HOW MANY STAR-FORMING REGIONS ARE THERE IN THE MILKY WAY?

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There are very good reasons to believe that every stellar clustering in the Milky Way is a star-forming region or at least that every association is such a region and the minor clusterings adjacent subregions.

Some star-forming clusterings are still active but it seems as if a majority should be burned-out. The problem is to estimate the total number of clusterings in the present Milky Way, de-activated and disintegrated as well as active.

Recent clusterings may, from an *observational* point of view, be subdivided in the following groups:

1. Rich and dense clusters.
2. Associations of luminous stars.
3. Relatively small and/or poor clusters.
4. Small cluster remnants or microclusters.
5. Various sorts of transitional configurations.

All these types of objects may indicate the presence of a star-forming region. The two first ones are presumably rather completely recorded within the reasonably accessible part of the Milky Way, say a 2 kiloparsec radius sphere centered at the sun. A certain fraction are to be considered as still living with recent production of new stars. This may also concern the third group, the detection completeness of which is much lower, maybe only around 10-20 per cent.

The fourth group definitely represents the exhausted regions and our knowledge about it is still highly incomplete. The number of identified members in each one of these clusters is always small but, on the other hand, the number of clusterings may be so large that the total number of stars which are confined to them may surpass the number of stars in other types of clusters by several orders of magnitude. In addition to these objects we have also to consider the clusters which disintegrated before the stars were formed.

A rough estimation indicates that the total stellar mass in the Milky Way, still confined to their star forming regions, is very high but it does probably not exceed the order of magnitude of one per cent of the mass of the Galaxy.

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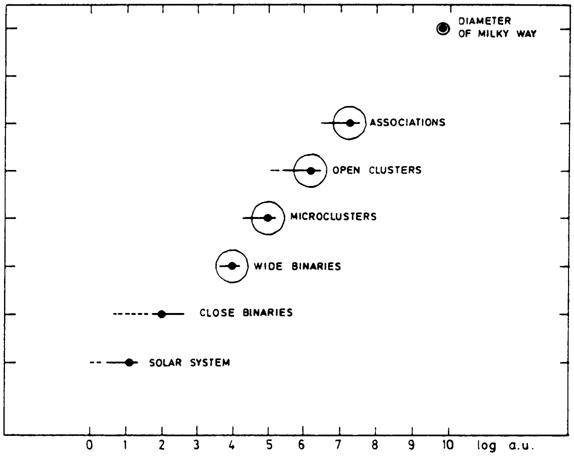

Fig. 1. If various types of stellar agglomerations in the Milky Way are arranged according to their typical linear dimensions we obtain this picture which has a certain pedagogic value, although its physical importance is debatable. The encircled objects represent the probable indicators of star-forming regions and the intention is to give an idea about the extension of such regions.

ABUNDANCES OF CLASSICAL CEPHEIDS AND EVIDENCE FOR SECONDARY STAR-FORMATION

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In addition to the well-known radial abundance gradient in the disc of our Galaxy, there are indications of small-scale variations (Talent and Dufour 1979, Giridhar 1983). We have compiled spectroscopic abundances for long period Cepheids and to eliminate the effect of differences in ages, derived their places of formation by calculating their galactic orbits backwards in time. The stellar orbits were calculated considering the axisymmetric gravitational potential as well as the spiral potential due to the density wave. The parameters related to spiral waves are taken from Yuan (1969). The equations of motion in the (ξ,η,ζ) system were numerically integrated using the Runge-Kutta method and birthsites were transformed to (ξ,η) in the reference frame of the spiral pattern. The details of the computations are described by Giridhar (1985). In addition to the accepted value of 13.5 km s^{-1} kpc^{-1} for pattern velocity, birthsites were also calculated for ω_p = 11.5 and 15.5 km s^{-1} kpc^{-1}. Figure 1 shows the birthsites in the galactic plane for the three values of the pattern velocity. The Cepheids in the figure

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