

Euler, Extrasolar Planets, and the History of Science at the 2009 AAAS Meeting

This past February Ronald Calinger (Catholic University of America) brought the life and research of Leonhard Euler to Chicago, which hosted the 2009 AAAS Annual Meeting. Calinger proposed and organized the symposium “From Enlightenment Lunar Theories to the Discovery of Extra Solar Planets.” Nobel laureate Leon Lederman moderated the symposium, which brought together many of the latest findings on the life and astronomical research of the Swiss-born mathematician and physicist Leonhard Euler (1707 – 1783), along with his legacy from recent observations using the Swiss Euler telescope. The symposium consisted of three papers and discussions of each. The speakers came from Switzerland, the Russian Federation, and the United States.

Siegfried Bodenmann, who edited some of Euler’s correspondence for the Euler-Archive Basel and is a doctoral candidate at the University of Bern, began with a paper titled “Alexis Clairaut, Jean d’Alembert, and Euler on Lunar Theory.” Bodenmann examined the mid-18th century development of mathematical techniques that made it possible to give an approximate solution of the three-body problem sufficiently accurate to account for the observed motion of the moon, especially its precession and at perigee. At first a sufficiently accurate solution of the motion of the moon at perigee based solely on Newtonian inverse-square law eluded Clairaut, d’Alembert, and Euler, as it had Newton, and they believed that Newton’s dynamics needed a small correction. But Clairaut later found the error in his calculations. This was the first major step in the development of mathematical tools that made it possible to infer the existence of an invisible object. Bodenmann traced the story of this breakthrough through the correspondence among the three natural philosophers and Gabriel Cramer. Bodenmann probed the central ideas in this episode: the effect of improving instruments on observations, tensions in the Paris Academy, networking, the nature of publications, and personalities. The discussant, Robert Bradley of Adelphi University, an editor of *Leonhard Euler: Life, Work and Legacy* (2007), elaborated on the mathematics that Clairaut employed in his solution and further examined the role of d’Alembert and Euler in the discovery process.

The second speaker, Calinger, presented new interpretations of aspects of Euler’s second St. Petersburg stay from 1766 to 1783. He reviewed Euler’s interactions with Catherine the Great, his struggles with two directors of the Imperial Russian Academy, and the emphasis on his third lunar theory, which Euler felt would be most crucial to his future reputation. Euler’s planning of the Russian expeditions to observe the transit of Venus in 1769, his improvement of telescopes with achromatic lenses, and the achievement of Euler’s research circle that Nicholas Fuss came to lead were outlined. Calinger corrected a misconception that often circulates, especially among mathematicians, that Euler insulted Denis Diderot. Instead the two men greatly respected each other. This set Euler more in the mainstream of the Enlightenment. The paper closed with Euler’s role in the inauguration of Princess Ekaterina Dashkova as director of the St. Petersburg Academy, Euler’s election to the American Academy of Arts and Sciences, and the eulogy of Fuss.

Alexey Lopatukhin, an independent scholar from St. Petersburg State University, was a discussant of the Calinger paper. He stressed the new facts that Calinger had uncovered, shared pictures of the Euler house today, and recounted several legends about Euler’s grave and remains. Since Lopatukhin was unable to attend, Dr. Dominic Klyve of Carthage College, the director of the electronic resource, the Euler Archive, read his comments and added some of his own. Among other things, he stressed the landmark nature of Calinger’s biography scheduled with Princeton University Press, and its expected impact on our

understanding of Enlightenment science, its role in advances in the general culture, and the early modern history of science.

Christophe Lovis of the University of Geneva presented “The Swiss Euler Telescope and the Search for Extrasolar Planets.” The discovery of the first extrasolar planet in 1995 revolutionized astronomy and created an entirely new field of study. Over 300 such planets are known, and these have completely upset our notions about how planetary systems form and what they should look like. As summarized by Lovis, this revolution has been led by the radial velocity technique, and many of the discoveries were made with the Swiss Euler telescope in La Silla, Chile.

Scott Gaudi of Ohio State University put these discoveries and the continuing search for extrasolar planets in the context of the greater search for life in the universe, describing how the radial velocity and other methods have demonstrated that low-mass planets are common, suggesting that Earth analogs might be quite common as well. These discoveries point the way to the discovery of another Earthlike planet, a “pale blue dot,” on which we can search for signs of extraterrestrial life.

Astronomers searching for extra-solar planets have had little exposure to the history of science, a situation they now plan to change. The launching of the Kepler satellite and its results should be one important source promoting fruitful exchanges. During the symposium, Lederman was busily taking notes. The participants were pleased to learn his one word assessment of the symposium later in the day, “Wow!”

The symposium grew largely out of the activities of the Euler Society. Anyone wishing further information on it, including its archives and annual meetings, should consult <http://www.eulersociety.org>.