USE OF THE UK SCHMIDT FOR A PHOTOMETRIC INVESTIGATION OF RED STARS IN THE ORION NEBULA MOLECULAR COMPLEX

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As a region of recent star formation and intense stellar activity the Orion Complex extending over several square degrees is of paramount importance in the study of early evolution and activity in the stellar chromospheres of low mass stars. Although red stars form a rather inhomogeneous group, including foreground K-M dwarfs, distant K-M giants, carbon stars and a variety of reddened objects, in principle these can be separated from a combination of photometric, spectroscopic and kinematic data. The proximity of the Orion Complex and its relatively high galactic latitude mean that future astrometric and radial velocity work will yield useful kinematical information on all member stars, including the enigmatic pre-main sequence stars on the lower part of the HR diagram. For these stars, differences in spectroscopic properties, photometric behaviour, kinematics and the interstellar environment contain the key to some of the problems, presently insurmountable, in the early evolution of the entire Orion Complex.

A recent 'Photometric Atlas of the Orion Nebula'(Andrews 1981), based on UBVI UK Schmidt plates, has been searched for possible K-M type stars, objects with $V-I \geq 1.4$, to limiting magnitudes, V = 16.2 and I = 12.6. Over 1300 such objects were found within 21 sq.degs centred on the Orion Trapezium. Preliminary results show large differences across the region, particularly in the CM diagrams of V-I versus V. This survey will be combined with previous photometric and objective-prism work, as well as flare-star detections of K-M objects, to investigate variations in the properties of red stars across the region. The total density distribution of over 16000 stars from the 'Photometric Atlas' is shown in Fig 1, which may be compared with Fig 2 which shows the general anti-correlation with the 2.6mm CO emission-strength given in the Columbia Survey (Kutner et al.,1977) delineating the molecular clouds. Red stars alone are plotted in Fig 3. The V-I versus V diagram (Fig 4) has been re-plotted for red stars in 45 rectangular zones at 2 min and 1 degree intervals (Fig 5). Zonal differences are clearly seen to contribute to the overall scatter in Fig 4. The red stars are fully listed in the 'Photometric Atlas', and will be the subject of further research at Armagh into the early evolution of low mass stars in Orion and other young clusters.

M. Capaccioli (ed.), Astronomy with Schmidt-Type Telescopes, 279–282.

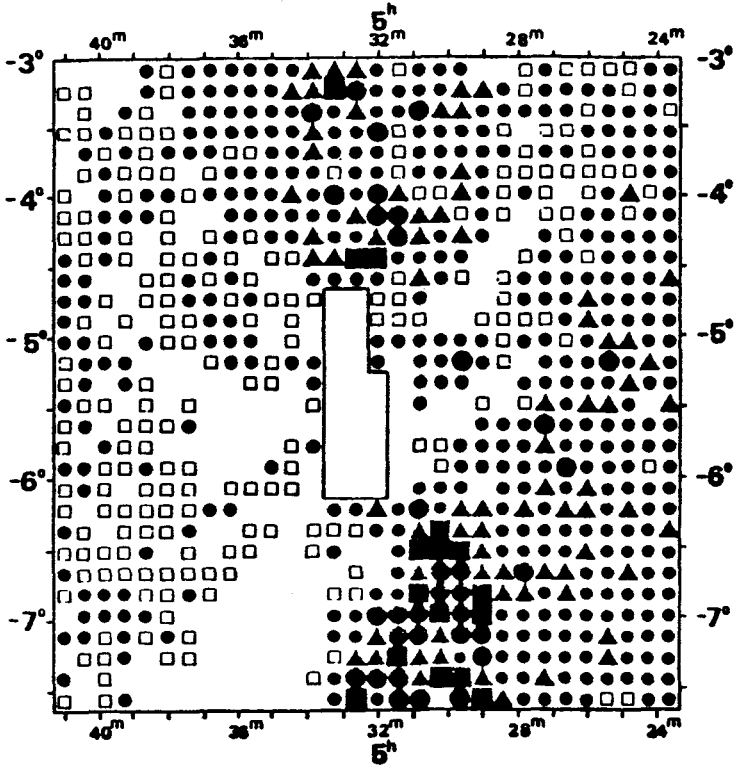

FIG 1

Stellar Density Distribution to V = 16.2 from GALAXY measures of UK Schmidt plate. See for details in 'Photometric Atlas of the Orion Nebula' (Andrews 1981).

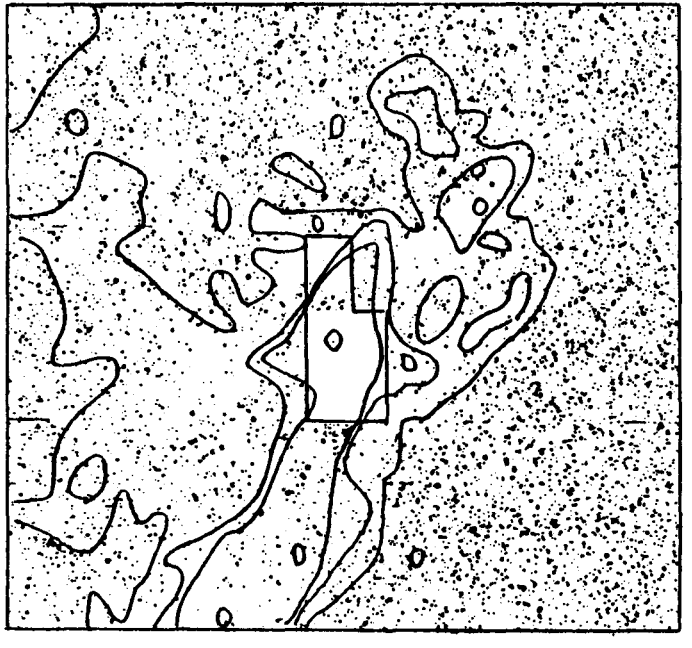

FIG 2

Computer-simulated Star Field to V = 16.2, for same region as Fig 1, showing contours of CO emission strength at 2.6mm wavelength. See Kutner et al.,1977.

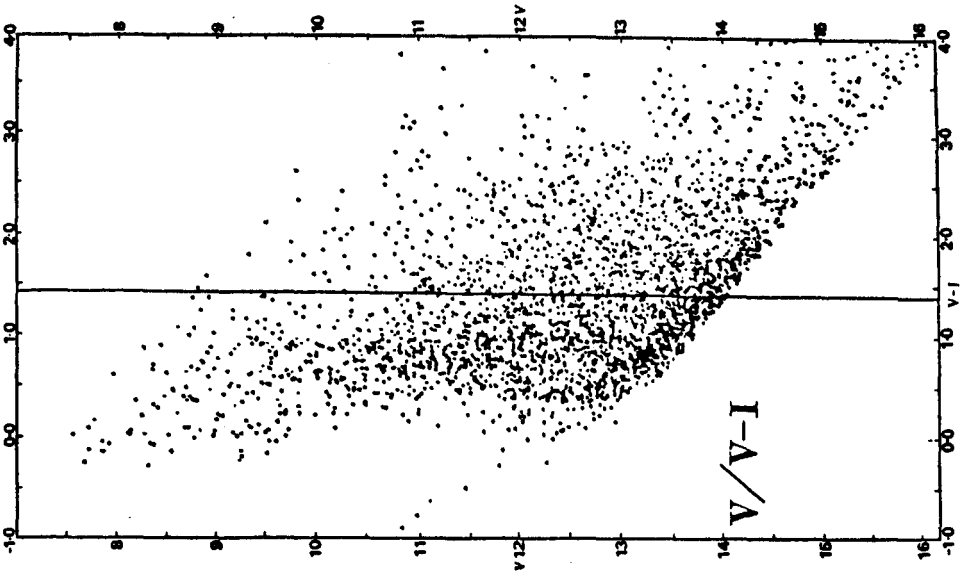

FIG 4 CM Diagram for over 3000 stars within the same region as Figs 1 to 3 (All I stars).

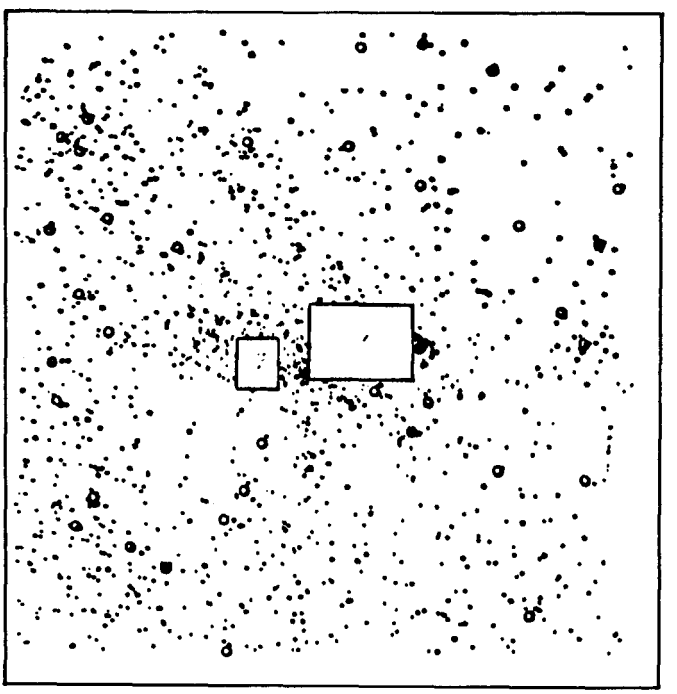

FIG 3

Distribution of Red Stars (V-I ≥ 1.4) in same region as Figs 1 & 2, with symbol size indicating V magnitude. See 'Photometric Atlas'. Large circles are reflection halos on the I plate. N.B. Transparent area to south-west.

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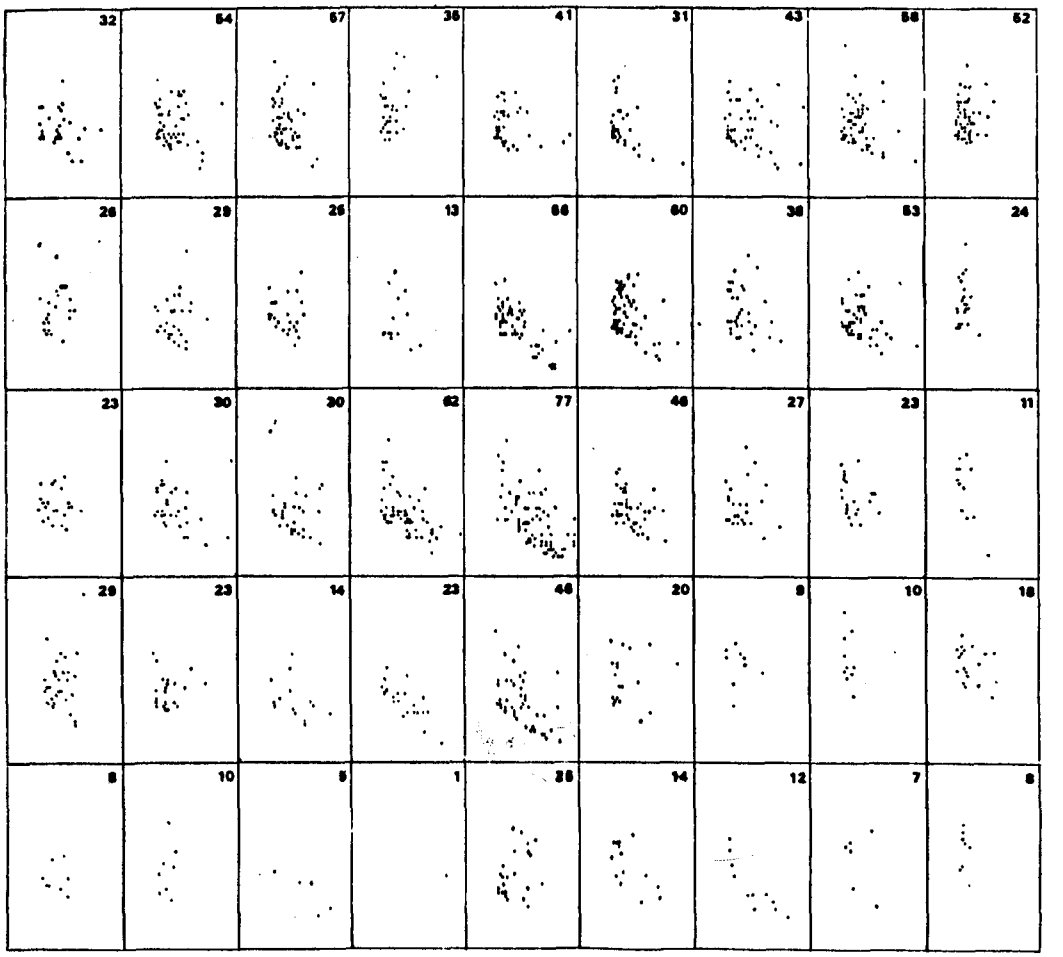

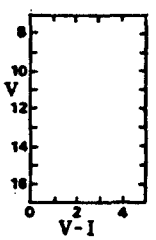

FIG 5 Zonal CM Diagrams (V-I versus V) for Red Stars, showing individual diagrams for 45 zones across the total area of Figs 1 to 3, and numbers of objects. The inset to the left gives the scale. Large differences are noted in various regions of the Orion Molecular Complex

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