

Rochester Skies

Pluto's not a Planet ★ *Astronomy League Info* ★ *Find a Finder*

Rochester Astronomy Club Newsletter

Issue #4 Fall '06

2006 YEAR IN REVIEW

As this is the RAC's last installment of the quarterly newsletter for 2006, I would like to review some of the club's accomplishments of the past year and plans for 2007.

We've enjoyed a healthy membership throughout all of 2006 with fun and interesting club meetings and numerous exciting outreach events. More importantly, we tried new things, particularly with our outreach, and in the process discovered what worked well, and what didn't. We were surprised at the healthy turnout of people on a cloudy night for the Pleiades occultation, and energized by the tremendous crowds gathered during the gorgeous nights of our Astronomy Day events. Interest in astronomy from the public was evident again when we had telescopes at the city's 4th of July fireworks display.

During this year we have had members conduct community education programs, speak to other organizations in town about our club, and set up public astronomy displays. A 12" Dynascope was contributed to the club, and its parts have been farmed out to various club members interested in restoring this classic. This newsletter has been very successful and the new RAC website should be up and going by this winter.

We hope to carry this momentum into 2007, bringing our interest and knowledge of astronomy "to the people" by continuing to display celestial objects and events with our telescopes, and by adding new outreach programs. We plan to incorporate into a not-for-profit organization next year. Any new ideas and suggestions for the club are welcomed!

As for us club members—the southeastern Minnesota skies have made it difficult to arrange many observing sessions this fall. However, we're used to that around here. And as always, we'll just look forward to the next time we can meet under the stars, and enjoy the night skies together. See you then!

RAC President
Randy Hemann



Come Experience the Universe



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If you have questions, comments or material for the Rochester Skies newsletter, please contact our lead editor at macastronomer@mac.com

THE QUEST FOR DOUBLE STARS

BY DEAN JOHNSON



Do you like challenges? Do you love astronomy, but wonder why you are looking at M13 or some other famous object for the 500th time? If you are looking for something fun and new in astronomy, the American Astronomical League has a great program in its Double Star Club.

We amateur astronomers know what double stars are, but when people around Spring Grove ask me, “What have you been looking at lately?” and I tell them “Double stars”, I often get a blank look. Then I patiently explain that double stars are binary or multiple star systems that revolve around a common center of gravity, and are separated by anywhere from a few thousand to hundreds of billions of miles or more.

The blank look oft becomes deeper. Then I tell them, “I look at them because they’re pretty.” Usually some recognition returns, and the subject quickly changes.

Nearly all of us into astronomy have viewed at least a few double stars in our time. Lovely Albireo (Beta Cygni) with its striking color contrast is a common target in the warm summer months. The pair of Alcor and Mizar (Zeta Ursa Majoris) is a test of excellent eyesight, and has been since ancient times to a wide variety of cultures.

Being exposed to the excellent three-volume set of Burnham’s *Celestial Handbook*, I have observed a few more doubles than a lot of amateurs. Our Club secretary Mark Calahan noted this when he reviewed my journals and helped me get my Messier certificate. He mentioned, “Dean, you like double stars. The Astronomical League has a program to get a double star certificate. Why don’t you go for that next?” Thank you, Mark! It was an excellent suggestion, and I went on the Internet to see what it would take.

It turned out to be quite a bit. The Astronomical League gave of what it considers to be the top 100 double stars in the sky. The Double Star Chair is a guy named Mike Benson (formerly from the Austin-Albert Lea area) who now resides in Nash-

ville, Tennessee. Of his observing list he writes,

'All objects are listed in Right Ascension order so that you can view them as they rise, and so that you can properly plan your observing sessions to make the most of your time. Information provided on each object includes: a check box, object to be observed, Right Ascension, Declination, magnitudes of the component stars, separation in arcseconds, and position angle from the primary star in the double or multiple system.'

This is all crucial information. To do the work correctly, you have to find, observe, describe in your notes what you see AND draw a diagram of the object involved. On average, it took me a half hour to do one object, but I take pretty good notes and like to linger over what I'm looking at. The most doubles I ever got in one night was sixteen.

The separation in arcseconds, magnitudes and position angles were critical in helping me realize that I was looking at the right object.

Of the 100 objects, 72 are listed by their Bayer designation (the Greek letter) in their constellation, 22 are represented simply by their number designation in their constellation (example: 65 Piscium) and six are only represented by their Struve catalog number!

I was a little taken aback. Up until I started this search, I had gone out with my scopes; my Burnham's Celestial Handbook, my little Peterson Field Guide to the Stars and Planets, and whatever other nifty little gadgets Duane always seems to have an endless supply of that I could afford. More help was needed and my lovely wife Betty got me the Sky Atlas 2000 Deluxe Edition for Christmas.

I started my search last December 1st in bitterly cold weather. I was only able to get out twice that month, but still managed to get my first ten targets down. I started with objects that I was already familiar with. I had seen 33 from The List before, and Burnham's Celestial Handbook had reference articles on 56 of the objects. As I got further into the search, finding the ones I hadn't seen before got easier because the RA, Dec, separation, magnitude and position angles (PA) are already listed.

If you are not familiar with PA it is not too difficult. When you look through your scope, you see a round field of vision, a circle of 360 degrees with 0 at the top, 90 at the right, 180 at the bottom, and 270 on the left. The PA of the intended double star is always given with North being the top of the field. If you are looking into the eastern sky, North is on your left. if you look south, North is straight up, etc. It takes a little getting used to, but if I can do it, anybody can.

...double stars are binary or multiple star systems that revolve around a common center of gravity, and are separated by anywhere from a few thousand to hundreds of billions of miles or more.

Figuring out the whole process was pretty fun, and then you've got the doubles themselves and they are SO pretty. (See, I wasn't lying to those poor Norwegians in Spring Grove!) If you like color contrast, check out Eta Casseopia, Gamma Arietis, Gamma Andromedae, Eta Persei, 32 Eridani, Gamma Leporis, Iota Cancr, 24 Coma Berenices, 70 Ophiuchi, Otto Struve 525, 31 Cygni, Beta Cygni, and Delta Cephei.

The best multiples I found were Sigma Orionis, Beta Monoceros, Zeta Ursa Majoris, Nu Scorpii, 31 Cygni, Gamma Delphinus and Struve 2816.

All these and several others got a "WOW!" listing in my journals. Most of the objects during this search were what I considered "No doubt" doubles, instantly recognizable as objects belonging on the list. Only a few were hard to recognize as double stars, usually because the primary would be so much brighter than the companion, or because of a very wide separation in arcseconds.

A few of the objects, Gamma Virginis, Alpha Piscium, Zeta Aquarii, Epsilon Bootes and 2816 Struve are so close in arcseconds that they are nearly impossible to split. I found that on nights with absolutely perfect seeing, I can split stars down to 1.5 arcseconds. Anything under 3" is tough for me on an ordinary night. But the Astronomical League says "Don't worry". If you can't split it, just send in your observation anyway, some of the stars will appear as elongated smears of light and that's just fine. The search is deemed feasible for anyone with a telescope 3 inches in diameter or larger.

I learned a great deal in the ten months it took me to complete this search. Right Ascension, declination, position angles, arcsecond separation and judging magnitudes are much more familiar now. Double stars are not as affected by moonlight so I can extend my telescope time, something I dearly love. The search for double stars has deepened my knowledge of the beautiful night sky, a worthwhile endeavour for any human being. It is something I highly recommend.



Double Star
Club

RAC



STARDUST@HOME

—Duane Deal

An interactive Internet-based search for interstellar dust in the Stardust aerogel collector

Most amateur astronomers with a home computer are familiar with the SETI@Home project. In exchange for a nifty screen-saver, participants loaned their processor's time to search for intelligent extraterrestrial life.

Astronomers at Burkle need more actively involved participants to aid the Stardust team. Stardust was an unmanned spacecraft that was sent through the tail of Comet Wild 2. As it sailed through the tail, it captured particles using a substance called aerogel. This only used one side of the aerogel grid. Flipping it over on the other side would allow it to pick up stardust as it traveled through the solar system. It was recently discovered that our solar system is being invaded by interstellar dust coming from the direction of Sagittarius.

Space is pretty empty, and Stardust may not find many particles on its journey through the solar system. The particles it may find will be microscopic. Imaging at the necessary magnification requires 1.5 million pictures, all of which need to be searched. That's where you come in. To begin the process, go to <http://stardustathome.ssl.berkeley.edu/>

Step 1. Read about the project.

Step 2. Take a Tutorial Session. Learn how to search for tracks in magnified aerogel.

Step 3. Take a test and register. Don't worry, it's not tough. You'll be a stardust hunter in no time.

Step 4. Login and search. Time to put all those lengthy minutes of education to work.

At first you might say, "This seems like work" but be warned, it's addictive.

There's no software to install. It all works in your internet browser. Each window is called a movie. With a movie open, you place your cursor on the focusing area and find the frame that is focused on the aerogel's surface. Slowly move the field of focus below the surface and look for conspicuous tracks left by captured stardust.

Not all of the movies are *real* movies. Every so often they throw in a Calibration Movie. A Calibration Movie is already known whether or not it contains a track. When you respond to a Calibration Movie, it keeps score of your answers.

Stardust Search Virtual Microscope		Percent of Images loaded: [Progress Bar]	Images loaded for next movie: [Progress Bar]	Go to: Home Log Out
Calibration Movie Statistics				
Calibration Movies Answered Correctly	102	Movie id:	8729427V1	
Calibration Movies Answered Incorrectly	5			
Your Overall Score:	97			
Total Real Movies Viewed:	291			
Your Rank:	6298 out of 18220			
Specificity:	100%			
Sensitivity:	91%			

Calibration movie showing a focused track. Focusing control is on the right, the score is at the bottom.

As I analyzed Movies, I got five of my first 100 calibration movies incorrect. That gave me a sensitivity score of 95%, (meaning I had missed 5 tracks). My Specificity score was 100% (because I had never given a false positive).

The more you analyze the easier it gets. In fact, throughout my second hundred calibration movies, I only answered one incorrectly. It also compares all searchers scores against each other. Right now my score is 3,672 out of 18,563. That means there are 3671 people ahead of me.

If you do find a piece of stardust, they will let you name it. I don't believe there is a standard for naming space dust, so be creative. Dusty, Speckles, Pepper, and Spot have probably already been taken!

So next time you're looking for something to do, maybe you could help out the Stardust team. If you do give it a try, let me know how you do.

To find out more about the Stardust mission, visit:
<http://stardust.jpl.nasa.gov/mission/index.html>

Northern Cross Word

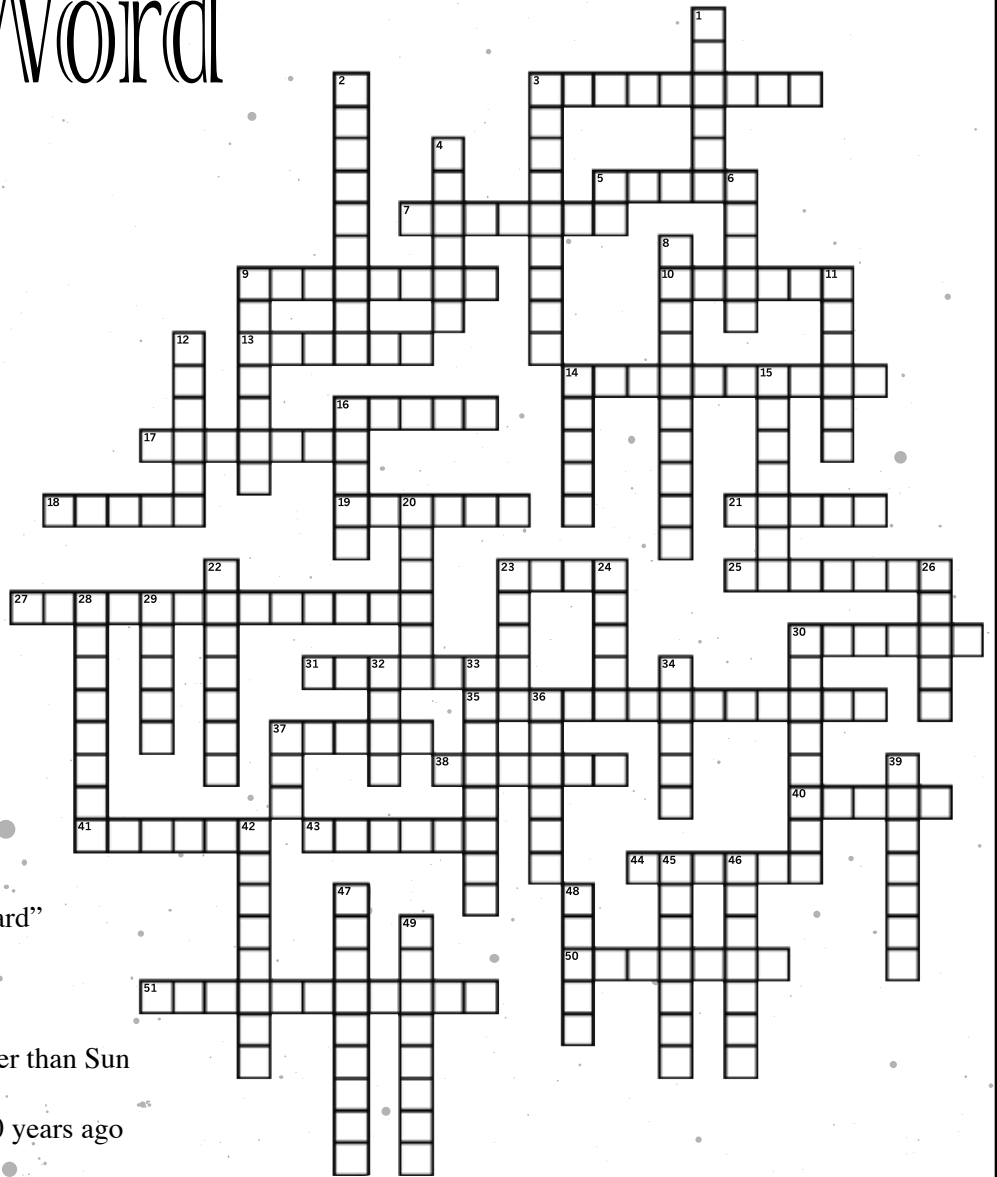
—Rebecca Bomgaars

ACROSS

- 3 A shiner on the Bull
- 5 Alpha Arietis
- 7 Brightest of seven sisters
- 9 If the Culligan man were a constellation
- 10 The eagle
- 13 The herdsman
- 14 Queen of Ethiopia
- 16 Top of the cross, tail of the swan
- 17 Heart of Cassiopeia
- 18 The hare
- 19 The Northern Cross
- 21 Largest constellation in the sky
- 23 Alpha Lyra
- 25 Greek for "Like Mars"
- 27 Nearest Star System to our own
- 30 Alpha Aquilae
- 31 This Italian astronomer is "backward"
- 35 Cluster of stars; the "hair"
- 37 Latin for "balance"
- 38 Root of the Tail
- 40 Brightest in Orion; 50,000x brighter than Sun
- 41 Dog star
- 43 Star in Draco's tail; pole star 5,000 years ago
- 44 Zeus in disguise
- 50 Cassiopeia's spouse
- 51 I'm a little teapot, short and stout

DOWN

- 1 Last star in the tail of the scorpion
- 2 Alpha star in Piscis Austrinus
- 3 Daughter of Ethiopian Queen
- 4 Head of the southward twin
- 5 Second in abundance in a star
- 6 The wolf
- 8 The Big Dog
- 9 Double star that is the head of the swan
- 11 Asterism makes a pentagon
- 12 The fish
- 14 Sent to devour Andromeda
- 15 Brightest star in Canis Major
- 16 This beast flies circles around the little bear
- 20 Name of the baseball team that went 3-and-out in the '06 playoffs, describes this constellation
- 22 The great square of _____
- 23 The maiden
- 24 Brightest star in Lepus
- 26 Brightest star in Virgo
- 28 Open cluster near the horn of Taurus
- 29 The Ram
- 30 Big Dipper handle arcs to this orange star
- 32 Musical constellation
- 33 Brightest star in Eridanus
- 34 The hunter
- 36 Brightest star in Perseus, Arabic for "the elbow"
- 37 Part of this constellation is known as "the sickle"
- 39 August 12th peaking meteor shower radiant
- 42 Arachnid constellation with "cat's eyes" in its tail
- 45 "the lonely one," brightest star in Hydra
- 46 Brightest star in Leo
- 47 The great bear
- 48 Naked-eye double star in Big Dipper (coupled with Mizar)
- 50 Meandering southern constellation, Greek meaning river



Astronomical League Viewing Clubs

For many beginning astronomers, and even some experienced ones, selecting targets can be a challenge. A quick glance at a star chart shows many galaxies, clusters, nebulae, and double stars, but it takes a lot of experience to know which objects are within the range of a particular telescope. Even with that solved, it's hard to know which objects will present a pleasing view in the eyepiece. Astronomical League viewing clubs present a handy solution to this problem, no matter what your experience level, equipment, or skies.

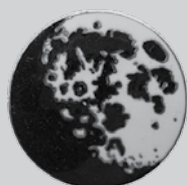
Introductory

Binocular



Constellation Hunter Club

Sky Puppy Club
(Sorry no pin)



Lunar Club



Universe Sampler Club



Binocular Messier Club



Deep Sky Binocular Club



Southern Skies Binocular Club

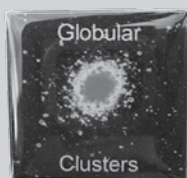
Telescopic



Caldwell Club



Arp Peculiar Galaxy Club



Globular Cluster Club



Galaxy Groups & Clusters Club



Messier Club



Herschel II Club



Open Cluster Club



Herschel Club



Planetary Nebula Club



Southern Sky Telescopic Club



Urban Observing Club



Member's Spot

"I've been interested in astronomy for most of my life. As a teenager, I pored over each issue of Astronomy magazine as it arrived. Sadly, I missed all the content about what could be observed using binoculars and believed that a telescope was required to do any real observing. I didn't own a telescope until I was in my twenties, and I ran headlong into my ignorance of the actual sky. After a few years, a few telescopes, and some bad advice about minimum requirements, I gave the hobby up. Years passed. It took an email from someone who had read an article on my web site that I'd written nearly a decade ago to rekindle the interest, and this spring, I sprung for a new telescope - my fifth purchase.

By Scott Regener

Any Rochester Astronomy Club member can join a viewing club simply by completing the observations required. In some cases, all it takes is seeing the objects and noting the date and time. For others, some sketching may be required, although the artistic demands are relatively light. In a few cases, purchasing a booklet for a nominal cost may be required. For most of the viewing clubs, the emphasis is on getting out there and learning the sky. A membership pin adds an additional incentive for completing a list.

There are currently 28 different clubs. There are clubs designed for extreme beginners, clubs for binoculars, clubs for small telescopes, and clubs for

large telescopes. There is even a club designed for children. It's hard to imagine the observer with an interest in astronomy that couldn't find a club to match their equipment, ability, and interest level. The Master Observer Club, 28th on the list, is not for the faint of heart. Membership requires completion of nine other viewing clubs. There are specific requirements, so if you're interested, check out the Astronomical League web site for more details.

Becoming a member of a viewing club isn't a race—you can take as much or as little time as necessary to complete a viewing program. The emphasis is on learning more about the sky by ob-

servation, not on completing checklists faster than others. And while it's possible to cheat, the only person you'd be cheating is yourself.

If you've already been observing for years, particularly if you've been keeping good records, you may already be well on your way to completing one or more of the clubs. In many cases, object lists overlap, so the same object may count more than once.

For more information on which clubs are available and what their requirements are, check out:

www.astroleague.org/observing.html.

RAC

Topical



Lunar II Club



Master Observer Club



Asteroid Observing Club



Earth Orbiting Satellite Observing Club



Comet Observers Club



Sunspotters Club



Meteor Club



Outreach Club



Planetary Observers Club



Double Star Club

scottREGENER

"I think my interest would have waned again, if not for the viewing clubs. By providing me with lists of objects that I can see with my telescope, I'm able to have success more often than failure. With goals to work towards, I'm learning a lot along the way. Best of all, I'm actually observing rather than just reading about it or dreaming of going to really dark skies.

"Meeting with the club each month is a big boost to my enthusiasm. Just sitting in a room with other people who understand and appreciate my interest in the sky helps fan the flames for this literally spectacular hobby."

Not finding what you're looking for?



FINDING A FINDER —D.DEAL

Consider upgrading your finder. Astronomy can be much more enjoyable when you're looking at objects rather than looking for them.

Ever seen a grown person sprawled out on cold-dewed grass, looking as if they were losing a game of twister to their telescope? Using some finders is not easy on your body. If your scope won't allow easy access to view through a straight finder, a right angle finder is just what the chiropractor ordered.

A right angle finder utilizes a diagonal allowing you to look in from the side, even when the scope is pointed straight up. Some use removable eyepieces, allowing you to use other eyepieces from your collection. Diagonals re-invert the image so that up is up and down is down, but at the expense of crossing left and right. This may even be a welcome change if your scope is inverted the same way. It is worth mentioning that there are finders with corrected views, but the added elements will cut down

the amount of light they pass through, making faint fuzzies more difficult to see.

Beyond the physical aspects, the optical factors of various finders should be understood before purchasing. Finders, like binoculars, have easy to find magnification and aperture specifications. They are written as Magnification x aperture (e.g. 6x30, where six is the magnification and 30 is the aperture in millimeters). Magnification is a third factor that should also be considered.

Between Aperture, FOV and magnification, a balance must be struck. As you increase one, the others are penalized. Finders with larger apertures are longer over-all, leading to longer focal lengths and a smaller field of view. For this reason, finder scopes with larger than 50mm apertures tend to show less than 5° of sky. While as much FOV as possible sounds like a good thing, it leads to less magnification and—in a roundabout way—less aperture.

APERTURE

A larger aperture captures more light, helping you see dimmer objects. The dimmer an object is, the more aperture you need to see it. A finder's primary purpose is to help you center an object. Anything that falls under the category "helps you see an object you otherwise would not have seen" is an important factor. An object you can see can be put right in the crosshair, accomplishing the goal.

FOV

Field of view (FOV) is very important for locating objects, as it defines how much of the sky you can see. You may need to hop from star to star to locate an object. A small FOV makes it difficult to make these hops. It can be related to a mountain climber with short arms and legs. The climber will have trouble reaching crevices that a taller climber can easily reach. Each star in your hop is like a crevice that can be clung to and aid in reaching the next, until finally reaching the goal.

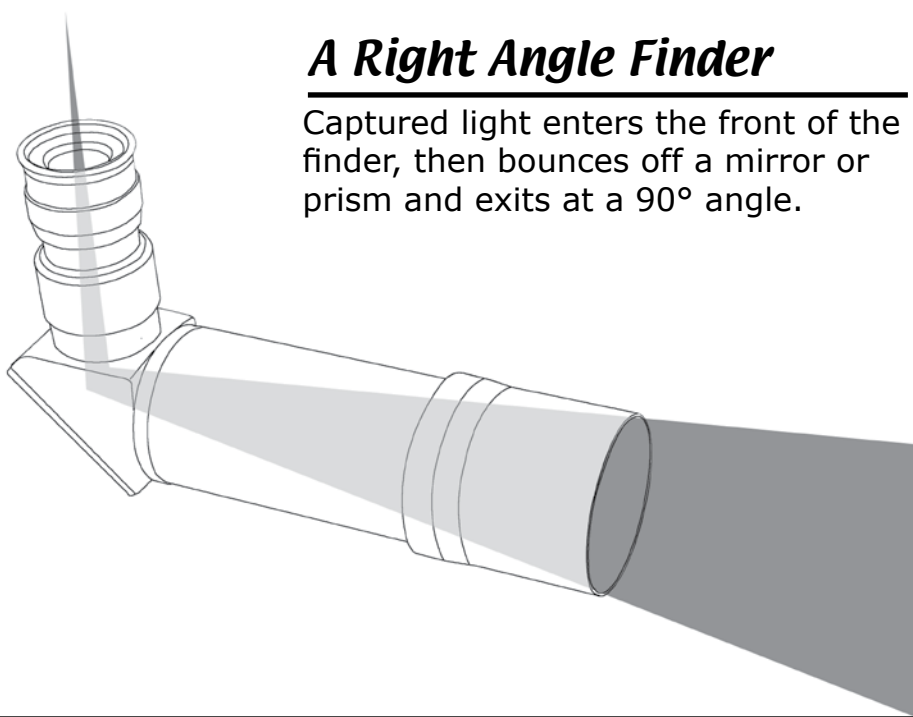
It must also be noted that a finder with a FOV less than the scope it's attached to is not very useful for finding objects. Generally, a 5° FOV or more is recommended.

MAGNIFICATION

Magnification is pretty straightforward; more magnification allows you to see smaller objects. It falls under the "helps you see an object you otherwise would not have seen".

A Right Angle Finder

Captured light enters the front of the finder, then bounces off a mirror or prism and exits at a 90° angle.



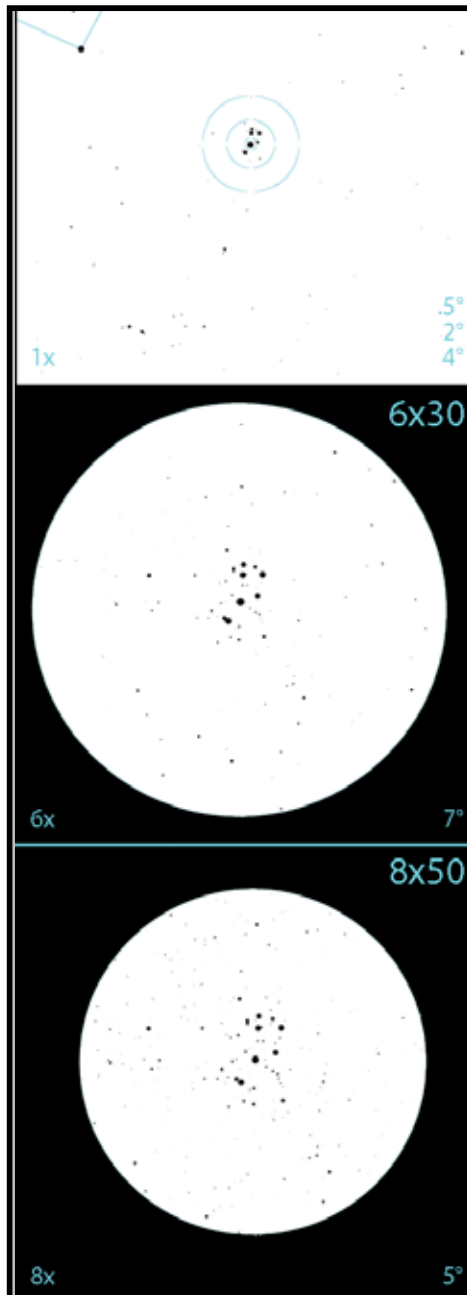
Here ends the circle. Although it is good to understand these factors when selecting a finder scope, most of the work has been done for you. The most popular finders are right in the sweet spot for finding celestial objects. They are between 6-9x magnification, 30-50mm aperture, and 5-7° FOV. Finders that are out of this range may have very specific purposes such as guiding during photographic imaging. An 11x80mm finder may sound tempting but the finder will pay a penalty for features that excel beyond the norm, such as a 4° FOV.

Between Aperture, Field of View & magnification, a balance must be struck.

An exception to the rule is the reflex (heads up display) finders like the Telrad or Rigel Quickfinder. Not to say they don't pay a penalty, they do. They give you no magnification (1x, same as you see with the unaided eye). This pays a huge dividend, as it allows you a full view of the sky (also the same as you would see with your naked eye). Instead of a crosshair, as you look through the glass you see an LED dot or target overlaying your view. This 1x magnification/natural view of the sky is wonderful when you want to get your scope pointed in the right direction and you already know where you want to point or can see what you want to point



A Telrad is a popular and relatively inexpensive 1x finder



Above are three different finder views. The top view is a Telrad with 1/2°, 2° and 4° circles. The FOV is completely open but there is no magnification.

The second view is an Orion 6x30 finder. The smaller aperture diminishes the dim stars, but the FOV is a nice 7°.

The bottom view is a Meade 8x50. The FOV shrinks to 5° but the extra aperture and greater magnification pulls out more stars.

at with your naked eye. Beginners with GOTO scopes can use them as a learning aid. When your scope auto points an object, you can look at your red dot or target and see exactly where it's pointing. It allows your scope to show you where the object is. Help your telescope help you!

Another option is a green laser pointer with a holder bracket. Similar to the "red dot" finders, except that you cast a beam deep into the sky, directly pointing out where the telescope is aimed. This is very easy to see and without having to look through any glass. A word of caution; be careful not to aim your laser-directed telescope at any airplanes. Pointing lasers at airplanes is dangerous for those aboard the airplane and also illegal.

Some finders may require you to modify your telescope, but if you can purchase a finder that will work with your existing bracket, upgrading is simple. Contact a telescope dealer or ask an experienced club member. They can help you with the details before you take the plunge.

Looking for objects can be fun. Having a finder that matches your telescope and your needs can be the difference between spending the evening looking for a single object and spending the evening looking for dozens of objects.

RAC

Looking for a finder?

Read the reviews on:

<http://www.cloudynights.com/>

Anacortes Telescope & Wild Bird has nearly every piece of astronomy equipment under the Sun:

<http://www.buystelescopes.com/>

Don't forget to check through the classifieds on Astromart for great deals on used equipment:

<http://www.astromart.com/>

Up until this summer, Pluto was known as the Ninth Planet



—Dean Johnson



As a kid, the story of Clyde Tombaugh thrilled and intrigued me. Clyde was a Kansas farm boy who taught himself astronomy and ended up with a job at Lowell Observatory. He worked independently, searching for the mysterious Planet X, a massive object that would explain the anomalies in Neptune's orbit.

It was pretty neat stuff: the quintessential American self-made man, a guy that was genuinely self-effacing, but nonetheless very intelligent and hard working. His feat in discovering Pluto gave the Lowell Observatory a measure of professional credit where its founder, Percival Lowell and all his questionable, and ultimately groundless theories about Mars, did not.

There was just one thing wrong to this triumph of American astronomy. Pluto

did not measure up to the original ideas about Planet X. First off, it was tiny and the projections about its diameter and mass dropped off with every new study. Secondly, it's orbit was extremely abnormal, tilted at an incredible 17 degrees to our solar system's orbital plane and so eccentric that it traveled inside the orbit of Neptune twice in one trip around the sun.

The numbers are eye-popping. Its diameter is only 1,432 miles, two-thirds the size of our Moon. Its mass is 1/2000th that of the Earth. Pluto's axis is inclined at 122 degrees; so like Uranus, it travels with its poles toward the Sun. At aphelion Pluto lies 4.59 billion miles from the sun and at perihelion it's 2.77 billion miles from the sun. That's a whopping 1.82 billion mile difference.

The more I read about Pluto as a youngster, the more I was disappointed, espe-

Pluto is not an orderly object.

cially when I came to learn that all of the Sun's planets travel within 3° of the solar system's plane with the exception of Mercury which is still only 7°, a far cry from Pluto's 17°. Pluto is not an orderly object.

In astronomy, however, a person has

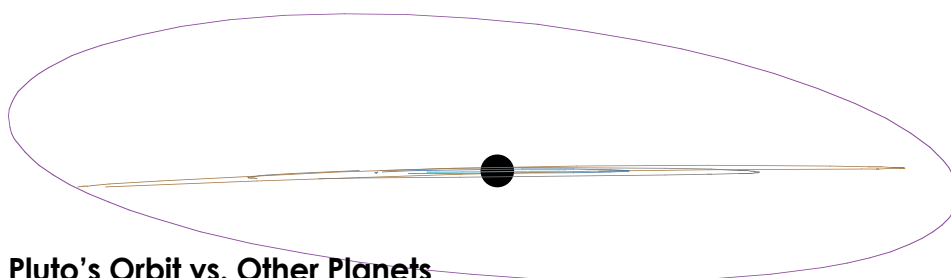
to be prepared for surprises. In 1978 Pluto was found to have a moon half its size, which was named Charon. The Pluto-Charon system, having their center of orbit between them, would be the only double planet in our solar system, if they were classified as planets. We have since learned that Pluto has two more very small satellites named Nix and Hydra. Pluto also has an interesting on-again, off-again atmosphere caused by its elongated orbit. Gases that remain frozen at perihelion are released at aphelion and later escape to space or refreeze again. If moved even closer to the sun, these gases would cause Pluto to grow a tail, much like a comet, and what an interesting comet that would make.

Pluto has always raised public interest, which is a good thing in astronomy. Interest generates curiosity. Enough curiosity has been raised for Pluto that NASA and space enthusiasts in general talked Congress into voting to fund the New Horizons mission. New Horizons is scheduled to arrive at Pluto in 2015.

Along with interest, astronomy also has its share of controversy. This summer, the International Astronomical Union (IAU) adopted a definition that results in only eight planets. Objects like Pluto, Ceres, Eris (UB313) and others are not planets; they are "dwarf planets".

Why use the term dwarf planet for an object that is not a planet? Gas giants and terrestrial (metallic) planets are still planets. A dwarf star is still a star and yet a dwarf planet is not a planet.

Our solar system has an asteroid belt and a Kuiper belt. The asteroid belt lies



Pluto's Orbit vs. Other Planets

between Mars and Jupiter and the Kuiper belt is beyond Neptune. Asteroids are the little rocky bodies of which Ceres is the largest. According to the IAU, a planet must have cleared its orbit of debris, yet there are asteroids that cross Earth's orbit. Although Earth is a planet, it is of vital importance to find these asteroids before Earth does clear them.

Kuiper Belt Objects are just coming into their own as a fascinating field of astronomical study. In the decades to come, with new instruments going into orbit, we no doubt will hear of many more discoveries.

It does not bother me in the least that Pluto is not considered a planet. I had a hard time accepting its status as one from the beginning. But Pluto - to me - is the very first Kuiper Belt Object, one of the nearest of its class and certainly the most interesting. 2015 will be a red-letter year for astronomy because we have never sent a major spacecraft mission into our solar system that, barring failure, didn't completely astound us. New Horizons will give us all we can handle, and Pluto will continue to generate interest in astronomy, no matter how we classify it.

RAC

CROSSWORD PUZZLE ANSWERS

Across

3	Aldebaran	17	Schedar	35	Coma Berenices
5	Hamal	18	Lepus	37	Libra
7	Alcyone	19	Cygnus	38	Megrez
9	Aquarius	21	Hydra	40	Rigel
10	Aquila	23	Vega	41	Sirius
13	Bootes	25	Antares	43	Thuban
14	Cassiopeia	27	Alpha Centauri	44	Taurus
16	Deneb	30	Altair	50	Cepheus
		31	oelilaG (Galileo, backwards)	51	Sagittarius

Down

1	Shaula	11	Auriga	28	Pleiades	45	Alphard
2	Fomalhaut	12	Pisces	29	Aries	46	Regulus
3	Andromeda	14	Cetus	30	Arcturus	47	Ursa Major
4	Pollux	15	Procyon	32	Lyra	48	Alcor
5	HE	16	Draco	33	Achernar	49	Eridanus
6	Lupus	20	Gemini	34	Orion		
8	Canis Major	22	Pegasus	36	Mirfak		
9	Albireo	23	Virgo	37	Leo		
		24	Arneb	39	Perseus		
		26	Spica	42	Scorpius		

Final Note

Things quieted down this quarter for the RAC. As always, the meetings were exceptional and Amanda Lee has done a wonderful job with the meeting minutes.

2007 astronomy calendars are available. To reserve one, please contact Rebecca Bomgaars with your information. For better compatibility with media resources we opted to remove the Moon photograph in our logo and replace it with a vector based Moon graphic. Please let us know if you like it better or prefer the old one.

Anybody who is out there working on an article, or if you'd like to submit one for the newsletter, please do. Soon enough, the winter newsletter will be under way. I would like to extend a thanks to everybody who helped with this newsletter. They wouldn't be possible without you.

—Duane Deal

It's a Little Known **Fact**

The fastest Earth reentering object made by humans was the...

Stardust Spacecraft

traveling at 28,860 mph,
12.9 kilometers/second



The Moon graphic was previously a photograph. Photographs are bitmap images, meaning that they are a bunch of pixels arranged in a grid to produce a picture. When a bitmap images is scaled, the individual pixels are also scaled. This can create jagged edges where they should be smoothly rounded.

The new graphic is a vector graphic. Vector graphics are comprised of shapes, which when scaled, retain their characteristics. A Vector graphic can be scaled to any size and rounded edges will remain rounded. Since it is made up of solid colors, it will also reproduce more accurately on other media, such as T-shirts and coffee mugs.

Rochester

Skies

Newsletter of the Rochester
Astronomy Club

Upcoming Events

Mercury Transit Public Outreach

RCTC, outside the main entrance, beginning at about 1:00PM

Club Meeting at RCTC *Topic: Lowell Observatory —Chris Hunt*

Star Party at Eagle Bluff

Leonid Meteor Shower

Club Holiday Party (no meeting at RCTC)

Star Party at Eagle Bluff

Second Chance

November 8 *

November 14

November 17 *

November 18-19

December 12

December 15 *

December 22 *

*Certain Events subject to change due to weather. Star Parties may occur on Saturday following the set date. There may also be alternate locations.

Rochester Astronomy Club
C/O R Bongaars, Treasurer
820 10^{1/2} St SW
Rochester, MN 55902

