THE

FLINT RIVER OBSERVER

NEWSLETTER OF THE FLINT

RIVER ASTRONOMY CLUB

An Affiliate of the Astronomical League

Vol. 18, No. 3 May, 2014

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Club mailing address: 1212 Everee Inn Rd., Griffin, GA 30224. FRAC web site: www.flintriverastronomy.org.

Please notify **Bill Warren** promptly if you have a change of home address, telephone no. or e-mail address, or if you fail to receive your monthly *Observer* or quarterly *Reflector* from the A. L.

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Club Calendar. Thurs., April 24: Gordon College observing at Abbott's Farm (9:00 p.m.); **Fri.-Sat., April 25-26:** JKWMA observings (at dark); **Thurs., May 8:** FRAC meeting/public UGa-Griffin lunar observing (7-10 p.m., the Garden in Griffin); **Fri.-Sat., May 30-31:** JKWMA observings (at dark).

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President's Message. Since we moved our meeting site from UGa-Griffin's main campus to the Garden in January, we've averaged 16.5 members and visitors at our meetings. **Bill Warren** says he's not exactly sure what half a person is, but we're very pleased with the results of that move. We haven't managed to attract many visitors to our lunar observings so far, but we're working on it and will continue to do so.

Meanwhile, thanks to those of you who have brought your telescopes to the meetings and observings. The sky over the Garden is surprisingly dark for a site so close to Griffin (population: 24,000), and at least half of our meeting attendees have stayed around for the observings afterward. Bringing your telescopes has allowed visitors and club members who aren't able to attend our club observings regularly to enjoy many of the night sky wonders that we see at JKWMA.

As I mentioned at our April meeting, one of my long-range dreams for FRAC is for us to have a permanent observing site of our own, or at least a site where we can set up on a permanent basis. I don't want to say too much at this point, but I'm looking into a way that we might be able to do it at little or no expense and great benefit to the club. I'll let you know more about it after I investigate it more fully.

-Dwight Harness

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Last Month's Meeting/Activities. On April 3rd, **Dwight Harness, Steve Bentley** and **yrs. truly** gave a noontime indoor presentation and outdoor solar viewing to about 25 members of the Pike Co. Kiwanis Club in Concord, Ga. The buffet lunch (at Concord Café) was splendid, and the Kiwanians were highly receptive to our presentation and viewing.

We had three visitors –**Teresa Watson; Kathy Holloway;** and **Stephen Byous** – and 17 members **(Steve Bentley; Sarah & David O'Keefe; Smitty; Larry Higgins; Jessie Dasher; Tom Moore; Felix Luciano; Joseph Auriemma; Aaron Calhoun; Mason & Erik Erikson; Tony Quinn; Truman Boyle; Dwight Harness; Carlos Flores;** and **yr. editor)** at our April meeting. Other visitors

arrived after the meeting, and with the sky's thoughtful cooperation we were able to show them a lot more than just **Jupiter** and the waxing gibbous **Moon.**

On April 12th, **Dwight Harness, Larry Higgins, Steve Bentley, Erik Erikson** and **Carlos Flores** represented FRAC with an astronomy booth at Bluebirds & Bluegrass Festival 2014 at Dauset Trails. The crowd was huge – more than 2,700 attendees -- and our guys were busy throughout, showing folks the **Sun** and talking about astronomy and FRAC.

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This 'n That. From **Alan Pryor:** "Went to see a fortune teller. She said she saw a clear night in my future. She did not say when."

*****The **Tennessee Spring Star Party 2014** will be held at Fall Creek Falls State Park near Spencer, TN from **Fri.-Sun., May 2nd-4th.** Admission is free – there is no registration or registration fee – and you can park your car, pickup truck, SUV or van on the observing field with your telescope.

However, the observing area is not a designated camping area, so travel trailers, tents and large RVs are not allowed on the field. You can camp at the designated campground or reserve a room at Fall Creek Falls Inn at a special astronomy event package rate. The Inn is within easy walking distance of the observing field, but a shuttle service will also be available to take you to or from the Inn or the observing field until 10 p.m. on Fri. & Sat. nights. A hospitality tent will offer free coffee, hot chocolate and refreshments for late-night observers.

From 11 a.m.-3 p.m. on Saturday, amateur and professional astronomers will deliver talks. Vendors will have astronomy equipment for sale on Fri. & Sat. On both nights, introductory workshops will be conducted at 8 p.m. to acquaint newcomers to astronomy with the use of telescopes and planispheres (star wheels) in learning to navigate the night sky.

For additional information about **TSSP 2014,** contact **Lloyd Watkins** at 615-824-3005 or watkinslk@comcast.net.

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***Upcoming Meetings/Activities.** With darkness coming later every evening and summer vacations drawing nigh, our May schedule is rather sparse.

At 9:00 p.m. on **Thurs., April 24th,** we'll conduct an observing for **Dr. Schmude's** Gordon College students at Abbott's Farm near Barnesville. There is no rainout date.

To get to Abbott's Farm from Griffin, go south on the 4-lane U. S. Hwy. 19/41 Bypass. It's 19.1 mi. on the 4-lane from Williamson Rd. (Ga. Hwy. 362) to Brent Rd. on the left. Turn there, and turn left again into the unpaved driveway of the first house on the left.

We'll have JKWMA observings on **Fri.-Sat., April 25th-26th,** and again on **Fri.-Sat., May 30th-31st.**

Our FRAC meeting/UGa-Griffin public lunar observing will be held from 7-10 p.m. on **Thurs., May 8th** at the Garden in Griffin. We've found to our delight that the site in fact offers much darker skies than our old site on the main UGa-Griffin campus. Our speaker, **Dr. Richard Schmude, Jr.,** will talk about his recent studies of **Mars,** with emphasis on the **North Polar Cap** and his latest brightness studies of the red planet.

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The Night Sky in May. There may be a new meteor shower after midnight on the evening of May 23rd-24th. The meteors will be debris from periodic comet **209P/LINEAR,** a small, faint comet that will pass within 280,000 mi. of **Earth's** orbit five days after the shower.

If the shower develops as expected, its meteors will be bright, slow-moving, and will remain in view longer and farther across the sky than other meteor showers such as the **Perseids** (August) and **Geminids** (December). This shower will be called the **Camelopardalids** (KAM uh loh PAR duh lidz) because its radiant – the area from which its meteors appear to be coming, no matter where they are seen in the sky – is in the constellation *Camelopardalis,* near **Polaris,** the North Star**.**

Observing this first-time visitor through the solar system will be confined to the hours between 1:40 a.m.-4:50 a.m. EDT on the 24th, with the peak at about 3:10 a.m. Meteor experts predict a peak rate of about 100 meteors per hour. Viewing conditions should be good, since the waning crescent **Moon** won't hinder observing.

Another meteor shower, the **Eta Aquarids,** should produce some similarly long streaks across the sky on the evenings of May 5th-7th. Like most showers, the closer to dawn you observe, the more meteors you're likely to see. They will appear to be coming from the SE.

New **Comet PanSTARRS (C/2012 K1)** will shine at mag. 7 or 8 in moonless skies from May 1st-3rd, and again from May 21st through the rest of the month. On May 1st, it will lie 2° N of **M51 (Whirlpool Galaxy)** in *Canes Venatici.*

As for the planets, well… **Jupiter** (mag. -2.0) will be up in the western sky until about midnight in mid-May. On May 5th, Jupiter's Galilean moon **Ganymede** will cast its shadow on the planet's surface for three hours, beginning at 10:08 p.m. Another Galilean moon, **Europa,** will begin a similar transit at 12:37 a.m.

Mars (mag. -1.2 to -0.5) will be up all night in the S sky. It will be small, but 'scopes of 4" or larger will reveal surface features such as the polar ice caps and **Syrtis Major**, a dark feature associated with an adjacent volcano. Use high magnification.

Mercury (mag. -1.1) will be a bright "evening star" in the NW sky during the last half of May, setting 2 hrs. after the Sun.

Saturn (mag. 0.1) will be up all night in May, its rings displayed more vividly than at any time in the past nine years.

Venus will be a "morning star" in May. **Uranus** and **Neptune** will be up, too, but they're too small and faint to be seen naked-eye.

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Star Birth and Death
article by Bill Warren

Star Birth. Stars are "born" in clouds of interstellar gas and dust produced by supernova explosions. When a portion of the nebulosity begins to contract over time, whether due to random motions of its gases or the explosive influence of a nearby star, it eventually reaches a point where it is sufficiently compressed to gravitationally attract more and more mass from the original cloud.

As the *protostar* mass continues to shrink, it compresses and heats up, eventually reaching a temperature of millions of degrees. The high temperature and pressure at the core create nuclear reactions in which hydrogen atoms fuse to become helium atoms. This process, known as nuclear fusion, is what defines a star and causes it to "burn."

At this point, the young star settles down to live out its life for millions or billions of years. How long it will live depends on its mass,, i.e., how much hydrogen it has to burn. Given sufficient mass, after using up its hydrogen the star will begin to convert helium into other, heavier elements such as oxygen and carbon. Very massive stars go on to produce even heavier elements such as iron.

Star Death. When a star exhausts the hydrogen in its core, it begins to expand and cool down, eventually swelling to many times its original size. Some aging stars cast off their outermost gases, forming a *planetary nebula.* Some cooler stars shrink to become *white dwarfs* that eventually wind up as dark, lifeless cinders like a used-up match.

Stars of much greater mass burn hotter, larger, brighter and faster than stars with less mass. Some of the most massive red giants eventually explode cataclysmically as *supernovas,* leaving behind a collapsed core called a *neutron star.* Neutron stars are tiny but incredibly compressed, with several times the mass of our **Sun** in an area the size of a small city like Griffin. Neutron stars rotate very rapidly, and some of them emit radio waves in regular pulses. Such stars are referred to as *pulsars.*

Some massive supergiant stars have a different fate in store for them. After going supernova, they collapse inward upon themselves so rapidly and violently that nothing, not even light, can escape their intense gravitational pull. The result is a *black hole,* a region in which everything within its gravitational influence is sucked into it.

Most, if not all, galaxies have one or more black holes at or near their centers. And because galactic cores contain stars, gases and dust in great abundance, those black holes usually are extremely large. As stars and star material are drawn into the black holes, they emit radiation. We refer to extremely distant, high-energy radiation sources as *quasars* (astronomy shorthand for "quasi-stellar" radiation sources). Quasars are thought to be the most distant and luminous objects in the universe.

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The Dark Side: A Prof. Stargazer Interview

Prof. Theophilus Stargazer *is the world's foremost astronomer, cosmologist and collector of bad astronomy jokes. (Example: A spiral galaxy goes into a pub. The bartender says, "Sorry, mate, I can't serve you. You're barred.")*

When some of our members caught up with the professor recently, he was grumbling about ***Bill Warren's*** *article in last month's* Observer*: "What*

that pinhead knows about dark matter and dark energy would fit on the head of a pin."

*"Perhaps you'd be willing to shed some light on those subjects," **Dwight Harness** suggested.*

"Certainly," the professor replied, "at my usual rate, $25 a question. I take Visa and MasterCard. Or, you can use my portable ATM. First question?"

Andy Hasluem: Are atoms the most basic form of matter in the universe?

Prof. Stargazer: Heavens, no! Atoms are combinations of things like protons, neutrons and electrons. But protons and neutrons are composed of even smaller particles called *quarks.*

Andy: Yeah, I learned about that in school: two pints make a quark. Or as we used to say back in England, two pints of Bass Ale make a drunk.

Prof. Stargazer: Statements like those, Andy, are why evolution is a theory, not a fact.

Andy: Well, then what is a quark?

Prof. Stargazer: It's the sound made by an animal that's half-duck and half-dog.

Ken Walburn: I don't get it.

Prof. Stargazer: C'mon, Ken. Ducks go *quack!*, and…well, you know.

Ken: Know what?

Smitty: Getting back to what you were saying, Professor: Is there anything smaller than a quark?

Prof. Stargazer: As I wrote in my best-selling book, *Stargazer's Guide to Particle Physics* -- ahem! -- quarks are composed of tiny particles called *damatta.*

Smitty: What's damatta?

Prof. Stargazer: Nothing, I was just clearing my throat.

Anyway, all of this relates to what astronomers refer to as *string theory.*

Dawn Chappell: Tell us about string theory, Professor.

Prof. Stargazer: I'll be happy to, Dawn. But first, may I say how much I've missed seeing you in recent years? Few women could wear a mud pack, hair curlers, a chenille bathrobe and fuzzy Minnie Mouse slippers as seductively as you did at our club observings.

Let's see…Where was I? Oh yes: string theory.

Cosmologists believe that matter ultimately is made up of tiny filaments called *strings*.

Dawn: Why is that important?

Prof. Stargazer: If you have enough money and pull the right strings, you can get your kid into Harvard.

Tom Moore: I have a distant relative in Harvard. In a jar of formaldehyde.

Prof. Stargazer: We're trying to be serious here, Tom. Do you have a question, you hebetudinous troglodyte?

Tom: Mmmblbrgrrbreckafrizz…

Prof. Stargazer: I'm not sure I heard that. But if you asked what I thought you did, it's the third room down the hall on the left. Wash your hands and turn out the lights when you're finished.

Next question?

Doug Maxwell: What's the difference between dark matter and ordinary matter?

Prof. Stargazer: Ordinary matter is – well, *ordinary*. Dark matter is a mysterious substance that gives cosmologists something to talk about besides whose turn it is to pay for lunch.

Frank Hiller: If we can't see dark matter, how do astronomers know it's there?

Prof. Stargazer: It's like **Larry Higgins** at JKWMA after a meal at Beans 'R Us Restaurant: you don't need to see him to know he's there.

Steve Bentley: Well, what is dark energy?

Prof. Stargazer: It's what you get when you don't pay your light bill.

I see that my personal ATM is running low on cash; does anyone have a final question?

Felix Luciano: I have one, sir. What is gravitational lensing?

Prof. Stargazer: That's a good question, Felix.

In observing distant galaxy clusters, astronomers have found that foreground galaxies act as lenses, gravitationally bending light from galaxies behind them.

For our purposes, however, gravitational lensing means that, if you drop an eyepiece, it will always fall lens-first, especially when you're standing on a hard surface such as concrete or asphalt.

Tell you what: The newsletter still has some space to fill, so I'll answer a few more brief questions for free.

Jessie Dasher: I've always wondered, Professor: How can the folks at *Astronomy* and *Sky & Telescope* predict precisely when and where events such as eclipses will occur?

Prof. Stargazer: They read each other's magazines.

David O'Keeffe: Should we, as astronomers, know where comets come from?

Prof. Stargazer: You Oort to.

Joe Auriemma: What is a supernova?

Prof. Stargazer: A nova with an inflated ego.

Truman Boyle: Why do we have seasons?

Prof. Stargazer: So the pollen and mosquitos will know when to appear.

Tony Quinn: What's the difference between a meteor and a meteoroid?

Prof. Stargazer: Meteors are less painful.

Carlos Flores: One last question, sir: What is *plasma*?

Prof. Stargazer: Plasma is a pulmonary condition suffered by inhabitants of **Pluto.**

Ken Walburn: I don't get it.

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Above: Jupiter. Alan Pryor's photo of the King of the Planets is highlighted by the **Great Red Spot**, a hurricane-like storm that has been raging continuously in Jupiter's atmosphere for hundreds of years with winds of up to 400 mph.

Two to three times larger than the **Earth,** the Spot – which is actually a pale salmon color, having faded from its original reddish hue – is located 22^{o} S of Jupiter's equator. It was first recorded by the German astronomer **Samuel Heinrich Schwabe** in an 1831 drawing. It may have been discovered much earlier, however, in 1665 by the Italian-French astronomer **Gian Domenico Cassini,** who also discovered four of **Saturn's** moons -- and, more famously, the dark gap in Saturn's rings that bears his name. You guessed it: the Domenico Division. (Just kidding.)

Above: Rosette Nebula, NGCs 2237-39 in *Monoceros.* North is at the top of **Felix Luciano's** h-alpha photo of this well-known but elusive emission nebula. Enjoy the photo, because it's vastly more than you're likely to see in a typical telescopic view.

The **Rosette's** large size – it encompasses an area four times the size of the **Full Moon** – requires binoculars or a rich-field telescope to see all of it at one time. The scattered, wispy nebulosity benefits from dark, clear skies and an O-III or nebula filter to bring out detail, whether you're using binoculars or a wide-field telescope.

Easier to see within the nebula, however, is the open cluster **NGC 2244,** a collection of about 15 bright young stars and twice as many fainter ones in an area measuring about 1/3^{o} in diameter. (It's located at the center and lower left portion of the large dark void in Felix's photo.)

NGC 2244 is featured in no less than *five* A. L. observing programs: Caldwell (#50), Deep Sky Binocular, Herschel 400, Open Cluster and Urban.

Next Page, Lower Left: Mars photo taken by **Alan Pryor** on April 14, 2014. The **North Polar Cap (NPC)** is small but clearly visible along the northern limb (edge). If you imagine the dark area extending to the lower right of the NPC and curving

back to the left as a Christmas stocking, the center of the "toe" is western **Chryse Planitia** ("Golden Plain") where, on July 20, 1976 *Viking I* became the first spacecraft to successfully land on Mars and perform its mission.

Another U. S. lander, *Mars Pathfinder,* set down nearby in **Ares Vallis,** an ancient flood plain located to the lower left of the "heel" in Alan's photo, on July 4, 1997.

The U. S. Mars rover *Opportunity* set down on Jan. 25, 2004 in **Meridani Planum,** a plain located 2^{o} south of the Martian equator, along the upper right limb of the lower dark area in Alan's photo.

Finally, the U. S. lander *Phoenix* touched down on May 25, 2008 in the northern polar region, slightly south of the NPC. Phoenix is famous for having been photographed by the Mars orbiter while making its descent via parachute.

Also present but unseen above the equator on the left side of Alan's photo is **Olympus Mons**, at 69,844 ft. the highest mountain in the solar system. And cutting a gash through the dark area at the lower right in Alan's photo is **Vallis Marineris,** a 2,500-mi.-long, 4.5-mi.-deep canyon system that dwarfs Earth's puny Grand Canyon.

Above Right: Mersenius is the large oval crater in the upper left portion of **Alan Pryor's** photo. It lies west of large, **Mare Humorum** ("Sea of Moisture") in the **Moon's** SW quadrant.

Mersenius is 58 miles x 49 miles in diameter and 7,500 ft. deep. Its wall is broken at the N and S ends, and its smooth lava floor contains numerous craterlets of more recent origin. The crater lying atop the southern rim is designated **Mersenius N.**

Mersenius is thought to be at least 3.85 billion years old. It was named for the 17^{th} century French physicist and philosopher **Marin Mersenius.**

The shadowed crater in the lower left corner is **Cavendish,** and the shadowed crater to the SSE is **Liebig.**

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