



July 2005 Newsletter of the Omaha Astronomical Society Issue 211

NOTICE THERE WILL BE A JULY MEETING
on 1st JULY, 2005

An artist's concept of Deep Impact's arrival at its target comet. The combination Flyby/Impactor spacecraft is expected to reach Comet Tempel 1 on July 4, 2005. Credit: NASA/Pat Rawlings.



General Meeting of the
Omaha Astronomical Society
Friday, July 1st at 7:30 PM
Durham Science Center, Room 169
UNO Campus

Program: See Page 3

Events

June Club Star Party
Saturday July 9, 2005
Club Site Weeping Water

Mahoney Public Star Parties

July 8, 2005
August 12, 2005
September 9, 2005

PLANNING MEETING FOR 2005
NEBRASKA STAR PARTY
July 14, 2005 @ 7:30PM
Mahoney State Park Lodge
Join us and do your part to help plan NSP 12!

MARK YOUR CALENDERS NOW
7th ANNUAL OAS_PAC BANQUET
October 14th, 2005 at 7:30 PM

STELLA is a publication of The Omaha Astronomical Society. Please send related correspondence to: STELLA, c/o Omaha Astronomical Society, P O Box 540424, Omaha, NE 68154



BULLETINS

July Meeting Presentation

Harlan Seyfer presents

Observing Double Stars

Good July Dates to Observe at the OAS Club Site or at any other good location

Friday 1 July, prior to new moon
Saturday 2 July, prior to new moon
Sunday 3 July, prior to new moon
Friday 8 July , new moon
Saturday 9 July, new moon

Upcoming Events

25th of June 9:00 AM
Weeping Water Site Clean-up

4 July approx 1:00 AM CDT
DEEP IMPACT will impact
Comet Temple 1

Omaha Astronomical Society

June 3, 2005, Meeting Minutes

Old Business

1. OAS Outreach Coordinator John Johnson

John Johnson reported that the May 19TH Benson West Elementary School Solar Party was a big success. A crowd of 300 attended the event. Mark & Sharon Weiss, Wayne Lainof, Clete Baker brought their telescopes for solar viewing.

John also reported that there is a Boy Scout "Astro Merit Badge" explanation that will be hosted by Rick & Vicki Neidergesses. The location will be announced soon.

John also stated that there will be a Cub Scout Star Party at Mahoney Star Park on July 16TH. Those interested in bringing their scopes & binoculars should contact John.

2. Messier Observing Committee. Clark & Deb Cheney

Deb & Clark Cheney reported the following:

- A. Jupiter is "prime" for viewing since it is closest to the Zenith this month in the early evening hours.
- B. By a question to the OAS membership attending this meeting, no one indicated that they used the OAS Astro Park since the last meeting.

New Business.

1. OAS in Pottawattamie County Conservation Publication

President Al Dorn reported that the OAS received credit and publicity in this publication for providing photos taken by the Hubble Telescope for the Hitchcock Nature Center Astro display.

2. Astro League 2005-06 Membership Dues

By a motion from John Artherton and a second by John John-

son, the OAS voted unanimously to pay the annual dues of \$ 5.00 per OAS Member to the Astro League. Treasurer Bill Bond was authorized to write a check for nearly \$500 for the AL dues.

3. Astro League Secretary Position Vote

By a unanimous voice vote, the OAS Membership voted for John Jardeen Goss of Virginia to fill the vacant Astro League Secretary position.

4. Theft at Hitchcock Nature Center

George Allen reported that a large aperture pair of binoculars was stolen from the Nature Center. Those frequenting e-bay, pawn shops, etc should keep a look out for the sale of these.

5. Astro Park Clean Up Day

June 25TH – Astro Park Clean Up Day II. This is Part Two of the Spring Clean UP began in April. Those willing to help should put their names down on a Sign Up Sheet that is being passed around. Clean Up activities are to finish painting the buildings, tree trimming, and finish the stair way to the lower level.

A motion to spend \$100 for food and clean up supplies (paint, etc) was made by Sharon Weiss and seconded by Howard Bohm. A voice vote passed the motion unanimously.

Notice

During the next few issues I will be trying a few new layouts for the STELLA. Any and all comments are welcome as to content and layout.

Thanks for your input.

Mark K. Weiss

July Sky Calendar

6th New Moon
14th First Quarter Moon
21st Full Moon
27th Last Quarter Moon
29th Delta Aquarid Meteor Shower

Recent Observing Awards

Visit the club web site at: www.OmahaAstro.com

Save the club money... and get your newsletter in full color by signing up for the email edition of the Stella. Signing up is easy... just go to:

[Http://www.omahaastro.com/DigitalStella](http://www.omahaastro.com/DigitalStella)

Welcome New Members...

Audra Lorimor of Omaha

Harlan's Top-Ten by Harlan Seyfer

Like most astronomers, amateur or professional, I have my favorites. Being a double-star enthusiast, my favorites are binary stars. You'll find these in the accompanying table ordered by right ascension.

Double stars are gravitationally bound to each other and revolve around a common center of mass called the barycenter. All kinds of stars can be found double, from brown dwarfs to red super giants. This is important, because the *only* way to accurately determine star masses is through the study of double stars. Often each member of a pair will be a different color, which adds to their fascination.

Anyway, to the list!

Name	Constellation	RA (2000)	Dec (2000)	Mag.	PA, Sep.	Distance
γ Andromedae "Almach"	Andromeda	02 ^h 03.9 ^m	+42° 20'	2.1, 4.8	64°, 9.8"	355 ly
Polaris " α Ursae Minoris"	Ursa Minor	02 ^h 31.8 ^m	+89° 16'	2.1, 9.1	216°, 17.8"	431 ly
β Monocerotis (triple)	Monoceros	06 ^h 28.8 ^m	-07° 02'	4.7, 5.2, 6.1	133°, 7.2"; 126°, 9.9"	691 ly
γ Virginis	Virgo	12 ^h 41.7 ^m	-01° 27'	2.7, 2.8	230°, 0.9" (July 2005)	39 ly
Alcor & Mizar	Ursa Major	13 ^h 25.3 ^m (Alcor)	+54° 58' (Alcor)	2.4, 4.0	71.6°, 11' 48"	
Mizar A & B	Ursa Major	13 ^h 23.9 ^m	+54° 36'	2.2, 3.8	153°, 14.4"	78 ly
ϵ Lyrae "Double Double"	Lyra	18 ^h 44.3 ^m	+39° 40'		172°, 3' 28"	160 ly
ϵ ¹ Lyrae				4.7, 5.8	348°, 2.7"	
ϵ ² Lyrae				5.3, 5.5	82°, 2.5"	
"Double Double's Double"	Lyra	19 ^h 08.8 ^m	+34° 46'		158°, 10' 22.5"	
STF2470 (north),				7.0, 8.6	270°, 13.9"	1,900 ly
STF2474 (south)				6.7, 7.9	264°, 16.1"	85 ly
Alberio (β Cygni)	Cygnus	19 ^h 30.7 ^m	+27° 58'	3.1, 5.1	54°, 34.4"	385 ly
61 Cygni (STF2758)	Cygnus	21 ^h 06.9 ^m	38° 45'	5.2, 6.0	150.7°, 30.9" (July 2005)	11.2 ly
STF2816 (triple)	Cephus	21 ^h 39.0 ^m	+57° 29'	5.7, 8.1, 8.0	101°, 11.7"; 338°, 20.0"	2,600 ly

PA (Position Angle), Sep. (Separation) and Mag. (Magnitude) are from the *Washington Double Star Catalog 2001.0* with the following exceptions. PA and Sep. for γ Virginis, Alcor & Mizar and 61 Cygni were calculated using *MegaStar5* and *Orbits Binaries Calculator*.

The first pair is gamma (γ) Andromedae, which the ancient Arab astronomers named Almach. Richard Allen, in *Star Names*, writes that Almach comes from the name of a small predatory animal similar to a badger. He goes on to speculate that, since this name has little to do with princess Andromeda, this star's name must predate the naming of the constellation. Be that as it may, it is a wonderfully beautiful pair. The primary (brighter of the two) is a golden yellow and the secondary a lightblue. Some observers have described the secondary as green, but I've never seen this color. You decide. The distance between the two stars is approximately 13 times the diameter of our solar system. John Mayer was the first to report this star as double in 1788; although, he believed this was a coincidence. Friedrich Georg Wilhelm Struve, observing from Dorpat, Estonia, took the first measurements of this binary star system in 1830. The components are separated by just a little less than ten arcseconds. A scope three inches or larger should resolve the pair. γ Andromedae is first on my list because it is the first binary I can recall observing with my first "real" telescope, a 4.5 inch Edmund reflector.

The second star on the list is alpha (α) Ursae Minoris, better known as Polaris, the pole star. The name Polaris comes from the Latin *Stella Polaris*, literally Pole Star. It is moving closer to the North Celestial Pole and will be closest around 2102. Polaris shines at magnitude two and its companion at magnitude nine, but it is not difficult to spot in a decent small scope. The primary is classified as a low luminosity super giant. That said, its absolute brightness is 1,900 times greater than our Sun. The distance between the two stars is approximately 30 times the diameter of our solar system. William Herschel, observing from Slough outside London, discovered α Ursae Minoris was binary in 1780. By the way, he moved to Slough to be near Windsor Castle where his patron King George III lived (yes, that George). Polaris is a Cepheid variable, changing 0.1 magnitude every 3.97 days. Unfortunately this is too small a change to be detected visually. When setting up my telescope, I always confirm north by sighting Polaris. I know the star in my sights is the Pole Star – and that it is getting dark enough to observe – when I can spot the pale blue secondary.

The third set of stars on the list is beta (β) Monocerotis. It is fitting that it is third on the list, since it is in fact a triple system, perhaps the most beautiful set of stellar triplets in the sky. All three members are of nearly equal brightness and all appear a blazing white. This latter fact suggests that they are of the same spectral type. In fact all three are type B3. This indicates that all are larger, brighter, and hotter than our Sun. The distance between the two outer stars is about 26 solar sys-

tem diameters. They orbit each other in 17,000 years, give or take a millennium. William Herschel discovered this triple system in 1781. I like these three stellar siblings because they arguably form the most beautiful set of triplets in the winter sky. Let me know if you agree.

The fourth binary system presents something of a problem. Gamma (γ) Virginis is rapidly closing. That's binary astronomer talk for "they're getting pretty doggone close, pretty doggone fast." Their separation this month (July 2005) is 0.88 arcseconds changing to 0.77 arcseconds in December. It will take an excellent night for any amateur scope to separate them this year. However, on a good night, an eight-inch scope or larger should be able to reveal an elongated image. Even this will become progressively more difficult until both stars merge indistinguishably into one "blob" as they approach their closest separation of 0.37 arcseconds in late 2007. It wasn't until the early nineties, that their orbits could be closely enough defined to calculate this distance. Older references may list a different year and closest separation. They won't be at least one arcsecond apart until 2010. If you are working on your Astronomical League Double Star List, beware! Gamma Virginis also goes by the beautiful name of Porrima, the Latin name for two goddesses of prophecy. The Chinese know Porrima as Shang Xiang, the High Minister. At their closest they will be about three astronomical units apart, roughly twice the distance between Mars and the Sun. Obviously I like this pair because of their changing appearance. I last observed them in April, 2003, when they were about 1.3 arcseconds apart. On that night – it wasn't very steady – I occasionally glimpsed a peanut-shaped star.

By contrast, number five on the list is Alcor and Mizar – much easier to observe than γ Virginis. In fact they are a naked eye pair known as 80 Ursae Majoris (Alcor) and zeta (ζ) Ursae Majoris (Mizar). Many early civilizations considered this double a test of vision; although today they are not very difficult to split with the unaided eye given a clear, dark sky. These stars are located at the bend of the big dipper's handle. Mizar (meaning "the apron") and Alcor ("the rider") are separated by about 212 solar system diameters. Mizar itself is double and historic. In January 1617 Benedetto Castelli wrote to his teacher Galileo Galilei to suggest that he look at Mizar. "Between the middle star [Mizar] of the Tail of Elix [Ursa Major] and the star closest to it, I now put 15 [arcseconds]." Thus, Mizar A and B were the first double pair to be discovered after the invention of the telescope. Later Mizar A & B was the first binary pair photographed in 1857 by G.P. Bond of Harvard College Observatory. Further more, during a project to photograph and classify spectra of major stars in the late 1880s, Antonia Maury noticed a strange doubling of lines in Mizar A's spectrum. The puzzle deepened

when the lines moved further apart then reversed direction to merge and split again. In 1890 Edward Pickering, director of the Harvard College Observatory where Antonia was employed, solved the mystery when he declared “The only satisfactory explanation ... is that [Mizar A] is itself a double star having components nearly equal in brightness and too close to have been separated as yet visually.” Each time I observe Mizar, I sense a connection with those historic events. I am looking over the shoulders of Galileo and Antonia and standing next to Bond!

The tiny summer constellation of Lyra contains the next pair – more truthfully a “pair of pairs”. This is the famous Double Double, epsilon (ϵ) Lyrae. Some folks, no doubt with much younger eyes than mine, have split ϵ^1 and ϵ^2 without optical aid, since they lie about 3.5 *arcminutes* apart. A small telescope or large binoculars will resolve each of these into a close pair. All four are white. ϵ^1 A and B are separated by about two solar system diameters, while ϵ^2 A and B are separated by a little less. F.G.W. Struve discovered both binaries in 1821. ϵ^1 A and B revolve around each other approximately every 1165 years. ϵ^2 A and B take an estimated 585 years in their dance. These times are only estimates, since it takes at least one complete revolution before an orbit can be precisely pinned down and they (obviously) have been observed for less than 200 years. I like this pair simply because they are a classic, easy to show visitors on a summer evening.

Two years ago in *Stella* (June 2003 to be exact), I wrote about the seventh set of stars on this list – the Double Double’s Double. They are found about 1.5 degrees south of Iota (ι) Lyra. Binary star astronomers have given each pair the names Struve 2470 and 2474. They were the 2470th and 2474th pairs recorded by Struve in his catalog back in 1829 and 1830 (he worked over the holidays). These sets of twins, although less well known than their famous neighbors, are easier to split. The S2470 pair are separated by 13.4 *arcseconds*, while their siblings to the south (by about 10 *arcminutes*) are separated by 16.2 *arcseconds*. S2474 is about 1,800 light years closer to us than is S2470, which makes it nearly impossible for them to be associated with each other except in our line of sight. They are a bit dimmer than the ϵ Lyrae sets of twins. S2474 appears more yellowish than S2470 to me. You, of course, may see a different color.

The eighth pair on the list is beta (β) Cygni, better known as Alberio, a favorite at nearly all summer star parties. This gold and yellow pair is sometimes called the Cub Scout Star. With a separation of 35 *arcseconds*, the pair is easy to observe in any telescope and most binoculars. The primary is 605 times the luminosity of our sun; the secondary 96 times. Not surprisingly, the first recorded observation of Alberio

is by F.G.W. Struve in 1822. Interestingly, the name Alberio does not come from Arabic. According to Richard Allen the name resulted from a misunderstanding of the Latin words *ab ireo* (bird's beak) in the description of the constellation Cygnus in the 1515 copy of Ptolemy's *Almagest*." In other words, a typo. The Sun's motion through the Galaxy is taking us towards this pair. In about 4.5 million years, it will be the brightest star in our sky, where it will be visible as a zero magnitude gold star and a second magnitude blue star very near by. At that time it will be a naked eye binary! One of the sky's most beautiful doubles, I never fail to catch it during the Nebraska Star Party.

Staying in the constellation Cygnus, the next-to-last set of stellar twins on my list is 61 Cygni. Being 11.2 light years from us, this is the closest known binary that can be observed from Nebraska's latitude. Struve first measured the pair in 1830. It has an unusually high proper motion of 5.22 arcseconds per year, easily detectable in an eight-inch scope. 61 Cygni was christened the "Flying Star" in 1792 by Giuseppe Piazzi, who eight years later discovered the first asteroid. Only 10% as bright as the sun, it is the first star (double or otherwise) whose distance was measured. Friedrich Wilhelm Bessel accomplished this in 1838. It's an especially fine double star. Both partners are golden yellow on a background of shimmering, faint stars. Their brightness and separation make them a good binocular target. This historic pair is another of my favorite Nebraska Star Party objectives.

The last set of stars on the list is circumpolar – they never set and can be viewed year round. Struve 2816 is a triple star system, a gold primary flanked by two slightly-dimmer blue stars. S2816 is in an interesting neighborhood, for it lies at the center of IC1396. J.L.E. Dreyer, described IC1369 as a "nebular part of [the] Milky Way", but it is a bit more than that. Kepple and Sanner, in the *Night Sky Observer's Guide*, list IC1396 as both an open cluster and an emission nebula. "This nebula with involved cluster is a large circular patch of haze spreading 3 degrees south of the orange-red star μ (mu) Cephei. The brightest stars of the cluster are arranged in a large 'X' centered upon the triple S2816." Low power and a well behaved sky are needed to see the nebula, S2816 is well worth higher magnification. Struve 2816 is a favorite of mine not just because it is a magnificent triple, but also for its fascinating home turf, well worth exploring on a fall evening.

So that's my list of favorite double star. Others may differ, but that's my list and I'm sticking to it. Two references not mentioned in this article were used: Brent Watson, *Finder Charts of Select Double Stars* (Bountiful, Utah: Sky Spot 1263 East Beverly Way, 2002) and Mike Ropelewski, *A Visual Atlas of Double Stars* (The Webb Society, ISBN 0-904824-01-2, 1999). Keep looking up. See you at NSP!



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