

JACOBUS CORNELIUS KAPTEYN
1851-1922

Kapteyn was born on 19 January 1851 in Barneveld, and grew up in a boarding school run by his parents, Gerrit Jacobus Kapteyn and the former Elisabeth Cornelia Koopmans. He was the ninth of fifteen children and family life was minimal because of his parents' running of the school. Whereas Kapteyn's older brother, Albertus Philippus (1848-1927) was judged by his father not to be suited for a higher education and was sent to a trade school (he became a well-known engineer, who ran Westinghouse Airbrake Europe), Jacobus showed his talents early and went to the University of Utrecht in 1868, at the age of 17. He took his Ph.D. in 1875 with a dissertation on *Onderzoek der trillende platte vliezen* (A Study of Vibrating Flat Membranes).

Kapteyn's first position was as observer at the Leiden Observatory (which because of Kaiser had become one of the foremost institutions for position measurements), but in 1877 he accepted the appointment to the new chair of astronomy at the university of Groningen. Had he remained at Leiden, he would undoubtedly have made his career as an observer. At Groningen, however, this was not an option: his requests for a well-equipped observatory fell on deaf ears because of opposition from the existing observatories at Leiden and Utrecht. Instead, he entered an arrangement with David Gill at the Cape Observatory: in Groningen, Kapteyn would measure the plates made by Gill's staff in their photographic *Durchmusterung* of the southern skies. For this work, Kapteyn designed precision instruments and organized an astronomical laboratory. The work began in 1885 and the positions of 450,000 southern stars thus measured appeared in three volumes between 1896 and 1900.

But stellar positions and brightnesses were only a means to an end. Like many other astronomers of his day, Kapteyn was interested in the distribution of stars and the structure of the Milky Way. By 1906, he had organized the international cooperative 'Plan of Selected Areas', in which the work of cataloguing the stars in 206 sample areas was divided among 30 observatories, a work that was not finished until almost half a century after Kapteyn's death. The information obtained was: apparent brightness, proper motion, radial motion, color, etc. Since the correlation of apparent brightness with distance had already been proven erroneous by William Herschel toward the

end of his life, Kapteyn took a statistical approach: although the correlation was false for individual stars, it should apply for representative groupings of stars. By about 1920, as Kapteyn's career neared its end, enough information was becoming available to reveal a disk-like structure of the Milky Way, about six times as wide as thick, with the Sun near the center. Kapteyn was aware of the problem of extinction—absorption of starlight by interstellar matter—but all his efforts to measure this were negative. The 'Kapteyn Universe' was therefore altered when absorption was demonstrated: its size had to be increased (although not as much as Harlow Shapley advocated) and the position of the Sun was determined, as argued by Shapley, to be eccentric. Kapteyn's *program*, however, retained its validity and was pursued by his successors. His study also showed that there were preferred motions of stars in the solar neighborhood, which showed relative motions of two groups of stars: this was important evidence that the Milky Way had a spiral structure and that our Sun was in one of the spiral arms.

After World War I, Kapteyn was one of a handful of scientists (see also Lorentz) who opposed the exclusion of German and Austrian scientists from international bodies and cooperative research—a practice not stopped until after his death. Kapteyn retired in 1921 and died in Amsterdam on 18 June 1922.

Primary works

Poggendorff, vol. 4, 726-727; vol. 5, 610-611; vol. 6, 1279. *Onderzoek der trillende platte vliezen* (Barneveld, 1875); with D. Gill, *The Cape Photographic Durchmusterung for the equinox 1875* (3 vols, 1896-1900); *First and second report on the progress of the plan of selected areas* (Groningen, 1911); with E.C. Pickering, *Durchmusterung of the Selected Areas between $\delta=0$ and $\delta=90^\circ$* (Groningen, 1918); *First attempt at a theory of the arrangement and motion of the sidereal system* (Washington, 1922); with F.H. Seares and P.J. van Rhijn, *Mount Wilson Catalogue of Photographic Magnitudes in Selected Areas 1-139* (Washington, 1930). Kapteyn published numerous scientific papers, the most important of which are listed in the obituary by W. de Sitter cited below.

Secondary sources

A.C.D. Crommelin, 'Prof. J.C. Kapteyn', *Nature* 110 (1922) 48; J.J. [initials only], 'Jacobus Cornelius Kapteyn', *Monthly Notices of the Royal Astronomical Society* 83 (1923) 250-255; F.H. Seares, 'Jacobus Cornelius Kapteyn', *Publications of the Astronomical Society of the Pacific* 34 (1922) 233-253; C.H. Hins, 'Jacobus Cornelius Kapteyn', *Revue générale des sciences pures et appliquées* 33 (1922) 449-450; W. de Sitter, in: *Hemel en Dampkring* 20 (1922) 98-110; C. Easton, 'Persoonlijke herinneringen aan J.C. Kapteyn', *Hemel en Dampkring* 20 (1922) 112-117, 151-164; A.S. Eddington, in: *The Observatory* 45 (1922) 261-265; *idem*, 'Jacobus Cornelius Kapteyn, 1851-1922', *Proceedings of the Royal Society. Series A* 102 (1923) xxix-xxxv; A. Pannekoek, 'J.C. Kapteyn und sein astronomisches Werk', *Die Naturwissenschaften* 10 (1922) 967-980; H. Hertzsprung-Kapteyn, *J.C. Kapteyn. Zijn leven en werken* (Groningen, 1928), English trans.: *The life and works of J.C. Kapteyn. An annotated translation with preface and introduction by Paul E. Robert* (Dordrecht: Kluwer, 1993); E.R. Paul, 'The death of a research programme: Kapteyn and the Dutch astronomical community', *Journal for the History of Astronomy* 112 (1981) 77-94; *idem*, 'J.C. Kapteyn and the early 20th-century universe', *ibid.*, 17 (1986) 155-182; *idem*, *Seeliger, Kapteyn, and the rise of statistical astronomy*, Ph.D. dissertation, Indiana University 1976. For Kapteyn's role in the 20th-century revolution in cosmology, see R. Berendzen, R. Hart, and D. Seeley, *Man Discovers the Galaxies* (New York, 1976).
A. Blaauw, in: *BWN*, vol. 2, 286-289; *idem*, in: *DSB*, vol. 7, 235-240.

[A.v.H.]