

THE FLINT RIVER OBSERVER

NEWSLETTER OF THE FLINT
RIVER ASTRONOMY CLUB

An Affiliate of the Astronomical League

Vol. 21, No. 7 **September, 2017**

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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. Sat., Sept. 9: Girl scout observing (Meansville, Ga., time TBA); **Thurs., Sept. 14:** FRAC meeting (7:30 p.m., The Garden in Griffin); **Fri.-Sat., Sept. 22-23:** JKWMA observings (at dark).

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Vice President's Message. Dr. Scott Harris, Planetary Geologist at Fernbank Science Center in Atlanta, is in charge of research involving the

Woodbury Structure, a suspected meteor impact site in Meriwether County. Dr. Harris's talk at our Aug. meeting, which concerned research findings since 2003, was profusely illustrated with graphs and photos – and confusing, in two respects.

First, the language and terminology of geology are as complex to a non-geologist as astronomy terminology is to a non-astronomer. But Dr. Harris couldn't stop to explain each term, or else we'd have been there into the wee hours of the morning. And second, his findings could not have been more unexpected.

We learned from Dr. Harris that the Woodbury Structure is not located at The Cove; it is, rather, a much larger area lying a short distance to the SE. The Cove is not a suspected impact site, although it looks exactly what a crater should look like.

The true Woodbury Structure, on the other hand, looks nothing like an impact site. There is no visible crater, and no rim. (The Wetumpka Meteor Crater in Alabama contains a large and immediately recognizable crater and rim.)

To compound the weirdness, no one would have suspected that there might be an impact site near Woodbury if area residents and pilots hadn't noticed The Cove's crater-like shape.

There's an old saying: *If it looks like a duck, waddles like a duck and quacks like a duck, it probably is a duck.* I'm not a flat-Earther, but after hearing Dr. Harris's talk I might have continued to believe that The Cove is a meteor crater, based on what we saw – except for two things.

First, geologists don't use Ouija boards or crystal balls to construct their views of reality; their facts are derived from research that is on a level far beyond most of our understanding. When geologists talk, intelligent people listen.

Second, I've never been able to explain something that **Dr. David King** (Auburn Univ.) wrote in one of his early reports on the Woodbury Structure. I quoted it on p. 2 of my Special Report, *FRAC Visits The Cove*: "The Flint River, which was there before the crater was formed..."

If a meteor impact large enough to create the 4.2-mi.-wide depression at The Cove actually occurred, it would have instantly erased that portion of the Flint River from the face of the Earth, and either later formed a lake (think: Crater Lake in Oregon) or at least diverted the upper portion of the river to somewhere else. (The Coosa River flows

by the NW portion of Wetumpka's crater rim, but that river formed *after* the impact, not before it.)

The bottom line: For what it's worth, like the 1960s **Monkees** sang, "Now I'm a believer." If there was an impact in the Woodbury area millions of years ago – and research by both Drs. King and Harris indicates that there probably was such an event – it did not create the concave depression that shapes The Cove.

So thanks, Dr. Harris, for your enlightening and revealing talk. I may not have understood everything you said, but I'm not foolish enough to dispute the conclusions you and other geologists have reached. I feel somewhat like the child who finally realizes that it's Daddy who has been eating the cookies and drinking the milk every Christmas eve. But that's the price we sometimes pay for growing up, whether chronologically or intellectually.

Finally, **Eva Schmidler** joined FRAC at our eclipse observing at The Garden. Welcome aboard, Eva!

-Bill Warren

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Last Month's Meeting/Activities. Nineteen members – **Marla Smith; Alan Pryor; Truman Boyle; Tom Moore; Felix Luciano; Aaron Calhoun; Joseph Auriemma; Cynthia Armstrong; Larry Higgins; Carlos Flores; Elaine Stachowiak; Steven Hollander; David O'Keeffe; Scott & Cindy Barton; Erik Erikson; Chuck & Neila Davis;** and yr. editor -- and one visitor (**Eva Schmidler**) attended our Aug. meeting. Marla's cheesecake bites were awesome!

Five members – **Felix Luciano, Dwight Harness, Sean & Gianna Neckel** and yrs. truly – participated in our High Falls State Park observing on Aug. 12th. The sky was uncooperative, but we told them how to view the eclipse safely and showed them the I.S.S. and **Saturn**, so the evening was a huge success.

Three FRACsters – **Aaron Calhoun, Marla Smith** and **Elaine Stachowiak** – attended our JKWMA observing on Aug. 19th. Marla: "The sky was clear and it was beautiful seeing all the stars! I enjoyed using my new telescope."

Larry Higgins, Aaron Calhoun, Elaine Stachowiak, Wayne & Kathy Gardner, Eva Schmidler, Cynthia Armstrong and yr. editor

gave out 119 pairs of solar sunglasses at the eclipse observing at The Garden on Aug. 21st. The weather cooperated nicely, and everyone was delighted and properly awestruck at what we saw. Larry showed 16 eclipsed Suns through a Saltine cracker, Aaron manned his 'scope non-stop throughout and Elaine womanned (is that a word?) a pane of #14 welder's glass.

(Note: Please send your eclipse experiences and photos to Bill at warren7804@bellsouth.net for inclusion in a future newsletter.)

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This 'n That. We sent this out earlier, but it bears repeating:

A VERY IMPORTANT ANNOUNCEMENT FROM THE GA. DEPT. OF NATURAL RESOURCES:

"When new state laws go on the books July 1, 2017, the Georgia Department of Natural Resources will say goodbye to Wildlife Management Agency stamps needed in the past to hunt in certain Wildlife Management Areas. The state will also do away with Georgia Outdoor Recreation Passes.

"We're going to allow you, with the purchase of basic hunting or fishing licenses, to access any wildlife management area or any public fishing area," said Jenifer Wisniewski, a communications representative with the DNR."

Here's what that means for FRAC members who want to observe at JKWMA: **Effective immediately, everyone who attends our observings at JKWMA must be prepared to show a valid Ga. hunting or fishing license (or a Ga. Lands Pass that costs twice as much as a hunting or fishing license, so don't buy one.)**

Joe Kurz is a wildlife management area, not a state park, so a State Parks Pass will be invalid there (although a hunting or fishing license is perfectly acceptable).

If you don't already have a valid Ga. hunting or fishing license, buy the fishing license. (A hunting license requires you to pass a hunter safety education course.) You can buy a fishing license at Wal-Mart, or by Googling www.gooutdoorsgeorgia.com or www.georgiawildlife.com/licenses-permits-passes, or calling 1-800-366-2661.

A one-year renewable fishing license costs \$15 (or \$18 for a first-time purchaser).

Senior citizens who were born before July 1, 1952 can get a Senior Lifetime Sportsman's license (that covers both activities) at no cost. Seniors born after June 30, 1952 must pay a one-time \$35 fee for a Senior Lifetime Hunting or Fishing license, or \$70 for a Senior Lifetime Sportsman's license.

We're sorry that it has to be this way, but after reading this you understand why it's necessary.

*Have you seen the new U. S. 2017 solar eclipse postage stamp? If not, go to the post office and buy one while they still have them in stock. It shows an eclipsed **Sun** – but if you press your finger on it like you're being fingerprinted, it lightens in color to show the **Moon's** features.

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Upcoming Meetings/Activities. On **Sat., Sept. 9th**, we'll conduct an observing for girl scouts at Camp Meriwether at Meansville, Ga. The starting time will be 8:30 p.m. There will be several troops in attendance that night, so we'll need a bunch of telescopes.

To get to Camp Meriwether from Griffin, start at the intersection of U. S. 19/41 Bypass and Williamson Rd./Ga. Hwy. 362. Go 18.4 mi. W on Ga. 362, and turn left at Ga. Hwy. 74/85/362. Go 1.0 mi., and turn right to stay on Ga. 362.

Go 2.9 mi. on Ga. 362 and turn right onto Luthersville Rd./ Hwy. 411.

Go 7.5 mi. and turn right onto Meadows Boone Rd. Go 0.4 mi. and take the 2nd right to stay on Meadows Boone Rd. Go 0.2 mi., and Camp Meriwether is on the left. Follow that road through the camp to the observing site near a small lake.

Our FRAC meeting will be at 7:30 p.m. on **Thurs., Sept. 14th** at The Garden in Griffin. Our program will be a dvd supplied by **Felix Luciano: Stephen Hawking's "Where Are We?"**

Our JKWMA observings will be on **Fri.-Sat., Sept. 22nd-23rd**. The gate will be open all night.

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The Planets in September. Now that the Great American Eclipse is over, the solar system can return to normal. At twilight all month, **Jupiter** (mag. -1.7) will be low in the WSW.

Saturn (mag. 0.5) will lie in the S sky, its rings tilted wide in our view.

Neptune (mag. 7.8) will be in the SE in the constellation *Aquarius*, its tiny blue-gray disk clearly non-stellar telescopically. **Uranus**, also in *Aquarius*, will rise a couple of hrs. after Neptune. At mag. 5.7, blue-green Uranus will be a small but easy telescopic target.

Looking east 45 min. before sunrise on **Sat., Sept. 16th**, **Mars** (mag. 1.8) and **Mercury** (mag. -1.0) will be just 1/3° apart, with brighter **Venus** (mag. -3.9) lurking 7° above them. To add to the fun, mag. 1.4 **Regulus (Alpha Leo)** will lie directly on the line between Mars/Mercury and Venus.

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Calhoun's Corner

Navigating the Sky By Degrees by Aaron Calhoun

Astronomers measure the separation of objects in the sky in degrees. Earth is a globe, and every circle contains 360°. Each of those 360° is divided into 60 *arc-minutes*, which in turn are subdivided into 60 *arc-seconds*. Because writing them out wastes space, they usually are abbreviated.

You already know the abbreviation for degrees. The abbreviation for arc-minutes is an apostrophe (e.g., 60'), and arc-seconds is a quotation mark (e.g., 60"). The term *arc* is necessary because those minutes and seconds refer to arc segments of a circle, not a straight line or time.

The **Moon** and the **Sun** are 1/2° in dia., so they are 30' (arc-minutes) or 1,800" (arc-seconds) in diameter.

You can use your hands and fingers held at arm's length against the sky as tools to measure distances to objects you're looking for.

Your little finger is 1° wide. Hold it up below the Full Moon, and the Moon will be half as wide as your finger.

Your three middle fingers held together are 5° wide.

Your clenched fist (including your thumb) is 10° wide.

If you spread your index finger and little finger as far apart as you can, they span 15°.

If you stretch your thumb and little finger to maximum width, the span is 20°.

From the horizon to the zenith directly overhead is 90°, or six index finger-to-little finger widths.

Those measurements are not exact, but they will get you where you want to go. Some people's arms are longer than other people's, but longer arms mean larger fingers too, so it works out the same.

A good telescope can see an area of sky as small as 1" or 2". That is important if you are trying to split a close double star like the **Double-Double (Epsilon Lyra)**. If you don't see four stars – two very close double stars – at low power, try higher magnification. You can use any magnification with stars because, unlike, say, faint galaxies, stars are points of light. Their light is not spread out over a large area, no matter how much magnification you use.

The famous Hubble Ultraviolet Ultra Deep Field photograph of distant galaxies in the constellation *Fornax* shows an area of sky measuring 2.4" in size. It shows 10,000 galaxies in an area that is 1/150th of a degree in size.

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Novels That Make an Impact, Part 3

Lucifer's Hammer, by **Larry Niven** and **Jerry Pournelle** (Playboy Press, 1977, 494 pp., \$2.40 + \$3.99 s&h in used paperback from amazon.com).

Background. While **Harold McAlister's** *Sunward Passage* (reviewed in the June *Observer*) deals primarily with events leading up to a potential comet impact, **Niven & Pournelle's** darkly compelling *Lucifer's Hammer* is broader in scope, and therefore more than twice as long. And whereas *Sunward Passage* takes place over a two-week period, *Lucifer's Hammer* encompasses a comet's approach, its devastating collision with Earth, and subsequent efforts of isolated groups of survivors to reestablish civilization and order in a chaotic world.

Reviews. Library Journal reviewer **Judith Yamamoto**: "*Lucifer's Hammer* contains good, solid science, a gigantic but well developed and coordinated cast of characters, and about a megaton of suspenseful excitement."

Bill Warren: "This was an excellent book. I enjoyed it from start to finish. (Apparently a lot of people agreed with me: it sold over a million copies, and was a *N.Y. Times* No. 1 bestseller.) I've read it three times.

"As an astronomer, I found the first part especially intriguing because I've always been interested in impact scenarios. The rest of the book involves mankind's efforts to survive a global catastrophe. It's engrossing reading that deftly straddles the line between hope and despair."

Plot. The book's main character, **Tim Hamner**, is a wealthy young heir to a soap company. He is also an accomplished amateur astronomer who has co-discovered a new comet, **Hamner-Brown**. (Shades of **Comet Hale-Bopp**: *Lucifer's Hammer* was published in 1977, eighteen years before Hale-Bopp was discovered, and not only are the discoverers' initials the same, but, like Hamner, **Thomas Bopp** is an amateur astronomer!)

The comet's orbital path is tracked, and although it is expected to pass close to the Earth, astronomers consider an impact unlikely. But they've been unable to track Hamner-Brown's trajectory accurately due to the comet's constant outgassing. (When a comet draws near enough to the **Sun** to feel its heat, it begins to release gases and dust in a process known as *outgassing*. See p. 6. -Ed.)

Eventually, "The Hammer" (as media refer to the comet) does fall, breaking up into smaller fragments that impact around the world with devastating results, striking parts of Europe, Africa, the Gulf of Mexico and both the Atlantic and Pacific Oceans. The strikes trigger worldwide volcanic activity and earthquakes at the San Andreas Fault and elsewhere, heavily damaging the Southern California region and the rest of California, with millions of casualties. The oceanic impacts trigger half-mile-high tsunamis that destroy major coastal cities around the globe.

Within hours of the comet strike, hundreds of millions of people are dead and much of the world is in ruins. As the survivors contend with weeks of nonstop rain due to the massive quantities of vaporized seawater in the atmosphere, flooding and mudslides are rampant, leaving the search for food and shelter a top priority. Civilization crumbles as people use the weapons at their disposal to protect themselves from each other.

Such books are known as "post-apocalyptic" novels, and you either like them or you don't. They tend to be long, because there are no quick-and-easy solutions to global catastrophes that turn civilization upside-down. They also tend to be somewhat

depressing or frightening, because you can't help but imagine what you'd do if such an unthinkable disaster were to occur. But they also offer hope because, like a forest that is destroyed by fire but eventually grows back, the actions and attitudes of the survivors remind us that mankind is resilient and resourceful in the face of adversity.

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There is talk of a new astrologer (**Copernicus**) who wants to prove that the Earth moves and goes around instead of the sky, the Sun, the Moon... The fool wants to turn the whole art of astronomy upside-down.

-**Martin Luther**, 1539

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The Eclipse That Eluded the Professor

Prof. Theophilus (pronounced: *The Awfulest Stargazer*) is a man of many talents. In addition to being the world's greatest authority on astronomy, astrophysics and cosmology, the professor is adept at things like convincing his wife that the lipstick stains she finds on his shirt collars on nights he says he's been observing are due to the lipstick he uses to convert regular flashlights to red-beam lights. (Editor's note: Most observers facing that problem use red nail polish. But unlike the professor, we don't have lipstick on our collars.) As you'll see in the following interview, *Prof. Stargazer's talents do not stop there.*

Bill Warren: Astronomy has a lot of terms that are hard to pronounce. I've been wondering, Sir: How do you pronounce words like c-a-t-a-d-i-o-p-t-r-i-c and s-y-z-y-g-y?

Prof. Stargazer: I don't. I avoid using words that are hard to pronounce. But if you're asking how other astronomers pronounce them – they spell them out, too, or else they mumble something nobody can understand. I hope that helps.

Incidentally, Bill, we're aware of your spelling problem. We've often noticed at meetings and observings that you don't always spell good.

Bill: Do you have a cold, or are you suggesting that I don't have good hygiene?

Prof. Stargazer: I'm not suggesting anything, Bill, but you can't fool our noses.

Next question?

Felix Luciano: Can you explain **Einstein's** relativity theory in terms that we can understand?

Prof. Stargazer: Certainly. As Einstein pointed out, time is relative to the observer. For example, on the day after tomorrow today will be the day before yesterday and today's tomorrow will be yesterday. (No wonder I miss so many appointments.)

There's more, though. Since *today* is today, it follows that tomorrow is yesterday's day after tomorrow. To prove all that, Einstein showed that yesterday was today before it was yesterday.

Felix: Did Einstein say all that?

Prof. Stargazer: Well...No, but he was a busy man. He left it to me to fill in the blanks in his theory.

Tricia Lopez: What does your wife do when you stay out all night observing?

Prof. Stargazer: Beats me.

Chuck Davis: What is *outgassing*?

Prof. Stargazer: It's what FRAC members do at observings when they think no one can hear them.

Chuck: I thought it had something to do with comets.

Prof. Stargazer: Only when they contain pork and beans. Pork and beans are **Larry Higgins's** favorite fruit.

Smitty: Who invented the Newtonian telescope?

Prof. Stargazer: I can't believe you asked me that question, Smitty. I thought you guys were astronomers!

The name says it all. The Newtonian telescope was invented by one of the most brilliant astronomers of all time, **Sir Isaac Newtonian**.

Smitty: Are you sure about that, Sir?

Prof. Stargazer: As another famous astronomer once said, "You can look it up."

Smitty: Who said that?

Prof. Stargazer: **John Dobsonian**.

Dwight Harness: What did you think of the solar eclipse, Professor?

Prof. Stargazer: Frankly, I was disappointed.

Dwight: How could you be disappointed with the greatest event in U. S. astronomy this year? Were you in the path of totality?

Prof. Stargazer: Yes, I was in Clayton, Ga. and the skies were clear throughout – but I didn't see the eclipse. And it was all *your* fault, Dwight!

Dwight: *My fault?* How could it have been my fault? I wasn't even in Clayton at the time; I was in Tennessee!

Prof. Stargazer: But you were at the August club meeting. I "borrowed" your wallet that night, and when I tried to use your Visa card in Clayton I was arrested.

If there's one thing I've learned in life, it's that county sheriffs don't have a sense of humor.

Dwight: Serves you right, you blinkstinking, blagstagg breckafritz! What do you have to say for yourself?

Prof. Stargazer (handing Dwight his wallet): Three things. 1. I intended to give it back to you at the next meeting. B. You need a new wallet; this one is in worse shape than the losing cars in a demolition derby. And 3. Your watch doesn't keep good time.

Dwight: You stole my watch, too? Why, you dirty rotten—

Prof. Stargazer (as club members restrain Dwight from going after him): I don't suppose this would be a good time to tell Dwight that I got fifty bucks for his wedding ring at a Clayton pawn shop, would it?

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Above: NGC 7000 (North America Nebula), an emission nebula in *Cygnus*. (Photo by Alan

Pryor.) Located just E of **Deneb (Alpha Cygni)** near the top of the Northern Cross that forms *Cygnus*, **North America Nebula** is huge, measuring $3^\circ \times 2.3^\circ$. As a result, it is best seen in binoculars, using a narrowband light pollution filter or an O-III filter. (Hold the filter over one of the oculars.) The easiest parts to see are Mexico, Florida and the East Coast of the U. S., which are outlined by dark voids representing the Gulf of Mexico and the Atlantic Ocean. The West Coast is less well defined.

Upper Right Corner: Waxing Gibbous Moon. (Photo taken by **Vencislav Krumov** from his hotel room in Abu Dhabi.) "Gibbous" refers to the Moon phases that are more than half full and less



than full (i.e., $\frac{3}{4}$ lit). "Waxing" means that it's growing larger.

Venci's photo shows **Jack's** (of "Jack and Jill" fame) pail of water (actually, it's **Mare Crisium, the Sea of Crises**) near the right limb (edge). Jack's "head" – he's wearing a cap pointed to the right – is **Mare Serenitatis, the Sea of Serenity**; his midsection is **Mare Tranquillitatis, the Sea of Tranquility**; his faint leg on the left is **Mare Nectaris, the Sea of Nectar**; and his other, larger leg is **Mare Fecunditatis, the Sea of Fertility**.

Also shown at the lower left lighted portion of Venci's photo is the lovely rayed crater **Tycho**, which is 51 mi. in dia. The rays – unseen in the photo, although they are easily seen at full moon -- measure 930 mi. in dia.; they are the largest rays on the Moon, and resulted from material ejected from a direct impact about 108 million yrs. ago. Visually, they look like spokes radiating outward from the hub of a wheel.

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