WOLF-RAYET STARS IN M31

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We have completed a survey of the closest giant spiral galaxy beyond our own for Wolf-Rayet stars, using narrow band imaging techniques (cf. Moffat and Shara 1983, Ap.J.,273,544). About 90% of the main body of M31 has been thoroughly searched to $B \cong 21.5$ ($M_B \cong -3.5$) to a level of emission line equivalent width W_e(HeII 4686 A) $\gtrsim$ 60 A. We do not expect interstellar extinction to be a limiting factor in the detection of WR stars, except possibly in the localized neighborhoods of massive HII regions. The mean extinction for stars in the disk is estimated to be $A_B \lesssim 0.9$ mag. Although some weak-line WN stars will have escaped detection, the survey should be complete for WC stars.

We confirm the trends found previously, that:
(1) M31 is presently an order of magnitude less active in star formation than the Galaxy, as reflected in the total number of WR stars, assumed to have evolved from massive progenitors. (A total of 31 WR stars has been found in M31 so far, which should represent at least 50% completeness. The Galaxy is known to contain $\sim$160 WR stars in less than 1/4 of its disk). This may be a consequence of the fact that M31 is an earlier type galaxy in which star formation is now proceeding at a slower rate than in the Galaxy.
(2) The WCL/WCE number ratio varies systematically with galactocentric radius as in the Galaxy (cf. Fig.3), possibly a consequence of the metallicity gradient known to exist in the disk.
(3) Most WR stars lie in the prominent ring of active star formation at $R \cong 7 - 12$ kpc from the center of M31 (cf. the Figures below).

The accompanying Figures show (1) the radio continuum map (λ 11 cm) of M31 from Beck and Graeve (1982, Astr.Ap.,105, 192) on which are superposed all spectroscopically

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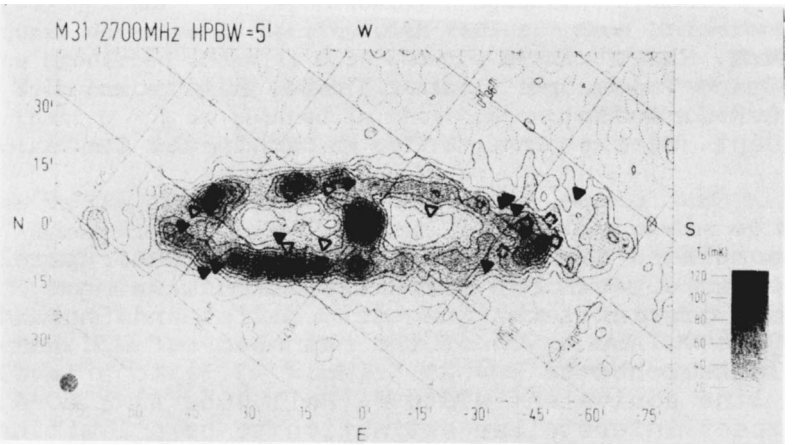
confirmed WR stars found to date, with the addition of two new, high priority candidates; (2) as in Fig.1, but for the 60 μm IRAS map of M31 (Habing et al. 1984, Ap.J.(Lett.), 278,L59); and (3) the distribution of various WR subtypes as a function of galactocentric radius in M31. The symbols are the same in all three Figures.

(1)



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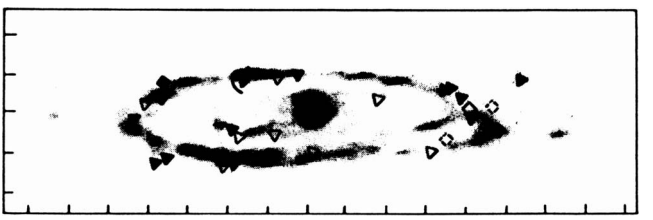

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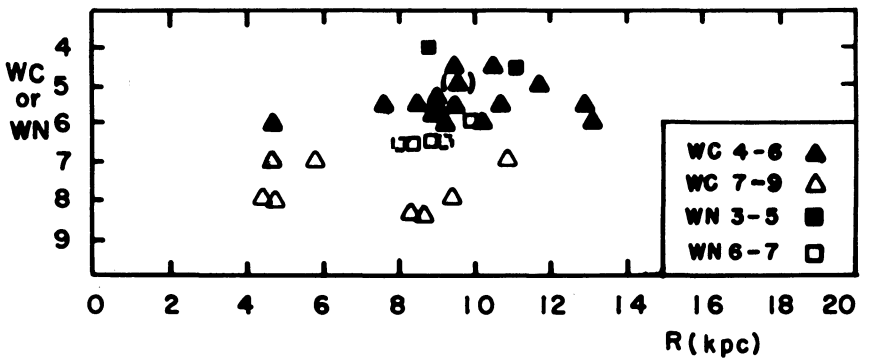

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