Further he was interested in astronomical literature and the reform of the calendar, and he edited a volume on general astronomy. He was elected an Associate of the Royal Astronomical Society in 1908. His death robs the science of astronomy of a worker who enriched the subject over a wide range of interests. F. J. M. S.

*Friedrich Küstner.*

On October 15, in his eightieth year, Prof. Küstner died at Mehlem a. Rhein, a little town with a lovely view of the mountains across the river. Here he lived after his retirement from the direction of the Observatory at Bonn, and spent the evening of his days in the devoted care of an unmarried daughter.

An excellent account of Küstner's work is given by Gill * in his address on presenting the Gold Medal of the Royal Astronomical Society for his 'Catalogue of stars, his pioneer determination of the Aberration Constant from motions in the line of sight, and his detection of the Variation of Latitude'. Gill and Küstner had much in common. They had the same enthusiasm, the same zeal for accurate work, and the same skill in overcoming the faults and idiosyncrasies of the instruments they employed.

Küstner was a student of Winnecke's from 1875 to 1879 at the University of Strassburg where he had Hartwig, Elkin, Ambronn and Hermann Struve as companions.

After leaving Strassburg he was appointed to a post in the office of the *Berliner Jahrbuch* and later as an assistant in the Observatory then in the direction of Förster. Here he began his researches on aberration, using the Talcott method. These were interrupted by his selection by Auwers to take part in the German Transit of Venus Expedition in 1882 to Punta Arenas. In 1884 he was appointed Observator at the Berlin Observatory and continued his research on aberration. He found that the morning observations in 1884 and 1885 gave a systematic difference of $+0''{\cdot}204$ from the evening observations. He definitely attributed this to change in the latitude. It was clearly pointed out by Gill †, that the *discovery*

* *M. N. R. A. S.* **70,** 395, 1910.
† Schlesinger, *The Observatory*, **59,** 191, 1936.

of the variation of latitude was made by Küstner, its *period* of 14 months by Chandler, and the dynamical explanation as due to the non-rigidity of the Earth by Newcomb. An international chain of observatories in latitude 39° 8′ was established by the International Geodetic Association in 1895 for the constant observation of latitude variation, and is now in charge of the Astronomical Union.

From 1885 to 1889 Küstner had charge of the Meridian-circle of the Berlin Observatory, re-observing the stars of Auwers' Fundamental Catalogue and a selection of fainter stars, including those used by Gill in his Solar Parallax, with the greatest accuracy. In 1891 he was appointed Director of the Observatory at Bonn, and with a new Meridian-circle constructed in 1893 embarked on a project which must be considered as the high-water mark of meridian observing. His aim was to produce a catalogue of stars which could be used to standardize the zone catalogues of the Astronomische Gesellschaft. For this purpose it was necessary that stars of different magnitudes should be observed, and that they should be evenly distributed over the sky. The result was a catalogue of 10,663 stars from the equator to Dec. 51°, executed by himself in four or five years with one assistant to read the microscopes. He was the first to eliminate magnitude equation from the right ascensions. This he did by reducing the magnitudes of the brighter stars by a series of carefully constructed and calibrated screens placed in front of the object-glass. The magnitudes of the stars were all reduced to be between $7^{m}\cdot5$ and $9^{m}\cdot5$, and by observing the same star with different screens interpolation formulæ were found, so that the right ascensions corresponded to a magnitude of $8^{m}\cdot5$. The probable error of his catalogue is about $\pm0''\cdot2$ in both coordinates.

With a three-prism spectrograph mounted on a 12-inch photographic refractor, he observed the radial velocities of stars at times when the Earth's orbital motion had a large positive or negative influence. The difference is a direct measure of the constant of aberration. Küstner obtained a value which would have made the solar parallax $8''\cdot844\pm''\cdot017$.

His work was highly appreciated in his own country

and abroad, and was recognised by the award of the Bradley Medal of the Prussian Academy of Sciences and the Gold Medal of the Royal Astronomical Society.

F. W. Dyson.

## *George Forbes, F.R.S.*

We regret to chronicle the death on Oct. 22 of Dr. George Forbes, F.R.S., at the age of eighty-seven. In the early days of the commercial use of electricity, he was a well-known electrical engineer, and was one of the consultants in the important scheme of using the power of Niagara Falls for the generation of electricity; when the scheme was in hand, Forbes went to Niagara to superintend the electrical work. Another aspect of his work is shown by an extensive research on the velocity of light (carried out in collaboration with Dr. T. Young) during his tenure of office as Professor of Natural Philosophy at Anderson's College, Glasgow, from 1872–1880. From an early age, he was greatly interested in astronomy, and his associations as a young man carry us back to the time of Airy and, later, of Sir David Gill, who was an intimate friend.

In 1874, Forbes was elected a Fellow of the Royal Astronomical Society, and the same year led a British party to Hawaii to observe the transit of Venus. He published an account of the various expeditions of 1874 in a small book entitled 'The Transit of Venus'. For many years Forbes continued an investigation into the question of an ultra Neptunian planet; other papers which he communicated to the Royal Astronomical Society testify to his interest in meteor showers, cometary orbits, and the solar motion. Two or three astronomical books of a popular nature also appear under his name, in addition to his biography of Gill ('David Gill, Man and Astronomer') published in 1916. As further illustrations of his versatility of mind, it may be mentioned that in 1877 he acted as special correspondent for *The Times* during the Russo-Turkish War, and he invented a range-finder for military work and a gun-sight for the Navy. He was the recipient of several honours in recognition of his scientific work.