



WASP

Warren Astronomical Society Paper

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March, 1991

MU DRACONIS

By Steve Franks

The variety among double stars is endless! As an example, a close binary system whose movement can be followed over the years even in small telescopes. This is Mu Draconis, situated midway between the two binocular pairs Nu and 16-17.

Like Nu itself, both components of Mu are white and nearly a perfect match in brightness. The separation of the stars in the former, however, is more than 30 times that in the latter! The actual figures for Mu show that both stars shine at magnitude 5.8 and are presently a very close two seconds of arc apart. The two suns are also of the same spectral class (F6).

Mu Draconis was at one time thought to be a very long period binary, whose circuit required as much as 2,000 years to complete. More recent results, however, have shown its period to be much shorter - about 480 years. Closest approach of the two suns is predicted for 1988, when their separation will be about 1.9 seconds. This is very nearly its present value, so you'll see little change in this parameter over the coming decades. Maximum separation of 4.5 seconds is expected in the year 2180.

Although Mu's separation is now relatively constant, its position angle will continue to change noticeably over the years. Currently it is decreasing - meaning that the components are moving clockwise with respect to each other. Back in 1830, its position angle was measured at 200 degrees; in 1975, 50 degrees, and in 1995, it will have diminished to 15 degrees (nearly due north in the sky).

A 3-inch refractor at high magnification will resolve this pair in good seeing and a 4-inch glass will cleanly split it. Such instruments - together with lots of time and patience - are all that is needed to observe the two suns moving about each other.

At least one classic observer considers Mu Draconis "a pretty pair" - with sufficient resolution. Most small instruments will show the two stars apparently in contact with each other on steady nights, and as a blended blob of light on other occasions.

Mu is actually a triple system, for a 13th magnitude star 14 seconds distant has been found drifting through space with it. There are also astrometric perturbations in the bright pair's orbit that may signal the presence of an unseen companion. This complex and fascinating system lies about 76 light-years from us.

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Warren Astronomical Society, Inc.

The WASP

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East Detroit, MI 48021

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and dues to:

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The Warren Astronomical Society, Inc., is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first and third Thursdays of each month, starting at 7:30 PM.

General Meeting on 1st Thursday:

Cranbrook Institute of Science
500 Lone Pine Road
Bloomfield Hills, MI

Business meeting on 3rd Thursday:

Macomb Community College
South Campus, Building B, Room 216
14500 Twelve Mile Road
Warren, MI

Membership in the Society is open to all. Annual Dues are:

Student:	\$10	College:	\$15
Senior Citizen:	\$15	Family:	\$25
Individual:	\$20		

Along the many benefits of membership are:

Discount magazine subscriptions:

Sky and Telescope:	\$16.00 (12 monthly issues)
Astronomy:	\$14.00 (12 monthly issues)
DeepSky:	\$ 8.00 (4 Quarterly issues)
Telescope Making:	\$ 8.00 (4 Quarterly issues)
Odyssey:	\$12.50 (12 lonthly issues)

Free copy of each WASP newsletter.

Free use of Stargate Observatory.

Special interest subgroups. (see subgroup chairperson)

Call list - don't miss unexpected events.

Free membership in Astronomical league.

Free Reflector (Astronomical League Newsletter)

Free use of W.A.S. Library. (see librarian)

Rental telescopes (see observatory chairperson)

Warren Astronomical Society Paper. The wasp is the official publication of the Society. Each new issue of the WASP is made available at the Macomb meeting on the third Thursday. Non-members will be charged \$1 for each new issue. Back-issues, when available, are free. Requests by other clubs to receive the WASP and other correspondence should be addressed to the editor. Articles for inclusion in the WASP are strongly encouraged and should be submitted to an editor on or before the first Thursday of each month.

Editor: Nancy Rowe 544-9081
2005 Hyland, Ferndale, MI
48220

NOTE: The mirrors in the telescope are being collimated so the telescope will be out of service for a few months. Lecturers will bring their own telescopes for viewing at the lecture.

Stargate Observatory is owned and operated by the Society in conjunction with Rotary International. Located on the grounds of Camp Rotary on 29 Mile Road, 1.8 miles east of Romeo Plank Road, Stargate features a 12.5 inch F17 club-built Cassegrainian telescope under a steel dome. The observatory is open to all club members in accordance to the 'Stargate Observatory Rules.' Those wishing to use the observatory must call the observatory Chairman by 7:00 PM on the evening of the session. The Observatory Chairman is:

Mike O'Dowd 268-7125

The Society maintains a library of astronomy-related books and periodicals at the Macomb County Community College meeting room. See the librarian for library rules or to check out a book.

Lectures are given at Stargate Observatory each weekend. The lecture will be either Friday or Saturday evening, depending on the weather and the lecturer's personal schedule. Lecturers should check with the ranger at Camp Rotary early in the week to determine whether scouts will be at the camp, and to inform the ranger of the day and time of the lecture. If you cannot lecture on your scheduled weekend, please make arrangements to switch weekends with another lecturer, or call the chairman as soon as possible. Upcoming lecturers are:

Francis Stabler	2-22/23	4-5/6
Riyad Matti	3-1/2	4-12/13
Scott Jorgenson	3-8/9	4-19/20
Frank McCullough	3-15/16	4-26/27
Robert Halsall	3-22/23	5-3/4
Jeff Bondono	3-29/30	5-10/11

Subgroups exist for those interested in specialized areas. Those interested should contact the chairperson, listed below:

Solar:	Ed Cressman	645-1837
Lunar/Planetary:	Alan Rothenberg	624-9339
Cosmology:	Mike O'Dowd	268-7125
Deep Sky:	Doug Bock	750-9369
Computer:	Larry Kalinowski	776-9720
Telescope Making:	Jim Houser	294-1952

The Call List is a list of people who wish to be informed of spectacular and unexpected astronomical events. Anyone who notices such an event calls the next person on the call list, who informs the next person, etc. A call list member can specify that he or she not be called at certain times. Any Society member is welcome to join the call list and can do so by notifying Jeff Bondono, 731-4706.

CALENDAR OF EVENTS

Thursday	Feb. 28	8:00	Computer Group Meeting - Larry Kalinowski - 776-9720
Thursday	March 7	7:30	WAS Meeting at Cranbrook
Thursday	March 14	7:00	Cosmology meeting at Glenn wilkins' home. Contact Mike O'Dowd 268-7125 Topic - The Electro Weak Force
Saturday	March 16	7:00	Deep Sky - Star Party at Doug Bock's 750-9369
Thursday	March 21	7:30	WAS Meeting at Macomb Community College

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Alt-azimuth Mount
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Contact: Frank McCullough
254-8164

The articles and columns that appear in the W.A.S.P. are strictly the opinion of the writer. It may be necessary to retype or delete parts of articles to conserve space. If you know of any upcoming events or speakers, that you would like to share with other club members, or have an article to submit, please call: Nancy Rowe 544-9091.

**KEEP
LOOKING
UP!**



Jack Horkheimer

Will be with the Club on Astronomy Day, April 20, 1991. Along with him will be Rick Hill from Kitt Peak Observatory. So plan on coming to Cranbrook to set up your scope or just enjoy the day with your fellow club members.

COMPUTER CHATTER

by Larry F. Kalinowski

One of the things that I've noticed recently is the lack of attendance by beginners in the field of computing. I hate to think that our computer group has discouraged anyone from attending. I realize the language can get mighty technical during our meetings but I also hoped we would encourage the individual just embarking into astro-computer land. If you're one of those individuals who can't decide which computer to buy or which direction to go, I know we can help you.

At our next meeting, on February 28th (8:00PM), I'm going to devote most of the evening to the novice in astro-computing. So if you're standing on the edge and don't know which way to jump, you're welcome to attend.

Our freebie table will have a change also. Not only will we have the usual printed handouts for distribution but you'll find programs on double density and/or high density disks, available for copying. This will avoid the last minute rushing around to locate disks that have been packed away. If you have programs of your own to contribute, make a copy and bring it to the meeting for our freebie table distribution.

See you at the Macomb meeting.

NU DRACONIS

Perhaps the finest double star among the multitude in this region lies in the dragon's head, just above Beta. This is Nu Draconis, an exactly matched pair of fifth magnitude white stars 62 seconds of arc apart - wide enough to make them visible even in finders and binoculars.

Smyth described the stars as "pale gray", and most observers see them as colourless. Off-white tints have been reported; however, Rev. Webb saw this pair as yellowish white and considered Nu "a grand object". Others have gone so far as to call both stars yellow.

This superb object is one of the very few wide pairs that remains attractive in large telescopes with their greater image spread. Barns, for example, called Nu "exceptionally fine" in his 10-inch reflector, and they are still a showpiece in a 13-inch refractor.

Nu Draconis is at its best, however, in small telescopes at very low magnification. A 2-inch refractor at just 30 power gives a thrilling view! The pair exerts a fascination to observers that is difficult to explain when we consider its lack of colour and wide separation. Perhaps it has something to do with seeing two so perfectly matched suns glowing against an empty black sky.

Both components of Nu are drifting through space together, forming a common proper motion (CPM) pair. The possibility exists that they are actually a very long period, slow moving binary. This pair is sure to please visitors at the telescope, as well as old hands.

PSI DRACONIS

This pair consists of 4.9 and 6.1 magnitude stars, 30 seconds of arc apart. Some early descriptions, and at least one modern one, describe the components as white or pearly white. But as Webb pointed out, a colour contrast is evident. Virtually all observers agree in calling the primary yellow and the companion lilac. At least one forgotten list dating from the 1890's (the Celestial Handbook by Colas) includes Psi under its heading of finest coloured double stars.

In judging star colours, use well corrected eyepieces such as orthoscopic and place the object under study at the center of the field of view to avoid spurious results. Direct rather than averted vision will often prove best for such work because of the eye's properties. Yet another hint is to slightly off focus the image to spread the star's light over a greater area of the retina. This is something that poor "seeing" (image steadiness) often does for you anyway. Try going both inside and outside of focus, and compare the tints you see.

Recording double star colours is a fascinating activity but one that unfortunately receives little attention from modern stargazers. "Show" pairs like Albireo are easy, but pinning down specific tints for objects like Psi Draconis takes skill. In time, your eye will become finely tuned for such studies - revealing beauty among the stars never before suspected.

OMICRON DRACONIS

Another Draconian double star offers contrast both in colour and brightness. This is Omicron, located about 15 degrees east and north of the head area. A line from Nu through Xi points roughly to its position.

Here we find a 4.8 magnitude primary and a delicate 8.2 magnitude companion sun an easy 34 seconds of arc apart. While this pair can be glimpsed even in a 2.4-inch refractor, the relative dullness of the small star makes the tints definite only with larger apertures. 6-inches or more are really needed to appreciate Omicron's charm.

Among the colours reported for this object are orange and green or emerald, and yellowish orange and lilac. Deep yellow and blue or "ashy" have also been seen. Here we're faced with the other side of the coin in our presentation of double star colours: Knowing what to look for before going to the eyepiece is an excellent way of "educating" the eye-brain sensory input. Low key pairs like Omicron Draconis are ideal for such schooling.

16-17 DRACONIS

While Nu ranks as Draco's finest double, 16-17 Draconis is its best triple. It can be found west of the dragon's head by following a line from Gamma through Beta twice their separation. Binoculars and finders will show an apparent double star, which scrutiny with a small telescope transforms into three objects.

We again encounter a nearly matched pair of stars, for both 16 and 17 Draconis shine at magnitude 5.6. The distance between them is just over 90 seconds of arc. A 5.6 magnitude companion attends 17 at a separation of four seconds, forming a striking triple system. The wide pair is moving through space together; the close one is of uncertain type, but is probably a binary.

A 2.4-inch refractor at about 100 power resolves all three stars nicely in good seeing, while 4-inch and larger instruments give the kind of view shown in our drawing. As aperture increases, this object becomes even more lovely.

As with 39 Draconis, a number of observers (both past and present) have viewed 16-17 as double rather than triple! Barns, for example, listed 17 and its companion without any mention of nearby 16. It's fun trying to unravel the basis of such unusual observations by the great observers of the past. Going to the eyepiece ourselves is often the only answer.

Smyth gave the colours of 16, 17A and 17B Draconis as white, pale yellow and faint lilac, respectively. Webb agreed closely with white, white and pale lilac. Cream and bluish have also been given for the 17 pair, while many observers today see all three stars a pale greenish white in hue.

39 DRACONIS

For a change of pace, we now examine two fine triple stars from among the many to be found in Draco. The first of these is 39 Draconis, located about midway between Xi and Omicron.

This object consists of three suns of magnitudes 4.9, 7.7 and 7.1. The companions' distances from the primary are 4 and 89 seconds, respectively. Some observers perceive 39 as an unequal double with a third star nearby. Can you confirm this impression in your telescope?

Barns described this "double plus" or triple, as "wide - impressive - colorful", evidently referring to the two brightest members. Webb gave the tints here as white, ruddy and lilac. Yellowish white, bluish and ash have also been reported.