Current Astronomy

AUGUST
2004

RIVER BEND ASTRONOMY CLUB NEWSLETTER

Uncertain weather plagues amateur astronomers of the middle-Mississippi River valley. Dennis "Rip" Rippelmeyer understands that a cloudless sky doesn't always result in good views through a telescope. **See his story on page 3.** PHOTO BY ERIC YOUNG

RIVER BEND ASTRONOMY CLUB

RIVERBENDASTRO.ORG

***River Bend Astronomy Club** serves astronomy enthusiasts of the American Bottom region, the Mississippi River bluffs and beyond, fostering observation, education and a spirit of camaraderie.*

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Affiliated with the Astronomical League, dedicated to fostering astronomical education, providing incentives for astronomical observation and research, and assisting communication among amateur astronomical societies.
www.astroleague.org

Affiliated with the NASA Night Sky Network, a nationwide coalition of amateur astronomy clubs bringing the science, technology and inspiration of NASA's missions to the general public.
nightsky.jpl.nasa.gov

Current Astronomy CLUB NEWSLETTER

EDITOR	Eric Young younger@wustl.edu

Submissions to the newsletter are encouraged.
Contact the editor for more information.

Events

August Meeting

Saturday, August 14th, 2004 • 7:00 p.m.

Kronk Observatory

132 Jessica Drive, St. Jacob, IL 62281

Looked up lately?

Join River Bend Astronomy Club

Want to learn more about astronomy? The members of River Bend Astronomy Club invite you to join. You won't need expensive tools or special skills — just a passion for observing the natural world.

• Meetings offer learning, peeks through great telescopes and fun under the stars.

• You will receive the club newsletter, *Current Astronomy*, packed with news and photos.

• Get connected with our member-only web site and discussion group.

• Borrow from the club's multimedia library.

• And that's not all! Through club membership you also join the Astronomical League, with its special programs and a colorful quarterly newsletter to enrich your hobby.

We meet monthly, observe regularly, e-mail news and quips constantly, and generally have a good time. Won't you join us?

Name(s) _____

Address _____

City _____ State _____ Zip _____

Phone (Day)_____ (Evening)_____

Email address (to receive club news and information):

_____

Where did you hear of our club?

_____

How long have you been interested in astronomy? _____

Do you have optical equipment? ___ Telescope ___ Binoculars

Are you afraid of the dark? ___ Yes ___ No (just kidding)

I am submitting my application for:

_____ Adult membership(s) @ $10.00/year (18 years or older)

_____ Youth membership(s) @ $8.00/year (under 18)

I enclose a check for a total of $_____
made out to "Ed Cunnius, Treasurer RBAC."

Signature _____

Date _____

River Bend Astronomy Club
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MAY04

Understanding seeing

Why what you get is what you see

BY DENNIS RIPPELMEYER

Astronomical seeing relates to how much the atmosphere distorts the image in our scopes. As magnification increases, the negative effect it has on our views worsens. Thermal layers in the atmosphere combine into eddies and ripples that act like lenses — lousy, constantly changing lenses. A similar effect can be seen while looking across the surface of a hot road. The scenery on the opposite side of the road will weave, bend and dance around. Our telescopes magnify this distortion and we see stars shifting position (slow seeing) and planetary detail turn to mud (fast seeing).

When you see the stars twinkling above, that's an indication the turbulence is moving slowly — or slow seeing. The brain can sometimes cope with this and give you those momentary delightful images. However, the stars can lie to you if the turbulence is rapid. The stars may appear still but when you raise the magnification, the brain can't keep up and will average the fast-moving image into a blur.

You can test the seeing by slightly defocusing a star until you get 5 to 10 diffraction rings (bullseye pattern). Steady pattern = excellent seeing. If the pattern is more stable on one side of focus than the other, atmospheric turbulence is the cause. I've read that this is because you are focusing on the turbulence itself in one direction and beyond it in the other. If the pattern is about equally messed up either side of focus, the problem may be a hot mirror, tube currents or another nearby source of heat (roof, parking lot, heavy breather near the end of your scope, etc.)

There are scales used to quantify seeing. The longest I've seen has ten stages (but who needs that much accuracy for trash.) The shortest (two stages) we already know — it's either (1) worthwhile setting up your scope or (2) not.

My favorite is a five-stage scale using the Airy disk of a focused star at high magnification:

V Motionless — an evening to remember (get out that 5x barlow)

IV Light undulations in the diffraction rings — better than average

III Bloated disk/broken rings — probably average in the St. Louis area

II Eddy streams in disk/rings mostly missing — some deep-sky observers will still be OK

I Boiling image/no indication of rings — popcorn and TV recommended

...aim high. Views close to the horizon are notoriously terrible since you are looking through much more of the atmosphere. Targets at zenith (straight up) will be the best.

It's been said that small scopes handle poor seeing better than large aperture scopes. Yes and no. If the turbulence is fast-moving, all scopes will give lousy views. If it's a night of slow seeing, however, this maxim can appear true.

The typical model for atmospheric turbulence is portrayed by many moving cells of still air. These cells supposedly average about 4" (10 cm) in diameter. If your scope has an aperture less than 4" and one of these cells pass your viewing axis, you will get that "brief moment of good seeing" we hear about. Larger aperture scopes will almost always be seeing more than one cell at a time so the two or more cells' distor-

tions get averaged into more of a blur and that "brief moment" doesn't happen as much. Anyway, that's the theory. I've usually found that if it's bad in my 18", it's bad in my 4" too….but that's my opinion and I've been wrong before.

When do you get good seeing? I have two "expert" articles in front of me. One states that "Good seeing nights tend to be clear cold nights with no wind," and the other, "The very best seeing often comes on still, muggy summer nights when the air is heavy with humidity and the sky looks unpromisingly milky with haze."

I tend to agree with the latter. Two of my best nights (I could crank the SCT up to 360x with no problem) have been in late August around 3 a.m. (different years, BTW). I also agree with RBAC member Jamie Goggin that a large high pressure dome usually brings good seeing. Jetstreams don't and St. Louis is the headquarters for the midwestern jetstream(s). After a front or storm, the stars usually shine bright and bold. This is good transparency (another topic) but not necessarily good seeing. The atmosphere is usually turbulent after such an event. Good seeing and good transparency, unfortunately, do not often coincide.

Also, aim high. Views close to the horizon are notoriously terrible since you are looking through much more of the atmosphere. Targets at zenith (straight up) will be the best.

A good prediction tool (as good as Meteorological forecasts can be, anyway) is the Clear Sky Clock developed by Attilla Danko. The St. Louis version can be found at: cleardarksky.com/c/StLouisMOkey.html

When atmospheric seeing is bad there is not much we can do about it. This was the primary reason for the Hubble Space Telescope. When seeing is bad due to local reasons, though, we can help the situation.

Set up early and let your optics and scope acclimate to the outdoor temperature. It can take less than a degree of temperature difference in your scope to compromise a diffraction-limited optic. For an example of what a warm mirror looks like, check out Bryan Greer's site: www.fpi-protostar.com/bgreer/sep2000s%26t.htm

Set up on a grassy area. Avoid pavement — it stores a great deal of heat.

Also, avoid viewing over roofs, chimneys or freshly parked vehicles — all heat sources.

In conclusion, when the seeing is great, go for your telescope's magnification limit. When it's not so great, drop to lower powers and target larger objects. If it's the pits — popcorn and Star Trek.

First light, first fright

Some years ago I bought my first "real" scope — a second hand 8" SCT. The previous owner told me it had good optics. It came with 25mm and 10mm eyepieces and the seller threw in a 14mm Konig he wasn't using anymore.

I couldn't wait to set it up that night. I finally found Saturn using the less than adequate stock finder and the 25mm eyepiece. *Great!* Now to crank up the power (after all, this baby ought to do around 400x.) I put in the 14mm and refocused…and refocused again. I thought to myself, "No wonder he gave me this eyepiece, it stinks." I replaced it with the 10mm. Worse! I could barely recognize the planet. I guess it wasn't the eyepiece….and this is only 200x! A chill ran down my spine as I contemplated the possibility that my latest aquisition was a lemon.

"Maybe the scope just needs to be collimated," I thought. I grabbed the notes I had downloaded from the web and checked the out-of-focus "doughnut" at low power. It looked just like the "good" picture in my notes. Then I put in the 10mm eyepiece and defocused to check the diffraction rings for concentricity. What a mess! The image looked as if someone ran the bullseye pattern through a blender. As I sifted through my notes, I saw a picture that closely resembled the image in the eyepiece. It was an example of poor seeing — atmospheric turbulence. But I could not convince myself that the atmosphere could be that devastating. Surely the mirror had a lousy figure.

A few nights later my fears were quelled. I found it easy to check collimation as the bullseye pattern was almost picture perfect. The Cassini Division in Saturn's rings was clearly evident in the 10mm as well as the 14mm. I suddenly had a new respect for Mother Nature.

Now that's high power

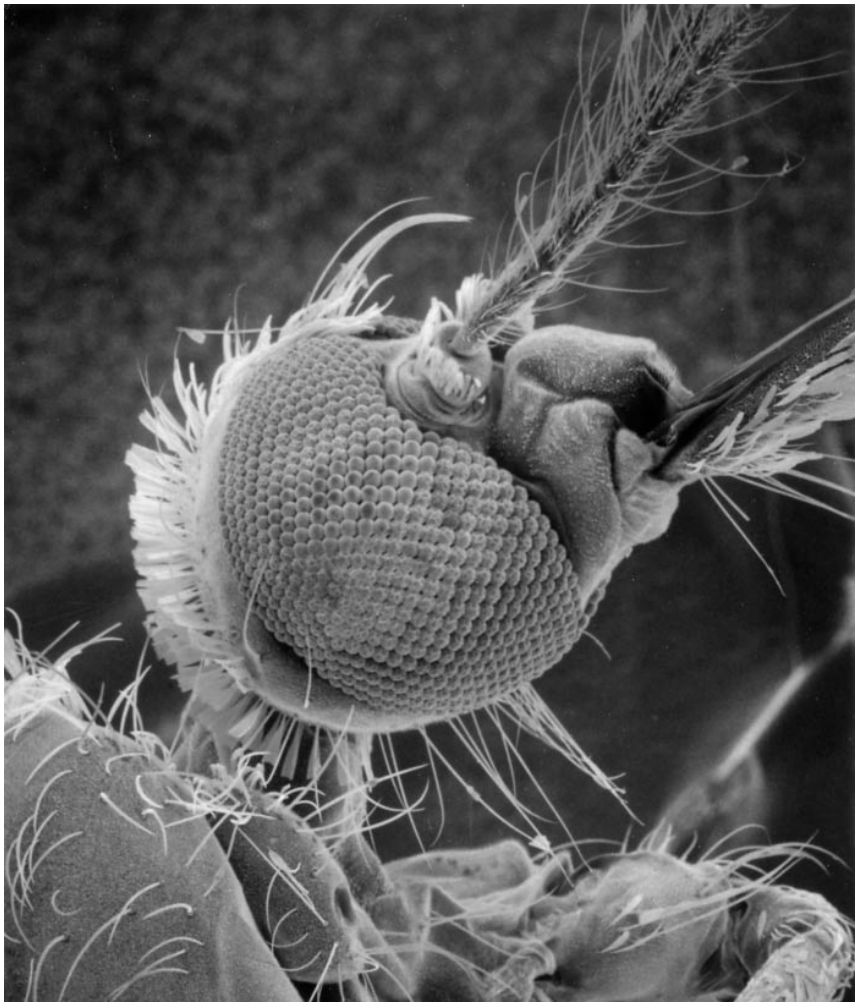
Members tour microscopy lab

BY ERIC YOUNG

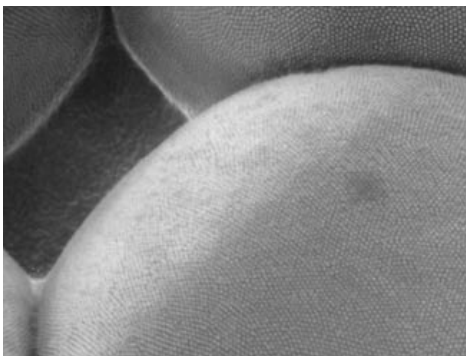
"Where the telescope ends, the microscope begins. Which of the two has the grander views?" wrote Victor Hugo in *Les Misérables*. RBAC member Mike Veith knows the two well because he enjoys his hobby of peering through his telescope and earns his living as a professional microscopist. Veith treated fellow club members on Friday, July 16th, to "grand views" in his microscopy lab at Washington University in St. Louis.

Veith chose the common mosquito, that blood-draining bane of backyard astronomers, to demonstrate the power of a scanning electron microscope.

Bill and Rita Breeden, Gary Kronk and Lois Butler examine Mike Veith's collection of specimens.



The scanning electron microscope imaged the head of a female mosquito at 80x (left). Note the compound eye: one of its nodules, seen below at 3,500x, shows another level of detail. Veith (above) says he enjoys finding such structures within structures in the biological universe.



The Space Place

BY DIANE K. FISHER

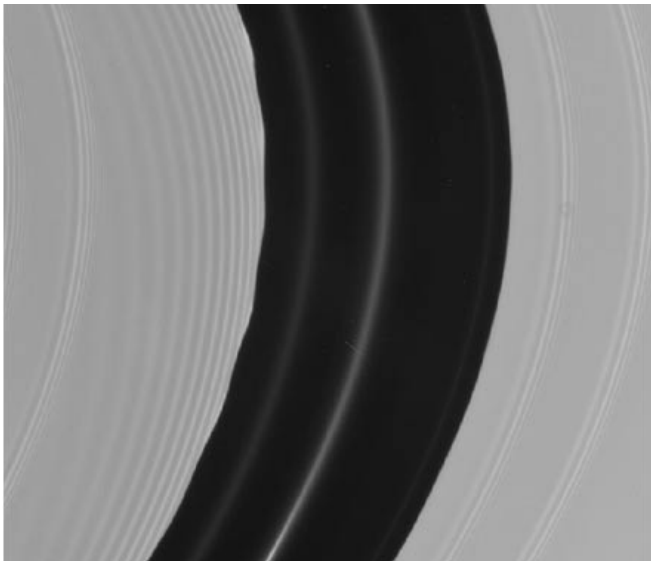
Waiting for Cassini's "safe arrival" call

The evening of June 30, 2004, was nail-biting time at Cassini Mission Control. After a seven-year journey that included gravity assist flybys of Venus, Earth, and Jupiter, Cassini had finally arrived at Saturn. A 96-minute burn of its main engine would slow it down enough to be captured into orbit by Saturn's powerful gravitational field. Too short a burn and Cassini would keep going toward the outer reaches of the solar system. Too long a burn and the orbit would be too close and fuel reserves exhausted.

According to Dave Doody, a Cassini Mission Controller at the Jet Propulsion Laboratory (JPL) in Pasadena, California, there was a good chance the Earth-bound Cassini crew would have to wait hours to learn whether or not the burn was successful. Of the three spacecraft-tracking Deep Space Network (DSN) complexes around the globe, the complex in Canberra, Australia, was in line to receive Cassini's signal shortly after the beginning of the burn. However, winds of up to 90 kilometers per hour had been forecast. In such winds, the DSN's huge dish antennas must be locked into position pointed straight up and cannot be used to track a tiny spacecraft a billion miles away as Earth turns on its axis. "The winds never came," notes Doody.

The DSN complex at Goldstone, California, was tracking the carrier signal from Cassini's low-gain antenna (LGA) when the telltale Doppler shift in the LGA signal was seen, indicating the sudden deceleration of the spacecraft from the successful ignition of the main engine. Soon thereafter, however, Goldstone rotated out of range and Canberra took the watch.

After completion of the burn, Cassini was programmed to make a 20-second "call home" using its high-gain antenna (HGA). Although this HGA signal would contain detailed data on the health of the spacecraft, mission controllers would consider it a bonus if any of that data were actually captured. Mostly, they just wanted to see the increase in signal strength to show the HGA was pointed toward Earth and be able to determine the spacecraft's speed from the Doppler data. If possible, they also wanted to try to lock onto the signal with DSN's closed-loop receiver, a necessary step for extracting engineering data.



NASA/JPL/SPACE SCIENCE INSTITUTE

After entering Saturn orbit, Cassini sent this image of the Encke Gap in Saturn's rings.

Normally it takes around one minute to establish a lock on the HGA signal once a DSN station rotates into range. Having only 20 second's worth of signal to work with, the DSN not only established a lock within just a few seconds, but extracted a considerable amount of telemetry during the remaining seconds.

"The DSN people bent over backwards to get a lock on that telemetry signal. They were awesome," remarks Doody.

See JPL's popular training document for mission controllers, Basics of Space Flight *(www.jpl.nasa.gov/basics), and the DSN website at deepspace.jpl.nasa.gov/dsn. For details of the Cassini Saturn orbit insertion, see www.jpl.nasa.gov/basics/soi. Kids can check out The Space Place at spaceplace.nasa.gov/en/kids/dsn_fact1.shtml to learn how the DSN antennas detect the tiniest spacecraft signals.*

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

Gallery

BY ERIC YOUNG

Summer breeze at Greenville College Observatory

JULY 17, 2004 What's between a soybean field, a cow pasture and the cosmos? The Greenville College Observatory, of course. A convoy of a dozen vehicles headed for the dark skies offered at the remote location. RBAC member Jamie Goggin, soon to be an instructor at the college, led the way. Early in the day the forecast looked iffy at best. But as darkness fell the atmosphere settled down and the club settled in to an evening of stargazing. Some folks had their fist view ever of a comet — gauzy comet LINEAR 2003 K4, which just happened to be handy overhead. Motors whirred in automatic mounts, folks spied meteors and satellites, and the fork in the Milky Way offered roads less traveled all evening long.

Tyler Dever with his 'scope. The Devers asked Kevin Muenzler of Eagle Creek Observatory in Texas for help getting started. Muenzler responded by mailing a 40mm eyepiece in need of a good home! Tyler's mom, Susan, says the family learned enough from the group on July 17th to re-locate several objects the following night on their own.

Among the guests was a dew-shielded Celestron 9 1/4 GPS telescope accompanied by its owner, Jeff Sjoquist (SHOW-quist). These units automatically tap the GPS network, pinpoint the user's location and get to work. Jeff offered a fine view of Jupiter in twilight through his 2" eyepiece.

The parade of telescopes at Greenville College Observatory

August 2004

RIVER BEND ASTRONOMY CLUB
RIVERBENDASTRO.ORG

July 2004

S	M	T	W	T	F	S
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September 2004

S	M	T	W	T	F	S
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2

Holidays | Moon Phases | RBAC | Space Mission | Observing | Trivia

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5 Neptune at opposition	6 C/2002 L9 (NEAT) closest to Earth	7 Last Quarter 5:01 p.m. CDT
8	9	10	11	12 Perseid meteors peak before dawn	13	14 RBAC Meeting 7:00 p.m.
15 New Moon 8:24 p.m. CDT	16	17	18 Venus at greatest elongation	19	20	21 Breeden "baby" LX90 3 months old
22	23 First Quarter 5:12 a.m.	24 Odyssey ends primary mission	25 P/2004 A1 perihelion	26	27	28 1789 W. Herschel discovers Enceladus
29 Full Moon 9:22 p.m. CDT	30	31 Saturn within 2 degrees of Venus	1	2	3	4

CALENDAR BY ED CUNNIUS