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# SPECTROSCOPIC OBSERVATIONS OF SYMBIOTIC STARS IN JULY AND SEPTEMBER 1981

The visible spectra of the following symbiotic stars were recorded on July and September 1981 with the 80 cm Telescope at the Observatoire de Haute Provence. The spectrograph was equipped with an R.C.A. tube and the spectrum was recorded on IIaO plates. The spectral range is from $\lambda$3600 Å to $\lambda$5300 Å and the reciprocal dispersion is 92.8 Å/mm at H$\gamma$.

We report here the most conspicuous features in the following tables.

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| Elements | (O III) | | | (Ne III) | He II | Fe II | (Fe II) | Fe III | (FeV) | (Fe VII) | N III | H I | He I | C III | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I.P. | 54.9 ev | | | 63.4 | 54.4 | 16.2 | 16.2 | 30.7 | 75 | 103 | 47.5 | 13.6 | 24.4 | 47.9 | |
| Stars | λ4363 | λ4959 | λ5007 | λ3868 | λ4686 | | | | | λ3760 | λ4640 | | | | |
| CI Cyg | x | x | s | s | s | | | | | w | w | x | | | 1 |
| Z And | w | | | | s | | | | | w | w | x | x | | 2 |
| BF Cyg | x | x | s | s | w | | | | | w | | x | x | w | 3 |
| AX Per | x | x | s | s | s | | | | | w | w | x | x | w | 4 |
| AG Peg | w | w | x | | s | | | | | | x | x | x | | 5 |
| AG Dra | | | | | s | | | | | w | | x | | | 6 |
| YY Her | s | w | w | | | | | x | | w | | x | | | 7 |
| V 1016 Cyg | s | s | s | s | s | x | x | x | x | s | x | x | x | x | 8 |
| EG And | x | x | x | | | | | | | x | | | | | 9 |
| TX CVn | | | | | | | | | | | | x | | | 10 |
| T CrB | x | x | x | | | | | | | | | x | | | 11 |
| CH Cyg | | | | | | x | | | | | | x | x | | 12 |
| HBV 475 | x | x | s | x | s | | | x | | x | x | x | x | w | 13 |

x:Present
s:Strong
w:Weak

| Elements | TiO α system | | | |
|---|---|---|---|---|
| Stars | 4761 | 4804 | 4954 | 5167 |
| CI Cyg | | | | |
| Z And | x | | x | x |
| BF Cyg | | | | x |
| AX Per | x | | x | x |
| AG Peg | | | x | x |
| AG Dra | | | | |
| YY Her | | | | |
| V 1016 Cyg | | | | |
| EG And | x | x | x | x |
| TX CVn | s | s | s | s |
| T CrB | x | x | s | s |
| CH Cyg | | | x | x |
| HBV 475 | | | | |

x : Present
s : Strong

1. The circumstellar nebula is certainly strong. Hγ and (OIII) 4363 Å have the same intensity. In September 1981, the blue red region is similar to that of Z And.
2. The cool giant type dominates and high excitation lines are very weak.
3. In July 1981, in the blue red region the spectrum is very similar to CI Cygni.
4. The TiO bands are stronger than in the spectrum of BF Cygni. Absorption line Ca I at λ4227 Å appeared in September 1981.
5. The absorption bands of TiO (4954 and 5167) are little developed. He II λ4686 Å is much stronger than $H_\beta$.
6. Strong continuum is visible at λ<3600 Å and λ> 4600 Å.
7. The high excitation lines from optical range are in agreement with U V observations.
8. This star is characterized by high excitation lines due to a very hot source of radiation.
9. Absorption line CaI at λ4227 Å is present in September 1981. An overlying continuum is visible at λ>4400 Å.
10. The TiO absorption bands are stronger than in the spectrum of TCrB.
    The continuum in the blue red region is very strong.
11. The bands of TiO and some atomic lines λ4326 Å, λ4404 Å of FeI are strongly developed in absorption.
12. Absence of high excitation lines. The M spectrum dominates in the blue red region.
13. The (OIII) line λ5007 is much stronger than λ4363 Å. The nebular component in the system is much developed.