical language and its evolution through time.

Keywords: Astronomical terminology, history of astronomy, astrophysics, geocentric theory, Ulugh Beg, Greek astronomy, Islamic astronomy, terminology formation, scientific language, celestial bodies, astronomical discoveries, linguistic classification.

Human curiosity about natural events and celestial bodies has existed since the earliest stages of civilization. Even before the rise of formal science, people began observing the stars and interpreting their motions to understand natural phenomena. Early navigational charts were drawn based on star patterns, and data related to equinoxes and seasonal changes were gradually collected. Initially, such observations fell within astrology, but over time, these practices matured into a scientific discipline — astronomy — which became one of the earliest natural sciences developed in response to practical human needs.

The word *astronomy* derives from the Greek terms *"astron"* (star) and *"nomos"* (law), referring to the study of celestial bodies and their systems, including their movement, structure, and development. Ancient Greek scholars like Pythagoras and Aristotle laid the foundations of early astronomical theories, such as the idea of a spherical Earth and the geocentric model with Earth at the center of the universe. Eratosthenes accurately measured the Earth's meridian arc, and Hipparchus compiled the first star catalog and discovered the precession of the equinoxes. Later, Ptolemy systematized Greek astronomical knowledge in his influential work *Almagest*, presenting a geocentric model that remained dominant for centuries.

Parallel to the West, significant advancements in astronomy were also made in the Islamic world, particularly under the Abbasid Caliphate. Between the 9th and 15th centuries, major observatories were established across the Middle East and Central Asia. Notable figures such as Al-Battani, Al-Farghani, Al-Khwarizmi, and Al-Biruni made lasting contributions to the field.

Al-Farghani's *Elements of Astronomy* served as an encyclopedic guide, while Al-Biruni's numerous works, including *Chronology*, *Geodesy*, and *The Mas'udi Canon*, demonstrated a deep understanding of celestial mechanics, calendar systems, and planetary motion.

In the 15th century, Ulugh Beg founded one of the most advanced observatories in Samarkand. His team, including scholars like Jamshid al-Kashi and Qadi Zada al-Rumi, created a comprehensive star catalog listing the coordinates of over a thousand stars. Known as a *Zij*, this catalog was divided into four sections: chronology, practical astronomy, descriptive astronomy based on the geocentric model, and astrology. Ulugh Beg's work played a major role in shaping both Eastern and global astronomy.

By the late medieval period, scientific and technological advancements in Europe accelerated astronomical progress. Figures such as Copernicus, Galileo, Kepler, and Newton reshaped the understanding of the universe through revolutionary theories and discoveries. From the 16th to early 20th centuries, astronomy saw the introduction of universal gravitation, orbital laws, and new observational methods. Later, astronomers like Rømer, Halley, Bradley, and Bessel continued to expand the field.

The 20th century brought transformative changes with the advent of spectral analysis and astronomical photography. These innovations led to the development of astrophysics — a branch focused on understanding the physical and chemical properties of celestial objects.

Modern astronomy is structured into several interconnected branches, as outlined by Mamadazimov Mamadmusa in his *General Astronomy* textbook:

1. **Astrometry** – studies the positions and movements of celestial bodies, including timekeeping.
2. **Theoretical Astronomy and Celestial Mechanics** – explores real motions and orbits using physical laws like those of Newton and Kepler.
3. **Astrophysics** – analyzes the structure, composition, and physical nature of celestial bodies.
4. **Stellar Astronomy** – investigates stars and their systems, interstellar matter, and related dynamics.
5. **Cosmogony** – examines the origin and evolution of celestial systems.
6. **Cosmology** – studies the overall structure and evolution of the universe.

The growth of astronomy naturally led to the emergence of a specialized scientific vocabulary. As linguistic research in terminology expanded during the 20th century, attention turned to analyzing and classifying terms across disciplines, including astronomy. Comparative studies between different languages helped clarify how astronomical terms evolve and are standardized globally.

There are several sources from which astronomical terms originate:

1. **Ancient naming traditions** – Early humans named constellations and celestial objects based on mythologies and everyday life.
2. **Scientific discoveries** – New celestial bodies or phenomena necessitate the creation of new terms.
3. **Technological advances** – Instruments like telescopes led to the discovery and naming of new phenomena.

The development of astronomical terminology is shaped by historical, cultural, scientific, and technological factors. International cooperation and scientific publications have played a central role in standardizing terms across nations, allowing researchers to maintain consistent communication and understanding.

Key sources for astronomical terminology include:

a) **Scientific textbooks and manuals** (e.g., *An Introduction to Modern Astrophysics*)

b) **Peer-reviewed journals** (e.g., *The Astrophysical Journal*, *Monthly Notices of the Royal Astronomical Society*)

c) **Observatories and planetariums**, which provide empirical data and imagery

d) **International organizations** like the IAU, NASA, and ESA

e) **Online platforms** (e.g., NASA's website, arXiv.org)

f) **Specialized dictionaries**, such as the *Oxford Dictionary of Astronomy*

In conclusion, astronomical terminology continues to evolve, drawing on a range of academic and cultural sources. It reflects both ancient traditions and modern innovations, forming a crucial part of international scientific discourse.

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