NEAR INFRARED OBSERVATIONS OF MAGELLANIC WN STARS

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November 27, 1980, we had the opportunity to make near infrared observations of a few WR stars of the Magellanic Clouds with the ESO reticon system attached to the Boller and Chivens spectrograph at the 3.6 m telescope. The observing conditions as well as the reduction procedure have been described in another paper of this symposium (Vreux et al., 1982). We will immediately show how the near infra-red can be useful to improve our knowledge of some WR stars.

The first example concerns a very early WN of the SMC, HD 5980, classified WN3p+OB by Breysacher and Westerlund (1978). In the near infrared, the spectrum of a WN3 is remarkably poor : there is nearly no emissions at all, the only two exceptions being the He II lines at λ 10124 A and at λ 6560 A. The spectrum of HD 5980 illustrated on figure 1 does not fit this description : in addition to the two emission lines mentionned above, we observe some lines of the 5 - n serie of He II, two He I lines ($\lambda\lambda$ 6678, 7065) and, more important, N IV 7109-7123 which is absent in WN3 spectra.

The spectra of HD 5980 we have undoubiously corresponds to a WN4 and not to a WN3. It has been taken at phase 0.38 of this eclipsing binary i.e. quite close to the secondary minimum which occurs at phase 0.36 (Breysacher and Perrier, 1980).

Leaving the very early WN we will now see how a simple look on infrared data can tell us a lot about a very late WN, HDE 269227. During the discussion of the spectrum of this particular object Walborn (1977) did introduce for the first time the WN9-10 subclass as the only way to classify this star if he had to give it a WR type as an alternative to a peculiar O supergiant. Since then two other objects of the LMC have been assigned the same type; in the catalog of Breysacher (1980) they have been given the numbers 64 and 91.

Appearing some time before Walborn's paper but apparently unknown to him at the time of his writing is a short description of the spectrum of HDE 269227 by Allen and Glass (1976) which is extremely interesting

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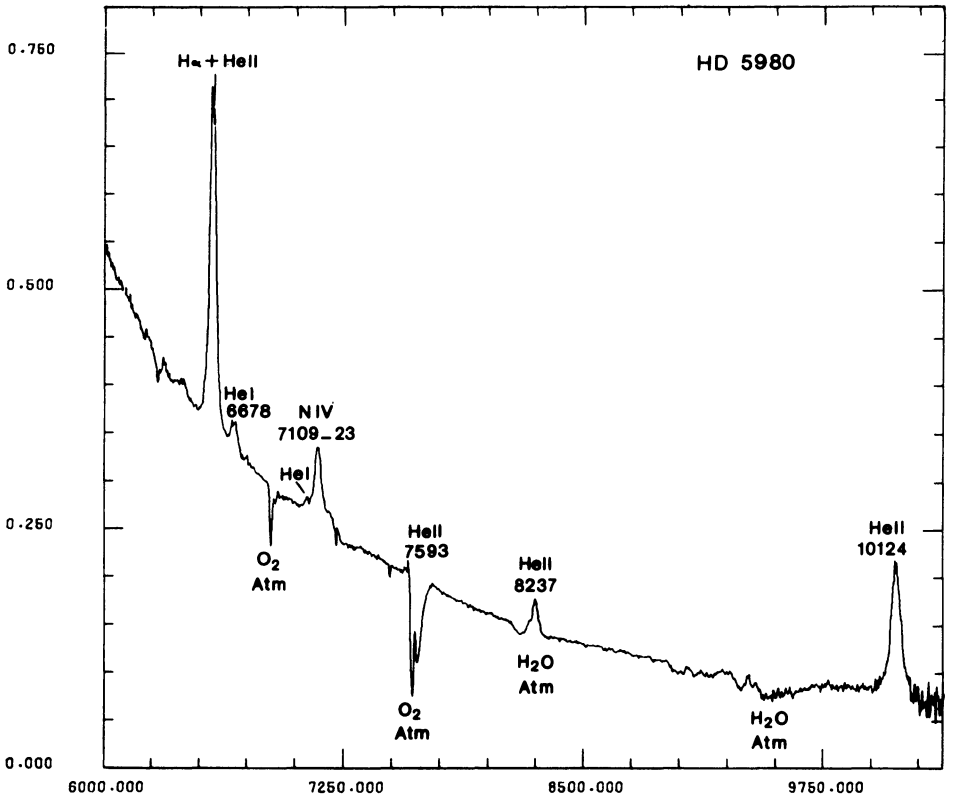

Figure 1- Spectrum of the SMC star HD 5980

Their spectral range is larger than Walborn's : it extends from 4000 to 8000 A. Unfortunately they do not give a lot of details but they find the spectrum quite similar to the one of V1329 Cyg (HBV 475), a symbiotic object classified M4+WN5. This similarity is made stronger by their infrared photometric observations which show that a late-type supergiant component has to provide the near infrared flux. However they note the absence of TiO bands.

Our near infrared spectra of HDE 269227 (figure 2) does not compare to any other WN spectra of our sample. The only conspicuous emission line are the blend of Hα + He II at λ6562 and a few lines of He I (λλ 6678, 7065, 7281, 7816, 10830). This is quite similar to the spectra of an extreme Of star like HD 152408.

Apart from these few emissions mentionned above, the near infrared spectrum of HDE 269227 is completely dominated by the spectra of a cool object characterized by strong Ca II absorption lines (λλ8498,8542,8662)

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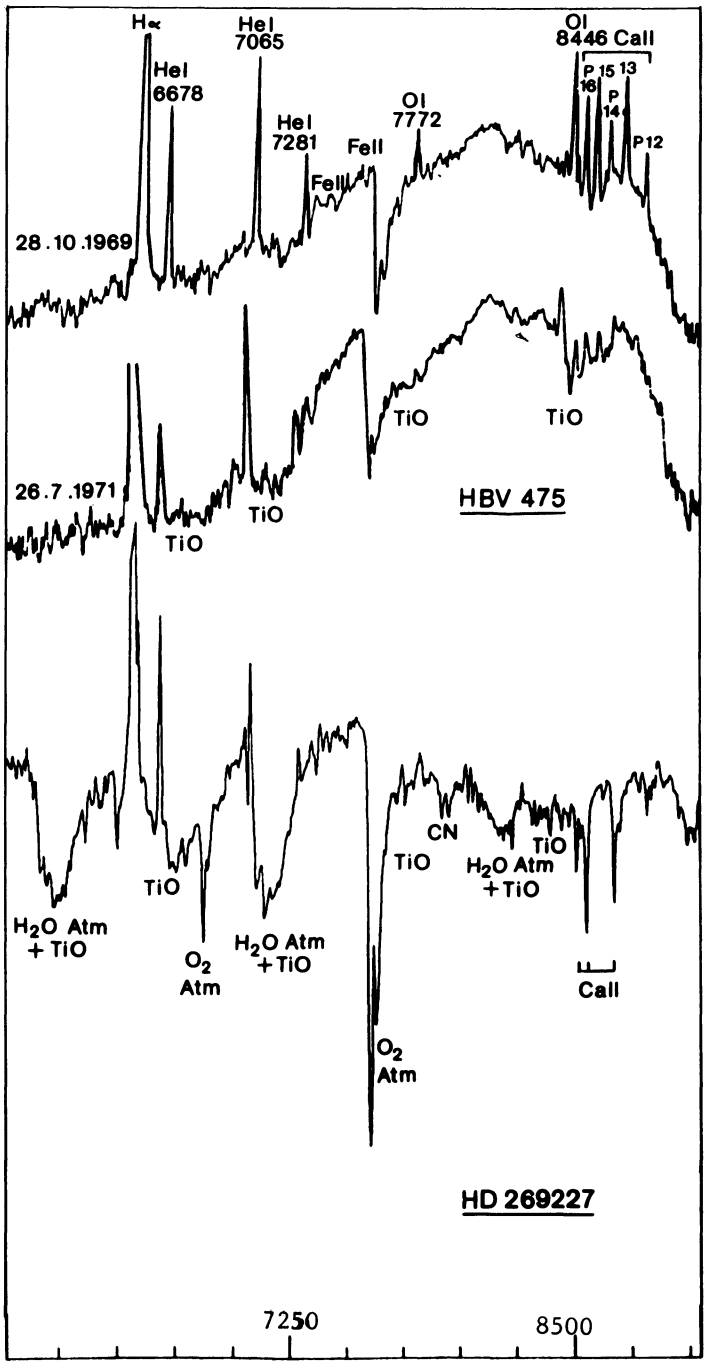

Figure 2 : Comparison between two spectra of the symbiotic star HBV 475 and the spectrum of the WN9 HD 269227.

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as well as strong absorption bands attributed so far to TiO.

A few years ago one of us (Y.Andrillat, 1973) obtained a serie of near infrared spectra of HBV 475 on hypersensitized Eastman Kodak IN.The linear dispersion was 230 A.mm^{-1} and the wavelength range extended from 5700 to 8750 A. As HBV 475 is variable, two tracings have been selected for comparison with HDE 269227 (figure 2). On the first one, obtained 28.10.69, the spectrum is dominated by emission lines of H (Hα and Paschen), He I ($\lambda\lambda$5875, 6678, 7065, 7281 A), Ca II (blended with P 13, P 15 and P 16), O I ($\lambda\lambda$7772, 8446 A), Fe II ($\lambda\lambda$7321, 7462, 7712 A). On the second tracing, obtained 26.07.71, the situation is quite different: the emission lines of Fe II, O I λ7772, He I λ7281 and of the Paschen serie have disappeared. On the other hand, absorption Ti O bands, already visible on the first tracing, are stronger.

If our near infra-red spectrum of HDE 269227 has to be compared to HBV 475 obviously the second tracing is the one to be used. But even so some differences remain : in HBV 475, O I λ8446 has always been observed as a clear emission and the Ca II triplet lines have never been observed as strong absorptions.

In conclusion, our observations support the results of Allen and Glass and HD 269227 cannot be considered as a prototype of a WN9 star. It is a binary system including a hot star and a cool object.

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