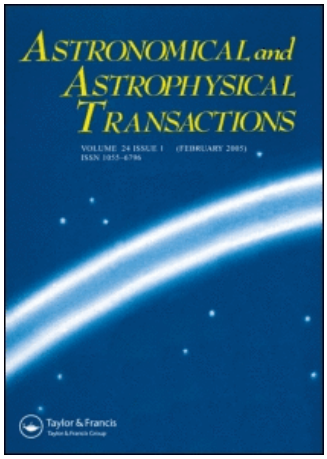

Astronomical & Astrophysical Transactions
The Journal of the Eurasian Astronomical Society
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713453505

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V. G. Surdin [a]
[a] Sternberg Astronomical Institute, Moscow

Online Publication Date: 01 January 1991
To cite this Article: Surdin, V. G. (1991) 'A review of: "Sites of star formation in galaxies: Star complexes and spiral arms, by Yuri N. Efremov. Nauka/Moscow, 1989, 248 pp."', Astronomical & Astrophysical Transactions, 1:1, 81 - 82
To link to this article: DOI: 10.1080/10556799108244523
URL: http://dx.doi.org/10.1080/10556799108244523

Astronomical and Astrophysical Transactions, 1991, Vol. 1, pp. 81–82
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BOOK REVIEW

SITES OF STAR FORMATION IN GALAXIES: STAR COMPLEXES AND SPIRAL ARMS, by Yuri N. Efremov. Nauka/Moscow, 1989, 248 pp.

Many problems connected with the large scale star formation are presented. The high luminosity young stars, their groups and systematic, are described in the first chapters of the book. Further, the scale of ages and the scale of distances of the open clusters are discussed.

The groups of young stars in our Galaxy, in the neighbouring irregular galaxies (LMC, SMC, IC 1613 and NGC 6828), and in spirals of the Local Group (M 31 and M 33), are the subject of the next chapters.

The problems concerning the spiral structure of galaxies begin the second part of the book. The arms of our Galaxy and of the Andromeda Nebula are scrutinized, the structure of which is very good seen through the distribution of the cepheid variable. The last chapters of the book describe the nature of young groups of stars, their origin and their relation to the physical prossesses in the discs of the galaxies.

Two levels of the problem of star formation are selected. There is the microlevel, at which the formation of individual stars is theoretically well investigated and slightly supported by the observations. But the galactic aspects of the problem of star formation—its macrolevel—are based on the vast observational data and are very poorly comprehended theoretically. Only an observer with a rich experience, such as Efremov, would be able to select a few, but important matters that are necessary for the construction of a self-consistent scenario of the origin of stars in galaxies. There are many original illustrations in the book: a lot of photos of galaxies and details of their spiral arms, obtained at the 6-m telescope, are very useful for knowledge of the problem.

A long time ago astronomers noted, that star formation was spread over enormous areas of a galaxy with the size of about 500 pc. Shapley (1956) picked out groups of OB-stars in LMC, named "constellations," Baade (1963) and Ambartsumian (1964) called these groups "superassociations" with the typical region of 30 Dor in LMC. Hodge (1973) noted groups of open clusters of the same age in regions of about 1 kpc in diameter. And Efremov (1971) discovered similar groups of cepheid variables. All these data were generalized by him, in the conception of a star complex, as a group of stars with the size of hundreds of parsecs and ages up to 10^8 years. All of these stars were evidently born in the same gas complex.

The origin of the stellar clusters, as well as the origin of the stars, has a collective nature—this is the fundamental conclusion of the book. Stars and stellar systems with genetic relations are forming the complexes. They are very visible on the photos of galaxies, as bright areas of spiral arms, or groups of high luminosity stars (LMC). Naturally, it is very difficult to select these enormous areas of star formation in our Galaxy. Cepheid variables, the irreplaceable

indicators of the distance, and the ages of the stellar groups, help the author in his work. In the Efremov's investigations, they are successfully used for the reconstruction of the history of star formation in space and time, for our, and neighbouring galaxies.

What are the basic structural levels in distribution of young stars? The author selected four levels: open and globular clusters, associations (mass 10^2–10^6 $M_\odot$, diameters 10–100 pc), aggregates (10^4–10^6 $M_\odot$, 250 pc), complexes (superassociations, 10^5–10^7 $M_\odot$, 600 pc) and regions (10^5–10^7 $M_\odot$, 1500 pc). This is motivated by convincing arguments, that clusters and associations of young stars, giant HII regions (superassociations), complexes of cepheid variables, are elements of common hierarchical structures, which were formed as a result of successive gravitational fragmentations of supergiant clouds of HI, with the masses of 10^7 $M_\odot$ and sizes 1 kpc. One could argue with the author about the specific physical mechanism of formation of a stellar complex, but their existence is beyond doubt.

The book is very professional and full of enthusiasm. I think that it is a useful and original book about largescale star formation.

V. G. SURDIN
Sternberg Astronomical Institute,
Moscow