OBSERVATIONS

A MONTHLY PUBLICATION OF THE

Chester County Astronomical Society

SEPTEMBER 2002

(VOLUME 10, NO. 9)

http://www.ccasastro.org

CCAS Schedule of Events

September 10, 2002 (Tuesday)	CCAS Meeting Location: West Chester University 7:30 p.m. EDT
September 14/15, 2002 (Friday/Saturday)	CCAS Observing Session Special: Lunar Observing Session Location: BVA sunset
October 4/5, 2002 (Friday/Saturday)	CCAS Observing Session Location: BVA sunset
October 8, 2002 (Tuesday)	CCAS Meeting Location: West Chester University 7:30 p.m. EDT
November 1/2, 2002 (Friday/Saturday)	CCAS Observing Session Location: BVA sunset
November 12, 2002 (Tuesday)	CCAS Meeting Location: West Chester University 7:30 p.m. EST
December 6/7, 2002 (Friday/Saturday)	CCAS Observing Session Location: BVA sunset
December 10, 2002 (Tuesday)	CCAS Meeting Location: **TBA** 7:30 p.m. EST

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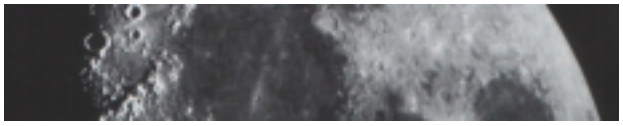
Newsletter Deadlines

These are the deadlines for submitting material for publication in the newsletter, through the January 2003 issue.

Issue	Deadline
October 2002	09/27/2002
November 2002	10/25/2002
December 2002	11/26/2002
January 2003	12/27/2002



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CCAS September Meeting

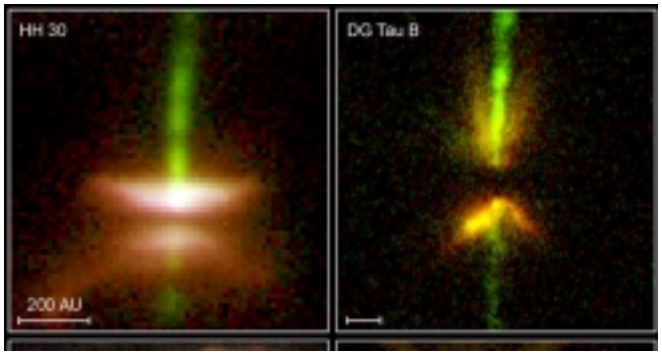
DATE: **Tuesday September 10, 2002**
TIME: 7:30 p.m. EDT
PLACE: Department of Geology and Astronomy Lecture Room (Room 113 – Boucher Building) West Chester University
LOCATION: South Church Street West Chester, PA (see map on page 9)

One of the topics of conversation at the September meeting will be the status of the Flower & Cook Observatory. Rich Mitchell will attend to catch us up to date, and also to share some thoughts with the Society about the future of the Observatory.

Our guest speaker for the September meeting will be Professor Laurence DeWarf, Instructor of Astronomy and Astrophysics at Villanova University. He will talk with us about "Young Stellar Objects", especially SU Aurigae, a forming star system which may be in the process of forming planets.

Laurence E. DeWarf earned his Bachelor of Science Degree in Physics at the University of Arizona in December 1987. He completed a second B.S. Degree in Astronomy at the University of Arizona in May of 1989. He completed his Master of Science Degree in Physics at the University of Wyoming in July 1992. His research interests are young stellar objects, extragalactic binary stars, and solar–type stars.

Be sure you don't miss this first meeting of what is sure to be an interesting season!



Two pictures of young stars with disks of dust around them, which may be planets in formation, as seen by the Hubble Space Telescope.

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Special Event on September 19, 2002

On September 19, astronomer and physicist Timothy Ferris will speak at the Free Library of Philadelphia about his new book *Seeing in the Dark*. The book is about how backyard stargazers are probing deep space and guarding Earth from interplanetary peril from asteroids and comets. The evening will include a slide show on the wonders of backyard stargazing. Tickets are $12.00. They are available through Upstages starting on September 5th. Upstages' number is 215-569-9700. For additional information contact the Program Director at the Free Library, Andy Kahan at 215-567-4341 or by email at KahanA@excen.library.phila.gov. You can only get tickets, however, via Upstages.

Timothy Ferris is the recipient of the American Institute of Physics Prize and the American Association for the Advancement of Science Prize. His previous books include the bestseller *The Whole Shebang* and *Coming of Age in the Milky Way* (nominated for a Pulitzer Prize).

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NASA's Space Place

Editor's Note: These are the first two installments (August and September issues) of what will become a regular monthly feature in Observations. Each article is prepared by NASA personnel and researchers, and covers various topics in astronomy and space exploration. We look forward to reading these articles each month, and we thank the people at NASA for making these available to astronomy clubs across the country. "Your tax dollars at work."

What Space-age Inventions Have You Touched Today?

Exploring space is not easy. Space engineers and scientists have invented many new devices to make it safe and not too expensive to go into space. Some of the inventions are used to help humans live in space. Showers and toilets that work without gravity are examples of inventions used on the Space Shuttle and International Space Station. Other inventions are used on spacecraft going to Mars and beyond.

Many devices invented for space are also very useful right here on Earth. New inventions or new uses for things invented for space are referred to as "spin-offs." For example, special materials were developed for space suits to protect astronauts from the harsh environment of space. These same materials are used in the special clothing that fire fighters wear to protect them from the harsh environment of a building on fire! Cordless tools were invented for the Apollo astronauts to use on the moon. Cordless drills and vacuum cleaners are examples of spin-offs from these inventions.

Doctors can now take amazing images of people's insides to find out exactly what is wrong with them. These images are possible because of technology developed to process pictures from space. And what about the TV satellite dish you may have on your roof? Space program technology helped to make those pictures and sounds crisp and clear.

If it weren't for the space program, some of these incredible inventions might never have come about! Find out about more space program spin-offs at http://www.sti.nasa.gov/tto/ and share the fun of spin-offs with kids by playing the Memory Game at The Space Place, http://spaceplace.nasa.gov/spinoffs.htm/ .

This computer game joystick, made by ThrustMaster, uses technology developed for a Space shuttle hand controller. The design for these toy gliders (AeroNerf Gliders), made by Hasbro, Inc., benefited from NASA wind tunnel and aerodynamic research.

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This article was provided by NASA's Jet Propulsion Laboratory, managed by Caltech in Pasadena, California.

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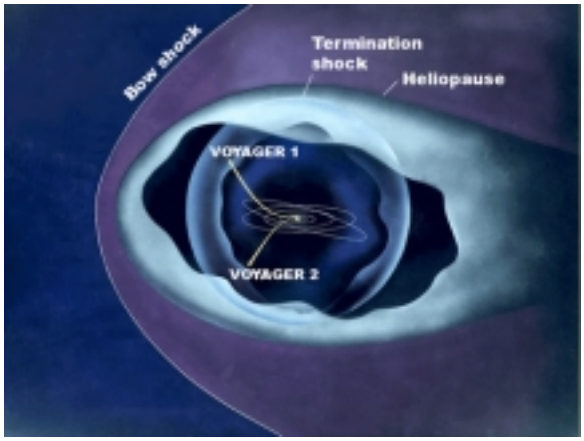
Seeking the Edge of the Solar System

In September and August, respectively, 2002, the Voyager 1 and 2 spacecraft will observe their 25th anniversaries in space, and both are continuing to perform long after their original mission to visit the Jupiter and Saturn systems. After Voyager 1's encounter with the two gas giants, it was aimed upward out of the plane of the ecliptic. Voyager 2, after its visit at Jupiter and Saturn, was given two more planetary destinations, Uranus and Neptune. It completed its "grand tour" of the outer planets in 1989. It was then aimed downward out of the ecliptic plane.

Now at a distance of about 85 AU*, Voyager 1 is the most distant human–made object. Round–trip light time is 24 hours. Voyager 2 is at about 68 AU. Their mission now is to study the heliosphere, the vast bubble of space within the Sun's influence, and the heliopause, the boundary of the solar system with interstellar space. At the heliopause, the outward pressure exerted by the solar wind balances the inward pressure of the interstellar wind. The region where solar wind particles begin piling up against the heliopause is the termination shock, where the solar wind should drop from about 1,500,000 kilometers (nearly 1,000,000 miles) per hour to 400,000 kilometers (250,000 miles) per hour. Voyager 1 is already detecting a slowing of the solar wind from the

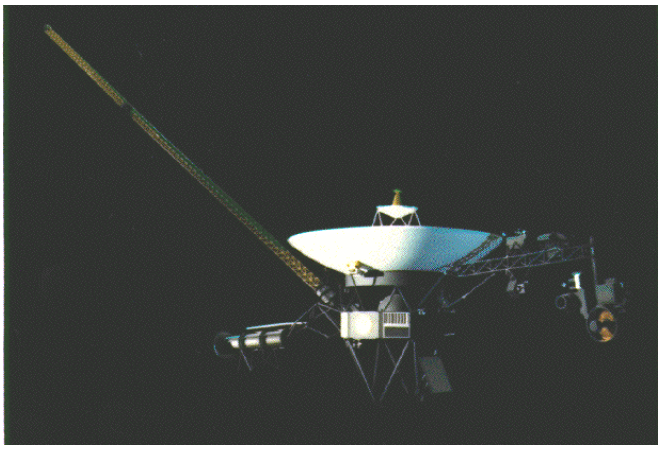
pressure of inbound interstellar particles leaking through the heliopause.



No one knows exactly how much farther Voyager 1 must travel to reach the termination shock or the heliopause. Dr. Ed Stone, Voyager Project Scientist since mission inception, estimates that the spacecraft could reach the termination shock within three years. Once there, Dr. Stone predicts it will still have about 5 billion to 8 billion kilometers (3 billion to 5 billion miles) and 10 to 15 years to go before actually crossing the heliopause into interstellar space. Because the heliosphere expands and contracts with the level of solar activity and the inward pressure of the interstellar wind is uncertain, it is very difficult for scientists to estimate the actual extent of the heliosphere.

Read more about the Voyager mission to find the heliopause at http://voyager.jpl.nasa.gov/ . For children, go to http://spaceplace.nasa.gov/vgr_fact1.htm to read about the Voyagers' grand tour of the outer planets and find out the secret code they use to send pictures back from space.

** AU = Astronomical Unit, the average distance between the Earth and the Sun, which is about 93 million miles or 150 million kilometers. [Editor]*



A photo of one of the Voyager spacecraft.

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This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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[End of the two installments of NASA's Space Place]

Hubble Heritage Image for August

NASA's Hubble Space Telescope has snapped a photograph of a strange object that bears an uncanny resemblance to a hamburger. The object, nicknamed Gomez's Hamburger, is a sun-like star nearing the end of its life. It already has expelled large amounts of gas and dust and is on its way to becoming a colorful, glowing planetary nebula.

The ingredients for the giant celestial hamburger are dust and light. The buns are light reflecting off dust and the patty is the dark band of dust in the middle. The Hubble Heritage image, taken Feb. 22, 2002, with the Wide Field Planetary Camera 2, shows the structure of Gomez's Hamburger with high resolution, particularly the striking dark band of dust that cuts across the middle. The dark band is actually the shadow of a thick disk around the central star, which is seen edge-on from Earth. The star itself, with a surface temperature of approximately 18,000 degrees Fahrenheit (10,000 degrees Celsius), is hidden within this disk. However, light from the star does emerge in the directions perpendicular to the disk and illuminates dust above and below it.

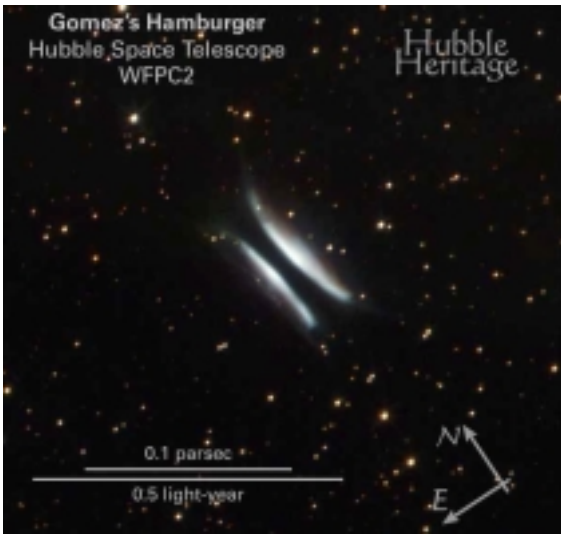
The reason why the star is surrounded by a thick, dusty disk remains somewhat uncertain. It is possible that the central object is actually a pair of stars. If so, then the star that ejected the nebula may be rapidly rotating, expelling material mostly from its equatorial regions. Stars with masses similar to our Sun's end their lives as planetary nebulae. The star evolves to become a bloated red giant, with a girth about 100 times greater than its original diameter. Then it ejects its outer layers into space, exposing the star's hot core. Ultraviolet radiation from the central core streams out into the surrounding ejected gas, causing it to glow. The glowing gas is called a planetary nebula.

The Hubble Space Telescope has provided numerous spectacular images of planetary nebulae over the past several years. Less well known are "proto-planetary nebulae," objects like Gomez's Hamburger that are in a state of evolution immediately before the true planetary-nebula stage. Just after the red giant expels its outer layers, the remnant star in the center is still relatively cool. Consequently, it emits ordinary visible light, but very little ultraviolet radiation. Therefore the surrounding gas does not glow. However, the ejected material also contains vast numbers of microscopic dust particles, which can reflect the starlight and make the material visible. This same effect of light scattering produces halos around streetlights on a foggy night. The lifetime of a proto-planetary nebula is very brief. In less than a thousand years, astronomers expect that the central star will become hot enough to make the dust particles evaporate, thus exposing the star to view. At that time the surrounding gas will glow. Gomez's Hamburger will have become a beautiful, glowing planetary nebula.

Gomez's Hamburger was discovered on sky photographs obtained by Arturo Gomez, an astronomer at the Cerro Tololo Inter-American Observatory in Chile. The photos suggested that there was a dark band across the object, but its exact structure was difficult to determine because of the atmospheric turbulence that hampers all images taken from the ground. Gomez's Hamburger is located roughly 6,500 light-years away in the constellation Sagittarius.

Image Credit: NASA and the Hubble Heritage Team (STScI/AURA)
Acknowledgment: A. Gomez (CTIO/NOAO)
Principal observers: Hubble Heritage Team: K. Noll, H. Bond, C. Christian, L. Frattare, F. Hamilton, J. Lee, Z. Levay, P. Royle (STScI); A. Gomez (CTIO/NOAO)
Release Date: August 1, 2002

Fast Facts for Gomez's Hamburger
Object Name: Gomez's Hamburger (IRAS 18059-3211)
Object Description: Proto-Planetary Nebula
Position (J2000): R.A. 18h 09m 16s
Dec. –32° 10' 45"



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September Skies

Autumnal Equinox: September 23

The Sun crosses the celestial equator at 12:55 a.m. EDT on Monday September 23 this year, marking the beginning of autumn in the Northern Hemisphere, and the beginning of spring in the Southern Hemisphere.

Moon Phases

New Moon	9/6
First Quarter	9/13
Full Moon	9/21
Last Quarter	9/29

The Planets

Mercury is in our evening sky as the month begins, but it will be close to the horizon, setting less than an hour after sunset. Start looking for it with binoculars about 30 minutes after sunset, to the right of much–brighter Venus. By mid–month it will disappear into the Sun's glare.

Venus is in the evening sky all month. It will be the only bright planet noticeable in the evening sky, but it will be getting close to the horizon. Venus will appear crescent–shaped in binoculars or a telescope.

Mars is in the morning sky in September, but is very faint and hard to find.

Jupiter is in the morning sky, and is the brightest object visible in the sky before the Sun rises. From September 1 through 10, it will be just 1º away from M44, the Beehive Cluster in Cancer. This will be a fine sight in binoculars, or a telescope with a wide–angle eyepiece. Then on the morning of Saturday September 28 at about 5:02 a.m. EDT two of Jupiter's moon, Io and Europa, will be just two arc–seconds apart, looking like a double star right next to Jupiter. You'll need a telescope to detect that the one "moon" is really a double!

Saturn is in the morning sky in September, standing high in the south at sunrise. At month's end it will be close to the star cluster M35 in Gemini.

Uranus is in Capricornus this month, and thus visible in the evening sky. This is a good month to find Uranus using a telescope. It looks like a blue-green disk in a telescope, small and featureless. See the charts for locating Uranus on pages 11 and 12 (produced using the computer program *Guide 8.0*).

Neptune is also in Capricornus. September is a good time to track down Neptune with a steady telescope using moderate to high magnification. It will appear as a tiny disk, perhaps bluish in color; much smaller than Uranus. See the charts for locating Neptune in September on pages 13 and 14 (produced using the computer program *Guide 8.0*).

Pluto is in Ophiuchus this month, and getting lower in the southwestern evening sky as autumn progresses. You'll need at least an 8" telescope, dark skies, good finder charts, and lots of patience to find Pluto.

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September Observing Opportunities

By Ed Lurcott, Observing Chair

Many of the hardened deep–sky enthusiasts do not even get out their telescopes when the moon is up and dominating the night sky. They wait for the moon to set before going after those elusive F.F.O.s (Faint Fuzzy Objects).

This fact points to another aspect of astronomy which is often overlooked, yet is much more accessible—lunar observing! The date for our September 13/14 observing session was chosen, in part, to coincide with the First Quarter phase of the moon. It is during this phase that the fine features on the moon's surface are most readily seen. Even binoculars easily show many craters, mountain ranges, and seas (usually called maria, the plural of mare, which is Latin for sea). Telescopes (3 to 6 inches of aperture is all that is needed) will show details of each large crater including terraced crater walls, central peaks, and even small craters within craters. These details are most easily seen along the terminator (that area along the line dividing the lighted portion of the moon from the darkened portion of the moon). Along this line the sun is just rising above the moon's horizon and is casting long shadows of the mountain peaks and crater rims, making them very visible from earth.

First Quarter Moon

The moon reaches its full phase on September 21 (this month's Full Moon is known as the Harvest Moon,) when it will rise in the east as the sun sets in the west. On September 23 the moon will reach the point in its orbit known as apogee, which is the furthest point from earth: it will be 252,495 miles away, and will appear to be less than 29.5 minutes of arc in diameter. That's 87% of the apparent diameter when the moon is at perigee (closest point to earth in its orbit).

You no doubt will notice how far south the moon is this month. The sun and planets appear to follow a path through the sky called the ecliptic. The ecliptic is 23.5 degrees south of the celestial equator in the summer evening hours. The moon itself varies up to five degrees north and south of the ecliptic as it goes through its monthly orbit. This month the ecliptic is climbing northward but is still far south of the equator. The moon is five degrees south of the ecliptic, and therefore appears in the far southern skies. You will need to observe from a location with a clear southern view (like at the Brandywine Valley Association where our observing session is held) to get a good look at the moon at First Quarter in September.

There is a lot of fascinating detail to see on the moon. Each phase presents different features and indeed each night the sun angle changes the view dramatically. The moon is also easy to find with binoculars or telescope. So, instead of avoiding it try enjoying it!

Clear skies!

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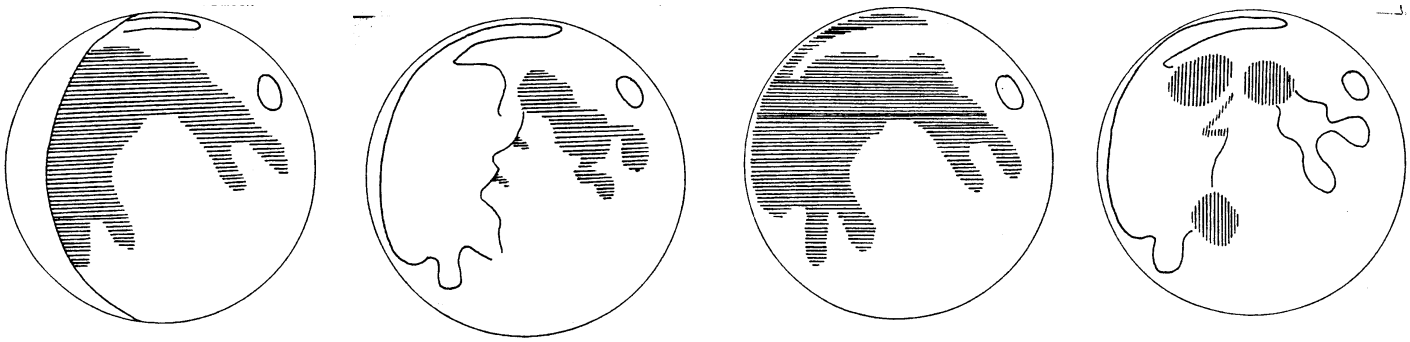

Cow jumping over the Moon | Woman in the Moon | Rabbit in the Moon | Man in the Moon

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Astronomus: 17

A Journal for Younger Astronomers

By Bob Popovich

"Relatively Speaking"

Relatively Speaking…was supposed to be the title of this month's installment. But that's not the way it turned out…

"God does not play dice." So spoke Albert Einstein a century ago. An awesome intellect, he understood that the universe, though complex and intricate beyond all reckoning, must have an overlying order. It was simply too beautiful not to. I admit I'm not a visionary, but my hindsight is pretty good, relatively speaking. How this article came to be showed that not only is there indeed a beautiful overlying order to things, but that I'm part of it and am able to perceive it…even if it's after the fact.

Part one of my story was back in early July when Betsy gave me a book entitled "Relativity Simply Explained" by Martin Gardner. Seeing the facial contortions I was making when reading Einstein's own explanation of relativity, she thought Gardner's book would present the theories in an understandable way.

Part two of my story was that, knowing I would be on vacation the first half of August, I drafted an article in mid–July describing some of the things I had read and my understanding of them. "And where were we going on vacation?" You might ask. To Switzerland.

Now the stage shifts to a suburb of Zurich where Betsy's aunt and uncle live. Having opened their home to us for two weeks they, along with their two grown children, were looking forward to being our tour guides through their beautiful country. A full itinerary was set for us including several cities as well as Alpine hikes. Now I knew that Einstein had lived and worked in Switzerland and I did hope to see where, but I wasn't sure if the opportunity would present itself.

The gentle days passed as we neared the end of the second week. Betsy's cousin Alexander told us that he had to go to Bern on business and invited us to meet him there in the afternoon. He said that Bern was an interesting town. How right he was.

Having raced to catch our trains (Swiss trains are immaculate, comfortable and extremely on-time), we arrived in Bern in late morning. Our guidebook listed much to see including a clock tower with multiple moving figures that "performed" on the hour. In the midst of trying to get our bearings in a town filled with narrow, winding streets, we found ourselves near the clock tower as noon approached. End part three.

Part four had us looking around the tower's base as we tried to decide which way to walk. Looking up and down the inviting street, Betsy and I turned down the street while the boys stayed at the tower. As Betsy paused to window shop I continued on a bit until I came to a gray stone building with a café set at its base. And there, just above the café's umbrellas was a plaque that simply read "Einstein Haus." "How about that!" I thought. I found Betsy and we went back to get the boys who had, as planned, met up with their cousin Alexander.

We walked back (briskly) to Einstein Haus and up the stairs to the top floor. And there we stood- in the bedroom occupied in 1905 by Albert Einstein, his first wife Mileva and their infant son Hans Albert. 1905. The year he published special relativity.

The fifth piece of my tale involves Ruth—the woman who collected our admission fee and described the apartment to us. Since it was lunchtime, she decided to hang up the "out to lunch" sign as she locked the front door. But being polite, she would remain with us to answer our questions and provide extensive detail on Einstein's life and work while in this apartment. So there we were: just Betsy, Ned, Nick and cousin Alexander. In Einstein's apartment with no one other than our guide Ruth. And the door locked so we would not be disturbed. It was wonderful!

The sixth and final part of this story became evident a couple of days later (my hindsight is good, just not quick) when I realized what an incredible string of events led to my visit to Einstein Haus. People, events and timing in such a delightfully intricate order that one can only look and enjoy. Much like we do every time we gaze at the night sky.

"A string of coincidences" you might say. If I may quote Albert Einstein, "God does not play dice."

Einstein's desk from the Patent Office where he worked. Now preserved in the apartment we visited at 49 Kramgasse, Bern.

Next time: "It's Fall, Everybody Up"

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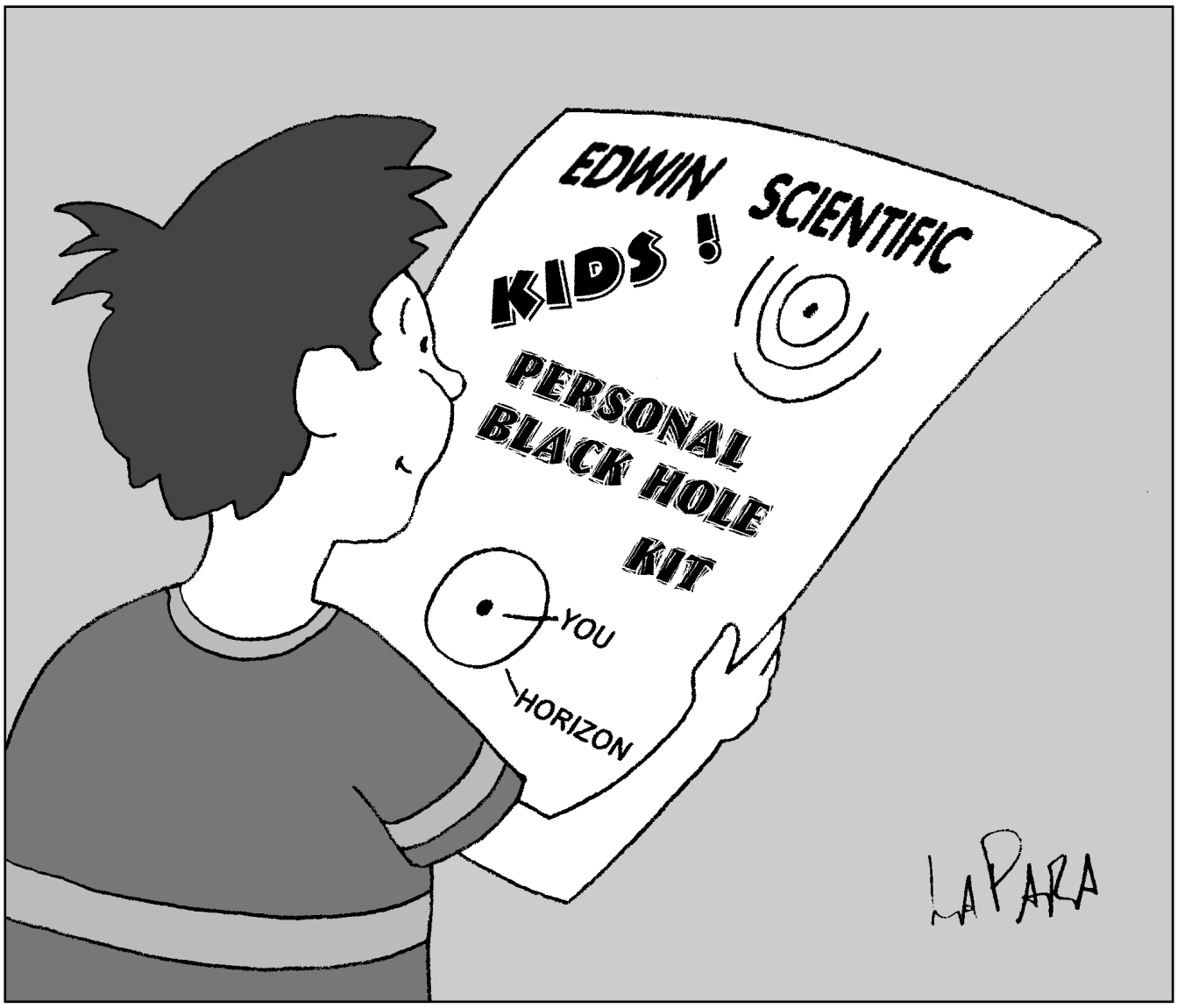

ONCE IN A LIFETIME OFFER

Cartoon by Nicholas La Para

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CCAS Information Directory

CCAS Lending Telescope

Contact Kathy Buczynski to make arrangements to borrow the Society's lending telescope. CCAS members can borrow the lending telescope for a month at a time; longer if no one else wants to borrow it after you. Kathy's phone number is 610-436-0821.

CCAS Lending Library

Contact our Librarian, Bill O'Hara, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings. Bill's phone number is 610-696-1422.

Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an email message and send it to

jim.anderson@mckesson.com

Or mail the contribution, typed or handwritten, to:

Jim Anderson
1249 West Kings Highway
Coatesville, PA 19320-1133

Get CCAS Newsletters via E-mail

You can receive the monthly newsletter by e-mail. All you need is a PC or Mac with an Internet e-mail connection. To get more information about how this works, send an e-mail request to Jim Anderson, the newsletter editor, at:

jim.anderson@mckesson.com

CCAS A.L. Award Coordinators

These are the members to contact when you have completed your observing log for the Messier, Binocular Messier, Lunar, or Double Star Awards:

Messier (both): Frank Angelini
(610-873-7929)

Lunar: Ed Lurcott
(610-436-0387)

Double Star: Jim Anderson
(610-857-4751)

CCAS Purpose

The Chester County Astronomical Society was formed in September 1993, with the cooperation of West Chester University, as a non-profit organization dedicated to the education and enjoyment of astronomy for the general public. The Society holds meetings (with speakers) and observing sessions once a month. Anyone who is interested in astronomy or would like to learn about astronomy is welcome to attend meetings and become a member of the Society. The Society also provides telescopes and expertise for "star nights" for school, scout, and other civic groups.

CCAS Officers

For further information on membership or society activities you may call:

President: Mike Turco
(610) 399-3423

Vice Pres: Steve Limeburner
(610) 353-3986

Treasurer: Pete LaFrance
(610) 268-2616

Secretary: Doug Liberati
(610) 827-2149

ALCor and Newsletter: Jim Anderson
(610) 857-4751

Librarian: William O'Hara
(610) 696-1422

Observing: Ed Lurcott
(610) 436-0387

Education: Kathy Buczynski
(610) 436-0821

CCAS Membership Information

The present membership rates are as follows:

REGULAR MEMBER.....$20/year
SENIOR MEMBER.....$10/year
STUDENT MEMBER...….....$ 5/year
JUNIOR MEMBER.....$ 5/year
FAMILY MEMBER.....$ 30/year

Membership Renewals

Check the date printed on the address label of this issue of *Observations*; "exp." appears in front of it, just after your name. If you are due to renew, you may send your renewal check made out to our Treasurer, Pete LaFrance. Mail to:

Pete LaFrance
413 Church Rd.
Avondale, PA 19311-9785

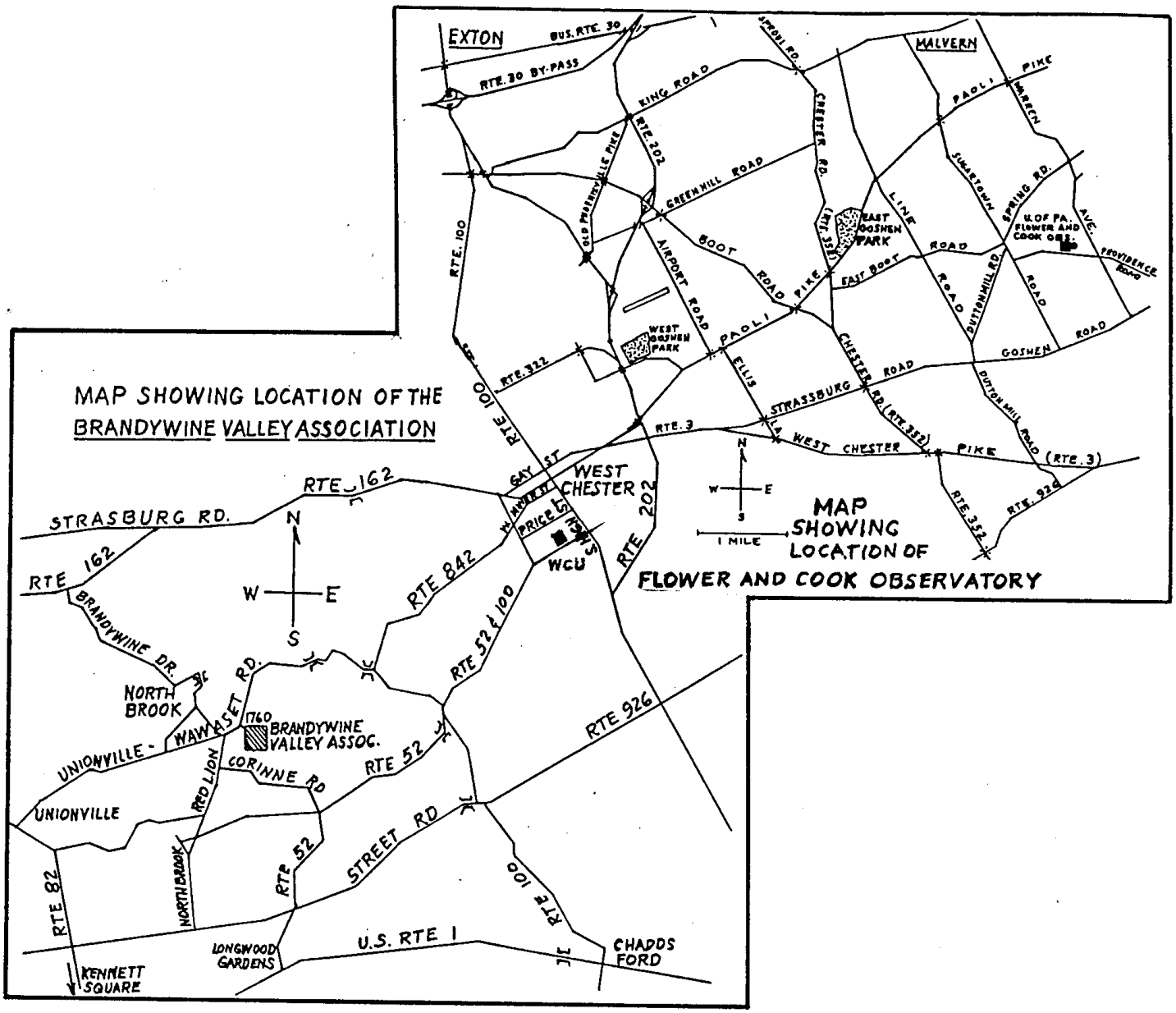
Sky & Telescope Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **$29.95** which is much less than the newsstand price of $54.00, and also cheaper than individual subscriptions ($39.95)! Make out a check to the Chester County Astronomical Society, note that it's for *Sky & Telescope*, and mail to Pete LaFrance. Or you can bring it to the next Society meeting and give it to Pete there. Buying a subscription this way also gets you a 10% discount on other Sky Publishing merchandise.

CCAS Website

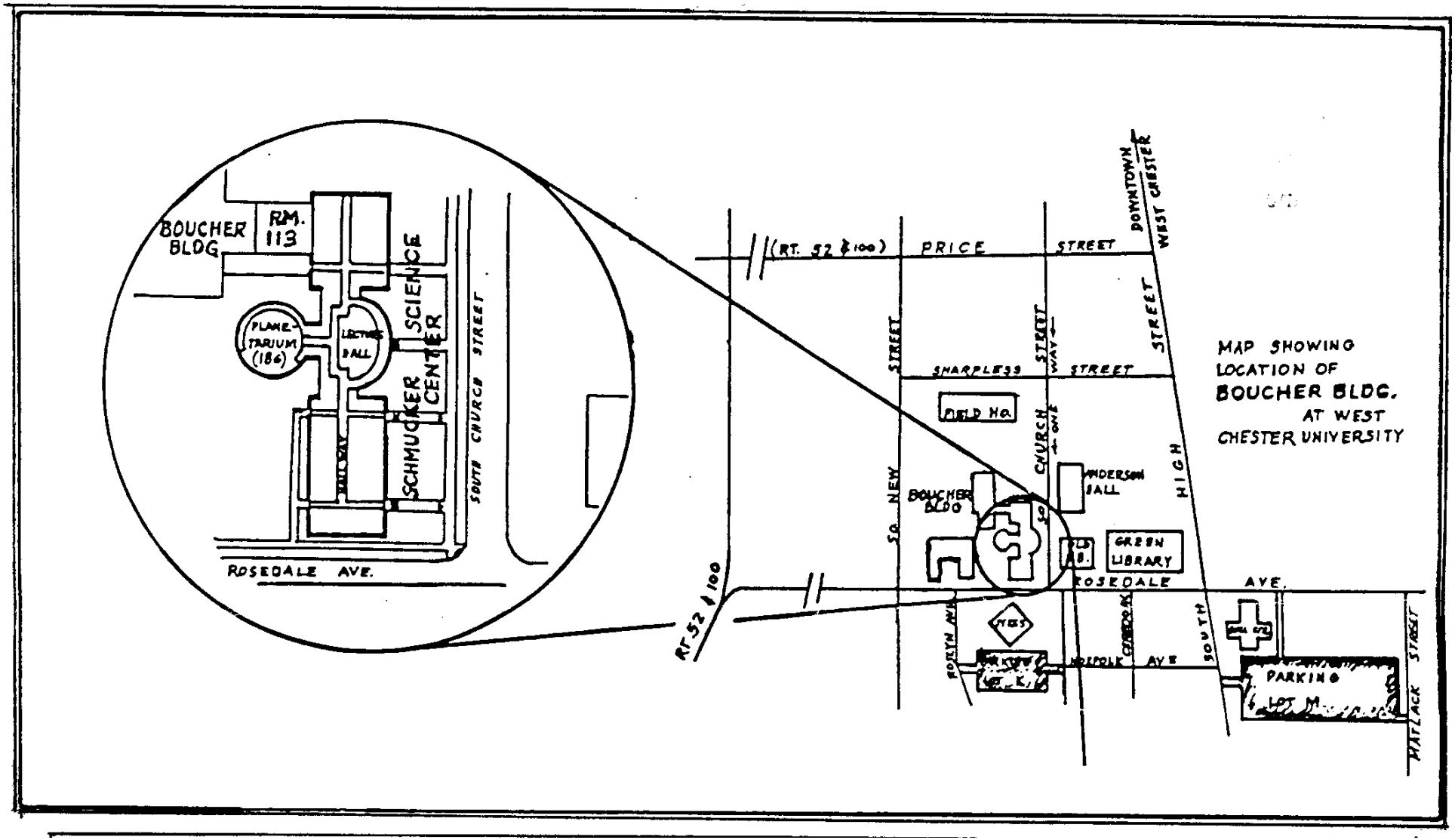
Pete LaFrance is the Society's Webmaster. You can check our Website at:
http://www.ccasastro.org

Pete welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work; no copying copyrighted material! Give your contributions to Pete LaFrance (610-268-2616)
or e-mail to lafrance@kennett.net

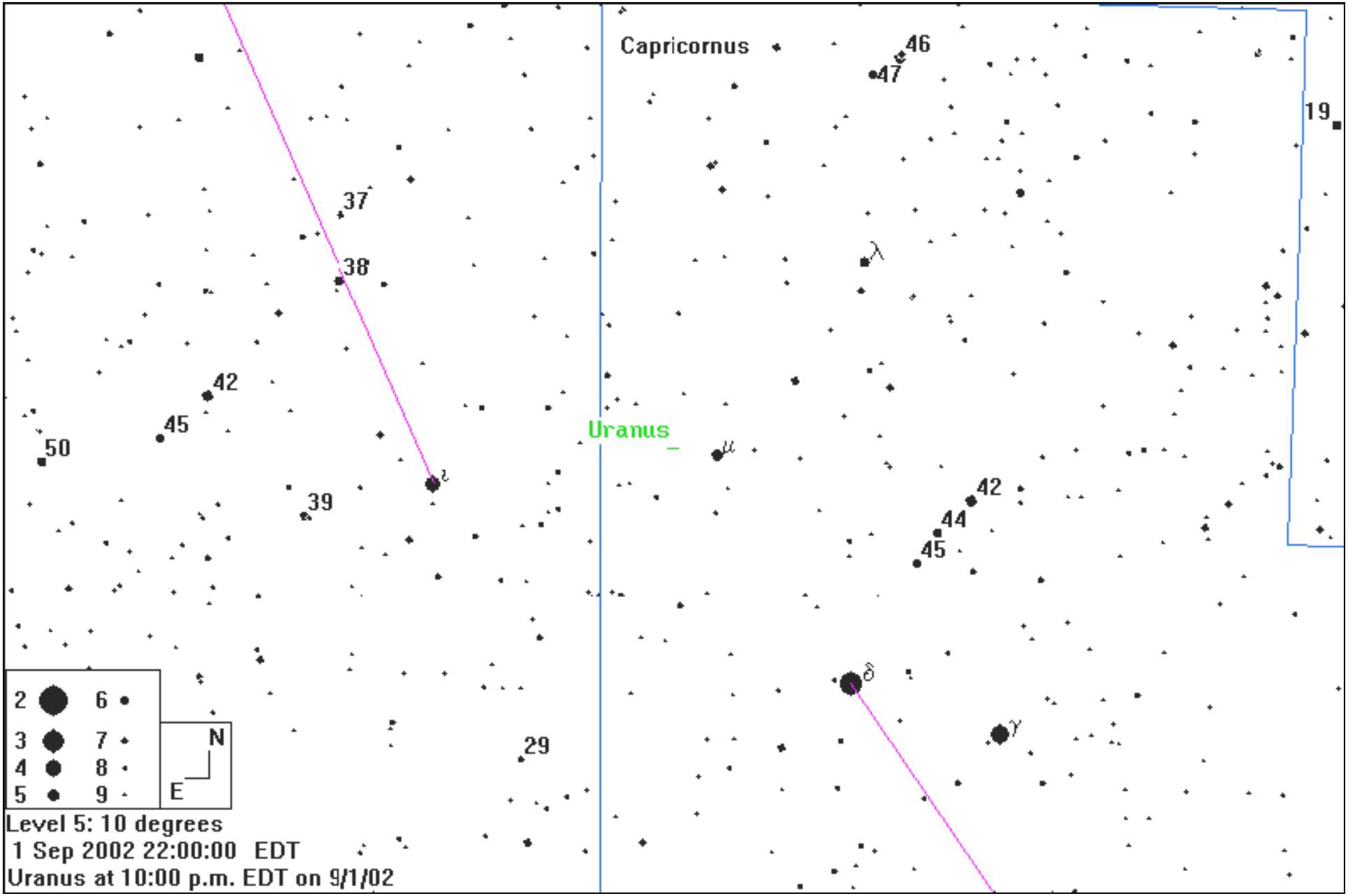


To get to the Myrick Conservation Center of the Brandywine Valley Association from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles.

To get to the observing site at the BVA property, turn off Route 842 into the parking lot by the office: look for the signs to the office along Route 842. From that parking lot, go up the farm lane to the left; it's about 800 feet or so to the top of the hill. If you arrive after dark, please turn off your headlights and just use parking lights as you come up the hill (so you don't ruin other observers' night vision).



Parking is available behind Sykes Student Center on the south side of Rosedale Avenue (Parking Lot K), and behind the Bull Center at the corner of Rosedale Avenue and South High Street (Parking Lot M). If you arrive early enough, you may be able to get an on-street parking space along South Church Street, or along Rosedale Avenue. You can take the Matlack Street exit from Rt. 202 South; Matlack Street is shown on the map at the lower right corner with Rt. 202 off the map. If approaching West Chester from the south, using Rt. 202 North, you would continue straight on South High Street where Rt. 202 branches off to the right. This would bring you onto the map on South High Street near Parking Lot M, also in the lower right corner.


Capricornus
Uranus
46
47
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37
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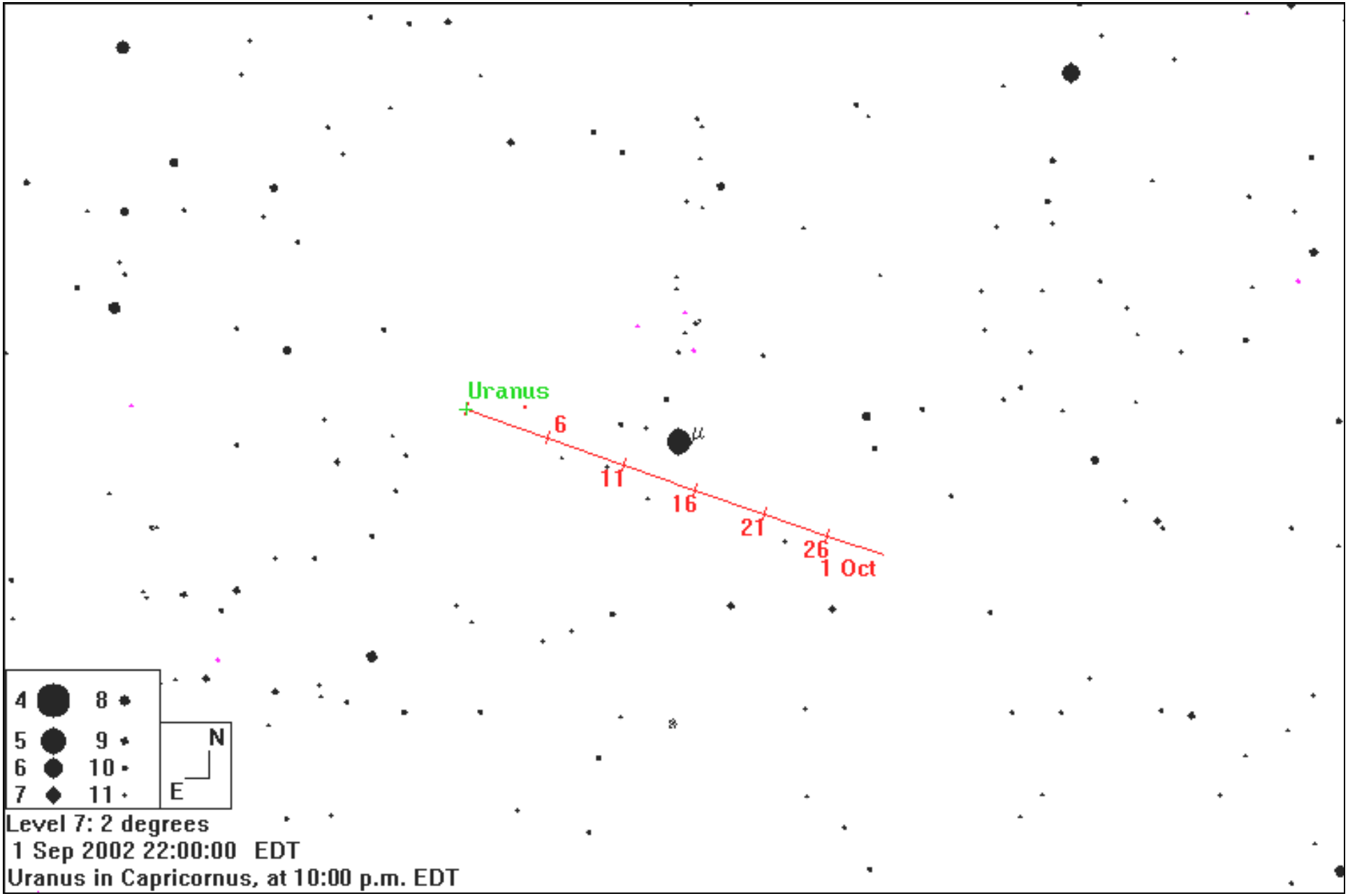
Level 5: 10 degrees
1 Sep 2002 22:00:00 EDT
Uranus at 10:00 p.m. EDT on 9/1/02


Uranus
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1 Oct
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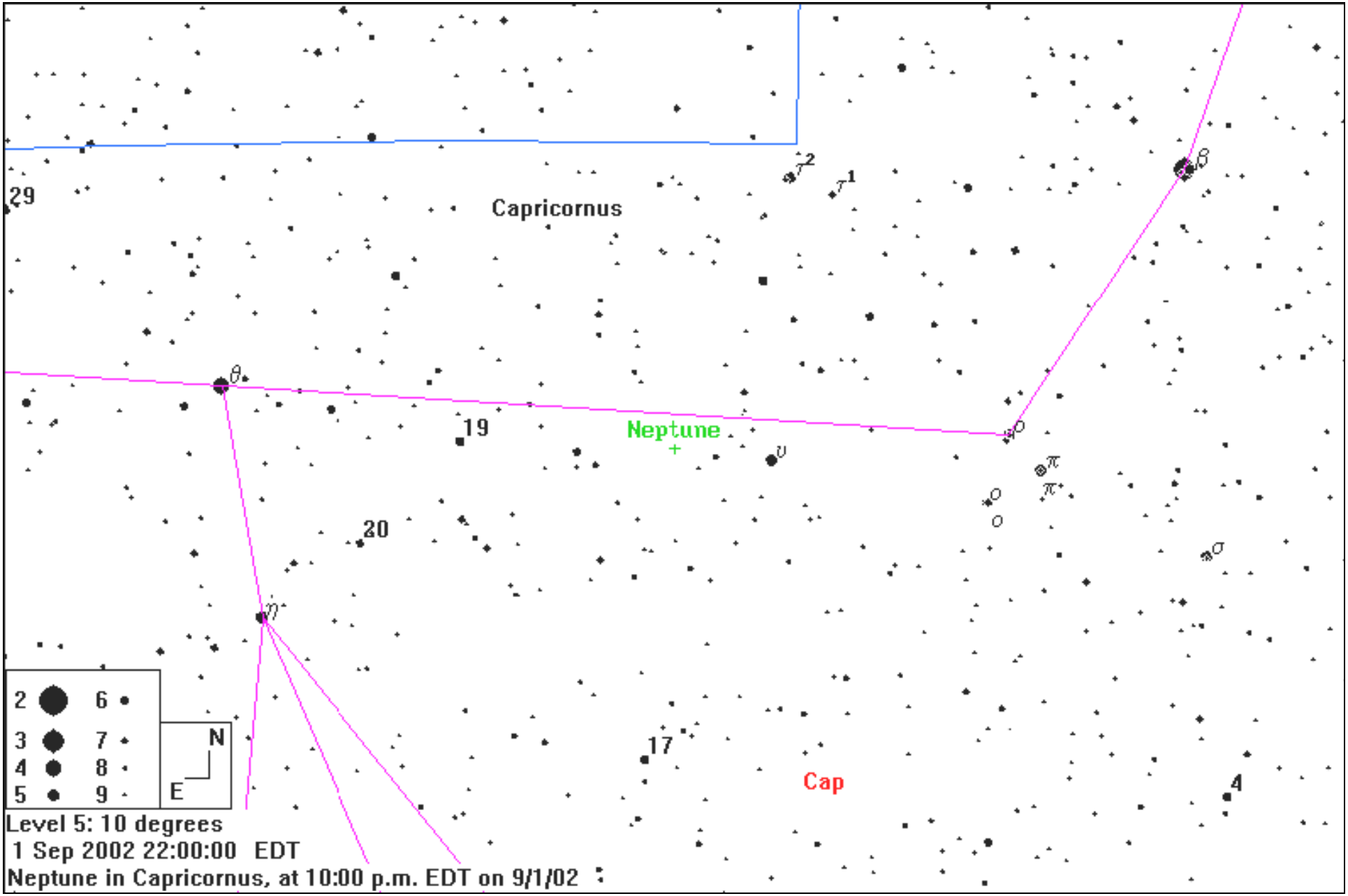
Level 7: 2 degrees
1 Sep 2002 22:00:00 EDT
Uranus in Capricornus, at 10:00 p.m. EDT


29
Capricornus
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Neptune
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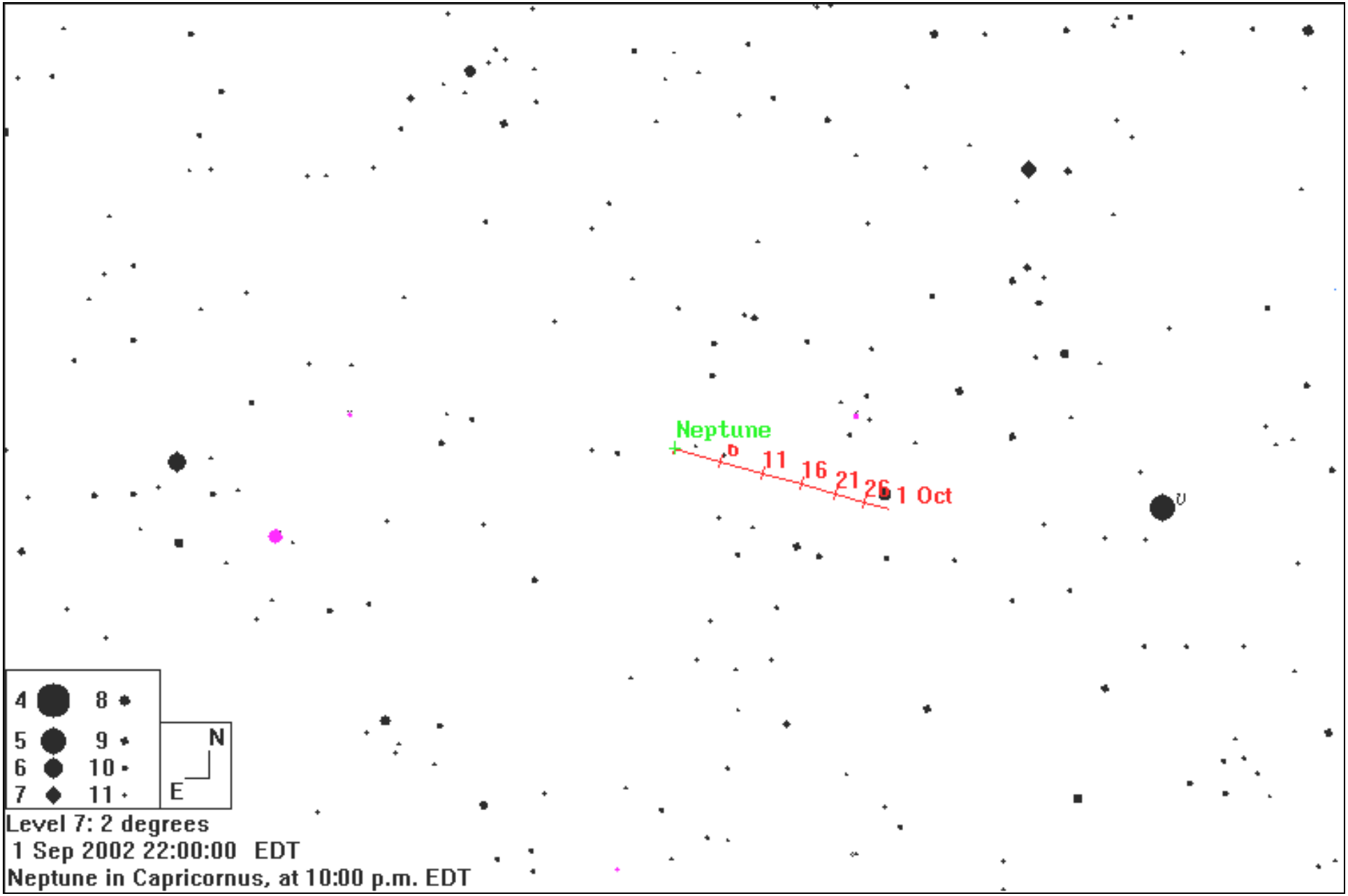
Level 5: 10 degrees
1 Sep 2002 22:00:00 EDT
Neptune in Capricornus, at 10:00 p.m. EDT on 9/1/02


Neptune
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Level 7: 2 degrees
1 Sep 2002 22:00:00 EDT
Neptune in Capricornus, at 10:00 p.m. EDT