MACARTHUR ASTRONOMICAL SOCIETY Inc.

Journal

PRIME FOCUS

Volume 2 Issue 7 **August 1997**

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Contents of This issue

President's Report

It was a busy month for the society with us holding a quite successful star party at the university on the 26th July. Many thanks to those who attended and helped on the night. The event would not have been as successful without the special help of Carol Oliver who organised the event, Bob Bee for his talk on deep sky objects, all the cold, dedicated astronomers with their telescopes (you know who you are), and Karen and Dave for their tireless work at the desk promoting our society. Plus all the, MAS members, University staff and students who helped in any manner, shape or form towards the overall success of our inaugural Star Party.

Also a special thanks to Sky & Space (Lyle), Binocular & Telescope Shop, (Mike & Don), Quasar Publishing (Greg Dawes and co), The SETI Institute and most of all our very special guest Dr. Seth Shostak from California USA.(He will be returning in Jan-Feb 98.)

I am sure you will agree, last meeting was one of our best, with international guest speaker Dr.Shostak with his unusual entertaining style discussing SETI, and other space related topics. This month we have a slide presentation-come workshop.

LIBRARIANS REPORT-- I will have lots of free handouts on the Mars Pathfinder, plus a new newsletter called the Planetary Times. Astronomy 97 books (still relevant for August – December) to sell for $2.00 each. Plus

magazines and books to borrow and look through. Please write your name in the 'borrows' book and see me before borrowing the item. Only one outstanding magazine is overdue, 1 video at UWS after star party. Come and peruse the collection.

CAMP CONSTELLATION 4 -- A better than average roll up, with myself and Dave Macey staying the night (brr it was cold). For the first time I started recognising galaxies and nebular in certain constellations, mainly due to coming on these camps and setting up the scope and being shown by more experienced members, reading Bob's informative constellation report in the Journal and looking through various books on the subject.

Many thanks to those who attended this event. I'm sure, like myself, we all had a fun and informative night viewing the glorious heavens above and each others company.

COMING EVENTS

SEPT. 6th-- Camp Constellation 5.-- Wilton, see notice board for details. We have a fantastic time at these events, seeing beautiful galaxies and star clusters, not to mention planets

SEPT. 15th-- Daniel Ross post grad physicist will talk to us about Mars Pathfinder.

OCT. 20th -- Steve Manos -- Space Camp and his trip to the United States.

NOV.-- Camp Constellation 6 (Date to be confirmed)

NOV. 17th -- Andrew Reid Ph.D. student, explaining Galaxies and Radio Astronomy.

7th DEC-- Christmas break. Picnic at Pembroke Park.

LATEST NEWS--

COMET DISCOVERER DIES -- Gene Shoemaker was tragically killed in a motor vehicle accident last month. He will be remembered for his co-finding of comet Shoemaker-Levy 9 which bombarded Jupiter back in 1994.

SPACE SHUTTLE *DISCOVERY* -- roared into orbit and set free a German satellite which will study the depletion of the ozone layer. It will orbit and gather data with two instruments aboard for 9 days. The shuttle will then pick it back up and take it down to Earth for an analysis of the data.

MIR-- The relief crew blasted off from Russia Aug. 6th, and docked successfully on Aug 8th. The crew of three - two Russian (who will repair the power supply problem plaguing the crippled aging space station) and one French. All expect no major dramas or problems to confront them, but do seem to worry that small difficulties maintaining the station could be taxing to their busy schedule at times.

THE MARS PATHFINDER - operated better than its expected 30 days and continues to operate. The rover is still surveying the local terrain with Soufflé the last rock encountered. Global Surveyor arrives at Mars in September and starts mapping in February 1998. (Feature article)

THE SUN - A small red 'something' has been spotted (is that a pun Phil? – Ed) on the Sun. (No more details).

MARTIAN WEATHER REPORT
(July 4-16th) Sol 1-12 (a Martian day 24 hours 37 mins)
The air pressure was 6.9 millibars, Earth is 1013. Wind speed was measured at 30 kms/h
Average temperature was a warm spring of -10 c
Earthrise occurs approximately 4.07pm (pacific daylight time) from the surface of Mars.

NASA RENAMES PATHFINDER--
The Mars Pathfinder has been given a new name. It is now known in tribute to the late Carl Sagan is called "The Carl Sagan Memorial Station." This is due to his overall contribution toward science and humanity.

SOJOURNER - after starting to slow down due to the batteries running low, was put to sleep and woken by NASA scientists 24hrs later. The batteries are now charged and the exploration continues.

MARS FINDS ITS PATHFINDER IN LIFE

Mars is at the tip of everyone's lips, and the euphoric atmosphere it has caused the general public is nothing short of astounding. The small lander and rover have far outperformed its expectations. The scientists originally hoped the rover would operate for 1 week. It is still performing 1 month later. The lander, expected to cease functioning after 1 month, is still operating successfully.
The Pathfinder mission incorporated with the Global Surveyor is a bold plan of producing spacecraft at a faster, cheaper, better philosophy, with a lot of smaller missions carrying less equipment, and bold new techniques allowing missions to proceed every 2 years. It is hoped by 2005, a sample return mission will be implemented.
Japan is now putting its energies into space and by 1998-99 "Planet B" an atmospheric probe will be sent to Mars.
We live in exciting times and it is hoped by 2001, a joint Russian, American and maybe European mission will be sent to locate a possible landing site for a manned mission in 2011-2016. The other probes every 2 years also are looking for a proposed manned landing site. This also includes missions to the Moon this month and later this year by America and Japan. Also Europe is sending a probe to Mercury in 2001.
Pathfinder has been sending back fantastic pictures and data of Mars. Since launching on December 6th, and taking 6 months to arrive on July 5th, it landed after aerobraking plus bouncing via airbags in what is believed to be an old river bed known as Ares Valley. The rover Sojourner (a small 6 wheeled microwave size car) has already explored many various types of rocks, some given the designation of familiar characters. The rocks are known as Yogi, Barnacle Bill, Casper, Wedge and Flat top, Twin Peaks (2 hills in the distance), the latest being Scooby Doo, Half Dome, Shark and Soufflé. The scientists have found some unusual colourings and compositions inside these rocks. Yogi has a small amount of quartz and on one of the twin peaks it is white and thus was named the ski slopes.
I have a separate newsletter which is called 'The Planetary Times' (free to members) which explains the mission is more detail, plus Jupiter Galileo reports, Global Surveyor update, and more. Handouts are also available.

Phil Ainsworth (President) ■

'Twas The Night before Bank Holiday

For a while now I've been hearing that Sunday night around 11pm is the best time to observe as the light pollution from suburbia is diminished. The explanation is that few industries operate Sunday night and people are more prone to retire early. It all makes sense.

It was cold but I was determined to take advantage of Monday's holiday by staying up late on Sunday.

My plan was to indulge in astrophotography and my camera was loaded with ASA 3200 film. I have had good results with this film and decided to take some piggyback shots. i.e. just the camera mounted to the scope and allow light to fall into the camera lens as opposed to the telescope mirror.

The night was clear and dark, but viewing slightly soft. A very mild mist or fog was sometimes present. I took various shots of M7 (in Scorpius) and Sagittarius. As the telescope was polar aligned with the motor engaged, I was hopeful of good results.

My plan was to indulge in astrophotography and my camera was loaded with ASA 3200 film.

I then decided to attach the camera, via an adapter, to the focusser so I could take some eyepiece projection shots of Jupiter. A problem was that the telescope became unbalanced and difficult to track correctly. I solved this problem by rotating the tube so the camera was aligned with the counterweight shaft and this provided stability.

I wasn't polar aligned as well as I thought, as the images of Jupiter were drifting in declination. However, I did manage to take quite a few frames. On Bank Holiday Monday I took my film to be developed, but I thought my camera was playing up on the night so I asked for the 'black bag'.

Placing my arms inside this device, I could open the camera and feel if the film was correctly wound. Well, it wasn't, and indeed the film had snapped inside. I still had what was left developed . However, some great shots were destroyed as I scratched the negatives heavily. Also I found that the ASA3200 was too grainy for the Jupiter shots.

I must leave the final word on this to our new puppy, Barley, who took such a dislike to the photos he pulled them out of the envelope and chewed them to bits while I was upstairs. (Barley preferred photos of Pluto? – Ed).

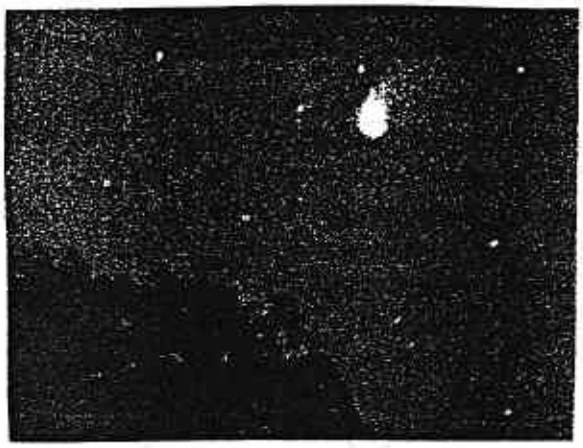
Postscript: Peter has told me that the gelatin in the film makes them rather attractive. As Bob says, I'll have the best developed dog in Campbelltown.

Noel Sharpe ■

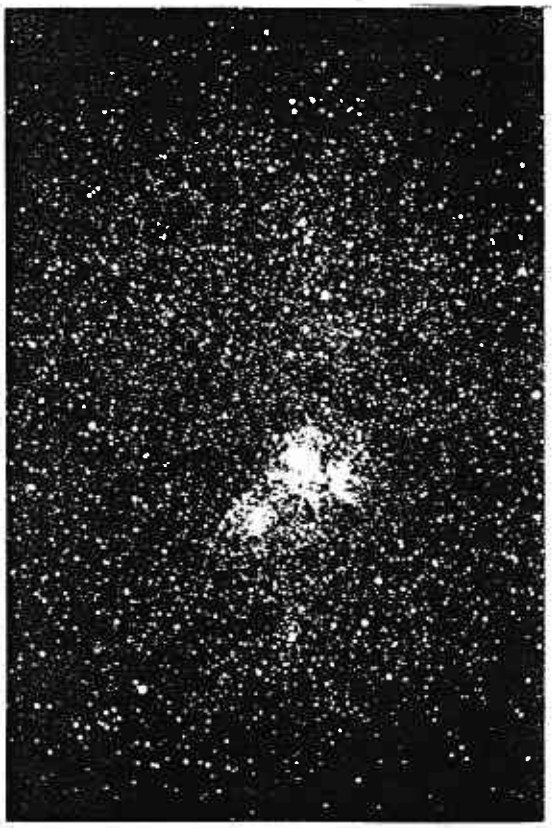
Members' Photos

This is what I like – printing photos taking by our members. Though the B&W photocopy doesn't do their fabulous colours justice, the quality of the astrophotography can still be appreciated, and act as an incentive to "go thou and do likewise."

Comet Hale-Bopp.
Photo by Steve Hutchinson



Eta Carinae by Peter Druery.
F6.3, off axis guided. 45min.
Note the excellent polar alignment and tracking. Used Fuji Super HGV 400.



Apollo 9

NASA and the Moon race between Russia and the United States were really beginning to hot up. Already the Americans had a jump on Russia with the successful Apollo program.

The Apollo 9 crew of James McDivitt, David Scott and Russell Schweikart launched on March 3rd, 1969 from Cape Canaveral via a Saturn V vehicle.

The astronauts, while on a ten-day mission, orbited the Earth. The major goal of this Apollo mission was to test the Lunar Module (LM). McDivitt and Schweikart piloted the LM while Scott piloted the Command Module (CM). The LM and CM separated to 160kms, then the LM fired its jets to catch up and dock with the CM.

The procedure went without a hitch and proved that America had the technology to take a landing vehicle out from a Command module and re-dock with the spacecraft, while orbiting the Earth. If they could do this procedure from Earth orbit, there seemed no major obstacle why it could not be done while orbiting the Moon.

For 241 hours Apollo 9 orbited at 190-192 kms above the Earth and successfully splashed down in the Atlantic approx. 5 kms from the target on March 13th after 10 days in space.

Phil Ainsworth ■

The Rain, the Park and Other Things

The Rain: The outlook was bleak, dark clouds overhead, the wind blowing streams of rain into your face. The safest place to be was inside and that's where we set up the telescopes which we figured would be used for display purposes only.

All of us seemed a bit despondent. It was like being all dressed up with no-where to go. Everything was well organised, with Phillip and Bob giving lectures and David and Karen holding the fort over our information table. However, I felt that the weather would lessen the contribution that telescope observation would have made for the night.

At this point the efforts of Carol Oliver must be noted. Carol worked day and night to make the star party a success. The previous comet night was a washout and to have bad weather again was just plain unlucky as we knew it would effect attendance.

Our faces told the story, but behind every dark cloud there's a little ray of sunshine, or in this case a sunset. A small pocket of hope opened and through this clear patch of sky Venus, Mercury and Leo's Regulus magically appeared and, like a magnet, drew our attention.

The big question was...do we set up or do we wait? Well, the waiting was over when several Society members escorted my telescope from its indoor position and kindly placed it outdoors.

Excitement grew as with the sky rapidly losing its cloud cover, a snakelike procession of car headlights appeared as the crowd arrived right on cue. This was great because all of the night's activities would now go ahead. Upon entering, the general public would hear lectures on the planets and deep space objects, see videos, visit a trade expo, sit inside a planetarium, eat sausage sandwiches, obtain show bags and balloons and pay a visit to the park and flash their red torches.

The Park: This park was level, large in size and easily accessible. However, not a blade of grass was to be seen as this was the car park and this was where the telescopes were operating.

Although now clear, the weather had affected the number of scopes present. I counted nine for public observation and a whole feast of objects were observed, some of which are listed below:

Venus, Mercury and Regulus, Mars and Jupiter, M6 & M7 (the Mangos in Pajamas? – Ed), Eta Carinae, Jewel Box, Omega Centaurus, Scorpio, Sagittarius and The Southern Cross.

Jupiter was superb, but for myself, the Jewel Box was exceptional. I've rarely seen it better and I stayed on it for some time. What was pleasing was the clarity and colour, a point many people commented upon.

The night was very busy and long lines formed, very much like the nights at Macqaurie University. For those of us experienced, we knew what to expect and took it in our stride. For others, it was a little daunting but very rewarding.

...Jupiter was superb, but for myself, the Jewel Box was exceptional.

The general public appreciates the chance to look through a telescope and I would say one in every three would ask questions not only about what they have just observed but also about anything to do with stars, planets and the night sky generally.

Questions like "How do you know that's Jupiter or Venus?"; "Can you show me Saturn?"; "Are there stars in the daytime?". All these are sensible questions.

And Other Things: Look, up in the sky. It's a bird, it's a plane. No, it's a ...balloon.

Several times someone in the crowd would say "Look, a satellite". And indeed, we would look and think it strange that a satellite would develop such a wobble in its orbit.

Of course, many balloons were present and filled with helium, so for a while looked like the MIR space station piloted by some cosmonaut who had downed a few too many vodkas.

It amazes me that whenever events like this are held, the No.1 question, without fail, is..."How much did this cost?" The person asking the question is saving to buy a telescope, just making conversation, has the money already, has a passing interest, would like to develop a hobby, or is just being nosey. I have no real answer except, when I replied to one observer, he said "you'd pay much more for a home computer and I bet you get much more enjoyment out of a telescope."

...by some cosmonaut who had downed a few too many vodkas.

I haven't thought about it like that but, yes, some hobbies are expensive, but to each their own.

Two ladies came up to me and asked "Where is the moon?" They then said how much they enjoyed seeing the craters when I last showed them at Bringelly. I couldn't recall at first but these two ladies were instrumental in the famous "buggered if I know" incident. For a full report, read 'The Eagle has landed' in May 1996 MAS Newsletter.

The two ladies found Seth Shostak's talk very informative, but felt some of the children in the audience should be better behaved and would I apologise ....which I did.

In Conclusion: Was the night a success? Yes, it was! The rain did play a part but I would say a crowd of 500 attended. This was a big event, and definitely raised the profile of both our Society and the SETI Australia Centre.

Did we sign any new members? Yes we did. Did I finally get my sausage sandwich. No, I didn't.

But what was appreciated was both Drs Seth Shostak and Ragbir Bhathal taking time at the end of proceedings to have a bit of a chat and a quick look through the scopes.

I am sure that other articles in this month's Prime Focus will be featuring the Star Party. At this point I'll make mention of those who supplied and operated telescopes and thank them publicly.

John Casey – 4 ½ " reflector.

Dick Everett – 60mm refractor, and picnic table and chairs.

Ian Porter – 4 ½" reflector & his hat

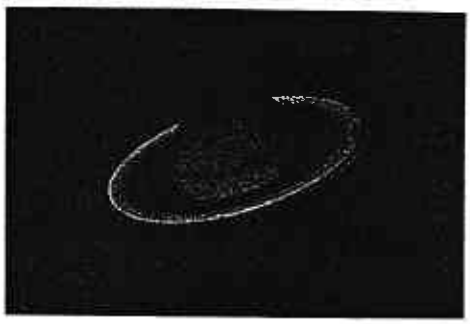
Eric Brown – 200mm Meade and computer.

Peter Druery – 200mm Celestron, and his assistant Dave Macey operating Peter's 4" Maksutov.

And a really big thank you to Steve Ryde from Cherrybrook technology High School and his whopping big 10" Dobsonian.

Well done one and all.

Noel Sharpe (Vice President) ■



From The Editor's Desk

The family Star Party on the 26th July turned out a winner, despite the gloomy weather initially. See Noel's article for more details. I'd just like to add: my congratulations to Carol and Ragbir for organising such a complex event; to Dr Seth Shostak for his brilliant lectures, both on the Science of Star Trek ('beam me up Scotty ' will never be the same again) and on SETI; my thanks to Karen Bates and David McBean for faithfully sitting at the MAS display all evening; Phil for his Solar System talk to a packed lecture theatre; and the SRC for some great sausage sandwiches. (Sorry Noel!). I enjoyed doing my talk on Deep Space objects. I hope the audience felt the same way.

The other big event, prior to the Family Star Party, was our own Comet Night on the 7th June. An interesting night of hands-on astronomy. A small number of stalwarts braved the June cold to see the Wilton sky.

Surprisingly, though the day had been perfect and the sky clear, even without clouds and totally moonless, the seeing wasn't good. There was obviously moisture in the air, giving the dark sky a 'cloudy' look, and stars a foggy halo through the binoculars.

Still, from time to time, it cleared and the seeing was better, though never great. A litmus test was the Coal Sack (next to the Southern Cross). Sometimes, it just wasn't visible. Other times it stared down like a rift in space. These were the better seeing periods.

I arrived too late for the comet. (Had to finish my 18 holes of golf). I spent some time with the young folk, exploring Scorpius, pointing out M6 and M7 which were plainly visible to the naked eye and delightful in our binoculars. We then moved to M4 (near Antares), which appeared in our binoculars as a faint hazy smudge. A friend with a 200mm telescope (I think it was Eric) trained on it and sure enough, it was a globular cluster, but without the concentrated condensed centre we normally expect.

Switching to find M80, also in Scorpius, Phillip Macey thought he could see it in his binoculars, but I couldn't. Younger eyes? Again, Eric used his 200mm and found a small globular cluster. Easy to see why it was first mistaken for a comet by Messier.

The night's scalp pole was beginning to fill up. With the coming and going of cloud, the view was fairly erratic. Here are some of the high points for me – hopefully others will give their own individual accounts.

* Explored the clusters around Eta Carinae, first with binocs, then with Noel's 200mm Newtonian. Glorious clusters, each individual in shape and character. A rich field of viewing.

* Noel showed me the trick of confirming that a mass of stars viewed on moderately high magnification through a scope was in fact a cluster. By simply releasing the lock on the RA movement, one can move the scope gently and ever so slightly from side to side. Soon you are looking at sparcely occupied space, then across the stars again, then more empty space on the other side. Clearly, the original stars were in a cluster. (Good trick, Noel).

* Though his 200mm SCT, Peter showed me first some interacting galaxies (which I must admit, even with peripheral viewing, I wasn't

convinced I could see), then Sombrero galaxy (M104). Now that I could see... ole.

* Peter gave Noel the recipe on how to find Centaurus A:
- first focus on Ω Centauri.
- Then, track 4° northward
- There, about 1 min. of RA towards 13 hrs, you have it. And Noel did.

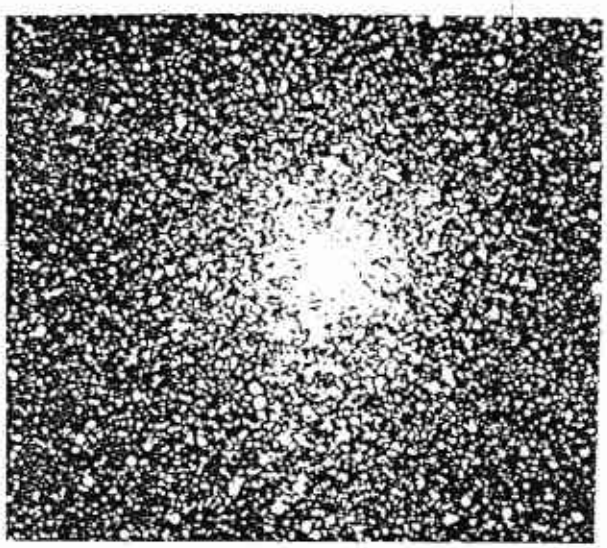
Being the gentleman he is, Noel gave me a peek and (sorry Peter) I could see it straight away, dark dust lane and all.

* NGC 2516 in Carinae, directly below the False Cross, was a beautiful sight in my 12x50 binoculars.

* Then came the Mystery Cluster of the night. The excitement was more in the process of tracking down its identity than the actual viewing of the object.

While randomly scanning the sky with my binocs, high up, slightly South, I spotted a pair of stars above the trees and about 3° below them, a fuzzy patch that looked like a globular cluster. Dave Macey and I agreed on its appearance but couldn't identify it. It was about 20 ° from Scorpius's tail, but cloud and trees prevented a complete view of related stars.

So what was it? And how did we 'nail' it? This was the process:
- We got Eric to point his finder scope at its approx. position. (Eric's scope was set up in a place which put a tree between it and the cluster, but we could see the two stars.
- From his scope location indicator, we got a rough RA and Dec. (17h, -52°).
- We used that RA/Dec on Eric's skyglobe program (yes, he had his laptop running in his car) to identify the constellation in that area of the sky. (OK, we could have used a StarWheel, but the laptop was more fun). It was Ara (the Alter). Yes, that was a new one to me too.
- We then referred to my copy of 'Collins Pocket Guide to Stars and Planets', looking up the map of Ara. There, at about 3° from β and γ Ara was a cluster called NGC6397. Collins gave the co-ordinates as 17h 41m, -54°.
- Eric set his SkyVector on those co-ordinates (you can feel the excitement even now, can't you), moved the telescope to that location and we looked through the finder scope. Yes, it was pointing to the right relative position to the two stars, but there was still a tree in the way of the cross hairs. We had to wait.
- A few minutes later, the cross hairs cleared the tree and it gave the same picture as our binoculars and we could see a faint fuzzy object.
- We then looked through the main scope and – low and behold – a nice globular cluster. It was very pretty to see, even more so for the process of detective work that went into identifying it. And all of a sudden, Ara doesn't seem such a dull constellation after all.



Globular Cluster NGC 6397 in Ara
Photo by AAT, used with permission.

Bob Bee ■

The Planets in Motion- A Cometary Tail

John Casey 11/6/97

The nights are getting longer, and colder. In spite of clearer skies, aging eyeballs resolve only blurred points of light, and Hale -Bopp is dimming - so, with the reading glasses on, it is a good time to read about the distant worlds and wonder. Winter is the time to take in some literature! What to read? Well, here is just the thing! It is about astronomy, politics, bigotry, philosophy, religion, ancient history, science, mythology, future prediction, traditions, tragedies, and people! Not interested? Then back to the telescope!

Immanuel Velikovsky was born in Russia in 1895 and studied in universities in Moscow, Berlin and Edinburgh. He obtained his degree in 1921, and for a time worked in Palestine, at Tel Aviv in the 1930s. He later moved to Zurich and Vienna in following his career in psycho-analysis, but his widening interests on natural phenomena, astronomy and prehistory made him think very radically. He worked with Albert Einstein between 1921 and 1924 on establishing the Hebrew University, and in 1939 emigrated to the USA.

According to Velikovsky, Venus was originally a comet...

After years of reading and research, he came upon the idea that many of the myths, biblical stories and traditions of ancient people from all around the world were telling the same story, and that they were based upon fact. In writing a book about Freud's heroes, he researched Moses and the Exodus. In the spring of 1940, he came to the conclusion that in the days of the Exodus described in the Bible, there was a great natural catastrophe, and that it was described by many cultures in similar ways, but with discrepancies in the timing between the different cultures. Over the next 9 years he began writing two books. One described how the time scales given to events of ancient Egypt were in error by 500 years [by double counting some Egyptian Pharaohs who had multiple names]. With this discrepancy in time eliminated, he claimed that events described by different cultures then lined up.

The other book, " Worlds in Collision" presented his evidence from testimony, tradition, legend and religions from all over the world, of Venus becoming a planet after near collision with Mars and Earth. According to Velikovsky, Venus was originally a comet, and gives such evidence as the pre-Columbian people of Mexico calling Venus " the star that smoked". Elsewhere in ancient times it was described as having a beard, and "Fire is hanging down from the planet Venus". He then goes on to show how events described in the Exodus were related to the close encounter of Earth with Venus, causing meteor showers, the rivers turning red with comet dust, fires in the sky from exchange of some of the hydrocarbon atmosphere of Venus at close quarters,[which also caused the formation of sweet sugarlike materials that became manna from heaven], lightning bolts from the differences in potential between the planets, huge earthquakes, rivers running uphill from gravitational effects, and continual darkness as dust and smoke blocked the sunlight.

This book was the first published in 1950, became a best seller- and caused controversy in scientific circles. Velikovsky published "Earth in Upheaval" a few years later, where he assembled geological, paleontological, and archaeological evidence for this same theory. At the same time [1950] he published "Ages in Chaos" to give the background evidence for his assumption of Egyptian history being out by 500 years to meet the event times he discussed in "Worlds in Collision".

" Worlds in Collision" became a best seller, but also a target for nearly universal abuse and derision. Many in the scientific community tried to pressure the publisher to stop printing the book, although most had not even read it. Even astronomers who took his theory seriously were targeted- the director of the famous Hayden Planetarium in New York lost his job for planning to mount a display about the theory.

Velikovsky made a number of predictions of properties of various celestial bodies, most of which were contrary to the established scientific community of the 1950-1960's. Whatever is thought about his theories, these must be tempered by the fact that many, in fact most, of his predictions were either correct, or at least more correct than those of his scientific counterparts of the same era. He suggested that the moon's rocks would be magnetic, and the magnetism would be aligned, that there would be an unusually high heat flux radiating from the moon's surface. Venus would be exceptionally hot, that the Sun and orbiting bodies would all hold a high electrical charge. These have proved to be correct.

So you can see, reading these books is fascinating, whether you consider it fact or fiction, science or science fiction, with history, geology, and general interest all thrown in. Velikovsky's books can be found in Campbelltown library. "Worlds in Collision" under S523.1, " Ages in Chaos" under 930. I haven't found a copy of "Earth in Upheaval" yet. There is a review of his work by the Editors of Pensee under the title of "Velikovsky Reconsidered" under 520.1. This details the political intrigue, and stifling of debate on Velikovsky's work.

Velikovsky made a number of predictions of properties of various celestial bodies...

If nothing else, Velikovsky ensured that astronomers, scholars, scientists and the general public would think outside the square, and the heat of the debate can still warm you now on a cold winter's night.

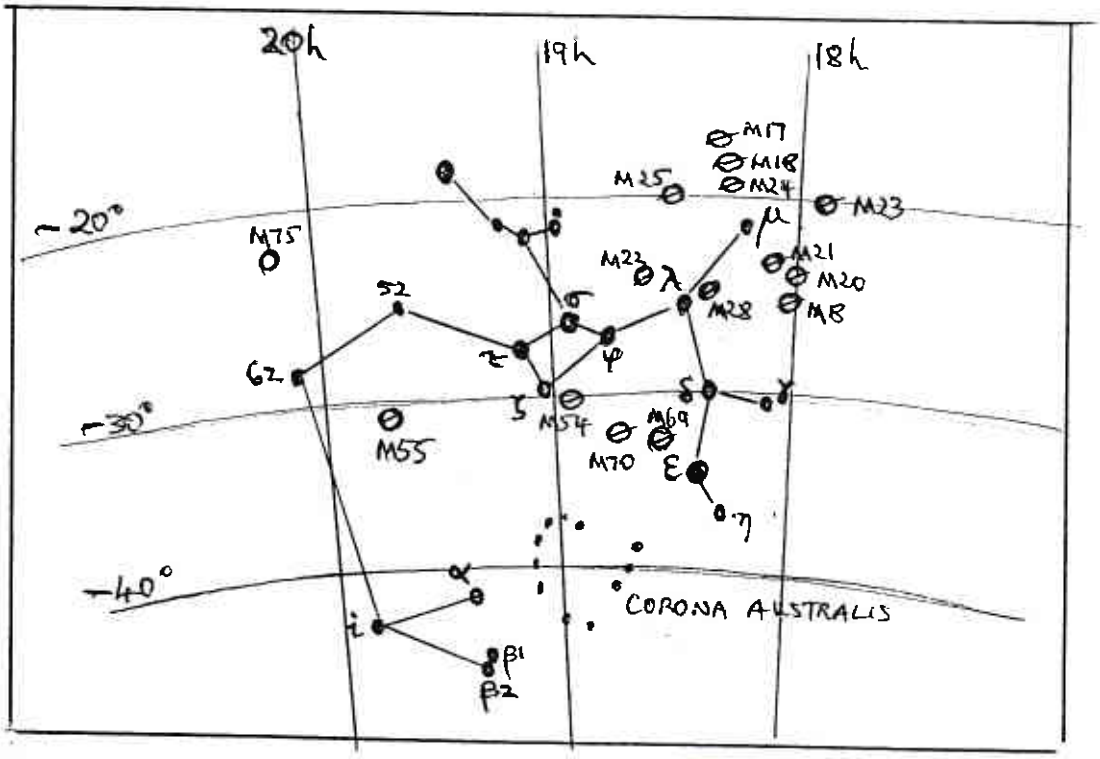
John Casey ■

Sagittarius The Archer

This has to be one of the most interesting and object packed constellations in the sky. Sagittarius is our window to the galactic centre – the very core of The Milky Way. But even that window has its curtain partly drawn – the Great Rift mocks our attempts to see the very nucleus of our galaxy's centre where, radio astronomy tells us, stars are jam packed together at distances measured in 100s of astronomical units, not parsecs. Instead we have tantalising glimpses of the hub, with stars so numerous, they look like spatter painting gone berserk.

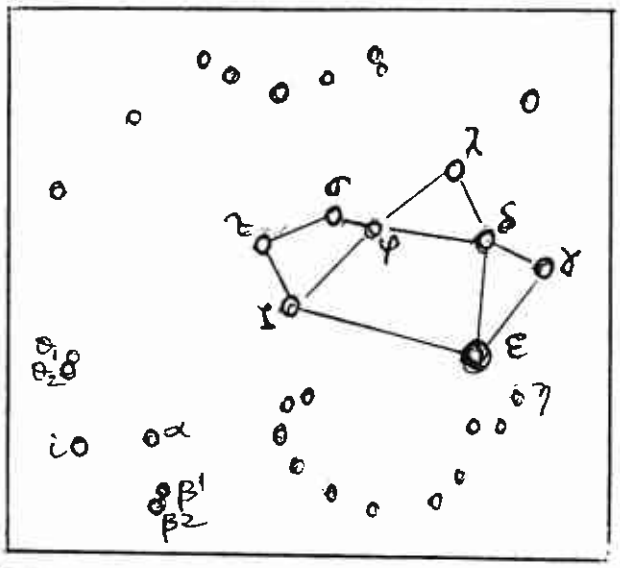
But that's another story. In this article we will be looking at the stars and deep space objects seen within the constellation Sagittarius itself. Due to the vast number of interesting objects (Messier numbered a staggering 15 objects in Sagittarius), this treatment has to be relatively brief. However, I would recommend additional reading to obtain a fuller picture. (A very detailed account is given in "The Constellations" by Lloyd Motz and Carol Nathanson, available in Campbelltown Library, 523.8 MOT).

Sagittarius (The Archer) represents, in traditional terms, a centaur (half man- half beast) with a bow and arrow aimed at Scorpius. If you use your imagination, you can see such a figure in the map provided here. (Hint: The bow is marked by λ, δ and ε Sagittarii.)



However, there is a more popular image in the stars, which I must admit I find easier to visualise and follow. That is – The Teapot. ("I'm a little teapot, tall..."). Use the same stars, connect the dots differently, and ... voila! The confusing thing is that some book accounts of the names of stars etc jump between one image and the next. One moment they're talking about the tip of the arrow and the next about the spout of the teapot.

So, to remove (or add) the confusion, I have provided another sketch, with the stars connected in Teapot mode. Take your pick. (By the way, in each sketch I've shown the curve of the crown in Corona Australis. This does not fall into Sagittarius, but it's a good reference point in the sky.)



Sagittarius defies the convention of having its brightest stars numbered in order of the Greek alphabet. Thus, Alpha (α) Sagittarius (Sgr) is not the brightest star. In fact Epsilon (ε) is. More of that later. Let's look at some of the stars. (And I mean that. Don't just read this article. Take it and a red torch outside and look at the stars, with binoculars or scope. You'll be surprised what you will see.)

α Sagittarii (Sgr) – called Rukbat (Archer's Knee). This is mag 4.0, a blue-white star 275 ly away. As you can see, it's a long way from the Teapot, and is in that nice little triangle of stars, near Corona Australis.

β Sgr – called Arkab (Tendon) is an interesting naked-eye double. It is located in that triangle. β^1 (called Arkab Prior, Arabic for Archilles tendon) is a blue-white star, mag 4.0, 190 ly. In a small telescope, you should be able to see its mag. 7.2 companion, separated by 28.5" of arc. β^2 about 180 ly away, is a mag 4.3 white star. This banana duo are not related by gravity. They just happen to be in line of sight, though only 10 ly apart.

γ Sgr is called Alnasl (the point of the arrow). It is also the tip of the teapot's spout. At mag. 3.0, it is a yellow class K giant, about 130 ly distant. γ offers us a hint of the direction of the Milky Way core. The bright starry region just north of γ gives an indication of the direction of the core.

δ Sgr is called Kaus Media (or Meridionalis), meaning the middle of the bow. It also forms the top part of the teapot spout. δ is an orange giant, mag.2.7, about 80 ly away. It has a luminosity 60 times that of our Sun

ε Sgr is called Kaus Australis (southern part of bow.) It's also the bottom of the spout. ε (Epsilon) is the brightest star in Sagittarius, mag. 1.8. A blue-white giant, with a luminosity 250 times that of our Sun, it lies about 100 ly away. 3.3' to the NNW binocs should pick up a companion star.

λ Sgr is Kaus Borealis (northern part of the bow). It's also the top of the teapot lid. Mag. 2.8, a yellow-orange giant about 70 ly away and is placed such that the background sky comprises numerous stars from the galactic hub.

σ Sgr (called Nunki). A blue-white star about 250 ly away, mag 2.0, it has a luminosity 1100 that of our Sun..

φ Sgr joins the handle top to the teapot. It's a class B8 giant, about

600ly away, and shines as bright as 1600 Suns.

There are more interesting stars (some binaries) in Sagittarius than there is space in this article. ζ (Zeta) is a binary, though a close one. η (Eta) a mag 3 red giant, has 9th mag white companion. ξ (Xi) is a naked eye binary. And so on.

Here's a location list for your use:

α	19h 24m, -40° 37'
β	19h 22m, -44° 27'
γ	18h 3m, -30° 26'
δ	18h 21m, -30°
ε	18h 24m, -30°
λ	18h 25m, -25°
σ	18h 52m, -26°
φ	18h 45m, -27°

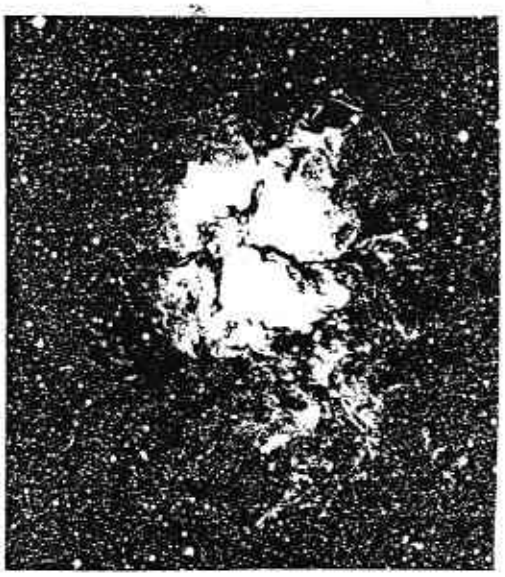
Messier Objects.

Now we get down to it. As I said earlier, there are 15 M Objects in Sagittarius. They are M8, 17, 18, 20, 21, 22, 23, 24, 25, 28, 54, 55, 69, 70 & 71. Their approx. positions are shown on the map. We'll have a look here at some of the better known ones.

M8 (Lagoon Nebula) NGC 6523. A good target for binocs or scopes (also visible to naked eye), appearing as a milky white nebula, with a dark rift down its centre (the lagoon). Of course, the beautiful long exposure pictures show it as red. The nebula itself covers an area of about three Moons. Look for the star cluster (NGC 6530) within the nebula.
M8 is about 5200 ly away.

M17 (Omega, or Horseshoe Nebula) NGC 6618. (Also called the Swan). A popular object. Visible in binocs as a wedge shape (about full moon size). Larger scopes reveal an arch shaped nebula, like the Greek letter Omega Ω. It can also look like a (short necked) swan. About 5,700 ly away.

M20 (Triffid nebula) NGC 6514.
Looks better in photos than by eye, but still worth a peek. Triffid it may be to some, but it still looks like a pansy to me. The three dark dust lanes neatly trisect the glowing ionised gas, lit by the multiple star (HN40) within it born from the gas cloud.
In the same field of view, you should also see M21 (NGC6531), a loose open cluster of about 50 stars.
M20 is about 5,200 ly away.



M20 - Triffid Nebula
(Photo by AAT, used with permission)

M22 (NGC 6656) is a great globular cluster, ranking just behind Ω Centauri and 47 Tucanae. Visible as a faint fuzzy star to the naked eye, it looks good in binocs and better in a scope. (Can you detect a slightly elliptical outline?) Contains about ½ million stars, and is about 10,000 ly away.

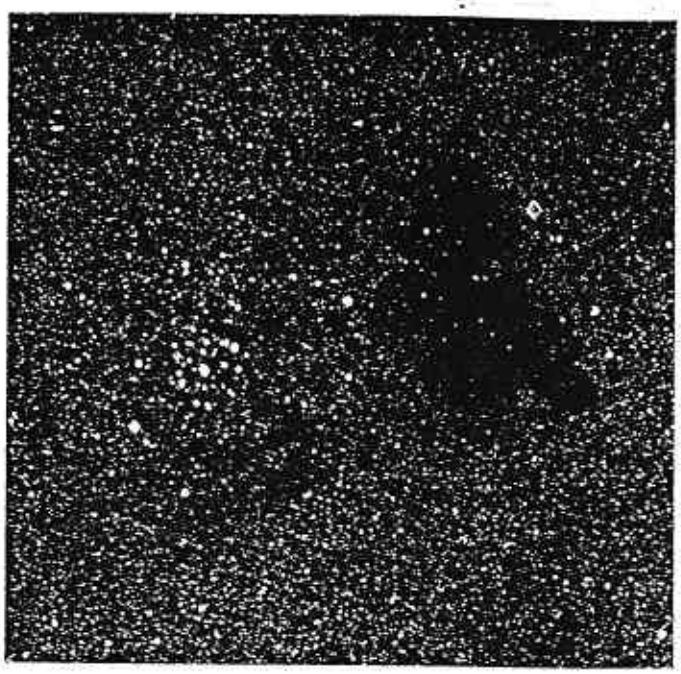
M23 (NGC 6494) is an open cluster. Barely resolvable with binocs, there are about 150 stars widely spread over a ½ degree field. Fairly elongated in shape, with some stars forming arcs. M23 is about 2,200 ly away.

M24 (Small Sagittarius Star Cloud) is a rich Milky Way star field. It appears grainy and shimmering in binoculars. Measuring about 2° by 1° it is one of the most prominent parts of the Milky way to the naked eye. This star cloud (it is not a nebula) contains millions of Milky Way stars. Photos show a pair of 'black eyes' caused by two dark nebulae near the top. It also contains a small tight cluster of 50 to 100 stars (NGC 6603).

M25 (IC 4725) contains about 50 loosely scattered stars. Good for binocs with mags from 6 to 10. Interesting because of the presence of U Sgr, a yellow supergiant Cepheid variable star (varies from mag 6 to 7 in1 week). Its existence in an open cluster is unusual and helpful for astronomers' calibration of their Cepheid P-L charts.

M55 (NGC 6809) is a globular cluster (7^{th} mag) which in binocs appears rather nebulous. You may be able to resolve individual stars in small to larger scopes. The central condensation of the cluster is hard to spot.
M55 is about 17,000 ly away.

Great Sagittarius Star Cloud, Barnard 86 and NGC 6520.
Just north of γ Sgr , like steam from the teapot, there is the spectacular Great Sagittarius Star Cloud, millions of stars lying near the central hub of our Galaxy, some 30,000 ly away.
Included in that cloud, is Barnard 86, a famous dark nebula (18h, -27° 50') and in the same field of view, an open cluster NGC 6520.
If you look at RA 17h 46.1m, -28° 51' you would be looking towards (but unfortunately not seeing) Sagittarius A which is an intense radio source that marks the exact centre of the core of our Galaxy.



Barnard 86 and NGC 6520
(Photo by AAT, used by permission)

Where to find the Messier objects in Sagittarius:

M No.	RA & Declination
8	18h 1.6m, -24 o 20'
17	18h 18m, -16 o 12'
18	18h 18m, -17 o 8'
20	18h 1m, -13 o 2'
21	18h 4m, -22 o 30'
22	18h 33m, -23 o 58'
23	17h 54m, -19 o 1'
24	18h 15.5m, -18 o 27'
25	18h 31m, -19 o 14'
28	18h 24m, -24 o 52'
54	18h 54m, -30 o 28'
55	19h 39m, - 30 o 57'
69	18h 30m, -32 o 21'
70	18h 42m, -32 o 17'
71	19h 53m, -18 o 47'

As you can see, Sagittarius is a gold mine of things to see, both with the naked eye, binoculars and telescopes. Go get 'em.

Bob Bee ■

Getting Started

The Planisphere or Starwheel is a very useful device but can be quite confusing in some circumstances.

It's the same problem you have with all star maps - they're drawn inside out. Actually they have to be. We're used to looking down at maps from 'outside', whereas star maps show us the view from underneath, the 'inside' view.

The back or North facing side of the Planisphere is straightforward. It shows the sky just as you see it with everything right side up. But the front is weird! East is West and West is East and half the sky is upside down.

How do we make sense of this? It all becomes clearer when we realise that we are positioned in the middle of the map and are being shown an overhead view. This is all very well but it's a proper pain in the neck trying to read the blasted thing whilst holding it above your head.

Don't despair - there is an answer.

Look closely at the lines drawn on the rotating map and you will notice that the radial or hour lines are marked with degrees of declination showing angular from the Celestial Equator. Align one of these hour lines with 12 noon at the very top centre, then determine along this line the declination of -35°. This is where you are standing, assuming you are somewhere around here. Mark this spot with a small circle on the clear overlay. Use a chinagraph pencil if you don't want to disfigure the plastic. Then adjust the chart to your current date/time setting.

How does this help?

Well, if you turn your Planisphere so that the compass point towards which you are looking is at the bottom, you will see that all of the sky between your little circle and the lower edge of the map now makes sense. Furthermore, since the circle represents dead overhead, you have some sort of marker in the sky to help with identifying constellations.

Rotating the Planisphere this way as you circumnavigate the sky even removes most of the distortion that its curvature causes to the relative position of the constellations. Oh, and your neck will really appreciate the consideration you are showing it.

I hope this helps you as much as it helped me.

Dick Everett ■

A Word About Numbers

In astronomy, we talk about Millions and Billions and so forth without much thought to their relativity.

Consider: -
A million seconds pass in about 11 ½ days.
A billion seconds, however, take nearly 32 years to pass.
A trillion seconds? 32,000 years.

July Posers:

Q1: Name two constellations without either Messier or Caldwell Deep Sky catalogued objects.

Q2: Is it possible you could view all 110 Messier objects on one night?
Where? When?