

CORRESPONDENCE

*To the Editors of 'The Observatory'**Double Stars at the Limits of Perception*

I read with interest R. F. Griffin's discussion of HD 97810 as a visual binary star¹. While the discovery of a 0.15-arcsecond pair with a 50-cm aperture is certainly a difficult observation, it is not as remarkable as one might imagine. The Dawes limit for this aperture is 0.23 arcseconds, but detection of merged pairs far below this value is readily achievable. Through careful attention to combined diffraction patterns, S. W. Burnham is known to have discovered pairs below 0.4 arcseconds with his 15-cm Clark refractor (see, for instance, the entry for β291 on page 245 of Burnham's catalogue² in which Dembowski obtained a separation of 0.33 arc seconds for this slow-moving pair three years after discovery).

My own visual observations suggest that pairs can be detected with certainty down to 5 arcseconds/ A cm, where A is the clear aperture of the instrument. This corresponds to 0.1 arcseconds for the 50-cm refractor in question. Good optics and steady seeing are assumed.

Yours faithfully,
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References

- (1) R. F. Griffin, *The Observatory*, 118, 350, 1998.
- (2) S. W. Burnham, *General Catalogue of 1290 Double Stars* (University of Chicago Press), 1900.

Clarification on the Hipparcos Numbering in the Trapezium

I feel that in a recent paper¹ on θ¹ Ori A, the criticism of the *Hipparcos Catalogue*² was a little harsh, in particular relating to the numbering of the entries. Assigning two objects with the same HIP number was deliberate.

Of the four bright stars in the Trapezium, only three *Hipparcos* pointings (and thus numbers) were allocated to them. This is because components A and B have a separation of 9" and the field of view of the detector had a radius of about 15", so the position in the main catalogue derives from a combined double-star solution for the AB system. This is flagged in the main catalogue by the reference flag for astrometry (H10) and the component identifier (H62).

Considering the density of stars in the region and the type of detector, it is not surprising that the photometry is not reliable. I am pleased that most of the points for HIP 26220 are flagged and that there is a general note in the main catalogue stating that the photometry is "Disturbed by other members of trapezium". Note also that both stars (A & B = V1016 Ori & BM Ori) in the field of view for HIP 26220 are variable, which would complicate any analysis of the photometry.

I would suggest having a quick look at Section 1.4, p.75, of Volume 1 of the *Hipparcos Catalogue* for more information regarding the double-star solutions. In particular Figure 1.4.1, p.76, gives some idea of the problems *Hipparcos* would have encountered with this system.

Some confusion might also arise from the component designation for the Trapezium in the *Hipparcos Catalogue*. Historically the designation of the components A to D for the Trapezium has been from West to East. However, the *Hipparcos Catalogue* followed the CCDM convention of brightest to faintest. Thus HIP 26220 is referred to in the catalogue as components B and D. Note that I have used the historical designations in the above discussion.

In the identification tables (Vol. 13) of the *Hipparcos Catalogue*, the historical designations have been used, thus search software which uses these data (e.g., *Simbad*) will correctly identify θ^1 Ori A with HIP 26220 and similarly the other members of the Trapezium.

Yours faithfully,
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References

- (1) D. J. Stickland & C. Lloyd, *The Observatory*, 120, 141, 2000.
- (2) *The Hipparcos and Tycho Catalogues* (ESA SP-1200) (ESA, Noordwijk), 1997.

SETI, Forty Years on

Forty years have passed since Frank Drake and his team aimed Green Bank's antenna at two possible ETI sites in the southern sky. Despite negative outcome, Drake's then-revolutionary project — backed by Lloyd Berkner and Otto Struve — inspired other radio astronomers to search for alien technological civilizations. A number of bioastronomers come to mind. Nikolai Kardashev, V. C. Troitskii, Gerritt Verschuur, Ben Zuckermann, Robert Dixon, Carl Sagan, Paul Horowitz, Jill Tarter, and Stuart Bowyer. Other SETI scientists also took part: Philip Morrison, Giuseppe Cocconi, Iosif Shklovskii, John Billingham, Bernard M. Oliver, and Freeman Dyson. As a duty to science, all risked their careers for the long-term chance to confirm ETI exists.

Now, forty years on, the subject of ETI is scientifically respectable. As we know, this is due to confirmation of detected extra-solar Jupiter-mass objects and protoplanetary discs. ETI signal-wise, since 1960 there have been several false alarms, CTA-102, "Wow!", LGM 1-4, and HD 119850 being among those instances. As to the chances of detection of ETI, Jill Tarter's words are apt "I don't wake up every morning thinking *today I'll find a signal*"¹. Tarter, who sees the situation pragmatically, instead enjoys the process of getting there, and hopes current SETI Project Phoenix targeted search goals will eventually lead to a remarkable payoff. Phoenix is the only major SETI programme that searches for ETI signals from nearby G-type stars.