



# The Meridian

Newsletter of the Quad Cities Astronomical Society • March 2015

## Upcoming QCAS Meetings

All meetings start at 6:30pm.

**April 6th**, Astronomy dialogs/meeting.

**April 20th**, monthly business meeting.

## Upcoming Open Houses

**April 25th** all at Wayne Jens Observatory

**May 30th** in Sherman Park.

**June 26th**

**July 25th**

**August 29th**

**September 26th**

## Meeting Notes

### From Board Meeting, March 11th.

Notes by John Robbins. Meeting called to order at 7:08pm.

Attending were Dale Hendricks, Bruce Brooker, Karl Adlon, Dana Taylor, John Baker, Steve VanHyfte and John Robbins.

John Baker shared information about pass-down processes (i.e., transfer of the office of treasurer) and will develop a PDF file to describe "how to do treasurer duties." John has also entered financial data into QuickBooks Pro for easier record keeping. He's calculated net income amounts of \$333.13 and \$1,998.94 for 2013 and 2014, respectively, detailed in the tables, 2013 at right and 2014 on next page.

Society bank account still has old names on it; needs updating. Tax forms may need re-filing and name changes as well. Forms 4506-C, 990 and 501c were mentioned regarding non-profit organization status. FYI, when a new treasurer is elected, a new fiscal year begins.

Karl Adlon handed out a section of text from the By-Laws regarding executive power. The By-Laws specifically say: The Executive Power of the Society

## Quad Cities Astronomical Society Profit & Loss Unclassified January through December 2013

	Jan - Dec 13
Ordinary Income/Expense	
Income	
Direct Public Support	
Corporate Contributions	250.00
Individ, Business Contributions	268.00
Total Direct Public Support	518.00
Program Income	
Membership Dues	520.00
Total Program Income	520.00
Total Income	1,038.00
Expense	
Facilities and Equipment	
Equip Rental and Maintenance	344.22
Rent, Parking, Utilities	293.65
Total Facilities and Equipment	637.87
Operations	
Postage, Mailing Service	72.00
Total Operations	72.00
Total Expense	709.87
Net Ordinary Income	328.13
Other Income/Expense	
Other Expense	
Ask My Accountant	-5.00
Total Other Expense	-5.00
Net Other Income	5.00
Net Income	333.13

shall be vested in the Board of Directors which shall have charge of the affairs and funds of the Society. Karl recommended the following as a standing policy: Any proposal that involves a dollar amount of \$200 or more must go to the Board for thorough review and recommendation before being presented to the membership.

Vent for Roll-Off Building. Suggestion was made to enhance ventilation for roll-off by installation of all-aluminum, solar collecting vent fans (a pair of them). The vent fans have been priced at \$63.00 each. Dale and Dana were to make a trip to the observatory on

**Quad Cities Astronomical Society**  
**Profit & Loss Unclassified**  
 January through December 2014

	Jan - Dec 14
<b>Ordinary Income/Expense</b>	
<b>Income</b>	
Direct Public Support	
Corporate Contributions	730.00
Individ, Business Contributions	1,020.00
<b>Total Direct Public Support</b>	1,750.00
Program Income	
Membership Dues	600.00
<b>Total Program Income</b>	600.00
<b>Total Income</b>	2,350.00
<b>Expense</b>	
Facilities and Equipment	
Equip Rental and Maintenance	32.50
Rent, Parking, Utilities	244.56
<b>Total Facilities and Equipment</b>	277.06
Operations	
Postage, Mailing Service	74.00
<b>Total Operations</b>	74.00
<b>Total Expense</b>	351.06
<b>Net Ordinary Income</b>	1,998.94
<b>Net Income</b>	1,998.94

Friday (3/13) to examine potential installation points.

Grant Application to Scott County Regional Authority (SCRA). SCRA distributes funding in spring and fall cycles, each with about \$1.4 to \$1.5 million dollars covering between 55 to 59 projects.

Spring grants are due on April 1, 2015. Dale has started to fill-out required forms, needed to specify our capital expenses and equipment. The fact that the observatory is located in Clinton county should not pose a problem since most of our visitors reside in Scott County. Evidence of STEM connection valuable, as is connection with Davenport Parks and Rec and Bettendorf HS.

20" Telescope/Mirror. Continued discussion on OMI's rework of our mirror. Very rough estimate is ~\$2k. Karl sent e-mail to OMI about refiguring. E-mails have been exchanged since regarding the option of replacement.

Classroom building & restroom facilities. Short discussion regarding the need for restroom facilities in proposed multi-purpose/classroom building. Restrooms are presently located in the campground bathhouse, which Bruce indicates in a mere two and a half minute drive away. Questions exist about availability of the facilities during open houses, but

since open houses occur on Saturdays, they should be open most of the year.

Bruce Brooker offered a wish list of various items:

- Panelling on the roll-off roof building. Some rotten panels need replacement. Some door trim is rotting, at upper left. Bruce moved that replacement materials be purchased, seconded by John Baker. Unanimous vote.
- Bruce would like to install a set of folding shelves in the dome building.
- Bruce wants to work on improving and refining the right ascension drive. Would like to replace the clock drive if we can't get the existing drive to work well.
- 20" telescope: Bruce would like to see a "picture" of which clearly shows a degradation in the quality of the image between instances of the scope being excessively warm and after it has reached ambient temperature.
- Coma corrector for the 16' needs a spacer for visual observations.
- We need to foster the connection with the Bettendorf HS planetarium and really get a STEM program developed.
- The new classroom building needs better definition of it's primary purpose and need. Is the "build it and they will come" philosophy sufficient?
- Suggestion that presentations could be made inside the roll-off roof building as is. Bruce believes that 20 people could be seated for a presentation made on the south wall.

Final comment, by Karl was that the 21st of March is a good night for any who might want to try a Messier Marathon (weather cooperating).

Meeting adjourned at 9:00pm.

### **QCAS Business Meeting, March 16th**

Notes by John Robbins. Attended by: Dale Hendricks, Dana Taylor, Bruce Brooker, Jeff Struve, Jim Rutenbach, Sam Snow, Tom Bullock, John Baker, Mitch White, Robert Mitchell, John Robbins and Bob Miller.

Meeting was called to order at 6:36pm. Treasurer reports an amount of \$2198.14 in QCAS account.

*Solar cooling vent* was ordered on-line, should be received by Dana on March 19th. Installation slated for the west wall of roll-off roof building. Unit is screened and should move 1200 cu. ft. per minute. Dale donated to club for a purchase price of \$221.00.

Continuing discussion for *grant for new building*. Question raised: is the new building really needed? Bruce offered the suggestion that roll-off roof building could be used with a screen on south wall. Could probably seat 15 to 20 people. For rained-out

open houses, it remains to be seen whether public will make the trip out, rain or shine. Determination for new building “need” is related to open house announcements and publicity (more below). New folding chairs may need to be procured (Sam’s club was suggested as a source). *Restrooms at Sherman Park.* Bruce again reminded the group that restrooms are available in the campground section of Sherman Park, which require 2 minutes, 47 seconds to get to by car. Need to check with park ranger as to restroom open times, particularly on evenings of open houses.

*QCAS assistance to Scouts.* Tom Bullock is trying to assist groups in gaining their astronomy merit badges.

*Open House Publicity.* Needs wider announcement. Possible solutions are radio announcements, announcements in print media: The Argus, River City Reader, The Radish, etc. When Dana was on Paula Sands, he made the announcement of an open house with little resulting visitation from public.

*20” telescope mirror.* Discussion continuing on replacement or refurbishment of 20” mirror of the telescope in the roll-off roof building.

A 20” f/5 OMI mirror made in 2004 was discovered by Karl to be available for the purchase price of \$1600, from a person from San Francisco who advertised the mirror on Astromart (five-star seller). Quality of the coating is objectively unknown beyond the qualitative photos and assessment shared by the seller. Suggestion was made to ask the seller whether he’d consider loaning the mirror for our testing it, mounted in our scope, with our purchase after determining its utility.

QCAS 20” mirror was made by Art Grebner in the 1980’s. Cost of refiguring was estimated at \$2,000 at the meeting. Dana later learned that actual refiguring and coating would cost \$1500.00 performed by OMI, in Iowa City. Having them do the work saves shipping costs, gives a guarantee for new coating and figuring. It also reduces risk upon the society of purchasing an older mirror, of unknown quality coating, sight-unseen.

Emails circulating among board members, following the meeting, after new estimate of refiguring and re-coating were very positive to go the refurbishment route with OMI. Several of the board members pledged donations of \$100 to \$200 (each) towards the cost of OMI’s work.

Meeting adjourned at 8:06, moved by Dana 2nd by Dr. Mitchell

## Planets in the habitable zone around most stars

[Source: *ScienceDaily*, March 19, 2015] Astronomers have discovered thousands of exoplanets in our galaxy, the Milky Way, using the Kepler satellite and many of them have multiple planets orbiting the host star. By analysing these planetary systems, researchers from the Australian National University and the Niels Bohr Institute in Copenhagen have calculated the probability for the number of stars in the Milky Way that might have planets in the habitable zone. The calculations show that billions of the stars in the Milky Way will have one to three planets in the habitable zone, where there is the potential for liquid water and where life could exist.

The results are published in the scientific journal, *Monthly Notices of the Royal Astronomical Society*.

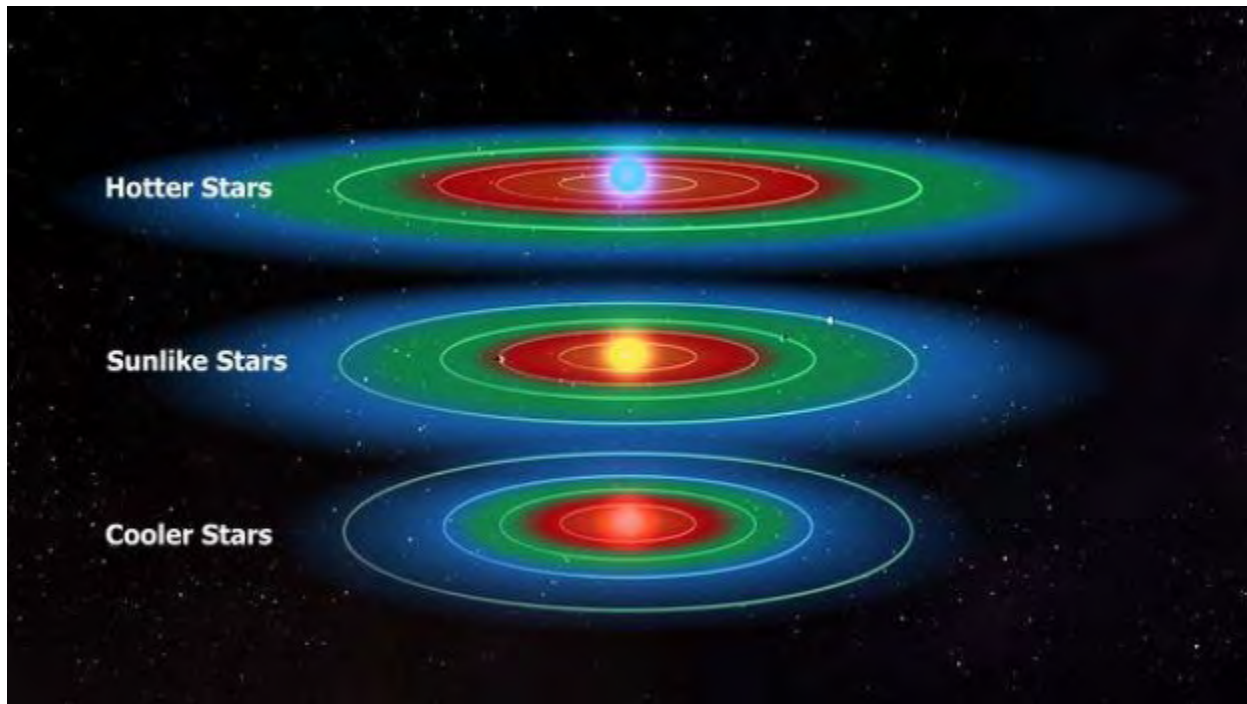
Using NASA’s Kepler satellite, astronomers have found about 1,000 planets around stars in the Milky Way and they have also found about 3,000 other potential planets. Many of the stars have planetary systems with 2-6 planets, but the stars could very well have more planets than those observable with the Kepler satellite, which is best suited for finding large planets that orbit relatively close to their stars.

Planets that orbit close to their stars would be too scorching hot to have life, so to find out if such planetary systems might also have planets in the habitable zone with the potential for liquid water and life, a group of researchers from the Australian National University and the Niels Bohr Institute at the University of Copenhagen made calculations based on a new version of a 250-year-old method called the Titius-Bode law.

### *Calculating planetary positions*

The Titius-Bode law was formulated around 1770 and correctly calculated the position of Uranus before it was even discovered. The law states that there is a certain ratio between the orbital periods of planets in a solar system. So the ratio between the orbital period of the first and second planet is the same as the ratio between the second and the third planet and so on. Therefore, if you knew how long it takes for some of the planets to orbit around the Sun/star, you can calculate how long it takes for the other planets to orbit and can thus calculate their position in the planetary system. You can also calculate if a planet is





The illustration shows the habitable zone for different types of stars. The distance to the habitable zone is dependent on how big and bright the star is. The green area is the habitable zone, where liquid water can exist on a planet's surface. The red area is too hot for liquid water on the planetary surface and the blue area is too cold for liquid water on the planetary surface.

'missing' in the sequence.

"We decided to use this method to calculate the potential planetary positions in 151 planetary systems, where the Kepler satellite had found between 3 and 6 planets. In 124 of the planetary systems, the Titius-Bode law fit with the position of the planets. Using T-B's law we tried to predict where there could be more planets further out in the planetary systems. But we only made calculations for planets where there is a good chance that you can see them with the Kepler satellite," explains Steffen Kjær Jacobsen, PhD student in the research group Astrophysics and Planetary Science at the Niels Bohr Institute at the University of Copenhagen.

In 27 of the 151 planetary systems, the planets that had been observed did not fit the T-B law at first glance. They then tried to place planets into the 'pattern' for where planets should be located. Then they added the planets that seemed to be missing between the already known planets and also added one extra planet in the system beyond the outermost known planet. In this way, they predicted a total of 228 planets in the 151 planetary systems.

"We then made a priority list with 77 planets in 40 planetary systems to focus on because they have a

high probability of making a transit, so you can see them with Kepler. We have encouraged other researchers to look for these. If they are found, it is an indication that the theory stands up," explains Steffen Kjær Jacobsen.

#### *Planets in the habitable zone*

Planets that orbit very close around a star are too scorching hot to have liquid water and life and planets that are far from the star would be too deep-frozen, but the intermediate habitable zone, where there is the potential for liquid water and life, is not a fixed distance. The habitable zone for a planetary system will be different from star to star, depending on how big and bright the star is.

The researchers evaluated the number of planets in the habitable zone based on the extra planets that were added to the 151 planetary systems according to the Titius-Bode law. The result was 1-3 planets in the habitable zone for each planetary system.

Out of the 151 planetary systems, they now made an additional check on 31 planetary systems where they had already found planets in the habitable zone or where only a single extra planet was needed to meet the requirements.

“In these 31 planetary systems that were close to the habitable zone, our calculations showed that there was an average of two planets in the habitable zone. According to the statistics and the indications we have, a good share of the planets in the habitable zone will be solid planets where there might be liquid water and where life could exist,” explains Steffen Kjær Jacobsen.

If you then take the calculations further out into space, it would mean that just in our galaxy, the Milky Way, there could be billions of stars with planets in the habitable zone, where there could be liquid water and where life could exist.

He explains that what they now want to do is encourage other researchers to look at the Kepler data again for the 40 planetary systems that they have predicted should be well placed to be observed with the Kepler satellite.

#### Titius-Bode law

The Titius-Bode law is a loose rule for planetary orbital periods and their distance from the Sun. The law was proposed in 1766 by J.D. Titius and was described mathematically by J.E. Bode in 1772. The law shows a relationship between the distance of the planets from the Sun based on a simple series of numbers: 0, 3, 6, 12, 24, 48, 96, 192, 384. Apart from the first two, the numbers are simply a doubling of the previous number. Then you add 4 to each number and divide it by 10 = 0,4 / 0,7 / 1,0 / 1,6 / 2,8 / 5,2 / 10,0 / 19,6 / 38,8. This gives a planetary system with stable orbits.



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#### QCAS Officers and Contacts:

President: Dale Hendricks	Vice-Pres: Bruce Brooker
Secretary: John Robbins	Treasurer: John Baker
Director: Dana Taylor	Facilities: John Baker
Web Master: Dana Taylor	Outreach: Tom Bullock
Programming: Jim Rutenbeck	

## Celestial Calendar

- Mar 20 04:36 NEW MOON
- 20 04:46 Total Solar Eclipse; mag=1.045
- 20 17:45 Vernal Equinox
- 20 21:19 Moon at Descending Node
- 21 17:13 Mars 1.0°N of Moon: Occn.
- 21 All night - good night for Messier Marathon
- 22 14:51 Venus 2.8°N of Moon
- 25 01:55 Aldebaran 0.9°S of Moon
- 27 02:43 FIRST QUARTER MOON
- 30 05:19 Jupiter 5.6°N of Moon
- 31 15:45 Regulus 4.0°N of Moon
- Apr 01 07:59 Moon at Apogee: 406012 km
- 03 22:17 Moon at Ascending Node
- 04 07:00 Total Lunar Eclipse; mag=1.001
- 04 07:06 FULL MOON
- 04 23:21 Spica 3.5°S of Moon
- 06 09 Uranus in Conjunction with Sun
- 08 08:08 Saturn 2.2°S of Moon
- 08 09:34 Jupiter 2.0°S of Beehive
- 09 23 Mercury at Superior Conjunction
- 11 10:28 Venus 2.5°S of Pleiades
- 11 22:44 LAST QUARTER MOON
- 16 22:53 Moon at Perigee: 361026 km
- 17 08:07 Moon at Descending Node
- 18 08 Venus at Perihelion
- 18 13:57 NEW MOON
- 19 14:24 Venus 7.2°N of Aldebaran
- 19 15 Mercury at Perihelion
- 21 11:35 Aldebaran 0.9°S of Moon
- 22 14 Mercury 1.3° of Mars
- 22 18 Lyrid Meteor Shower
- 25 18:55 FIRST QUARTER MOON

from [www.astropixels.com](http://www.astropixels.com)



**QCAS Meetings:** First Monday (workshop) at 6:30pm, and third Monday, (business), at 6:30pm, Bettendorf Library, 2950 Learning Campus Dr., off of 18th Street, Bettendorf.

#### QCAS Correspondence:

Please contact the society at:  
 P.O. Box 3706, Davenport, IA, 52808.  
 Members are welcome and encouraged to submit articles for The Meridian. Submit Any and all interesting items (via e-mail) to: John Robbins or Dale Hendricks.