A SURVEY OF THE M17SW GIANT MOLECULAR CLOUD FOR H-ALPHA EMISSION STARS

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The M17SW giant molecular cloud extends over 4° (∿ 160 pc) at the south-west of the giant H II region M17. The distance and the mass of the cloud are estimated to be approximately 2.2 kpc and 3×10^5 $M_\odot$, respectively.

This cloud has been proposed by Elmegreen and Lada (1977) as one of the typical sites of sequential star formation. However, Jaffe and Fazio (1982) have found 20 km/sec far IR sources scattered throughout the cloud. They have argued that the star formation in this cloud is not sequential but stochastic, or externaly trigged by a spiral shock wave.

We have surveyed M17 and the M17SW giant molecular cloud inside of the ^{12}CO contour of 5 K by Elmegreen *et al.* (1979) for emission-line stars to investigate the situation of star formation including low-mass stars. The surveyed area is about 2.3 square degrees. The 105/150-cm Kiso Schmidt telescope and the 61/91-cm Schmidt telescope at Cerro Tololo were used, both equipped with a 4° objective prism with a RG645 filter and 103aE emulsion, and a RG630 filter and IIIaF hypersensitized emulsion, respectively. A total of 71 emission-line stars and 25 suspected ones have been found. The limiting magnitude is estimated at m_r = 15.0. This limiting magnitude means that not only Herbig Ae/Be stars but also the brighter T Tau stars are detectable at the distance of 2.2 kpc and A_V = 1.0.

Rough estimates of magnitudes and colors for the stars are derived from their image diameters on the Palomar Sky Survey prints. We used the star-counting instrument at Tokyo Astronomical Observatory. A description of the instrument and the method of the calibration is found in Tanabe and Mori (1971). The accuracy of the magnitude determination is estimated to be about 0.5 mag (m.e.), while the color index $m_b - m_r$ is estimated to be about 0.3 mag (m.e.) because the measured internal error is smaller.

The celestial coordinates of the stars are determined from their positions on a plate of Kiso Observatory. The XY-measuring instrument at Kiso Observatory is used. The data are reduced to the 1950.0 right ascension and declination by the standard coordinate method. The derived coordinates of the stars are compared with the IRAS catalogue of the point sources, but no stars coincide with IRAS sources within 10 arc seconds.

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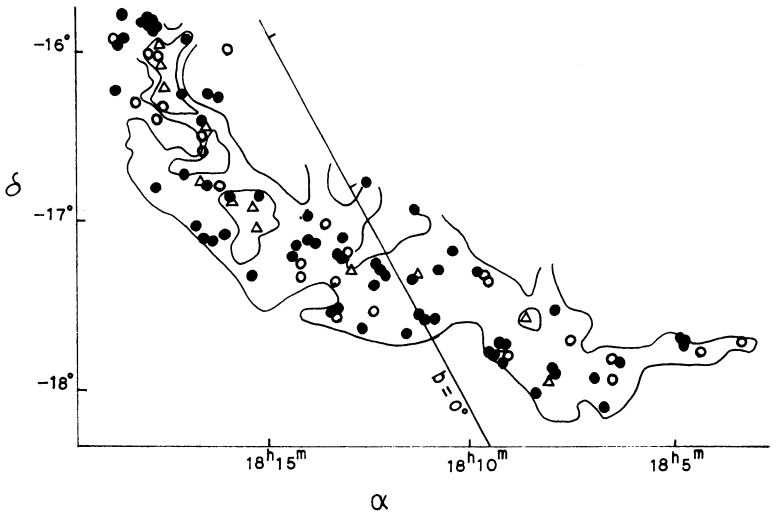

Fig. 1. Detected stars (filled circle) and suspected ones (open circle). Triangles are 70 μm sources from Jaffe and Fazio (1982), and contours are $^{12}CO\ T_A^*$ from Elmegreen *et al.* (1979).

The distribution of the detected and suspected stars is shown in Figure 1. It delineates the ^{12}CO contours from Elmegreen *et al.* (1979) and the 70 μm sources from Jaffe and Fazio (1982) as well.

To compare the surface density of Hα emission stars in the vicinity of the giant molecular cloud, two comparison fields of 30' × 30' were chosen to the north and to the south of the cloud. The numbers and the surface densities of the Hα emission line stars in the survey area and in the comparison fields are shown in Table 1.

TABLE 1

	area (square degree)	detected	suspected
surveyed area	2.3	71 (31/square deg)	25 (11/square deg)
comparison fields	0.5	14 (28/square deg)	10 (20/square deg)

Many of these emission-line stars may possibly be field stars. Still we have a significant excess of emission-line stars in the cloud compared with those in the two comparison fields outside the cloud, the surface density of emission-line stars in the survey area is the same as that in the comparison field, but the surface density of all the stars in the comparison field is about 3 times larger than in the survey area. From this simple statistical argument we can expect that more than half

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of the detected Hα emission-line stars are associated with the giant molecular cloud. A group of 6 stars coincides with an IR source. The colors of those stars show that 4 may be of early type. Thus, our results seem to support the arguments by Jaffe and Fazzio (1982).

We need more spectroscopic observations of those detected stars to know whether they are field emission-line stars or young objects.

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EVIDENCE OF COLLECTIVE FORMATION OF LOW MASS STARS IN THE DARK CLOUD KH141

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To find evidence for collective star formation without massive stars in the dark cloud complex Kh141 (Saito 1980), a search for T-Tauri stars has been made.

We surveyed for Hα emission stars on objective prism plates taken with the 105cm Schmidt of Kiso Observatory. An unobscured field neighbouring Kh141 was also surveyed as a comparison field. Nextly, U,B, V, and I direct plates were taken with the 40cm Schmidt of our department. Further, we obtained spectrograms of selected T-Tauri candidates (see below) with the image intensifier spectrograph attached to the 188 cm telescope at Okayama Astrophysical Observatory.

On the objective prism spectral plates, we have detected eighteen Hα emission stars projected on the Kh141 region. Seven of them have been identified with IRAS point sources. Two of the eighteen are known T-Tauri stars, and other two are known as early type stars. From the obtained spectrograms we tried to classify the other fourteen with the following results: two have been found to be new T-Tauri stars (Figure 1), three have been classified as early type stars, while the remaining nine objects are too faint to be classified.

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