HANDMAIDEN FOR CELESTIAL MECHANICS

MY OVERALL IMPRESSION of Brouwer was that he was deservedly a highly appreciated, world-wide expert on celestial mechanics. This was an important distinction after World War II, when few colleges were teaching the "old fashioned" celestial mechanics that became so important to future planning for space flight. Brouwer was the one to whom ordnance and space flight experts would turn for advice. But for other fields of astronomy he had little appreciation. Astrometry he and Dr. Boris Garfinkel described as "the handmaiden for celestial mechanics" providing positions of stars as accurate as possible for use as reference points for determining the positions of objects in the planetary system, particularly for newly discovered asteroids.

Brouwer had a complete grasp of the best mathematical reduction procedures for reducing Cartesian measured coordinates on photographic plates to celestial coordinates and proper motions. But for acquiring those necessary measurements, he had little grasp of the instrumental problems to be solved in order to obtain sufficient accuracy. Heinrich Eichhorn, then at Connecticut Wesleyan University, came frequently to Yale to give advice, but with little avail. I had no control over the procedures I was to follow. In his treatise, *Astronomy of Star Positions* (1974), Eichhorn discussed the results of the Yale astrometric catalogues. He had helped me considerably with suggestions for procedure, but he was aware of the time restrictions put on me for getting the catalogues published while carrying out the other projects that Brouwer heaped upon me. In his treatise Eichhorn commented that somewhat higher accuracy could have been obtained but

added, "That this did not happen is certainly not the fault of the principal investigator."

AN EXTENSION OF A LICK PROPER MOTION PROJECT

AT **LICK OBSERVATORY** work was in progress for determining positions and proper motions of stars to nearly 18th photographic magnitude relative to external faint galaxies and quasars, objects far too distant to reveal any proper motions, and therefore excellent as reference points for stellar proper motions. The Lick program encompassed stars to -23°. First epoch plates were taken between 1947 and 1954, and second epoch plates for the determination of proper motions were to commence about 20 years later.

Brouwer planned for Yale to extend this Lick program to the South Pole. He therefore ordered a telescope similar to the one at Lick (a 20-inch double astrograph), but which Lick astronomers ultimately declared superior to theirs. (He also ordered a 40-inch reflector for the Bethany station.) In 1965 the Yale-Columbia Southern Station was transferred to El Leoncito, Argentina, where the 20-inch telescope was erected. Arnold Klemola, who had gotten his Ph.D. at the University of California in 1962 and was already familiar with the Lick program, was the first to be put in charge of the Yale extension until 1966 when he accepted an appointment at Lick working on the original project. A. G. Samuel was then in charge of taking further Yale plates, and Adriaan Wesselink kept track of what plates had been taken, examining them in order to ascertain if any needed to be repeated to get better quality images. When Yale entered upon this project, Lick extended its own program to stars between -23° and -33° in order

to have a sufficient overlap with Yale to assure there would not result appreciable systematic errors between them.

A partial selection of 8790 stars or about 8% of all the stars on the Lick program was published in 1971 (Klemola *et al.*, 1971). The entire results of the Lick project became available electronically, not in book form. The work at Yale is still in progress.

THE FIRST DEPARTMENTAL CHRISTMAS PARTY

ON THE SOCIAL SIDE, Christmas my first year at Yale was a bit depressing. The last working day before Christmas, at five o'clock as they were leaving for home, Miss Jenkins and Dr. Brouwer stopped at my office, where I was still hard at work, asking me to make certain that when I left all the doors and windows were locked. No word about "Merry Christmas." What a complete change from Harvard under Harlow Shapley, who always entertained his staff royally at a Christmas party, with singing, and dancing the Virginia reel led by Annie J. Cannon (of *Henry Draper Catalogue* fame).

The following year graduate student Jocelyn Gill and I were reminiscing about Christmas at various institutions we had attended. We decided to ask Brouwer if we could put on a modest party in the class room, with singing under the leadership of Morris Davis, our computer expert, who with all his family were highly musical, followed by refreshments. Brouwer reached into his pocket as though ready to pay our expenses, but we declined, as this was purely experimental. The following year Brouwer said his wife would take care of the refreshments. For subsequent Christmas parties we decided to get small gifts and balloons for the little children who

accompanied their parents. Brouwer was to play Santa (without the Santa attire) distributing the gifts to the children. He looked very happy in this role. The character of the Christmas party has changed over the years but there has never again been a Christmas without a party to raise the spirits of the staff.

Two Transition Years

Upon Brouwer's death Dr. Rupert Wildt was appointed Acting Director until such a time as a new Director would be appointed. Wildt's first act was to eliminate all the celestial mechanics workers who did not have tenure, leaving only Gerald Clemence and Boris Garfinkel, both of whom were close to compulsory retirement age. Wildt then came to me. He said, whoever would be the new Director would not be interested in astrometry. He therefore recommended that I seek employment elsewhere. As he did not know who the new Director would be, I bided my time and did nothing about seeking another job, continuing my work as usual.

Then one day Pierre Demarque visited the department to decide whether or not he would accept the appointment as new Director. He even came to my office. I immediately said, "If you are not interested in astrometry, please say so. I have two half-time jobs and I can subsist on the other half." He graciously replied that he was not interested in doing any astrometry himself, but that he was completely in favor of having ongoing projects continue, an opinion he was later to exemplify.