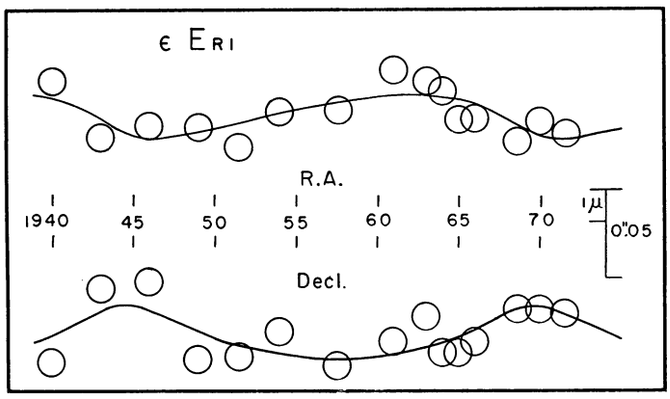


Wiggle of Epsilon Eridani's path over a 30-year period betrays existence of a massive planet-like object in orbit around it.

Van de Kamp/Sproul

A planet for the sun's twin

A massive planet-like object has been discovered around the star Epsilon Eridani

by Everly Driscoll

"Then felt I like some watcher of the skies when a new planet swims into his ken; Or like stout Cortez when with eagle eyes he star'd at the Pacific—and all his men look'd at each other with a wild surmise—silent, upon a peak in Darien."
John Keats

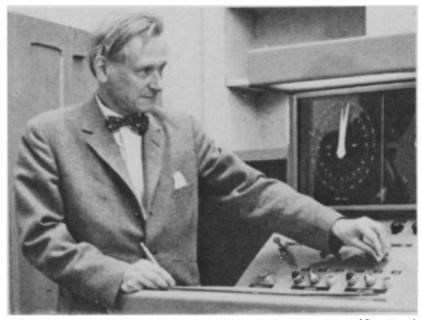
Not from a peak in Darien, but from Pennsylvania's Sproul Observatory, another planet has been found around another star. Jupiter, king of the gods and largest of our planets, has been dwarfed—perhaps again.

Astronomer Peter van de Kamp has announced the discovery of a jumbo planet, six times more massive than Jupiter, revolving around the star Epsilon Eridani 10.7 light-years away. The planet-like object revolves once every 25 years at an average distance of 750 million miles from its star (about eight times the distance of earth from the sun). Because of that distance, its temperatures are too cold for life, at least as we know it. Van de Kamp reported the discovery at the recent meeting of the American Astronomical Society in Las Cruces, N.M.

Van de Kamp's discovery is even more intriguing because Epsilon Eridani is similar to our sun—a yellow-orange star (SN: 1/27/73, p. 60). It is the closest such star to the sun. It's mass, however, is only seven-tenth's that of the sun, and its luminosity, only 30 percent.

What to call this dark companion is a problem. While it is large for a planet (as far as we know), it is too small to be a bonafide star. The smallest stars are six percent the mass of the sun. A celestial body has to be at least that large, astronomers believe, to generate temperatures for nuclear reactions in the core, which turn on the star's light. The new object is only one percent or less the mass of the sun. "The nature of the object should keep theorists busy for a while," says van de Kamp.

The jumbo object cannot be seen, and couldn't be even now with a large space telescope. Van de Kamp infers the presence of the planet by the gravitational perturbations it causes on the star. As stars move through the galaxy, they usually follow a smooth path. Epsilon Eridani's path is a wiggly one. From the star's spectrum, van de Kamp can determine the star's mass. From the size of the wiggle, he then can determine the mass and orbital path of the dark companion. He has spent 36 years patiently photographing 40 or more nearby stars in order to detect such wiggles in their walk. In 1963, he announced that Barnard's star, the second closest to the sun (5.9 light-years and moving closer) had a wiggle. At that time he estimated the mass of the dark companion to be about one and one-half times the mass of Jupiter. Then in 1969 he suggested an alternative possibility to explain the wiggle—a second planet orbiting Barnard's star (SN: 4/26/69, p. 398). The difference between the one- or two-planet interpretation is in the orbital shapes. If Barnard's star has only one planet, then that planet's orbit must be a highly elongated ellipse to account for the wiggle. If there are two planets, as van de Kamp suggests, both planets have orbits that are nearly circular and both are about the mass of Saturn. Their orbital periods would be 26 and 12 years.



J. J. Barton/Sproul

Van de Kamp continues planet-hunt.

Sproul

Lippincott studies Lalande-21185.

Another star, Lalande-21185, eight light-years from our sun, shows a characteristic wiggle that could be attributed to a planet 10 times the mass of Jupiter. "There is something there," says Sarah Lee Lippincott, also of Sproul. She has been working on Lalande now for 13 years. "But the wobble does not permit a simple explanation," she adds.

Van de Kamp is also studying photographic plates of the 61 Cygni system. Kaj Aa. Strand first suggested in 1943 that the system could have planets.

The work is slow. Van de Kamp has been studying Epsilon Eridani now for more than four years. Only after examination of more than 800 photographic plates could he be confident about that star's companion. Barnard's star was even more complex because of the width of the wiggle, or shift in angle. Robert Jastrow of the Goddard Institute for Space Studies in New York compares the width of the wiggle to that of a human hair when seen from a distance of one mile. Many years of observation and plates are necessary to verify such perturbations.

There are probably smaller planets orbiting these stars. But only the larger planets exert a sufficiently strong tug on the parent star to produce a detectable wiggle.

There are 100 billion stars in the Milky Way galaxy. There are about 10 billion other galaxies, each with that many stars. Since planetary formation is probably a normal by-product of star formation, there are probably millions of earth-like planets. Their discovery, however, awaits the invention of new photographic techniques, and time. □