



OBSERVING DOUBLE STARS

(FROM COMPUERVE'S NAKED EYE ASTRONOMY SECTION... BY MARTIN MORRISON)

Observing double stars is an interesting phase of star-gazing that can be done with any telescope or pair of binoculars. The beginner should start with easy doubles, e.g., 10 seconds of arc more more separation with a comes (companion) star no fainter than eighth magnitude. It should be noted that close doubles near the limit of resolution for a particular telescope can be split only when seeing conditions are excellent. Make Mizar your first double. It is easy to find, with Alcor alongside supplying positive identification.

A fundamental rule in telescope optics states that the true angular field of view multiplied by the magnification equals the apparent angular field of view. This rule can also be applied to any part of the field. For example, the popular double star Mizar is separated by 14 seconds of arc. This is the true field angle, the same angular separation as you see the stars with using your unaided eye. The human eye can't "split" 14 seconds of arc, so you have to magnify. A magnification of 43x will increase the angle to about 10 minutes of arc, which you can see quite easily.

About the closest star separation that the eye can distinguish is 4 minutes of arc (240 seconds of arc). Twice this distance, or an 8-minute apparent field angle, is a more practical value for comfortable viewing. In cases where the comes is more than five magnitudes fainter than the primary, you will need a wider separation: 20 or 25 minutes of arc, nearly the width of the moon seen with the naked eye. Note that Mizar and Alcor are separated by nearly 12 minutes of arc and should be easily split by the naked eye.

The table below gives the power needed for an 8-minute apparent field. Try half the power to test your eye, your equipment, and the seeing conditions.

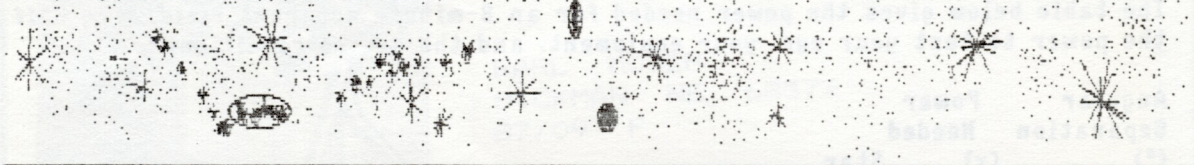
Angular Separation (")	Power Needed (x)	Star
1	480	35 Comae Berenices
1.2	400	Zeta Cancri
1.5	320	Mu Cygni
2	240	Xi Ursae Majoris (Alula Australis)

(CONTINUED ON NEXT PAGE...)

2.5	192	Alpha Geminorum (Castor)
3	168	Zeta Aquarii
4	120	Gamma Leonis (Algieba)
5	96	Gamma Virginis (Porrina)
6	80	Pi Bootis
7	68	32 Eridani
10	48	Gamma Andromedae (Almach)
11	44	Eta Cassiopeiae
13	36	8 Monocerotis
14	34	Zeta Ursae Majoris (Mizar)
18	26	Alpha Ursae Minoris (Polaris)
20	24	Alpha Canum Venaticorum (Cor Caroli)
22	22	8 Lacertae
24	20	Zeta Piscium
25	20	61 Cygni
30	16	Iota Cancri
35	14	Beta Cygni (Albireo)
40	12	16 Cygni
45	12	Zeta Lyrae
55	10	67 Ophiuchi
65	8	Tau Tauri
90	6	Epsilon Sagittae
95	6	Gamma Leporis
100	6	Delta Bootis

The resolving power of your equipment is limited by the diameter of its objective lens(es). A star is a mathematical point, subtending an angle of 0.05 second of arc or less. No telescope can show such a tiny object as it really is, but instead expands the angle to form a small disc of light, known as a diffraction disc. The smaller the diffraction disc, the better the resolution. Resolution means simply the ability to show fine detail, and an exact measure of this is offered by close double stars.

The value called "Dawes Limit" does not call for actual separation, since it recognizes only the bright center of the star image. The "Working Value" is the approximate minimum for complete separation. The Dawes Limit is calculated by dividing the value 115.8 by the diameter of the objective in millimetres. The Working Value uses the value 200.



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THE REVIEWER...

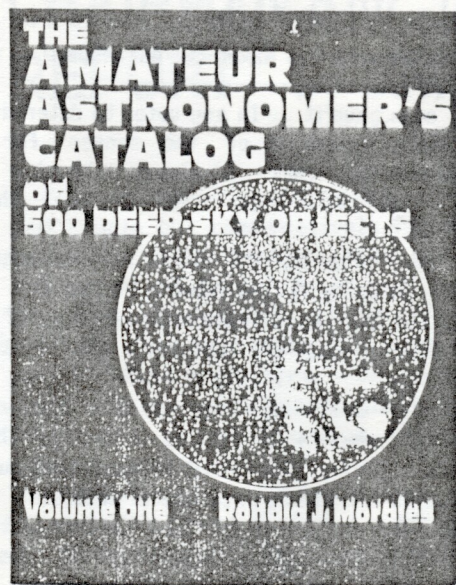
by John Lortz

The Amateur Astronomer's Catalog of 500 Deep-Sky Objects by Ronald Morales

I've been a member of the Astronomy book club for many years (as I assume many of you have). The nice thing about the club is the monthly catalog of astronomy books to help the amateur keep abreast of what's new in astro books (the one bad thing about the club is remembering to send back the little reply cards which say you don't want the monthly feature book!). If you are a prolific book purchaser (as I am, or as Ron Veys is) the club can save you at least 10% on all the books you purchase. The Astronomical Leagues book service also saves you money, but the Astronomy Book Club's catalog is what sets it apart.

Anyway, my latest purchase pleased me enough to want to pass its existence on to you. The Amateur Astronomer's Catalog of 500 Deep-Sky Objects is written by Ronald Morales and is a fine beginning reference for those using small to medium sized telescopes. The book contains everything from discussions on observing techniques and tips to hints on how to find a good observing site and how we as amateurs can help in the fight against light pollution. None of these topics are verbosely handled, but there is enough of a discussion to provide the reader with some good info.

The meat of the book is of course the catalog section, but before you get to it the author presents a few helpful tables and forms. There are six different blank observing forms that the reader can duplicate and modify. There are separate sheets for observing bright diffuse nebula, dark nebula, galaxies, globular clusters, open clusters, and planetary nebula. The forms are followed by set of tables describing what is contained in the actual catalog. Included in tabular form are the messier objects as well



PUBLISHED BY AZTEX CORP. PRICE: \$12.50

as a group of deep sky objects the author found to be especially worth finding.

The catalog section is 59 pages long and gives short descriptions of over 500 telescopic objects found in the NGC. Black and white pictures of selected objects are included with the text. The last part of the book consists of a listing of some non-NGC objects, a map of the Virgo Cluster of Galaxies, a map of the Fornax galaxy group, a glossary, and a recommended reading list.

This is not an exhausting survey of all of the deep sky objects an amateur has to choose from, but it does give one a great amount of guidance in choosing some worth while observing targets. Mr. Morales calls this book "Volume One", so I assume he will be following it with something else quite soon. After seeing the quality and amount of information in this volume, I very much hope he does!

Our Eyes Sometimes Tell Little White Lies...

(from Compuserves Naked Eye Astronomy)

The eyes have it. In any vote to determine the most important of the senses for a stargazer, the eyes will always outnumber the nays. You can't feel, smell or hear the universe.

Our eyes allow us "to reach the unreachable stars," in spite of the lament of The Man of LaMancha. Our eyes reach out to tell us of the form, color, size and movement of celestial objects.

Aristotle would have agreed with this view of the phenomenon of sight. Literally. He proposed sight was the result of rays sent out by our eyes to detect the presence of objects.

Today we explain sight as the interaction of light with light sensitive nerve cells—the rods and cones found in the retina. The rods and cones of the eye nourish our brains with celestial images. But sometimes they don't always give us the whole truth. Sometimes they tell little gray lies.

The rods and cones serve different functions and therefore provide us with different information. The rods provide vision in semi-darkness or dim light conditions, such as those for stargazing. The cones give color to our vision but only in bright light conditions.

There is a concentration of cones near the center of the eye. This area provides the best view of an object when viewed directly in bright light.

Many people are disappointed at what they see when looking at far distant galaxies and gaseous nebula through a telescope. They don't see the colors found in textbook and magazine photographs. This is because our eyes do not see colors when observing faint objects. They only see shades of gray. In effect, we become color-blind when observing through a telescope.

Sometimes a novice telescope user feels completely blind because he or she can't see what others can see through a telescope eyepiece. This is because they are trying to look directly at the objects. They are trying

to look at dim celestial objects with only the cones in the center of the retina. This is the least light sensitive part of the retina.

Experienced telescope users learn to look for faint objects with "averted vision." They look for objects out of the side of their eye, taking advantage of the light sensitive cones.

Sometimes our eyes can tell big fat lies. They do this when they do not work properly. Many famous astronomers have had this problem.

Johannes Kepler, the early seventeenth century mystic and mathematician who solved the centuries old problem of accurately predicting the movement of the planets, had vision problems. Kepler was near sighted and had multiple vision in one eye.

Isaac Newton, the late seventeenth century astronomer who saw gravity controlling the actions of objects everywhere in the universe, was confined by his vision to the world of very close by. Newton's extreme myopia blurred the images of distant objects.

Giovanni Schiaparelli, the late nineteenth century astronomer who discovered the "canals" on Mars, had to give up his planetary observing because of failing eyesight. There were astronomers at the time who believed Schiaparelli became aware of his problem too late.

The nature of sight and concern with the eyes has always been of interest to astronomers. John Herschel, the astronomer son of William Herschel who discovered the planet Uranus, suggested the use of small glass shells for the protection of the cornea against diseases. This suggestion in 1827 led to the development of the first hard contact lens 60 years later.

Get out and treat your rods and cones to the wonders of the night sky. The night sky is beautiful even if you don't know what you are looking at. And this is not a lie.

FOR SALE... Cave 12 1/2 inch telescope, deluxe model, lot of extras, also a 10x10 ft. observing site 30mi east of Lincoln. Call 467-1665 for details
FOR SALE... RV-6 telescope with enhanced coatings, incl. 32mm Plossl, 18mm Erfle, 18mm Symmet, 9mm Symm., eye-piece box. Asking \$300 Contact Andy Corkill at 488-1096

There are three star parties coming up with the first just two days after the August club meeting on August 29th. The others are on September 5th and 26th so get your equipment ready. If you missed the club picnic, I feel sorry for you since it cleared off both for the picnic and for about three hours after darkness set in providing those who stayed with some spectacular views of the objects in the Milky Way. Russ Copple brought his pair of 11x80 binoculars and the views of deep-sky objects through them were fascinating. The Andromeda Galaxy looked like it was hanging in space in an almost three dimensional field of stars and the Sagittarius star clouds showed a wealth of detail. If you have never been to a star party then by all means go the next one. Even if you don't have a telescope, chances are there will be someone there with one who will be glad to let you have a look.

The nice thing about the early fall sky is that it offers the best of the summer sky and a preview of the winter wonders to come. There are two wonders that are worth a good look way up north on the Cygnus/Cepheus border, namely the open cluster NGC 6939 and the small spiral galaxy NGC 6946. NGC 6939 is a moderate sized group of stars that should be visible in a six inch if you look one degree south and 1.5 degrees west of Eta Cephei. This cluster has several rows of stars that remind me of stadium lights, hence I call this group the "Seacrest Cluster", after a very well know source of light pollution. About a degree to the south-east of this cluster is NGC 6946. It is rather faint so it should be a challenge to small instruments but an eight inch makes it look a bit like M33 does in a four inch at low power. My ten inch does show hints of patchy detail, but it took a 12.5 inch to show the spiral arms.

OBSERVING CHAIRMAN'S REPORT by David Knisley

Many observers have heard of the Veil Nebula but comparatively few seem to have actually seen it. Located in an area about four degrees west and a bit north of Xi Cygni, the brightest portions have been seen in a very good pair of 10x50 binoculars. One bright portion goes right through the star 52 Cygni and can be glimpsed with an eight inch as very faint wispy streak. The main section of the nebula is about two degrees east and a bit north of 52 Cygni and shows amazing detail when observed with a ten inch reflector and a Lumicon UHC filter. This is also a good object for owners of rich-field instruments.

If you thought the good globular clusters are mainly summer objects, M15 should change your tune. Located 3.5 degrees west and about two degrees north of Epsilon Pegasi, this cluster will show a wealth of stars in a six or eight inch telescope and is bright enough to be visible in binoculars.

As a final note, I would ask avid observers to set up your telescopes in your front yards and observe the moon or the planets. This request is not for your benefit but for those who might see you and become curious. We use to have public shows out at Gateway which generated a great deal of interest and I think we may have to go back to doing this sort of thing. Even though we have the Observatory to generate interest, we still need to be good ambassadors to the hobby of Amateur Astronomy and show people that they too can become involved in one of the most fascinating hobbies in the world!

AT THE LAST MEETING...

The meeting was called to order by President Corkill at precisely 7:31pm (not bad!) who asked if any visitors were present... 2 visitors were acknowledged. There were 29 members present. A letter from the Ames club was read, they are looking for a mount for their Newtonian Cassagrain telescope. The scope is 65 inches long, 15 1/4 inches in diameter and weighs about 85 lbs.

John Lortz presented the club with the PAC New-member Packets. The packets contain starting information for new amateurs as well as info on the club and maps showing local observing sites. The packets are free to any new members that desire one.

Everyone was reminded that August 9th was the date for the PAC annual star party at Wagontrain Lake.

The club voted for Astronomical League officers... Jim Brown (President), Ken Wilcox (V-President), Harriet Witt Miller (Secretary) and Merry Mooten (Exec. Secretary).

The PAC has 3 votes in these elections.

It was then time to give away some door prizes. Winners were Earl Moser (won a Halleys Space Figet), Ron Veys (photographic plates from Sky & Tel), Donn Baker (photographic plates from Sky & Tel), Brian Schaaf (mural of famous astronomers by Don Cohen), Cedric Gibb (1986 Wonders of the Universe Calender), and John Lortz (a computer mural of the moon from UNL).

Andy reported that the Observatory Site committee has had two meetings since the last club meeting, and that they would meet after the meeting tonight. The feasibility study is still going on, but by next months meeting an answer of yes or no will be made by the committee.

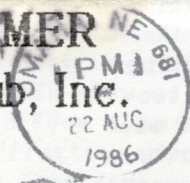
Two programs were presented. The first was by Jack Dunn and concerned his recent trip to a Planetarium Convention in Tuscan. The second was by Steve Kell who presented some tips on piggyback astrophotography and showed some of his most recent photography endeavors.

THE PRAIRIE ASTRONOMER

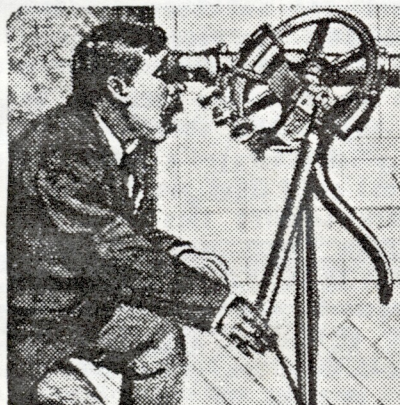
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Next Meeting August 26th