



First Light

The Newsletter of the Cape Cod Astronomical Society



February, 2011

Vol.22 No. 2

What We Thought in Antiquity

Birds may flit around us as we sit in the woods, and we note them as black, yellow, pretty, or whatever...

... and we think we are getting all the pleasure we can from them;

...but interest quickens when one comes along that we can name...

...at once it has individuality and an importance which none of the rest have.

So it is with the stars; as a starry night is beautiful and we gaze at it and enjoy it and do not care to know more about it in detail...

But if by chance we come to know by name one bright star, it immediately separates itself from all the others...

And becomes an Individual.

If we enlarge our acquaintances in the skies, the whole aspect of the heavens is changed...

And, instead of a brilliant assembly of impersonal points of light,

We now see a host of individuals that we know as bright Capella, somber Betelgeuse, and others.

[This from the Introduction to *The Friendly Stars*, page 4, by Martha Evans Martin, a Star Guide published more than 100 years ago. The author makes the very important point that each one of us can claim familiarity with, indeed, claim friendship with objects in nature, only after we can name them. Please see reference 7 to peruse this old book online.]

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- **Next Monthly Meeting:** is Thursday, February 3rd at the D-Y Library. Paul Blackmore, staff photographer for *The Cape Cod Times*, will present a program: **Celestial Landscape Photography**. (Please see the moving banner and the "tail of the rocket" on our website's home page for more information on Paul and other upcoming speakers and topics.)
 - Treasurer's Report: As of January 1, 2011, 93% (43 members) of those members not having dues-exempt status (Lifetime, spouse, etc.) have paid dues for the current cycle. Kudos and thanks to all those members! Please see page 3 for more information.
 - The last scheduled Star Party for this season took place in October. Sometimes emails will be sent out to alert members to special opportunities coming up at the Dome. Contact info@ccas.ws or Mike Hunter, Observatory Director, if you wish to set up a **special Star Party** for your group during the winter or spring months. MEMBERS, particularly newly joined: we would like to provide you an opportunity to observe and to learn. If you would like to spend an evening at The Schmidt, contact us and we will try to schedule.
 - In this issue: Treasurer's Report / February Observing / Asteroid Iris / Algol Minima at prime time this month / How to Determine Dec and RA for the sun and the azimuth for north with a piece of cardboard!

Bright New Stars:

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 have new information for us (background, astro equipment preferred, interests, etc.) on yourself or someone else, please let us know (email info@ccas.ws).

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

If you are a regular contributor, thank you very much!

Many thanks to Bernie Young for his article (page 5) on how to determine Dec and RA for the sun and the azimuth for north with a piece of cardboard!

CCAS Events

It may be the “little things we do” that are most important in encouraging inquirers to climb the small hurdles that we all encountered in the learning curve in amateur astronomy. For example, just this past month, one member spent several hours with a new member explaining some of the “tricks” involved in aligning a GoTo scope; another member spent several hours with an astronomy teacher sharing ideas on approaches to teaching key concepts; a third member coached a neighbor on how to set up a scope; finally, a fourth member fielded an inquiry from a high school student looking for volunteers to help with a class project. If we want to attract new blood to amateur astronomy, particularly young folks, these kinds of outreach one-on-one are key. Kudos to all for their efforts here this month. Let’s double such activity in the months ahead.

Many thanks to Paul Cezanne, for leading a lively discussion of some options in the world of planetarium/sky-charting software at our meeting on January 6th. Thanks also to Tom Leach and Mike Hunter who participated in software demos. Paul introduced us to two programs: Astromist and Stellarium; the former is a economical powerful sky charting program that runs on many handheld devices; the latter, remarkably, a free program, is a bit more robust and runs on PC and Mac computers.

Tom introduced us to TUBA, a Touring the Universe Through Binoculars Atlas, and Mike briefly profiled several apps that run in iPhone, iPod, or iPad, including “3D Sun” and “Moon Globe”.

At our meeting on February 3rd, Paul Blackmore, staff photographer for *The Cape Cod Times*, will present a

program: **Celestial Landscape Photography**. Paul’s specialty is to shoot nightscapes which incorporate the land and the stars over a long period of time which result in enchanting images that cannot be captured by the human eye. He is a self-taught photographer who has won many New England Press Association awards as well as awards from the New England Associated Press News Executives Association. Paul is a dynamic prize-winning photographer who teaches photography “so the novice photographer can understand it. He works as a photojournalist, but his passions are landscape photography and nightscapes. He is a board member and a founder of the Photographic Society of Cape Cod.

On March 3rd, CCAS’ Bernie Young will present a program: **“Occultation Astronomy.”** Bernie has taken on a key role in advancing our ability to observe and record data on lunar, asteroid, and planet occultations of stars. Bernie’s introduction to astronomy began when his 6th grade class won a Star Pointer, a combination calculator and equatorial mount made out of cardboard. [Please see the Feature Article on page 5 of this issue of *First Light* for an overview of a remarkable daylight use for a Star Pointer.] Bernie’s interest in the sky lay dormant until three years ago when he joined CCAS and became a frequent star party participant. That led to an invitation to join the observatory staff. Last spring he was appointed member of the Cape Cod Astronomical Foundation to serve as Director of Research and Development. He is a registered professional engineer and a professional land surveyor in private practice.

At our meeting on April 7th, optical engineer Peter Howes will present a program **“Evolution of Large Mirror Telescope Systems at the Haleakala Observatory.”** The observatory stands at an altitude of 10,000 feet. Starting in 1969, the Avco Everett Research Laboratory won the management contract for the observatory and Peter was responsible for this program for over a decade. He will talk about the early days when the technologies were developmental and the evolution of large mirror systems moved from huge monoliths to the early days of compensated imaging. Because of the remarkable clarity, dryness, and stillness of the air, and its location above one-third of Earth’s atmosphere, as well as the limited light pollution, the summit of Haleakala is one of the most sought-after locations in the world for ground-based telescopes.

Thanks again to Tom Leach, who continues to put together great programs of speakers for our meetings. Speakers for the CCAS Lecture Series are now fully scheduled through our July meeting! If you would like to take a peek at what’s coming up beginning in May, take a look at <http://www.ccas.ws/monthlynotice.html> or

look in the “tail of the rocket” on our main website page.

Members, **PLEASE** participate in the effort to recruit good speakers to present programs in astronomy and related sciences at our meetings. Please send any ideas or contact information to Tom Leach, our President and Program Chairman. For sure he will follow up.

Or, even better, volunteer to give a talk yourself!

The minutes of our January meeting prepared jointly by Charlie Burke, our Secretary, and Peter Kurtz are on our website; click on the “Minutes” button at www.ccas.ws or go to <http://www.ccas.ws/minutes/ccasminutes010611.pdf>

Executive Corner

Members of The Executive Board exchange ideas by email and phone on a continuous basis and now and then formally convene by conference call. Anyone wishing to offer an item to the agenda, please contact Tom, Paul, Peter or Charlie.

Treasurer’s Report:

Membership and Dues: We are pleased to report that CCAS now has 61 active members. Of these, 15 are "exempt" from dues because of special status (Lifetime Member, spouse, high school student, etc.) That leaves 46 members eligible to pay dues. At the beginning of 2011, 43 of those 46 folks (93%) are up-to-date on dues payment for the July 1, 2010 dues cycle. Thanks to all members for their support of CCAS!!! If you are one of the three delinquent folks, please get on board as soon as possible! Thank you.

From the Foundation... and Dome...

As always, “Private” group or individual observing sessions at the Werner Schmidt Observatory may be scheduled by contacting Observatory Director Mike Hunter at mamhunter@yahoo.com 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. Currently, Tom Leach is using the 14” for outreach in Harwich. Robert Tobin has the 8”. If you wish to borrow one of these ‘scopes, contact info@ccas.ws

February Observing:

Jupiter and its Moons: Jupiter season is approaching its end as the planet stands lower and lower in the western sky after sunset. Jupiter stands at altitude 32° in the southwest for Cape Codders one hour after sunset at the beginning of February. Try to observe Jupiter and its moons as early in the month as you can.

We hope you were successful in observing the double shadow transits on Jupiter in January as profiled in last month’s FL. This month there are no prime time *double* shadow transits but there is a good opportunity 6:18pm to 8:31pm on February 9th when Io’s shadow will cross the planet. For us at the Cape, Jupiter is at an altitude of only 18° at 7pm that night so don’t delay making your observation. A second similar shadow transit takes place on February 16th but Jupiter will be below the horizon for observation by Cape Codders.

Uranus sits about 6° to the southwest of Jupiter; the pair have been very close for a long time now. The evening season is ending for 6th magnitude Uranus as it is for Jupiter. Now is the time to take an early evening look with binoculars or telescope.

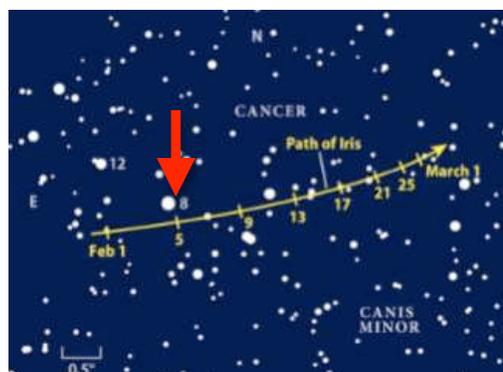
Saturn season begins! The planet, its rings and its moons rise at 10:12 for Cape Codders on Feb 1, and become prime time evening observing targets by month’s end when rise takes place at 8:21 at the Cape.

Resources for Jupiter and its moons for February:

- Position charts for Jupiter’s main moons are published in the February issues of *Astronomy Magazine* (p37) and *Sky and Telescope* (p47);
- A Chart for timing of “special” Jupiter moon events is published on page 58 of the February *S&T*. See also reference 5 for an all-season dynamic model of the moment-to-moment positions of Jupiter’s main moons at any time, any date.

A “New” Asteroid:

The **asteroid 7 Iris** crosses Cancer this month, when the



8th-magnitude object will be easy to spot through a small telescope. Its position makes it a great target in the southeast after darkness falls. Look near 5th magnitude star 8 Cancri (red arrow) early in the month and farther west as the month progresses. Start with a robust planetarium program or use a GoTo scope with up-to-date asteroid information. Confirmation: there are many dim background stars in the field where Iris lies; so the key is to make a drawing at x hour and come back at x+2 or so and see which items in your x hour drawing have moved. Avoid Feb 13 -16 when the moon will be too close and bright. Iris measures about 125 miles x 150 miles in size. See the February issue of *Astronomy Magazine*, p43 for a larger version of the finder chart.

A Good month for Observing Brightness Variations in Algol:

Algol, β-Perseii, is a classic eclipsing variable star; while about mag 2.1 during most of its variation cycle, about every 10 hours it dims for a short time to mag 3.4. Since this happens regularly on a very short time scale, the key is to begin observations at least 1.5 hours before minimum, watch it dim to 3.4, and then watch it re-brighten. February is an especially good month to take a look. Minima take place in mid-night viewing on February 7th, 1:28am; in prime time on February 9th, 10:18pm; and, again in prime time, Feb 12th, 7:07pm. Algol is nicely placed in the northwest on these dates albeit with a nearby moon.

Zodiacal Light (spring 2011 edition):

Feb 19 – March 6 is prime time to look for the Zodiacal light, a broad beam of light heading up the ecliptic from the horizon, about 80 minutes after sunset. There is a nice picture on page 43 of the Feb *S&T*. If you see it, call your colleagues and friends and let them know what’s happening!

Asteroid Occultations:

Doing a little homework on Asteroid Occultations might be in order before Bernie Young’s presentation in March on “Occultation Astronomy”. Take a quick look at the little article on Asteroid Occultations in February’s *S&T*, page 58. Three occultations of stars by asteroids in February are profiled although none of them will be viewable from Cape Cod. More to the point for us, see the “world” of asteroid occultations at www.asteroidoccultation.com/IndexAll.htm and “how to” information at www.asteroidoccultation.com/asteroid_help.htm before Bernie’s talk.

Mooncusser’s Almanac and Monthly Alert ¹ By Peter Kurtz February 2011			
Object	Feb. 1 (EST)	Feb. 15 (EST)	Feb. 28 (EST)
Sun	R: 06:52 S: 16:56	06:35 17:13	06:16 17:29
Moon	R: 06:00 S: 15:50	14:26 04:56	04:05 13:49
Mercury (near the sun)	R: 06:11 S: 15:30	06:28 16:30	06:32 17:41
Venus (predawn)	R: 03:57 S: 13:27	04:11 13:40	04:18 13:59
Mars (in the sun)	R: 07:00 S: 16:55	06:35 16:57	06:10 16:59
Jupiter (early evening)	R: 09:00 S: 21:04	08:11 20:24	07:26 19:48
Saturn (evening)	R: 22:12 S: 09:48	21:15 08:53	20:21 08:00
Uranus (early evening)	R: 08:49 S: 20:45	07:55 19:54	07:05 19:06
Neptune (in the sun)	R: 07:36 S: 18:11	06:42 17:19	05:52 16:30
Pluto (pre-dawn)	R: 04:27 S: 14:14	03:33 13:20	02:43 12:30

More details on all the events mentioned in the preceding, and others, can be found in the January issues of *Astronomy* and/or *Sky and Telescope* magazines or online at reference 4.

Moon Phases, February, 2011	
New Moon	Wednesday, Feb 2nd, at 9:31pm EST
First QTR	Friday, Feb 11th at 2:18am EST
Full Moon	Friday, Feb 18th at 3:36am EST
Last QTR	Thursday, Feb 24th at 6:26pm EST

Anyone having an interest in monthly **Libration and Declination Tables for the Moon**² or **Dates and Times for the Minima of Algol**^{1,3} during this month please contact your editor for information or sources.

Feature Article:

Measurement of the Declination and Right Ascension of the Sun, and North Azimuth using the Star Finder

by Bernie Young

I built a star finder for the astronomy students at DY to use, and brought it to the last couple of CCAS meetings where some of you may have seen it. This exercise was prompted by a desire to demonstrate something interesting you could do with the star finder on a sunny day. It also is an exercise in taking measurements of multiple variables and analyzing the results.



Star Finder setup for solar observation. The nail pins the orientation east or west of a trial azimuth.

The star finder has been constructed with a wedge angle equal to the co-latitude of the Werner Schmidt Observatory, $41^{\circ}40'N$. Coincidentally, the WSO is the same latitude where I live, so if you want to do some terrestrial latitude sailing, you may eventually find me. I have a GPS, which serves as my chronometer. I can't see Polaris in the daytime, and don't have a north azimuth line in the yard, but I do know that the house and garage are oriented about 25 degrees east of true north.

I set up my work bench on a line with one side of the garage. I established a "trial" north azimuth 30 degrees west of this line using a pocket 30-60-90 degree triangle. I put holes in a piece of plywood to provide stops so the star finder could be rotated 15, 7.5, 0, -7.5, and -15 degrees east of the trial north azimuth line. Somewhere in this plus or minus 15 degree range is true north, and that's to be determined.

Over the course of an hour, I took measurements of the declination and right ascension of the sun. The fixed variables set on the finder are the time zone (EST), longitude, (it's constructed for the latitude), day of the year, and time of day. There is no provision for the equation of time. The procedure was to adjust the right ascension and declination on the instrument until the sun projected through the sight tube (a plastic straw) onto my hand. In the "better lucky than smart category" the length and diameter of the straw resulted in a noticeably brighter spot in the projection on my hand when it was well aimed at the sun. Each measurement series began with the star finder pointed 15 degrees east of the trial north azimuth, and ended with it 15 degrees west, and consisted of recording the time (truncated to the previous minute), and the right ascension (in degrees rather than h:m:s), and declination of the sun. I started out recording angles to the nearest degree, but realized I could easily estimate to $\frac{1}{2}$ degree, and maybe even $\frac{1}{4}$ degree. At one data point per minute, it takes 7 minutes to step through the north azimuth rotation angles. Then I went back to the 15 degree east position and repeated the sequence.

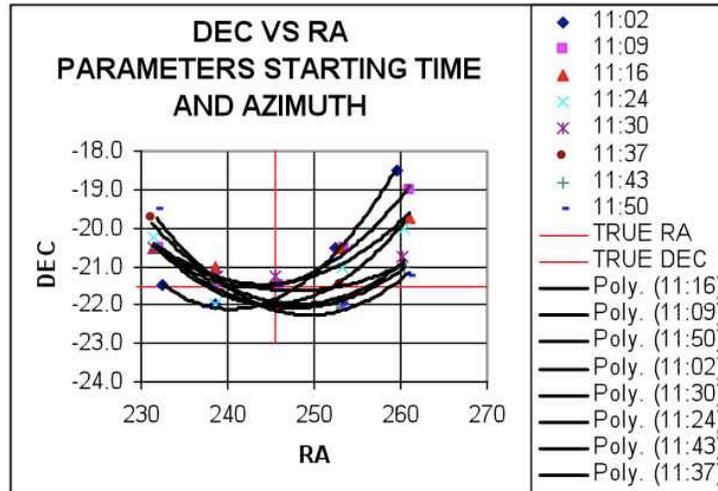
This is similar to celestial navigation in which latitude and longitude are determined by measuring the elevation of the sun several times before and after solar noon to get the maximum elevation and the time it occurs. From that you can determine your location.

The data is shown in the following figures. If I were a glutton for punishment, I would have rejected the outlying data and cross-faired the rest. I did enough of that working my way through college. A multivariate regression analysis would be good too, but I didn't want to invest the time, and my real objective was to perform a dry run of what might be a good student project. I took an

easy approach and let the spreadsheet do a crude analysis.

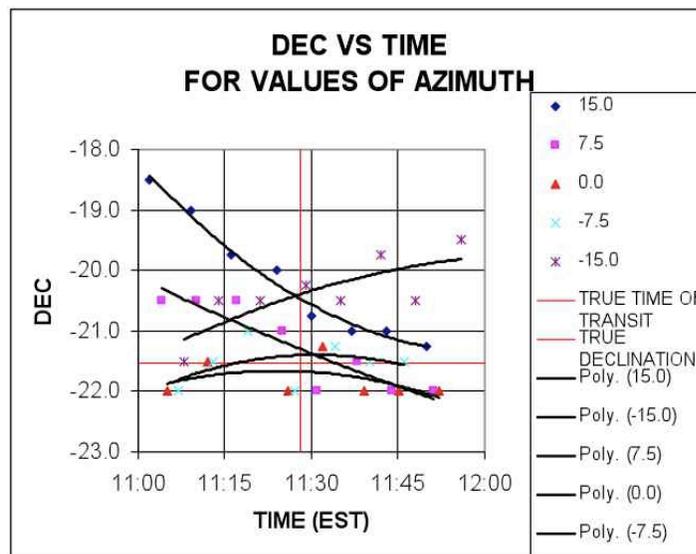
The result is the mini-max interpolation of the data. If you measure before or after local noon, or the pointer is oriented too far west or east of true north, declination is more negative. Figure 1 suggests the sun reached its highest point (most positive declination) of -21.5 degrees at 11:30. Note that this coincides very nicely with the true declination of -21.535 degrees for our date of November 29, 2010, and time of local noon, 11:28am (red lines). For a first attempt with an instrument made out of wood and paper, and an admittedly crude analysis, getting accuracy to about $\frac{1}{2}$ degree is acceptable.

Figure 1. Measuring the Declination of the Sun. If you measure before or after local noon, the minimum declination is too negative. The minimum declination is greatest about 11:30.



So which way is north? Figure 2 shows the most easterly azimuths falling steeply to the right. Conversely, the most westerly azimuths are rising to the right. This suggests some azimuth (true north) near zero would produce a curve convex up with maximum at solar noon, the time of the solar transit. At the expense of one more figure and a little calculus, -1.2 degrees (that's 1.2 degrees west) of our trail azimuth is true north.

Figure 2. Declination vs. Time, for values of Azimuth. Another series at -1.2 degrees azimuth should have produced a curve that was convex up **with a maximum at the time of transit**, suggesting that true north is west of the trial azimuth by this amount.



What if the star finder had a provision for entering the equation of time? Would there be better agreement between the measured RA and the true value? Would it result in a different estimate of true north?

What We Thought “in Antiquity”:

Please see the note on page 1.

Telescope for Sale:

Peter Mello of Eastham has an **Orion SpaceProbe 130ST EQ Reflector Telescope** for sale. Peter has decided to sell because he doesn't think he will use the scope all that much. It's been used twice. Anyone interested in purchasing this scope from Peter please call him at 508-648-0321 or send an email to Peter Mello psmello11@gmail.com

Asking price is \$225.

Features from Orion Website:

- Designed for serious beginner or intermediate stargazer
- 130mm aperture; 650mm focal length give wide field of view and bright images
- equatorial mount for hand-free celestial tracking
- includes Starry Night software.

Main | Orion SpaceProbe 130ST EQ Reflector Telescope



Got Got Any Local Photos Showing Light Pollution or “Good” Lighting?

Reminder: Please think about the opportunity to take photos documenting light pollution or “good” lighting as requested in last month's story “Local Astronomers Aim to Limit Light Pollution”. Tom Leach, our President, is working on a video portrait on the local light pollution situation⁶. Once again, Tom requests that *All interested persons send him photos which might be useful in this video story; again, local photos of GOOD light situations and, more importantly, BAD light situations. Please notify Tom directly if you have photos or let us know at info@ccas.ws.* Thank you.

**A PORTION OF THIS PAGE IS
INTENTIONALLY LEFT BLANK TO REMIND
ALL MEMBERS THAT THERE IS ALWAYS
PLENTY OF ROOM IN *FIRST LIGHT* FOR
YOUR CONTRIBUTIONS**

Cape Cod Astronomical Society

President	Tom Leach	508-237-9291
Vice President	Paul Cezanne	508-487-1456
Secretary	Charles Burke	508-394-9128
Treasurer	Peter Kurtz	508-255-0415
Observatory Director	Michael Hunter	508-385-9846
<i>First Light</i> Editor	Peter Kurtz	508-255-0415

info@CCAS.ws

Mailing Address: PO Box 207 Harwich Port MA 02646

Cape Cod Astronomical Foundation

Chairman	Werner Schmidt	508-362-9301
Vice Chairman	Michael Hunter	508-385-9846
Director R&D	Bernie Young	508-394-1960
Secretary	Ed Swiniarski	508-896-5973
Treasurer	Pio Petrocchi	508-362-1213
Observatory Director	Michael Hunter	508-385-9846
Observatory		508-398-4765

The **Cape Cod Astronomical Society** meets at 7:30 pm on the first Thursday of every month in the library of the Dennis-Yarmouth 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 K-12 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 2007*, and other sources. The *Observer's Handbook, 2007 and 2008*, 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 December2007-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.

4) *Astronomy Magazine's* online The Sky This Month online feature [http://www.astronomy.com/en/News-Observing/Sky this Month/2010/12/Venus rules the morning sky.aspx](http://www.astronomy.com/en/News-Observing/Sky%20this%20Month/2010/12/Venus%20rules%20the%20morning%20sky.aspx)

5) ALL DATES AND TIMES UTILITY FOR JUPITER'S MOONS:
<http://www.skyandtelescope.com/observing/objects/planets/3307071.html>

6) Tom Leach's draft video on light pollution: <http://www.youtube.com/watch?v=AkwLyD1YKzM>

7) *The Friendly Stars* available for perusal online:

http://books.google.com/books?id=fY4XAAAAYAAJ&printsec=frontcover&dq=The+Friendly+Stars&hl=en&ei=_VsjTMztD4P_8AbQm7STBQ&sa=X&oi=book_result&ct=result&resnum=1&ved=0CCgQ6AEwAA-v=onepage&q&f=false