

Biographical Encyclopedia of Astronomers

© 2007 Springer

Neugebauer, Otto E.

Born Died Innsbruck, Austria, 26 May 1899;

Died Princeton, New Jersey, USA, 19 February 1990

Austrian-German-American mathematician and historian of mathematical astronomy Otto Neugebauer meticulously demonstrated the technical content of ancient mathematical astronomy and the ingenuity in abstract thinking of ancient mathematicians and astronomers

Otto Neugebauer's father, Rudolph Neugebauer, was a railway engineer. The Protestant family moved to Graz, Austria, when Otto was still young. There, Otto attended the Akademisches Gymnasium, studying mathematics, mechanics, and technical drawing, in addition to the Greek and Latin required by the curriculum. In 1917, he enlisted in the Austrian army, ostensibly to avoid taking the Greek examination to receive his graduation certificate. Neugebauer became a lieutenant in the artillery, spending the remainder of the war as a forward observer on the Italian front.

In 1919, after his discharge, Neugebauer entered the University of Graz to study electrical engineering and physics, transferring to the University of Munich in 1921. There he attended lectures by Arnold Sommerfeld and Arthur Rosenthal. After the death of his parents and as a result of Austrian hyperinflation, Neugebauer lost his entire inheritance and suffered a difficult winter, but in 1922 he changed the focus of his education, moving to the Mathematical Institute at the University of Göttingen, where he studied under Richard Courant, the new director of the institute, and with Edmund Landau and Emmy Noether. By 1923, Neugebauer became an assistant at the institute, and in 1924, special assistant to Courant, and was put in charge of the library. During 1924, he spent time at the University of Copenhagen with Harald Bohr, with whom he published his only paper in pure mathematics

During this time, Neugebauer studied Egyptian mathematics, publishing a seminal document on the *Rhind Papyrus*, a late Egyptian mathematical document.

In 1927, Neugebauer received his *venia legendi* (authorization to teach) in the history of mathematics and became a *Privatdozent* (lecturer). He soon married Grete Bruck, a fellow student and also a mathematician. Their two children, Margo and Gerry (a distinguished infrared astronomer), were born in 1929 and 1932, respectively. The following year, Neugebauer traveled to Leningrad, Russia, to work with Wilhelm Struve in preparing the *Moscow Papyrus*, an important text in Egyptian mathematics, for publication. In 1929, Neugebauer founded a Springer series devoted to the history of mathematical sciences, astronomy, and physics, the *Quellen und Studien zur Geschichte der Mathematik, Astronomie und Physik* (Sources and Studies on the History of Mathematics, Astronomy, and Physics). Under his editorship, its focus would be primarily on Egyptian mathematics

Starting in 1927, Neugebauer learned Akkadian through an investigation of Babylonian mathematics, which eventually enabled him to establish the origin of the sexagesimal system and collect a substantial corpus of texts later published as *Mathematische Keilschrift-Texte* (Mathematical Cuneiform Texts) in several volumes. This corpus demonstrates the richness of Babylonian mathematics.

Neugebauer was the founding editor of the review journal *Zentralblatt für Mathematik und ihre Grenzgebiete* (Central Journal for Mathematics and its Border Areas) and a Springer series of short monographs on current mathematics. But when Adolf Hitler became chancellor of Germany, Neugebauer was removed from his job at the Courant Institute for presumed political unreliability. Obtaining a professorship at the University of Copenhagen starting in 1934, he prepared a series of lectures on Egyptian and Babylonian mathematics and planned a volume on Greek mathematics

In his 1928 review of *The Venus Tablets of Ammizaduga* by Stephen Langdon et al., Neugebauer demolished the earlier chronology of the Old Babylonian dynasty. In a paper a decade later, he similarly cast doubt on the use of the Sothic cycle for establishing the origin of the Egyptian calendar. Neugebauer became intensely interested in astronomical cuneiform texts, which were primarily ephemerides in the form of arithmetic functions for computing lunar and planetary phenomena. He developed a method using linear Diophantine equations to check these functions, with the result that many previously unrelated cuneiform fragments were joined and dated. This work showed that some functions ran continuously for hundreds of years and provided the basis for much significant work to follow. After publishing some of his results in 1938, Neugebauer's work was interrupted by difficulties with Springer and his editorship of the *Zentralblatt*, from whose board he resigned in December. Neugebauer was immediately offered a position at Brown University in the United States, which he readily accepted, moving to Providence, Rhode Island, and founding *Mathematical Reviews* in 1939. He shortly afterward applied for American citizenship

At Brown University, Neugebauer quickly published several papers on ancient astronomy and mathematics, later reprinted in his book *Astronomy and History* (1983). His most famous work is *The Exact Sciences in Antiquity*, a survey of Egyptian mathematics and astronomy, and their relation to Hellenistic science and its descendants. Neugebauer's treatment of the subject emphasizes the transmission of ideas as they were developed, with many cultures adding to the corpus of understanding and observations of astronomical phenomena.

With his collaborator Abraham Sachs, Neugebauer published all the known Assyrian astronomical texts as *Astronomical Cuneiform Texts* (1955), most dating from the last three centuries BCE. In his preface, he commended the spirits of the ancient scribes of Enu ma-Anu-Enlil, who "by their untiring efforts built the foundations for the understanding of the laws of nature; they also provided hours of peace for those who attempted to decode their lines of thought two thousand years later."

Neugebauer published several analyses of Egyptian astronomical documents, tomb ceilings, coffin lids, zodiacs, and papyri, collecting these works in the three-volume work *Egyptian*

Astronomical Texts (1960–1969). His later *History of Ancient Mathematical Astronomy* (1975) indicated, however, that the Egyptian contribution to mathematical astronomy was minimal.

Along with the chief librarian at Brown University, a classicist and papyrologist, Neugebauer published *Greek Horoscopes* (1959), the standard work on the subject, containing an introduction to the methods of Greek astrology. He planned a history of mathematical astronomy from antiquity to Johannes Kepler and published many ancient texts from several languages, including Greek, Latin, Indian, Arabic, and Ethiopian. Neugebauer's *History of Ancient Mathematical Astronomy* established the history of ancient astronomy on a new foundation and demonstrated the continuity of the science from ancient times to the present. The material included planetary and lunar theory, astrological sources, the works of Ptolemy and their derivatives, chronology, astronomy, and his own methods, which had proven so useful. In later publications, he dealt with astronomy in the Middle Ages, Byzantine sources, and analysis of Nicolaus Copernicus's *De revolutionibus*, Ethiopian astronomy, chronology, and the calculations of the ecclesiastical calendar, with an analysis of the primitive astronomical section of the *Book of Enoch*.

Neugebauer became professor of the history of mathematics at Brown University and was named the Florence Pirce Grant University Professor there in 1960. After his retirement, he moved to the Institute for Advanced Study at Princeton University, where he spent the remainder of his life. Some of the work Neugebauer completed during his last years was published posthumously.

Neugebauer received honorary doctorates from Saint Andrews University (Scotland), Princeton University, and Brown University; was elected to membership in academies of science and the arts of Denmark, Belgium, Austria, Great Britain, Ireland, France, and the United States; received the Balzan Prize (1986), the Franklin Medal (American Philosophical Society, 1987), and awards from the History of Science Society, the Mathematical Association of America, and the American Council of Learned Societies; and in 1967, became the only historian of science ever awarded the Russell Lectureship of the American Astronomical Society. His approach to the history of mathematical astronomy continues in the work of many influential scholars.

Katherine Haramundanis

Selected References

Pannekoek, A. (1961). *History of Astronomy*. London: Allen and Unwin.

Sachs, J. and G. J. Toomer (1979). "Otto Neugebauer, Bibliography, 1925-1979." *Centaurus* 22: 257-280.

Swerdlow, Noel M. (1993). "Otto E. Neugebauer." *Proceedings of the American Philosophical Society* 137: 139-165.