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# Binary

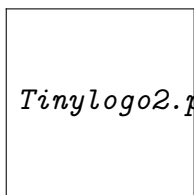
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## Journal of the Double Star Group

*Adviser and editor: Dr. John McCue, FRAS*

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Deep Sky Section,  
Director: Dr. Stewart Moore.*



*British Astronomical Association*

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## Book review

THE CAMBRIDGE DOUBLE STAR ATLAS

by James Mullaney FRAS and Wil Tirion

Cambridge University Press ISBN 978-0-521-49343-7 (pbk)

Review by Simon Johnson

It is refreshing to know that the amateur astronomer can at last buy a single-volume, high-quality modern atlas dedicated to the pursuit of double star observing. Here we have not only a publication that is a must-have reference for the astronomer's bookshelf, but also one that should be used regularly at home and in the field by beginners and more seasoned astronomers alike to plan double-star observations. Written by the well-respected James Mullaney, author of *Double Stars and How to Observe Them*, and with charts by the incomparable Wil Tirion, whose maps are a joy to use, it immediately gives a sense of inspiration, and one can readily take comfort in knowing that the information contained within will be of great use and benefit to the observer.

Cambridge University Press publications are known for their high quality and this atlas is no exception. High-quality, glossy front and rear covers allow accumulated surface dew to be easily wiped off, and the 303 x 240 mm spiral binding make this a practical design for outdoor use at the telescope by allowing easy access to each map. For practicality, I personally prefer atlases in the smaller size of 220 x 150 mm, such as Sky and Telescope's Pocket Sky Atlas 2 and Binocular Highlights 3.

The main body of the book encompasses a star-chart section and three appendices (a constellation table, a table of Greek letters and a Cambridge Double Star Atlas target list). All in all, it provides an abundance of information for the double star observer that will give many hours of enjoyment and facilitate useful observations at the telescope.

The atlas contains thirty-two charts, including chart indexes for the northern and southern hemispheres, allowing the user quick access to a chart of interest or a particular area of the sky. What I liked and found to be particularly useful is that for each chart the constellations are labelled and outlined in light blue, thus facilitating chart navigation and location of the double pairings sought after.

Although this atlas has been primarily designed with double star observation in mind, it also serves as a general-purpose guide for viewing all types of deep-sky objects, showing, as it does, many prominent asterisms, star clusters, nebulae, galaxies and variable stars as well as the majestic Milky Way itself, with object symbols following a design and layout similar to that of Sky Atlas 2000. The horizontal and vertical axes are calibrated with declination and right ascension respectively, and numbered green arrows lead the observer to the next most practical following chart. The green labelling makes it easy to locate double stars. Stars are shown down to magnitude 7.5, so this atlas will be of use to the small telescope and binocular user also. Each chart has a key for the most popular classes of objects, using Tirion's easily recognisable style. There is truly enough information plotted here to satisfy the hungriest of double star and deep-sky observers alike.

Appendix C is a nice addition, listing all the doubles found in the Cambridge Double Star Atlas in order of right ascension, with columns headed Object/Constellation, Designation, RA (2000.0) and Dec, Magnitude and Separation/Remarks. This is the original working list used in plotting all the double and multiple stars shown in the atlas. Pairs having companions at or brighter than the map's visual magnitude limit of 7.5 and with a separation of 180 arcseconds or more are plotted as separate stars, the position angle (PA) in degrees being, where available, an aid in positioning them with respect to their primaries.

In use I found the atlas a pleasure, with its high-quality charted maps and extensive objects embedded within them and a useful key on each page. Like Norton's Star Atlas, this double star atlas sets a benchmark standard for, no doubt, many more similar publications. It goes without saying that I would thoroughly recommend that all amateur astronomers own a copy of this atlas.

#### References

1. Double Stars and How to Observe Them. James Mullaney, 2005.
2. Sky and Telescope Pocket Sky Atlas. Roger W Sinnott, 2006.
3. Binocular Highlights. Gary Seronik, 2006.

4. The Cambridge Double Star Atlas. Mullaney and Tirion; p.1. 2009.
5. The Cambridge Double Star Atlas. Mullaney and Tirion; p.93. 2009.

## Four possible new northern double stars

by Abdul Ahad

Following a visual survey over the past few years using my Skywatcher 8-inch Newtonian reflector, I have identified four double stars that have not hitherto appeared in any double star lists, and were not included in the WDS catalogue. They are all strewn across the northern constellations of Hercules, Lacerta and Vulpecula, and their components range between 8th and 11th magnitudes in apparent brightness.

I originally began my campaign back in the summer of 2004, when I started micrometric measurements of the nearby binary system 70 Ophiuchi and also commenced a proper motion study on Barnards Star and 61 Cygni (please browse my online article Introduction to Astrometry of Visual Binary Stars - by A. Ahad <http://www.astrosience.org/abdul-ahad/astrometry.htm>).

In order to decide if a particular pair was a common proper motion (CPM) double star, with, therefore, a strong likelihood of them being a genuine binary pair connected together by gravity as they drift through space, I made use of the astrometry data listed in SIMBAD, particularly the new catalogues UCAC3 and PPMXL. This entailed scrutinizing the proper motions of each star in both RA and Declination. If both stars in the pair had similar proper motion directions in both RA and Declination, within reasonable limits, then that pair was said to have satisfied my CPM criterion. Out of the scores of pairs I thus examined, I finally narrowed my list down to just these three common proper motion binaries:

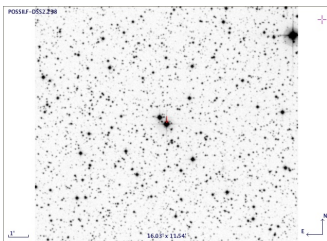


Figure 1: Double star in Lacerta

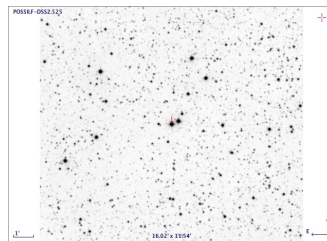


Figure 2: Double star in Vulpecula

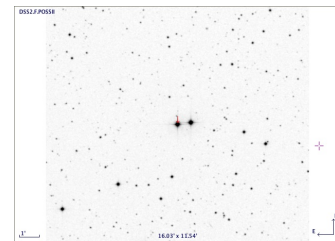


Figure 3: Double star in Hercules

(1) HD 213128 / BD+51 3386 in constellation Lacerta, J2000.0 ICRS coords : 22 28 13.7 +51 54 19.8 / 22 28 15.8 +51 54 39.4, V mags 8.88, 9.88, spectral class A0 V and A0 V

(2) HD 344698 / HD 344697 in constellation Vulpecula, J2000.0 ICRS coord.: 19 39 57.7 +23 17 25.2 / 19 39 56.3 +23 17 34.3, V mags 10.01, 10.1, spectral class A7 V and A7 V

(3) BD+36 3014 / BD+36 3014p in constellation Hercules, J2000.0 ICRS coord. : 18 05 36.2 +36 18 04.9 / 18 05 33.0 +36 18 10.6, V mags 9.44, 10.16, spectral class F2 V and K0 V.

I have also observed a 10.5 magnitude reddish star adjacent to the 8th magnitude M0 red dwarf BD+16 3495 in constellation Hercules. The current separation is roughly 20 arc

seconds and measured from the north, the faint companion star sits at roughly 2 o'clock position relative to BD+16 3495 (J2000.0 ICRS coord: 18 24 59.6 +16 41 55.5). Having compared the relative positions of these two stars on photographic surveys taken in the 1950s versus the 1990s (POSS I vs POSS II), I noted the fainter star had shifted by about 10 arc seconds relative to BD+16 3495. The proper motions of these two stars, as determined from the PPMXL catalogue are, however, very different.

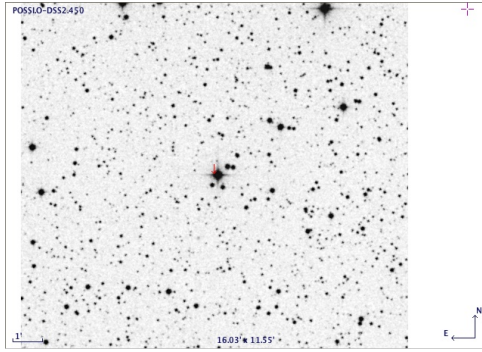


Figure 4: POSS I image in 1950s.

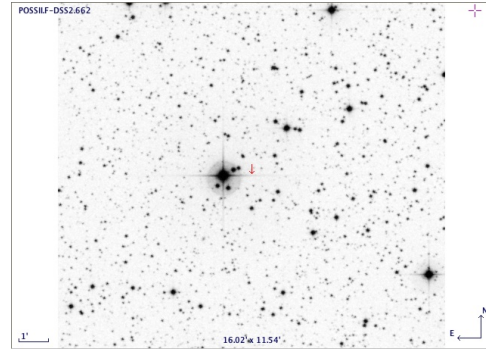


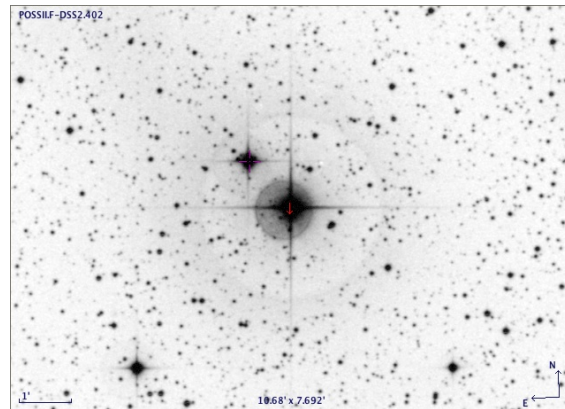
Figure 5: POSS II image in 1990s.

## A possible new double star in Cygnus

by Peter Clark

On the night of August 10-11, 2010, while locating neglected double SEI1390 by star-hopping, the atlas showed a very useful but insignificant single 6th. magnitude star very close by my target. I was soon on to it, noticing it looked impressively double, and even triple on a  $2^\circ$  field of view. Amazingly, no catalogue I have access to lists it as a double, including the full WDSC. All three stars are shown as HD200253 in SkyMap Pro.

*Observations are needed of this star, at 21h 01m 13s, +36° 01' 24" in Cygnus, which is unusually bright to be unrecorded as a double star. Mr. Clark has measured the separation as 74.3". The magnitude of the secondary is 8.9 so it should be well within the reach of modest telescopes.*



## Observing requests

by John McCue

The previous two articles, by Abdul Ahad and Peter Clark, report double stars that are not listed in the Washington Double Star Catalogue (WDSC), overseen by the US Naval Observatory. Since this catalogue is the repository of all double star observations made worldwide, then it is reasonable to assume that if you observe a double star that is not listed then it has not been seen by any other observer, or at least not recognised as a double. This is the case with the five doubles reported in the previous two articles. Both these observers, and I, have further observations of doubles in this category, which will be reported in the next issue of this journal.

BAA observers are urged to observe these stars, and particularly to measure the separation and position angle of these pairs.

### What to record

The details needed for an observation are to be seen in tables 1 and 2 of this issue. The magnitudes may be quoted from catalogues or estimated from your personal observation, and N is the number of nights over which the double was observed, or the number of times the PA and Sep, were measured on one night, which led to the average PA and Sep. being quoted.

## Observations for the Washington Double Star Catalogue From the WDSC Established Doubles list

There are literally thousands of double stars for the observer to choose from, and plenty of books and atlases to help observers. The following observations will add to the store of scientific knowledge of double stars by submission to the Washington Double Star Catalogue. Established doubles are those that have been observed many times, and recently. Neglected doubles are exactly that, and are further described below.

Table 1: WDSC submissions of established doubles

Star	RA(2000)	Dec(2000)	Mags	PA	Sep	N	Epoch	Name
	hhmm.m	+ddmm		ddd	ss.s	no.obs	yyyy.yy	
H VI 50	1849.7	-0555	6.2 8.2	169	112	3	2007.68	HD
$\Sigma$ 2391	1848.7	-0600	6.5 9.6	330	39.5	3	2007.68	HD

### From the WDSC Neglected Doubles list

These doubles have not been observed for 20 years or have been observed only once. The compilers of the WDSC would like confirmation of their existence, and do not necessarily require position angle and separation measurements.

### Observer abbreviations

JM - John McCue, RP - Rob Peeling,

HD - Howard Davies, BM - Brian McInnerney.

Table 2: WDSC submissions of neglected doubles

Star	RA(2000)	Dec(2000)	Mags	PA	Sep	N	Epoch	Name
	hhmm.m	+ddmm		ddd	ss.s	no.obs	yyyy.yy	
ALI 952	2049.2	+3917	8,11	333	21	1	2008.73	JM
HJ 1711	2157.6	+6808	9.8 10.0	254	12.5	4	2008.82	JM
SEI 1565	2058.8	+3530	8.5 10.0	Star	only	single	2008.75	JM
SEI 1565	2058.8	+3530	8.5 10.0	Star	only	single	2008.90	RP
SEI 10	0058.9	+3230	9.5 10.0	No	stars	seen	2008.85	JM
DOO 90	2206.6	+4156	9.5 9.7	No	stars	seen	2008.87	JM
BRT 2502	2202.7	+2215	11.4 12.4	235	16	2	2008.88	JM
ALD 7	2351.2	+5123	10.0 10.9	Star	only	single	2008.88	JM
A 912	0033.6	+4509	8.4 10.2	207.7	14.6	4	2008.90	JM
SEI 11	0059.9	+3202	10.0 10.5	No	stars	seen	2008.90	JM
ALD121	2352.5	+5134	9.2 10.2	No	stars	seen	2008.90	JM
HU 1651	0128.3	+5328	9.6 9.3	162	16.9	3	2008.91	JM
FOX 134	0346.8	+4239	10.0 10.4	113	7	3	2008.92	JM
CHE 58	0208.5	+2832	9.4 10.7	287	13.6	3	2008.98	JM
GCB 35	1914.6	+2426	9.5 10.0	10.0	5.0	1	2009.63	BM
J 2344	2122.8	+3147	10.0 10.0	250	6.0	1	2009.74	BM
ES2670	1858.2	+3011	9.9 10.3	64	10.3	3	2009.80	JM