

Rochester Skies

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Is Seeing Always Believing?

by President Randy Hemann

"Vision is controlled hallucination" (Max Clowes, 1971). Max Clowes was one of the best known British researchers in Artificial Intelligence, having done pioneering work on the interpretation of pictures by computers. Professor Alan Yuille of UCLA describes computer vision

as "inverse computer graphics". Computer graphics generate images from a specification of a visual scene (e.g. objects, scene structures, light sources). Computer vision struggles with the task of inverting this process to infer the structure of the world from the observed image(s). Humans, by using a whopping 40 per cent of our brain's cortex (mostly unconsciously), can efficiently coordinate numerous simultaneous parallel processes into an interpretation of the world that has focused on our retinas. Still, it's not an infallible system. What we see in our brains depends on the neurological representation of the

object in our visual cortex as well as our current knowledge of the object's circumstances and our expectations of what the object's environment "should" show us. The combination of these elements, called perception, can result in some odd phenomena.

At its best the human eye can discern the seams of a baseball traveling 90 mph and predict its eventual location [figure 1], and at its ridiculous worst, stare at an optical illusion and can't figure out why that staircase seems to go perpetually upward (or downward.) [figure 2] Our vision is trained, and our expectations, nurtured by memories of past similar

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Rochester Astronomy Club

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circumstances, filling in the gaps to make sense out of it. Cerebral cortexes aren't wired exactly the same, so when looking at the same object, different people will see different things based on their own prior experiences and expertise.

In visual astronomy we deal with this perceptual unpredictability all the time. I

Acquired knowledge and expectations don't always work for us. There are still certain objects that like to play tricks. I find M97, the Owl Nebula to be a common visual perception nemesis. If sky transparency isn't near perfect, those two dark eyes of this distant planetary seem to dance all over its face. Stop! Stay put! Another visual adversary is galaxy NGC

galaxy" to star-hop over to nearby Stephen's Quintet. Compared to the elusive NGC 891, it has nearly the same dimension (10.2'x4.2' vs. 11.7'x1.6') and magnitude/surface brightness (9.5/13.3 vs. 9.9/13.6). But I can slide right by 891 several times before I see it, and yet I *never* miss 7331 when slewing towards that. To me NGC 891 remains a ghost that appears and disappears at will, with its edge-on dust lane sometimes there, but often not.

So I would suggest it would be prudent to validate our visual realities by observing with friends, who can double-check our celestial perceptions, and help us to not hallucinate. Maybe it's too dangerous to go out observing alone. You know, I tell my kids never to go out alone in the dark. It's a big sky out there and you should have an astronomy buddy with you at all times, just to be safe. Thank goodness for our club!

Happy New Year! Looking forward to buddying with you in 2012!



Figure 1

remember first starting out star-hopping with my Orion DeepMap 600 sprawled out in front of me, trying my best to hunt down some lesser known NGC galaxies around the 10 to 12th magnitudes. It was so hard to see them, though I *knew* I was in correct star field. When I began using more sophisticated maps and planetary software programs, their richer star fields not only validated my correct position in the sky but tattled on the exact orientation and size of the galaxies in a particular eyepiece. My start-to-find times dropped considerably! Of course, I knew what to expect; I knew what I was supposed to see.

891 in eastern Andromeda. It's just hard to find! However, in Pegasus, just west of Andromeda, I use NGC 7331, as an easy-to-go-to "finder

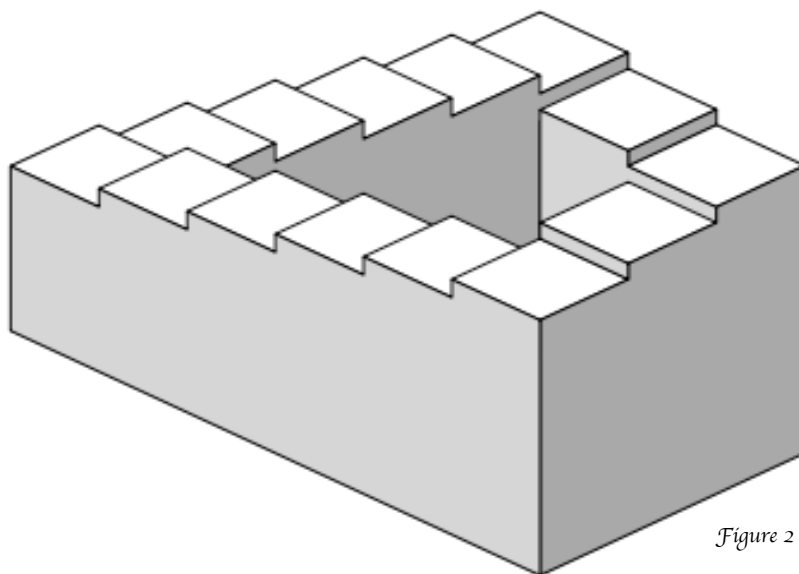


Figure 2

In Memory of Mark Callahan

by Don Schlosnagle



At the end of last year, on December 28, 2011, the Rochester Astronomy Club lost a dear friend, but it was not our loss only for Mark was well thought of, respected, and loved by family, friends, colleagues, students and patients around the world. Mark did not present a different face to each of these groups. To know Mark was to know Mark, something to which I can attest since the days we were thrown into Central Junior High School together.

At Mark's memorial service, colleague Rick Nishimura did an excellent job identifying four traits of Mark that anyone meeting him for the first time would recognize: humor, generosity, enthusiasm, and willingness to get the right things done even if it meant bending a few rules.

I think that Mark's mind operated at faster-than-light speed. He would very often come out with a very witty remark before a speaker had even finished their utterance. And if you watched his eyes, you could tell that in a flash he had thought of and evaluated probably a dozen jokes before deciding on the one that he would deliver aloud. His ability to entertain attendees at our monthly planetarium shows is legendary.

I'm sure there are many individuals and organizations that can speak of Mark's generosity. For example, at the end of silent auctions to benefit the Southeastern Minnesota

Honors Choir that both our daughters sang in, he would buy up many of the items that no one had bid on. And I bet that not many club members know that in the more informal days of our club, before we collected dues, Mark paid for our membership in the Astronomical League so that we each had opportunities to participate in Observer's Clubs and receive the Reflector magazine. Exhibiting a different kind of generosity, each time Mark produced a multi-page newsletter, in color, to hand out at our planetarium shows he put my name on it, ahead of his, even though I had little or nothing to do with producing it.

Whatever Mark did, he did with joyful enthusiasm. Whether it was producing the newsletter, which I believe was a form of recreation away from work for him, working toward a pilot's license, helping with astronomy outreach programs, coaching boy scouts on their merit badges, or going on medical missions to Central and South America, he did wholeheartedly, with no qualms or regrets. And of course, wherever his travels took him, he always made time to visit planetariums, observatories, or other sites of astronomical interest.

I don't know when Mark's interest in astronomy first developed, but it was evident from the first time I met him. Our association with the planetarium goes back to our high school days when director and

astronomy teacher Howard Schriever showed astronomy club members how to operate the still very useful optomechanical projector, now supplemented with a digital projector. Mark's interest in astronomical subjects was wide ranging, but one area that he was particularly fond of was archaeoastronomy, subscribing to a journal of that same name. Mark never failed to point out to class attendees that the names of asterisms, constellations and stars that we commonly used had other patterns and names in different cultures. He was fond of asking if anyone knew the Japanese name for what we call the Pleiades, telling them that they all knew it, and to think of Japanese cars. Usually, no one could guess, but, of course, all knew the design of the logo for Subaru when told of it.

Mark touched many, many lives. It is difficult to describe with words the legacy of a man such as Mark. In one fitting and thoughtful tribute to one who was so fond of astronomy, the Owatonna Clinic bought Mark's family a star name. So next time you are out with your telescope under dark skies, as Mark liked to be, turn your telescope to RA 17h 43m 01.19s DE +29° 39' 13.95" (HIP 86506) to view the newly christened "Mark J Callahan" and take a moment to reflect on our departed friend.

12/21/2012 - Doomsday

by Dean Johnson

December 21, 2012. The End Of The World. Wow, that's not too far away. The prediction comes from the Mayan calendar which until the 18th century was more accurate than anything the European civilizations had come up with. As the time for this prediction gets closer, I have been asked about this more and more frequently. The only reason why I am writing this article is that I was asked by two different well educated people at two different businesses within a half an hour about the Mayan prediction of the "End of the World."

Each conversation started in almost exactly the same way. "Dean, you know a bit about astronomy; what do you think about the Mayan 2012 Doomsday prediction?"

I replied, "All those guys on TV who talk about the 2012 end of the world have bad haircuts, talk in funny accents, go by names like Cedric, Rupert and Percival and are masters of the words 'could, if, maybe, might, perhaps, possible, potentially and what'. Then they quote some obscure ancient documents made by the astronomer-priests who practiced human sacrifice and present that as ironclad proof that the "End of the World" is imminent. To further cement the current hoax, they mention that the winter solstice will coincide with the rising of the

Sun with the galactic core which is a mere 28,000 light years distant.

That indeed might sound pretty impressive except for the fact that the nearest star system to the Earth is Alpha Centauri which lies 4.4 light years away. 4.4 light years is 25 trillion miles away. The fastest spacecraft we have launched,



Voyager 1, is traveling at 11 miles per second. At that speed you could reach LaCrosse, Wisconsin in 3 seconds, (wouldn't that be nice!), but to reach Alpha Centauri would take 40,000 years.

But no matter. The conjunction of the Earth, Sun, and our galactic core will take place on December 21st, the winter solstice. How did they predict this in the first place?

The astronomer-priests of the New World, which included the Mayan, Aztec and Incan civilizations, were undoubtedly the greatest visual astronomers the world had ever seen. They could tell summer solstice, autumnal equinox, winter solstice and vernal equinox. These are all crucial to the planting and harvesting of crops. In short, somebody had to have the ability to tell time. They did this by inventing three calendars, first a five day "week", second a 260 day "calendar that coincided with the orbit of Venus that had a great impact on their religious purposes, and third a 360 day solar calendar that gave them 18 months of 20 days. The 260 day calendar and the solar calendar only coincided every 52 years and this was known as "The Calendar Round". They knew that they had to throw in five extra days at the end which were considered "unlucky".

Even more impressive, in my opinion, was that they could forecast lunar and solar eclipses which much have seemed like magic to the average populace. But for me the most astounding thing that they accomplished in visual astronomy was that they knew that for a star to rise one calendar day later than in the previous calendar year, it took 72 years to accomplish this. This is what causes the precession of the Earth's poles which takes 25,800 years to shift from current pole star to come

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around again to the one we see in our sky.

This just fascinated me to no end, because the average lifespan of a New World astronomer-priest/human sacrificer was only roughly 50 years. How could they accomplish this?

The answer is simple. They stared through a hole in the wall of their temples and timed when a prominent star arose. Since the rise of that star took more than their lifetimes, the information had to be passed down from father to son, or elder to apprentice. This would have taken incredible patience, and would probably have beaten watching TV. It also may have explained why human sacrifice might have been made up for the tedium of proving the existence of precession.

But knowing this was vital to knowing of the passing of a "world age" when the Sun did not rise in a certain constellation in the sky, or in the case of the New World astronomer-priests, they often used the dark nebulae in the Milky Way to judge this. Then when the Sun passes from one mark to another, which also make

our Tropic of Cancer and Tropic of Capricorn no longer pertinent, to them it was the end of a World Age.

Since they were exceptional visual observers, but had never looked through a telescope, how wonderful it would be if I could get one of them to Eagle Bluff one night, overcome the language barrier, have the guy dressed for Minnesota cold and could persuade him not to sink his obsidian knife



into my chest to cut my heart out. We could have learned a lot from each other. But the chances of that are the same as the Mayan Doomsday prediction to come true on December 21st.

Once again we are faced with that, (at least to Cedric, Percival and Rupert) we are now faced with the End of the World. This has to rate right up there with the Y2K scare of 2000 and the

Millerite end of the world prediction of 1859, which was tried twice.

What will happen on Dec. 21st, 2012? Well, I can tell you just what will happen. Cedric, Percival and Rupert will be down at their favorite bar with decent haircuts, no longer talking in funny accents and calling each other by their real names of Charlie, Pete and Bob, and they'll be bragging about how much money each of them made by

scaring the hell out of people while they are enjoying a cold beer. Then they will start brainstorming about the next big End of the World event when the asteroid Apophis will make its close pass to Earth on Friday, April 13, 2029 (O o o o h, Scary!). Stand by, astronomy fans, I'm sure there will be

more on THAT to come.

In the meantime, one word of advice, **BE SURE TO GET YOUR CHRISTMAS SHOPPING DONE EARLY!!** Because when the poor saps that have bought into this farce wake up on December 22nd to find that they are still here and the world hasn't come to an end, the Malls are going to be packed!

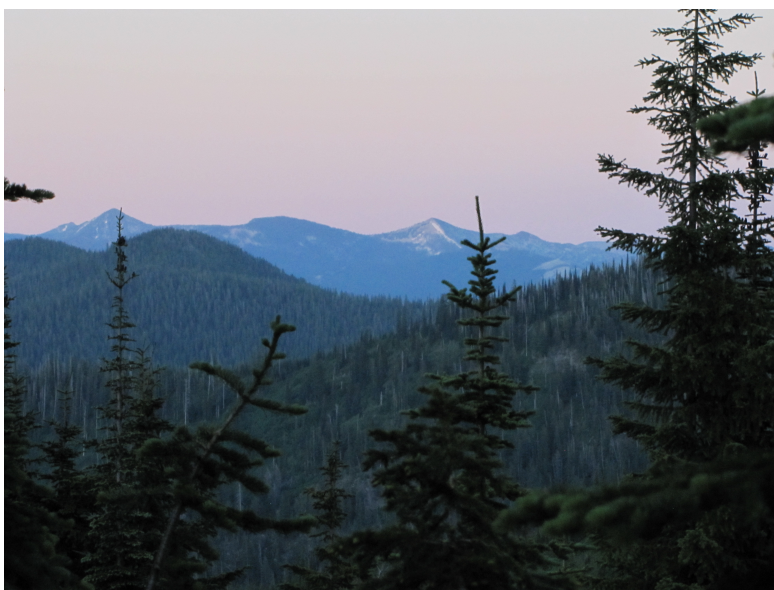
Going to the Sun

by Kirk Severson

I set out from Rochester en route to the Nebraska Star Party via Going-to-the-Sun Road in Glacier National Park. This two-week road trip to the dark skies of the Merritt Reservoir had humble beginnings. My first look at the night sky came on a Freeway pulloff area just before we arrived at Sheridan, WY. We were starting to see the atmospheric effects of getting high and dry - nice clear points of light and shimmering arms of the Milky Way. In between the occasional car flying by at highway speed -- mere dozens of feet away from me (and my Mountaineer-turned-light-shield) -- I tried to impress upon my lovely traveling companion that the fuzzy patches over our heads were part of the Milky Way and not wispy clouds. The evening was cool, but it was a welcome change from the swampy weather we had to endure in Rochester while packing.

Once we arrived in Montana, our hosts had a place in mind for a little impromptu star party. Up in the Cabinet Mountains of the Kootenai National Forest above Troy, MT the local authorities had recently constructed a warming hut for snowmobilers and winter sports enthusiasts. The facilities consisted of a large single room log hut with big doors on one side sealed from the elements with a curtain of plastic slats

(like they used to use in the freezer aisle of the local grocery store). Inside there was a burn barrel, some wood and a few picnic tables. A stand-alone outhouse rounded out the facilities and served as useful shielding against the firelight which escaped through the translucent fenestration. (I'm told the winter users



of these facilities affix a toilet seat to the vent pipe of the snowed-in latrine and make do.)

I set up my dob in the shadow of the latrine with the help of one of the dogs, who placed an extra stick on top of the rocker box, in case I found out I was missing a truss. As we waited for dark I ran around photographing the scenery in the waning twilight. I went for the delicacies which Dean proffers up as Obvious Stuff: Ring Nebula, Dumbbell Nebula, Whirlpool Galaxy, Andromeda Galaxy. This was partly

because I aimed to impress our hosts with interesting sights and also because I wanted to ensure success in finding the targets. I noticed that despite the nice views we had been treated to, there was heavy dew developing on my gear and heavy eyelids developing on my friends. I packed up when it became apparent that I had to beg for customers to come out of the warming hut to spy a new celestial treat. They talked it up good, so I held an encore star party the next night for one member of our host family who couldn't make it up to the warming hut the first night.

From Troy we headed East to Glacier National Park. The first night there, we set up camp in Avalanche Campsite on the West side of the park. We needed firewood for the nights we were going to be spending enjoying the chilly, clear, dark skies, so we set off over Going to the Sun road to see the East side of the park in soft evening light. We arrived at the trading post just in time to grab a few bundles of wood and fire making supplies before they shut the lights off on me. It was now 9:00pm and much darker inside than out. So we took our time heading back up Going-To-The-Sun road to Logan Pass, looking for wildlife and

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Going to the Sun ... continued from Page 6

enjoying dusk in the Rocky Mountains.

We arrived at Logan Pass and discovered an ornery foreman who informed us that the pass was closed for construction. I had been looking forward to getting to the West side of the pass and having a bit more light for the drive back down to the campsite. This was not in the cards. We would have to wait until 2:00 a.m. for a 15 minute window where the road would be opened to let traffic through the construction zone. I thought pretty hard about getting out the scope and setting up for a few hours on a pull-off and trying not to get so engrossed that we missed the short window. Instead we drove the sketchy roads around the south side of the park and arrived in camp a bit before the other option would have permitted.

The next day we slept real late and went for a hike to Trout Lake. We stayed out well past dark and got some good 0x views of the heavens along the way. The following morning while at the ranger station reporting a black bear sighting, we heard about a Glacier Star Party going on at Logan Pass that night. We took advantage of the day and drove our pile of firewood and astronomy gear back over Logan pass to the East side of the park looking for a place to light a fire and cook a picnic lunch. (We had a couple coolers of groceries and several bundles of firewood which had nary been touched.) We didn't find one and still had all of these supplies with us when we went back up the pass to attend the star party. Arrival time was 9:00 p.m., but it doesn't get good and dark at the top of Logan Pass in late July until 11:00 p.m.

The extra time was used to talk about Astronomy as a hobby, and thank the friends of the park organization which provided a trailer stocked with many scopes to the park for outreach. It was adorned with some nice logos and the slogan "Half the Park is After Dark." They also made sure the scopes were all set up and the public was parked and aware of star party etiquette. (Shawna was chewed out by the park ranger for taking a flash photo of the trailer even though it was still fairly light out at the time.) Astronomers were briefed by the park ranger first, making sure they each had a small set of interesting targets which they could both find and discuss intelligently with enticing facts and figures for the public. Both astronomers and public were well prepped on what the observing plan was for the evening well before it was dark enough to observe.

By the time darkness fell the public's astronomy appetite was whet with extensive discussion of our neighbor, the Andromeda Galaxy. While everyone knew a few exciting facts about the nearby galaxy, I was the only one who elected to use my light bucket to collect its photons and share with the masses. As a result of all this publicity, the line for my scope got rather long and it was getting on toward our quoted end time of midnight before I was able to move on to Pinwheel and Dumbbell.

Somewhere in the course of this night of "astronomizing" we realized we were expected at the Merritt Reservoir for the NSP the following night. I wasn't keen on dismantling the scope (right after being able to monopolize access to it again) and hitting the road, so I took

my time on a few more targets while Shawna rested for the journey. Before long, I packed up when it became clear the locals were so accustomed to the great views they weren't sticking around to enjoy them much longer. About 2:00 a.m. I had my scope packed up and headed to the NSP, but first we headed west to break camp and load up before heading back over Logan Pass headed east. I drove and Shawna rested until dawn and then she took over so I could rest up for a night of stargazing and merry-making in Nebraska! We switched again somewhere in South Dakota and arrived at the observing site about 11:00 p.m.

By this time dark sky mandates were in force over the observing field. Because I can't turn the dome lights off on the Mountaineer, I decided to carefully climb out the driver's side window so as not to flash my dome light at the dark-adapted throngs. However, implementing the plan, I instead accidentally kicked my brights and flashed my hi-beams at the dark-adapted throngs! Apologetically, I wandered the observing field until I was able to echolocate the RAC delegation by listening for our Southern Observing and Outreach Coordinator seamlessly blending the technical lexicon of Messier numbers, NCG designations and the classes of binary star systems with the Norwegian-American Astronomy Society's lexicon of "Wow" "Ja," "Sure," "You Betcha" and "Skol." And that is how I attended two star parties in different states in the same day.





The Nerdiest Video Game Ever



by Dr. Tony Phillips

NASA has a job opening. Wanted: People of all ages to sort, stack, and catalogue terabytes of simulated data from a satellite that launches in 2015. Agile thumbs required.

Sorting terabytes of data? It's more fun than it sounds.

In fact it's a game: Satellite Insight. The Space Place Team at the Jet Propulsion Laboratory created the entertaining app for iPhones to get the word out about GOES-R, an advanced Earth science satellite built by NOAA and NASA.

Described by the *Los Angeles Times* as possibly "the nerdiest game ever," Satellite Insight may be downloaded for free from Apple's app store. Be careful, though, once you start playing it's hard to stop. Some reviewers have likened it to Tetris, one of the most popular video games of all time.

GOES, short for "Geostationary Operational Environmental Satellite," is the workhorse spacecraft for weather forecasters. NOAA operates two (at a time) in geosynchronous orbit, one above the west coast of North America and one above the east coast. They monitor clouds, wind, rain, hurricanes, tornadoes and even solar flares. The GOES

program has been in action since 1975.



GOES-R is the next-generation satellite with advanced technologies far beyond those of the older GOES satellites. It has sensors for lightning detection, wildfire

mapping, storm tracking, search and rescue, solar imaging, and more. Many of the sensors are trailblazers. For example, the Advanced Baseline Imager has 60 times the capability of the current imager—16 channels instead of 5. It has twice the spatial resolution and five times the temporal refresh rate, including the 30-second imaging of weather systems over a region of 1000 km x 1000 km. Also, the Geostationary Lightning Mapper can count and pinpoint lightning bolts over the Americas 24/7. It's the first such detector to fly on a geosynchronous satellite, and it could lead to transformative advances in severe storm warning capability.

All in all, GOES-R represents a "huge technological leap from the current GOES." We know this because Satellite Insight tells us so. The app

has an informative "Learn More" feature where players can find out about the satellite and the data they have been sorting.

Which brings us back to sorting data. It's a bit like eating Cheerios; just don't tell the kids it's nutritious, and they love it. Helping GOES-R gather and stash data from all those advanced sensors is just as satisfying, too—a dose of Earth science wrapped in thumb-flying fun.

More information about Satellite Insight may be found on the web at <http://itunes.apple.com/us/app/satellite-insight/id463588902?mt=8>. The game also available in web form (flying thumbs optional) at spaceplace.nasa.gov/satellite-insight.



This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

2011 Holiday Party

by Scott Regener

Once again, the Rochester Astronomy Club held its holiday party. A members-only affair, the fest always features food, talk, and elections. This year, the entire slate of officers was re-elected by unanimous voice vote. Talk of the upcoming year rounded out the meeting. Though well attended, there's always room for more, so please mark your calendars now for the second Tuesday in December!



The Moon

by Rebecca Bomgaars



DOWN

1. igneous rock created from lava
2. point in moon's orbit when farthest from earth
3. area where eclipse is visible
4. astronomer published first standardized names of lunar features, nomenclature later replaced by Riccioli
6. lunar month measured from one new moon to next
7. mean _____ of the moon is 1,079 miles
8. type of eclipse when moon is farthest away from earth
9. full moon that occurs twice in same calendar month
11. government agency over seeing space travel
14. early Greeks noted this eight year lunar cycle
16. _____ calendar that begins new calendar month by sighting the first crescent moon (middle eastern religion)
18. lunar _____: visual effect caused by the curved path of the moon as it rises and sets
20. highland landing of Apollo 16 (1972)
21. your earth weight in pounds if you weighed 15.3 pounds on the moon
23. the moon is full when it is in _____
25. percent of light reflected from an object
27. Apollo mission number of first use of lunar Rover
29. science dealing with the study of the moon (from Greek goddess)
31. German word for moon
33. scale used to rate the moon's appearance during an eclipse
34. walled plain in SW quadrant shows up as cross at terminator line
35. moon _____, vertical streaks of light above/below the moon
39. the Latin name for valley on the surface of the moon

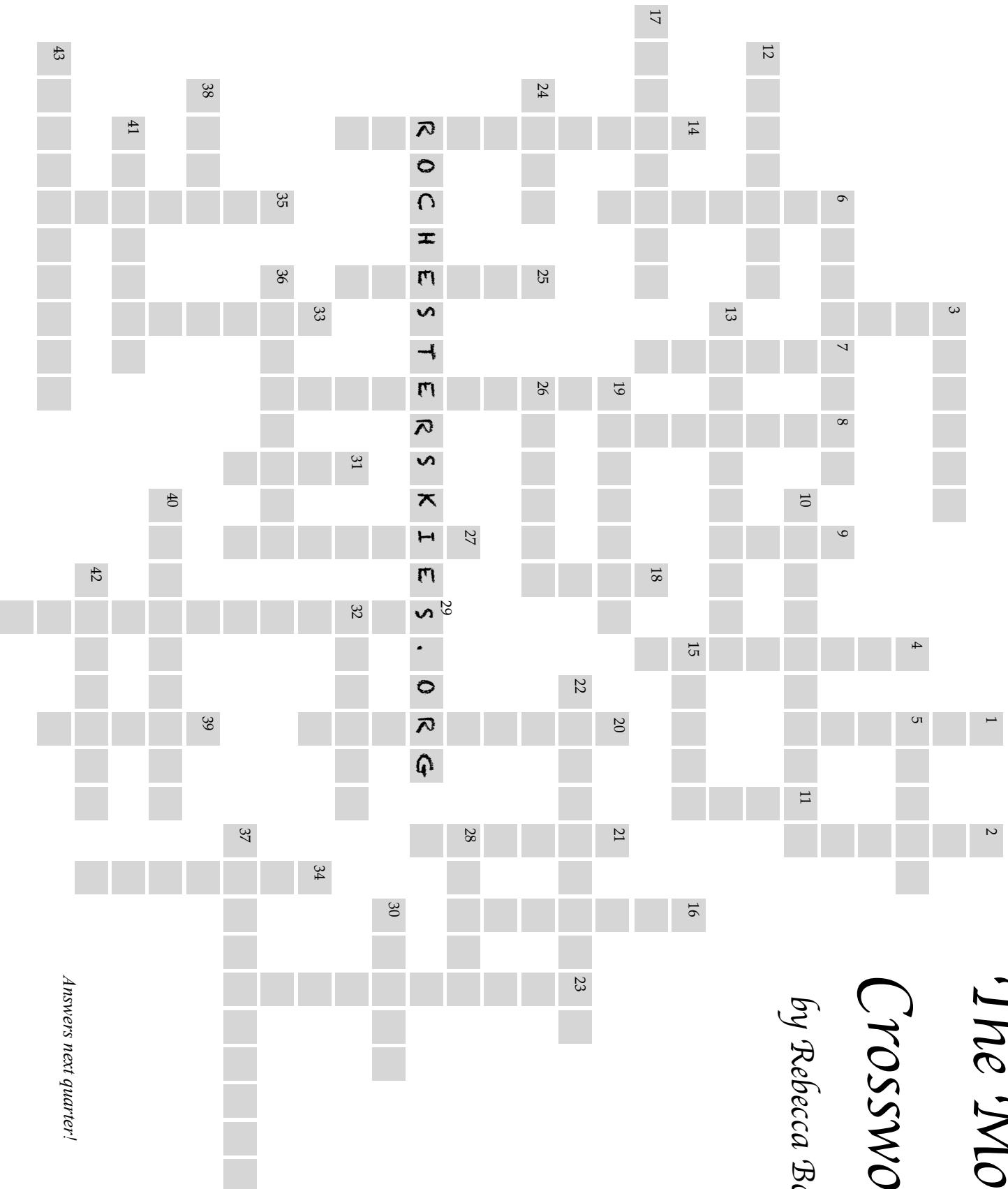
Across:

3. opposite of nadir
5. cycle of lunar months (18 yrs 11 days) the time it takes for moon/earth/sun to return to same relative position
6. lunar cycle if measured by timing the orbit in relation to specific star
10. 1994 spacecraft that mapped both sides of the moon, or "O, My Darling"
12. 19 year lunar cycle, new and full moon will fall on the same calendar day
13. central meridian & lunar equator cross at this point
15. dark central area of shadow cast during eclipse
17. gravitational force that creates "piling" effect on Earth's oceans
19. composite rock found on moon & earth formed from small pieces of different minerals
22. line formed by the edge of the illuminated portion of moon
24. lowest high tide of the lunar month
26. man, woman, and _____ in the moon
28. prominent lunar crater named for Danish astronomer
30. earth _____, reflected sunlight from the earth to moon
32. astronaut on Apollo 8 and 13
36. 5 orbital points between 2 orbiting bodies canceling out gravitational and centrifugal pull
37. "Eastern" sea seen on far side of the moon only on favorable librations
38. Czech cartographer, "Atlas of the Moon"
40. irregular motion of the moon in its elliptical orbit
41. type of occultation that only intercepts the north or south limb of the moon
42. another name for a penumbral eclipse
43. paler halo-like image off to the side of moon 22-or-46 degrees away

The Moon

Crossword

by Rebecca Bomgars



Answers next quarter!

Rochester Skies

Upcoming Events

- | | | |
|-------------|---|--|
| Feb 17/18 | - | Dark Sky Weekend at Eagle Bluff* |
| Feb 24/25 | - | Dark Sky Weekend at Eagle Bluff* |
| March 13 | - | Monthly Meeting @RCTC - Larry Mascotti |
| March 23/24 | - | Dark Sky Weekend at Eagle Bluff* |
| April 10 | - | Monthly Meeting @ RCTC - TBD |
| April 20/21 | - | Dark Sky Weekend at Eagle Bluff* |
| April 28 | - | Astronomy Day @ Mayo High School* |
| May 8 | - | Monthly Meeting @ RCTC - TBD |

* Events subject to change due to weather. Check Rochesterskies.org for updates