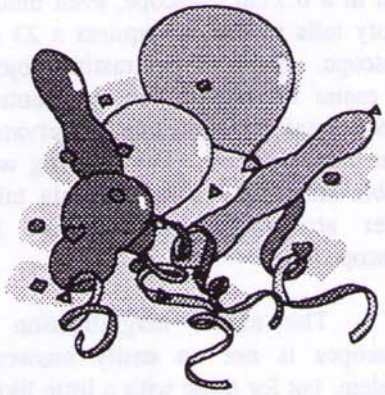
HAMILTON AMATEUR ASTRONOMERS

Event Horizon

Volume 2 Issue 1 November 1994

Editorial



Happy First Birthday

It is hard to believe that one year has passed since our club was first established. Many new friends and lots of good ideas have developed during this time. I wish this club all the best as we look forward to another fabulous year full of fun and activity.

Thanks go to all the contributors of this newsletter. This issue is once again filled with fascinating tidbits of informaiton for all to enjoy. As fun as it is to play around on the computer, arranging articles and checking the spelling (how do you spell guage, anyways?) I'd rather be feeling the cool breeze of the crisp outdoors, observing some distant galaxies and globular clusters. As you can tell by the pictures frequently found, (courtesy of Home Planet) I'm into the observational astronomy. Now, where did I put my Sorels.

Patricia Marsh 575-4191

Chair's Report

OK! OK! OK, Trish, I will write a Chair's Report.
Yes, I will get the report to you by tomorrow.
Yes I promise, by tomorrow.
Goodbye, see you tomorrow!"
Hanging up the phone I break into a cold sweat and start to tremble; I have to write one of those terrible "Chair's Reports".

Now, I could start out by pointing out that we're moving into Fall and will probably have a lot of bad weather to ruin our observing. No, that's not very positive, and after all we have had a very good Fall so far.

Think , Grant, think! Well, I could talk about Ev's and Patty's programs that are aimed at expanding and enhancing the HAJA. These two programs will offer our youth members a meeting of their own every month. And a junior news letter also! With the enthusiasm that is been generated by these two ladies and all those people who are helping our club in general, and our youth members in particular, should be served richly. No, I can't do that because I already did it in this paragraph.

I could talk about the direction in which I hope to guide this club. Let's see ... "If you are new to our group...." No, I can't do that; Doug said that last month. After all, this is a group effort and a new Chair is not going to redefine the direction of this club. We will move forward as a group responsive to the membership and **only** to the membership. If I am lucky I might and be able to read the members' wishes accurately and thus be better equipped to avoid any rocky shoals over the next year (judging from the past, that should be marshmallow shoals).

What about mentioning the renewed relationships with the RASC Hamilton Centre and how we plan to have a "WIN/WIN" relationship that will benefit the membership of both clubs? We will mention their events in our newsletter and they will mention ours in theirs. We will invite their members to join in on some of our fun and they will do likewise. I could talk about this but a better idea would be to let some of these events unfold naturally, like opening up presents on a birthday!

Do-o-o-oh.. What to write about? Oooh, I can't think. Well, to heck with it! I won't write a Chair's report this month!

(Sorry, Trish...)

Grant

Inside This Issue

Magnification

Hey, mister, how powerful is that telescope of yours?" Anyone who has ever shown the sky to the public has been greeted with this question. I used to launch into a great and lengthy description about how we astronomers were more interested in light gathering powers of a telescope and not mundane magnification. This was answered by a blank stare that inevitably was followed by "Yea, but ... how **powerful** is it?"

To us amateur astronomers this **should** be a relevant question. We have all used the rule of "twenty times the diameter of the objective in centimetres" and have probably never thought where this rule came from. We should know about the restrictions imposed upon us by our equipment. When I talk about equipment as regards magnification, I am referring to our telescope and our eyes. Let us assume that both work at the limit of their ability.

The magnification of a telescope with a given eyepiece is determined by dividing the focal length of the objective by the focal length of the ocular. (#1) That is a 15 cm F8 (focal length 1200 mm) telescope with a 25 mm eyepiece yielding 48 power. We soon find that we can't increase or decrease the power of our telescopes without bounds simply by changing eyepieces, there are limits.

The lowest power that a telescope can produce is directly related to the diameter of the dark-adapted eye. The exit pupil of a telescope is found by dividing the objectives diameter by the magnification of the telescope.(#2) If the fully dark-adapted eye has a smaller opening than the exit pupil of the telescope, the eye will in effect restricts the size of the telescope being used. Dark-adapted eyes vary between people, but for sake of argument let's assume an aperture of 7.5 mm for the average. This yields a bottom limit of 1.3 times the diameter of the objective in) centimetres.(#3)

The upper limit of a telescope is also determined by the eye. When the exit pupil drops below 1 mm there is a marked degeneration of the image quality. The minimal allowable size of an exit pupil is 0.75 mm; below this lever the quality really starts to suffer. Using the same formula as we did in finding the lower limit the upper limit is found to be 13 times the diameter of the objective in centimetres.(#4) If we are only interested in separating doubles and not on image quality then we can increase this value to 20 or 30 times the objective's diameter.

The laws of physics are such that a telescope has a limit to which it can resolve. No matter how much magnification you give the telescope, if it is not resolved at the focal plane of the telescope it will not be resolved at all. The empirical value for this limit is known as the Dawes Limit.(#5) The human eye can resolve about 1' at the very best.(#6) When we combines these two facts, we come up with a magnification of maximum resolution to be 10 times the diameter of the objective in centimetres.(#7) Any magnification above will not yield any more detail but it might just make it easier to see the detail that exists.

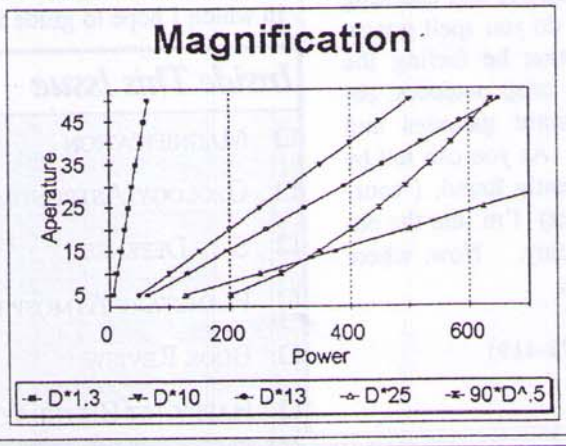
This article does not take into effect the psychological aspects of observing. People feel more comfortable observing a larger object than a smaller object; therefore smaller telescopes are more pleasing at their higher power levels. Lines are easier to resolve than points: Cassini's division (0".5) was first seen in a 6.5 cm telescope, even though theory tells us that it requires a 23 cm telescope. Strongly contrasting objects are easier to resolve than low contrast objects making planetary observation even more difficult. For working with double stars, the Lewis Formula takes better account of the size of the telescope.(#8)

The usable magnification of telescopes is not an easily answered problem, but for those with a little liking for math I have included some useful formulas (see footnotes). For all others, I have added a chart and graph.

So what do you say when you get the Dreaded Question about power? Well, you now have the facts ¾ do with them as you must. For my part, I mumble a lot.

Grant W. Dixon

Aperature	Low Limit	Resolution	Upper		
D	D*1.3	D*10	D*13	D*25	90*D^.5
5	7	50	65	125	201
10	13	100	130	250	285
15	20	150	195	375	349
20	26	200	260	500	402
25	33	250	325	625	450
30	39	300	390	750	493
35	46	350	455	875	532
40	52	400	520	1000	569
45	59	450	585	1125	604
50	65	500	650	1250	636



#1 M=F/f
2 d=D/M
3 M'=D/0.75=1.3D
4 M"=D/0.075=13D
5 R=11.58/D" arc
6 R.Mr= 60" arc
7 Mr=60D/11.58" arc = 5.2
8 M"=90D0.5

Geology and/or Astronomy ~ Part 1

This article was originally written in four parts and submitted to the "Geminews" newsletter for the Gemini Gem and Mineral Club, Burlington, Ont. I have submitted it to the "Event Horizon" as two articles, but the information is unchanged, and therefore, it has a geological approach. I hope you find it enjoyable.
Ev

Over the past year I've discovered a new hobby. Rocks, minerals and Geology!! As a new member to the Gemini Club my first series of articles is going to touch on a smattering of my rock knowledge along with my intermediate knowledge of astronomy. (Did you guess? I'm also an astronomer.) Combining the two may seem bizarre but they do have a definite relationship, if precarious at times. The common areas are meteors, comets, tektites and meteorites. I'll be giving geological definitions, specifics and examples. In this version of the article, part one will cover Meteors, Comets and Asteroids. Part two will encompass Tektites, Meteorites and Craters. So without further ado, here it is.

METEOROIDS are meteoritic particles in space before any encounter with the Earth.

METEORS - (Shooting Stars) These are very tiny bits of debris from the size of pebbles down to sand and even dust particles. Each defenceless particle has its own gentle slow drifting orbit, while in essence the Earth with its respective screaming orbit, bowls them down. Meteors occur in two classes: 1) sporadic meteors, (more commonly called shooting stars) which constitute debris from the solar system; and, 2) as Meteor Showers, always associated with a specific comet, ie. Orionids Meteor Shower/Comet Halley. As they collide and enter the Earth's atmosphere the friction causes them to burn up and we see the beautiful brilliant streaks in our skies. However, they do not land and therefore, I will discuss them no further.

COMETS - are essentially huge dirty snowballs in space. They are composed of mud, dust and ice. Comet Halley is potato shaped, and 10 km. long. Our solar system is on a flat plane, likened to an egg. The yolk is the sun (wider than the rest of the egg), and the white is the plane of the solar system (thinner than the yolk). Comets are suspected of coming from the outer reaches of our solar system in a place known as the Oort Cloud, which surrounds our solar system like a great sphere (an egg inside a ball). They follow circular orbital paths within this sphere and it is believed that there are literally millions and millions of comets residing here. Two comets may travel close to each other for years and eventually come so close that one will be re-directed - out into space, or into the solar system beyond Jupiter, Saturn, Uranus, Neptune & Pluto. If we're lucky it may be directed to the inner solar system, toward Mercury, Venus, Earth & Mars. These are the ones we can see at night in the sky. As the comet travels toward the sun, the ice begins to melt and debris is loosened (remaining close to the comet's head), and the Solar Wind pushes the remains away to form the comet's tail. It is the debris from the comets tail that crosses and collides with Earth's orbit. Most comets are only interlopers, enter the solar system, loop about the sun once, and leave never to be seen again. The rare one will achieve its own circular orbit within the solar system. All orbital comets have very limited life spans in the inner solar system since the sun will completely melt and dissolve them and they can't regain their mass. This means that Comet Halley, with an established orbit, will eventually melt away. Planets and asteroids all stay on the same plane, and a collision with Earth is unlikely (although not impossible). Comets however, surround our entire solar system like a giant sphere, and are not governed by the same forces as asteroids. They can enter from anywhere, on any plane at any time and at any speed. They enter the solar system quite randomly, and the occasional comet will get caught in the orbit of any celestial body, including the Earth, and strike it. Comet debris does not land either due to its icy composition.

In times past, comets struck the earth quite often. Today, it is a rare occasion for a comet to survive our atmosphere and make an impact with the Earth. The pressure of our atmosphere is now strong enough to cause a comet to explode high up, before impact. There is no crater or debris. For the longest time I believed that the Tunguska Event was caused by a comet collision, but have since learned that it was a stony meteorite. I'll discuss this later. So, I now have no record of a comet collision. If anyone knows of one, please tell me about it. **However!...** In July 1994, a comet called Comet Shoemaker-Levy 9, (discovered by the team of the Shoemaker's and David Levy, a Canadian) will collide with Jupiter, the largest planet of our solar system. So without a doubt, it can happen. This one is close enough to observe the impact and consequent results, yet far enough away to be safe.

So close, yet so far!! Count your rocks!!

Asteroids - As I mentioned above, planets and asteroids all stay on pretty much the same plane (relatively flat),

and due to gravitational forces are most unlikely to collide with the Earth. There have been (and will continue to occur) collisions of asteroids with the Earth. In the beginning it was a common occurrence, but at this stage in the Solar System's evolution, these impacts are few and far between, particularly the massive impacts that leave craters like Barringer in Arizona. Asteroids reside in the "Asteroid Belt" located between Jupiter are Mars. These two planets have tremendous gravitational forces which determine the orbits of asteroids. Jupiter has a very strong gravity and can pull asteroids into its influence easily, and they're pulled through the Jovian System and destroyed or sent out at the outer reaches of its system. Mars does not have the gravitational pull to force large asteroids off course and small ones are unlikely to be disturbed. The asteroids that we "worry" about are most likely to be at the outer edge of Jupiter's influence, such as Gaspra and Apollo 3103 1982BB. Their orbits continually grow wider and more elliptical, gradually extending to the point where they can cross Earth's orbit, at which point it is captured and hurled down towards us, possibly showering us with '*meteorites*'. I should point out at this time that once any celestial body impacts the Earth it is called a meteorite, (composition and origin to be determined upon analysis). Although Apollo passed within 20 million miles of Earth and we believe we've received debris from it, it does not seem that we are in any danger at this time, or in the near future. There are also occasions when cosmic bodies (asteroids, comets or meteorites) enter the atmosphere causing explosions and devastation, but do not survive to the surface. Following are two such examples...

1) On June 30, 1908, a witnessed and recorded explosion took place in the atmosphere, approx. 8 kl. above the ground, near the Tunguska River, Siberia and the shock wave levelled hundreds of square miles. It is believed to have been a "tiny" stony meteorite. The explosion was equivalent to about a 10-megaton nuclear bomb, or an impacting body weighing approx. 100,000 tons. Seismographs all over the Earth detected the explosion. The more sophisticated seismographs measured 4 shock waves going through the earth. The meteorite did not have enough strength to survive to the surface, but rather gave up its energy of motion in the atmosphere, creating the equivalent of an "air burst" in nuclear weapons jargon. When scientists arrived on the scene to explore, ten years later, only the devastation remained because the meteorite had dissipated and any traces of it had long since been carried away by weathering. There was no impact, therefore no crater was formed. Unfortunately, for the geologist, there are no remains for collection. It is believed to have been caused by a stony asteroid.

2) On March 31, 1965, in Revelstoke Alberta (about 300 km from Calgary), an explosion of a meteorite took place approx. 30 km. up. It had the energy of 20 kilotons (close to the equivalent of Nagasaki 1945). No devastation and no crater. Two weeks later, two snowshoers found two small patches of meteoritic particles, collectively weighing less than 1 gram. It was proven to be a carbonaceous chondrite (a fragile stony meteorite).

In Part Two, I will explain the journey of these meteorites through the atmosphere, what happens to them, and why they explode. I'll cover Tektites, Meteorites and Craters. Look for it!

Ev Butterworth

Asteriod Gaspra

Self Defense for Bespeckled Backyard Astronomers

If you need glasses to read charts, magazines, etc. but hate jamming your glasses into your face to get close enough to the eyepiece, try this. It suits my needs extremely well.

Find an older pair of your glasses which still work for you. Remove the lens of your "eyepiece" side. Soaking that side in hot water will soften the plastic and make it easier to remove the lens. I wouldn't want to read a novel with one eye in the dark using a red light, but for checking your charts, etc. it is easy.

The next logical step is to make a mask for the non-viewing eye. Although a viewing hood is essential on occasion, it is awkward and causes eyepieces to fog up if you're not careful. Closing one eye is a strain on both.

A pair of old, scratched clip-on sunglasses can be used. Remove the "eyepiece" side and spray the other half with one or two coats of flat black paint. Although not as good, electricians tape would work, too. You just flip the mask up of down as required. If you prefer to wear your full glasses at your scope, you could still make a mask for them.

Robert Roy

DID YOU KNOW THAT...

the most remote galaxies are flying away from us at 95% of the speed of light.

Planetary Atmospheres ~ Part 2

An interesting aspect of Venus' cloud cover is that it moves around the whole planet as a single unit at 300 km/hr., forming a dark horizontal "Y feature" or a reversed "C" shape due to winds diverging at the equator. This top cloud layer circulates the planet in 4 days, while the rest of the planet spins in 243 days, making this 60:1 ratio the solar system's largest "super rotation." Meanwhile, the winds blowing through the middle and lower atmosphere travel at different speeds but in the same westward direction at all latitudes. (See Fig I)

In February 1990, as the Galileo probe en route to Jupiter passed close to Venus, new details of its atmosphere came to light. Infrared energy bubbling up through the cloud deck revealed a highly turbulent layer through which heat was conducted by rising thunderhead-like convection currents. Also, 9 radio pulses were received by the spacecraft's plasma wave detector, in a wide range usually attributed to lightning. But until other plausible sources are dismissed, the case for Venusian electrical storms remains unsolved.

Moving outward beyond Earth to the neighbouring Mars, one apparent difference between the four terrestrial planets is their respective cloud cover. Where Mercury's is nonexistent, Venus' surface is completely hidden by clouds, while only half of Earth and a mere 10% of Mars is cloudy. Of these, most of Mars' clouds are similar to Earth's convection, wave, fog and orographic (which cling to mountains) cloud formations. However, in the winter south polar region, there are unique CO2 clouds which freeze out into dry ice "snow" when temperatures there drop below 146°K. In this way, about 1/5 of Mars' atmospheric C02 is exchanged each season between the air and the polar cap, and this in turn creates changes in the total atmospheric pressure. When the C02 condensates, enlarging the ice cap, pressure drops and a strong planetary-wide air "condensation flow" travels toward the polar area. As well, heat is released, but as the westerly winds here are inefficient conductors, there is a marked contrast between polar and equatorial temperatures.

In response to temperature changes across different latitudes, an atmospheric Hadley cell pattern forms, in which rising air from one warm location circulates to a cooler one, then returns. While Earth and Venus have a Hadley cell in each hemisphere, thereby keeping weather systems from crossing the equator, Mars has a single cell through which north-south weather patterns span both hemispheres. Thus warm Martian currents from the summer hemisphere flow up and over to the opposite hemisphere where cooler temperatures cause it to lose altitude so that it returns to its original hemisphere. (See Fig. II)

Since Mars' atmosphere is thinner and colder than Earth's by 500K, and as it has no oceans to moderate its temperature, it responds faster to both heat loss or gain. At orbital perihelion, Mars receives 40% more sunlight, shrinking its northern water ice cap, and inducing swirling currents of warm air to form yellow clouds. With speeds up to 400 km/hr., these winds raise surface dust up into the atmosphere, giving the sky a peach-pink hue, due to iron oxide particles.

As Mars' original outgassed water vapour could easily have formed an icy layer some 50 metres deep, and while much of it is still contained within polar ice caps and soil, recent monitoring by the Very Large Array telescopes in Mexico have produced a startling result: Mars' water is disappearing! The total water vapour left in the planet's atmosphere is only half of what was detected in the late 1970's by the Viking spacecraft. However, if the Japanese Institute of Space and Astronautical Science (ISAS) follows through with its planned 1996 launch of the Mars probe (Planet-B), this mystery may be solved.

After considering the terrestrial planets, the Jovian system of gas giants seem almost alien in nature. Recalling the relationship between planetary size, temperature and escape velocities, we expect that as the largest world in our solar system,Jupiter must have retained all of its primordial gases. And data from Voyager 1 and 2 have revealed just that: this totally liquid kinq of the planets has an 86:13.8 percent ratio of hydrogen to helium in its atmosphere. Its semipermanent cloud formations created by large-scale convection consist of dark brown, red or green belts alternating with light tan, white or yellow zones, all moving parallel to the equator. Their colours are indicative of their respective altitudes and compositions, with white cirrus clouds of ammonia crystals lying above the beige and brown ammonium hydrosulphide ice clouds. Below these reside layers of ice crystal clouds and water vapour clouds. Where water droplet and ice crystal clouds condense from Earth's atmospheric water vapour, Jupiter's clouds condense from water vapour and ammonia.(See Fig. IV)

Although both planets exhibit low and high pressure systems, Earth's circulating storms are generally confined to one region while Jupiter's tend to get wrapped around the planet because of its fast 9.8 hour spin.

The equatorial region of the planet is bounded on either side by a North and South belt. The normally wide and dark South Equatorial Belt changed to white in 1992, but by the following year had resumed its dark colour after a column of material erupted near the site. Between the South Equatorial Belt and South Temperate Belt (see Fig. III), exists a counterclockwise-rotating red oval eddy, twice the size of Earth. This 300+-year-old high pressure storm resides above

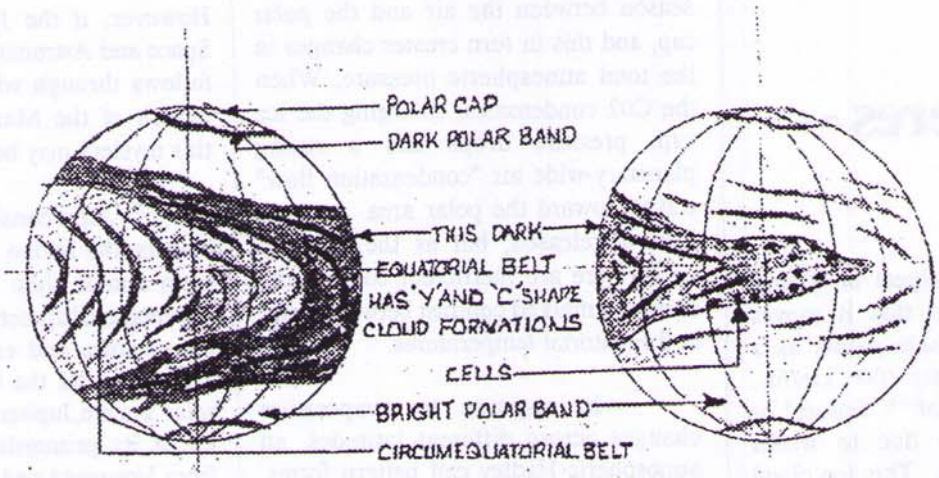


FIG I : CLOUD BELTS ON VENUS

FROM: ATLAS OF THE SOLAR SYSTEM · PATRICK MOORE (PG. 108)

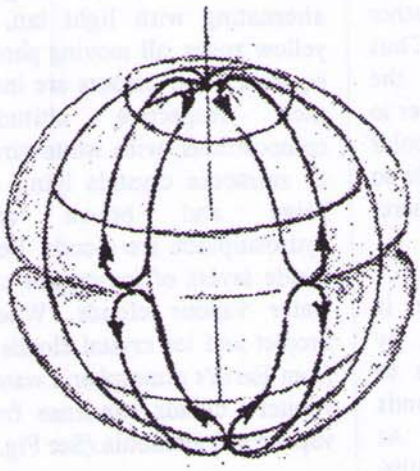


FIG II · HADLEY CELLS

THIS PATTERN OF AIRFLOW FROM WARMER LATITUDES TO COOLER ONES AND THEN BACK AGAIN, CAN BE FOUND ON EARTH VENUS AND MARS. HOWEVER, MARTIAN CURRENTS CAN CROSS THE EQUATOR, UNLIKE THOSE IN THE OTHER TERRESTRIAL PLANETS.

NOTE : WARM AIR RISES, FLOWS TO COOL ZONES. THEN DROPS ALTITUDE AND RETURNS.

FROM : ATLAS OF THE SOLAR SYSTEM · PATRICK MOORE & GARY HUNT (PG 107)

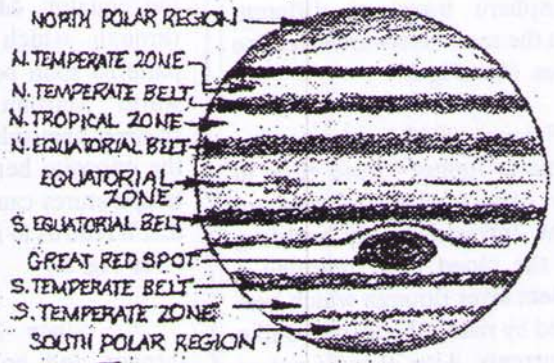
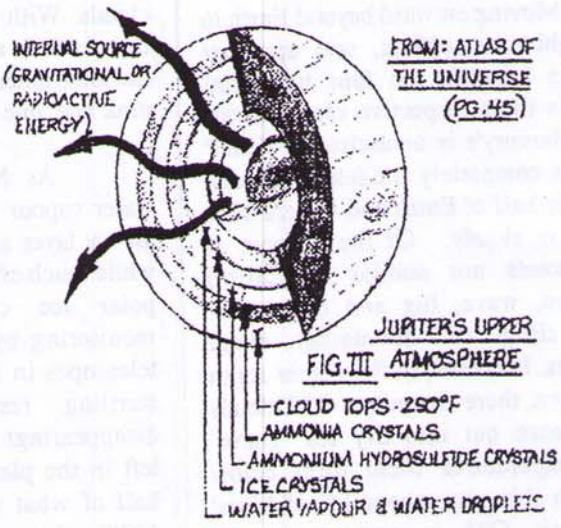


FIG. IV :
JUPITER'S SEMI-PERMANENT CLOUD FORMATIONS

FROM : ASTRONOMY : THE COSMIC JOURNEY (PG. 226)

FROM : ASTRONOMY : THE COSMIC JOURNEY (PG. 226)



FROM : ATLAS OF THE UNIVERSE (PG. 45)

JUPITER'S UPPER ATMOSPHERE

FIG. III

most of Jupiter's cloud cover in colder temperatures, and is likely the top of an "updraft plume" whose colour comes from the photochemical breakdown of phosphine. Called the Giant Red Spot, it occasionally wanes in intensity but circulates the planet at its own rate while the equatorial regions (SYSTEM I) rotate 5 minutes faster than the rest of Jupiter (SYSTEM II).

Spots are quite common to the gas giants, for smaller red and white spots have been observed in Jupiter's northern hemisphere while dark brown and large white ovals have been sighted near the GRS. As Jupiter's structure is one of hot gas surrounded by cold gas, these spots are like heat vents for the convection cells that percolate up through the atmosphere.

Another trait shared by Earth and Jupiter is the glowing light show of aurora. On Jupiter, the interaction of ultraviolet radiation with atomic and molecular hydrogen produces a very prominent aurora in its north polar region. And in imaging views of aurorae, astronomers found and identified the trihydrogen ion H3+ in Jupiter's atmosphere. This ion forms when the planet's magnetic field electrons "bombard ordinary hydrogen molecules to form H2+. A proton can then hop from this ion to another hydrogen molecule nearby to produce the trihydrogen ion."

One final point about Jupiter: despite its great distance from the Sun, its lower atmosphere is warmer, with temperatures ranging around 250°K because it radiates double the amount of incoming sunlight and this internal heat source is what powers the motion of the cloud and storm systems.

Joyce DiClemente

Book Review

Looking Up
-A history of the Royal Astronomical Society of Canada
By R. Peter Broughton
Dundurn Press, Toronto and Oxford, 1994
288 Pages, Hardcover. $34.95

In 1990, the R.A.S.C. celebrated its centenary; an event that inspired Peter Broughton (then, president of the R.A.S.C.) to write a historical book about the organization and its personalities. The resulting volume, Looking Up, was meant to give members of the R.A.S.C. and other interested parties, a ready access to the society's past and a view (albeit, the author's) of its workings, strengths and weaknesses.

To be fair, I must admit that my interest in reviewing this book was derived not only from its contents but also the circumstances of its production. With regards to its content and execution, I can report that Mr. Broughton has succeeded in writing a scholarly history of the R.A.S.C. The structure of the book is well organized and the information appears to be accurate. All that's missing is a sense of being there; a feeling that you're witnessing history unfold on the pages. One reason for this is the author's style, which can be best described as dry and impersonal. There's little humour (certainly a part of R.A.S.C. history) and not enough in the way of interesting stories, anecdotes, etc. to keep the reader ploughing through the book's 288 pages. It's no doubt difficult to cram over 100 years of history into such a limited space without making it sound like a Reader's Digest Condensed Book or a high school history text, but the reader's sympathy can only extend so far... Good quality illustrations would go a long way to bolster Mr. Broughton's Lacklustre writing, but all the plates in this volume are black and white, with most appearing indistinct due to too coarse a half-tone being employed.

Thankfully, this book is not entirely without merit: for centre members curious about what went on in their club before local newsletters sprang up, Looking Up could fill in some blanks. Also, the brief biographies of R.A.S.C.

Looking Up is strongest in the retelling of R.A.S.C. history and really should have stuck to that end. It's when Mr. Broughton drifts towards editorializing about topics like women in the R.A.S.C., the relationship between professionals and amateurs, the value of the R.A.S.C. "Journal" and the rationalization of society financial matters (including membership fees) that the book treads on very thin ice. It's clear from his opinions that Mr. Broughton feels the society is in good hands (as of 1993) and has a bright future if we all try to get along and not rock the boat. This brings us to consider the wisdom of Mr. Broughton and his peers, who thought that spending over $26 000 of R.A.S.C. funds to publish this book was in the best interests of the society and its membership. One of the author's reasons for producing Looking Up was to offer members a history of the R.A.S.C. without having to delve into old "Journal" articles that are often difficult to find. Since Mr. Broughton is such a champion of "The Journal," wouldn't it have made better sense to reprint a series of articles in "The Journal," adding a few of his own for completeness, to tell the society's history?
Personalities, past and present, adds a little flesh to the names we've only read or heard before.

However, for those with more of a non-historical interest in astronomy, this book offers very little in the way of enjoyment. One part did make me chuckle, though. In the final sentence of the book, the author quotes a famous Star Trek-ism, and attributes it to the wrong character. Mr. Spock would not be amused, but he might find Looking Up to be a "fascinating" read...

Clive Gibbons

Happy First Birthday H.A.A.

What can be said about an infant's first year? What makes them take that first step? HAA, conceived 13 1/2 months ago, was brought fourth by Doug Welch. His premise was that astronomy is for everyone, and should not cost the moon and stars. A group of enthusiastic individuals with the drive to accomplish this goal, dove in and made arrangements. A newsletter was created (to be proud of, for sure), heavy advertisement on all the media sent out and the birth of HAA became a reality. On November 12, 1993, the first General Meeting of the Hamilton Amateur Astronomers (HAA) took its first breath. With approximately 50 people attending it was a moving start.

It has been onwards and upwards from there. As we look back over the past year, your club has seen a vast expanse of activity: the Nov. 29, 1993 Total Lunar Eclipse; Cosmology Discussion Groups; a Field Trip to the McLaughlin Planetarium; numerous new observing sites (not to mention the trips to find such sites); the Amateur Telescope Making group; a Messier Marathon; the May 10, 1994 Solar Annular Eclipse (at home!!); Bancroft, Silent Lake, First Annual Summer Star Party; Comet Shoemaker/Levy-9-Jupiter Impacts, the event of the millennium; Member Observing Nights; Public Education, be it in the MacMaster Planetarium, school classrooms, Junior Program; outdoor star parties or teaching our own new members and families; and last but not least our incredible Event Horizon Newsletter, filled with enlightening and entertaining articles.

To put it mildly, our club has had the healthiest start to any life that could be possible. The one ingredient that has been the driving force behind the tremendous success is the people who have dedicated their time, efforts and mostly their love of astronomy into the nurturing of this organization. These people are a family unit, caring about the clubs growing needs and of each other.

November 11, 1994 will mark the first birthday of the Hamilton Amateur Astronomers. I hope all of our members have and will continue to enjoy the resources available to them. Become a part of the unit that makes us so strong.

As we leave our infancy behind, we can reflect on the many tremendous strides we've accomplished and look forward to the many footsteps and milestones ahead of us. Thanks Doug for the wonderful idea and to the host of hearty astronomers who've made a year of truly rewarding triumphs.

Happy First Birthday HAMILTON AMATEUR ASTRONOMERS! One bump and a pinch to grow an inch!

Ev Butterworth, member

Black Holes for Beginners

On an astronomy telnet newsgroup, a young 10 year old boy asked questions regarding black holes and received a response that even I could understand.

Answers from: Ragnar Aas
Organization: Department of Physics, University of Bergen, Norway

1. Why do black holes suck things in?

All objects with a mass sucks things towards itself. The reason why black holes do this so thoroughly, is because they have such enormous masses in a very concentrated volume. Say, if the earth had been compressed into a black hole, it would be a mere 7 mm in diameter.

2. Has anyone seen a black hole?

The reason it is called a black hole is because it emits no light, so nobody can see it. The way we can observe that it is there, is the way it interacts with objects close to it. If there is a star close by, the black hole will tend to suck out mass from this star. And this mass, when it closes in to the
black hole, will become extremely hot and emit x-rays.

Another way of observing a black hole, is if you have a star behind the black hole. A black hole has so enormous gravitational forces that it even sucks light towards itself. So light coming from an object behind it, will be "refracted" by a gravitational lens; the black hole. In this way, we can see two stars around the BH that are identical.

3. How do we know that they exist?

We don't. At least, not for sure. There are, of course, some objects that are suspected to be black holes. Like the socalled Cygnus X-1 in Cygnus.
In a recent issue of Sky & Telescope, there was an article about a new candidate for a black hole that was more certain than Cygnus X-1.

4. Where do objects go when they go into a black hole?

This is a question heavily debated. Since inside the black hole, time and space cease to exist as dimensions, there has been some theories that they maybe appear somewhere else in time and space. They may even escape to other universes. In our universe, there have been observed "white holes".

These are locations in space where mass seems to come bursting out of seemingly nowhere. This may be "the other side" of a black hole.
Because of the enormous gravitational forces inside a BH, the mass is thought to be compressed into a point, with no size at all. The black hole, as we call it, is just the limit from where the light can escape. As I mentioned before, light is attracted by the BH, and from inside it, no light can escape. This is why it is "black".

5. How old is a black hole?

It may be several billion years old. Mr. Stephen Hawking has proposed that after many billion years, the black hole may explode, releasing all its mass and energy. I haven't read this theory, though. So I won't go into the details.

6. What is in a black hole?

Mass, energy and gravitational forces. Enormous amounts of them...
Of, course, these are only theories. No-one has been there to investigate....
7. *** Do you have any suggestions for a demonstration that I can do for my class?

You could always use the model that S. Hawking uses to explain the forces from an object. It was really meant to explain a part of the theory of relativity, but it can be used for this purpose.

Make a small frame, of wood or something.
Wrap some rubber, maybe from a balloon over this frame.
Put a marble-ball or something other heavy, round object on the rubber.
You will now see that it makes the rubber bend downwards. If you now take another ball, much lighter than the first, you will see that it tends to run down into the deepening made by the heavier one. This is an illustration of the gravitational forces between them. Even if you give the ball a small speed as it passes the hole, the trajectory will at least be bent towards the deepening. The heavier the first ball, the more it will bend. And if the first ball is heavy enough, the second one will fall into the pit no matter what you do. MAKE SURE THE FIRST BALL ISN'T SO HEAVY THAT THE RUBBER BREAKS!

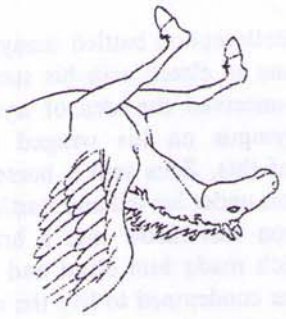
Submitted by Patricia Marsh
Taken from newsgroup Sci.astro

Greek in the Round

Pegasus, the famed winged horse is also known as the Great Square of Pegasus. Despite the size, the constellation represents only half of the animal. The origin of the figure is uncertain and very ancient. Following precession, shifting the stars backward in time to the fifth millennium B.C. at the latitude of 40o N, the spring equinox occurred in Gemini and the autumnal one in Sagittarius. Both signs were situated on the Milky Way, which seemed like a drown bow above the then Polar star, Thuban, at that time located on the tail of Draco. The summer solstice occurred in Virgo, and the winter solstice in Pisces - amid which our Square was enthroned, exactly on the meridian of the solstice. This geometric placement resulted in Pegasus (then called Paradise) being identified as "the charismatic centre of the sky - the merging point of the harmony of the universe". This Paradise offered the model from which the magical unit of measure used in Sumer, the *iku*, derived. With this, Utnapishtim (the Sumerian Noah) built his ark in a cubic shape.

Pegasus is also upside-down. Why? There are no explanations and his position remains a mystery. The only vague reason could possibly be found in the attempt of Bellerophon who, riding Pegasus, tried to reach Olympus. In order to stop him, Zeus sent a horsefly to bite the animal. Startled, the horse jumped and threw Bellerophon out of the saddle. Is it possible that Zeus, in placing Pegasus among the stars, depicted him in the act of kicking, upside-down? The fact remains that Pegasus was shown upright until the time of late Greek astronomy. It seems therefore legitimate to ask if perhaps is was an erroneous transcription by some astronomer or the whim of a local legend that, at some point, turned Pegasus over.

Bellerophon's story begins at the time of Poseidon having an affair with the beautiful Lybian princess Medusa. Athene was enraged by this profanity and she transformed Medusa and her two sisters into hideous Gorgons with hair of serpents and bodies of birds. Medusa was later killed by Perseus who, with the help of the magic of several gods, succeeded in decapitating her. Immediately, Pegasus and the warrior Chrysaor, who had been conceived inside Medusa from Poseidon's seed, emerged from her open neck. Perseus did not ride Pegasus as some believe. He was already endowed with the winged sandals that allowed him to fly (although he later called the horse to carry he and Andromeda to safety).



After his birth Pegasus lived on Mount Helicon, where he became the favourite of the muses. He caused the spring of Hippocrene to well up. He remained there, untamed and wild, for many years until he was tamed by Bellerophon.

Bellerophon was a suppliant to the court of Proetus, king of Tiryns, but the kings wife, Anteia, fell in love with him. He rejected her and she took revenge. She told here husband that Bellerophon had tried to seduce her. The king, not wanting to kill Bellerophon himself, sent him to his father-in-law,

Iobates, with a sealed message in which he asked him to kill the young man. However, Iobates was also reluctant and therefore sent Bellerophon to kill the mythical creature Chimera, a fire breathing monster with the head of a lion and the body of a she-goat. The king knew no man could survive such a duel. Bellerophon asked advice of the seer Polyeidus, who told him he could capture and tame Pegasus. Only in riding such a steed could he kill the monster.

There are many versions of the capture of Pegasus by our hero. Some say that it was Minerva who inspired him to forge the first bit; others say that Poseidon consigned him the horse already tamed; others still say that it was Bellerophon who tamed him with a golden bridle. However, Bellerophon rousted the Chimera, wounded it with his arrows and succeeded in jamming a piece of lead between its jaws that, melted by its burning breath, flowed down into its stomach and killed the monster. He returned to Iobates, who realized that Proetus had been wrong about the young man, and gave his daughter, Anteia's sister, in marriage.

Bellerophon battled many times and became so elated with his successes that he conceived the idea of trying to reach Olympus on his winged horse. Hearing of this, Zeus sent a horsefly to bite Pegasus under his tail and startle him. Bellerophon was throw into a bramble bush, which made him blind and lame, and he was condemned to live the rest of his life without seeing other men.

Pegasus' fate was different. He continued his flight into the sky, where he was received by Zeus, who quartered him in the ancient stables of Mount Olympus and gave him the duty of transporting for him the flashes of lightning forged by the Cyclopes. For this reason, his image was immortalized among the stars as the constellation of the winged horse.

Ev Butterworth

Pole to Pole

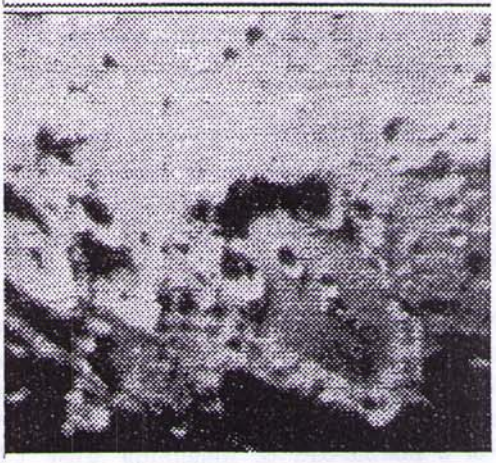
Greetings from the Land Down Under!

The Murdoch Astronomical Society was originally formed in 1974, shortly after the opening of Murdoch University. Since much of its membership comes from students, the activity of the society has varied over the years as the student body changes. After a lapse of 2 years the society was reformed in 1988 and since that time has been very active. There has also been a concerted effort to recruit members from the wider community. At present the membership stands at about 35, half of whom are non-students.

The society holds monthly meetings at the university throughout the year. The meeting format is typical of most astronomy club meetings, although much emphasis is given to observational reports and plans. The membership ranges from novice to expert so time is usually taken for talks on basic astronomy and observing techniques. Since the society in run by students, the meetings tend to be rather informal, and one of the most popular times are the informal discussions that take place after the meeting over coffee.

Twice a month the society holds viewing nights at the campus observatory. Since there is a fair amount of light pollution in the area, these nights are devoted to planetary observing and to assisting newer members in gaining observing experience. Once a month around new moon, a dark-sky observing night is held in an area without light pollution. Other observing nights are organized as the occasion arises. eg for a grazing occultation or a meteor shower. At least once a year an astrocamp is held at a sheep station called Meline, situated some 650km north-west of Perth. The camp usually lasts for a week and since the nearest neighbour is 40km away, the skies are very dark. In addition to these club activities, many members have their own observing projects.

Members interests span a wide range, covering things such as astrophotography, comets, meteors, deep-sky, asteroid occultations and grazing occultations. The society owns a number of telescopes, the largest of which is a 17.5" dobsonian. Recently the society was given a $3000 grant from a government community group funding program. This money will be used to purchase a new equatorial mount for a 12.5" newtonian and a CCD autoguider. This should make the astrophotographers in our midst happy!

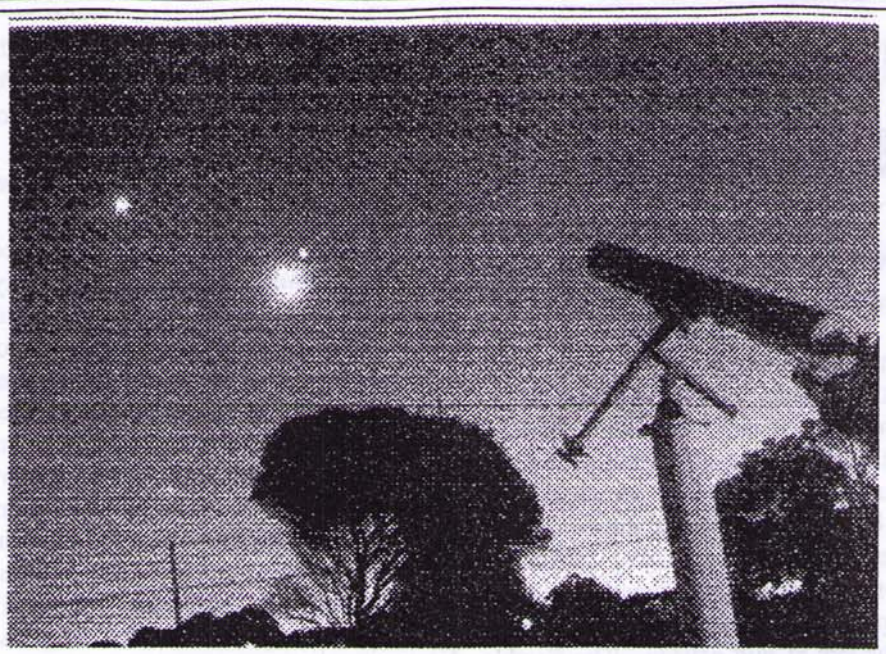


1) Crater Clavius
14" Celestron with 7mm Plossel eyepiece; .05 second exposure Fuji 1600 slide film
September 14, 1994 by Maurice Clark

As well as members activities, the society plays an active role in taking astronomy to the general public. Numerous viewing nights are held each year for various groups such as schools and scouts and at least one major public night is held at the university each year. Several of our members have been

interviewed on radio and one of our members conducts an adult education class on astronomy. Several members are also involved with assisting a Japanese astronomy club in setting up an observatory about 120km north of Perth. When this is completed early next year, it is expected that many amateur astronomers from around the world will be coming to Perth for southern hemisphere observing which will provide a big boost to the local interest in astronomy.

Maurice Clark
Australia



Conjunction between Moon, Jupiter, Venus and Mercury. October 7, 1994
50mm lens at f 2.8 30 seconds exposure Fuji 1600 slide film
The telescope on the right is a 6" f15 refractor that I was using to observe the conjunction. The blue light comes from a "bug zapper" which I was using to try and clear the air!
by Maurice Clark - Australia

What's Your I.Q.?

How much can you take? I've never seen a species so inquisitive. It does my heart good. I trust you are doing well! Keep it up.

1) *False, though until the 1960's it was believed to be true. The revolution period of Mercury is 88 days, and if the rotation period were also 88 days there would be a region of permanent sunlight and a region of permanent night, with a narrow intervening 'twilight zone'. In fact the rotation period is only 58.6 days - two-thirds of a Mercurian 'year' - so that every part of the planet is in sunlight at one time or another.*

2) *False. In 1603 Johann Bayer allotted Greek letters to the stars in the constellations, theoretically beginning with the brightest (Alpha, Beta, Gamma...) and so on to Omega, the lat letter of the Greek alphabet. In many cases the brightest star is indeed Alpha - thus Sirius is Alpha Canis Majoris - but in many other cases the rule is not strictly followed; thus in Sagittarius (the Archer) the two brightest stars are not Alpha and Beta, but Epsilon and Sigma.*

3) *He didn't! Possibly he suggested the experiment, but there is no evidence that he ever carried it out, though some later scientists may have done so.*

4) *M31, the Andromeda Spiral, at a distance of 2.2 million light-years. Note that I said 'easily visible', because very keen sighted people claim to be able to glimpse the slightly more distant Triangulum Spiral, M33 which is easy enough through binoculars.*

5) *Jupiter*

6) *Aurora Australis*

I've looked hard for you this month. You won't guess these!

1) What is a binary star?

2) What is the difference between a globular cluster and a galaxy?

3) What was the name of the European space-probe which went through the coma of Halley's Comet in March 1986?

4) Where are: (a) Modred, (b) Izanagi, (c) Roncevaux Terra, (d) Thrace Macula, (e) Asgard?

5) Which of the nine planets has the longest revolution period?

6) True or False? The largest known meteorite is still lying where if fell in Southern Africa; it weighs at least 60 tons.

There you go, your monthly challenge. Good Luck! See you next month.

IO, Keeper of the Flame
Jupiter Co-ordinator.

Upward Skybound

November brings the beginning of the cold nights and a lot of rain preceding snow. Get ready! This month there is a Total Eclipse of the Sun on Nov. 3 in South America. Is anyone going? If so, be sure to tell us all about it. Here in North America we will witness a Partial Penumbral Eclipse of the Moon on Nov. 17/18. The Earth casts a shadow of two parts: the darker inner ring called the umbral; and the lighter outer ring called the penumbral. The moon will be high in the sky at mid-eclipse. The Earth's penumbral shadow will cover approximately 91% of the moon. The prediction is that this could be a particularly dark eclipse as penumbral eclipses go. Be sure to bundle up. The shadow will begin to cross the moon at 11.26pm EST., but the shadow will not be prominent until about an hour later. Mid-eclipse occurs at 1.44am EST. At this point the northern limb will be noticeably darker than the southern limb. The event will end 4.02am. EST.

Mercury - is visible for the first half of the month low in the east-southeast just before sunrise. It is a favourable elongation for northern latitudes.
Venus - becomes bright at mid-month in the southeastern morning sky. On the morning of the 30th Venus and the Moon will lie close together and are both in crescent phases. Check them out in a telescope.
Mars - moves from Cancer to Leo and rises in the late evening. It will continue to brighten as it comes nearer to Earth.
Jupiter - will be visible very low in the east-southeastern morning sky by the end of the month.
Saturn - In Aquarius is approaching the meridian at sunset and sets about midnight. Don't miss this most beautiful planet.

Workshops:

- **Sat. Nov. 26/94 "Member Observing"** To be held at the **Binbrook Conservation Area**. Go for those Messier objects! Come when you can.
- **Sat. Dec. 10/94 "Member Observing"** As above.
* **Jovial Satellites: Mon. Dec. 12/94, 7:00pm. McMaster University, Room B148,** beside the planetarium. This is an introduction for our junior members to meet each other and become involved with special astronomy related projects and observing sessions. Put your family membership to use and give your children a place of their own. December will focus on a Christmas Party so the members can become acquainted with each other. They will all receive a special satellite name and we'll talk about the Comet Shoemaker/Levy-9, impacts. The Jovial Satellites will meet every other month on the alternate month of the Public Junior Program HAJA.

Clear Skies Above
Ev Butterworth, Observing Director

Off the Beaten Path

Like spring, fall is primarily a season for galaxy observation. Fall skies contain various galaxy clusters such as the Fornax and Sculptor groups. Galaxies, by far, are the dominant deepsky objects in both the NGC and Messier catalogs. Keeping in mind that most other types of deepsky objects that can be seen in amateur telescopes are not extra-galactic in nature, this is quite remarkable. There are a few exceptions like the Tarantula Nebula in the LMC, and various emission nebula visible in other spiral galaxies, like M33.

M33 - Located in Triangulum, it is one of the few galaxies visible to the naked eye, from a dark site. It is known as the "Pinwheel Galaxy". Normally a binocular object, M33 contains many other NGC objects within it. NGC 604 is the brightest of these HII regions, located on the NE side of M33. This is clearly visible in an 8" scope under ideal conditions.

NGC 7785 - This is an 11.6 magnitude elliptical galaxy located 1 degree S-SW of Omega-Psc. This is one of the brightest galaxies in this area, appearing as an irregularly round object with a bright core.

NGC 925 - At magnitude 10.1, this object appears as a halo of nebulosity around a bright core. NGC 925 is located 2 degrees SE of Gamma-Tri.

NGC 772 - Located in Triangulum, this 10th magnitude E3 galaxy also has bright HII regions that are visible with larger scopes.

NCG 869 & 884 - The famous double cluster in Perseus. Don't forget to look at this pair of jewels in the northern sky. It is particularly beautiful in a wide field eyepiece, like a Naglar.

NGC 752 - This is a sparse open cluster located about 7 degrees south of Gamma-And. It forms a twisted X in the finder scope.

So when tired of the same old objects and don't know what to look at next, be adventuresome and go off the beaten path.

Charles W. Baetsen
(524-0148)

M33 the "Pinwheel Galaxy"

Hamilton Amateur Astronomers 1994-1995 Council

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	Rosa Assalone	(905) 529-4657
	Raechel Carson	(905) 577-6608
	Nina Snaith	(905) 627-5478

H.A.A. Member Phone List

In the December issue of Event Horizon, we will be printing a list of members' names and phone numbers. This listing will allow you to contact other members for news on observing nights, outings, meetings, special events or for advice on equipment.

If you do not wish your name and number to appear in the listing, please contact Ann Tekatch at (905) 575-5433.

Astronomy Magazine Offer

Subscriptions to HAA members are available at $24.00 (U.S.) + 7% G.S.T.

To subscribe, send a money order payable to "Kalmbach Publishing Co." in the amount of $25.68 (U.S. Funds) along with your name and mailing address to: Ann Tekatch, 19 Pheasant Place, Hamilton, Ontario L9A 4Y4.

1995 R.A.S.C. Observer's Handbooks

We have placed an order for 25 handbooks and these should (hopefully) be available by the November 11th. general meeting.

The price this year remains the same as last year: $11.25. To reserve your copy, call Ann Tekatch at (905) 575-5433.

Sky & Telescope Magazine Offer

Subscriptions to HAA members are available at the reduced rate of $29.96 (U.S.Funds).

To subscribe, send a money order payable to "Sky Publishing Corp." in the amount of $29.96 (U.S.) along with your name and mailing address to: Ann Tekatch, 19 Pheasant Place, Hamilton, Ontario L9A 4Y4.

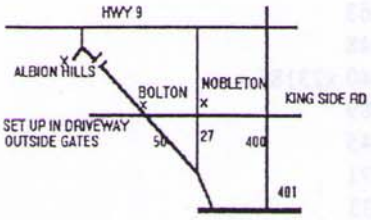
Subscribers through this programme are also entitled to a discount of 10% on Sky Publishing books and other items.

Membership Dues are Due!

If you liked our first year - you'll love the second!

Don't let your membership lapse. Renew your valuable ties to the largest independent astronomy club in Canada!

Efstonscience presents **Space your Face** Observing Sessions. Held on one of the five days up to and including every first quarter and last quarter moon. Everyone welcome. The place is Albion Hills Conservation Area. Arrive around sunset. As clouds can break up as quickly as they can roll in, the final go/no go decision must be made approx. 1 hour before sunset. At this time you may call the "Obsreving Hotline" 787-4581 -Glen



EVENT HORIZON- the radius surrounding a black hole at which a particle would need an escape velocity of lightspeed to escape; that is, the point of no return for a black hole.

The latest S&T Bulletin says that a new white spot on Saturn is visible with small telescopes. If anyone was successful in seeing the spot, please let us know by sending in your observations.

Editor's Address

Please submit all articles, thoughts, or ideas to this address:

Patricia Marsh
21 Kendale Crt.Apt.# 111
Hamilton, Ont. L9C 2T8
or via modem- 575-4191
or via e-mail at:
marshp@dogwood.physics.mcmaster.ca

Deadline is December 1, 1994

Astrophotos welcome. We may be able to have them scanned and they will appear on the World Wide Web. Don't be shy.

Thank you in advance..

CALENDAR OF EVENTS

- Sat. November 12, 1994- 8 pm — **R.A.S.C. Invitation to the Observatory-** Topic of discussion will be "Astrophotography". For directions please call Rich Petrone at 547-2589
- Mon. November 14, 1994- 7-8 pm — **Junior Group Meeting- CANCELLED-DATE CHANGED TO NOV.28**
- Mon. November 14, 1994- 7:30 pm — **ATM Meeting-** Caledonia- Call Jim Winger at 765-4649 for details and directions.
- Fri. November 18, 1994- 7:30 pm — **Council Meeting-** at the home of Patricia Marsh, Call Grant Dixon at 627-3683 for details.
- Sat. November 19, 1994- 8:00 pm — **Cosmology Discussion Group-**McMaster University, Burke Science Building Room B149. Topic "Quantum Physics as related to Cosmology". For details call Bill Tekatch at 575-5433
- Sat. November 26, 1994- 8:00 pm — **Messier Hunt-** observing session. **Binbrook Conservation Area** For details call Ev Butterworth at 632-0163
- Mon. November 28, 1994- 7:30 pm — **ATM Meeting-**Caledonia, Call Jim Winger at 765-4649 for information.
- Mon. November 28, 1994 7-8 pm — **Junior Group Meeting-** McMaster University, Burke Science Building Room B149. Call Patti Baetsen at 524-0148 for details
- Thur. December 1, 1994 — **Deadline** for newsletter. Please submit articles to Patricia Marsh.
- Thur. December 1, 1994 8:00pm — **R.A.S.C. General Meeting-** McMaster University Medical Centre Rm 1A4 Everyone welcome.
- Fri. December 9, 1994- 7:30 pm — **General Meeting- ALTERNATE LOCATION:** McMaster University, Medical Building- Room 1A4. Guest speaker is Dr. Derek Ford from the Dept. of Geography at McMaster University. Topic is "Planetary Geography".
- Sat. December 10, 1994 8:00 pm — **Observing Session-** Binbrook Conservation Area. For details please call Ev Butterworth at 632-0163
- Mon. December 12, 1994 7:30 pm — **ATM Meeting-** Caledonia, Please call Jim Winger for directions.
- Mon. December 12, 1994 7:00 pm — **Meeting for Jovial Satellites-** junior members meeting being held at McMaster University Burke Science Building Rm B148. for details please call Ev Butterworth at 632-0163.
- Fri. December 16, 1994 7:30 pm — **Council Meeting-** at the home of Ev Butterworth. For more information please call Grant Dixon at 627-3683.
- Fri. January 13, 1994 7:30 pm — **General Meeting-** Spectator Auditorium. For more information please call Grant Dixon at 627-3683. Everyone Welcome.