



First Light

The Newsletter of the Cape Cod Astronomical Society



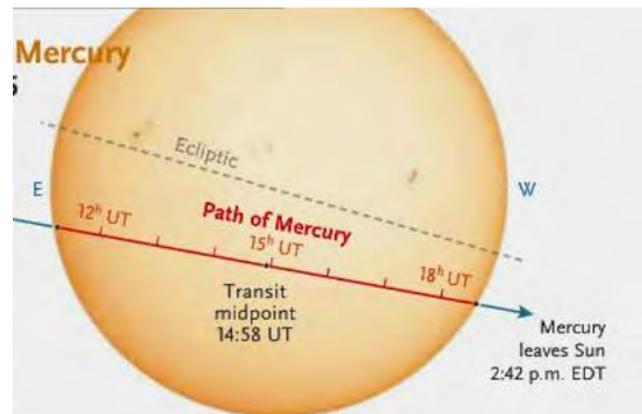
May, 2016

Vol. 27 No. 5

Mercury is a very small Actor on a very large stage this month!



...stacked frames, Mercury transit, 2000.



...expected path 7:00-14:45 May 9,2016 (S&T)

***DO** come to The Schmidt Observatory Monday MORNING, May 9th, before 7am, to observe the Transit of Mercury across the face of the SUN, We will observe through at least two telescopes... one black and white (video), the other Hydrogen Alpha. Please see story beginning on page 2.*

CAUTION: There is great risk of immediate and permanent eye damage when observing the sun. The use of UV and IR blocking filters such as the Baader films or narrow band filters like the hydrogen-alpha telescope are essential. Join us in safely viewing the Mercury Transit.

Prepare for the Transit of Mercury: Our Next Monthly Meeting is Thursday, May 5th, at 7:30pm in the D-Y High School library. **Bernie Young**, Research Director at the Schmidt Observatory, will introduce the upcoming **Transit of Mercury** and plans for observing and recording this phenomenon at the Schmidt. Don't miss this warm-up session or the "Star Party" itself on Monday morning, May 9th.

Reminder: The next "Quarter-Moon-Saturday" Star Party (public welcome) is Saturday, May 14th at 7:30pm. We are also continuing once-a-month "New-Moon-Saturday" "work" evenings for *Staff and CCAS Members only*: May 2nd. Please see more information on both these opportunities with schedules, including a look forward to the summer schedule, on page 3.

In this issue: A Tiny Actor on a Very Large Stage! / Two new CCAS members / See the Transit at the Schmidt! / Speakers Coming to Us from HSCfA / Star Party Schedules and Times / A day-time Lunar Occultation / Mars at its Best! / Saturn Right Behind! / Eta Aquarid Meteors for a whole month! / "Cambridge Explores the Universe" by Jim Lynch /

Bright New Stars:

We are pleased to welcome John Tulik to membership in CCAS. John joined us at our April 7th meeting. He and his wife Kelly McCarthy recently moved to Truro. He was a member of the Gloucester Area Astronomy Club and the North Shore Astronomy Club in the past. He has a 10" Celestron reflector and is continuing to learn how to use it. Welcome John and Kelly!

We are also happy to welcome Jeannie Woelfel Sumner to membership in CCAS. In her first contact with us by email, Jeannie reports that, after many years of looking forward to it, she recently acquired a Celestron Nexstar 8 SE Schmidt-Cassegrain telescope and is super enthusiastic about how much fun it is.

Jeannie lives in Wareham, has a sister who lives in Dennis, and has offered to help with meetings or Star Parties as she becomes familiar with CCAS. We look forward to meeting you and your sister, Jeannie. Welcome aboard!

We like to profile new members in our Society in this section of First Light each month. If you are a new member and have not yet been so recognized, or might have new information for us (background, astro equipment preferred, interests, etc.) on yourself or someone else, please let us know (email info@ccas.ws).

MEMBERS: PLEASE CONSIDER SUBMITTING AN ITEM OR ARTICLE FOR PUBLICATION IN *FIRST LIGHT*.

CCAS News Items and Current Events:

"Star Party, 7:00am, Monday, May 9th, to Observe the Transit of Mercury:

A rare Mercury transit of the Sun visible in its entirety for east coast observers lucky enough to have clear skies is coming up Monday, May 9th.

The Werner Schmidt Observatory invites all to observe the event in black and white (video) and in hydrogen-alpha. Plan on getting to the Dome at 7:00am, latest.

First contact occurs at 7:12 am EDT at altitude 18 degrees. Egress occurs at 2:41 pm when the sun is obviously high in the sky. This is a long duration event and offers ample time for still and video photography. Public welcome!

Mercury is only 12 arcseconds in apparent diameter, so a magnification of 50 or greater is suggested. Projection methods commonly used for eclipses and sunspots may not be successful.

CAUTION: One more time: There is great risk of immediate and permanent eye damage when observing the sun. The use of UV and IR blocking filters such as the Baader films or narrow band filters like the

hydrogen-alpha telescope are essential.

Join us in safely viewing the Mercury transit. If you observe at home, be sure you are using the proper filters and cover any finderscopes.

In the event of cloudy weather, we will attempt to follow the live-streaming of this event offered on the internet by other observers.

Please see the excellent articles in the May issues of *S&T* (p48) and *Astronomy* (p 62) on the upcoming transit event.

CCAS Meetings:

Many thanks to Joel Burnett, Hank Ricci, Bernie Young, and Charlie Burke for their contributions to the "State of the Observatory" presentation at our meeting on April 7th. Joel reviewed physical and technical improvements in our facility, highlights of recent and upcoming star parties and educational programs at the Dome and at local schools; Hank showed some spectacular astrophotos and discussed techniques; and Bernie Young introduced the group to photometry and our new capabilities in measuring the brightness of observing targets. The capabilities and programs at our own Schmidt Observatory are world class. Thanks to all.

Upcoming Meetings:

Our next monthly meeting: is Thursday, May 5th, at 7:30pm in the D-Y High School library. **Bernie Young**, Research Director at the Schmidt Observatory, will introduce the upcoming **Transit of Mercury** and plans for observing and recording this phenomenon at the Schmidt. Don't miss this warm-up session or the "Star Party" itself on Monday morning, May 9th.

We are pleased to announce that the first of several staff members from the Harvard Smithsonian Center for Astrophysics have been lined up to speak at CCAS meetings by Jim Lynch. The first of these will be with us at our meeting on Thursday, June 2nd. **Anastasia Fialkov**, an ITC Fellow (Institute for Theory and Computation) at HSCfA is a theorist working with radioastronomy observers. She will speak to us on **the 21-cm line of neutral hydrogen**, a wavelength of light which can be observed from very early times. She will discuss the properties of these signals and what we can learn about the very early stages of the universe.

Professor Emeritus Larry Marschall of Gettysburg College, astronomer, teacher and always an excellent speaker, will speak to us at the July 7th meeting on new information about **Pluto** gleaned from data collected by NASA's New Horizons mission. More information, when available.

Finally, we are pleased to announce that HSCfA Professor **Antony A. Stark** will speak to us at the **August 4th** meeting. Professor Stark will speak on **Cosmology with the South Pole Telescope**. Here is his abstract:

The South Pole Telescope (SPT) is designed for observational cosmology, the detection of faint features in the Cosmic

Microwave Background. After many years of preliminary work at the Amundsen-Scott South Pole Station, the South Pole Telescope became operational in 2007, and has been scanning the sky around the Galactic Poles ever since. Discoveries include detection of clusters of galaxies by the Sunyaev-Zel'dovich (SZ) effect, first detection of lensed galaxies in the early Universe, and measurement of features in the Cosmic Microwave Background. We'll discuss how these results contribute to understanding the Big Bang and the formation of structure in the Universe. This is a new chapter for us at CCAS following on the talk by HSCfA Post-Doc Colin Bischoff way back in August 2013 in which he introduced us to the work at the South Pole Station searching for B-mode radiation in the CMB. At that time, there was some evidence for B-mode radiation but the data was confounded some by interferences in the signals. We look forward to an update by Professor Stark.

Reminder:

Gus Romano (or his delegate) “hosts” a Dutch-treat dinner gathering for members and friends on each CCAS meeting night (before the meeting) at the South Yarmouth Hearth & Kettle restaurant at 5:45pm; (the meetings begin at 7:30 at D-Y.) The speaker for each meeting is always invited.

Please join the group to dine and talk about all things interesting, including astronomy! The H&K is at 1196 Rte 28, South Yarmouth, about a half mile west of the Station Avenue/Main Street intersection with Rt. 28 (traffic light).

Mike Hunter, CCAS President, is our Program Chairman. Please contact Mike or info@ccas.ws if you have any leads on speakers for September and beyond.

Members, *PLEASE* participate in the effort to recruit good speakers to present programs in astronomy and related sciences at our meetings.

Please let us know if you have any leads...
or, even better, volunteer to give a talk yourself!

The 2015-2016 **Dues cycle** began at our July meeting. Dues for most folks are \$30/year. We need this money to pay our bills and support our Observatory! Please bring your check to the next meeting or mail right away to: CCAS, 34 Ridgewood Rd. Orleans MA 02653. Thank you.

Thank you all for a very good response this time around. We still have several active members who are more than a year in arrears. Please, everyone, “get current” as soon as possible.

The Cape Cod Astronomical Foundation is now participating in the AmazonSmile program (<http://www.smile.amazon.com>); please go to this Amazon login page and sign up. Going forward, 0.5% of the price of all your Amazon purchases will be donated to the Cape Cod Astronomical Foundation when you are a signed-up participant.

The minutes of the April meeting are on our website; click on the “Minutes” button at www.ccas.ws or click here <http://www.ccas.ws/minutes/ccasminutes040716.pdf>

From the Dome:

CCAS Members: Once again: There are many good things happening these days at The Schmidt. Please consider *involving yourself*. Contact Bernie or Joel directly if you can help or notify us at info@ccas.ws and we'll pass your interest along.

“Winter” Schedule of “Quarter-Moon-Saturday” Star Parties Continues; Summer Schedule of Weekly Thursday Events begins June 23.

Want to know what a “Quarter-Moon-Saturday” Star Party is? Our website (“Star Parties and Activities Info” button) describes it this way:

From September thru June, we will have one regularly scheduled Star Party each month on the Saturday closest to the date of First Quarter Moon (about 7 days old.) **Please note: in May and June, start times will be 8:30pm because of the later sunset times.**

When the moon is near its First Quarter, the terminator (the line dividing light from dark) is favorable for viewing sunlight or shadow on the sides of craters. This time is also good for observing the dark side of the moon occult (cover) stars in the sky beyond it as it moves in its orbit.

The continuing schedule for “Quarter-Moon Saturday Star Parties” follows. *Public always welcome.*

The **May** and **June** events will begin at **8:30pm**:

Saturday	May 14 th
Saturday	June 11 th

Please note: The Summer Schedule of Every Thursday** Star Parties at The Schmidt Observatory begins Thursday, June 23rd, and ends on August 25th. Starting time: 8:30pm; ending time: 10:30pm. (**Except on CCAS Meeting Nights which will be July 7th and August 4th.)

FOR MEMBERS ONLY:

“New-Moon-Saturday” Work Sessions at the Schmidt Continue:

The continuing schedule for “New-Moon-Saturday” Member Work Sessions follows (**Start Time 8:30pm**):

Saturday	May 2 nd
Saturday	June 4 th

These meetings, held each month on the Saturday closest to the New Moon, provide a regular opportunity for CCAS members to work on projects at the Dome and/or to become better acquainted with our equipment and more involved with Dome activities and operations including maintenance. If you are a CCAS Member, and not yet involved at the observatory, this is your opportunity to join in, have fun, share stargazing, learn about observing and using our Equipment with the Observatory Staff.

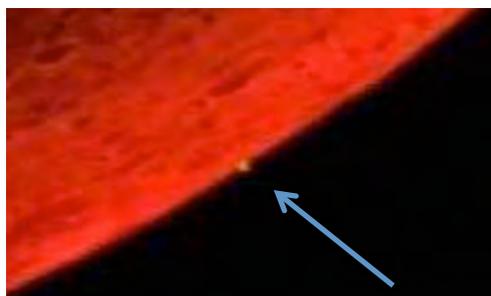
As always, "Private" group or individual observing sessions at the Werner Schmidt Observatory may be scheduled by contacting Observatory Director Joel Burnett at Joelburnett@comcast.net or sending an email to info@ccas.ws

Our Society exists to promote observing! Help us promote this objective by asking for time at the Dome! CCAS has both 8" and 14" Dobsonian telescopes for loan to members. Contact info@ccas.ws if you wish to borrow one.

Daytime Lunar Occultation of Bright Star Aldebaran:

A daytime lunar occultation of mag 1 star Aldebaran occurred late Sunday, April 10th. Hank and Marylou Ricci, Bernie, and his 10 year old neighbor and family watched the disappearance and re-appearance events. To diminish the blue-sky background and improve contrast, our Mallincam was fitted with a Wratten 25A filter. This is a classic technique brought over from the film camera era.

The moon first snuffed out the star at 6:55pm; the re-appearance took place on the bright edge of the moon at 23:57:54 GMT, 7:57:54pm EDT. In Benie's dramatic photo shown here, Aldebaran can be seen (arrow) as it emerges



from behind the bright limb of the moon as it retreats eastward.

Bernie reports: "In a request for data, our Australian colleague Dave Herald wrote "The typical rate of motion of the lunar limb relative to the star is around 0.3"/sec. At 30 frames/sec (NTSC), you have an angular resolution of 0.01"/frame. For double stars we already make use of multiple observations to measure the double star parameters of separation and PA at that resolution. For a star with a large angular diameter such as Aldebaran, the possibility also exists

to map the light distribution across the stellar disk. The code to achieve this is not yet written in Occult, but is quite do-able. But we can't do anything until we have observations being reported! "

A video of this event can be seen at the Schmidt Observatory.

April Observing:

Observing Resources:

Please see resources in the May issue of *Astronomy Magazine*, pp 36-43, and *Sky and Telescope*, pp 41-56, and Reference 5 for good guides to the sky. See *AM*, p41, *S&T*, pp 50-51 and reference 6 for positions of the moons of Jupiter and Saturn and special phenomena of the moons of Jupiter this month.

Highlights in the Night Sky for May

Last month we featured **Mercury as "the STAR"**; this month, we feature it as **"a very small star on a very BIG stage"**! Please see our front page story, and, on page 2, more information about plans to observe the **Transit of Mercury** at our own Schmidt Observatory on the morning of Monday, May 9th, and an introduction to the subject in a presentation by Bernie Young at our meeting on May 5th.

Mooncusser's Almanac and Monthly Alert¹			
MAY 2016			
Object	MAY 1 (EDT)	MAY 15 (EDT)	MAY 31 (EDT)
Sun	R: 05:36 S: 19:39	05:20 19:53	05:08 20:08
Moon	R: 02:41 S: 13:35	14:04 02:40	02:28 14:45
Mercury (transit 5/9)	R: 06:00 S: 20:43	05:03 19:00	04:13 17:59
Venus (in the sun)	R: 05:18 S: 18:45	05:07 19:19	05:05 19:57
Mars (all nite)	R: 21:42 S: 07:05	20:31 05:54	19:03 04:28
Jupiter (evening)	R: 14:29 S: 03:32	13:34 02:37	12:34 01:35
Saturn (all nite)	R: 22:12 S: 07:42	21:13 06:44	20:04 05:36
Uranus (predawn)	R: 04:49 S: 17:53	03:56 17:02	02:55 16:02
Neptune (predawn)	R: 03:18 S: 14:28	02:24 13:34	01:21 12:32
Pluto (late nite)	R: 00:30 S: 10:00	23:34 09:04	22:30 08:00

The Other (Yawn!) Planets:

- **Mars** continues its best showing in ten years this month rising about an hour after sunset on May 1st as noted in the chart below. It is at opposition during the night of May 21-22 and at its closest point to earth *in a decade* a few days later on May 30th. At its closest, it will be mag -2, as bright as Jupiter, and, having angular diameter 18.6" will make possible study of many surface features through a good telescope on a night of good "seeing".
- Our Almanac Chart shows that **Saturn** rises right behind Mars each night during May. DO enjoy Saturn and the movement of its moons all during May. Saturn is approaching opposition day, June 2nd.
- Transiting on May 1 about 9pm, and earlier as the month moves along, **Jupiter** and its moons will continue to please. They are high in the sky during prime viewing hours. Enjoy!

The Eta Aquarid Meteor Shower:

Not the most spectacular... but long lasting and very reliable, the **Eta Aquarid Meteor Shower** peaks sans moonlight (new moon) predawn the nights of May 5th and 6th; at peak, 40 meteors/hr can be expected. But don't limit yourself to predawn on those two nights. The earth's orbit passes through debris left behind by Halley's Comet for more than a month from April 19th through May 28th...so look for shooting stars any time you're outside in the dark; if you see a flash, its likely an Aquarid! Focus especially on the east/southeast where the radiant is below the horizon until a bit after midnight, but the meteors are not constrained by that.

Minima of Algol^{1,3}, May:

Algol, a variable double star in Perseus, shines normally at mag 2.1 but once every 2.87 days dims to mag 3.4. The

dimming is caused by the dimmer of two self-orbiting stars eclipsing the brighter as viewed from earth.

There is one convenient evening occurrence of the Minima of Algol this month: Tuesday, May 17th, at 10:49pm

Using binoculars or a small telescope, try to begin viewing two to three hours before the minima to watch the dimming (record magnitudes now and then by comparing Algol with neighboring constant magnitudes) and up to two to three hours after the minima to watch the brightening.

Declination Tables for the Moon² during this month. Please contact your editor for information or sources.

Moon Phases, May, 2016

New Moon, Friday, May 6th, at 3:30pm EDT

Moon is at perigee, same day: HIGH TIDES

First QTR, Friday, May 13th, at 1:02pm, EDT

Full Moon, Saturday, May 21st, at 5:14pm EDT

Last QTR, Sunday, May 29th, at 8:12am EDT

NOTICE: NEW COPIES OF THE BROCHURE INTRODUCING CCAS AND ITS ACTIVITIES ARE AVAILABLE; INQUIRE AT info@ccas.ws IF YOU WISH COPIES

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Cambridge Explores the Universe

by Jim Lynch (CCAS, WHOI, ASA)

If you wanted to guess at the scientific capital of the United States, Cambridge, Massachusetts would probably be an excellent first guess. Home to Harvard and MIT, and neighboring many other excellent colleges and universities in Boston, Cambridge is a scientific and engineering mecca. Astronomy, too, has a larger than life presence here, with the Harvard Smithsonian Center for Astrophysics (HSCfA) being located on 60 Garden Street, only a fifteen minute walk from the center of the Harvard campus. Here, about 900 astronomy professionals work on almost all the areas of modern astronomy and astrophysics.

We at CCAS have been fortunate to have some of their staff visit and present lectures at our meetings, and thanks to our making some further contacts, we are due to see some more of these exciting presentations in the coming year.

One of the things that Cambridge is also noted for is the generous public outreach of its famous institutions. In science, Harvard, MIT, the Boston Museum of Science, and the City of Cambridge have all joined forces to create a yearly Cambridge Science Festival, which this year was held from April 15-24. The HSCfA has a component of that Festival called "Cambridge Explores the Universe," which features a large open house, replete with lectures, tours, exhibits, and hands-on demonstrations. This year, it was held from 12 noon to 4 PM on Saturday, April 23rd.

Mike Hunter and I (Jim Lynch) had been working to get speakers from the HSCfA, and, with the help of postdoc Peter Williams, (whose mother recently donated some excellent telescopes belonging to Gary Williams, deceased, to CCAF) we have had a wonderful response. Given that response, I decided to go to the HSCfA open house, and meet whoever I could from the Center. Sadly, my wife Christine had to work that afternoon (librarians never rest!), but I did enlist a scientific visitor from Haifa University, Dr. Boris Katznelson, to accompany me. Boris and I are both physicists by training, so a day looking at astrophysics didn't seem like a bad idea at all!

When we got to HSCfA, we met Peter Williams, who studies (among other things) red dwarf stars, and recently had a very exciting article about a rather anomalous dwarf published in the prestigious *Astrophysical Journal*. Peter steered us to both a good lunch and to the Center for the HSCfA events, which seemed rather undersubscribed as we arrived at noon sharp. (That changed quickly, as soon as the rain stopped!)

The first orders of business were to get a program and to get oriented. In the main area were the tour sign-ups, as well as several activities for both children and adults. A big screen showed a film on the construction of the Giant Magellan Telescope in Chile, for which HSCfA is a consortium member.

A postdoc at the "Ask an Astronomer" table explained some details to Boris and me, while we gazed raptly at the screen. (It turns out that, for a billion dollars, you can buy a heckuva nice telescope!) Also in the main area were computer screens where K-12 students could do image processing of galaxy images, with easy to use software, and younger children could do some coloring activities. These booths/tables were big hits as the day went on.



We then signed up for the first one of the four tours available, the 1.2 m radio telescope tour, which features an instrument still actively used for research. (If you're scratching your head over 1.2 m, worry not. This radio telescope looks at millimeter wavelength molecular lines, and not the 21 cm line of hydrogen. So the antenna size scales to wavelength, and is perfectly adequate.)

Senior HSCfA astronomer Tom Dame gave a wonderful "all ages" lecture about how the scope we were looking at mapped out the giant molecular clouds of the Milky Way, which is one of the Center's most famous lines of research.

We then went to see the Solar Dynamics Observatory Control Room lecture, which featured a humongous multi-screen image of the sun in "near real time." These images are brought in (as is much data these days) from satellite relays on Svalbard,

Norway (a beautiful island from which I have gone out to sea often), and then analyzed by laboratories around the world, with HSCfA being a prominent one of them. One of the most intriguing parts of the lecture for Boris and I was not the science per se (which was interesting, of course!), but a bright young girl of perhaps ten who asked absolutely penetrating questions of HSCfA staff scientist Nicole Schanche, who was giving the talk. One could see a young scientist in the making, which is a large part of what the Cambridge Science Festival (and our own CCAS effort) is about.

The last lecture we attended was on the historical Great Refractor that Harvard used in the 1800's. Lecturer Sam Palmer gave a great history talk about what was, when it hit first light, the largest telescope in America. I got to sit in the (historical, of course) red velvet observers cushion, which was about the only comfortable amenity an observer back then would have!

Before leaving, I was able to touch base briefly with Ms. Mary Dussault, of the Center's Science Education Group, and I'm hoping that we can establish a good link with her group, and exchange ideas on educational programs.

All in all, a wonderful day, well spent with some very interesting people. I would heartily encourage any and all CCAS members to visit one of HSCfA's many open events, and get to know some of the very accomplished (and quite approachable) folks that work there.

Many thanks, Jim Lynch, for a wonderful essay on your wonderful experience at Cambridge, and your invaluable work in recruiting astro speakers for us at HSCfA.

.....Masthead and References Continued on Next Page.....

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Cape Cod Astronomical Foundation

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The **Cape Cod Astronomical Society** meets at 7:30 pm on the first Thursday of every month in the library of the DennisYarmouth Regional High School in Yarmouth, Massachusetts. Meetings are open to the public. Membership dues are \$30 for adults, \$15 for students in two year colleges and part year residents, and no charge for spouses or for students in K12 schools.

REFERENCES AND NOTES FOR THIS ISSUE:

- 1) Information for The Mooncussers Almanac and Monthly Observing Alerts was extracted from Sky Events, Astronomy Magazine Online (Astronomy.com), Stargazing.net's Planet Rise/Transit/Set calculator (<http://www.stargazing.net/mas/planet2.htm>), *Astronomy Magazine*, *Sky & Telescope Magazine*, *Sky and Telescope Skywatch 2011*, and other sources. The *Observer's Handbook, 2010 and 2011*, published by The Royal Astronomical Society of Canada is also an important reference, particularly for information on lunar libration and declination and the minima of Algol.
- 2) Information on how Libration and Declination Maxima and Minima can make visible parts of the moon normally hidden was reviewed in the January2007/January2008 *First Light*. Quick recap: Max Long brings to view extra right side; Min Long, extra left side; Max Lat, extra north side; Min Lat, extra south side. Max Dec puts it high in our sky during its transit; Min Dec puts it low.
- 3) Algol is an eclipsing variable star in Perseus which has its brighter component eclipsed or covered by its companion once every 2.87 earth days. When the dimmer component is not eclipsing the brighter, Algol appears typically about magnitude 2.1; when eclipsed, magnitude 3.3 The minima usually lasts about two hours with two hours on either side to bring it back to mag 2.1. Good comparison stars are γ Andromedae to Algol's west, mag 2.1, and ϵ Persei to its east, mag 2.9. S&T's reliable calculator for Minima of Algol dates and times can be found at: <http://www.skyandtelescope.com/observing/celestial-objects-to-watch/the-minima-of-algol/>
- 5) Here is the web address for Astronomy Magazine's "The Sky This Month" online for May: <http://www.astronomy.com/magazine/sky-this-month/2016/03/red-planet-delights>
- 6) S&T's interactive Java utility for showing the positions of Jupiter's main moons for any date and time: <http://www.skyandtelescope.com/observing/objects/planets/3307071.html>
for Saturn's moons: <http://www.skyandtelescope.com/observing/objects/planets/3308506.html>