

Rappahannock Astronomy Club

Minutes, July 8, 2009, Meeting

In attendance:

- Barton Billard
- Scott Busby
- Don Clark
- Victor Fisher
- Tom Harmon
- Leigh Gettier
- Glenn Holliday
- John Neasham
- Michael Masters
- Tim Plunkett
- Javier & Ruby Valverde

President Scott Busby opened the meeting shortly before 7:30 p.m. with introductions around the room. Twelve members were present.

Program

Mike Masters presented the first part of a program on “How We See the Sky,” subtitled “The Physics and Physiology of Visual Astronomy.” He will continue with the second part at our next meeting. The original topic idea he came up with in January was on choosing eyepieces, but he found that topic could not be covered well without taking a broader view. His topics included—

- The light we see
- How we see that light
- Types of object
- Eyepieces
- Telescope basics
- Eye and vision
- Eyepiece essentials
- Atmosphere and sky.

Mike’s talk provided some interesting facts about the eye and vision that are relevant to astronomy. The pupil of the eye opens to a larger diameter as one adaptation to darkness. A younger person’s dark-adapted pupil can reach 7 millimeters or more in diameter. With age, the maximum diameter reduces to 5 millimeters or less. A consequence for astronomy is that the lowest power that does not cause some light to be lost is 3.5x per inch of telescope aperture for younger eyes, increasing to 4.9x per inch for older eyes. The rods and cones are the cells that sense light in the retina of the eye. Cones sense color and need about 100 photons, about the level of starlight, to start to respond. Rods provide low light sensitivity and are not color sensitive. They provide additional dark adaptation through chemical changes. The pupil dilation adapts to darkness in seconds. The photochemical changes take place over a period of 30 to 40 minutes (up to 2 hours) typically. It can take up to 24 hours to recover from exposure to bright light, for example from a day at the beach.

The eye detection limit is about 50 to 150 photons arriving over a period of several seconds. This limit theoretically corresponds to a visual magnitude of 8.5, but sky brightness reduces the limit to between 7 and 7.5, assuming the best eyes under the darkest skies.

Rods have less than 1/5 the resolution of the cones, which have about 1 line per arc minute resolution. We have to magnify small objects enough to use the eye’s resolution. It is easier to see large objects than smaller ones at faint contrast. Improved sensitivity to faint objects through averted vision works by using the part of the eye between where the sensitivity is reduced by the concentration of less-sensitive cones in the fovea and where it falls off again in the peripheral vision. Look outward from the direction of

the nose so that the faint object falls nearer the nose than the fovea (and opposite of the blind spot outward from the fovea where the optic nerve exits the retina).

Characteristics to consider in eyepieces include magnification (determined by the ratio of objective focal length to eyepiece focal length), apparent field of view (AFOV), eye relief, barrel diameter, and focus distance (some eyepieces come in "parafoveal" sets having the same focus distance to allow exchanging them without having to adjust the focus). Larger AFOV gives a larger true field of view at the same magnification. Alternatively, larger AFOV allows a higher magnification with the same true field of view and thus reduces sky brightness. Longer eye relief, preferably 20 millimeters, is helpful for use with glasses. True field of view is limited by the field stop, in turn limited by the barrel diameter (27 millimeters or less with a 1.25-inch barrel and 46 millimeters or less with a 2-inch barrel).

To be continued next meeting...

Treasurer's Report

Tim Plunkett said the total balance in the June 30 report does not reflect the Universe DVD purchase. The Club has 19 paid members as of the end of June.

Old Business

Two star parties were held in June. Scott said poor forecasts for Skyline on the 20th resulted in only one member (himself) making the trip. He had good viewing late, but the early hours were half and half. Glenn told us that on the 27th, Caledon had 69 people participating in a campout event. He was there and told them about our star party, with the result that campers came in force to get looks through the telescopes. The event was viewed as very successful by the Park as well. The next star party is July 18 at Caledon. Glenn told us about the clinic he is holding that day on Scout astronomy merit badge requirements that afternoon.

Galileoscope purchase—Tim did not have new information on how long it will take for our order to arrive.

Universe DVD series—Tim brought the DVD set and suggested that the Club could add it to the library and lend out individual DVDs to allow more members to view the series.

Plan for RAC attendance at regional star parties—Scott said that the recommended event for this year, Star Quest, was already booked up. It was decided to combine the idea of a club trip to Star Quest with the Green Bank event Mark de Vito proposed, and begin planning for next year.

Virginia State Parks request for a program at Westmoreland— Glenn agreed to follow up with Annette Bareford, the Virginia State Park person requesting our help with a program.

Beginners' resource—Leigh finished it and it is on the Club website.

Beginners' resource (revisited)—Mike asked Leigh whether he would be a sort of beginner coordinator. Leigh was agreeable and was made a committee lead.

Future Club meeting program contacts—Marc has an action to ask Nicole for her preference on meeting dates to present her program.

Club meeting location—Scott moved and Mike seconded to continue holding meetings at the Pizza Hut with the 7:30 starting time. The motion was approved.

Dark Sky sites—the consensus was to table the subject. Our main site is Caledon and making the Big Meadows event informal lessens the need for an alternative.

Status of Club loaner assets—Glenn has the solar telescope for the Scout clinic. Brenda has the Club Dob.

New Business

The Club picnic is August 22. Scott will ask for volunteers via e-mail, for example, someone to bring chips and dip, etc. Scott will bring the burgers, etc., for grilling. This year we did not hold raffles at the meetings to raise funds for prizes at the picnic as was done last year. Scott described an alternative gift exchange that might be substituted. Recommended start time is 1:00 pm. August 22 is a regular star party date.

Next Meeting

The next meeting is scheduled for August 12, 2009, 7:30 p.m., at the Pizza Hut, 1224 Powhatan St., Fredericksburg.

Submitted by Bart Billard, Secretary