SOME REGULARITIES IN CHEMICAL COMPOSITION OF UNEVOLVED MAIN SEQUENCE STARS AND SYNTHESIS OF THE ELEMENTS

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The published data on chemical abundances derived from fine analysis for about 80 G, F and A main sequence stars are analysed. The following conclusions are drawn :

1. The range of variation of heavy elements abundances reaches three magnitudes dex. The abundances of all elements heavier than He increase from star to star simultaneously.

2. For each element we have plotted lg N_{el}/N_H (taken lg N = 12) versus lg N_{Fe}/N_H and found linear dependence with a high degree of correlation (Fig. 1,2,3).

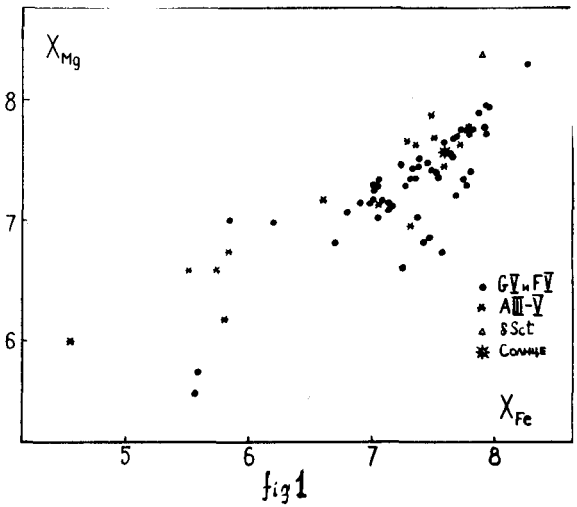

fig 1

3. The slopes of such graphs are dependent on the atomic number of an element. For lighter than iron group elements the slopes are less than 45^o ($\alpha = tg\phi < 1$), for elements heavier than iron group the slopes are larger than 45^o ($\alpha > 1$). For all iron group elements $\alpha \approx 1$. (Fig. 4).

4. The previous point means that relative abundances of iron group keep constant within all range of iron abundances, that is for stars of both

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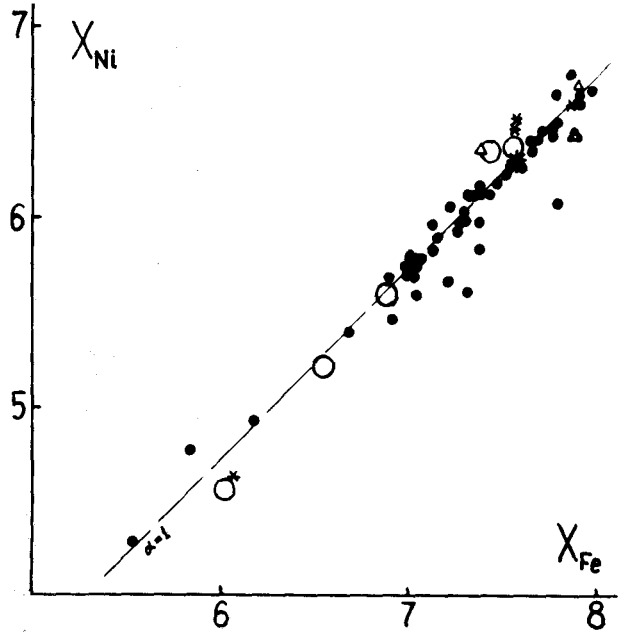

Fig. 2

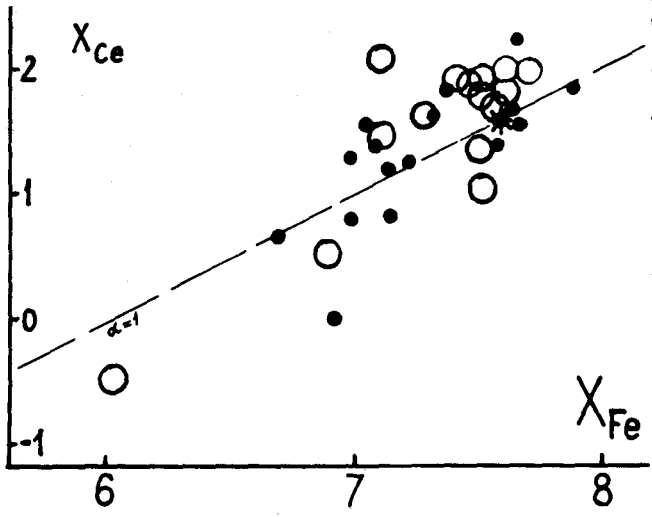

Fig. 3

population types I and II. If these elements were formed in equilibrium process during supernova explosions, their relative abundances would be strongly dependent on the physical conditions (T, p, etc).
Thus constant relative abundances mean that either during the history of Galaxy always the same physical conditions were realized in all supernova explosions or iron peak elements were not created by e-process.

5. The dependence of on atomic number requires its physical explanation and probably consideration of new mechanisms of interstellar medium unreachment by heavy elements.
The existence of regularities found in this work indicates also that mixing of interstellar gas during the history of Galaxy was not very efficient.

The results of this investigation are published in more detail in Soviet Astronomy Letters, volume 3, January-December 1977, pp. 11-13.

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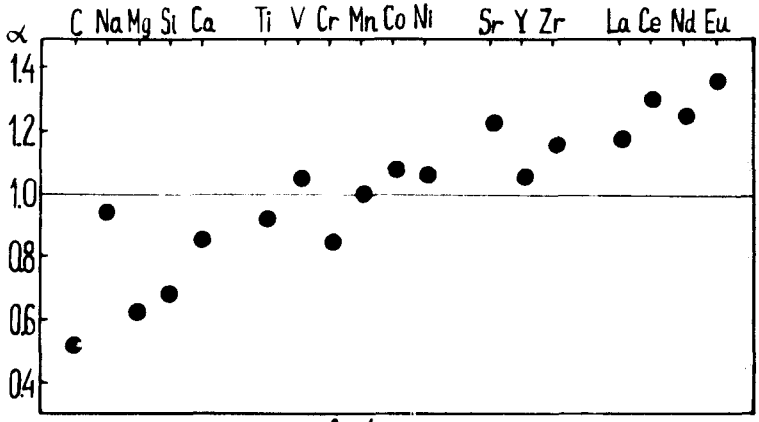

fig 4

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