

CANOPUS

The Astronomical Society of Southern Africa

Johannesburg Centre

Monthly Newsletter for October 2000

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**The Sir Herbert Baker Library, 18a Gill Street, Observatory, Johannesburg
P.O.Box 93145, Yeoville, 2143**

Editorial

Cloudy skies and accompanying wind have made their impact on all of us the last couple of weeks. This year, the August winds only just qualified for that title, arriving on the 31st...but so far, have not managed to usher in any rain. I know that rain is generally the enemy, but it's an unfortunate fact of life that the rest of nature, including of course our gardens, and the dams, mealie and wheat fields etc... actually need it so that we can survive to curse it! Sounds like Catch-22 to me.

The International Space Station (ISS) is big in the news at present, with the Space Shuttle Atlantis up in orbit with it as this editorial is being composed. As mentioned in the previous editorial, once it is completed, it really will be quite unmistakable and very easy to view when passing overhead.

I have the first of a hopefully regular series from the "Sky Owls" presented by Dave Gordon which details his and Dino Fotinidis' Astronomical adventures as well as supplying a good picture or two.

Brian's "Sky this Month" is a very useful event guide and handily placed (as always) on the back page so that you may refer to it without have to scratch through the pages of the magazine.

Danie has supplied an interesting Variable of the Month prompted by an internationally known friend and asks that you do a little amateur research of your own - with appropriate feedback of course. A larger version of the sky chart will be available on the website where you may download it and print it out for observing purposes.

Where might you find life on Mars? - Try digging for it according to the New Scientist.

And for something a little out of the ordinary - see page 4 for information on a really special event.

This will probably be the last Canopus sent out to all current members who have not yet sent in their subscription for the 2000/2001 Jo'burg centre year. The Canopus is one of our major costs and we can't produce it without the subscriptions backing it up. *As previously mentioned, our fee structures, especially the Family Member subscription, are very inexpensive for the perks they provide - access to a physical site with some excellent telescopes, a library with a great selection of books and magazines, the "Mars Bar" and of course, last but not least, your own Johannesburg Centre magazine - Canopus.*

The Editor

chris@penberthy.co.za

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Notice of Meeting

The **October** meeting of the Johannesburg Centre of the Astronomical Society will be held in the Sir Herbert Baker Library, 18a Gill Street, Observatory, on Wednesday the 11th of October, 2000 at 20:00.

Topic:

Meteorite Collecting

By: **Trevor Gould**

Future Meetings

November 8 th	Impact Craters	Prof Uwe Reimold
December 9 th	Under the Full Moon	Annual Star Party

Are there any subjects that you would like to hear at one of the monthly meetings? Contact your local friendly committee member and ask her/him to discuss it in committee.

Dark Sky Viewing

On the Saturday nearest New Moon at Tom Budge's Farm in the Magaliesberg. Remember that this is by arrangement only as most observers will be following specific viewing programmes and if you don't have your own 'scope, you should contact one of the observers (e.g. at the monthly meeting) to arrange some viewing time with them.

28th October
25th November

Year End Star Party 2000
"Under the Full Moon"
9th December

Annual Subscription Fees

There are no changes to the Johannesburg Centre's subscription fee structure for the 2000/1 year. The joining fee remains R50-00 and the Annual fee R100-00. The Family membership subscription fee also remains unchanged at R125-00. The Family membership is restricted to couples and their co-resident dependants and although all Family members receive full rights as members of the Centre, only one copy of the monthly magazine, Canopus, will be posted to the family address. The annual subscription form is included with this issue of the Canopus and we would like to urge you as members to pay your subs as early as possible to enable your committee to plan the Centre's projects for the year ahead.

Please post your subscription fee, or deposit/transfer it directly into the Society's bank account at **NEDBANK**. The Account information is as follows:-

Bank:		NEDBANK
Branch	Name:	Park Plaza
	Code:	19 21 42 44
Account	Type:	Current Account
	Number:	1921 013761
	Name:	<u>ASSA Johannesburg Centre</u>

Please remember to write your name on the deposit slip or to include your name as a reference on a direct transfer. Then fax the details to (011) 339-2926 to let Constant know that you have paid via direct deposit or transfer so that you will be kept on the Canopus mailing list.

Jo'burg Centre Outings for 2000

Your Committee is making arrangements for several outings during the year. Amongst these are some old favourites as well as a couple of new ones which should prove interesting.

Swinburne was visited, and an article has been promised for the next issue of Canopus.

Boyden has been cancelled due to lack of availability of the 60" but we'll plan a visit again next year.

We will also be looking at the possibility of arranging visits to other ASSA Centres (e.g. the Pretoria Centre) during the year - and also try to see if we can organise some joint ventures.

Haartebeeshoek - Wolf Lange is attempting to organise a visit later in the year, as well as a visit to the Suikerbosrand Nature Reserve.

Tswaing Crater - still trying to set up a day visit under the guidance of Prof. Reimold

Telescope Making Classes

Would you like to make your own telescope?...or finish off a partially finished one? Well your opportunity has arrived (once again). Join the Telescope Making Class being held under the guidance of Brian, Evan and Chris. Contact Brian on 803-8291 if you are interested.

* * * * *

Special Evening - Millennium Celebrations.

In recognition of the tremendous contribution South African amateurs have made to the field of Astronomy we are holding a very special evening, with talks by some prominent Astronomers.

This glittering evening is going to be the most important event of the new millennium (or the last of the old millennium, depending on which view you subscribe to). But certainly an evening NOT TO BE MISSED.

Please make a note of this date in your diary.

When : **November 11th 2000**

Where : To be announced.

* * * * *

CHANDRA CLINCHES CASE FOR UNEXPECTED BLACK HOLE DISCOVERY

From: NASANews@hq.nasa.gov
RELEASE: 00-140

There's new evidence the universe is home to a type of black hole that's not too large and not too small. As black holes go, it's a middleweight that may represent the missing link between its flyweight relatives and the super-heavyweight variety found at the center of most galaxies.

Using NASA's Chandra X-ray Observatory, several groups of scientists have zeroed in on a mid-mass black hole located about 600 light years from the center of galaxy M82. "This opens a whole new field of research," said Martin Ward of the University of Leicester, England, a lead author involved with the observations. "No one was sure that such black holes existed, especially outside the centers of galaxies."

The M82 galaxy got its name nearly 220 years ago when it became the 82nd entry in a systematic catalog of nebulae and star clusters compiled by French astronomer Charles Messier.

The black hole found in M82 packs the mass of at least 500 suns into a region about the size of the Moon. Such a black hole would require extreme conditions for its creation, such as the collapse of a "hyperstar" or the merger of scores of black holes.

"This black hole might eventually sink to the center of the galaxy where it could grow to become a supermassive black hole," said Dr. Hironori Matsumoto of the Massachusetts Institute of Technology (MIT), Cambridge, the lead author on one of three Chandra papers scheduled to be published on the

mid-mass black hole.

Although previous X-ray data from the German-U.S. Roentgen Satellite, and the Japan-U.S. Advanced Satellite for Cosmology and Astrophysics (ASCA) satellite, suggested that a mid-mass black hole might exist in M82, the crucial breakthrough came when astronomers compared the new high resolution Chandra images with optical radio and infrared maps of the region. They determined that most of the X-rays were coming from a single, bright source.

Repeated observations of M82 over a period of eight months showed the bright X-ray source

gradually peaking before dimming. Another critical discovery was that the intensity of the X-rays was rising and falling every 600 seconds.

This flickering of the X-ray intensity is similar to the well-studied characteristics of black holes swallowing gas from a nearby star or cloud," said Dr. Philip Kaaret of the Harvard-Smithsonian Center for Astrophysics, lead author on the paper reporting the 10 minute variations. "Explanations other than a massive black hole for this object are implausible."

Observations with Japan's Nobeyama Millimeter Observatory by Dr. Satoki Matsushita of Harvard-Smithsonian and colleagues have revealed a large expanding superbubble of gas centered on the mid-mass black hole in M82. The energy of several thousand supernovae would be required to produce such phenomena.

In the past, our Milky Way galaxy could have produced mid-mass black holes during periods of vigorous star formation. Hundreds of these massive black holes may exist unseen in our galaxy, in addition to the dozen or so known stellar black holes and the supermassive black hole that is safely confined to the galaxy's nucleus.

Scientists from Kyoto University, Ehime University, RIKEN (The Institute of Chemical & Physical Research), and Nobeyama Radio Observatory, all in Japan, were also involved with the Chandra observations.

The observations were made with the High Resolution Camera (HRC) and the Advanced CCD Imaging Spectrometer (ACIS). The HRC was built for NASA by the Smithsonian Astrophysical Observatory, Cambridge, MA. The ACIS instrument was built for NASA by MIT, and Pennsylvania State University, University Park.

NASA's Marshall Space Flight Center in Huntsville, AL, manages the Chandra program, and the Smithsonian's Chandra X-ray Center, Cambridge, MA, controls science and flight operations. TRW, Inc., Redondo Beach, CA, is the prime contractor.

Sky Owls Observing at Frankfort, Free State, 26 August 2000

(27° 15' S, 28° 31' E)

By Dave Gordon

An account of Dave Gordon and Dino Fotinidis' astronomy observations at a dark sky venue about 1½ hours drive from a light-polluted Johannesburg. It should be noted that their respective spouses were in attendance and in fine outdoors spirit, however they once again displayed an astronomy attention span of about 4.3 nano-seconds!

We arrived on the deserted farm at about 4.30 in the afternoon, greeted by a stunning sunset. The venue is ideal for astronomy observation; set upon a small hill with no obscuring trees or

mountains - 360 degrees of pure bliss. There is a slight horizon glow from distant Frankfort but this little disadvantage is offset by absolutely no farm lights in the immediate vicinity.

We quickly set about preparing telescopes and photographic equipment. We ate a scrumptious meal while the sun finally obliged and plunged below the horizon. With human batteries fully charged and the last wisps of twilight fading, it was time for pleasure.



The first priority when observing and especially taking astrophotos, with non-computerised equatorially mounted telescopes, is to obtain a perfect south celestial pole (SCP) alignment. There is no star precisely on the SCP. This problem is overcome by applying a good knowledge of the surrounding star field at the SCP in a low-power viewfinder and in a low magnification eyepiece. The wedge

latitude setting must be accurate and the telescope mount set level with a spirit level.

The advantage of spending a little extra time gaining a perfect SCP alignment is evidenced when the setting circles gain an astonishing accuracy, time and time again, when using them to seek deepsky splendours using RA and declination coordinates. In low-power eyepieces, we were able to manually target galaxies within a maximum of a 30' error

margin! That is we obtained a 100% success rate on finding the object within the field of view, first time every time. Subsequently, once centered in the field of view, deepsky object tracking was perfect over extended periods.

The astro photography segment of our evening was devoted to low power, large field of view starscapes. For this purpose, we followed a 20-

minute exposure of Crux and the pointers, with the same time on the star field in Sagittarius/Scorpius using a 50mm lens on ASA 200 film. On Lyra's culmination, a 20 minute exposure with the possibility of an aeroplanes' jet trail cutting through the lower region of the constellation. This all on scope piggyback.



Then it was time to unleash the scopes. Our first stop was three out of the four finest globular clusters in the sky. We chose them first as we wanted to raise the astronomy attention span of our wives. We showed them M16 Hercules Cluster, M5 in Serpens Caput and the most glorious one of all, Omega Centauri. The following dramatic words bubbled out: "But they all look the same!" It was a sign for some serious astronomy to take place.

M6, the butterfly cluster in Scorpius, was in fine form and we couldn't resist a 30 minute guided exposure using Dino's specially designed guide tube and illuminated eyepiece. Thereafter we set the cameras on tripods and left them to record long star trails of the SCP region and of the eastern horizon.

The time arrived for deepsky splendours. However, at this point in the evening thirst levels for hot chocolate and coffee became unbearable. We hadn't brought along a pot for boiling water on the Cadac. Amory, and particularly Tinkie, get full credit for ingenuity upon discovering Dino's tool-tin as a perfect receptacle for heating water. This has elevated them to full assistant quasi-astronomer status!

Each of the following objects was found using the setting circles. Search time was no more than about one to two minutes per object. The scopes in use were 8 and 10 inch LX50 SCTs with 6.4, 12, 15, 25, 32 and 40mm eyepieces. In each instance, it was interesting to note the difference in image definition produced by the scopes.

First stop was NGC 253 in Sculptor. At mag 7.1, a very bright angle-on spiral galaxy, elongated NE to SW and lying just north of two 9th magnitude stars. Well defined with brighter area in the halo and a certain mottled glow towards the centre. There was almost no material difference in the image detail produced by the two scopes. This is probably attributable to the galaxy's fairly strong surface brightness of mag 12.6.

NGC 55 is a spiral galaxy almost edge-on. Long, elongated, flat, thin and brighter on the western side. Fading quickly towards the east, almost as if the edge has been cut-off prematurely. This probably the result of obscuring inter-stellar medium. We noted that the core appeared off-centre towards the western side. We would like to propose this be nicknamed the "Circumcised Galaxy"!

Spiral galaxy M77 in Cetus (NGC 1068) was quite small with a fair surface brightness. O'Meara records this at 13.2 with a visual brightness of 8.9. We noted a bright core, slightly barred, wispy spiral arms which appeared very faint in the halo area and about the core. The galaxy appears just west of a 10th magnitude foreground star. We also noted that this was one of the peculiar Seyfert galaxies. These galaxies are known for their unusually bright nuclei. The reason is attributed to supermassive black holes in their centres.

We continued to ride the whale on to NGC 247 which we found to be a very faint, elongated edge-on spiral galaxy with very low surface brightness. We dubbed this one a "blink-and-miss-it" (b.a.m.i.)-type galaxy. However, the longer we kept eyes to eyepieces, the more ancient photons of light soaked retinas until very faint mottled features began to materialise. The entire galaxy was elongated north to south with a magnitude 8.5 foreground star positioned near the southern tip.

It was about this time that one of the farmer's more adventurous cows decided to sneak along and take a closer look at the motor car in which

the spouses were now in a deep restful sleep. At first, the astronomers, deep in observation, didn't hear the cow nuzzling the car's back bumper, and no doubt, about to move in for a more involved and fulfilling scratch. With much wild gesticulations and traditional ululations, we managed to dissuade this wanderer from further extra-vehicular activity. It took some time to calm the now wide awake assistant quasi-astronomers.

Target Pegasus and NGC 7331, a large angled spiral. Elongation is approximately north to south with strong oval-shaped nucleus of grainy texture. Two mag 13 stars lie west of the northern tip. We spent much time on careful observation and discussion regarding the 4 faint, nearly-stellar objects lying about 4 to 8 arc-minutes east of 7331. Eventually, we were able to clearly identify 3 of these in the 10 inch scope as the very faint 14th and 15th magnitude galaxies of NGC 7335, 7337 and 7340. The fourth object was confirmed as a foreground star. We also made the initial error of mistaking this complex as Stephan's Quintet, which in fact lies half a degree to the south-west of NGC 7331 - oh the joys!

The grand finale - NGC 1365 in Fornax. Low surface brightness with a distinctive bar formation in the centre and a "two-claw" spiral arm structure: one band extends northwards from the western side of the bar, the other extends southwards from the eastern side of the bar, both ends becoming very faint, very quickly. A gentle nudge north east and south west from 1365 and we were in the middle of Fornax festival of galaxies. What a stunning sight to end an evening, which had begun with indifferent seeing conditions, dramatically improving by 2am in the morning, to very steady with excellent transparency. 5 galaxies in one field of view, some elliptical, others irregular. The field of view was a photon extravaganza of galactic proportions!

Weary and satisfied, our 3am repack and trek back to reality was about to start. We'll be back!

(Dave Gordon is a financial and training consultant. Dino Fotinidis is an Industrial Chemist. Anybody with their own observing equipment, and brave enough to match their energy and enthusiasm for astronomy, is welcome to join them on their next planned mission to Frankfort. Contact Dave on 083-746-2200 or Dino 083-229-3885 for details of the next Sky Owls outing.)

Dig for life on Mars

Author: Mark Schrope

New Scientist issue: 16th September 2000

Find liquid water on Mars, and life may not be far behind. Many scientists believe that this water can only exist thousands of metres beneath the planet's surface. So a team of engineers at NASA's Jet Propulsion Laboratory in Pasadena, California, is developing a robotic mole that can drill deep into Mars and return samples to the surface through a tube that it constructs as it digs.

JPL's Martian mole moves through the ground like a piledriver, repeatedly raising an internal weight and then hammering it into the ground. On Mars it will be wired up to a set of solar panels on the surface that provide only enough power to illuminate a few light bulbs. So the designers had to make a machine that could penetrate the ground using only this meagre power.

The design JPL came up with has a hammer head that spins at up to 20,000 revolutions per minute before engaging a central thread that drives it into the ground. This delivers roughly twice the force of a sledgehammer blow on Earth, and enables the mole to burrow at up to 10 metres per day.

As it digs, the mole extrudes a tiny tube containing two passageways which provide a link to the surface and back. Liquid xenon circulating through these tubes will carry samples that can be sieved and analysed on the surface.

One possible target for the mission is a potential aquifer that many scientists believe may exist about 5 kilometres down near the Martian equator, says Brian Wilcox, the project leader. Another option is to aim for one of the planet's polar ice caps and study Mars's climate history over the past few million years by examining ice samples.

The group has already built a prototype of the hammer mechanism and is now planning the tube extruder. In 2002, Wilcox plans to test the complete system in the Alaskan permafrost. He says his team could be ready to tackle Mars within a decade.

"Drilling may well be the only way we can get to places that have a chance of having life on Mars today," says Michael Carr, a geologist at the US Geological Survey who is reviewing NASA's Mars programme.

If you have access to the World Wide Web, point your browser to the following URL:-

<http://www.newscientist.com>

Tree rings challenge history

Could a comet hitting the Earth 1,500 years ago have triggered a global disaster in which millions of people lost their lives? It is an old claim that historians say has little evidence in written records to support it, but now a tree ring expert has said the idea must be re-examined.

Mike Baillie, professor of palaeoecology at Queen's University in Belfast, UK, said it was very clear from the narrowness of growth rings

in bog oaks and archaeological timbers that a great catastrophe struck the Earth in AD 540.

"The trees are unequivocal that something quite terrible happened," he told the British Association's Festival of Science. "Not only in Northern Ireland and Britain, but right across northern Siberia, North and South America - it is a global event of some kind."

Jonathan Amos

BBC News

September 8, 2000

Variable of the Month

CoD -62deg 466

Colin Henshaw is a celebrated binocular variable star observer. He has observed from Mauritius, several countries in Southern Africa, the Middle East and the UK. He is a co-discoverer of the famous supernova 1987a, hence his unusual Email address.

Recently he wrote to me as follows:

Return-Path: <cohensn1987a@hotmail.com>

Dear Danie,

I was in the Royal Astronomical Society Library on Monday when I came across the latest MNASSA journal and your article on the Apr 6th Aurora and your e-mail address. Delighted to learn that all is well at your end. I have heard lots of nasty stories about Zimbabwe recently. I do miss Africa. In recent years I have been teaching in Saudi Arabia and the United Arab Emirates. . .

I have had my paper on CoD-62deg466 published in France recently, and I have prepared a chart. Unfortunately I cannot observe it from this hemisphere, so I depend on my colleagues in the Southern Hemisphere to follow it for me. I can send you a chart.

The object is listed in Guide 7 and Sky Map Pro, and I found it has a B-V of five mags. [Wow! Such a large colour index means that it is ruby red - Danie] Such an object must be variable.

If I send you a chart, can you let me know what it is doing?

Best wishes,

Colin

Here is a wonderful opportunity for Canopus readers to do some real science and to be listed as collaborators if Colin produces another paper. It is just a matter of watching it at every opportunity and reporting to Colin, Jan Hers or me.

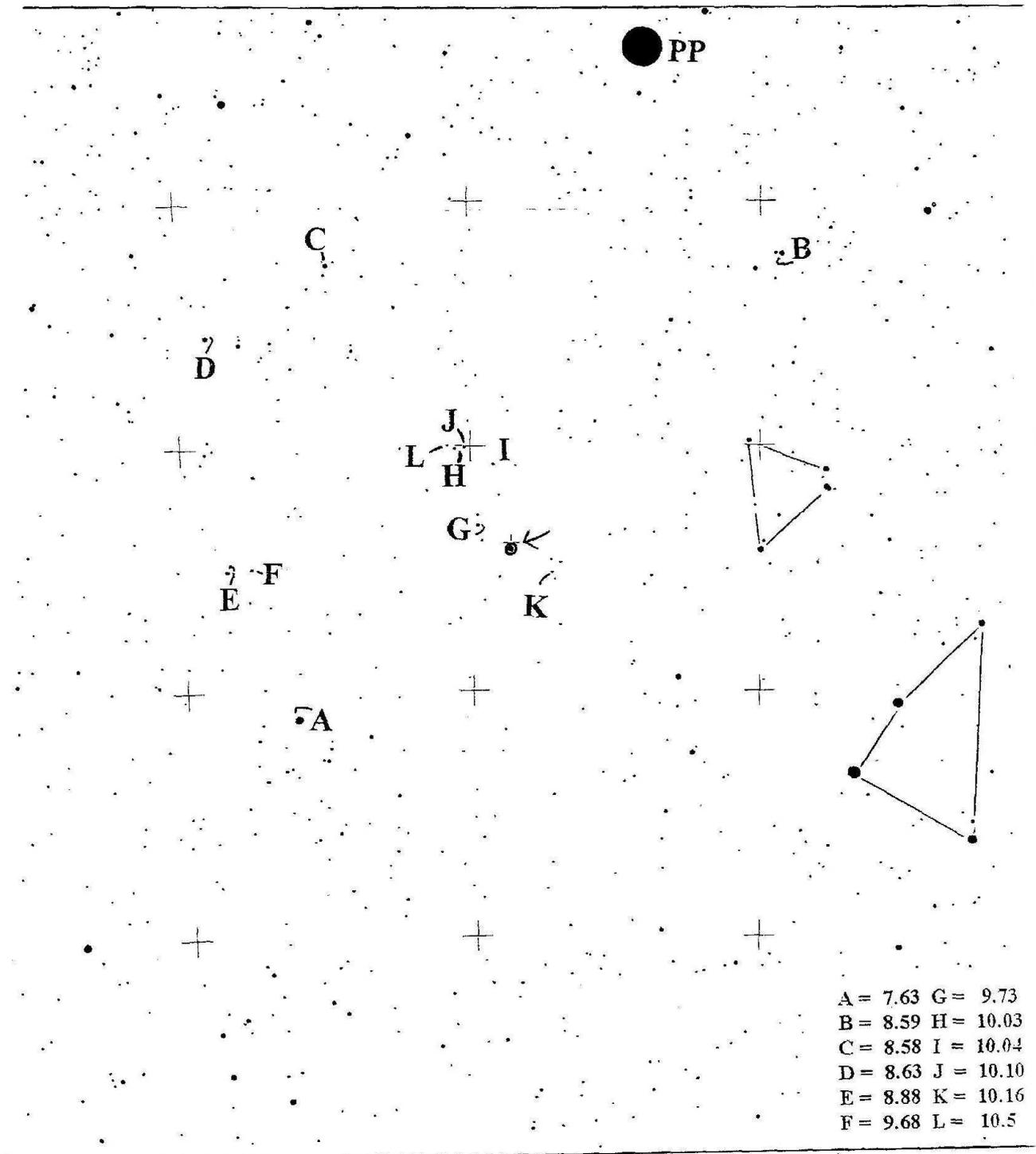
The variable is just southeast of **P Carinae** and is near our old favourite **S Carinae**.

Enjoy Colin Henshaw's suspected variable.

Danie Overbeek.

Star Chart for Variable of the Month
CoD -62deg 466

CoD -62° 466 Sp Unknown
(1950) 10h 32m 31s.7 -62° 27' 27".26 var?



A = 7.63	G = 9.73
B = 8.59	H = 10.03
C = 8.58	I = 10.04
D = 8.63	J = 10.10
E = 8.88	K = 10.16
F = 9.68	L = 10.5

Sources: SAOC; Tycho



22-11-1992 Maunatlala
Botswana

The Sky this Month

October 2000

dd hh	dd hh
5 11 FIRST QUARTER	19 22 Moon at perigee
6 04 Mercury greatest elong. E(25)	20 08 LAST QUARTER
6 08 Moon at apogee	21 05 Jupiter 4.6 N of Aldebaran
7 06 Neptune 1.3 N of Moon	24 06 Mars 3.5 S of Moon
8 08 Uranus 1.4 N of Moon	26 16 Uranus stationary
13 09 FULL MOON	26 22 Venus 3.3 N of Antares
14 19 Mercury greatest brilliancy	27 09 NEW MOON
15 06 Neptune stationary	27 15 Mercury 6.5 S of Moon
16 06 Saturn 1.7 N of Moon	29 22 Venus 12.2 S of Pluto
17 01 Jupiter 2.3 N of Moon	30 05 Mercury in inferior conjn.
18 15 Mercury stationary	30 09 Venus 4.5 S of Moon

November 2000

dd hh	dd hh
3 04 Moon at apogee	15 13 Mercury greatest elong. W(18)
3 14 Neptune 1.6 N of Moon	18 16 LAST QUARTER
4 08 FIRST QUARTER	19 12 Saturn at opposition
4 16 Uranus 1.8 N of Moon	21 18 Mars 4.2 S of Moon
7 19 Mercury stationary	24 12 Mercury 3.0 S of Moon
11 22 FULL MOON	26 00 NEW MOON
12 11 Saturn 1.8 N of Moon	28 02 Jupiter at opposition
13 04 Jupiter 2.5 N of Moon	29 19 Venus 2.0 S of Moon
14 06 Mercury greatest brilliancy	30 22 Neptune 1.9 N of Moon
15 01 Moon at perigee	

LOCAL TIMES of RISE and SET for the MAJOR PLANETS, 2000

Site Location:- Long. **+28.0** deg. Lat. **-26.0** deg.

Local Time:- UT **+2.0** hrs.

Date	Sun		Mercury		Venus		Mars		Jupiter		Saturn	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Oct 07	05.42	18.09	06.50	20.06	07.18	20.31	04.15	15.49	22.24	09.02	21.33	08.25
Oct 17	05.32	18.14	06.31	19.56	07.19	20.48	03.54	15.37	21.42	08.21	20.51	07.44
Oct 27	05.24	18.20	05.40	18.53	07.24	21.06	03.33	15.25	21.00	07.39	20.09	07.03
Nov 06	05.17	18.26	04.38	17.24	07.33	21.24	03.11	15.13	20.16	06.55	19.26	06.21
Nov 16	05.12	18.33	04.15	17.04	07.45	21.39	02.49	15.01	19.31	06.11	18.43	05.38
Nov 26	05.09	18.41	04.17	17.25	08.00	21.50	02.28	14.49	18.45	05.27	18.00	04.56