AOH Newsletter

Spring 2022



News and Notes

Still Zooming and Still Observing

We will continue our Zoom sessions on the weekend nearest the full moon until we run out of things to talk about, or until further notice, whichever comes first. Join us on Zoom on April 16, May 14, and



Zoom meetings from January 15, February 19, and March 19



Brent's telescope at Kneeland, January 29, tracking Jupiter in the twilight —BH

June 11. And we will have observing sessions April 2, April 30, and May 28, weather permitting. Stay informed by visiting the <u>AOH Upcoming</u> <u>Events Page</u>.

More photos from January 29, clockwise from right: setting up scopes and binoculars —JT; Stormy relaxing and keeping warm —JT; Brent and his scope —KC











Top: Venus, Mars, and Mercury on the morning of Februarfy 17 — RG Middle: the Leo Triplet, NGC3628, M65, and M66 on March 5 — RG

Bottom: Alfredo looking at the Moon on March 5 —KY



Thanks to Brent H, Johnny T, Kai C. and Rick G for the photos. Thanks to Mark W, Frank S, Grace W, and Susie C for their contributions. And thanks to Susan F for proofreading.

Upcoming Celestial Events

Spring Showers

Meteor showers for Spring include:

April 21-22. Lyrids. "The Lyrids are a medium strength shower that usually produces good rates for three nights centered on the maximum. These meteors are best seen from the northern hemisphere where the radiant is high in the sky at dawn. These meteors also usually lack persistent trains but can produce fireballs."

May 4-5. Eta Aquariids. "The Eta Aquariids are a strong shower when viewed from the southern tropics. From the equator northward, they usually only produce medium rates of 10-30 per hour just before dawn. Activity is good for a week centered the night of maximum activity. These are swift meteors that produce a high percentage of persistent trains, but few fireballs."

[Descriptions from the <u>American Meteor Society</u>.]

Mercury's Evening Apparition

In the latter half of April, Mercury appears in the evening twilight, reaching its greatest eastern elongation on the 29th. It is magnitude 0.3 that evening, but appears dimmer because it is near the horizon. Look for it just two degrees south (left) of the Pleiades on the 30th. And if you want to look for Uranus, too, on April 17th it will be at magnitude 7 just two degrees south of Mercury (left and a little lower).

Total Lunar Eclipse

On Sunday, May 15, the Moon rises in Humboldt County at 8:21 pm, with the partial (or umbral) phase of a lunar eclipse already well under way. You'll need a good eastern horizon; even so it's hard to pick out an eclipsed moon against a still-bright sky. Don't give up; as the sky darkens and the Moon gets higher in the sky, it will become easier to see. The total eclipse begins at 8:29, and lasts until 9:54. The partial eclipse will end at 10:55. The Moon remains in the Earth's outer shadow (that's called the penumbral phase) until 11:51, when it returns to full brightness.

The Morning Planets

In April and May, 2022, the predawn sky will be decorated with four bright planets: Venus, Mars, Jupiter, and Saturn. The top picture below, from <u>in-the-sky.org</u>, shows the locations of the planets in their orbits. The bottom picture is a <u>Stellarium</u> view of the lineups. Click on either picture to get a sequence of views.

As the planets move, from our point of view we get especially close conjunctions on April 4 (Mars and Saturn, 0°19'), April 30 (Venus and Jupiter, 0°14'), and May 29 (Mars and Jupiter, 0°38'). In fact, the planet Neptune is also among these naked-eye planets. It has its own series of conjunctions on April 12 (with Jupiter, 0°6'), April 27 (with Venus, 0°0.4'), and May 17 (with Mars, 0°34').

Omega Centauri

This object was catalogued as a star by the astronomer Claudius Ptolemy of Alexandria in the second century, and given the name "Omega" as the 24th brightest star in Centaurus by Johann Bayer in his 1603 catalogue. It was Edmond Halley in the 17th century who first recognized it as a non-stellar object. Today it is understood to be the largest, brightest, and most massive globular cluster associated with our Galaxy.

At declination -47.5 degrees, it is theoretically visible only from points whose latitude is less than -47.5+90 or 42.5 degrees north. Since our favorite spot at Kneeland Airport has latitude 40.7 degrees, we are in luck. Indeed, several of us have seen it from there.

This daytime photo from the <u>Kneeland Sky Cam</u> shows an unnamed peak 5.5 miles away. That peak is due south of the airport. In 2022, on Sunday May 1 at 12:08 am and Saturday May 28 at 10:17 pm, Omega will also be due south of the airport, right behind the peak. As the earth rotates, the peak will move out of the way to the left, and Omega will appear to its right, if the horizon is clear. These are both AOH observing weekends, so let's hope we get a chance to see it.



The Virgo Cluster

If you're an experienced Messier Marathoner, you probably know what's in store for you around midnight in March or April—the constellation Virgo and her cluster of galaxies is ready for your perusal. But if you're not obsessed with doing all the Messier objects in one night, I recommend Tony Cecce's <u>Twelve Months Tour of the Messier</u> <u>Catalog</u>. He picks thirteen of the galaxies to look at in June, when Virgo is up high as soon as it gets dark. He writes: "Successfully navigating the Virgo cluster is the biggest challenge in the Messier Catalogue, and is affectionately known as 'Heartbreak Ridge' to marathoners. What makes the Virgo cluster such a challenge is the closeness of the Messier objects to each other, and the large number of other galaxies in this region. It is easy to become lost among the galaxies, and not be able to tell which one you are looking at. Here are several tips that can be of use as you navigate your way through the cluster."

Let's start with finding Virgo. You probably know how to start at the Big Dipper and "follow the arc to Arcturus and the spike to Spica." These two stars, together with Denebola, the "Tail of the Lion," form a nice triangle; the brightest star inside this triangle, close to the Arcturus-Denebola side is Vindemiatrix, a.k.a. Epsilon Virginis, Virgo's right hand.

Now put your Telrad, or other bull's eye finder, at a point midway between Vindemiatrix and Denebola. A wide-field eyepiece should be showing you M84 and M86. Now you can swing around the arc from here to M87, then to M89. M90, M91, and M88.

Now go back to M89, either by backtracking from M88 or by starting over from M84 and M86. This time from M89 swing downward to M58, M59, and M60.

Finally, go back to M84 and M86 and swing upward to M99, M98, and M100. While you're galaxy-hopping, don't get distracted by the many other galaxies in this cluster; Messier got most of the brightest ones, but there are dozens more that amateur scopes can pick up. The *Stellarium* map shows two outliers, M85 and M49, which are not on Cecce's June list, but if you find his thirteen, you might as well throw these in, too.

Right: the inner loop of galaxies in the Virgo Cluster click on the picture to get the Messier numbers. From <u>The Astronomy</u> <u>Picture of the</u> <u>Day</u> for April 22, 2011.

> Below: a <u>Stellarium</u> view of the Virgo Cluster. The Telrad bullseye is halfway between the stars Vindemiatrix and Denebola. The Telrad ring diameters are 1/2, 2, and 4 degrees.



The Library Telescope Project by Mark Wilson

Over 400 libraries in 45 states as well as in Canada, the United Kingdom, and the Netherlands, have become participants in the Library Telescope Project, whereby library patrons can check out a telescope, just like a book. The program was founded in 2008 by the New Hampshire Astronomical Society, and quickly spread throughout New England, and then across the country, and to Europe.

You can read all about it at <u>https://www.librarytelescope.org</u> where there are links to libraries and other clubs involved in this project.

The Humboldt County Public Library, with the assistance of the Astronomers of Humboldt, is about to become the latest participant.

Last November the AOH Board authorized the purchase of an Orion Starblast 4.5-inch tabletop telescope. This is the scope that is recommended by the Astronomical League (of which AOH is a member), and is the scope that they give away each year in a drawing. AOH has been in the drawing, but we haven't won yet. If and when we do, we'll have another one to put into the program.

AOH will make a few modifications to the scope, making it both easier to use and fiddle-proof, and in early April will formally donate the scope to the library. Check the club's website for info about the dedication ceremony and star party to mark this event.

After a short training period for the library staff, the scope will be available for anyone with a library card to check out, take home, and use.

The checkout "kit" will include a user's manual, a constellation guide, a moon map, and other suggestions for objects that one can view with a small scope. Borrowers will be referred to the AOH website where they can get links to other resources

The Orion Starblast is a sturdy but lightweight Dobsonian. It comes with a red-dot EZ Finder, and AOH will equip it with an 8mm to 24mm zoom eyepiece. At a focal ratio of f/4 it will afford views from 19 power to 56 power.

AOH members will be on call for any assistance that the library staff may need, and to perform any cleaning, adjustments, or routine maintenance that the scope may require. If you would like to be involved with this ongoing task email <u>markw@astrohum.org</u> and we'll put you on the committee.

We are looking forward to working with the library in this project and in other outreach possibilities.



Library Telescope: an Orion Starblast 4.5 inch tabletop reflector, with some ancillary materials—a folding moon map, a constellation guide, and an instruction manual.

The Sea Serpent by Ken Yanosko

Hydra, the Sea Serpent, or Water Snake, is the largest of the 88 modern constellations. It tops out at 1303 square degrees on our spherical sky maps, and stretches across more than one-quarter of the sky. So how come we don't pay much attention to it?

Hydra. Click to toggle between an image adapted from <u>Stellarium</u> and an image from <u>Urania's Mirror</u>, 1825.

Well, first of all, although it's completely visible from our latitude, it's pretty far south, and never far above the horizon. In the Spring, look below Cancer, Leo, and Virgo; there you find the three small constellations Sextans, Crater, and Corvus; and south of these you come to Hydra. [Note that Hydra is not to be confused with another constellation, much farther to the south, below our horizon, named Hydrus, also known as a Water Snake. And neither of these has anything to do with the two-part constellation Serpens, which is on either side of Ophiuchus, the Snake Handler. The sky is full of snakes!]

And secondly, Hydra is pretty dim. The brightest star, Alpha Hydrae, a.k.a. Alphard (Arabic for "The Lonely One") is second magnitude; everything else ranges between magnitudes 3.3 and 4.4.

In Greek mythology, Hydra is identified with the nine-headed monster slain by Hercules, although our classical sky maps depict only one head. According to the story, Hercules had a tough time of it—every time he cut one of the heads off, two more grew back in its place. Hercules finally enlisted the help of his chariot driver, who burned the stumps of the severed heads to keep the new ones from sprouting. The last head, however, turned out to be immortal, and Hercules buried



Hercules and the Nine-Headed Hydra, depicted on a vase dated 525 BC, in the Getty Villa, Malibu. Photo from <u>Wikimedia</u> (public domain).

it under a rock by the side of the road. So if you're ever traveling in southeastern Greece, it would be good not to go looking under any rocks!

The Babylonians, too, identified this constellation as a monster. The Mušḫuššu was a scaly animal with snake-like head and tail but with lion-like forelimbs and hind legs like eagle claws. Legends about it

date back to the sixth century BC, when it appeared on the famous Ishtar Gate in Babylon.

In the Far East, the Chinese divided the sky into quadrants, one of which was ruled by the Vermilion Bird of the South.



The Mušhuššu, depicted on the Ishtar Gate of Babylon, dated 575 BC. The Gate is reconstructed in the Pergamon Museum, Berlin. Photo by the author.

The Chinese Lunar Mansions of Western Hydra. From Upper right to lower left: 柳 Willow, 星 Star, 張 Extended Net, and 翼 Wings. Together these asterisms comprise the head, neck, body, and wings of the Vermilion Bird. The map is adapted from Wikipedia (public domain).





A seventh century painting, one of a pair, of the Vermilion Bird from the Great Tomb of Gangseo, a UNESCO World Heritage Site, at Daean City, Korea. Photo archived by the <u>Northeast Asian History Net-</u> work, Seoul (public domain). The stars of the western half of Hydra comprised four Lunar Mansions; together these asterisms formed the Vermilion Bird. To the east, Hydra hosted three more Lunar Mansions. According to Ian Ridpath [*Star Tales*, <u>http://</u> <u>www.ianridpath.com/startales/hydra.html</u>] these had judicial themes: a Judge, the Trial, and the Execution (So much for any presumption of innocence!).

There are a few deep sky objects in Hydra. Three Messier objects are M48, an open cluster; M68, a globular cluster; and M83, which is known as the Southern Pinwheel Galaxy.

Some other interesting sights worthy of mention have NGC numbers. NGC2936 is variously known as the <u>Porpoise Galaxy</u> or the



M48 forms an equilateral triangle with the head of Hydra and the star Procyon at right. M68 and M83 are on either side of Hydra's tail. Adapted from <u>Stellarium</u>.

Penguin Galaxy, but you probably have to be looking at the Hubble photo to visualize either one of these. Its odd shape is due to gravitational interaction with a neighbor. NGC3242 is a planetary called the "<u>Ghost of Jupiter</u>," for obvious reasons. And NGC 5694 is a globular known as <u>Tombaugh's Cluster</u>. It was discovered by William Herschel, but Clyde Tombaugh first identified it as a globular. It's extremely distant, and recent measurements indicate it is probably in the process of escaping from the Milky Way's gravitational grip.

So spend some time in the Spring with Hydra. You'll have nothing to fear!



Starlink: "String of Pearls?" by Frank Simpson

I was outside at 4:35AM May 6th, 2021, hoping to see the meteor shower from the residual debris trail of Haley's Comet, that our friend, Cherrie, had told us about. I saw but one meteor (falling star), straight up, from the wide views of the Clubhouse of our mobile home park in Novato. A few minutes later, far overhead, I saw an unusual string of lights migrating from near the handle of the Big Dipper in the West, and disappearing just south of Saturn toward the East.

They occurred in two bunches. The first string had exactly 10 "pearls." A short time later a longer string, of maybe 50 pearls, sailed above me, again traveling steadily from West to East, along the same path as the first. I ran into the house and woke my wife, Maggie, but the long train of pearls was just disappearing from view as she arrived outside.

Is this the Second Coming? Are they Russian missiles? What is going on? I rushed to the internet to find out if others had seen it. And they had! <u>https://www.youtube.com/watch?v=pgysWWwESfU</u> Only two days before, Elon Musk's SpaceX had released 60 satellites into space from their reusable Falcon 9 rocket. I was watching this chain of orbiting satellites as they passed over our home!

The purpose? Musk has received permission from the US Federal Communications Commission (FCC) to deploy as many as 42,000

satellites during these next few years into a low altitude orbit above the earth. He envisions a network of intercommunicating satellites called "Starlink" that will provide affordable (?) internet access to people living in even the most remote regions of our planet. He thinks it will prove lucrative, generating perhaps 30 billion dollars per year, thereby funding his venture to Mars. The US military already is testing Starlink on jet airplanes as a communications tool, with favorable results. Though the network is barely functional, prospective civilian customers already have placed more than 500,000 advance orders with Musk, at \$99 apiece.

On May 9th, just after sunset, our friend David Gray, Maggie, and I snapped this photograph with an iPhone, while standing along Marin Valley Drive. This group of Starlink satellites appeared in the Northwestern sky, traveling northward.

Many people, particularly from the astronomy community, are concerned about SpaceX's launches of "debris" into space. Others laud the cutting-edge technology, and the possibility of providing internet service to the world.

There have been about 25 launches of Starlink satellites by Elon Musk so far. CNBC has more: <u>https://www.youtube.com/watch?v=Qd-</u> <u>3suMNNIVs</u>

This website provides times for seeing the "Strings of Pearls" from your location. <u>https://findstarlink.com</u>

Maggie made metaphor to covered wagon trains crossing our continent a mere 150 years ago...

This illustration is from the South China Morning Post.



Things I Learned from the Internet by Ken Yanosko

No, I don't mean how NASA faked the moon landings, or how the Air Force is studying alien technology at Roswell, or how Elvis is alive and well in Las Vegas. I mean some good and useful stuff about how to use and care for my telescopes.

Polar Alignment

First of all, how do I get my polar axis pointed north? I carry a compass with me, and I know that from here true north is about 15 degrees west of magnetic north, so I can get a good first approximation. Then it gets dark enough to see Polaris. But then what? I still always seem to have some residual drift. Well, *Sky & Telescope*'s Alan MacRobert recommends the "declination drift method" as the most accurate way to get aligned. He writes, "The method is straightforward, but it does require some time and patience.

"First, aim the mount's polar axis roughly at Polaris. Now point the telescope at a star that's somewhat above the celestial equator and as close to south as you can judge by looking opposite Polaris. Put in a high-power eyepiece. If the eyepiece has cross hairs, center the star on them. Otherwise put the star on the north or south edge of the field and defocus it a little. Turn on the clock drive, and ignore any east-west drift.

"If the star drifts south in the eyepiece, the polar axis is pointing too far east. If the star drifts north, the polar axis is too far west. Shift the polar axis left or right accordingly, until there is no more drift. Then aim at a star that's near the celestial equator low in the eastern sky. If the star drifts south, the polar axis points too low. If the star drifts north, the polar axis points too high. Again, shift the polar axis accordingly.

"Now go back and repeat from the beginning, because each adjustment throws the previous one slightly off. When all visible drift is eliminated the telescope is very accurately aligned."

Collimation

Now, what's the easiest way to collimate a reflector? I have both a laser collimator and a bahtnikov mask, but each of these has its complications. However, *S&T*'s Gary Seronik offers the "<u>no-tools telescope</u> <u>collimation</u>" technique.

Seronik's advice is to track a star, preferably second magnitude, and defocus it into a donut. (If you don't have a tracking mount, use Polaris.) If the donut hole appears off-center, use your declination and right ascension (or altitude and azimuth) controls to move around to where the donut is symmetrical, but now off-center in the eyepiece.

Then use your collimation screws to center the star in the eyepiece. Now refocus, to make the donut smaller, and repeat. When the donut appears to be both symmetrical and centered in the eyepiece, you're collimated.

This technique assumes that your secondary mirror is already aligned properly. This <u>link</u> to another Seronik page tells you how to make it so.

Cleaning Eyepieces

I know that a little dust on my mirror doesn't hurt anything but any speck of dust on my eyepiece is very close to my system's focal plane and can look as big as a log. Again, in *S&T*, Craig Michael Utter offers a "quick and easy way to dust eyepieces."

"Lay a finger across the eye end (without touching the glass!) and suck air under your finger past the lens. (This moves the dust from

the eyepiece to your lungs, but every astronomer knows which is more important.) [Don't blow or you'll leave droplets of spit.] The job takes about one second." It usually does the trick, but if not, then you can always start hunting for your air bulb or lens brush.



This article is distributed by the <u>NASA Night Sky Net-</u> work, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach.



Weird Ways to Observe the Moon by David Prosper

You can observe the Moon whenever it's up, day or night! While binoculars and telescopes certainly reveal incredible details of our neighbor's surface, bringing out dark seas, bright craters, and numerous odd fissures and cracks, these tools are not the only way to observe details about our Moon. There are more ways to observe the Moon than you might expect, just using common household materials.

Put on a pair of sunglasses, especially polarized sunglasses! You may think this is a joke, but the point of polarized sunglasses is to dramatically reduce glare, and so they allow your eyes to pick out some lunar details! Surprisingly, wearing sunglasses even helps during daytime observations of the Moon.

One unlikely tool is the humble plastic bottle cap! John Goss from the Roanoke Valley Astronomical Society shared these directions on how to make your own bottle cap lunar viewer, which was also suggested to him by Fred Schaaf many years ago as a way to also view the thin crescent of Venus when close to the Sun:

"The full Moon is very bright, so much that details are overwhelmed by the glare. Here is an easy way to see more! Start by drilling a 1/16-inch (1.5 mm) diameter hole in a plastic soft drink bottle cap. Make sure it is an unobstructed, round hole. Now look through the hole at the bright Moon. The image brightness will be much dimmer than normal—over 90% dimmer—reducing or eliminating any lunar glare. The image should also be much sharper because the bottle cap blocks light from entering the outer portion of your pupil, where imperfections of the eye's curving optical path likely lie." Many report seeing a startling amount of lunar detail!

You can project the Moon! Have you heard of a "Sun Funnel"? It's a way to safely view the Sun by projecting the image from an eyepiece to fabric stretched across a funnel mounted on top. It's easy to make at home, too—directions are here: <u>https://www.nightwise.org/sun-funnel</u>. Depending on your equipment, a Sun Funnel can view the Moon as well as the Sun—a full Moon gives off more than enough light to project from even relatively small telescopes. Large telescopes will project the full Moon and its phases, with varying levels of detail; while not as crisp as direct eyepiece viewing, it's still an impressive sight! You can also mount your smartphone or tablet to your eyepiece for a similar Moon-viewing experience, but the funnel doesn't need batteries.

Sun Funnels in action! Starting clockwise from the bottom left, a standalone Sun Funnel; attached to a small refractor to observe the transit of Mercury in 2019; attached to a large telescope in preparation for evening lunar observing; projection of the Moon onto a funnel from a medium-size scope (5 inches).



This article is republished from The Conversation under a Creative Commons license. You can read the original article at https://theconversation.com/the-surfaceof-venus-is-cracked-and-moves-likeice-floating-on-the-ocean-likely-due-totectonic-activity-162984



The surface of Venus is cracked and moves like ice floating on the ocean —likely due to tectonic activity

by Paul K. Byrne

The big idea

Much of the brittle, upper crust of Venus is broken into fragments that jostle and move—and the slow churning of Venus' mantle beneath the surface might be responsible. My colleagues and I arrived at this finding using decades-old radar data to explore how the surface of Venus interacts with the interior of the planet. We describe it in a new study published in the Proceedings of the National Academy of Sciences on June 21, 2021.

Planetary scientists like me have long known that Venus has a plethora of tectonic landforms. Some of these formations are long, thin belts where the crust has been pushed together to form ridges or pulled apart to form troughs and grooves. In many of these belts there's evidence that pieces of the crust have moved side to side, too.

Our new study shows, for the first time, that these bands of ridges and troughs often mark the boundaries of flat, low-lying areas that themselves show relatively little deformation and are individual blocks of Venus' crust that have shifted, rotated and slid past each other over time – and may have done so in the recent past. It's a little like Earth's plate tectonics but on a smaller scale and more closely resembles pack ice that floats atop the ocean.



The crust of Venus is fractured into large pieces that behave more like chunks of ice floating on the ocean.

Photo from Endlisnis/Wikimedia Commons (public domain)



Where ice chunks collide, the ice is thrust upwards to create ridges much like what researchers think happens on Venus.

Photo from Ben Holt and Susan Digby/ Wikimedia Commons (public domain)

Researchers have hypothesized that—just like Earth's mantle the mantle of Venus swirls with currents as it's heated from below. My colleagues and I modeled the sluggish but powerful movement of Venus' mantle and showed that it is sufficiently forceful to fragment the upper crust everywhere we've found these lowland blocks.

Why it matters

A major question about Venus is whether the planet has active volcanoes and tectonic faulting today. It's essentially the same size, composition and age as Earth—so why wouldn't it be geologically alive?

But no mission to Venus has yet conclusively shown the planet to be active. There's tantalizing but ultimately inconclusive evidence that volcanic eruptions have taken place there in the geologically recent past—and are perhaps even ongoing. The case for tectonic activity—the creaking, breaking and folding of the planet's crust—is on even less solid ground.

Showing that Venus' geological engine is still running would have huge implications for understanding the composition of the planet's mantle, where and how volcanism might be taking place today and how the very crust itself is formed, destroyed and replaced. Because our study suggests that some of this jostling of the crust is geologically recent, we may have taken a big step forward in understanding if Venus really is active today.



A red-hued image of the surface of Venus showing a large darker piece of the surface surrounded by lighter colors against the backdrop of space.

The largest block of lowlands the team found—the dark red shape in the center of this radar image—is about the size of Alaska and surrounded by ridges and deformations that show up as lighter colors.

What still isn't known

It's not clear just how widespread these crustal fragments are. My colleagues and I have found 58 so far, but that's almost certainly a low estimate.

We also don't yet know when these crustal blocks first formed, nor how long they've been moving around on Venus. Determining when the crust's fragmentation and jostling occurred is key—especially if planetary scientists want to understand this phenomenon in relation to the planet's suspected recent volcanic activity. Figuring that out would give us vital information on how the planet's surface features reflect the geological turmoil within.

What's next

This initial study has allowed my colleagues and me to make our best guess yet about how Venus' vast lowlands have been deformed, but we need much higher-resolution radar images and topographic data to build on this work. Luckily, that's exactly what scientists are going to get in the coming years, with NASA and the European Space Agency both recently announcing new missions bound for Venus later this decade. It'll be worth the wait to get a better understanding of Earth's enigmatic neighbor.

> Paul K. Byrne is an Associate Professor of Planetary Science at North Carolina State University

After Words

"We are just an advanced breed of monkeys on a minor planet of a very average star. But we can understand the Universe. That makes us something very special."

> Stephen Hawking Interview, *Der Spiegel* October 1988

Heavenly Bodies by Susie Christian



Where lost things end up