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COLIN GUM AND THE DISCOVERY OF THE GUM NEBULA

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As some later speakers will be talking of a proposed time scale of tens of thousands of years, it is appropriate to begin this symposium with a brief sketch of some recent history. Most people in this room do not know who Colin Gum was. As a former colleague and personal friend of his, I want to give a short outline of his career and scientific work. He made three principal contributions to astronomy, and it is interesting that all three of these are relevant to today's symposium.

Colin Gum lived from 1924 to 1960. He graduated with a Bachelor of Science Honours degree in physics at the University of Adelaide in South Australia, and later received his Ph.D. at the Australian National University for work done at the Mount Stromlo Observatory. He then spent three years in my group at the CSIRO Radiophysics Laboratory in Sydney, followed by a year in Pasadena as a Carnegie Fellow. In fact, I believe his was the first Ph.D. in astronomy that was awarded at ANU. It is an interesting historical sidelight that his flight to California in 1959 was the first commercial jet service across the Pacific - a Boeing 707 operated by the Australian airline Qantas. The passengers all received special V.I.P. treatment.

His first project at Mount Stromlo was a radio survey at 200 MHz (Figure 1), carried out with C. W. Allen, who is now at the University of London and is well known for his compendium entitled Astrophysical Quantities. This was one of the first large-scale radio surveys. Although carried out with a Yagi antenna with a beamwidth of 25° , it was not superseded for several years. It includes the part of the sky that is being considered at this symposium.

Colin Gum's Ph.D. project was a photographic survey for H II regions in the Southern Milky Way from longitude (l^{II}) 220° to 20° . He used an f:1 Schmidt with a 10-cm aperture, and an 11° field. Photographs were taken in a 250\AA band centered on $H\alpha$, and in a 600\AA comparison band nearby. Exposure times were 20-60 minutes, which enabled him to get down to emission measures as low as 600. Some of these observations were taken at Mount Stromlo, and others during site testing work in the Flinders Range in South Australia, where he had very good skies. He also took slit spectra with a nebular spectrograph to confirm the reality of some of the very faint regions.

His catalog of 85 physically separate regions is published as an RAS Memoir, but the most memorable result was his suggestion that certain faint nebulosities were part of a large and nearby H II region excited by γ^2 Velorum and ζ Puppis. The key factor in his interpretation was that the outlying fragments show normal H α emission, but have no suitable exciting stars in the immediate vicinity. His first sketch of what is now known as the Gum Nebula is shown in Figure 2, which is taken from a short paper in Observatory. Note the use of the old galactic longitude scale. It was the faint outer segments that led him to postulate the existence of a very widespread formation. Some other work on southern H II regions had been done before this time, but apparently not to the same sensitivity, and not to such high latitudes.

At CSIRO, he was concerned with 21-cm studies, and his most notable work was carried out as a member of the IAU Subcommittee which had the task of defining the new galactic coordinate system. This system is primarily based on the so-called "principal plane" of the neutral hydrogen layer, as derived from the Leiden and Sydney 21-cm surveys of the 1950's. Colin Gum actually carried out the least-squares solutions to determine the best position for this plane, and was thus closely involved with the final choice of the coordinate system. A large variety of solutions was computed under slightly different assumptions, to gain a better understanding of the accuracies involved.

Colin Gum was killed in a skiing accident in Switzerland at the age of 36. He had a short scientific life, but he completed several important studies in both optical and radio astronomy, and his name is well entrenched in the sky through the famous nebula that is the center of today's discussions.

References

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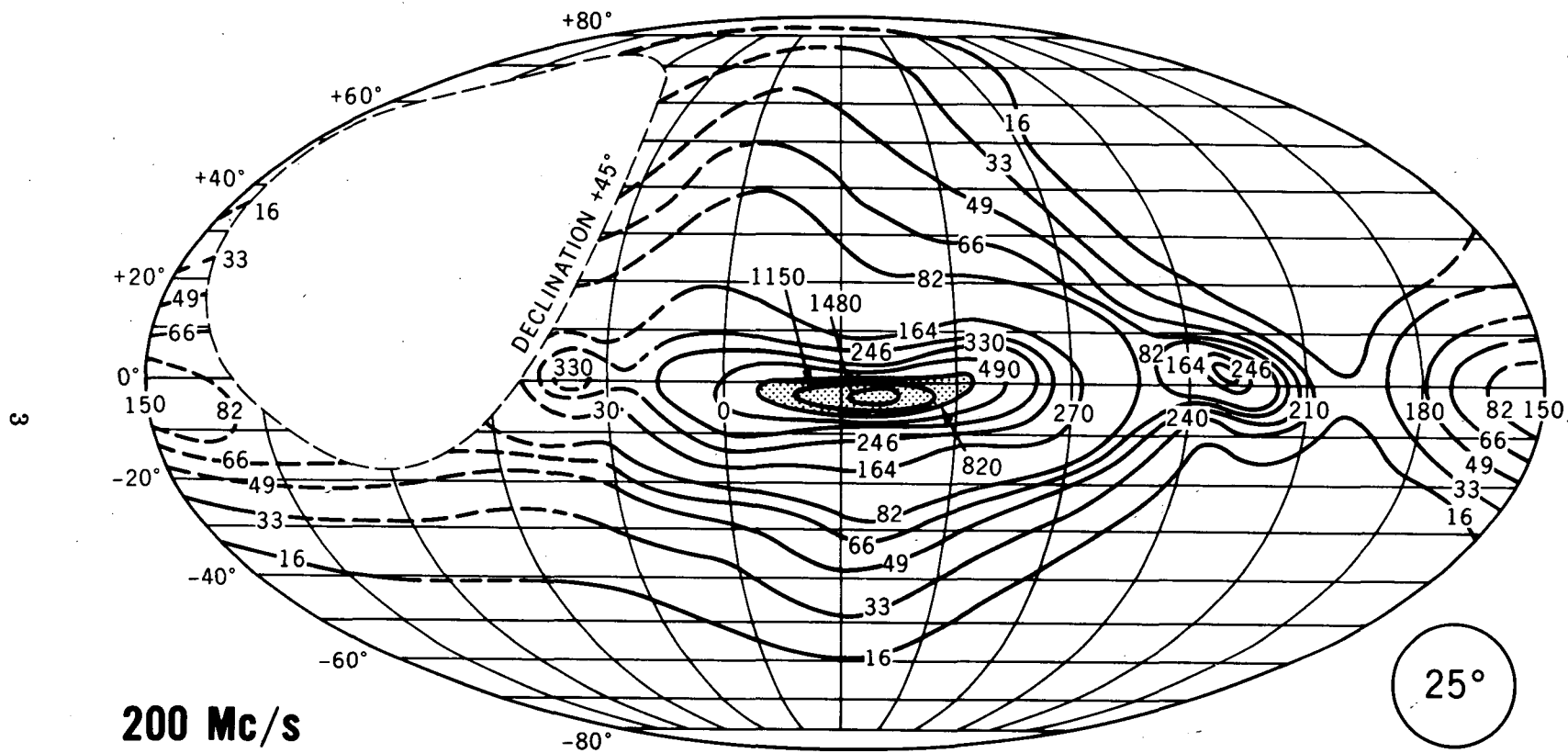


Figure 1. Isophotes of brightness temperature at 200 MHz, from observations with a beamwidth of 25°, plotted in old galactic coordinates (Allen and Gum 1950), as modified by Pawsey and Bracewell (1955). This was one of the first large-scale radio surveys.

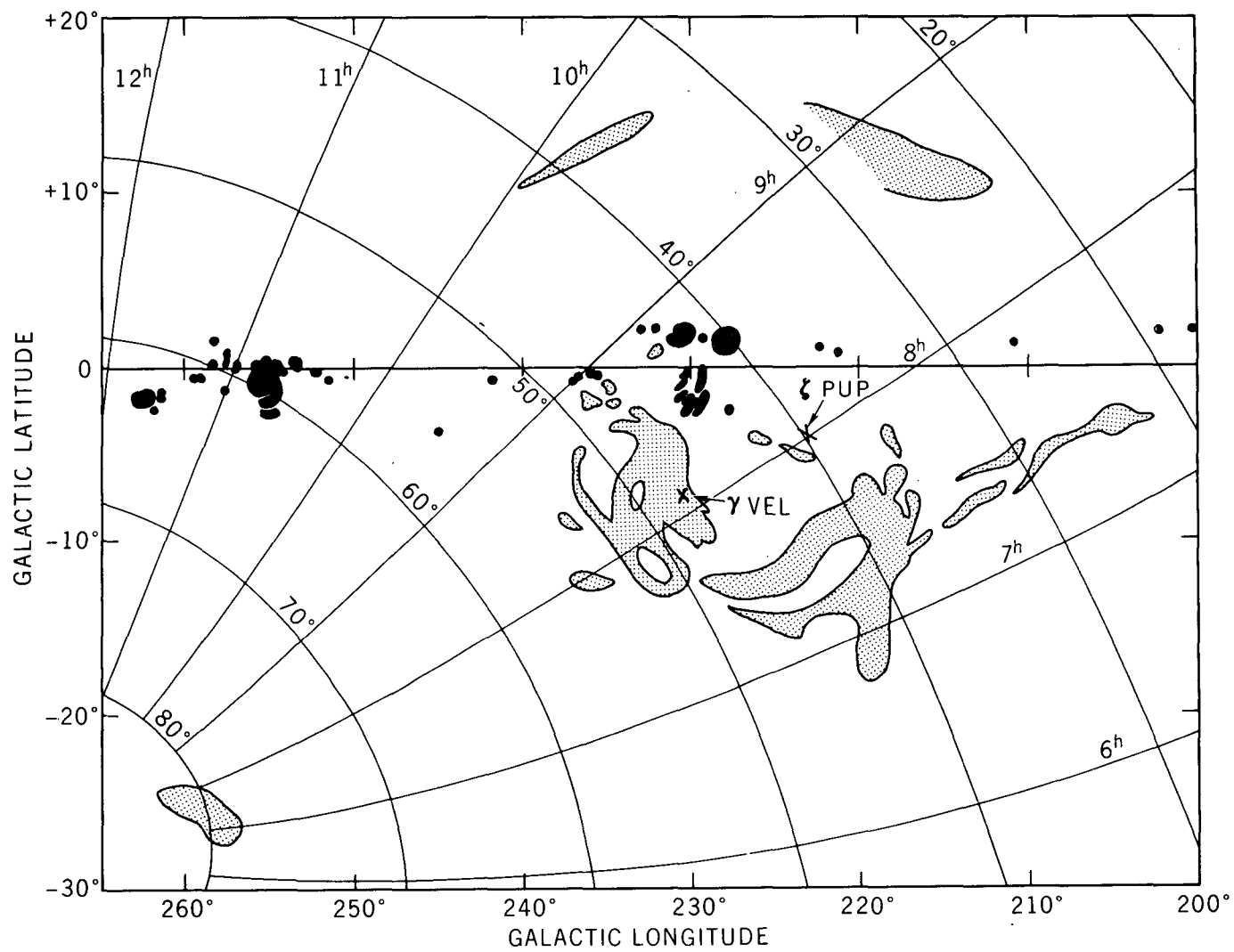


Figure 2. Gum's (1956) sketch of the "large H II region excited by γ^2 Vel and ζ Pup," with the constituents indicated by half-tone areas. Other galactic nebulosities at greater distances are shown as solid black areas. (Old galactic coordinates.)