Fall 2012
Issue 99

Battle Point Astronomical Association BPAA

Quarterly

www.bpastro.org Bainbridge Island, WA

Events Calendar

(unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

SEPTEMBER

September 22 Autumnal Equinox (7:49 a.m. PDT)

September 27 7:00 p.m. Introduction to Amateur Astronomy class begins

September 29 ○ (8:19 p.m. PDT)

OCTOBER

October 1 8:00 p.m. *The City Dark* at Open Mic Science, Treehouse Café

October 4 7:00 p.m. Intro to Amateur Astronomy week #2

October 5 Robert Goddard's 130th birthday

October 11 7:00 p.m. Intro to Amateur Astronomy week #3

October 13 7:00 p.m. Planetarium Show "Dancing with the Stars" and Stargazing

October 15 ●

October 18 7:00 p.m. Intro to Amateur Astronomy week #4

October 25 7:00 p.m. Intro to Amateur Astronomy week #5

October 29 ○ (12:49 p.m. PDT)

NOVEMBER

November 1 7:00 p.m. Intro to Amateur Astronomy final class

November 4 Daylight "Saving" Time ends

November 10 7:00 p.m. Planetarium Show and Stargazing

November 13 ● Total Solar Eclipse (Australia)

Calendar *con't page 2*

Cassiopeia from Firmamentum Sobiescianum sive Uranographia *star atlas by Johannes Hevelius, courtesy U.S. Naval Observatory and the Space Telescope Science Institute.*

Mermaid Politics

CALENDAR NOTES: It's fall, time for school, and we have once again teamed up PhD Astronomer David Fong, BPAA Education Director, and Steve Ruhl, BPAA president, to teach our popular Introduction to Amateur Astronomy course. Having taken this course myself, I can assure you that regardless how much or how little you think you know, you'll find it worthwhile and enjoyable.

Talk of education reminds me that when my eyes turn northward this autumn, they will frequently greet the familiar "W" of Cassiopeia. Although the "W" doesn't really stand for Washington, this asterism is particularly prominent in our state's skies, and, from Bainbridge Island, could even be said to point slightly east towards the UW campus, perhaps serving as a subconscious stimulus towards higher education. Quite a reach, I admit; but I always like to think the stars inspire.

The mythology may inspire more. The story pits the vain and apparently gorgeous Cassiopeia, queen of all Ethiopia, against the ever-humorless gods. She dared boast that both she and her daughter Andromeda were more beautiful than any of the fifty daughters of the sea god Nereus. This was quite a claim. The fifty Nereids were renowned for their beguiling beauty. That they were always naked and often friendly towards sailors no doubt helped their reputation. But it was deserved; our more modern fairy tales of entrancing sea nymphs and mermaids derive directly from the Nereids. The gods did not tolerate such impudence, of course, and eventually, as punishment, cast both Andromeda and Cassiopeia into permanent exile in the sky. Cassiopeia was bound in torture to a chair, condemned to eternally spend half the year hanging upside down. This myth is generally portrayed as a cautionary tale against vanity. But I'm not so sure. Although legends claim the Nereids aided many sailors, guiding them away from storms and towards the best fishing, Cassiopeia and her daughter actually are modern celestial guideposts. Schedar, Cassiopeia's brightest star, is the third star listed on the US Navy's official celestial navigation almanac. And note that this Arabic star name means "The Breast." It seems the queen had every right to brag. You don't see any mermaids in the heavens. No, it seems to me the actual lesson is don't worry about the authorities; when you know you've got something special, don't cower—proclaim it! Telling your truth might just get you immortalized.

Sadly, mortality only lasts a few more moments. So say the 2012 Solstice

Calendar *con't from page 1*

doomsayers. I do not wish to belabor here the many reasons why this fear is so misplaced. We will all hear far too much about this. But I do want to alert you that the very newsletter you now read is, in precisely the same way as the Mayan calendar, predicting our imminent demise. This is issue #99. No one has ever lived to see a *BPAA Quarterly* with a three digit issue number. Surely this means the world will end. And note that the impending rollover to issue #100 will arrive on or about the same day as the dreaded Mayan katun 13. The coincidence cannot be ignored!

It is no coincidence that you are reading this. Clearly you already love the stars. To further your celestial education, sign up now for our very popular Introduction to Amateur Astronomy class or join us at any of our monthly Planetarium Show and Stargazing sessions. We won't bind you to the stars; you may find that happens regardless. Join us. The stars have much to teach us all.—*Cheth Rowe*

November 17 Leonid meteors peak

November 28 ○ (6:46 a.m. PST) Penumbral Lunar Eclipse

DECEMBER

December 2 Jupiter at opposition

December 8 7:00 p.m. Planetarium Show and Stargazing

December 9 Vesta at opposition

December 13 ● Geminids meteor shower peak

December 18 Ceres at opposition

December 21 Winter Solstice (3:12 a.m. PST)

December 28 ○ (2:21 a.m. PST)

Any member who is planning to observe can invite others to join in by sending an email to *bpaa@yahoogroups.com*. To join our email group, send an email with your name to *bpaa-owner@yahoogroups.com* and we can enroll you. If you want to have web access to the messages and files, you can join the Yahoogroups by clicking the register link for new users on *http://groups.yahoo.com/*. Request to join at *http://groups.yahoo.com/group/bpaa/*. The system will send us a message, and we'll approve your request after we verify your membership.

Snapshots from the Oregon Star Party

August 14-19 2012

Mel Bartel's telescope walk-about, in the blazing sun.

A colossus

For 25 years, astronomers have gathered at the Oregon Star Party, *http://www.oregonstarparty.org*, held high in the Ochoco mountains. The terrain resembles the surface of Mars, all red rocks and red dust, but, apart from the dust-devils that the late afternoon wind kicks up, the air is clear, and the night fabulously dark.

This year the drifting smoke of forest fires cast a pall, but the Milky Way shone brightly as I'd hoped, and, to me, the sky seemed completely splendid.

During the day we hid from the sun under awnings and wide-brimmed hats, except when lured out by expert talks and telescope tours by astronomers such as Richard Berry and Mel Bartels.

The main drag

A long view, over the meadow and to the woods.

A remote-controlled quadrocopter hovered overhead, courtesy Dan Gray, the author of the program that controls the Ritchie Telescope.

NASA astronaut Michael Barratt, M.D., M.S., author of *Principles of Clinical Medicine for Space Flight*, was the OSP's special guest. One of the few people to have ridden both the space shuttle and the *Soyuz*, he gave a riveting description of reintry in the *Soyuz* that included melting window glass and multiple explosions.

Barratt felt the biggest medical barrier to manned space flight was radiation exposure and cancer risk. Other issues, such as bone-mass loss, have proven to be manageable.

Helpful OSP volunteers sported tie-dyed shirts and kept things moving along. A first-aid crew was on hand. Astronomers traded ideas and admired each other's hardware. Comforts included espresso and fast food; Malcolm and I indulged ourselves in $10.00 showers in the clean and uncrowded shower truck, and even won door prizes: a hat, a gift certificate, and a helical focusser. —*Vicki Saunders*

Egyptian Zodiac

SEEING STARS

Earthly Astronomy

Astronomy 0.001

The science of astronomy uses the sciences of physics and chemistry and mathematics—up in the sky and far out in space. But is it a social science? Is it an issue for you every day, like health care or economics?

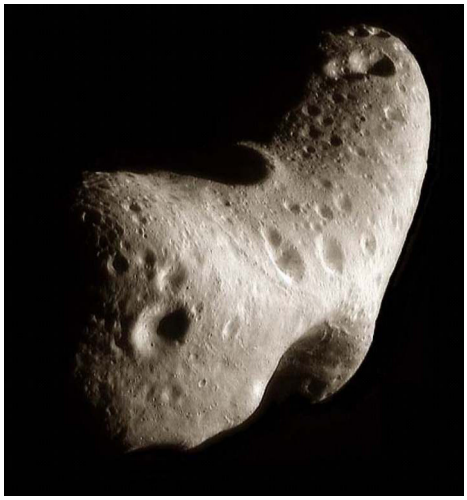
At the beginning, yes it was. A lot of early astronomy was tied to agriculture. Farmers in the Middle East knew that the rising of various stars or constellations marked the changes in the seasons. The appearance of Sirius in the morning sky in Egypt was a signal for farmers to prepare their fields for the annual flooding of the Nile. As they tracked the constellations they saw that they followed a path that made a kind of belt around the sky. (Their word for belt was zodiac.) They divided the belt into twelve big constellations and, perhaps, assigned qualities to each one that reflected the weather and the life they knew—the wet, fishy days of spring, the hot, dog days of August.

For the Mayans, celestial motions determined not only the planting and harvesting of crops, but religious ritual. In China the astrologers used the stars to predict the seasons and advise farmers.

Those are ancient uses of astronomy. The stars and the Sun and the rotation of the Earth also determined how we divided clock time. The need to know how far we'd traveled pushed us toward increasingly accurate clocks. Astronomy was crucial to this measurement. And now, to keep up with what is happening to our slowing Earth, we adjust our clocks by setting them ahead a second now and then, as we did this year just before midnight on June 30th. Did you feel the loss?

Great international expeditions were mounted to measure the Transit of Venus to help solve the problem of measuring distance. And as our clocks became better, along with our math, the more surely we could plot our journey to the Moon and back. In the course of traveling to the Moon and Mars we have developed better metals to withstand the extreme temperatures of space. Weather satellites allow us to predict whether we will need to scrape the ice off our windshields tomorrow morning. GPS satellite technology helps us find our way. Astronomers watching for sunspots enable us to take precautions to protect our electronic communications systems.

The better we have applied our earthly knowledge of physics and chemistry to the colors we see in the stars, the better we know what chemicals each is made of, and whether stars or asteroids or comets have water that we might someday tap. We know that at least some of the asteroids might yield exceedingly valuable mineral resources if we can bring them safely and softly to Earth. We might capture a typical S-class asteroid like Eros, which attracted a lot of publicity in 2000. It and its like have a density of 2,500 kg/m^3. Such asteroids may be 10% iron: an asteroid that has a 10 kilometer radius would contain 1 trillion times more iron than the entire annual output on Earth. To say nothing of whatever other metals might be there.



The asteroid Eros, image courtesy NASA

Astronomy has revealed the possibility of unexpected collisions with asteroids. It wouldn't take that big a rock to do years and years of damage. This time, instead of wiping out the dinosaurs, we might lose all the plants we eat. Our humanoid ancestors escaped the last time, but will we? Do we try to find the rogue and divert it before it gets to us? Or break it into little pieces so it can hit us many places instead of just one?

The use of mountain tops as locations of big telescopes conflicts with logging interests, with recreational use, with some local traditional cultural uses, and with environmental interests. Radio astronomy uses wave bands that might be needed by emergency vehicles, by navigation, or developments yet-to-come in electronic communications.

The dust pollution of our cities has been bad both for the clear view of the stars and for our health. Light pollution interferes with our seeing the stars, particularly with our children's first experience of that excitement.

When we talk about exploring space, there are the issues of whether we and our space vehicles have polluted the Moon and Mars. We have left about 170,000 kg of junk on the Moon. As for the "empty" space between us and the Moon, there's about 5,500,000 kg of human junk floating around ready to collide with each other or any space ship we send up. Or come down on top of us. Some of it is like the glove that astronaut Ed White lost in 1965 and subsequently burned up in the atmosphere. The satellite Vanguard 1, which the US launched in 1958, is the oldest piece of space junk up there. Well, you and I are safe: it's not expected to come down for another 240 years. What is

Steve Ruhl

President's Message

I recently returned from the 25th Oregon Star Party (*for more on OSP see article page 2*). And while the viewing was not so great this year, I was inspired by the keynote speaker, Michael Barratt. Michael is a medical doctor specializing in space medicine and a NASA astronaut. He spent 199 days in space when he went up to the *International Space Station* (*ISS*) on Expedition 19 on *Soyuz* and came down in Expedition 20. Later, he went back up to the *ISS* on space shuttle mission STS-133, the last flight of the shuttle *Discovery*.

I have heard astronauts speak before; they are well-trained and provided with great audio-visual tools to supplement their talks, though the talks tend to be on the scripted side. Dr. Barratt was no exception, although he brought a unique film, somewhat contraband, taken by a space tourist during the *Soyuz* reentry. But the talk itself was not my inspiration.

While robotic craft such as *Curiosity* have made great strides in recent years, there has been a distinct lack of progress in manned space flight by this country. With the end of the shuttle era, manned space flight has come to a screeching halt. Development has been repeatedly reset by successive administrations as objectives are altered. I was particularly distressed by the cancellation of the Constellation program.This left NASA looking to hitch rides to the *ISS* with the tourists on *Soyuz*, and placed a great drain on the institutional knowledge of spacecraft development.

I feel that if intelligent life on this planet is to survive for the long term, we need to get off this rock and develop interstellar travel. There are just too many global calamities waiting to happen that have small short-term probabilities but high long-term certainties.

Michael reset my views with a casual answer to a question during the Q&A session. When asked about the future of manned space flight, he responded that it had never been brighter. While we have lost many assets, others are on the way.

The Russians have *Soyuz*. The Chinese are methodically progressing to the moon. The Europeans are busy man-rating the *Ariane*. And Lockheed is actually bending metal on *Orion* with an eye to a lunar orbit mission near the end of the decade.

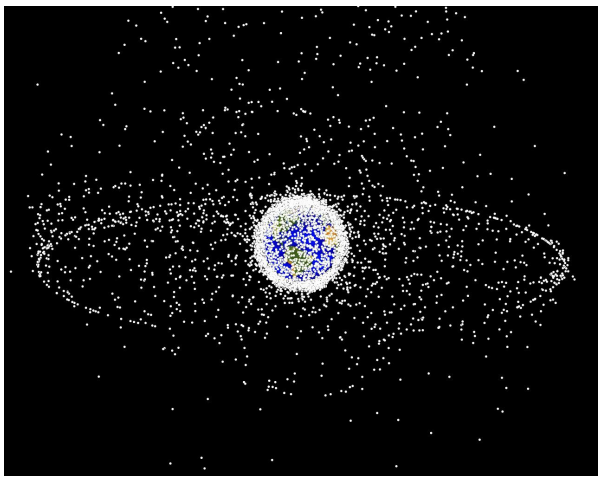
Additionally, commercial vehicles are in development. For low earth orbit (LEO), Boeing is working on *CST-100*, Space X is working on *Dragon*, and Sierra Nevada is developing the *Dream Chaser*.

But for manned space exploration, my biggest concern is the lack of heavy lift boosters to LEO. The largest current boosters are the *Ariane 5*, which can lift about 21,000 kg, and a variant of the Boeing *Delta IV* that can get 23,000 kg there. The shuttle could orbit about 25,000 kg. (By comparison, *Saturn V* would lift about 140,000 kg to LEO.) The good news is the *Falcon Heavy* by Space X is in development and it should handle about 53,000 kg to LEO. First flight should be next year.

Long term future manned missions, such as a mission to Mars, would be assembled in LEO allowing for multiple rockets to provide components, and advances in rendezvous techniques have eliminated the need for the super heavy-lift capability of the Saturn.

Though I would feel really good if NASA regained focus on manned space flight, still, I feel better.

Earthly Astronomy *con't from page 3*



Space debris plot courtesy NASA

our responsibility for it, and to anything else it may hit? Should we clean up our messes before we add more to them? And how much would that cost?

What is our responsibility to any life is hiding on Mars, or to whatever microorganisms we may leave behind? Or to whatever unique life we might inadvertently bring back to multiply and mutate here?

The list goes on: global warming, fuels from space, international cooperation, the legal collection of space objects like meteorites or rocks gathered on Mars, money to be spent either on mining Eros or on stem cell research —astronomy plays a part in what we know, and how we use what we know for society.

We often talk about the revolutionary influence that Galileo's astronomical observations had on the rigid dogma of the Church in the 16th century. But we sometimes forget that astronomy also led the way among the sciences in combining precise geometric and instrumental accuracy that could be repeatedly verified. This combination gave the public a basis to trust the far-out astronomers—and astronomy, that most social, earthly science.

—*Anna Edmonds*

Simple Tools for Beginning Stargazers

Beginners can start navigating the constellations and stars with readily available tools.

First, you need to know what you are looking at. For this you will need a sky-map (a road-map of sorts). Astronomy magazines such as *Sky and Telescope* or *Astronomy* include a monthly sky map and information on the sun, moon and planets and other objects of interest.

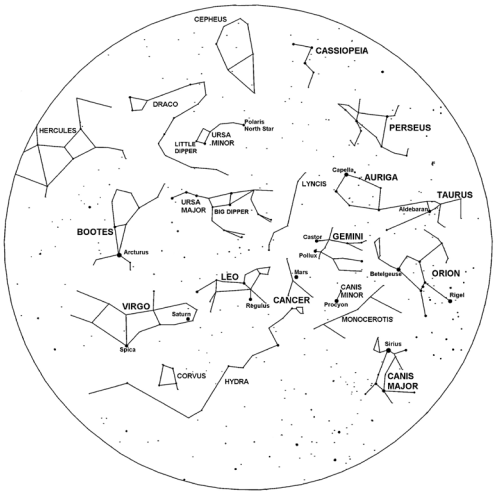
A planisphere is a sky chart that can be used year-round. It is a circular slide-rule device that shows the constellations in the viewable area of the sky depending on the month and time of day and your latitude. In the Seattle area, it is available with a latitude of N42° and can be used from latitude N32° to N52°. Seattle and Bainbridge Island are about N47.6°.

A pair of household 7X to 10X power binoculars is a great device for

the beginner. They are usually available in the house, easy to use and there is no alignment required, just point and look! Some fancy telescope mounts can take upwards of 20–30 minutes to align after they are set up. Binoculars provide a great field of view somewhere in the order of 5 degrees, and their large aperture will allow you to view more stars than you can see with the naked eye. In addition, with a dark sky (you always have to give that caveat around any suburban area), you can also view some distant galaxies and other nebula.

First you need to know where to look in the sky, to recognize and identify some of the constellations.

Almost everyone knows how to locate the North Star, Polaris, using the Big Dipper's two-alignment stars. Once north is located, you then can orientate yourself so that, by consulting the sky-map or planisphere, you can identify the constellations.



Start out slow and don't rush. Just locating and tracing the stars of a constellation provides satisfaction. By recognizing constellations you are starting to develop a skill that will allow you to wander through the sky. Don't forget the moon and the inner planets! Just don't look at directly at the sun! We want to keep you as a viable member of the BPAA. Using the constellations and individual stars to locate what you want to view is also referred to as star hopping.

After you feel comfortable with navigating the sky using the constellations, you may want to see objects that cannot be viewed with binoculars. Now is the time to look at the stars with a telescope.

The club has a number of telescopes that are easy to use. These are Newtonian reflectors mounted on a Dobsonian mount which is basically an elevation axis mounted on an azimuth axis. To point to an object, you locate it by star hopping by moving the telescope up/down and clockwise/counter-clockwise by hand. You must also correct the position as the object drifts out of the telescope's field of view.

There are a number of experienced astronomers in the BPAA who are more than willing to help you. The club has a monthly planetarium show and star party that will educate you about the universe and the use of the telescopes. In addition, anyone can organize an impromptu star party by emailing interested parties (*see the box on page 2*). For times and dates of the planetarium shows, consult the monthly newsletter, or the BPAA website, *http://www.bpastro.org*.

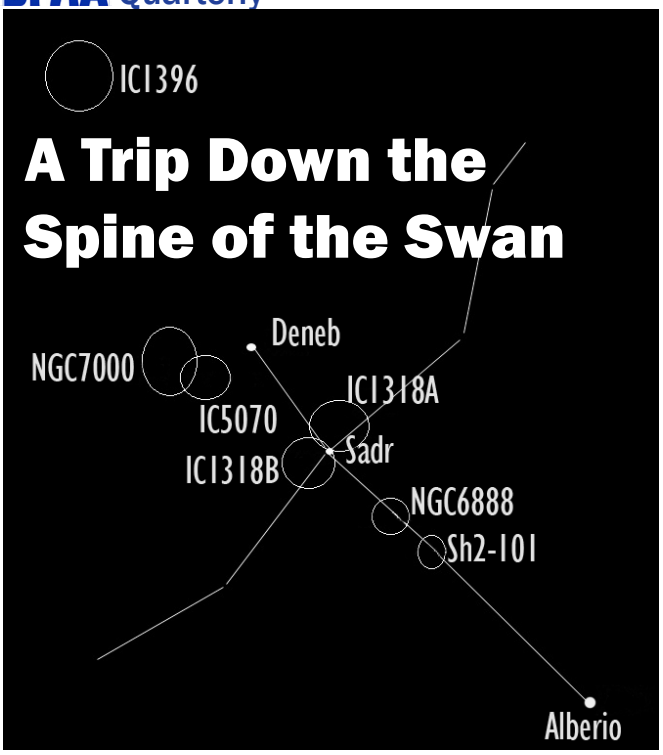
To check out a telescope you must have been a member for at least six months. We waive the six-month requirement if you make a refundable deposit.

Before you check out any telescope, you must be trained on the use of that particular telescope by an experienced member/trainer. This takes about thirty minutes to an hour, depending on the complexity of the telescope and your own level of experience. The trainer signs and dates the check-out sheet. When you borrow a telescope we include a selection of eyepieces and other appropriate accessories.

A club Dobsonian

Telescopes and accessories may be checked out for 60 days and renewed subject to demand by others. Check-out sheets are in a book in the telescope storage office at Ritchie Observatory. To make arrangements to borrow a telescope, contact our Telescope Loan Manager Dave Janich at (206) 780-2357 or email *equipmentloan@bpastro.org*.

—Dave Janich



Nebula 1. IC 1396, the Elephant's Trunk

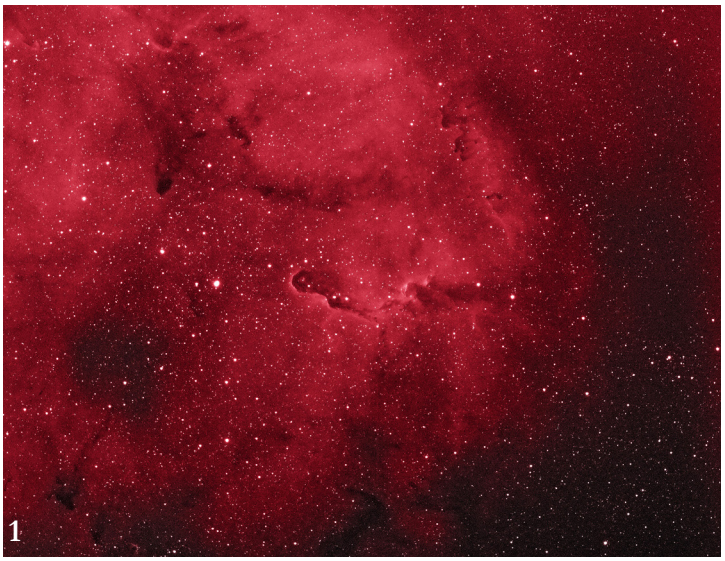
Our first object is actually just over the border of Cygnus in Cepheus. IC 1396 is glowing hydrogen about 2400 light-years distant. The section in the center of the photograph is called the Elephant's Trunk Nebula. *Image captured on July 16, 2012 with a H-alpha filter. 50 minutes exposure (10x300s), Canon EF 400mm F5.6L lens and SBIG 8300M camera. The approximate area of the image is 2° x 3°.*

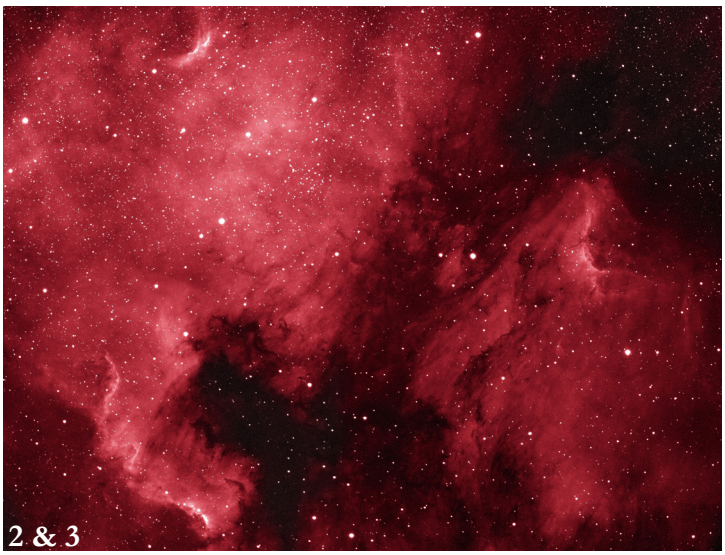
Nebulas 2 and 3. NGC 7000, the North American Nebula and IC 5070, the Pelican Nebula

As we move further south, we come upon the tail of the swan and the star Deneb (Alpha Cygni), the brightest star in Cygnus. The name Deneb is derived from the Arabic word for "tail." Just to the east of this star is a large area of bright nebulosity that is visible to the naked eye at a dark sky site (and periodically at Battle Point Park.) This area is home to the North American Nebula (NGC 7000) and the Pelican Nebula (IC 5070). *NGC7000/IC 5070 image captured on July 10, 2012 with a H-alpha filter. 50 minutes exposure (10x300s), Canon EF 400mm F5.6L lens and SBIG 8300M camera. The approximate area of the image is 2° x 3°.*

Cygnus

Cygnus, the swan, is a dominant constellation in the summer sky. Deneb, Cygnus' brightest star, makes up one vertex of the "summer triangle"—three stars highly visible at mid-northern latitudes during the summer. Cygnus is the 16th largest out of of the 88 consellations. The spine of the swan bisects the center of the Milky Way, an area actively producing new bright hot stars that contains many emission nebulas; they glow from the energized plasmas, mostly hydrogen, surrounding them. I've photographed seven nebulas down the spine of the swan. The map at left shows their locations.





Nebula 4. IC 1318B Nebulosity near Sadr

As we move south, further up the spine, we come to the star Sadr (Gamma Cygni). If you heard the word Sadr pronounced, you might think of some Greek man-goat mythological beast, but you would be wrong. Sadr is derived from the Arabic word for "chest," and is from the same Arabic root as Shedar, Cassiopeia's breast star. The Sadr region is home to diffuse nebula. Sadr is the brightest star in the field of photo 4. Above (or to the north) of Sadr is NGC 6910, a small open cluster of stars. Note its location for photo 5. *Image captured on July 24, 2012 with a H-alpha filter. 50 minutes exposure (10x300s) mapped to Red, Green and Blue filters, 30 minutes exposure (6x300s) each with a Canon EF 400mm F5.6L lens and SBIG 8300M camera. The approximate area of the image is 2° x 3°.*

Nebula 5. IC 1318A, North and West of Sadr

If we move north and west of Sadr, we observe most of the remainder of the emission nebula IC 1318. The open star cluster NGC 6910 is in the lower left corner of the image. *Image captured on July 25, 2012 with a H-α filter. 50 minutes exposure (10x300s) mapped to Red, and Green and Blue filters, 30 minutes exposure (6x300s) each. Canon EF 400mm F5.6L lens and SBIG 8300M camera. The approximate area of the image is 2 º x 3 º.*

Nebula 6. NGC 6888, the Crescent Nebula

As we continue south, we come to NGC 6888, the Crescent Nebula. This target is my personal nemesis. I have shot it numerous times but the nebula is faint and it is difficult to get the contrast I am after. This is my best effort to date but I will probably be doing it again. At the heart of the Crescent Nebula is the Wolf-Rayet Star WR 136. Wolf-Rayet stars are massive stars in the later stages of their life. These stars lose mass rapidly by creating a massive solar wind. The solar wind of WR 136 is about a billion times stronger than that of our own sun. The nebulosity structure is a result of the shock waves when the star entered its red giant phase. Eventually, this star will supernova. *Image captured on July 22, 2012 with a H-alpha filter. 70 minutes exposure (14x300s), Canon EF 400mm F5.6L lens and SBIG 8300M camera.*

Nebula 7. Sh2-101, the Tulip Nebula

Shown in the Hubble palette.

As we move even further south, we reach our last object, Sh2-101, the Tulip Nebula. I photographed this nebula in the Hubble palette, using filters that look at the wavelengths of specific elements and map them to specific colors, so unlike the others, it is not dominantly red. The Hubble palette maps emissions from Sulfur-II to red, Hydrogen-α to green, and Oxygen-III to blue. *Image captured on August 2, 2012 with a H-alpha filter. 50 minutes exposure (10x300s) binned 1x1, and SII & OIII filters with 50 minutes exposure (10x300s) binned 2x2, a AT106 (690mm focal length) telescope and SBIG 8300M camera. The approximate area of the image is 1 º x 1.5 º.*

The last star up the Spine of the Swan is the visually stunning double star, Albireo. While I do not have a photo of it, one of the companions is blue, the other gold. Again, the etymology of the word comes in a roundabout way from Arabic with a liberal translation meaning "hen's beak."This is one object that is best viewed in an eyepiece.—*Stephen Ruhl*

8–Fall 2012

In this Issue

In Short

Articles

BPAA Quarterly is a publication of the Battle Point Astronomical Association.
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