DISCOVERY OF LITHIUM IN THE ATMOSPHERE OF THE MAGNETIC STAR β CORONAE BOREALIS

Four spectrograms of β C Bo taken with the grating spectrograph of the Merate Observatory, dispersion 35 A/mm, show a moderate strong line at λ 6708. The only possible identification is that with the resonance doublet of Li I at λ 6707.70 and λ 6707.89.

Table I gives the equivalent widths of the Li I line and for comparison those of a blend of Gd II and Fe I at λ 6704.5.

TABLE I

Spectrogram	Date (U.T.)	$W_{\lambda\ 6708}$	$W_{\lambda\ 6704.5}$
H 1680	1963, May 5.98	0.21	0.28
H 1695*	16.85	(0.31)	(0.45)
H 1696	16.89	0.15	0.30
Fa 1700	17.05	0.16	0.30

(*) The continuous background is uncertain, because the emulsion is defective in the surroundings of the two lines.

A spectrogram of β U Mi (K4 III) has been studied for comparison. The Li I line has an equivalent width of 0.12 A.

Using the solar curve of growth, with log $c/v = 5.16$ ([1]) and the curve of growth for β C Bo ([2]) with log $c/v = 4.85$, we find that the total abundance of lithium in the atmosphere of the magnetic star is at least 1000 times higher than in the solar atmosphere. The lower limit is obtained by reducing the measured equivalent width by a factor of 2 in order to allow for possible errors due to the relatively low dispersion. If we assume for W_λ (Li I) the average observed value we find log $(N_*/N_\odot) = +\ 3.50$.

This result confirms the hypothesis proposed by Fowler, Burbidge and Burbidge ([3]) that light elements like deuterium, lithium, beryllium and boron might be produced by spallation process in the atmospheres

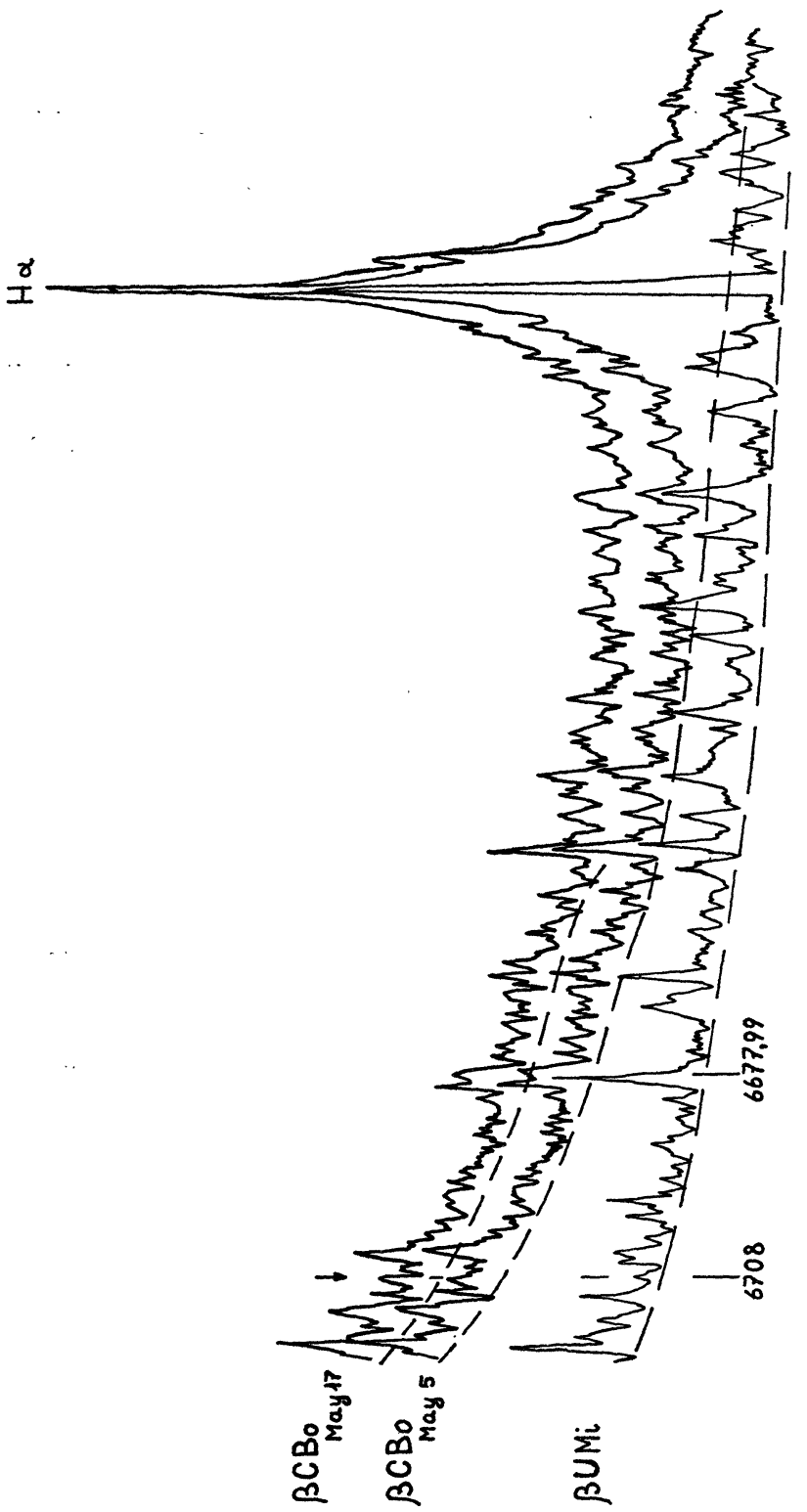

Fig. 1. — Transmission tracings of the region Hα— λ 6715 for two spectrograms of β C Bo and for the spectrogram of the comparison star β U Mi.

of the magnetic stars. That is high energy particles accelerated by the stellar magnetic field, colliding with heavy nuclei fragmentize them and produce neutrons and D^2, He^3, He^4, Li, Be, and B.

Another proof of this hypothesis has been recently given by the observations of Sargent, Searle and Jugaku ([4]) that beryllium is probably overabundant by a factor of 100 in the atmospheres of the magnetic stars.

Observations of several magnetic stars in the λ 6700 region of the spectrum are in progress.

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Merate, May 25th, 1963.

([1]) Wright, K.O. - Public. Dom. Obs. Victoria **8**, 1, 1951.
([2]) Hack, M. - Mem. S.A.I. **29**, 263, 1958.
([3]) Fowler, W.A., Burbidge, G.R., Burbidge, E.M. - Suppl. Ap. J. **2**, 167, 1955.
([4]) Sargent, W.L.W., Searle, L., Jugaku, J. - P.A.S.P. **74**, 408, 1962 and Ap. J. **136**, 559, 1962.