# SCORPIO

Journal of the Astronomical Society of Frankston Inc

Vol 2, No.4 | P.O.Box 596, Frankston Victoria 3199 | JULY/AUG 1993


## FUTURE EVENT

GENERAL MEETING

21 July 1993

Special Topic:

Mr. Bill Magnusson

"Satellite Communications"

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18 August 1993

Special Topic:

"Practical Astrophotography"

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VIEWING NIGHTS

28th August at The Briars

The Briars is located off Nepean Highway at Melways Map 145, E11

Ballom Park is located off Cranbourne Road at Melways Map 103, B4

COMMITTEE MEETING

29 July 1993

26 August 1993

The Astronomical Society of Frankston was founded in 1969 with the aim of fostering the study of astronomy by amateurs and promoting the hobby of amateur astronomy to the general public. The society holds a General Meeting each month for the exchange of ideas and information. Regular observing nights, both private and public are arranged to observe currently available celestial objects. In addition the Society provides the services of its members for educational presentations or observing nights for schools and local community groups.

## WINTER SOLSTICE PARTY

Everyone has agreed the Winter Solstice Party was a great success. About thirty members joined the party at the President's home to celebrate the passing of the winter solstice and have a great time. There was more than enough food and I think we all went home a bit over indulged. The party broke up into four basic groups. The TN's {telescope nuts} who despite almost 100% cloud cover, heavy dew and freezing conditions were determined to time all the Jovian moon events for the night. Just before it was discovered that the lens cover was still on the 110mm refractor, a well known observer was heard to say '' It looks a little out of focus to me !!'' { X-ray vision ???). The arm chair computer astronomers settled in to explore the finer points in Skyglobe(R) software or watch some videos. (The Kiligons lost). At the other end of the house was a lively game of bingo. Tony Hales won the door prize, a Lunar Atlas and Don Leggett was given away as a ''lucky'' star prize. All in all everyone had a great time and plans are being made for the next one.

Thank you to all those people who helped out.

## NAME YOUR TOPIC

I try to include in each Scorpio issue a main article discussing some aspect of interest in astronomy. If you have some special topic you would like explored please drop me a line.

PJL

**PLEASE NOTE**

Annual subscriptions are now due

If you are unfinancial this is your FINAL copy of Scorpio.

Subscriptions may be made to the treasurer at the general meeting or posted to the Society post box.

Meeting Venue:

The Peninsula School

Wooralla Drive, Mt Eliza

(Melways Map 105, F5)

Room F6 at 8.00pm on the third Wednesday of each Month except December/January

Visitors are always welcome

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Annual Membership Fees

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|---|---|
| Full Members | $20 |
| Concession Members | $15 |
| Family Members | $30 |
| Family Pensioners | $25 |

Membership Fees due 1st July each year

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President

Peter Lowe (03)775 9347

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Peter Brown (03)789 5679

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Don Leggett (059)854 927

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Committee

| | |
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Don't forget if you have any comments about the magazine, its layout or its contents - please send comments to the President

# SOCIETY NEWS

## COMMITTEE NOTES.

There have been some ''lively'' Committee meetings in recent times as we try to lay out the future directions for the Society.

Reviewing the results todate:-

* The viewing night activities have been very successful and money reserves are rising thanks to the excellent organising efforts of Tony Hales

* Our credentials with The Briars are being steadily developed and with the generous donation of the Higginson Smithfield Telescope (HST), we now have an excellent opportunity to establish a permanent observatory.

* Membership is slowly rising and the new general meeting format is developing into a more social and less formal structure.

* The incorporation of social events into the monthly programme while slowing down a bit during winter is definitely helping develop a more active membership.

* Telescope making is slowly on the increase.

The Committee is trying to come to grips with the next course of action and how to use our funding accordingly. It has been agreed that we need to have The HST sited in a temporary building at The Briars before the end of the year. This building would be upgraded to a proper facility as funding allows. A simple roll-off building is currently being designed and costed as a proposal to the Briars. With the Frankston Council grant we are planning to enhance out telescope building activities.

The Committee needs your views on our future directions and if you would like to discuss any suggestions please don't hesitate to see me or any committee member.

## ODD SPOT

Did you know the word "influenza" is derived from 14thcentury Florence, when an unusual conjuction (or lining up in the sky) of the planets was thought to "influence" epidemics of coughs, colds and fevers

## SOCIETY EVENTS

Well, how many of you glimpsed the lunar eclipse in early June? Not many I would venture. Tales at the ASF Solstice Party were mainly of woe at being clouded out, though a couple of stout fellows waited until after midnight for the weather to break, and were rewarded with some views of the majestic event. Indeed, Don Casserley kindly presented at the party a video he took of the eclipse, and this was the only view many members had outside of the 6 o'clock news.

Ros and I were set up for extensive observations that night. She was due to take photometric-like readings of the Moon's overall brightness. For this, we improvised and wedged an old photoresistor from Tandy Electronics into a used 35 mm film can. This was then wedged neatly into one eyepiece of our set of 7x50 binoculars, which was mounted to a piece of wood via a universal camera joint. The other eyepiece was, of course, for aiming. The light levels could be gauged by measuring the detector's resistance with a multimeter, and tests a couple of days prior to the eclipse showed it had no trouble whatsoever detecting the Moon.

My involvement for the night was to take crater timings as the Earth's shadow passed over these lunar features, and to time lunar occultations as very faint stars passed behind the limb and later reemerged. There was also a grazing occultation due to pass near Armstrongs Road in Seaford, and several other members from the ASV were to rendezvous with us and set up an observing line to catch the event around mid-eclipse.

Well, the weather came in and flu struck and that was it for all the planning. Better luck next time. I believe others north of Melbourne had substantially better weather.

Even the Solstice Party (kindly held at Viv and Peter Lowe's) was clouded out.

In true druidic tradition, members stood around the Standing Stone Circle (Peter Lowe's observatory, consisting of about 8 bricks stacked on each other!). Strange arcane terminology used by ancient craftsmen was heard to be muttered in the dark of the night. Things like ''columns'', ''pillars'', ''pointing'', ''cement'' and ''Scorpio''. We hope sufficiently skilled peasant labour is mustered to complete it in shorter time than for Stonehenge, and hopefully by the next Solstice.

Although members opted not to appear at the venue in white robes, several Solstice pagan traditions were observed throughout the evening. Bruce Tregaskis attempted to sacrifice himself by jumping through a plate glass window, however, he probably did not fulfil the prerequisites for such an offering in the first place.

Strange monotonous chants were even heard from one side of the house as the evening progressed. Attempts to translate its meaning were in vain, but it went something like ''bingo, bingo, bingo''. On the other side of the house, equally warped activities were going on as other members enjoyed a video of Star Trek 6 - The Undiscovered Country - opening with an impressive supernova-like demise of the Klingon moon Praxus. All in all, a very enjoyable evening, despite the weather, with an excellent turnout from members. I would say leftovers were on the menu for the next fortnight.

Peter Skilton

## BRIARS SNOWED OUT!!

The planned viewing nights during the Queen's Birthday long weekend were completely washed out. In some areas around the peninsula there was even snow. While these events were unfortunately postponed, it is gratifying to see that even in mid-winter a significant number of people booked for the night. We will be re-scheduling these viewing nights in a few months. Thank you to all those who stood ready to help out.

# WHAT'S NEWS IN ASTRONOMY

## EXCALIBUR !

With a broken up comet due to collide with Jupiter next year has come a heightened awareness of large chunks of rock flying around in the Solar System, and potentially able to impact Earth.

Large flying mountain-size pieces of rock and ice regularly cross the Earth's orbit, travelling at relative speeds of many tens of kilometres per second, one of which has been implicated as the cause of the extinction of the dinosaurs 65 million years ago.

The London Telegraph reports an interesting proposal from sciencefiction writer Arthur C. Clarke.

He suggests exploding a 1000 megaton hydrogen bomb on the opposite side of the Sun from the Earth. This hopefully would shield humanity from the blast. The explosion would create a massive pulse of microwave energy that would propagate throughout the Solar System.

The idea is that any encountered object would then give a faint radarlike echo, which could be received on Earth and processed into a 3-dimensional map giving the size and distance of all serious hazards out there, so that we would know what to expect, and hopefully be able to launch a mission to counter any threat of impact.

The project to be called Excalibur would use a bomb about 80,000 times larger than the small atomic bomb detonated over Hiroshima in the second World War. I'm not sure of the actual reason for the project name, however, it must have something to do with the legendary medieval Arthurian sword that was embedded in the boulder and provided by the Lady of the Lake.

Such an idea should not be dismissed lightly. After all, Arthur C. Clarke proposed in 1948 the idea of communication satellites in geosynchronous orbit.

While such a project may keep many weapons specialists gainfully employed for several years, hopefully, any future budding astronaut on the way to or from Mars would be sufficiently shielded from the microwaves to save arriving at his destination medium-rare!

## TIMES ARE A CHANGING

With enterprise bargaining and productivity increases being the industrial buzzwords at the moment, you might be excused for thinking the days are getting longer. Well they are. In fact, by about 17 ten thousandths of a second per century due to tidal friction.

Two astronomers at the Royal Greenwich Observatory have studied ancient Chinese and Babylonian records and found that eclipses occurred at times different from predictions based on the assumption of a constant length of day.

The net effect is that a clock set in Babylonian times would now be 6 hours out.

Now, as the rotation of the Earth slows, the angular momentum has to go somewhere. Remember the effect of a ice-skater spinning around on the one spot. If the skater puts out their arms, their spinning will slow so as to keep the angular momentum constant for the skater overall.

In the case of the Earth, the angular momentum is transferred to the Moon to keep the Earth-Moon system at constant levels. As a result, the Moon is moving around in an orbit that is about 2 inches per year further from the Earth, in the same way as the skater's arms are slowly extended.

In fact, the Moon is now 3 feet farther away from the Earth today than when Neil Armstrong walked upon the surface in 1969. Assuming the Moon existed at the time, and extrapolating backward in time, when the Earth was initially formed some 4,000 million years ago, the Moon would have been 3 times closer (and hence much larger) than it is today.

## SPACE SICKNESS

## IT'S ALL IN THE MIND

Scientists in California are starting to understand the causes of ''space sickness'' that afflicts upto 70% of astronauts. They believe the affliction stems from the brains attempts to determine ''up'' from ''down''. Sensing organs in the inner ear called the utricles provide the brain with information about the orientation of the head. The utricle in each ear are not identical and one utricle can send the brain a stronger signal than the other. In gravity the brain learns to compensate for these slight differences however in the weightless conditions of space the brain losses this compensation and the person gets space sick. While this does not lead to a cure, it does provide a method of screening astronauts who might be prone to space sickness.

## ASTEROID BEYOND SATURN

Another faint asteroid has been discovered beyond the orbit of Saturn. Designated 1993HA2 the object is about 50 - 100 kilometres across. Very few asteroids have been found beyond Saturn's orbit but the number have been slowly rising. It seems with new instrumentation and more modern detectors we have entered another period of discovery similar to that when the asteroids were first discovered.

The evidence is building to suggest there are many more objects of this size in the outer solar system waiting for discovery.

## VASTROC/NACCA DETAILS

The Canberra Astronomical Society have issued the first call for papers or poster for the 16th NACAA to be held next Easter.

We have also received application forms for the VASTROC Conference to be held at LaTrobe University at the end of August this year. Application forms will be available at the general meetings.

Details are available from Peter Lowe.

## UNDERGROUND THERMOMETER

The evidence for global warming in the world climate has to a great deal been derived from air temperature records taken around the world. The problem with using air temperature readings is their high variability day to day, season to season and place to place. Invariably some form of statistical data reduction must be done and this has made interpretation of the climate data record difficult. What is needed is a thermometer with sufficiently slow response and record durability to smooth out these fluctuations. Researchers at the University of Minnesota have discovered such a thermometer: the Earth itself. During summer the ground warms while it is cooled in winter. These temperature fluctuations are conducted into the ground and can take decades to decay away. Measurements of the ground temperature taken upto 115 metres below ground seem to show a record of global warming during the past 30 years. The record indicates a mean temperature rise of 0.041 degC per year that matches well with local air temperature readings. While the results must be considered preliminary they suggest another source of data to explore the global climate changes in recent decades.

## HOW TO MAKE PULSARS

Last year a veritable ''clutch'' of millisecond pulsars was found in the globular cluster 47 Tucanae. Checks on other globular clusters have since shown they are a rich source of this type of object. A very surprising discovery because the only known way of making the neutron stars needed for pulsars was in supernova explosions of massive, short lived stars. Globular clusters are thought to be very old structures and any massive short lived stars would have long since died. Pulsars produce their flashing behaviour from rapid rotation. Intense magnetic fields produced at localised spots on the neutron star's surface radiate prodigious amount of energy that we see as pulses while the star spins. Most pulsars rotate with periods ranging from a few seconds to a few tenths of seconds. At the time of the globular cluster discovery, some pulsars had been found with periods of a few milliseconds and were thus rotating over a thousand times a second. Hence the surprise at finding so many millisecond pulsars in globular clusters. To explain this concentration of rapidly spinning neutron stars in globular clusters an alternate mechanism whereby a neutron star can form had to be found. Scientists at Columbia university USA have now suggested an alternative. They suggest these millisecond pulsars start out as Earth sized white dwarfs in orbit about a companion star. The white dwarf slowly accretes material from the companion absorbing the material into its structure. As the white dwarf accretes the material, it builds up angular momentum and when its mass reaches a critical limit of about 1.4 solar masses it will suddenly collapse into a neutron star conserving its angular momentum by spinning up rapidly in the process. The neutron star has thus formed without the need for a supernova explosion. There are thus two ways to produce pulsars and if you'll pardon the mis-quotation

''This is the way we make pulsars, not with a bang but a whimper''

## BY THE WARMTH OF THE SILVERY MOON ?

On 3 February this year, the Russians reflected sunlight onto Europe via a giant orbiting mirror in space. The two cosmonauts onboard the MIR spacestation reported seeing a streak of light extend from the space mirror down to the Earth 260 miles below.

The mirror was particularly thin and unfurled to 66 feet across. Although the trial lasted several hours, any observer on the Earth would only have noticed a flash for a second or two as the beam passed overhead at a speed of 5 miles per second.

Why do it? Well, apparently the aim was to beam sunlight to the Earth and light up dark polar regions or national disaster areas. To achieve this in practice will require a mirror up to 400 metres across and is technically achievable.

Also recently, we have all heard in the news of proposed plans to send giant advertising billboards into Earth orbit. These will apparently be easily visible from the ground by the sunlight they reflect. This light pollution is bad enough for observational astronomers, but things could get worse if a ''tongue in cheek'' idea put forth in Nature ever got going.

The Moon reflects only about 5 percent of the sunlight reaching it (about the same as from chimney soot). If we could sprinkle the lunar surface with a thin layer of common white magnesium oxide powder (think of milk of magnesia), it could be increased to reflect 95 percent, making moonlight 20 times as bright as now.

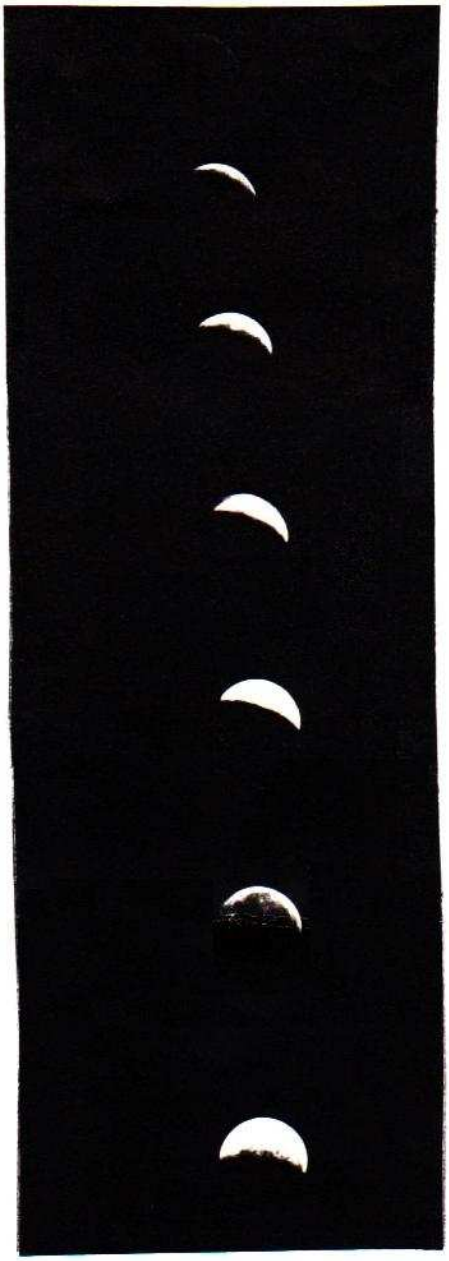
The wild suggestion is to use rocket motors burning magnesium metal in oxygen to produce a plume of the white powder that would gently settle over the entire Moon's surface. About 10 million tonnes would be necessary to coat the entire surface, and this could be projected to the Moon by Earth-based high velocity rail guns currently under development.

The article says that life on Earth would be changed. Dazzlingly bright moonlight would save billions of dollars on street lighting, lovers would blink in the unromantic glare, and criminals would not be able to lurk in the shadows. Siberia would flourish under the warmth. I reckon it would certainly turn you off variable stars around full moon. Who knows, you might need to use UV blockout sunscreen lotion at night time.

## ASTEROID HANCOCK

Mining magnate Lang Hancock has been immortalised in space after a small asteroid was named ''Hancock''. The object is about 10km across and orbits the Sun between Mars and Jupiter. No doubt it's made of iron.

# Lunar Eclipse Photos



I had hoped to show a fabulous series of photographs of last months lunar eclipse replete with close ups of semi-darkened craters and star fields at totality. There is one thing all amateurs alike have to come to terms with and that is Murphy's Law stating "The cloud cover varies inversely to the importance of the event being observed" In this case 100% cloud cover.

Oh well C'est la vie. I had a small group of guest observers round my place to watch and photograph the event. We even had the Celestron 11 set up to take time lapse photos. All we could do however was curse our luck and get stuck into some conversation about telescope making and how to get the vacuum coater up and running. Around 12.30am we decide to call it a night and when outside saying Good Night, lo' and behold the cloud cleared and a sliver of moon was visible. The telescopes were abandoned because the remaining cloud prevented any observing at high magnification but Steve Malone and I remained to snap some tentative photos using telephoto lens. A small selection of the results is shown.

## VARIABLE STOPS VARYING

North hemisphere observers are in the process of watching a cepheid variable star stop varying. The pole star Polaris has shown regular cepheid type variations in brightness throughout this century. Cepheids are a type of variable known to change in brightness due to regular pulsations in size. Polaris's light variation has slowly changed from about 10% at the turn of the century through 5% in the 1980's and to less than 1% today. Doppler shift measurements in the star's spectrum show the magnitude of the size pulsations has declined and at the present rate of decline Polaris will assume a steady luminosity about 1994. It will be the first cepheid know to have stopped pulsating. The reason for Polaris's grinding to a halt is not known however the star will not doubt be closely watched.

What a great project for an amateur to find a second Southern equivalent !!

## SPACE ADVERTISING HORROR

An international boycott of companies using satellite advertising is being organised to quash plans of launch a giant billboard into low Earth orbit. The advertising company plans to launch a marketing satellite into very low orbit and inflate a 5 mile long sunlight reflecting billboard which will be easily visible from the ground. While this "cosmic advert" will only be visible for a few weeks before the satellite is dragged into the atmosphere and destroyed, astronomers and environmentalists around the world see the launch as a sign of things to come. What next?

# Observing Variable Stars

On any one night the stars above us are fixed, unchanging points of light. This is not the case however night to night, month to month or year to year. There are literally thousand of stars that change brightness and colour with all sorts of intriguing behaviour and with a little bit of planned observing the amateur astronomer can extract some of these behaviours. Stars that change their appearance are called "Variable Stars" and the study of variables is an area of observing that is just made for the amateur astronomer.

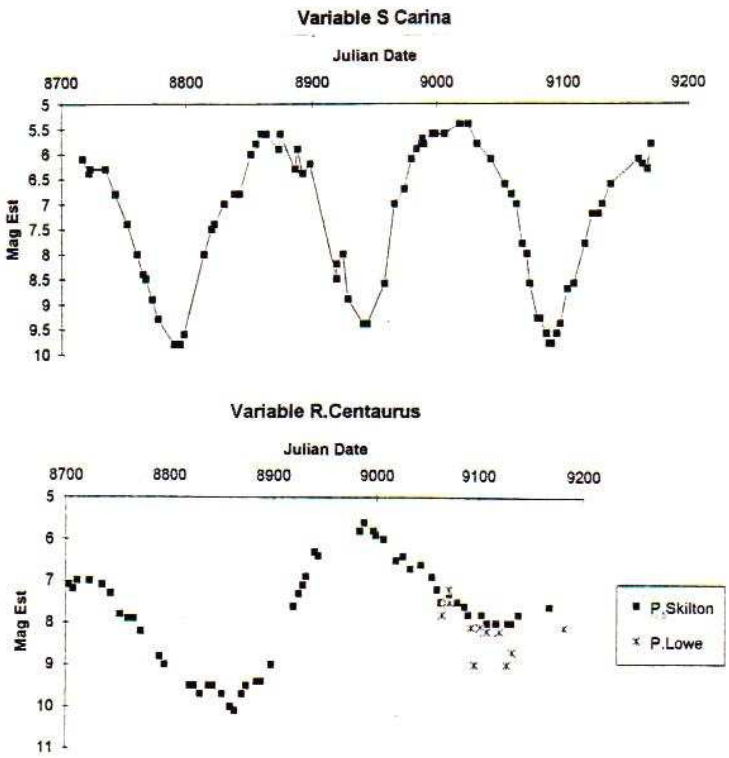
To the observer at the telescope, a star will always appear as a point of light and any change in a star's brightness can only be made in comparison with other stars in the same visual field. The observer thus records whether a variable is brighter or dimmer than known reference stars. By keeping an observing diary and monitoring a star's brightness relative to its neighbours, the light curve for the variable can be measured. The variable's light curve is a plot of the star's brightness against time. It is common to characterise a variable by the type of light curve observed. Two examples of light curves being monitored by Peter Skilton are shown below.

There are numerous ways in which a star can change its brightness as seen from Earth. The star could intrinsically change its brightness due to changes in internal structure or surface condition. Alternatively the star's luminosity may be steady but appears to change brightness because of a geometric event such as the star becoming obscured by a cloud of dust. Studying variables requires planned and persistent observations to build up a history of the individual stars' behaviour. In some cases this requires years of observations to build up a suitable database but in most cases some results come after only a few weeks' observations.

There are a number of fairly standard classifications of variables (although there are still a good many variables that refuse to be classified). The classifications are based around the type of light curve associated with the variable and thus the underlying mechanism for the light variation. Let's consider some of the mechanisms whereby a star's observed brightness can change. It could for instance change it's size in some manner. The Cepheid variables named after the first star known of this type Delta Cephei are a form of pulsating star and change their brightness and colour as they regularly pulsate like beats of a heart. Cepheids are believe to be undergoing regular ionization and recombination of the star's atmosphere that responds by changing its opacity. The varying opacity effectively changes the size of the star's photosphere and thus its luminosity. Cepheid stars are a very important variable type because earlier this century it was discovered there is a relationship between the period of pulsation and the stars actual (or absolute) luminosity. Thus an astronomer need only measure the period of a Cepheid's brightness changes to deduce its absolute luminosity and then knowing its brightness as seen from Earth, the distance to the star can be computed. Cepheids vary with periods ranging from a few days to a few weeks. While the brightness changes are not very great they are easily measured with a telescope or binoculars.

Another group of pulsating variable is the more irregular Mira type, named after the group's prototype Omicron Ceti, better known as Mira. Mira types are old red giant stars and do not have a periodic variation in brightness but change their brightness from semi-regular to random ways. These semi-regular periods can range from a few hundred to thousands of days long. The light variations stem from changes in the stars size due to convection of hot packets of gas rising from deep inside the star to the stellar surface. The famous star Betelguese or Alpha Orionis is a Mira type with irregular variations covering several years.

In addition to these periodic variables, there a number of irregular variables such as the U-Geminorum type that maintains steady brightness and cyclically brightens 2 or 3 magnitudes or conversely the RCrB type that suddenly decreases in brightness. The RV Taurus types exhibit irregular minimum with varying depth of fading from cycle to cycle while the SX Centaurus type show superimposed long and short term variations. A final type of intrinsic variable is the flare stars including novae and supernovae.



Some flare stars are re-current such as T-Pyxidix that flares about every 20 year. The star is now well overdue for its next flare. The last flare occurred 26 years ago in 1967.

Extrinsic variables are the class produced by the geometry of the observation rather than actual changes in the star's luminosity although both changes can occur simultaneously. The simplest form of extrinsic type is the Algol eclipsing variable. Eclipsing variables are binary stars in which the star separation is sufficiently large for each star to retain its normal shape and structure but the orbital plane is close to the line of sight as seen from Earth. Thus we terrestrial observers will see cyclic eclipses as the stars appear to pass back and forth across each other. The deeper of the minima occurs when the brighter star is eclipsed and is called the primary eclipse while the shallow minima are called the secondary eclipse.

Beta Lyrae type eclipsing variables also consist of a binary star system however the stars are no longer far enough apart to maintain their individual shapes. Each star is distorted by tidal and rotational interactions leading to considerable variation in the star's surface temperature. The stars apparent brightness varies continuously as the star rotates.

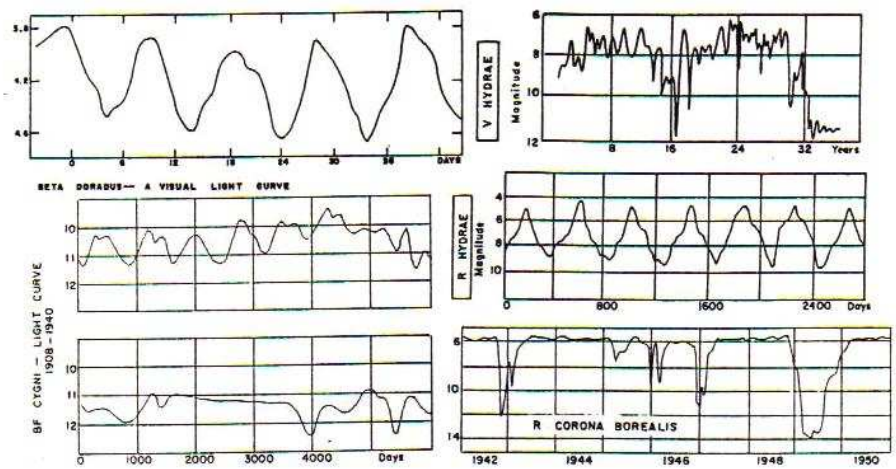
A similar type, the W. Ursae Majoris variable is an even more extreme version. These stars are even closer and distorted to the point where the stars can physically interact. Their light curves show continuously fluctuating light variations with periods as short as a few hours. A number of flare stars may be advanced forms of this variable type.

Finally there are the rotational variables such as Proxima Centauri, the close star to our solar system. These stars show small regular variations due to disturbances on their surface. Solar flares and sunspots do change our Suns luminosity but at an insignificant level. On rotational variable the surface disturbances are much more extreme and might affect 30% of the star's surface. Studies of these types of variables can tell us a lot about the rotational history of stars as they age.

Studying variable stars can be a great pastime but it does require some pre-planning. A small number of variables can be monitored using a pair of binoculars. Most of my variable observations are made using a pair of 16X50's however to get reliable magnitude measurements a small telescope is essential. Small 4-6 inch telescopes are more than adequate although larger is better to see variable at fainter magnitudes. Stars down to 13th magnitude are well within the range of a small Newtonian. It is normal to make up charts showing the variables' surrounding star field. Charts of some regularly observed variables are available and are a good starting point. Finding the variable can be the hardest part of the visual programme because these stars can be quite faint even at maximum, typically 8-10th mag. Some time spent star hopping to find the star will be needed and I recommend you make a drawing showing your star hopping path so you can re-trace it. As you become more attuned to each variable, you will be able to find the star without the need for the chart however I still recommend drawing one, you can soon become disorientated as the seasons march on. Once the variable has been located, you quickly compare the star brightness with each of the comparison stars. Don't spend too much time staring at the star just quickly move the eye back and forth between the variable and the comparison star. Decide which is brighter or dimmer and pass on to the next comparison star. Some people claim to be able to estimate magnitude differences to within 0.1 mag. I find this very difficult and would put my estimates at ±0.1 if conditions are good and ±0.2 under average conditions. In you records you should note the time, observing conditions, instrument used, variable name, estimated magnitude and some comment about the usefulness of the observation such as good, poor, bad.

If you are of a mind, your readings can be sent to data collecting groups who help co-ordinate and collate observations. If you wish to do this, please contact Peter Skilton.

Amateur astronomy is a fascinating hobby whereby an observer can explore the finer, less obvious complexities of Mother Nature while simultaneously breaking away from the hustle and bustle of modern living. The observation of variable stars supplements both these outcomes and can be a fun way to explore the skies above us.



# The Higginson Springfield Telescope

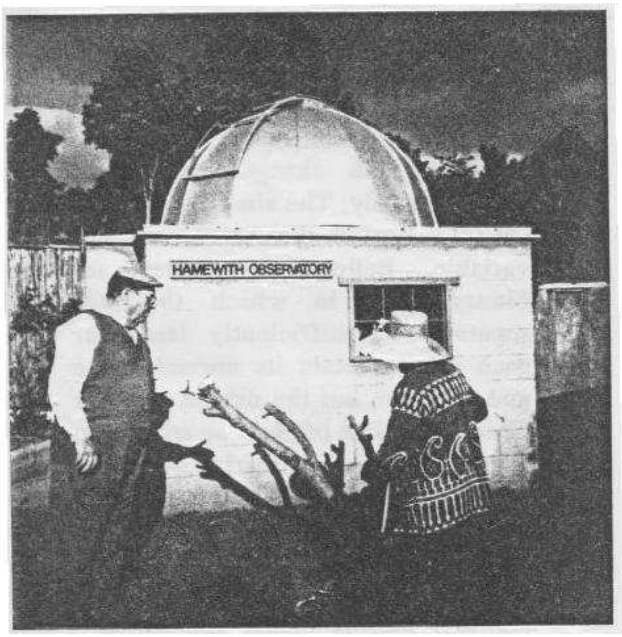
No doubt you are all aware that Mrs Higginson has kindly donated to the society her late husband Arthur's springfield mounted Newtonian telescope. It is hope that subject to agreement from The Briars management committee, we will be able to mount the instrument there in an observatory.

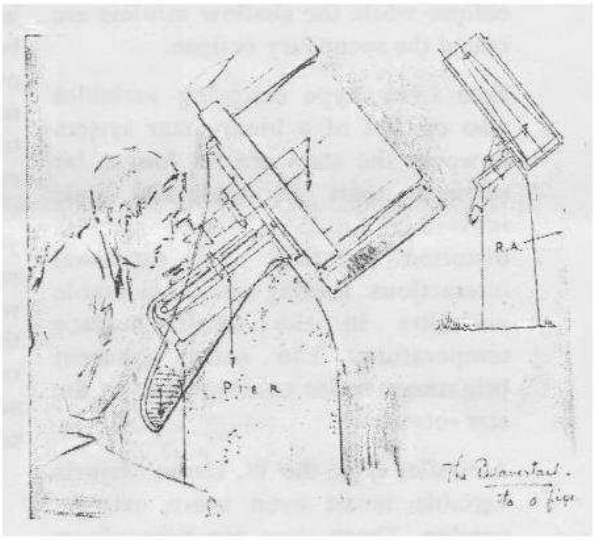
The Hamewith Observatory where the instrument has been house, (see photo right ) was built by Arthur in the early days of the society and is a concrete brick structure with a sheet metal dome about 3 metres across. The dome is electrically driven using a bike chain and motorised gearbox. Mrs Higginson has decided to retain the observatory building which she hope to convert to some other function.

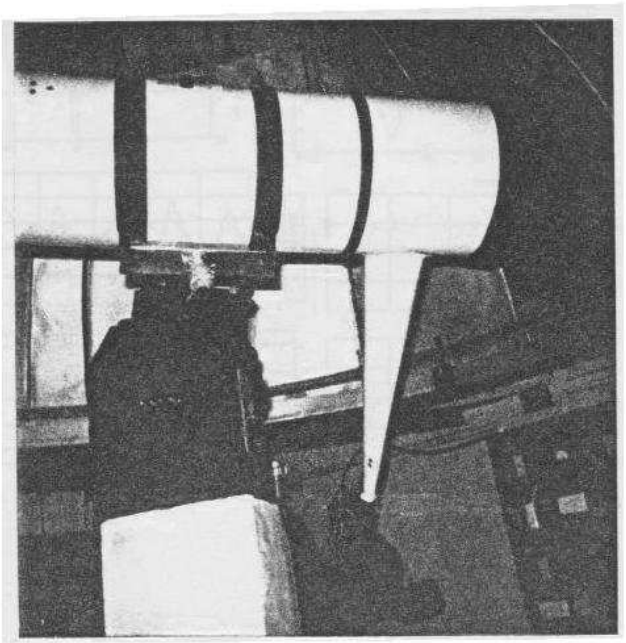
The instrument itself is a 250mm Newtonian mounted on a Springfield type drive. (see lower photo right ) The Springfield mount is an unusual telescope configuration with the advantage that the eyepiece is at a fixed location. An observer can thus view any part of the sky without needing to move from his or her observing chair. (see bottom diagram from Amateur Telescope Making Book Two) While the optical train for this type of telescope is more complex than the normal Newtonian and certainly places more stringent tolerances upon the optical performance of each component, this is offset by the advantages of a fixed observing position.

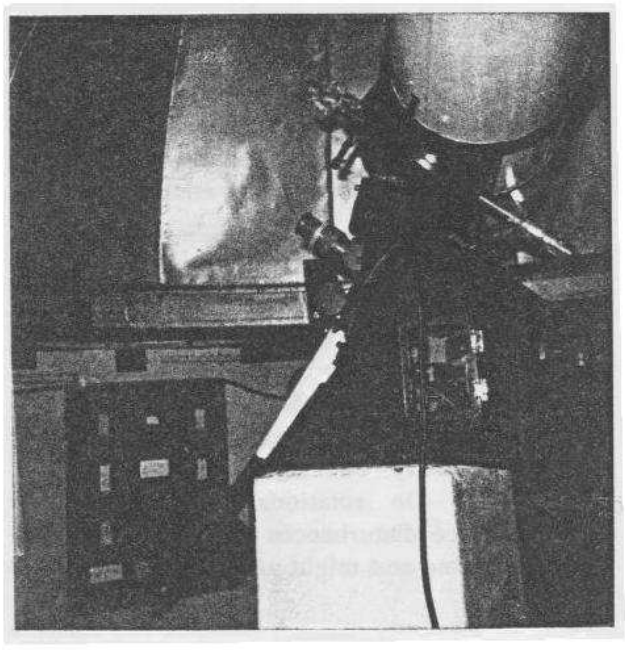
Such a mount is ideal for public viewing because it eliminates the problems and dangers of people hanging off telescopes.

While we are not yet sure of the final form of observatory required for this instrument, it is hoped The Briars will allow us to mount the instrument in a temporary building for this summers observing.





# *Scorpius Extra!!!!!*

Below - The Springfield telescope today at the MPAS Briars site in 2006
Photos - By Greg Walton