ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

Durban ’nDaba

Monthly Newsletter of the Durban Centre - January 2022

Table of Contents

Member Submissions Disclaimer

The views expressed in ’nDaba are solely those of the writer and are not necessarily the views of the ASSA Durban Centre, nor that of the Editor.

Chairman's Chatter

January 2022

Dear ASSA members.

As we begin another orbit around our magnificent star, we reflect on the past year and the difficulty we had faced. It is not without its glorious moments that will go into the history books, those that we can proudly say we have lived through.

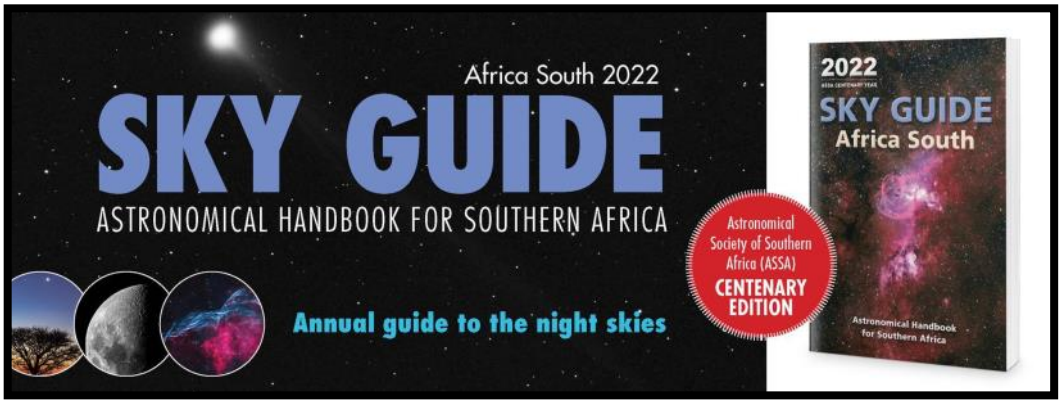
One of these achievements was reaching the Corona, no not that Corona, the one that has played a role in giving life to our planet. The Parker Solar probe has treated us to images of structures called Coronal streamers.

Another long awaited achievement has finally seen fruition. The James Webb Space Telescope was launched on 25 December 2021. It is estimated to reach its orbit in the L2 region on 23 January 2022. I am sure we all look forward to seeing the images that will come through in the early months of the year.

This year's 2022 Sky Guide is for sale @ R 100:00 each. Please send orders and proof of payments to the treasurer@astronomydurban.co.za.

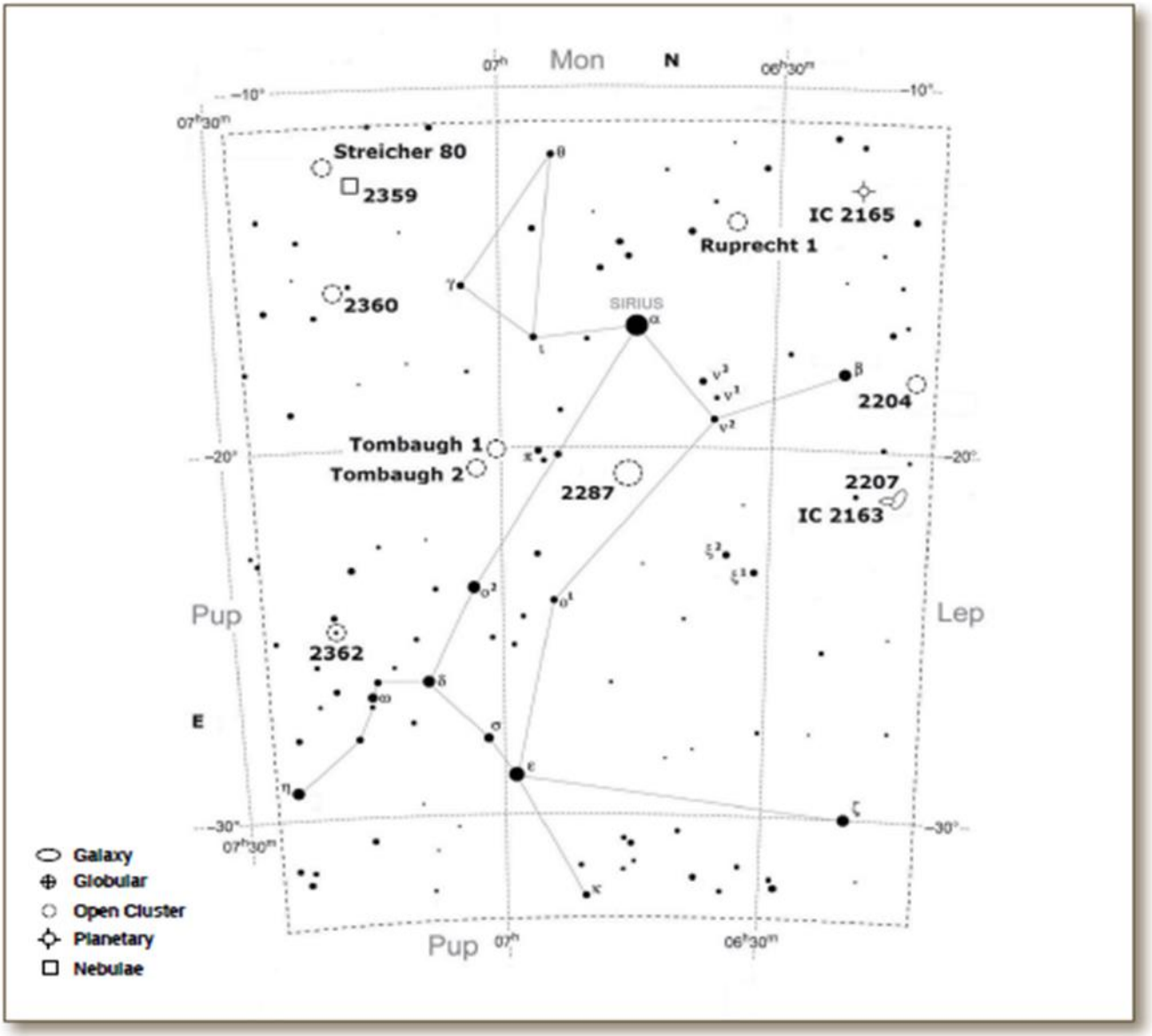
On behalf of the committee of the Astronomical Society of Southern Africa, Durban Centre, I wish you and your family a prosperous new year.

Amith Rajpal



Astronomy Delights:
Canis Major - Orion's Trusty Hunting Dog

By Magda Streicher



The constellation of Canis Major

In Memory of Snoekie and Snippie

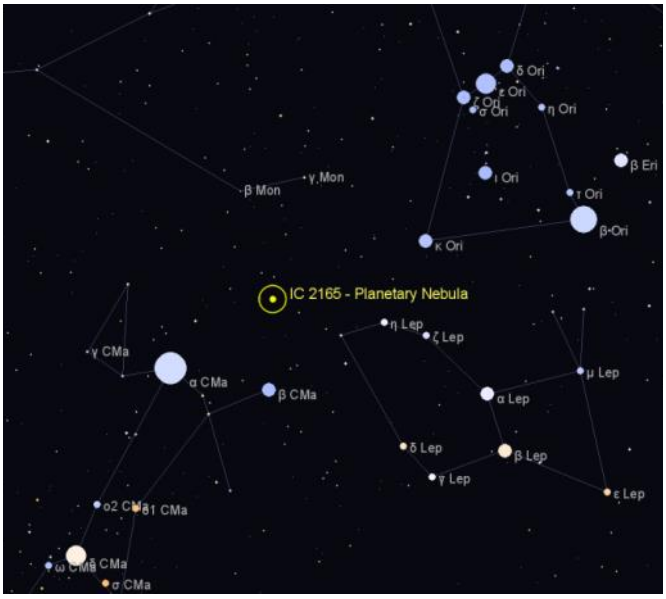
...Canis Major

When Canis Major makes its appearance in the east during the southern hemisphere's late summer, I am reminded of the important symbolic role of the dog in ancient times. Centuries ago, the Egyptians painted the dog figure against their monuments and temples as a heavenly symbol. The constellation Canis Major and I have something in common. The same way the Tropic of Capricorn crosses my earthly home, it also cuts a path through the dog constellation.

Canis Major is a well outstanding constellation which has 30 stars brighter than magnitude 5. The starry dog figure is characterised by its bright eye alpha Canis Majoris also known as Sirius or the Dog Star, the brightest star in the sky, as it looks up at its master Orion. Sirius shines unparalleled at magnitude -1.4 with a metal blue-white colour, a mere 8.6 light-years away, twice the mass of the Sun and only 250 million years young. The name Sirius comes from the Greek word Seirios which means scorching.

ABOVE: Alvan G. Clark – Wikipedia

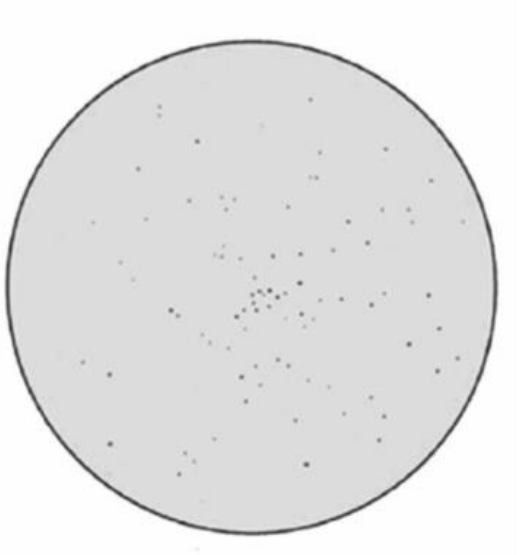
Alvan G. Clark discovered Sirius' companion star on 31 January 1862 while testing an 18-inch glass at Cambridge port, Massachusetts. For many years I have been trying to observe Sirius B (a third the mass of Sirius), and would have been satisfied with only a glimpse. The intense concentration, aggravated by the brightness of Sirius, soon causes one's eyes to literally swim with tears. Eventually on good advice from astronomy friend Bruce Dickson, I placed Sirius on the brink of the field of view and could finally appreciate the white dwarf. With a separation of 7" in a position angle (PA) 106° and orbital period of 51.5 years, Sirius B at magnitude 8.5 beckoned me from where the star is hidden between the flashing silver spikes of Sirius. Definitely not an easy observation, in fact, to spot Sirius B is one of the most challenging. Friedrich Wilhelm Bessel already noticed in 1844 that two of the brightest stars in the sky, Sirius and Procyon show slow, periodic position shifts with respect to other stars.



In the far north of the constellation is the planetary nebula IC 2165, situated in the north-western corner of the constellation. This object is easy to find and stands out well, seen as an even bluish disc with a smooth surface brightness

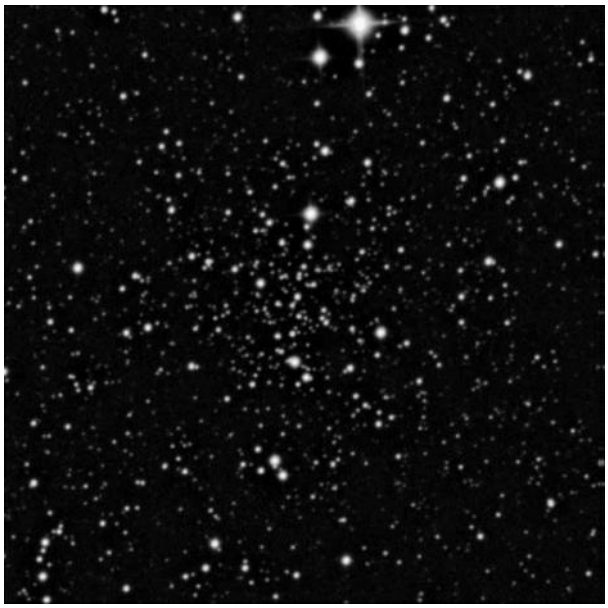
With higher magnification, it turns out to be slightly darker towards the centre with a glimpse of a faint magnitude 14.5 centre star. With the use of a nebular filter, its high surface brightness reveals its delicate nebulosity with diffused edges.

...Canis Major



ABOVE: RUPRECHT 1 – Open Cluster

The open cluster RUPRECHT 1 is situated about halfway between Sirius and IC 2165 in a sprinkled star field. Closer investigation shows an arrow shape of faint stars pointing in a south-east direction. Fainter members fill up the space and spray out in a north-west direction giving the impression of ice cream on a cone. There are a handful of Ruprecht clusters that find a home in the constellation Canis Major.



RIGHT: NGC 2204 – Open Cluster
Photograph: phys.ttu.edu

The cluster **NGC 2204** nestles at the right front paw of the starry figure very close to the border with Lepus. The object is 1.8 degrees west of beta Canis Majoris, named “Murzim” that means the announcer, situated west of Sirius and rises before its brilliant neighbour. The relatively small star group is very elongated, flowing from north-east to south-west with mixed magnitude stars. A very small knot of faint stars can be seen toward the middle area before it splashes south into a larger uneven circular haze of faint stars. The northern part of the group is marked with brighter stars, one an exceptional orange magnitude 5.8 member. The galaxy couple NGC 2211 and NGC 2212 take up their stands 44’ east of NGC 2204. But be aware, the pair is rather faint.

Apparently, an international team of astronomers has discovered a new dwarf galaxy that is being tidally shredded and devoured by our Milky Way. The Canis Major dwarf lies even closer to the galactic centre than any other companion galaxy previously known.

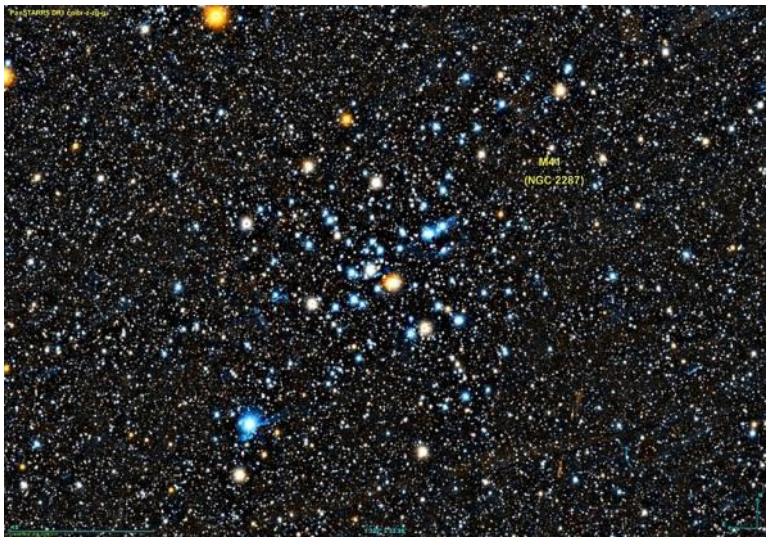
The impressive close pair of galaxies NGC 2207 and IC 2163, is situated further south along the border line with Lepus. I was pleasantly surprised at the amount of detail visible in this unique object. Although rather faint, the two galaxies are surprisingly easy seen. NGC 2207 shows much more detail with a relatively bright nucleus and a flimsy south-west edge. IC 2163 is seen as a small faint haze on the eastern edge of NGC 2207, barely touching it, gravitationally disrupting each other.

LEFT: IC 2163 and NGC 2207 – Galaxies
Photograph: Dieter Willasch

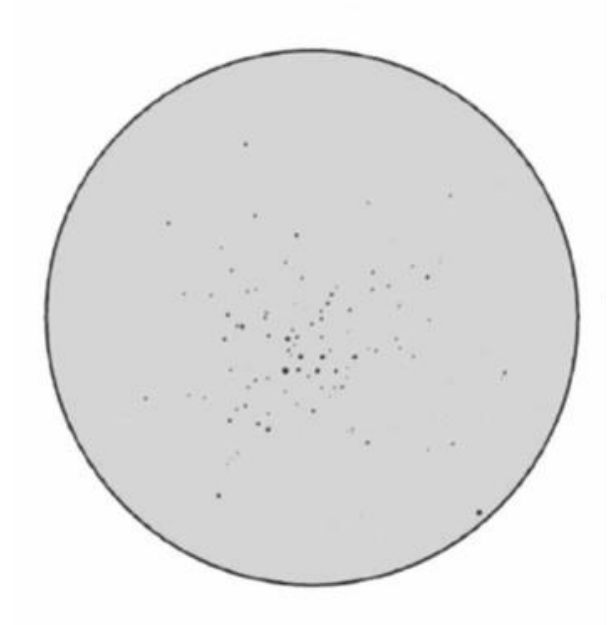
...Canis Major

Sir John Herschel discovered NGC 2207 on the night of 24 January 1835, and he recorded it as rather bright, pretty large, very elongated, and suddenly becoming a little brighter in the middle. He failed to identify IC 2163, which was discovered by Herbert Howe on 11 February 1898 at the Chamberlin Observatory, Denver Colorado.

RIGHT: NGC 2287—Wikimedia Commons



Like a bunch of fleas, **NGC 2287**, also known as Messier 41, takes cover under the belly of the dog figure, 4 degrees south of the star Sirius. This beautiful cluster of approximately 100 stars which can be seen with the naked eye and partly resolved using binoculars is moving away from us at about 34 kilometre per second, 24 light-years across and 2300 light-years distant. This is one of the few deep sky objects to have been recorded in ancient times. It is also one of the night sky's delights with the grouping reminding me of a lovely flower, opening its petals in clear curls and curved lines. Two rusty coloured stars remind me of pollen threads flowing out of a central crown consisting of a semi-circle of brighter members. A swarm of faint stars covers the cluster like dusting powder with a few dark patches in-between.



ABOVE: NGC 2287 – M41 Open Cluster

Clyde Tombaugh's planet Pluto (which he discovered in 1930) has been laid to rest, but who knows about his discovery of two clusters in the constellation Canis Major? **TOMBAUGH 1** displays a sort of oval grouping, containing very faint stars, slightly elongated in an east to west direction. A string of faint stars swings out to the east of the barely compact centre. **TOMBAUGH 2** is situated about 40' to the south-east as a much smaller hazy patch with only a few stars resolved.

LEFT: Dr. Clyde W. Tombaugh (1907-1997)
Photograph: The Telegraph

...Canis Major

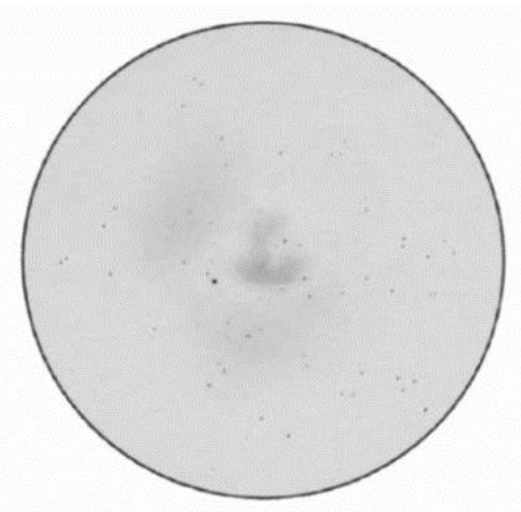
A small portion of Tombaugh ashes was placed in a container aboard the New Horizons spacecraft now travels to the mysterious Kuiper Belt or Third Zone before eventually leaving the Solar System altogether and taking Clyde Tombaugh's ashes with it.

The open cluster NGC 2362 reveals itself as a roundish haze in low magnification, giving a rather globular cluster impression. NGC 2362 is a beautiful, irregular shaped cluster, with a sparkling mass of mainly blue-white stars. A few members are grouped more to the southern side of the cluster. NGC 2362 is estimated to be only 1 million years old, one of the youngest clusters known, with tau Canis Majoris a possible true member.

NGC 2359 is well-known as Thor's Helmet, also called the Duck Nebula, and situated in the northeastern corner of the constellation. It is a dim complex of filamentary nebulosity surrounding a Wolf-Rayet star. The northern part is hazy and flimsy in contrast with the southern, more defined part. It appears to be the head and bill of a duck looking sideways. With imagination a magnitude 9 star on the eastern edge could be seen as the duck's eye.

ABOVE: NGC 2359 – Diffuse Nebula

Charles Wolf and Georges Rayet discovered an unusual pattern in the wavelengths of light emitted by certain very hot stars. This type of star loses its outer hydrogen layers late in its evolution.



ABOVE: STREICHER 80 – Photograph: DSS

The asterism S**TREICHER 80** consists of a handful of mixed magnitude stars with a surprising broken oval impression. The brightest star magnitude 9.4, HD 58055, is situated towards the northern edge in the field of view. It was a great surprise to discover that one of Clyde Tombaugh's open clusters also appears to have in its midst a sort of oval impression, and on top of this in the same constellation.

NGC 2360, also known as Caroline's Cluster, is situated just 3 degrees east of gamma Canis Majoris. This lovely grouping is a scattering of faint stars in short and long strings, which are tightly grouped together. The cluster core is well concentrated and outstanding.

It is said that a dog is a man's best friend, so make the starry dog your friend, with the numerous beautiful objects that it unconditionally gives us to enjoy.

...Canis Major

OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 2204	Open Cluster	06h15m.7	-18°39′.5	8.6	12′
NGC 2207	Galaxy	06h16m.4	-21°22′.4	10.8	4.8′×2.3′
IC 2163	Galaxy	06h16m.5	-21°22′.6	12.4	3′×1.2′
IC 2165	Planetary Nebula	06h21m.7	-12°59′.3	10.6	4″
RUPRECHT 1	Open Cluster	06h36m.4	-14°09′.0	11	6′
NGC 2287 Messier 41	Open Cluster	06h46m.1	-20°44′.3	4.5	38′
TOMBAUGH 1	Open Cluster	07h00m.4	-20°34′.2	9.3	6′
TOMBAUGH 2	Open Cluster	07h03m.6	-20°49′.1	12.5	3′
NGC 2360	Open Cluster	07h17m.8	-15°37′.7	7.2	12′
NGC 2359	Diffuse Nebula	07h18m.6	-13°12′.7	9	9′×6′
NGC 2362	Open Cluster	07h18m.8	-24°57′.3	4.1	8′
STREICHER 80 HD 58055-group DSH J0723.3-1237	Asterism	07h23m.3	-12°37′.5	9	8.5′

At the Eyepiece

January 2022 by Ray Field

The Earth is nearest the Sun this year on the 4th.

The Moon is New and nearest the Earth on the 2nd, First quarter on the 9th, Full on the 18th and Last quarter on the 25th. The Moon is near Mercury and Saturn on the 4th, Jupiter on the 6th, furthest from the Earth on the 14th, near Pollux on the 17th, Regulus on the 20th, Spica on the 24th, Antares on the 28th and Mars on the 29th.

Mercury is at its greatest elongation of 19° East of the Sun on the 7th when it can be seen low over the West after Sunset. By the 23rd Mercury is at inferior conjunction and is too close to the Sun to be seen. The moon is near Mercury and Saturn on the 4th.

Venus is close to the Sun this month and re-appears from its conjunction with the Sun, around mid-month, and by the 20th it rises an hour before the Sun.

Mars, the “Red planet”, in Sagittarius, is near the Moon, before Sunrise on the 29th and 30th, near the “Teapot” asterisum. It is not at its brightest now but should be easy enough to see. It rises about 2 hours before the Sun in January. To the naked-eye it looks like a reddish “star”.

Jupiter is near the Moon on the 6th in Aquarius, below the “Vee” of Capricornus. Jupiter sets at 22:00 on the 1st and by 20:30 at the month’s end.

Saturn, in Capricornus, is not well placed for observation this month. It sets at 21:00 on the 1st but is soon lost in the solar glare by the 15th.

Meteor Showers. The Alpha Crucids time to watch from mid-night to 03:30 are active from the 6th to the 28th of January, with the maximum on the 19th. Their ZHR is less than 5 per hour, and their observing prospect is poor. The start of the alpha Centaurids is on the 28th January but their maximum is only on the 7th February. Their ZHR is only 5 per hour, however their observing prospect is good.

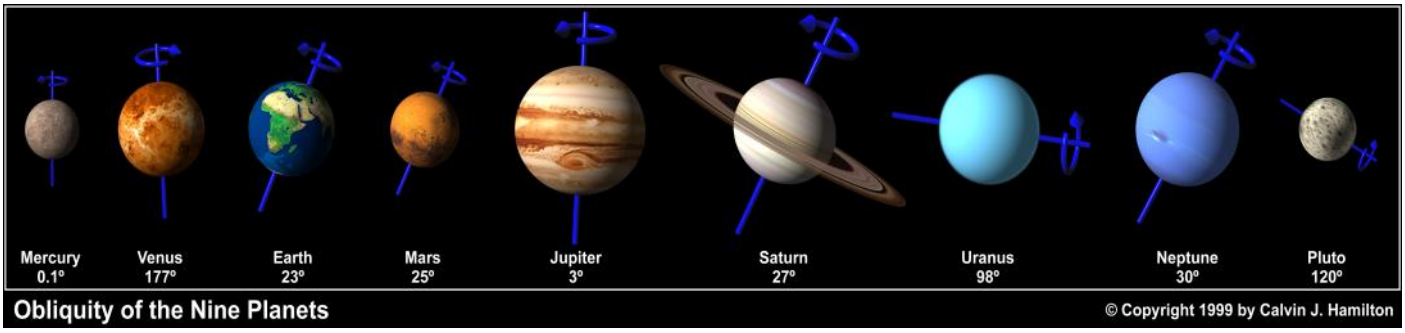
Comet C/2021 A1 (Leonard) is nearest the Sun on the 3rd January in Pisces Australis, which contains the bright star Fomalhaut. It may nearly reach naked eye visibility. Look for it after Sunset low over the SW horizon.

Comet 104P/Kowal2 is closest to the Sun on January 11th in the constellation of Cetus. Its magnitude is only expected to peak at nine, which is well below naked-eye visibility. It has an orbital period of 57 years.

...At the Eyepiece

The Starry Sky from Durban for January 2022 at 21:00. The Southern Cross is very low over the southern horizon. The bright star Fomalhaut and Grus the Crane are setting over the South West. The second brightest star in the sky, Canopus is well up over the South and the bright star Achenar is down to its right. Orion is nearly overhead and the brightest star, Sirius of Canis Major, follows it across the sky. Low over the North East the 2 bright stars in Gemini can be seen. Looking North, the bright reddish star, Aldebaran in Taurus is left of the belt of Orion and Sirius is to the right of the belt.

References: ASSA Sky Guide 2022, Philips Planisphere for 35°S and Nortons Star Atlas.



For Sale - Astrophotography Filters

Baader 1.25 inch / 32 mm filters

Luminance (clear), Red, Green, Blue, and a UV/IR – Cut/L filters.

Narrowband Ha 7nm, Oiii 8.5nm and Sii 8.0nm.

Still in the original packaging. Have never been opened.

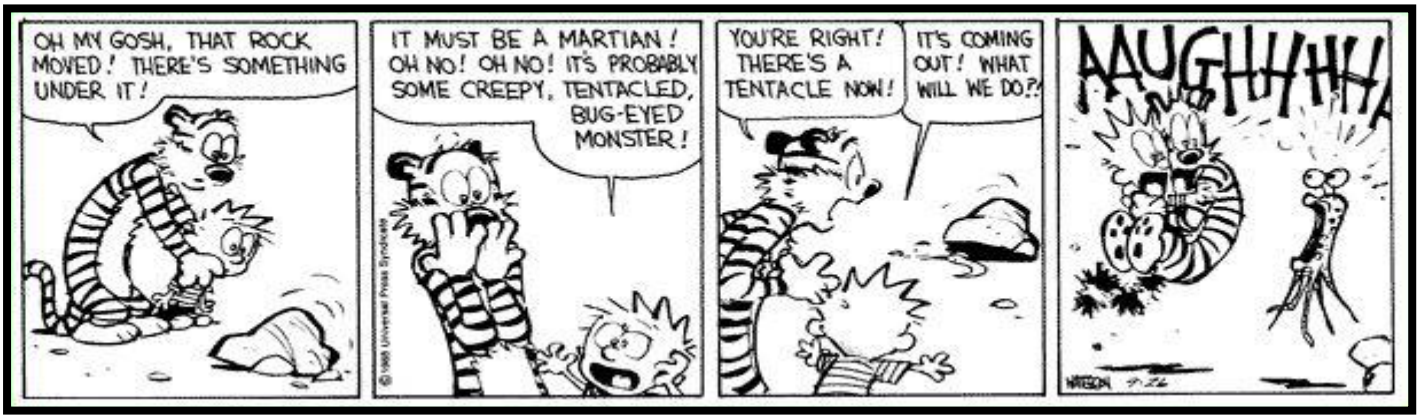
Originally Paid: R 12 000

Asking Price: **R 10 000**

CONTACT: **Johnny Visser**

Cell Number: **082 357 3091**

Email address: **ximatrix@telkomsa.net**



Ode to a Small Telescope

by Joe Bergeron

A small telescope faces the Milky Way. Image credit: Brian Ventrudo.

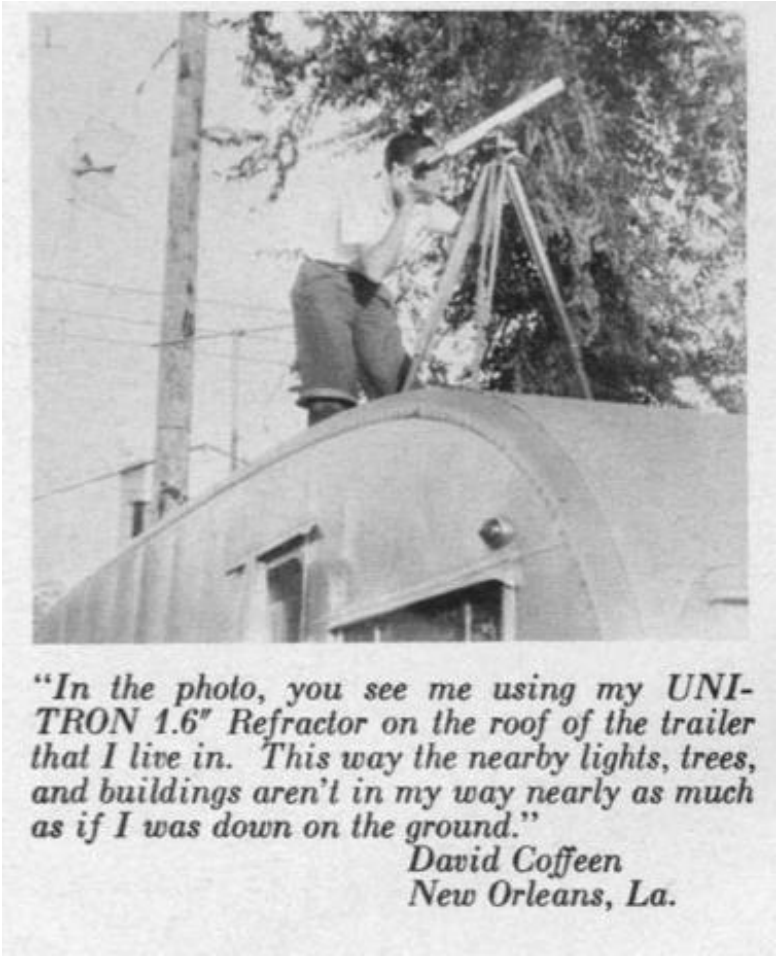
Sometime in 1955, Mr. David Coffeen of New Orleans, Louisiana came up with $75. In today's currency, that's about $700, a respectable sum. And what did Mr. Coffeen do with his hard-earned savings?

He purchased a telescope.

Which telescope? A Unitron altazimuth refractor with an aperture of just 40mm, less than that of most finder scopes today. It came with three eyepieces, a star diagonal, and a wooden storage case, because it was an honest astronomical instrument.

Mr. Coffeen used his telescope from atop his modest trailer home. There was a lot to see with that 40mm scope: loads of lunar detail, the rings of Saturn, the Galilean moons of Jupiter and a couple of belts, hundreds of double stars, many of the Messier objects, and a lot more.

He was so proud and pleased that he wrote to Unitron to show off this arrangement, and became immortalized in the image below:



"In the photo, you see me using my UNITRON 1.6" Refractor on the roof of the trailer that I live in. This way the nearby lights, trees, and buildings aren't in my way nearly as much as if I was down on the ground."
David Coffeen
New Orleans, La.

David Coffeen, I salute you. I'd like to think that in later years you were able to get your hands on a big 60mm scope, or maybe even a massive 3-incher, which would have been considered an impressive instrument!

Today, most amateur astronomers would scoff at the idea of a 40mm telescope, especially as a main (or only) instrument. Some will assure you that an 8-inch (200mm) is a "starter" telescope, and that really, nothing smaller than a 10-inch (250mm) is worth looking through.

The fact is, spending $700 today will get you a decent 10-inch reflector telescope on a Dobsonian altazimuth mount. Even if you insist on a refractor, which is an inherently more expensive breed of telescope, it will still get you a fair 120mm achromatic refractor on a usable equatorial mount, with enough left over for another eyepiece or two. Either is, of course, far more capable than any 40mm telescope.

...Ode to a Small Telescope

But don't count out those tiny telescopes. Few of us started out with anything smaller than a 60mm refractor. That's about 10 times the aperture of the fully dilated human eyeball (depending on age and other factors). To get that same huge jump in light grasp again, someone with a 60mm scope would need to acquire a 600mm (24-inch) scope. Even today, amateur telescopes of that size or greater are not that common.

What about resolution? The smallest thing the unaided human eye can distinguish as anything other than a point of light is about 2 arc minutes across (theoretically, a 6mm telescope could resolve down to about 20 arc seconds, but our eyeballs are not optically equal to the task). A good 60mm scope will resolve to 2 arc seconds, a 60-fold improvement! To improve this by another factor of 60, you'd need a 4-meter telescope, like the Mayall reflector at Kitt Peak, and it would have to either be in space or equipped with advanced adaptive optics to overcome the seeing limitations of our turbulent atmosphere, which make it uncommon for any telescope to resolve below one half second of arc, no matter how big it is.

ABOVE: A young observer with a small refracting telescope, along with illustrations of what can be seen with such an instrument. Image credit and copyright: Joe Bergeron.

The point is this. For most amateur astronomers, that first decent telescope, no matter how small or humble it may be, is by far the biggest gain in observing capability they will ever see, no matter what bigger telescopes they get in the future.

If some people consider a 10-inch scope a starter instrument today, it's worth remembering that 50 years ago, a 10-inch was about as big a telescope as many amateur astronomers would ever see, let alone own. An 8-inch Newtonian was a hallowed object worthy of reverence, a truly serious telescope, and for that matter, so was a wee 3-inch refractor. To judge from the Unitron advertising of the day, a towering 4-inch refractor was really all an amateur observer needed to aspire to. Unitron claimed that a professional astronomer once said that "a 3-inch refractor will show everything that an amateur would wish to see." Well, maybe not, but they will provide decent views of at least a few examples of every major class of astronomical object.

Then in the 1980s, along came the erstwhile monk and astronomy evangelizer John Dobson, who slapped large if optically dubious mirrors into slapdash altazimuth mounts. Telescope makers followed his lead, and suddenly starlight was pouring into our eyepieces! After a few years a 10-inch was a medium-sized telescope, and a 15-inch was the beginning of large apertures. The images in these early Dobsonian reflectors might not have been very refined, but they sure were bright, permitting glimpses into previously unthinkable deep sky depths.

...Ode to a Small Telescope

Left: Big, bigger, biggest. A selection of early Dobsonian telescopes by Coulter Optical in the mid 1980s.

Dobsonians gradually got more sophisticated, their optics improved, and a typical amateur can now get a workable telescope of large aperture that would have been the belle of the ball and featured in *Sky & Telescope* when he was a kid.

And yet, a fine small telescope remains a treasure, and a thing of wonder. It can be carried around and set up easily. It can be transported without needing a big vehicle or towing a trailer. And it can show you so much. The smallest telescope I regularly use is a short 92mm apochromatic refractor. If it was the only telescope I could own and use, I would still consider myself blessed and in touch with the sky. It provides views of planets that are better than those of many bigger telescopes of other types, it's spectacular for low-power Milky Way scanning, and when used carefully beneath a dark sky, it can show you a lifetime's worth of deep sky objects. For example, from the Mojave Desert I easily saw NGC 2419, the "Intergalactic Wanderer", a globular cluster in the constellation Lynx that lies at the astounding distance of some 300,000 light years. The faintest star I glimpsed in its vicinity was a faint magnitude 13.9.

Modern small telescopes are smaller than ever, or at least shorter. The old ones were achromats (color free) with a focal ratio of f/11-f/16, a necessity to limit residual chromatic aberration, or "false color" from the main lens. Today, the advent of newer glass types makes it practical and economical to make small apochromatic (really, really color free) refractors of short focal length. These highly refined instruments are not only fine for visual use, but they're also ideal for astrophotography, or imaging, because of their "fast" focal ratios of f/6 or f/7 and their small size that makes it feasible to use them on small mounts.

Big or small, humble or exotic, every decent astronomical telescope shares a few important qualities. One is their purity of purpose. They carry no violence, no greed, no aggression, no anger. They exist only to expand the mind and heart. They provide knowledge, and hint at truth. They are fundamentally simple things, yet precise, and perfectly adapted for their function.

No man-made object is more pure or venerable than a fine old telescope that has been gathering starlight for years or decades. This is as true of a small refractor used to contemplate the Moon from an urban balcony as it is for a big reflector hunting galaxy clusters beneath the darkest skies. If you have either or both, you are fortunate.

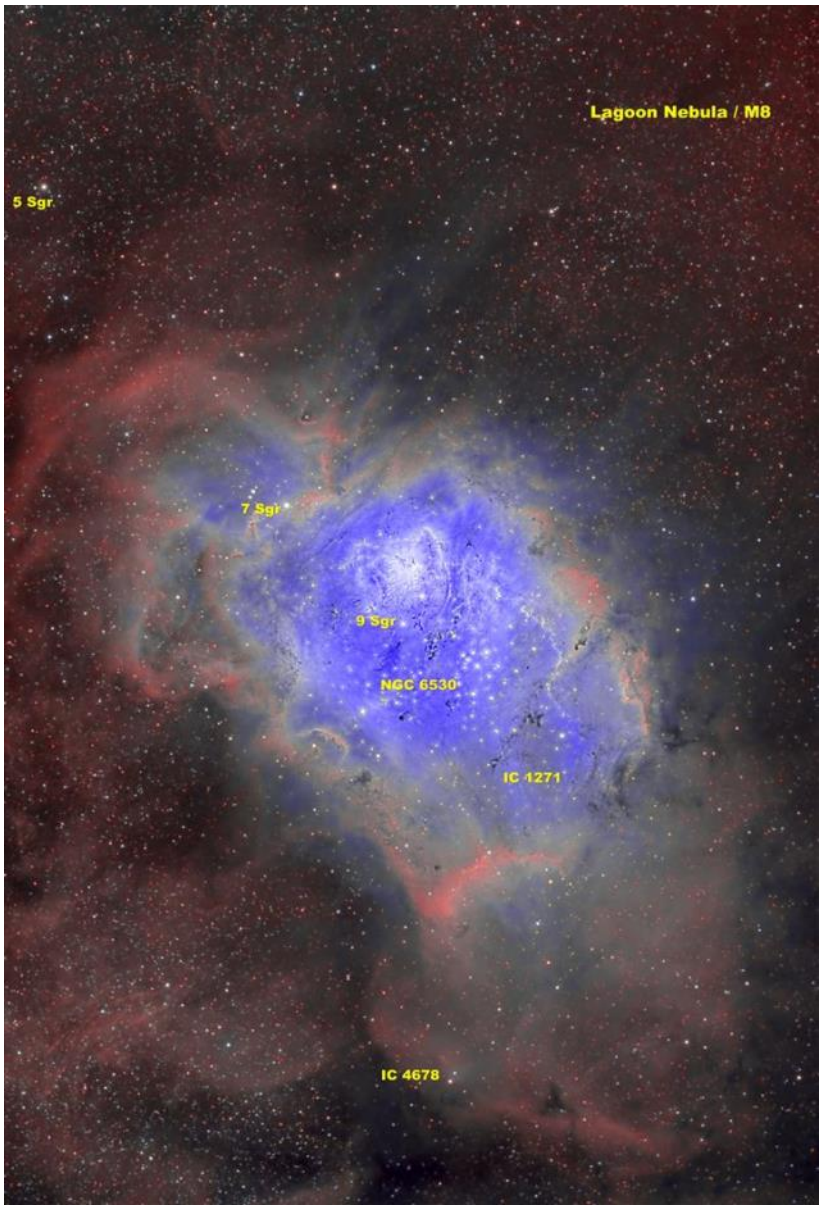
The Cover Image - Lagoon Nebula

by John Gill

The **Lagoon Nebula** (catalogued as **Messier 8** or **M8**, **NGC 6523**, **Sharpless 25**, **RCW 146**, and **Gum 72**) is a giant interstellar cloud in the constellation Sagittarius. It is classified as an emission nebula and as an H II region.

The Lagoon Nebula was discovered by Giovanni Hodierna before 1654 and is one of only two star-forming nebulae faintly visible to the eye from mid-northern latitudes. Seen with binoculars, it appears as a distinct oval cloudlike patch with a definite core. Within the nebula is the open cluster NGC 6530.

The Lagoon Nebula is estimated to be between 4,000–6,000 light-years away from the Earth. In the sky of Earth, it spans 90' by 40', which translates to an actual dimension of 110 by 50 light years. Like many nebulae, it appears pink in time-exposure color photos but is gray to the eye peering through binoculars or a telescope, human vision having poor color sensitivity at low light levels. The nebula contains a number of Bok globules (dark, collapsing clouds of protostellar material), the most prominent of which have been catalogued by E. E. Barnard as B88, B89 and B296. It also includes a funnel-like or tornado-like structure caused by a hot O-type star that emanates ultraviolet light, heating and ionizing gases on the surface of the nebula. The Lagoon Nebula also contains at its center a structure known as the Hourglass Nebula (so named by John Herschel), which should not be confused with the better known Engraved Hourglass Nebula in the constellation of Musca. In 2006 the first four Herbig–Haro objects were detected within the Hourglass, also including HH 870. This provides the first direct evidence of active star formation by accretion within it.



TECH SPECS:

IMAGES:
- 50 x Ha for 120sec
- 45 x Sii for 120 seconds
- 45 x Oiii for 120 seconds
- 60 x Flats per filter
- 60 x Darks
- 4 hr 40m integration time

CAMERA
- QHY268m

FILTERS
- Astrodon 36mm 5nm

SCOPE
- APM 107/700 apo & flattener

MOUNT
- Celestron CGX

SOFTWARE
- N.I.N.A.
- PhD2
- PixInsight

Seven Sisters - Oldest in the Family?

Astronomers Say Global Myths About 'Seven Sisters' Stars May Reach Back 100,000 Years

ABOVE: 7 Sisters Image – Credit NASA/ ESA / AURA / CALTECH

In the northern sky in December, *(Northern Hemispher*) is a beautiful cluster of stars known as the Pleiades, or the “seven sisters”. Look carefully and you will probably count six stars. So why do we say there are seven of them?

Many cultures around the world refer to the Pleiades as “seven sisters”, and also tell quite similar stories about them. After studying the motion of the stars very closely, we believe these stories may date back 100,000 years to a time when the constellation looked quite different.

The Sisters and the Hunter

In Greek mythology, the Pleiades were the seven daughters of the Titan Atlas. He was forced to hold up the sky for eternity, and was therefore unable to protect his daughters. To save the sisters from being raped by the hunter Orion, Zeus transformed them into stars. But the story says one sister fell in love with a mortal and went into hiding, which is why we only see six stars.

Close to the Seven Sisters in the sky is the constellation of Orion, which is often called “the saucepan” in Australia. In Greek mythology Orion is a hunter. This constellation is also often a hunter in Aboriginal cultures, or a group of lusty young men. The writer and anthropologist Daisy Bates reported people in central Australia regarded Orion as a “hunter of women”, and specifically of the women in the Pleiades. Many Aboriginal stories say the boys, or man, in Orion are chasing the seven sisters – and one of the sisters has died, or is hiding, or is too young, or has been abducted, so again only six are visible .

...Seven Sisters

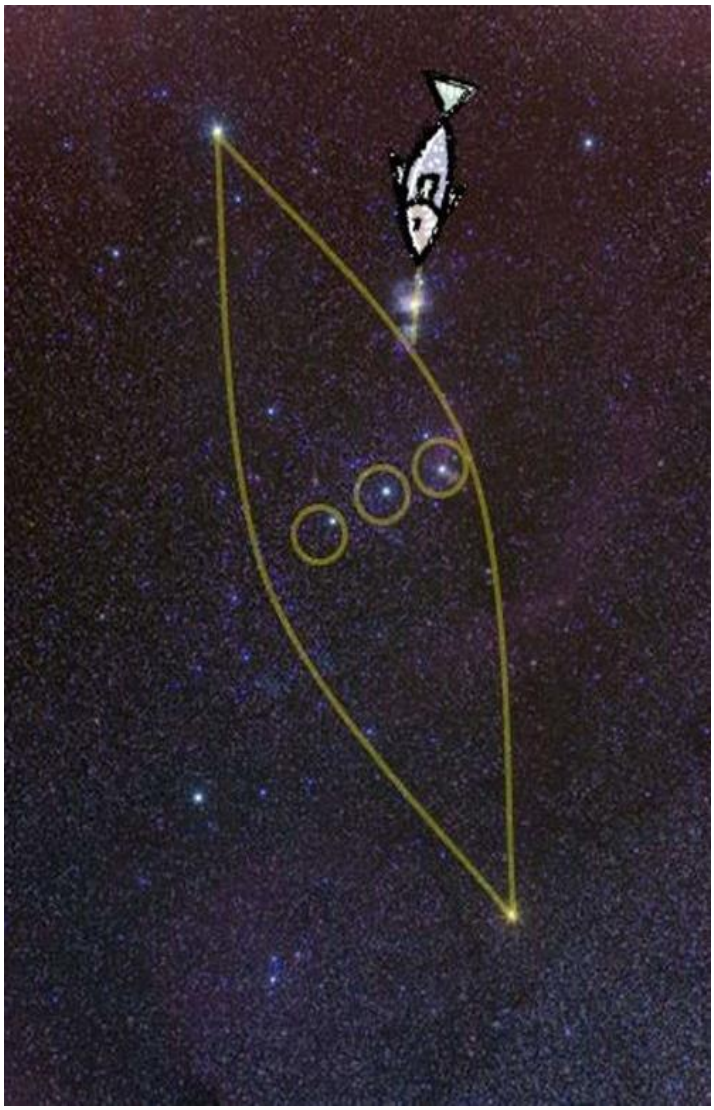
The Lost Sister

Similar “lost Pleiad” stories are found in European, African, Asian, Indonesian, Native American and Aboriginal Australian cultures. Many cultures regard the cluster as having seven stars, but acknowledge only six are normally visible, and then have a story to explain why the seventh is invisible.

How come the Australian Aboriginal stories are so similar to the Greek ones? Anthropologists used to think Europeans might have brought the Greek story to Australia, where it was adapted by Aboriginal people for their own purposes. But the Aboriginal stories seem to be much, much older than European contact. And there was little contact between most Australian Aboriginal cultures and the rest of the world for at least 50,000 years. So why do they share the same stories?

Barnaby Norris and I suggest an answer in a paper to be published by Springer early next year in a book titled Advancing Cultural Astronomy, a preprint for which is available here.

All modern humans are descended from people who lived in Africa before they began their long migrations to the far corners of the globe about 100,000 years ago. Could these stories of the seven sisters be so old? Did all humans carry these stories with them as they travelled to Australia, Europe, and Asia?



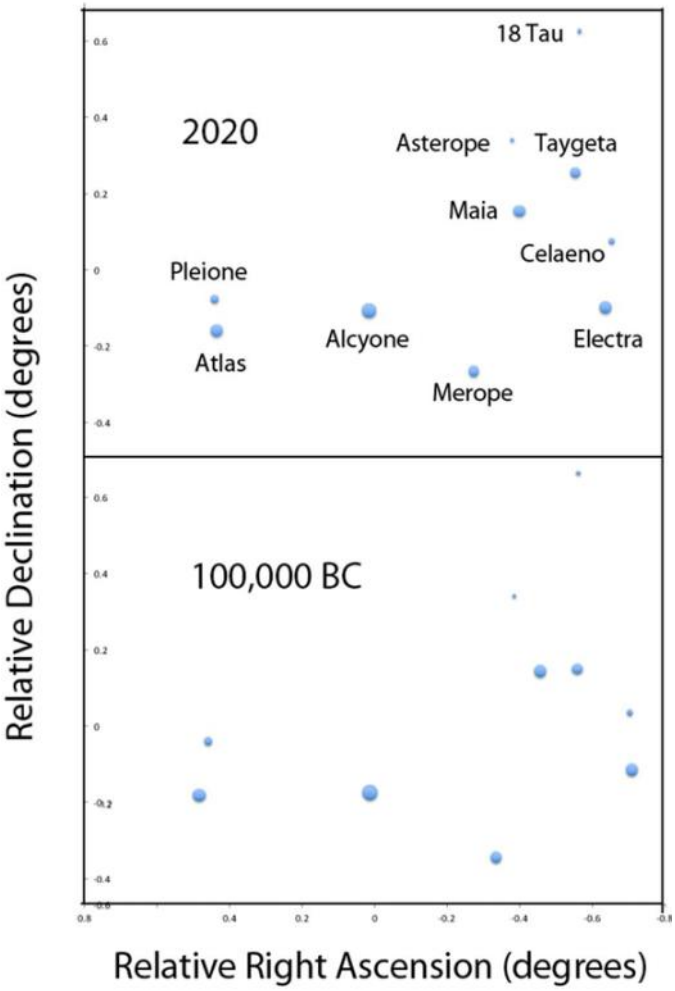
ABOVE: An Australian Aboriginal interpretation of the constellation of Orion from the Yolngu people of Northern Australia. The three stars of Orion’s belt are three young men who went fishing in a canoe, and caught a forbidden king-fish, represented by the Orion Nebulae, Drawing by Ray Norris based on Yolngu oral and written accounts.

Moving stars

Careful measurements with the Gaia space telescope and others show the stars of the Pleiades are slowly moving in the sky. One star, Pleione, is now so close to the star Atlas they look like a single star to the naked eye.

…Seven Sisters

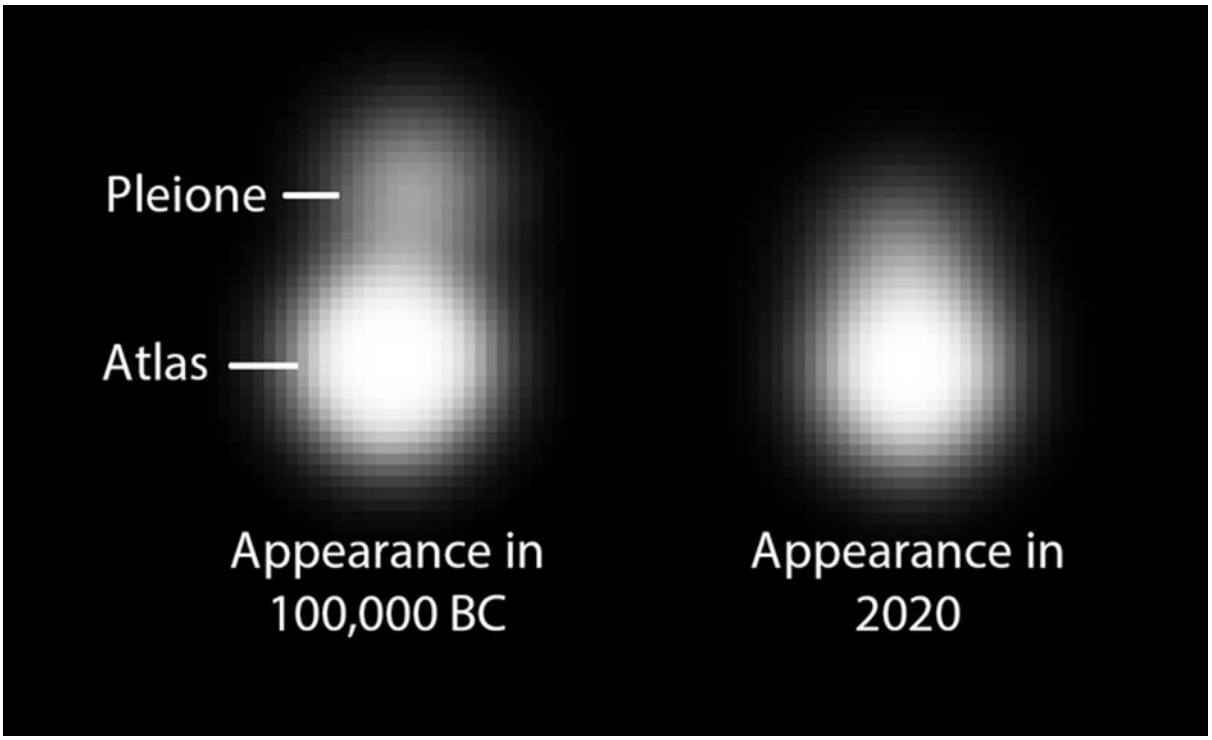
RIGHT: The positions of the stars in the Pleiades today and 100,000 years ago. The star Pleione, on the left, was a bit further away from Atlas in 100,000 BC, making it much easier to see. Ray Norris



But if we take what we know about the movement of the stars and rewind 100,000 years, Pleione was further from Atlas and would have been easily visible to the naked eye. So 100,000 years ago, most people really would have seen seven stars in the cluster.

We believe this movement of the stars can help to explain two puzzles: the similarity of Greek and Aboriginal stories about these stars, and the fact so many cultures call the cluster “seven sisters” even though we only see six stars today.

Is it possible the stories of the Seven Sisters and Orion are so old our ancestors were telling these stories to each other around campfires in Africa, 100,000 years ago? Could this be the oldest story in the world?



ABOVE: Simulation showing hows the stars Atlas and Pleione would have appeared to a normal human eye today and in 100,000 BC. Ray Norris

Whose Stars?
Our Heritage of Arabian Astronomy

Most accounts of the history of astronomy present a linear development from Greek polymaths to Muslim scholars and then enlightened Europeans. This is not one of them.

The modern night sky is messy, awash with the remnants of cultural interactions that span millennia. Greco-Mesopotamian constellation figures bear Latin names. Their brightest stars are designated with letters of the Greek alphabet, yet most of them bear proper names that derive from Arabic. Even so, many of these star names are Arabic descriptions of Greek constellation figures, not Arabian ones.

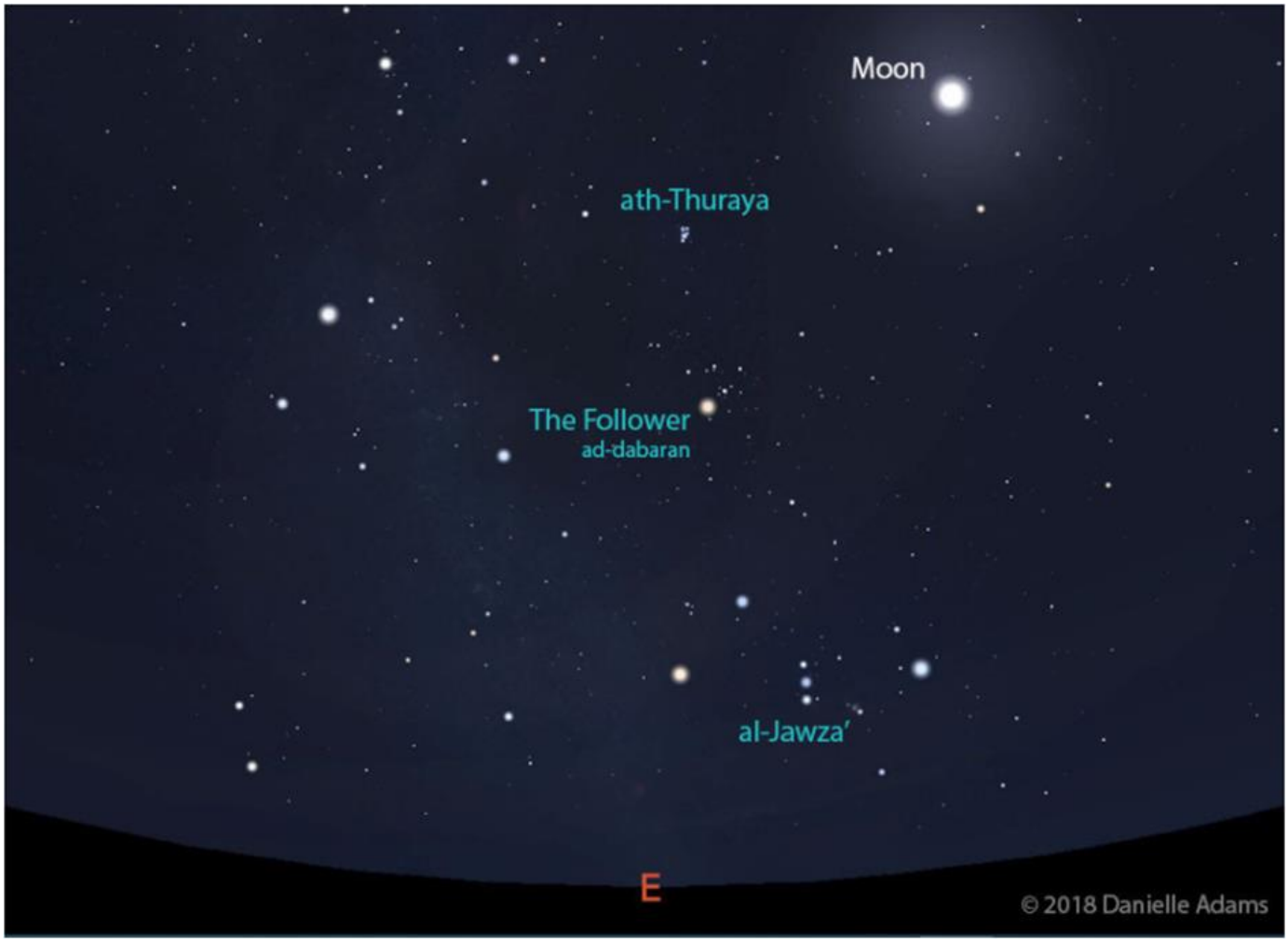
Whose stars are these? Much like a Photoshop image whose many layers have been combined, the multicultural textures of the sky have been flattened by the very process of cataloging its stars. This is useful when an international community of scholars needs to ensure they are speaking the same language, but as a result it tosses away alternative views of the sky, much like the hidden layers of a flattened Photoshop image. At the UNESCO's December 18 World Arabic Language Day approaches, they reconstruct a couple of flattened images of the Arabian sky, uncovering their messy textures, and in the process learnt a bit about how one cultural naming system won out over another

th-Thuraya - The Star par Excellence

Step outside tonight, a couple hours after Sunset, and look to the east. There, in one of the densest regions of the sky, you may recognize the brilliant red star that is known today as Aldebaran (alpha Tauri). Attested since pre-Islamic times (before 610 CE), the Arabic name of this star (*ad-dabaran*) literally means "the Follower." It was so named because it follows on the heels of the most renowned object in the Arabian night sky: the brilliant star cluster called ath-Thuraya, known today as the Pleiades. This star cluster was so highly celebrated that it was often simply called the Star (*an-najm*).

Aldebarab / *ad-dabaran*) - This beautiful orange-red star is located in the constellation Taurus. Aldebaran dominates the Taurus and is the fourteenth brightest star in the night sky. The apparent magnitude of the star is 0.87 and the absolute magnitude is -0.65.

…Arabian Astronomy



ABOVE: The North Eastern Sky in Mid-December

Arabia at this time was not homogenous in culture or language, so the name of the Follower (*ad-dabaran*) was also expressed as the Follower of the Star (*tali an-najm* or *tabi' an-najm*). Sometimes this star was called the Urger of the Star (*hadi an-najm*), as if it were driving ath-Thuraya on ahead of it. The Umayyad poet Dhu r-Rumma (d. 735 CE) beautifully depicts the sky scene with great imagination:

I arrived haphazardly when ath-Thuraya, high overhead, was like an aquatic bird soaring,

Its rear parts - the Follower - flying in her tracks, yet neither falling behind nor overtaking her,

With twenty small stars as if they - and he in the sky if he could speak –

Were camels that he led riding widespread, riding camels that were about to scatter away from him,

Both connected and dispersed, and One Urging drives them to the water from the heart of the spacious desert on their first night of travel.

As for the Star itself, the name ath-Thuraya is a long-used proper name whose meaning is connected to the notion of abundance, and possibly also moisture. An approximate translation for this diminutive noun could be "the Little Abundant One"

...Arabian Astronomy

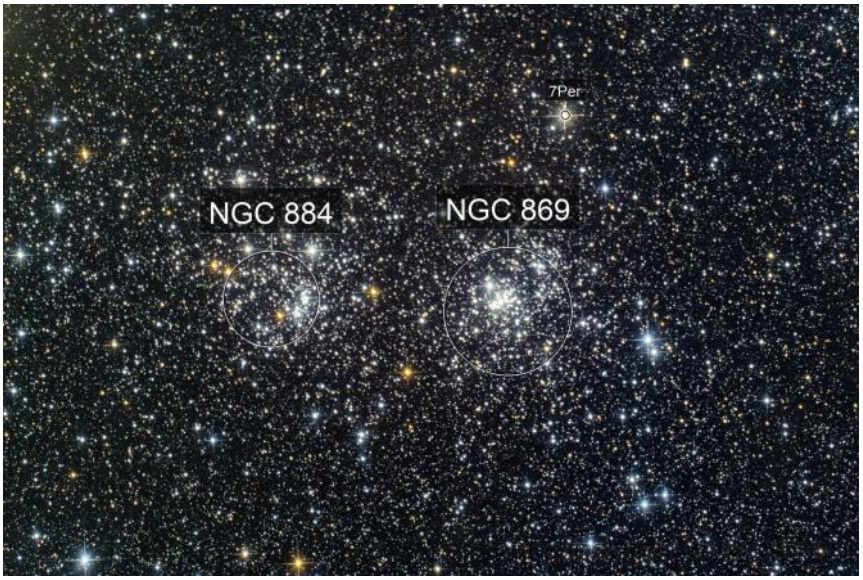
The setting of ath-Thuraya in the west just as the light of dawn overtook it (a specific time of morning called *ghalas*) occurred during the Arabian rainy season called *al-wasmi*. These were the heavy rains of autumn that literally “marked” (*wasama*) the desert with green foliage. Setting about a week after ath-Thuraya, the Follower also brought heavy rains, earning it another nickname: the Stirrer-Up of Rain (*al-mijdah).*

ABOVE: The Hands of ath-Thuraya, shown as they are setting in the west before Sunrise.

Despite its Arabian fame, the name ath-Thuraya survives in no modern star name. However, this star cluster was anthropomorphized as a female figure with two expansive arms, and from these arms come the internationally recognized star names of Ceph, Mirfak, Menkib and Kaffaljidhma. The shorter arm was called the Amputated Hand (*al-kaf al-jadhma'*) because it is the shorter one and lacks a proper hand. This is represented by a chain of stars that extends from ath-Thuraya to the star Kaffaljidhma in the Greek constellation of Cetus.

The other arm was called the Henna-Dyed Hand (*al-kaf al-khadib*) because one of its end stars is orange like the color of henna after it has dried. This arm extends through the dense starfields of the Milky Way, from ath-Thuraya through much of modern-day Perseus and Cassiopeia. The Henna-Dyed Hand was well-articulated with numerous named stars, some of which survive as modern star names like Ceph (”hand”, from *kaf*), Mirfak (“elbow”, from *al-mirfaq*) and Menkib (“shoulder”, from *al-mankib*). In addition to these were other named points that included the Shoulder Blade (*al-'atiq*), the Upper Arm (*al-'adud*), the Forearm (*al-dhira'*) and the Tip (*ibrat al-mirfaq*) and Pit (*al-ma'bid*) of the Elbow

…Arabian Astronomy



Between the Forearm and the Hand itself is a fuzzy patch of sky that was interpreted to be the Tattoo on the Wrist (*washm al-mi'sam*) of ath-Thuraya. Binoculars reveal this nebulosity to be the famed Double Cluster of Perseus (NGC 869 and NGC 884).

The Two Hands of ath-Thuraya were attested in poetry by the time of the poet Dhu r-Rumma (d. 735 CE); their many parts may have been in use at that time as well, but this was surely the case by the time of the philologist Ibn Qutayba (d. 889 CE).

The story of al-Jawza' and Suhayl

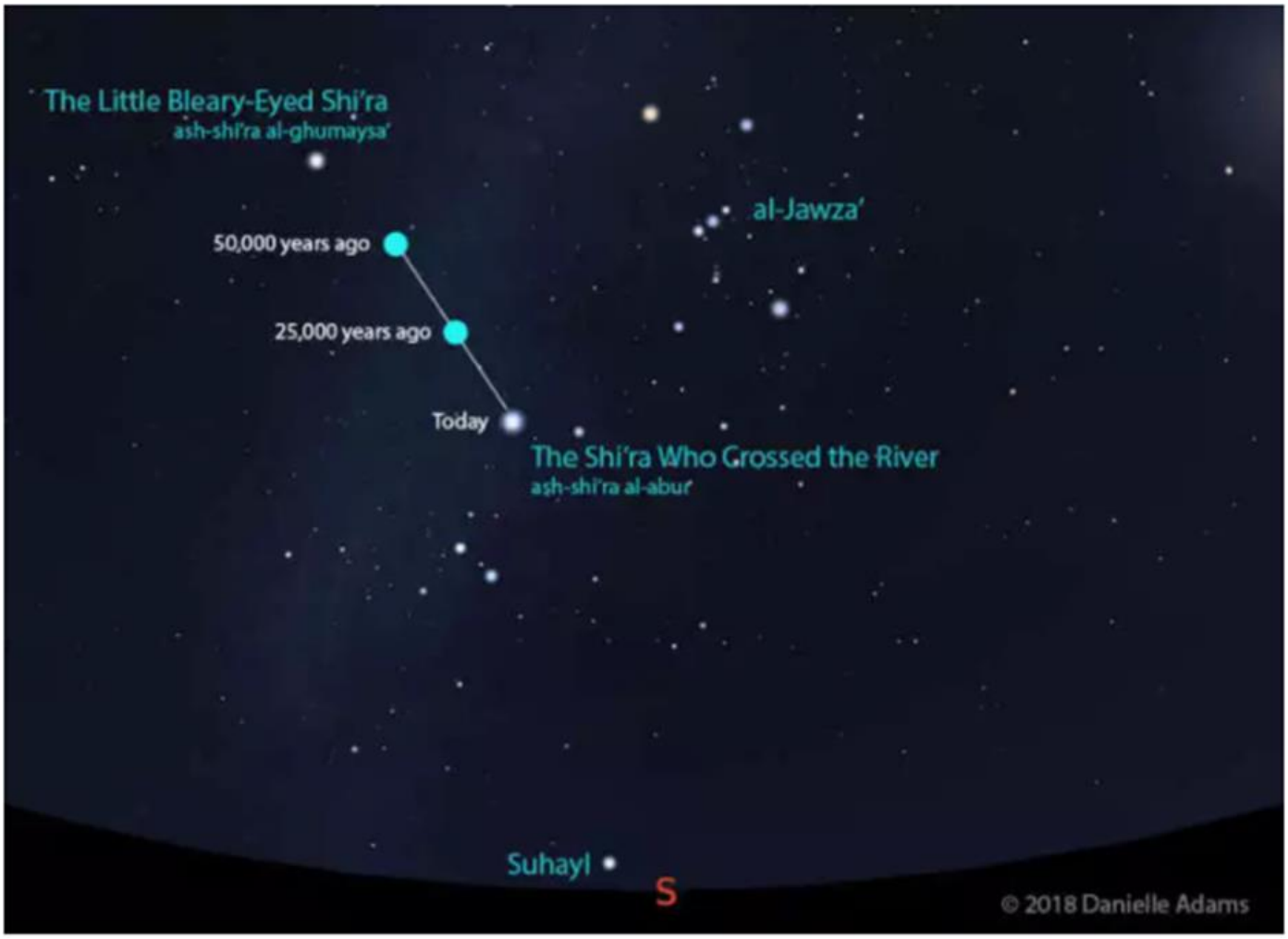
If you ask most Arabs today about al-Jawza', they will point you to the Greek zodiacal figure of Gemini. Yet, long ago, the Arabian figure of al-Jawza' largely correlated with the stars of Orion, and in the beginning the figure likely included just the three brilliant stars that mark the modern-day Belt of Orion.

Like ath-Thuraya, al-Jawza' is a long-used proper name, and its Arabic root conveys the sense of being in the middle of something else. It is likely that the name was applied on account of the visual appearance of a nearly perfect line of three stars spaced equidistantly, which together were located between two other pairs of bright stars that in time came to represent the hands and feet of al-Jawza'. Indeed, it may have been that just the central star of the three was the first to bear the name al-Jawza'. A similar but less bright line of three stars is found in the handle of our modern Big Dipper, the central star of which Ibn Qutayba also identified as al-Jawza'.

An old Arabian legend tells the story of the woman al-Jawza', who had been promised to a man named Suhayl. This man lived across the river with his two sisters, known together as the Two Shi'ra Sisters (*ash-shi'rayan*). When the wedding night came, something dreadful happened, and by morning al-Jawza' was dead. Fearing for his life, Suhayl fled far to the south. One of his sisters crossed the river to be closer to him, and so she was called the Shi'ra Who Crossed Over (*ash-shi'ra al-'abur*). His other sister stayed at home and cried her eyes out, so she was called the Little Bleary-Eyed Shi'ra (*ash-shi'ra al-ghumaysa'*).

Like al-Jawza', the characters in this story correlate with stars in the night sky. Suhayl, who fled far to the south, is represented by the star known by modern astronomy as Canopus, the second brightest star in the sky. The Shi'ra Who Crossed Over is the brightest star in the sky, known today as Sirius, and her sister, the Little Bleary-Eyed Shi'ra, is the somewhat less bright star Procyon, whose light is dimmer because her eyes are filled with pus from crying so much.

...Arabian Astronomy



ABOVE: The Shi'ra Sisters in the mid-December about 30 minutes after midnight, looking south from the Northern Hemisphere

Incredibly, the star Sirius really did cross over the river, the Milky Way as seen from Earth. Sirius is so bright in part because it lies very close to the Earth, just 8.6 light years away. This nearness to Earth means that Sirius moves very slowly against the background of the stars that lie much further away. Today, Sirius lies on the west bank of the Milky Way "river", but it lay on the east bank some 50,000 years ago. This does not necessitate that the legend is 50,000 years old; the Shi'ra Who Crossed Over could simply have been imagined to have crossed the river at any point in the past. Nevertheless, it is a remarkable correlation.

…Arabian Astronomy

You can see this same sky scene this December if you happen to live at a latitude below +35 degrees N and can stay up until about midnight. Dhu r-Rumma also describes the brilliant stars in this region as strings of pearls:

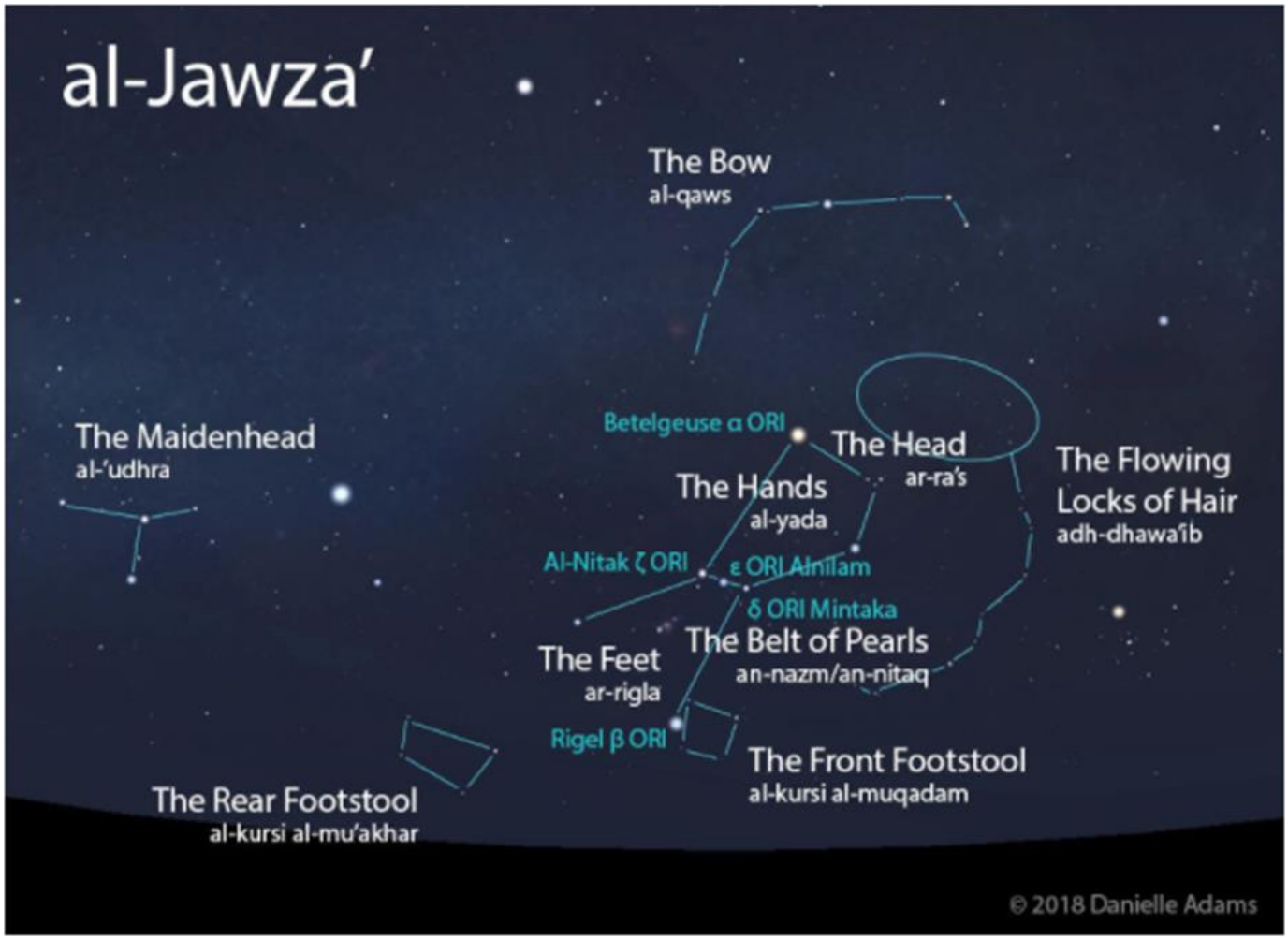
When Suhayl shone like a blazing fire, alone like the banished wild bull,

And al-Jawza' glistened like necklaces,

And the Star, having begun its descent after culmination, joined with al-Jawza' ascending,

As if, from a view extended through the horizon, they were strings of pearls.

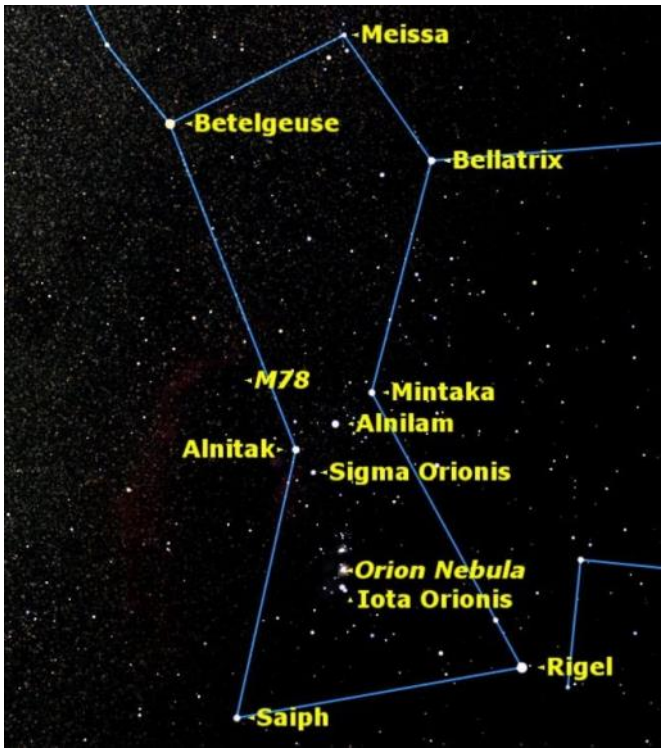
Over time, the figure of al-Jawza' was extended to include Two Hands (*yada al-jawza'*), Two Feet (*rijla al-jawza'*) and a Head (*ra's al-jawza'*) with Flowing Locks of Hair (*adh-dhawa'ib*). Al-Jawza' also acquired some possessions, including a large Bow (*qaws al-jawza'*) and two footstools, the Front Footstool (*al-kursi al-muqadam*) and the Rear Footstool (*al-kursi al-mu'akhar*). Far away from these parts, a triangle of bright stars with a reddish one in the middle came to represent the Maidenhead of al-Jawza' (*'udhrat al-jawza'*), an old name that was attested as far back as the poetry of Muhalhil (d. 531 CE).



ABOVE: Al-Jawza', shown as it is setting in the west before Sunrise

…Arabian Astronomy

Like ath-Thuraya, the name al-Jawza' does not survive on its own in modern astronomy, but many of the elements of its extended figure do. The three central stars were collectively known as the String of Pearls (*an-nazm* or *an-nizam*), the Belt of al-Jawza' (*nitaq al-jawza'*) or the Jeweled Belt of al-Jawza' (*mintaqat al-jawza'*). Because modern astronomy does not normally assign the same name to multiple stars, each of these names has been attached to one of these three stars as Mintaka, Alnilam and Al-Nitak. One of the feet of al-Jawza' today bears the name Rigel, a transliteration of the Arabic *rijl*, meaning "foot". Above the String of Pearls, one of the Two Hands is a brilliant red giant star that is called Betelgeuse. Originally, this name was *yad al-jawza'*, the Hand of al-Jawza'.



ABOVE: Orion and Orion's Belt

After Greek astronomical texts were translated into Arabic, beginning in the late 8th century CE, the name al-Jawza' was transferred to the Greek constellation Gemini, because being in the middle of something necessarily requires a something on either side, which fit the figure of Gemini as the figure of two twins. The Greek constellation Orion was brought into Arabic as the Giant (*al-jabar*). Although Orion's bow is on the opposite side of the figure compared to the larger Bow of al-Jawza', the head, hands and feet correlated well, so those star names were reused within the context of Orion. Having been displaced by the Greek Giant and her name given to the Greek Twins, the female Arabian figure of al-Jawza' eventually disappeared from the sky altogether.

Many of the star names we have looked at in this article are exceptionally old. The Star (*an-najm*) and her Follower (*ad-dabaran*), al-Jawza', Suhayl and the Two Shi'ra Sisters (*ash-shi'rayan*) all appear in the pre-Islamic poetry of Muhalhil, who died in 531 CE, nearly a hundred years before the development of Islam. They have been the cornerstones of Arabian star lore for many hundreds of years, enriching poetry and serving as beacons in the night for those navigating the desert seas. Some have endured until today; others have been displaced by Greek images of the night sky.

Thank you to Farouk Amond for sharing this story for publication.

https://www.planetary.org/articles/whose-stars-arabian-astronomy

NASA’s Journey to Mars

NASA is developing the capabilities needed to send humans to an asteroid by 2025 and Mars in

Mars is a rich destination for scientific discovery and robotic and human exploration as we expand our presence into the solar system. Its formation and evolution are comparable to Earth, helping us learn more about our own planet’s history and future. Mars had conditions suitable for life in its past. Future exploration could uncover evidence of life, answering one of the fundamental mysteries of the cosmos: Does life exist beyond Earth?

While robotic explorers have studied Mars for more than 40 years, NASA’s path for the human exploration of Mars begins in low-Earth orbit aboard the International Space Station. Astronauts on the orbiting laboratory are helping us prove many of the technologies and communications systems needed for human missions to deep space, including Mars. The space station also advances our understanding of how the body changes in space and how to protect astronaut health.

Our next step is deep space, where NASA will send a robotic mission to capture and redirect an asteroid to orbit the moon. Astronauts aboard the Orion spacecraft will explore the asteroid in the 2020s, returning to Earth with samples. This experience in human spaceflight beyond low-Earth orbit will help NASA test new systems and capabilities, such as Solar Electric Propulsion, which we’ll need to send cargo as part of human missions to Mars. Beginning in FY 2018, NASA’s powerful Space Launch System rocket will enable these “proving ground” missions to test new capabilities. Human missions to Mars will rely on Orion and an evolved version of SLS that will be the most powerful launch vehicle ever flown.

A fleet of robotic spacecraft and rovers already are on and around Mars, dramatically increasing our knowledge about the Red Planet and paving the way for future human explorers. The Mars Science Laboratory Curiosity rover measured radiation on the way to Mars and is sending back radiation data from the surface. This data will help us plan how to protect the astronauts who will explore Mars. Future missions like the Mars 2020 rover, seeking signs of past life, also will demonstrate new technologies that could help astronauts survive on Mars.

Engineers and scientists around the country are working hard to develop the technologies astronauts will use to one day live and work on Mars, and safely return home from the next giant leap for humanity. NASA also is a leader in a Global Exploration Roadmap, working with international partners and the U.S. commercial space industry on a coordinated expansion of human presence into the solar system, with human missions to the surface of Mars as the driving goal. Follow our progress at www.nasa.gov/exploration and www.nasa.gov/mars.

NASA's Orion Flight Test and the Journey to Mars

In the not-too-distant future, astronauts destined to be the first people to walk on Mars will leave Earth aboard an Orion spacecraft. Carried aloft by the tremendous power of a Space Launch System rocket, our explorers will begin their Journey to Mars from NASA's Kennedy Space Center in Florida, carrying the spirit of humanity with them to the Red Planet.

The first future human mission to Mars and those that follow will require the ingenuity and dedication of an entire generation. It's a journey worth the risks. We take the next step on that journey this Thursday, Dec. 4, with the uncrewed, first flight test of Orion. (Follow along on the Orion Blog, or see the full schedule of events and launch viewing opportunities).

Orion is the first spacecraft built for astronauts destined for deep space since the storied Apollo missions of the 1960s and 70s. It is designed to go farther than humans have ever traveled, well beyond the moon, pushing the boundaries of spaceflight to new heights.

Orion will open the space between Earth and Mars for exploration by astronauts. This proving ground will be invaluable for testing capabilities future human Mars missions will need. The area around our moon, in particular, called cis-lunar space, is a rich environment for testing human exploration needs, like advanced spacewalking suits, navigating using gravity, and protecting astronauts from radiation and extreme temperatures.

One of Orion's early missions in the 2020s will send astronauts to explore an asteroid, which will be placed in a stable orbit around the moon using a robotic spacecraft. This Asteroid Redirect Mission will test new technologies, like Solar Electric Propulsion, which will help us send heavy cargo to Mars in advance of human missions. Astronauts aboard Orion will return to Earth with samples of the asteroid, having tested a number of collection tools and techniques we'll use in future human missions to Mars or its moons.

...Journey to Mars

Astronauts will board Orion for a first crewed flight in 2021. Many of Orion's systems needed for that flight and others will be tested on Thursday with the first uncrewed flight test.

Orion’s flight test is designed to test many of the riskiest elements of leaving Earth and returning home in the spacecraft. It will evaluate several key separations events, including the jettison of the launch abort system that will be capable of carrying astronauts on future missions to safety if a problem were to arise on the launch pad or during ascent to space, and the separation of the Orion crew module from its service module ahead of its reentry though Earth’s atmosphere.

Orion’s heat shield also will be tested to examine how the spacecraft endures its high speed return from deep space. The heat shield will experience temperatures near 4,000 degrees Fahrenheit during Thursday’s test, and will come back at about 80 percent of the speed the spacecraft would endure returning from the vicinity of the moon.

Other elements will also be put to the test, including how Orion’s computers handle the radiation environment in the Van Allen Belt, the spacecraft’s attitude control and guidance and how its 11 parachutes slow the crew module to just about 20 mph ahead of its splashdown in the Pacific Ocean.

Teams also will evaluate the procedures and tools used to recover Orion from the ocean after it touches down about 600 miles southwest of San Diego and is transported back to shore.

Testing these capabilities now will help ensure that Orion will be the next generation spacecraft for missions in the 2020s that will put Mars within the reach of astronauts in the 2030s.

As development continues on Orion, astronauts aboard the International Space Station are helping us learn how to protect the human body for longer durations, which missions to Mars will require. Researchers operating increasingly advanced rovers and spacecraft on and around Mars are revealing the planet's history while characterizing its environment to better prepare for human explorers. Here on Earth, the U.S. spaceflight industry is building and testing next generation technologies NASA will need to send astronauts to Mars and return them safely.

The Journey to Mars is humanity's Next Giant Leap into our solar system. The Orion spacecraft and its first flight test will help make it possible.

Image by John Gill

How to get People from Earth to Mars and Safely Back Again

From theconversation.com

There are many things humanity must overcome before any return journey to Mars is launched. The two major players are NASA and SpaceX, which work together intimately on missions to the International Space Station but have competing ideas of what a crewed Mars mission would look like.

Size matters

The biggest challenge (or constraint) is the mass of the payload (spacecraft, people, fuel, supplies etc) needed to make the journey. We still talk about launching something into space being like launching its weight in gold. The payload mass is usually just a small percentage of the total mass of the launch vehicle. For example, the Saturn V rocket that launched Apollo 11 to the Moon weighed 3,000 tonnes.

But it could launch only 140 tonnes (5% of its initial launch mass) to low Earth orbit, and 50 tonnes (less than 2% of its initial launch mass) to the Moon. Mass constrains the size of a Mars spacecraft and what it can do in space. Every manoeuvre costs fuel to fire rocket motors, and this fuel must currently be carried into space on the spacecraft.

SpaceX's plan is for its crewed Starship vehicle to be refuelled in space by a separately launched fuel tanker. That means much more fuel can be carried into orbit than could be carried on a single launch.

Left: Concept art of SpaceX's Dragon landing on Mars. Official SpaceX Photos/Flickr, CC BY-NC

Time matters

Another challenge, intimately connected with fuel, is time.

Missions that send spacecraft with no crew to the outer planets often travel complex trajectories around the Sun. They use what are called gravity assist manoeuvres to effectively slingshot around different planets to gain enough momentum to reach their target.

This saves a lot of fuel, but can result in missions that take years to reach their destinations. Clearly this is something humans would not want to do.

Both Earth and Mars have (almost) circular orbits and a manoeuvre known as the Hohmann transfer is the most fuel-efficient way to travel between two planets. Basically, without going into too much detail, this is where a spacecraft does a single burn into an elliptical transfer orbit from one planet to the other.

A Hohmann transfer between Earth and Mars takes around 259 days (between eight and nine months) and is only possible approximately every two years due to the different orbits around the Sun of Earth and Mars.

...Earth to Mars and Back

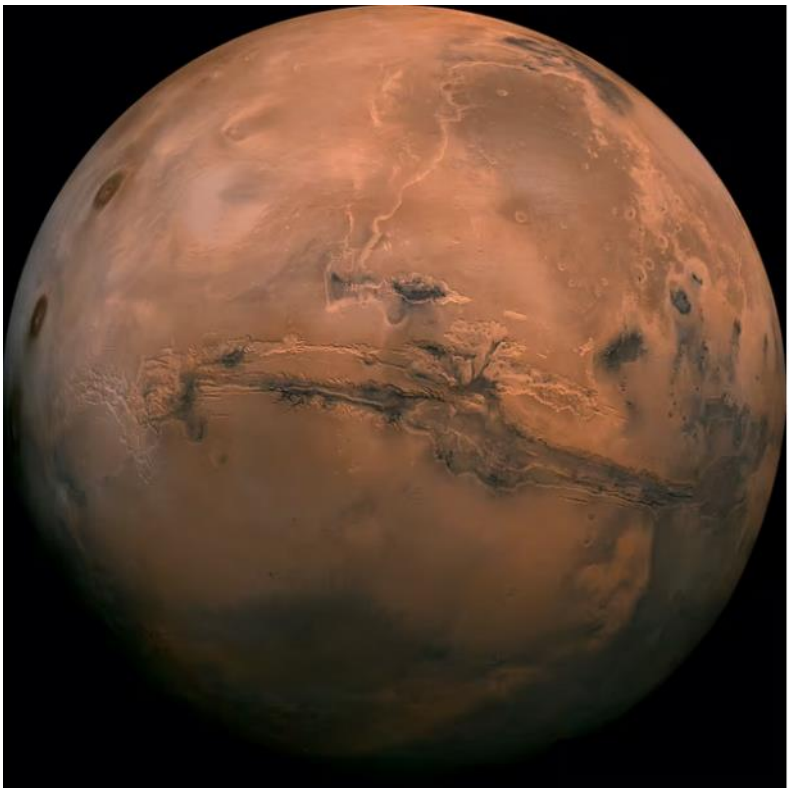
Safe landing

Suppose our spacecraft and crew get to Mars. The next challenge is landing.

A spacecraft entering Earth is able to use the drag generated by interaction with the atmosphere to slow down. This allows the craft to land safely on the Earth's surface (provided it can survive the related heating).

But the atmosphere on Mars is about 100 times thinner than Earth's. That means less potential for drag, so it isn't possible to land safely without some kind of aid.

Some missions have landed on airbags (such as NASA's Pathfider mission) while others have used thrusters (NASA's Phoenix mission). The latter, once again, requires more fuel.



ABOVE: Mars and Earth have few similarities.

Life on Mars

A Martian day lasts 24 hours and 37 minutes but the similarities with Earth stop there.

The thin atmosphere on Mars means it can't retain heat as well as Earth does, so life on Mars is characterised by large extremes in temperature during the day/night cycle.

Mars has a maximum temperature of 30°, which sounds quite pleasant, but its minimum temperature is -140°, and its average temperature is -63°. The average winter temperature at the Earth's South Pole is about -49°.

So we need to be very selective about where we choose to live on Mars and how we manage temperature during the night.

The gravity on Mars is 38% of Earth's (so you'd feel lighter) but the air is principally carbon dioxide (CO_2) with several percent of nitrogen, so it's completely unbreathable. We would need to build a climate-controlled place just to live there.

SpaceX plans to launch several cargo flights including critical infrastructure such as greenhouses, solar panels and — you guessed it — a fuel-production facility for return missions to Earth.

Life on Mars would be possible and several simulation trials have already been done on Earth to see how people would cope with such an existence.

Return to Earth

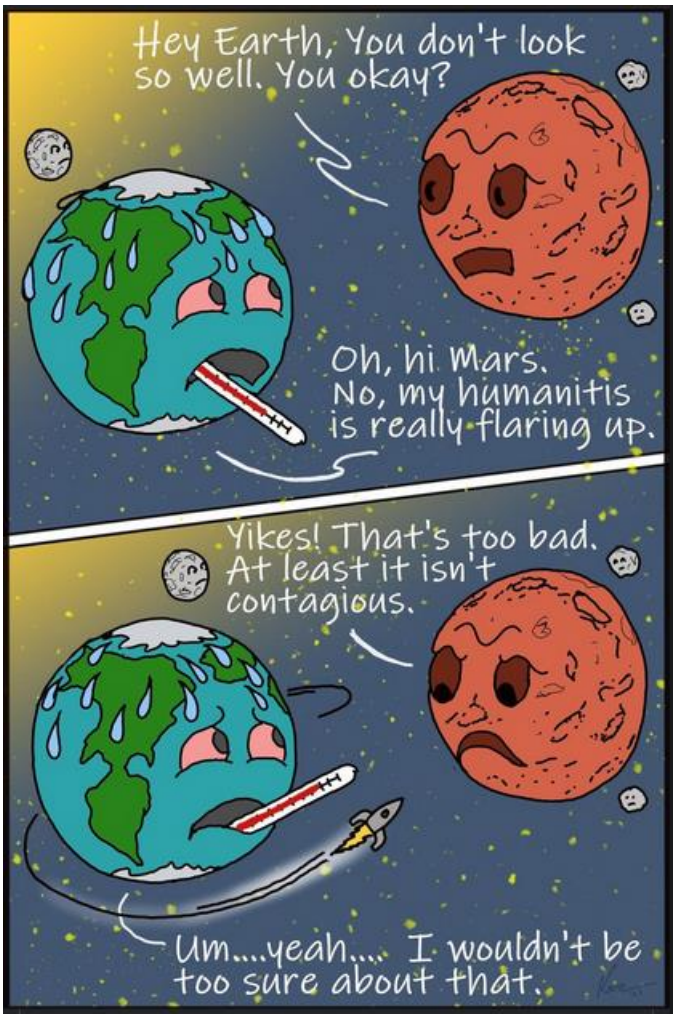
The final challenge is the return journey and getting people safely back to Earth.

Apollo 11 entered Earth's atmosphere at about 40,000km/h, which is just below the velocity required to escape Earth's orbit.

...Earth to Mars and Back

Spacecraft returning from Mars will have re-entry velocities from 47,000 km/h to 54,000 km/h, depending on the orbit they use to arrive at Earth.

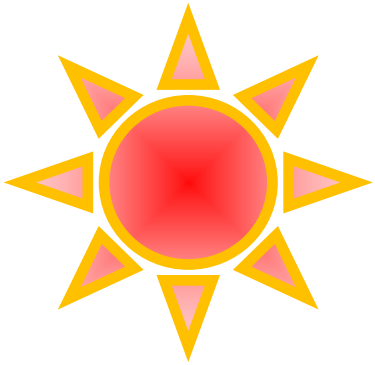
ABOVE: And we need to return people safely back to Earth, mission accomplished. NASA



They could slow down into low orbit around Earth to around 28,800 km/h before entering our atmosphere but — you guessed it — they'd need extra fuel to do that.

If they just barrel into the atmosphere, it will do all of the deceleration for them. We just need to make sure we don't kill the astronauts with G-forces or burn them up due to excess heating.

These are just some of the challenges facing a Mars mission and all of the technological building blocks to achieve this are there. We just need to spend the time and the money and bring it all together.



James Webb Telescope Follow up

Compiled by Corinne Gill

What an amazing Christmas Event.

The most powerful space telescope ever built has officially left Earth. NASA's James Webb Space Telescope blasted off on Dec. 25 at 7:20 a.m. 14;20 South African time, from the European spaceport on top of the Ariane 5 Rocket, one of the world's most powerful rockets.

"Go Webb!" range operations manager Jean-Luc Voyer called out after the spacecraft completed a crucial maneuver soon after lift-off. Cheers and sheer delight erupted in the control room. Mission members in face masks donned bright red Santa hats in celebration of the successful Christmas Day launch.

Once the telescope was launched there are no second chances It has 300 single-point failure items and they all have to work right. Being so far from earth there is no possibility for a maintenance crews to go and fix what is wrong!

It will take 2 weeks to unfold the space telescope. The web observatory has about 50 major deployments! 178 release mechanisms which must work to deploy those 50 parts. Every single one must work; to achieve the JWT working and functioning as it should, with its unique design.

Above: A camera on the James Webb Space Telescope's Ariane 5 rocket captured this view on the right of the observatory all folded up for flight as it soared into space during launch.

The JWT has already begun the key task of unfurling a giant umbrella-like shield to protect its delicate instruments from the intense radiation of the Sun.

In the first month: Telescope deployment, cool down, instrument turn-on, and insertion into orbit around L2. Then the telescope deployment structures completion, secondary mirror tripod unfolding, latching and rotating the two primary mirror wings. The telescope and scientific instruments will start to cool rapidly in the Sunshield shade, which will take several weeks to cool down to each stable temperatures; carefully controlled with strategically-placed electric heater strips so that everything shrinks carefully and so that water trapped inside parts of the observatory can escape as gas to the vacuum of space and not freeze as ice onto mirrors or detectors, which would degrade scientific performance. The primary mirror segments will be unlocked and then the secondary mirror which will be verified that the control station can move them. Near the end of the first month, they will execute the last mid-course maneuver to insert into the optimum orbit around L2. During this time the scientific instrument systems will also power-up .

Once completely deployed, the James Webb Space Telescope's revolutionary technology will study every phase of cosmic history - from within our solar system to the most distant observable galaxies in the early universe. The infrared telescope will explore a wide range of science questions to help us understand the origins of the universe and our place in it.

https://www.npr.org/2021/12/25/1065805684/james-webb-space-telescope-livestream-launch, https://www.nasa.gov/press-release/nasas-webb-telescope-launches-to-see-first-galaxies-distant-worlds, https://www.space.com/21925-james-webb-space-telescope-jwst.html' https://www.youtube.com/watch?v=uUAvXYW5bml, https://jwst.nasa.gov/content/webbLaunch/news.html, https://www.space.com/james-webb-space-telescope-christmas-launch-photos, https://jwst.nasa.gov/content/webbLaunch/assets/documents/WebbFactSheet.pdf, https://webb.nasa.gov/

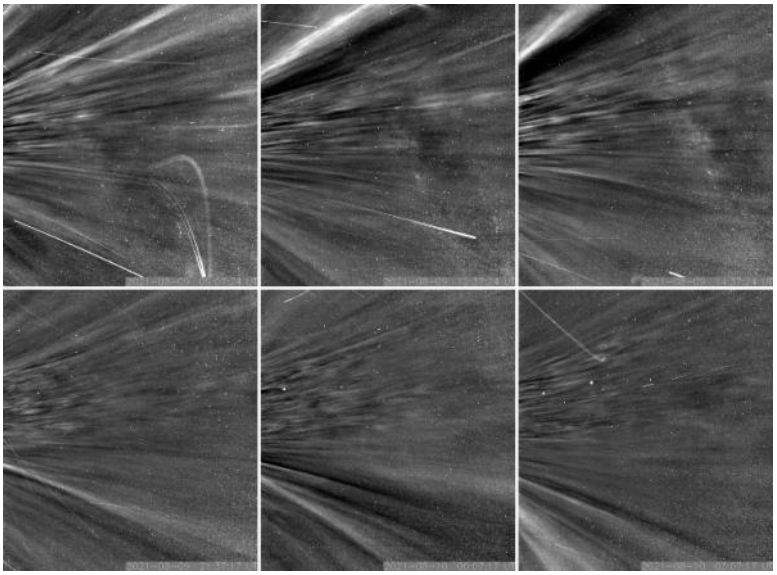
Parker Probe Touches the Sun

Compiled by Corinne Gill

For the first time in history, on 14 December 2021, a spacecraft has touched the Sun. NASA's Parker Solar Probe has flown through the Sun's upper atmosphere – it's Corona – and sampled particles and magnetic fields there. The space craft which was launched in August 2018.

The new milestone marks one major step for Parker Solar Probe and one giant leap for solar science. Just as landing on the Moon allowed scientists to understand how it was formed, touching the very stuff the Sun is made of will help scientists uncover critical information about our closest star and its influence on the solar system.

Unlike Earth, our Sun does not have a solid surface. It is a giant ball of hot plasma that's held together by its own gravity. Solar material flows out from the surface. But around the Sun, it's bound by the Sun's gravity and magnetic field. This material forms the Sun's atmosphere – the Corona. The Corona is that fiery-looking outer layer of the Sun that appears around the moon's silhouette during total solar eclipses, the wispy outer atmosphere; known as Coronal streamers.



LEFT: The Parker Solar Probe passed through our Sun's Corona, or wispy outer atmosphere, it flew by structures called Coronal streamers. These structures are the bright features moving upward in the upper images above, and angled downward in the lower row. They are the streamers visible around the dark moon silhouette during total solar eclipses. And now they Parker Solar Probe – has touched these streamers, and measured them, for the first time. Image: NASA/ Johns Hopkins APL/ Naval Research Laboratory.

Eventually, some of this hot and fast solar material escapes the pull of the Sun and gushes out into space as solar wind. The boundary that marks the edge of the Sun's atmosphere in known as the Alfvén critical surface; the point that marks the end of the solar atmosphere and the beginning of the solar wind, estimated to be somewhere between 10 to 20 solar radii from the surface of the Sun. This is equal to 4.3 to 8.6 million miles (7 to 13.8 million km) from the Sun.

The Parker Solar Probe has been sampling the Corona's particles and magnetic fields. It's been making many discoveries distant spacecraft can't make. For example, the solar wind is a stream of charged particles released from the Sun's Corona. It found zigzag structures in the solar wind that scientists are calling switchbacks. Parker discovered that the switchbacks occur in patches and have a higher percentage of helium – a sign that they came from the photoshere. Also found that the patches of switchbacks aligned with magnetic funnels that emerge from the photosphere between convection cell structures called supergranules. Now, scientists think these magnetic funnels may also be the source of the fast solar wind.

Flying so close to the Sun, Parker Solar Probe now senses conditions in the magnetically dominated layer of the solar atmosphere – the Corona – that could never be seen before. We see evidence of being in the Corona in magnetic field data, solar wind data, and visually in images.

https://earthsky.org/space/parker-solar-probe-1st-spacecraft-to-touch-the-sun/, https://www.youtube.com/watch?v=LkaLfbuB_6E,, https://www.nasa.gov/feature/goddard/2021/nasa-enters-the-solar-atmosphere-for-the-first-time-bringing-new-discoveries

ASSA Year End Function 2021

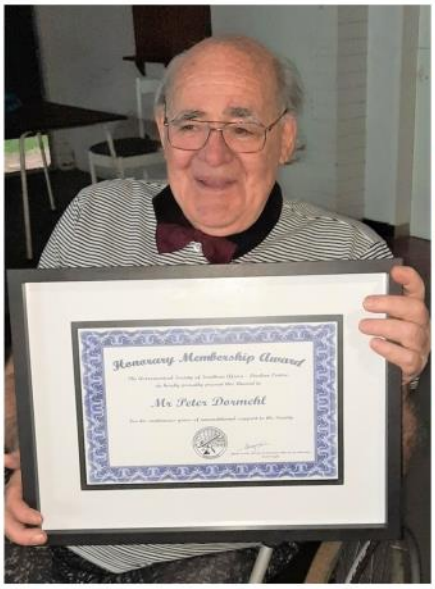



















Public Viewing Roster ASSA Durban

Dome Master	Phone	Telescope Volunteer	Assistant	New Moon	Public Viewing
				4 December 2021	Happy New Year

PUBLIC VIEWING RESUMED:

Public viewing is allowed back on site at the school in the dome and around the pool; due to revised lockdown level 1. This may change according to any revised lockdown conditions.

Please note there is a roster with a booking system. Once the number of telescopes are confirmed, Individuals will be contacted to confirm dates and times. Please book your place !

Kindly note, everyone will be required to adhere to the Covid & social distancing regulations of 1.5m and all will need to sign the attached mandatory questionnaire. Temperatures will also be taken on site.

NOTIFY OBSERVATORY MANAGER:

Members interested in attending the above viewing evenings and/or becoming involved in assisting with the viewing evenings, please send your names to Mike Hadlow at the following address: mike@astronomydurban.co.za

Volunteers to please identify which role you are willing to assist with, Dome Master, Viewing Assistant or a Telescope Volunteer.

After which, attendance will be confirmed and viewing dates will be announced.

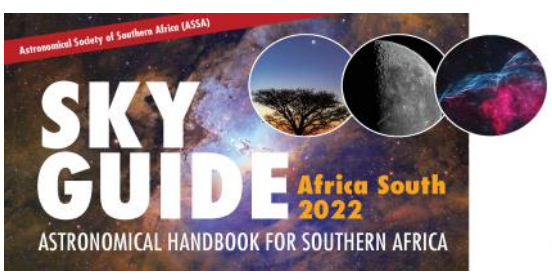
VOLUNTEERS REQUIRED:

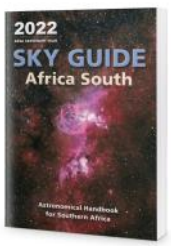
Dome Master - Taking responsibility for the viewing evenings and learning how to set up, manage and use the new telescope.

Viewing Assistant - Learning about the new telescope, assisting with the viewing evenings, assisting viewing members as required.

Telescope Volunteers - Members willing to bring their telescopes to the viewing evenings to set up around the pool for public viewing. **VOLUNTEERS REQUIRED:**

Viewing Contacts:	Phone	Email
Mike Hadlow	083 326 4085	mike@astronomydurban.co.za
Alan Marnitz		alan@astronomydurban.co.za
John Gill	083 3788 797	john@astronomydurban.co.za





2022 ASSA Sky Guide
Now available to members for only
R 100:00
Please deposit into the ASSA bank
Details on Noticeboard page.
Use your personal reference
SG - Surname & First Name
E-mail proof of payment to
treasurer@astronomydurban.co.za

Notice Board

MEETINGS:

- GENERAL MEETING: to be held on **12th January 2022**
- PUBLIC VIEWING MEETINGS - please refer to website under the tab “Viewing and Events” for any updates with regards dates & public viewing under the current Covid restrictions; or click here: https://astronomydurban.co.za/events-viewing/

MNASSA:

- Monthly Notes of the Astronomical Society of Southern Africa.
- Available at www.mnassa.org.za to download your free monthly copy.

NIGHTFALL:

- Fantastic astronomy magazine. Check it out.
- Available from the ASSA website assa.saao.ac.za/about/publications/nightfall/

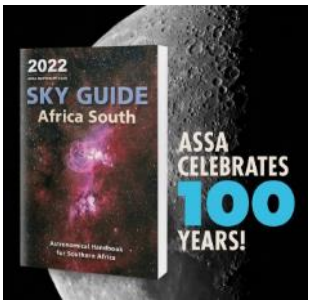
MEMBERSHIP FEES & BANKING:

- Many thanks to all the members who have paid their Membership fees for the 2021-07-01 to 2022-06-30 financial year.

Membership fees are indicated below:

- Single Members: R 170:00
- Family Membership: R 200:00 for parents
- Under 18 members: Free
- Cash/Cheques: Please note: NO cheques or cash will be accepted
- Account Name: **ASSA Natal Centre**
- Bank: **Nedbank**
- Account No. **1352 027 674**
- Branch: **Nedbank Durban North**
- Code: **135 226**
- Reference: **SUBS - SURNAME and FIRST NAME**
- Proof of Payment: treasurer@astronomydurban.co.za

Pay Fees Online



SKY GUIDE 2022 and ASSA MASKS - Limited number available !!!

- Sky Guides: R 100:00 each with payment reference: SG - SURNAME and FIRST NAME
- Masks: R 50:00 each with payment reference: MK - SURNAME and FIRST NAME

Please ensure proof of payment is sent to treasurer@astronomydurban.co.za

RESIGNATIONS from ASSA:

Please send an email immediately notifying the Secretary of your wish to resign from the society to : secretary@astronomydurban.co.za

NEW COMMITTEE POSITIONS & CONTACTS:

Chairman	Amith Rajpal	Amith@astronomydurban.co.za	
Vice Chair	Debbie Abel	Debbie@astronomydurban.co.za	
Secretary	Francois Zinserling	Secretary@astronomydurban.co.za	
Treasurer	Corinne Gill	Treasurer@astronomydurban.co.za	
Guest Speaker Liaison	Piet Strauss	Piet@astronomydurban.co.za	
Observatory & Equipment	Mike Hadlow	Mike@astronomydurban.co.za	083 326 4085
Observatory Assistant	Alan Marnitz	Alan@astronomydurban.co.za	
Publicity & Librarian	Claire Odhav	Claire@astronomydurban.co.za	083 395 5160
Out-Reach - Public	Sheryl Venter	Sheryl@astronomydurban.co.za	082 202 2874
Out-Reach - Schools	Sihle Kunene	Sihle@astronomydurban.co.za	
St. Henry’s Marist College Liaison	Moya O`Donoghue	Moya@astronomydurban.co.za	
’nDaba Editor, Website & Facebook	John Gill	John@astronomydurban.co.za	083 378 8797

ELECTRONIC DETAILS:

- Website: www.astronomydurban.co.za
- Emails : AstronomyDurban@gmail.com
- Instagram: https://www.instagram.com/astronomydurban/
- Facebook: https://www.facebook.com/groups/376497599210326