CORNELL ASTRONOMICAL SOCIETY NEWSLETTER

ISSUE 14• NOVEMBER 2023

LETTER FROM THE PRESIDENT

I hope everyone had a wonderful Halloween! At the Obs, we followed up on last year's space pirate theme by dressing as *space cowboys*. We had trick-or-treating candy, a nearly-clear night, and a surprise visit from our old friend Lucas Lawrence (Class of '23)!

Our lecture series resumes in November with Prof. Anna Ho on the 3rd. The following Tuesday, Nov. 7, I'll be giving our final lecture on Carl Sagan's life and work. There will be apple pie served! Turn to page 5 to see the full listing of *four* Sagan-adjacent events.

There's lots more to read in this issue, from club updates to astrophotography by our members to musings on Pluto's planet status. There's also a poetic spin on our usual Solar System moon pieces, and at long last, the return of the CAS crossword!

Wishing you clear skies,
Gillis Lowry, President

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WHAT HAS CAS BEEN UP TO?

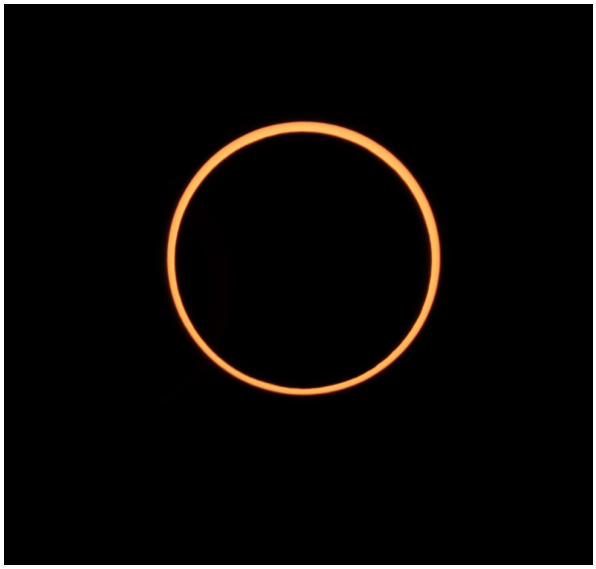
BY TREYTON GRAHN

We've been very busy the past few weeks. From cosmological events to very important birthdays, here's a recap of our exciting recent events!

OCTOBER 14 ANNULAR ECLIPSE

On October 14, much of North America saw an annular eclipse. This is where the Moon passes in front of the Sun, but is too far away in its orbit for totality, causing a "ring of fire" to be seen instead at the peak of the eclipse. We would have seen a partial eclipse in Ithaca, but unfortunately, it was very cloudy that day, and the eclipse was totally blocked.

Despite the cloudy day, CAS members flocked to the observatory to have fun and hand out eclipse glasses. Now, we look forward to the April 8 total solar eclipse next spring, and we have high hopes for better weather to see an even more spectacular sight!



Annularity seen from Albuquerque, NM
Credit: Christopher Lowry

FINISHING THE SUN PUZZLE

Triumph! The puzzle is complete!

Eighteen months ago—April 12, 2022—CAS started a 1,000-piece jigsaw puzzle of the Sun. This puzzle became infamous for the time we spent on it, with progress very slow in the beginning.

In June 2023, Marquice Sanchez-Fleming joined the effort. In just four short months, he contributed a hundred pieces to the puzzle single-handedly, restoring our hope that the puzzle could be solved! With everyone's help, the puzzle was finally completed on October 13, 2023. Now, we start on a 1,000-piece puzzle of Mars—let's hope this one isn't another eighteen months in the making!

CELEBRATING IRV'S 101ST BIRTHDAY

The Irving Porter Church Memorial Refractor Telescope, or "Irv" for short, is Fuertes Observatory's most historic telescope. Its name commemorates the efforts of Irving Porter Church (1851–1931), Professor of Applied Mechanics and Hydraulics, to see that the dome of Cornell's then–newly constructed observatory would not stand empty.

Commissioned from the now-defunct Warner & Swasey Co. of Cleveland, Ohio, using donations from alumni of the College of Civil Engineering and Professor Church himself, Irv's installation in the dome was completed on October 16, 1922. This past October 16, we celebrated Irv's 101st birthday with sea shanties, milkshakes, and the perennial "Happy Birthday" song. Here's to 101 more years!

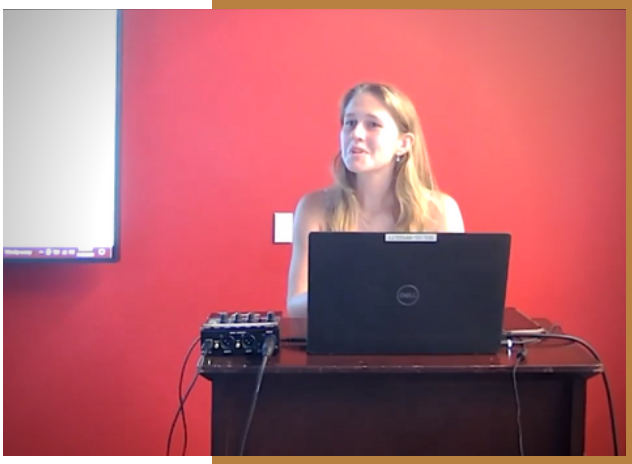
The Irving Porter Church Memorial Refractor Telescope, and a few of its devoted fans, on its 101st birthday

LECTURE SERIES RECAP

BY JACK QUALKENBUSH

With three of our five scheduled lectures now behind us, the Cornell Astronomical Society's fall lecture series is almost over. If you missed our past lectures, or just want to revisit them, you can find them on our YouTube channel.

Our first lecture was given by 2022–23 CAS president Annika Deutsch. Her talk focused on the study she conducted last summer at the National Radio Astronomy Observatory on the supernova SN2018ivc, which she nicknamed Cece. After a few years dimming as expected, Cece showed dramatic re-brightening in its synchrotron emission, which could help reveal the history of its original star.



CAS member Sophia Arnold presented on her summer research at LIGO

CAS member Sophia Arnold gave our second lecture, about her summer research as part of the LIGO SURF program. At LIGO, Sophia worked to improve the detector's sensitivity through an instrument called the Front Surface Type Irradiator, or FroSTI. Sophia designed a GUI that, while helpful for testing of FroSTI's performance, is not specific to the instrument and can be used in a wide variety of other applications.

For our third lecture, Dr. Ligia Coelho, a microbiologist at the Carl Sagan Institute here at Cornell, discussed her current research on biopigments of microbes in harsh climates. Dr. Coelho suggested that maybe "purple is the new green"—if harsh biomes on Earth are anything to go by, then on many distant icy planets, purple pigments might be even better to look for than green ones.

We had a fourth lecture scheduled to be given by graduate student Maura Lally, which unfortunately had to be canceled due to illness. (We're glad Maura is feeling better now!).

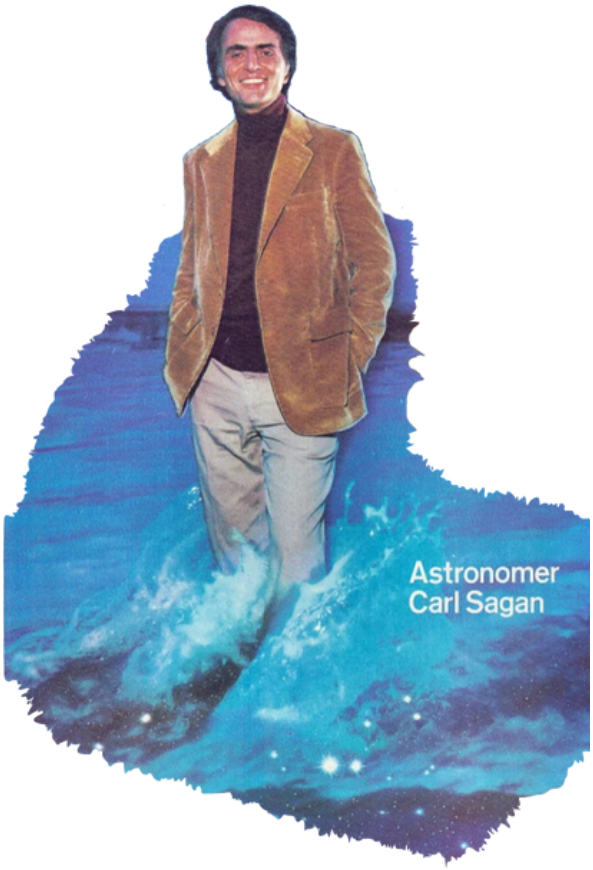
Our next lecturer, who will speak on November 3, will be Professor Anna Ho. Professor Ho's research is on time-domain astronomy, especially supernovae and energetic transients—very quick, very bright astronomical events. Professor Ho was also in the news recently: NASA chose her for their ULTRASAT science team this past July.

Our final lecture on Tuesday, November 7, will be a special one: current CAS President Gillis Lowry will give a presentation overviewing Carl Sagan's life. This will wrap up our Fall lecture series, but do not fret, for our lecture series will return in the spring semester.

HONORING CARL SAGAN'S 89TH BIRTHDAY: UPCOMING EVENTS!

BY GILLIS LOWRY

The late, great Cornell Astronomy Professor and science communicator Carl Sagan would have celebrated his 89th orbit on November 9th, 2023. As his sharer-of-a-birthday, I am pleased to announce our Sagan-adjacent events will span not one day, not one week, but *multiple months*!



Cover of TIME Magazine, October 20, 1980.

WEEK OF NOV. 9:

Carl Sagan: A Life
November 7 from 7–8 PM
RPCC Multipurpose Room 218

CAS President Gillis Lowry will give a lighthearted overview of Carl Sagan's life and work. Apple pie served! Register here.

Carl Sagan Planet Walk
November 11 from 1–3 PM
Start in the Ithaca Commons

Walk and talk with CAS members about each planet in this scale Solar System model spanning one mile. If you're not too tired afterward, join our additional walk to Lakeview Cemetery (total 2 miles, ending with elevation change). Register here.

FEBRUARY:

34TH ANNIVERSARY OF THE PALE BLUE DOT IMAGE

Voyager spacecraft–themed programming!

Cosmos Ep. 6 Showing and Q&A with Ann Druyan!
February 13 from 6:30–8:30 PM
Cornell Cinema (104 Willard Straight Hall)

Watch Cosmos Ep. 6 (Travelers' Tales, about Voyager) and participate in a Q&A with Carl Sagan's wife and talented communicator Ann Druyan! We will be curating Q's in advance; send to astrosociety@cornell.edu.

Lecture Series: Prof. Jim Cordes on his Voyager research!
Tentatively February 16 at 7 PM
Appel Multipurpose Room 303

Prof. Cordes will discuss his decades of work with Voyager spacecraft data!

CAS-TROPHOTOGRAPHY

BY BEN JACOBSON-BELL & MARQUICE SANCHEZ-FLEMING

With a decent DSLR camera and even a quite small telescope, stunning photographs of the cosmos are well within reach. The trick is to take long exposures, collecting many more photons over time than the human eye can manage, and to "stack" them digitally, averaging out the camera noise and bringing out your target's fainter features.

Lately, some members have taken an interest in astrophotography through Irv, our 101-year-old flagship telescope, using the club's DSLR camera (purchased three years ago by then-Treasurer Ariel Marxena). Here are some of the results!

M57 / Ring Nebula (08/01/23)
124 × 30-second exposures
Credit: Erik Payton & Ben Jacobson-Bell

RING NEBULA (M57)

Situated roughly 2,500 lightyears away (or 14,697,500,000,000,000 miles), the Ring Nebula lies in the northern sky near the bright star Vega in the constellation Lyra, which coincidentally helps form the top of a summer asterism known as the Summer Triangle.

The Ring is a planetary nebula—the stellar remnant of a dead star. Over the rest of its life, it will exhaust all of its remaining ionized gas into the vastness of interstellar space.

Finding the Ring Nebula may seem like a daunting task to beginning astronomers, but it is easily found halfway between two bright stars immediately southwest of Vega. This makes it a perfect target for amateur astronomers or simply those interested in the mysteries hidden within the night sky.

To those interested in the secrets of the universe, and to those who have spent their lives studying stars, we find ourselves fascinated by sights far removed from us.

ANDROMEDA GALAXY (M31)

M31 / Andromeda Galaxy (09/14/23)
12 × 30-second exposures
Credit: Ben Jacobson-Bell & Gillis Lowry

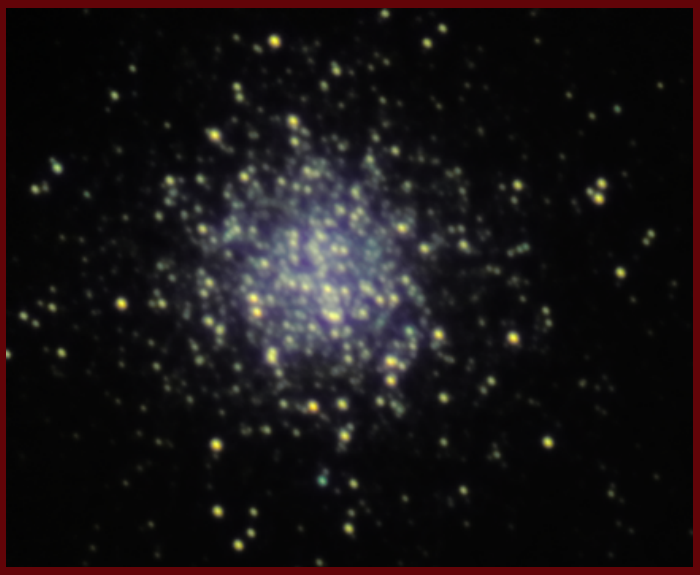
The Andromeda Galaxy, the Milky Way's closest major neighbor, is over 2.5 million lightyears away, but getting closer all the time. In a few billion years, the Andromeda Galaxy and the Milky Way will collide and merge, forming a composite galaxy some astronomers call "Milkomeda." Don't worry, though—any passing stars are likely to miss the Sun by a huge margin.

We took the exposures for this image on the spur of the moment at the end of a long night of observing. The bright core is visible along with some dark nebulosity, but with even longer exposures, we could extract much more of the galaxy's detail, like its stunning spiral arms. We look forward to adding to this image soon!

HERCULES GLOBULAR CLUSTER (M13)

The Hercules Globular Cluster is an old favorite for open houses at Fuertes. In the early fall or late spring (or all summer long), it's a bright cloudy cluster of hundreds of thousands of stars situated very close to directly overhead. It's a perfect first target for telescope beginners, and for astrophotography—the more photons you collect, the more of those dim, dim stars you can see!

We will soon be bidding Hercules farewell in our late fall open houses, but we look forward to welcoming this great globular cluster back next spring. Until then, there are plenty of other photography targets to try out!



M13 / Hercules Globular Cluster (09/19/23)
96 × 30-second exposures
Credit: Ben Jacobson-Bell & Gillis Lowry

GALLERY OF SOLAR SYSTEM GAS GIANTS

Jupiter (09/22/23)
~100 × 0.2-second exposures
Credit: Erik Payton

Saturn (08/27/23)
~100 × 0.2-second exposures
Credit: Erik Payton

Uranus (10/04/23)
21 × 0.2-second exposures
Credit: Ben Jacobson-Bell

Planetary astrophotography is very different from deep-sky astrophotography. The exposures don't need to be nearly as long, and the editing workflow has to change if you want to bring out features like banding or moons. Notably, on the truly small planets like Mars or the truly distant planets like Uranus, it can be a challenge to bring out any detail at all.

We hope to fill out this gallery over time with images of the other planets!

FUERTES SPACE COWBOY CLOSE-UPS

From left to right: Jack Qualkenbush, Stella Dang, Ben Shapiro, Gillis Lowry

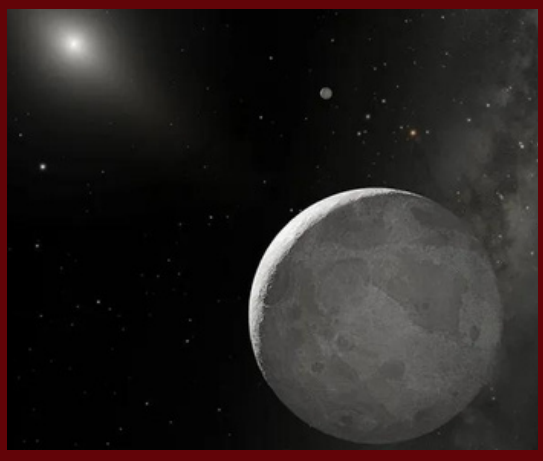
IS PLUTO A PLANET?

BY DYLAN JACKAWAY

For most of the twentieth century, generations of students learned that the Solar System consisted of nine planets—until the famous "demotion" of Pluto to the status of "dwarf planet" left us with only eight. Many felt this decision of the International Astronomical Union (IAU) in 2006 to have been a gross injustice. So what's the big deal? Should Pluto be considered a planet?

Image of Pluto taken by NASA's New Horizons spacecraft
Credit: NASA

When Clyde Tombaugh discovered Pluto in 1930, he thought it was far more massive than it actually is. He had wanted to explain an irregularity in the orbit of Neptune, which later turned out to be due to an observational error. Rather than having mass comparable to Earth's, Pluto turned out after many iterative estimates to be even less massive than the Moon. It seemed as though Pluto was more different from the other eight planets than they are from each other, especially with Pluto's orbit being offset from the plane of the Solar System by 17°.



Render of the large Kuiper Belt object Eris and its moon Dysnomia imagines the rest of the solar system as a distant, dusty disk
Credit: NASA/ESA/STScI

In the 1990s, a ring of smaller objects, similar to the Asteroid Belt between Mars and Jupiter, was found beyond Neptune's orbit, with some almost as large as Pluto. Named after the planetary scientist Gerard Kuiper, this new Kuiper Belt led some astronomers to wonder if the list of planets ought to be extended with each new discovery, or if a new category should be created.

The real catalyst, however, came in 2005, with the discovery of an object later named Eris, which was in fact more massive than Pluto, so the issue of what objects to consider a planet could no longer be ignored. For the first time, the IAU proposed a proper definition of a planet, with three criteria:

1. It must orbit the Sun.
2. It must be round due to the effect of its own gravity.
3. It must have "cleared the neighborhood" of its orbit of other competing objects.

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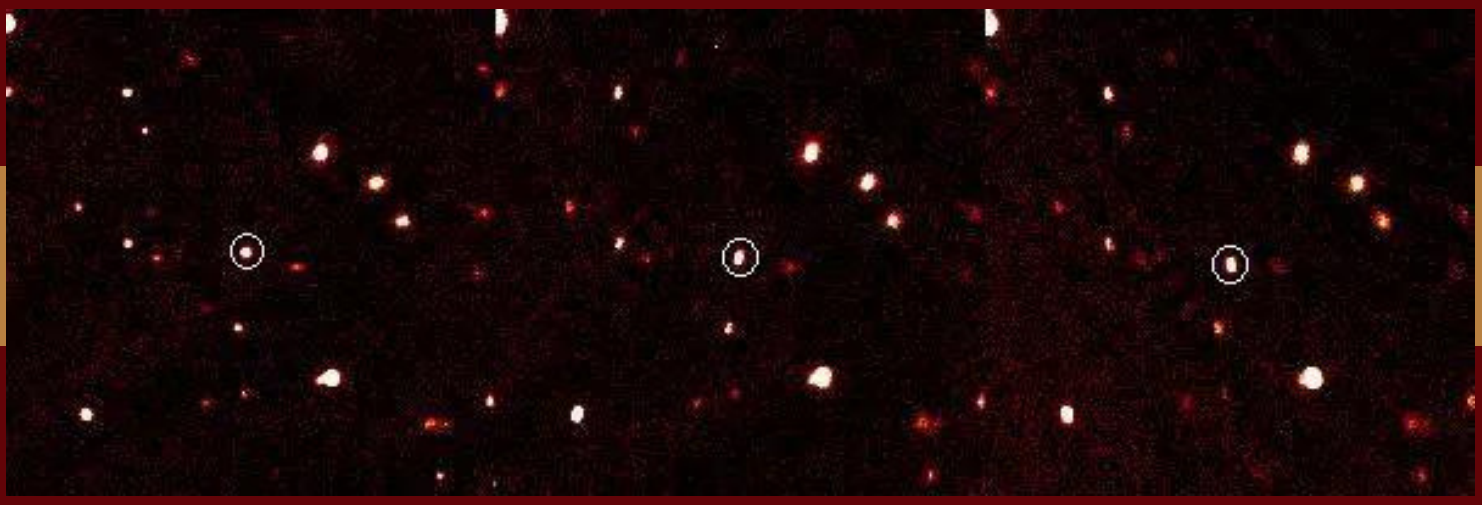


These time-lapse images of a newfound dwarf planet in our solar system, formerly known as 2003 UB313 or Xena, and now called Eris, were taken using the Samuel Oschin Telescope at the Palomar Observatory
Credit: NASA/Palomar Observatory

While Pluto passes the first two tests, it falls short on clearing its orbital path. “True” planets tend to either collide with objects in similar orbits or fling them away gravitationally during the process of solar system formation. The IAU also created the category of “dwarf planet,” reclassifying Pluto and Eris, as well as Ceres, the first object to be discovered in the Asteroid Belt in 1801, as such.

This story could have become a footnote of history, but it was instead met with public outrage and sympathy for Pluto. The newly coined term “plutoed,” meaning “demoted” or “disqualified,” was voted the 2006 Word of the Year. The reasons for this outcry have been debated, but it probably has something to do with the association with Mickey Mouse’s pet dog, combined with Pluto’s prior status as the smallest of the nine planets. Astronomer Michael Brown, however, who contributed to this decision, is unrepentant—in 2010, he published his memoir, *How I Killed Pluto and Why It Had It Coming*, to positive reviews.

In 2015, the *New Horizons* probe conducted a fly-by of Pluto and its companion Charon. (Some consider Pluto and Charon to be a “double dwarf planet,” since they both orbit a point located between the two objects). In Pluto, the mission revealed a world with just as much intricacy and depth as any full-fledged planet, with a heart-shaped lake of frozen nitrogen and mountains of water ice. After all, one could argue that a dwarf planet is just another kind of planet, and Pluto remains “our favorite dwarf planet since 2006.”

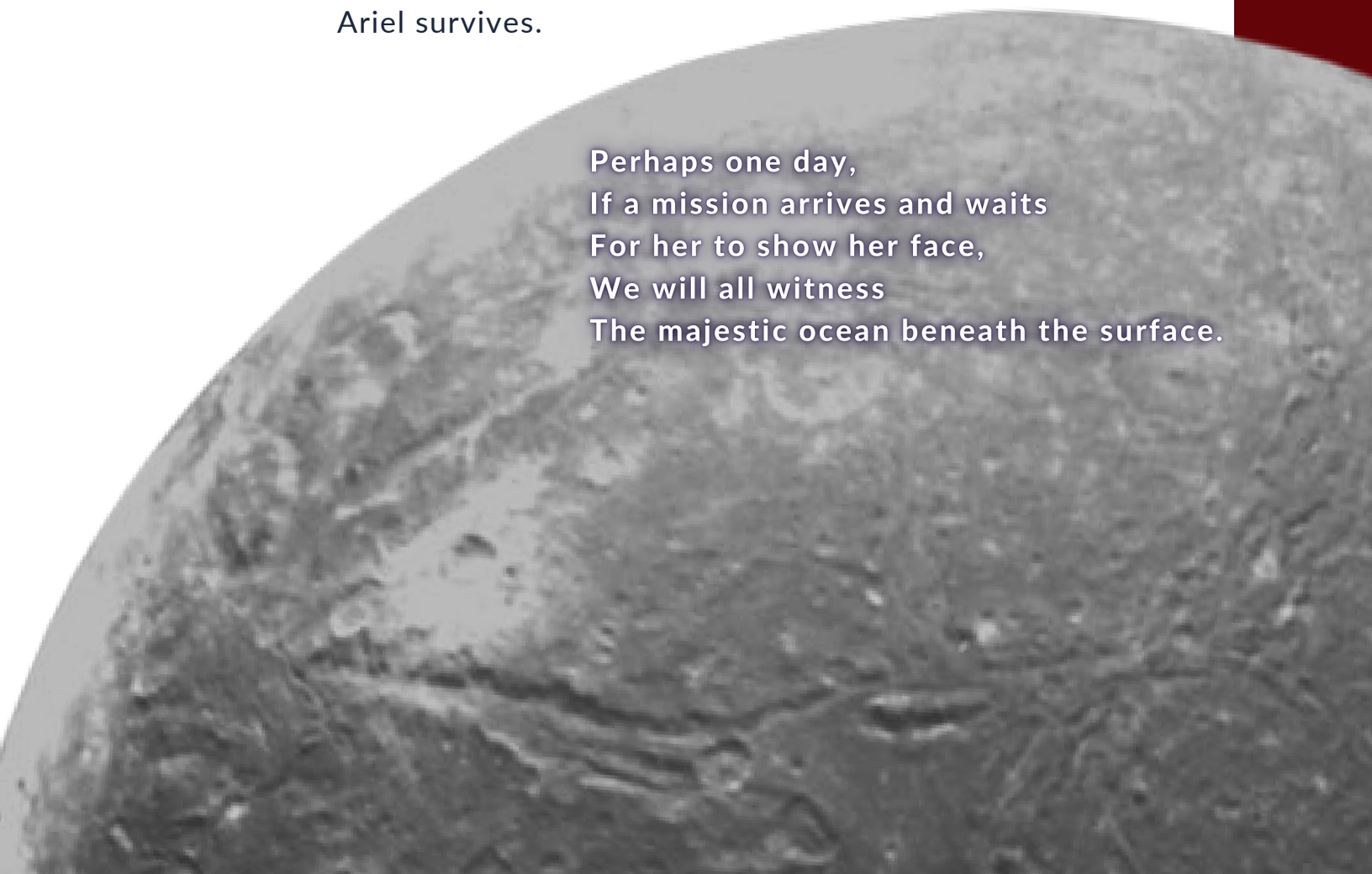
ARIEL

BY JUSTINE SINGLETON

(You might be expecting this to start with “Picture this”, but bear with me).

Out there in the Uranian orbit
Some on Earth might barely notice it.
Brightest of the ice giant’s moons,
Built by pressure,
Built to endure.

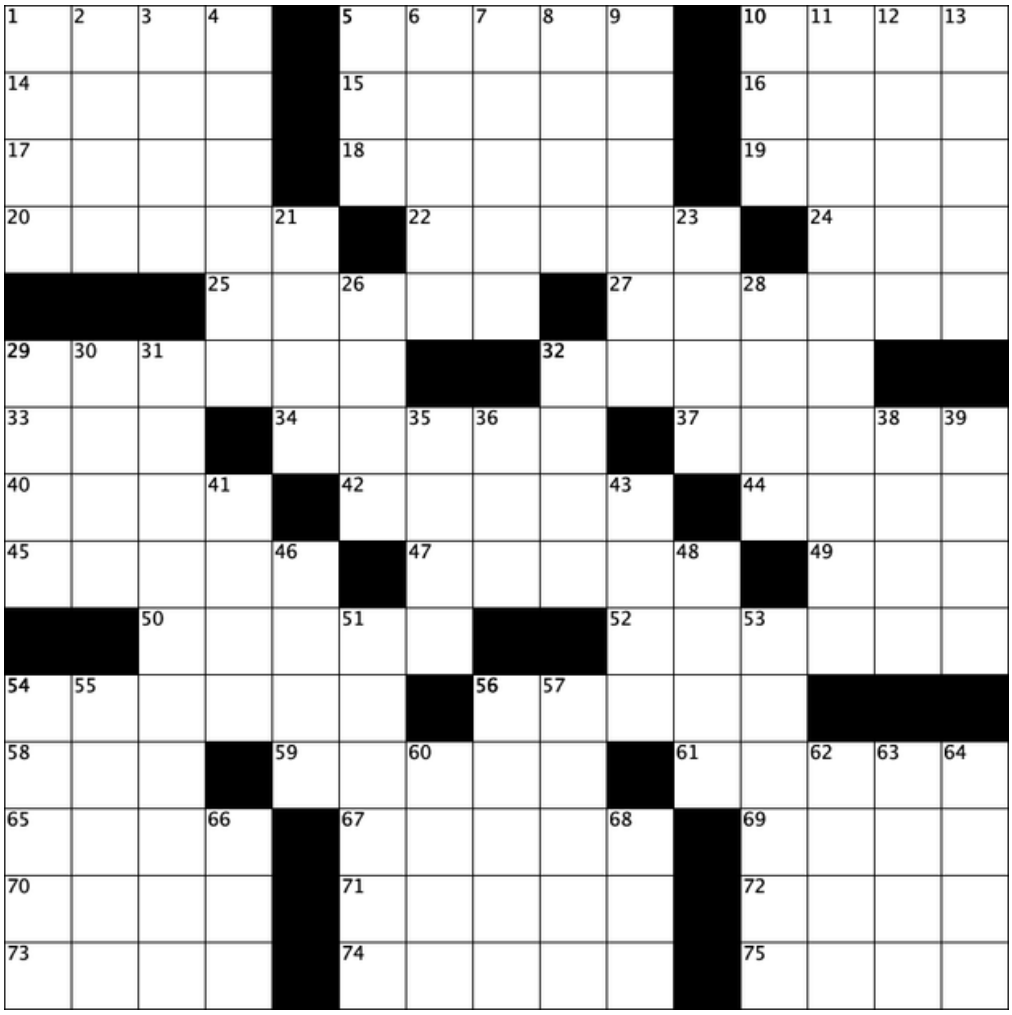
Through collisions and craters,
Ariel survives.
Through icy volcanoes and tidal heating,
Ariel survives.
Through scars and grabens,
Ariel survives.



Perhaps one day,
If a mission arrives and waits
For her to show her face,
We will all witness
The majestic ocean beneath the surface.

CROSSWORD

BY BEN JACOBSON-BELL



ACROSS
1. ___ Celeste, famous ghost ship
5. Waned
10. Lhasa ___, long-haired dog breed
14. State with the former headquarters of the Warner & Swasey Co.
15. Broadcast again
16. Tidy
17. With 42-Across, the scientific study of space
18. With 42-Across, measurements of movements of objects in space
19. With 42-Across, one on a space mission
20. Namesake of Cornell's School of Applied Economics and Management
22. Possessive pronoun for them
24. Business VIP
25. Code eponym
27. Provides food for an event
29. Noted producer of pianos, motorcycles, and Vocaloid
32. Symbiotic Spider-Man villain
33. Self-importance
34. Helpful
37. With 42-Across, telescope designed for taking pictures
40. Breathing organ
42. Prefix from the Latin for "star"
44. Whence Blåhaj
45. With 42-Across, worship of celestial bodies
47. Macaroni noodle, colloquially
49. Member of a Tolkien treefolk
50. Protrusions from roofs
52. They may be black and white and red all over when sunburned
54. London landmark above the Palace of Westminster
56. Approval
58. "Te ___" (Spanish "I love you")
59. Oft-rattled weapon
61. Satiated for now, with "over"
65. With 42-Across, navigational instrument that measures positions of stars
67. With 42-Across, impact crater
69. With 42-Across, reading of the stars to predict the future
70. "Gadzooks!"
71. Guitar-like instruments
72. Precipice
73. "The Force Awakens" protagonist and others
74. Weather away
75. Painter Bob

DOWN
1. Alternative theory to dark matter: Abbr.
2. Greeting at sea
3. They're salted in some cocktails
4. Cellist with an instrument named Petunia
5. "Uhh..."
6. Roots for some salads
7. Clean in a tub, perhaps
8. One Irish name for Ireland
9. Fog maker
10. Druyan who pushed for the inclusion of "Johnny B. Goode" on the Golden Record
11. Mediator
12. Adjective for kraut
13. Four Holy Roman Emperors, by name
21. Neighborhood north of SoHo
23. Pushed, as a doorbell
26. Nadal of tennis, familiarly
28. Donuts and coffee mugs, topologically
29. Raise one's voice
30. Water, como en el Golfo de California
31. City in Jamaica namedropped in Stan Rogers's "Barrett's Privateers"
32. Address, e.g., maybe
35. Employs
36. Cardinals' city, on scoreboards
38. Surname with a tilde meaning "crag"
39. Bowler and stovepipe, for two
41. Take
43. Like viscous liquids
46. The Y of YSL
48. It's just down the Slope
51. Make possible
53. Water heater
54. Hay cubing machine
55. "Pale Blue Dot," for one
56. Address
57. Holding weapons
60. Effect of movement in some photographs
62. Extinct flightless bird
63. Easter activity need
64. Easter activity need
66. Newsletter overseers, in brief
68. Suffix with "Japan"

CREDITS

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Sources for “Ariel”

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Image

The Cornell Astronomical Society (CAS) is a registered student non-profit organization founded in 1972 at Cornell University.

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