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THE NEW COMPANION OF THETA CORONAE BOREALIS

On July 1971 the Bureau for the Astronomical Telegrams diffused the announcement of the discovery by Couteau of the duplicity of Theta CrB (Couteau, 1971) with a companion whose brightness seemed to be rapidly diminishing. Subsequent communications confirmed the brightness variation of the secondary star as shown in the following table.

| | | |
|--------|---|---------------------------|
| May 10 | Theta CrB is observed visually as a single star | Couteau 1971 |
| Jun 24 | Theta CrB is estimated 0 ^m 5 brighter than accounted in the photometric catalogues | Locher 1971 |
| Jun 29 | Theta CrB appears to be double; the companion at the distance 0 ^m 46 with magnitude 5 ^m 5 | |
| Jul 2 | The star appears double: distance and magnitude of the companion 0 ^m 47 and 6 ^m 7 | Couteau 1971 |
| Jul 7 | No indication of the presence of emission object brighter than 8 ^m 5 is found in the spectrogram | Honeycutt and Chaldu 1971 |
| Jul 8 | The spectroscopic results of the preceding day are confirmed | Hube 1971 |
| Jul 9 | Theta CrB appears double: distance and magnitude 0 ^m 55 and 6 ^m 7 | Worley 1971 |

On July 8, immediately after the announcement of the Couteau's discovery, the star was observed with the photoelectric photometer attached to the 40-cm refractor of the Teramo Observatory and other few observations were performed until October 16 in the attempt to ascertain the fading of the companion through the variation of the whole brightness of the system. Eta CrB was used as comparison star adopting the V magnitude 4^m98 (Blanco et Al. 1968). The magnitudes so obtained are reported in the following table together with all previous brightness determinations we have been able to collect.

Photoelectric magnitudes of Theta CrB

| Date | V | N | Authority |
|-----------|-------|----|---------------------|
| ante 1958 | 4.22 | ? | Mandoza 1958 |
| 1956-1963 | 4.15 | 2 | Ljunggren, Oja 1964 |
| 1963-1965 | 4.13 | 3 | Iriarte et al. 1965 |
| 1964-1965 | 4.15 | 2 | Raggkvist, Oja 1966 |
| 1970 | | | |
| June 16 | 4.20* | 19 | Roark 1971 |
| 17 | 4.19* | 42 | " |
| 18 | 4.21* | 37 | " |
| 19 | 4.22* | 32 | " |
| 20 | 4.20* | 17 | " |
| Sept. 15 | 4.15* | ? | " |
| 16 | 4.14* | ? | " |
| 1971 | | | |
| July 8 | 4.12 | 4 | Burchi, Tempesti |
| 11 | 4.15 | 3 | " " |
| 18 | 4.12 | 4 | " " |
| 25 | 4.14 | 4 | " " |
| Oct. 16 | 4.15 | 4 | " " |

*Band of 234 A half-width centered at 5507 A

The table shows no evident change of brightness; true microvariations of the star may be present in the Teramo observations and a confirmation is found by a careful analysis of Roark's observations. In the course of the Teramo observations the companion was not seen, but the photometric equipment did not allow the full exploitation of the resolving power of the telescope. Since on May 10 Theta CrB was observed single, the appearing of the companion cannot be ascribed to the effect of orbital motion as suggested by Worley (1971); the sudden increase of brightness that seems to be happened between May 10 and June 24 gives a full explanation of the phenomenon. With the parallax 0".015 (Hoffleit 1964) and the mass relevant to a main-sequence B7 star, the orbital period results of the order of some decades and the suggestion of Worley might hold only if one refuses the observation of May 10 and assumes the companion be still visually detectable. The lack of informations on visual observations of the companion after July 9 confirms our conclusion.

The Teramo observations show the star to be constant at the normal brightness from July 8 to October 16, that indicates the secondary star be dropped at a magnitude $>8^m0$ already on July 8. This result is in agreement with the statement of Honeycutt, Chaldu and Hube, but it is difficult to reconcile with the brightness value given by Worley: his estimate should be in error of more than one magnitude. From the observation of Locher we may infer the magnitude 4^m8 for the secondary star: its previous invisibility requires therefore a light-variation amplitude of at least 6^m0 .

Attention is called on the quasi periodic strong light variations of Theta CrB found in the shorter wave lengths by Roark (1971).

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References:

- Blanco, V.M. et al. 1968, Publ. U.S. Nav. Obs. second series
XXI
Couteau, P., 1971, Circ. Bur. cent. int. Telegr. astr. n. 2339
Hägkvist, L., Oja T. 1966, Medd. Uppsala astr. Obs. n. 155
Hoffleit, D. 1964, Catalogue of Bright Stars, third rev.
edition (Yale Univ. Obs., New Haven)
Honeycutt, R.K., Chaldu R. 1971, Circ. Bur. cent. int. Telegr.
astr. n. 2340
Hube, D.P. 1971, Circ. Bur. cent. int. Telegr. astr. n. 2340
Iriarte, B. et al. 1965, Sky Telesc. 30, 21
Locher, K. 1971, Circ. Bur. cent. int. Telegr. astr. n. 2342
Ljunggren, B., Oja, T. 1964, Medd. Uppsala astr. Obs. n. 147
Mendoza, E.E. 1958, Astrophys. J. 128, 207
Roark, T.P. 1971, Astr. J. 76, 634
Worley, C.E. 1971, Circ. Bur. cent. int. Telegr. astr. n. 2340