Champion Star Distance Measurer

Astronomy

Astronomers Celebrate Dr. Mitchell's Thousandth Parallax

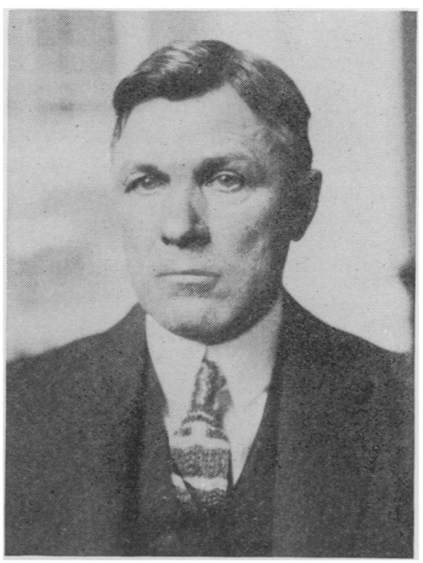
MEETING at Yale University on February 7, at the gathering of the Astronomical Neighbors, the leading astronomers of the East honored Dr. Samuel A. Mitchell, director of the Leander McCormick Observatory of the University of Virginia, the world's champion star distance measurer. Dr. Mitchell has just completed the measurement of 1000 star parallaxes, from which their distances are derived. This is over a hundred more than his nearest competitor and more than the next three combined. Dr. Frank Schlesinger, professor of astronomy at Yale, pioneer in the field, and Dr. Heber D. Curtis, director of the Allegheny Observatory at Pittsburgh, which has published over 800 such measurements, joined with other prominent eastern astronomers at the meeting.

Dr. Mitchell gives credit to Dr. Schlesinger for the development of the method that he used, measuring parallaxes from star photographs.

"The few of us who are parallax observers are all of us followers after Schlesinger," he told Science Service. "We depart from his method only in the details. An astronomer can now finish as many parallaxes in a year as was formerly possible in a lifetime using visual methods, while the accuracy of photographic work has reached the next decimal place."

It is the travel of the earth in its orbit around the sun that makes such measurements possible. A simple experiment shows the principle of the method. Hold your finger at arm's length in front of your face, so that it obscures some distant objects, like bricks in a wall. Close your eyes, one at a time, and notice how far the finger seems to move against the background. Now bring your finger nearer to your face, perhaps within ten inches, and close each eye again. Then, you will notice, the motion of the finger seems to be much greater.

Exactly the same method is used by the astronomer. Referred to the sun, the earth in June is some 186,000,000 miles away from where it is in December. The closer a star, the more it seems to move in six months, as seen against the background of very distant stars. By



Dr. Samuel Alfred Mitchell

taking photographs of the star under study, at six month intervals, and measuring its apparent motion on the two plates, its distance can be calculated. The apparent displacement of even the nearest stars is very small. Alpha centauri, the closest star, visible from the southern hemisphere, is displaced about a second and a half of arc by the earth's motion. This is about the angle that a quarter would make a little over two miles away. Actually, parallax measurements are expressed as the displacement from the center of the earth's orbit, and not from opposite sides, so that the parallax of alpha centauri is .758 second, corresponding to a distance of 24 trillion miles.

After centuries in which astronomers had tried to measure star distances in this way, but had been unsuccessful because of their inferior instruments, Friedrich Wilhelm Bessel, a German astronomer, measured the parallax of 61 Cygni in 1838. This is a faint star in the constellation of the Swan. During the following half century an average of one measurement a year was made, so minute are the quantities measured.

Over twenty years ago Dr. Schlesinger, then at the Yerkes Observatory, developed the photographic method. With the 40 inch refractor, still the world's largest lens telescope, he began the modern era of measurements, with previously unprecedented accuracy.

Since that time, the work has been carried on mainly by six observatories, the Leander McCormick, under Dr. Mitchell; the Yerkes Observatory, under Dr. Schlesinger and his successors; the Mt. Wilson Observatory, in California; the Allegheny Observatory of the University of Pittsburgh, under Dr. Curtis; the Sproul Observatory at Swarthmore College, of which Dr. J. A. Miller is the director; and the Greenwich Observatory, in London, England. Dr. Mitchell has now completed 1000 parallaxes, while Allegheny has just recently published their number 805. The remaining four, and some other observatories that have done a little of the work, have measured about 1400, making a total of some 3200 completed parallaxes. However, as many of these are of the same stars, so that the work of different observatories can be compared, there are only about 2000 separate stars of which the distances have been measured.

"This trigonometric method," said Dr. Mitchell the other day, "is the only direct method of measuring stellar distances. There are several very excellent indirect methods but their results must always be calibrated by means of the trigonometric parallaxes. There is no other way of standardizing them.... Since the Allegheny and McCormick observatories between them have measured the distance to most of the stars whose parallaxes are known by trigonometric methods, then it may almost be said that the dimensions of the universe depend upon the Allegheny-McCormick standard."

If they are wrong, then such figures as 900,000 light years, or 900,000 times six million million miles, which has been given for the distance of one of the nearest of the "island universes," are also wrong.

The "Astronomical Neighbors," at whose meeting the celebration was held, is a group of prominent eastern astronomers who meet occasionally at Yale, for informal discussion of their problems.

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