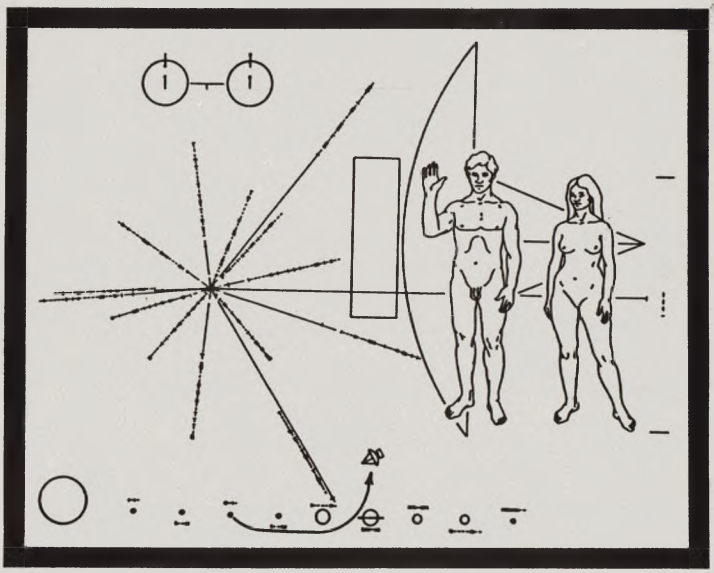
NOVA NOTES



Halifax Centre

May–June 1988
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Number 3

1988 Halifax Centre Executive

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Notice of Meetings

Date: Wednesday, May **4th**, 1988: **7:00 P.M.**
Place: Halifax Planetarium, Dunn Building, Dalhousie University
Topic: **BEGINNER'S GROUP MEETING**

Date: Friday, May **27th**, 1988 ***4th FRIDAY ***
Topic: **A N N U A L B A N Q U E T**
see notice inside for details and map

Date: Wednesday, June **1st**, 1988: **7:00 P.M.**
Place: Halifax Planetarium, Dunn Building, Dalhousie University
Topic: **BEGINNER'S GROUP MEETING**

Date: Friday, June **17th**, 1988
Place: Nova Scotia Museum. Access from the parking lot and side entrance. Meeting to be held in the lower theatre.
Topic: The **7:00** video presentation has not been finalized yet.

M E M B E R ' S N I G H T ! !

We will be having our annual trivia contest. **Doug Pitcairn** will show some slides taken through an improvised camera and **Pat Kelly** will show some slides of astronomical interest taken on a recent trip. Any members who have any interesting slides, pieces of equipment etc. are welcome to bring them along and give a short talk.

Note: The above list is tentative and subject to change.

About the cover: This is the plaque which was fastened to both Pioneers 10 and 11 in the event that they were ever found by extraterrestrials.If you don't already know, see if you can figure out what each of the different parts represent. If I remember, I'll include the solution in the next issue.

Editor's Report

Patrick Kelly

Well, once again I have lots of interesting tidbits with which to fill my Editor's report, so let's get started! Once again, you may have noticed some format changes to **NOVA NOTES**. I have decided to "fancy up" the titles to articles somewhat as well as make the footer at the bottom of each page a bit more formalized. This will also allow for a bit more text on each page. In addition, you may recall that a while back I had decided to try and have all articles start at the top of a page and was going to adjust the size of the characters in each article to accomplish that. Well, I had no idea just how much fiddling (meaning time) that it was going to require and that instead of looking better, the different sizes detracted from the overall all appearance. Thus I have decided to stick with one size of type for all of the articles and hopefully a bit of editing will make for an attractive page layout. In addition, I have been told by several people that the 12 point that I had been using could easily be made smaller and still be easy to read so I have switched to 10 point. This should make for a smaller newsletter (in terms of size and weight), which will not only save time collating and stapling, but will help in case the post office ever actually weights **NOVA NOTES** before they process it. However, each issue should still have about the same actual content, so don't let the new smaller size fool you!

Our former member **David Levy** has discovered yet another comet. Congratulations once more! This one is 1988e and the IAU circular announcing its discovery is reproduced below:

Circular No. 4566

Central Bureau for Astronomical Telegrams
INTERNATIONAL ASTRONOMICAL UNION
Postal Address: Central Bureau for Astronomical Telegrams
Smithsonian Astrophysical Observatory, Cambridge, MA 02138, U.S.A.
TWX 710-320-6842 ASTROGRAM CAM Telephone 617-495-7244/7440/7444

COMET LEVY (1988e)

David Levy, Tucson, AZ, reports his visual discovery of a comet with a 0.4-m f/5 reflector, as shown below. The object is diffuse, coma diameter 1', with a 1'.5 tail in p.a. about 240 deg.

1988 UT	R.A. (1950)	Decl.	m1
Mar. 19.5	21 30	+16.2	11
20.5	21 32.6	+16 48'	
21.49	21 35.2	+17 30	11.6

Another member who deserves congratulations is **Larry Bogan**. The keeners in the observer's group had been planning a Messier marathon for Saturday, March 19th. However, the weather did not cooperate and it was postponed until next year. We did not know that we had already been beaten to the punch by Larry who had been able to observe **103** Messier objects on the night of March 17th. You can read about his adventure in his article in this issue.

A few items concerning our last few meetings are in order. The constitutional amendments were both approved unanimously and have been sent off to National Office for approval. Once they have been O.K.'d there, they will be officially ratified. The **Book & Junk Sale** that we had at our March meeting brought in over **$80** for the centre. I would like to thank all of you who participated. The sale was quite popular and we hope to have one at another meeting soon (possible the June meeting). The idea of distributing **NOVA NOTES** at a regular meeting has had two advantages: I get to place faces to some of the members I have known only as names on mailing labels and we saved **$20** in postage for the last issue. We should save a bit more money on postage as we have also asked all of the libraries who currently get a complimentary copy to send us a note if they wish to continue to receive it.The July-August issue will have all of the details, maps, etc. for **NOVA EAST '88** and will be distributed at the meeting in June.

Some members were disappointed to find out that they could not read **Doug Pitcairn's** weekly astronomy column as it is only in the Saturday **Mail-Star** If you would like to see it in the **Chronicle-Herald** as well, we suggest that you write to the editor at P.O. Box 610, Halifax, N.S. B3J 2T2. Our other resident author, **Rev. Ted McLeod** who writes an astronomy column for the Wednesday issues of **The Daily News** has had his column picked up by the **Fredericton Gleaner** Also on the topic of literary merit, our observing chairman **Mary Lou Whitehorne** had a book review published in the last issue of the **National Journal**.

An interesting piece of correspondence that came up at our last executive meeting was a letter from the an astronomy club in **Barbados**. One of our members (I can't remember offhand exactly who it was) met some of their members while visiting their over the winter and as they seemed interested in what we were doing here, he thought that we should send them a letter telling them about us. They have replied with the hope of forming some sort of affiliation with us as well as sending an order for seven handbooks. They seem like an active group and the executive is following up on it. (Any volunteers for exchange speakers!!)

Well, I see that I have used up my two pages (you see what I mean about editing to make something fit!!) so I must close for now. Clear skies, and hope to see (or hear from) you soon. Ω

The Observing Chair

Mary Lou Whitehorne

Some people complain that the observing chairman is too busy with other observing projects and should come out to Beaverbank more often. So I decided to do just that! I called a session for Wednesday, February 24th. Five of us braved the cold and the first quarter moon only to have it cloud over as we arrived at the site - true to the tradition of our former observing chairman, one Glenn K. Roberts!

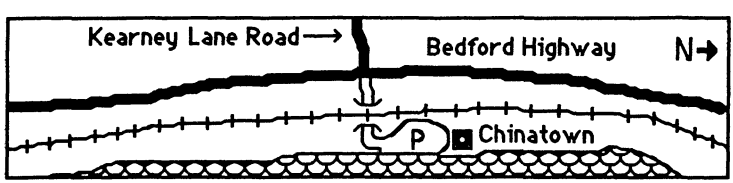
Being optimistic we took heart in the weatherman's words (clear!), dragged our gear up the hill and set up anyway. We then spent quite a considerable time playing "What star is that?" as various luminaries made solo appearances in the holes between clouds. We also played "Chase that Break" as we tried to predict what celestial delight would spring into view as larger holes in the clouds glided over. We managed to score on Polaris, Aldebaran, Castor & Pollux, Algeiba, Regulus, Betelgeuse, Rigel, Procyon and M42 and the Beehive.

It eventually cleared by 10:30 P.M. and Doug picked off a few galaxies in his light bucket - M81, M82, M51, M65, M66 and NGC 3593. We all had a look because by this time the corrector plates of the C8, Meade and B&L 8000 were all heavily frosted over. So was my temper! Pitcairn also discovered a mysterious pair of footprints (very large!) on the Moon's terminator. Could it be possible - a lunar Sasquatch??? *[Editor's Note: Are you sure the footprints weren't Doug's??]*Ω

The 1988 Annual Banquet

Halifax Centre

This year the Halifax Centre's annual banquet will be held at the Chinatown Restaurant.Our speaker for the evening will be **Randall Brooks**.There will be a cash bar from **6:30** to **7:00** with dinner at **7:00**. The menu consists of: Egg Rolls,Bo Bos,Pineapple Chicken, Almond Lobster Ding, China town Fried Rice, Honey Garlic Ribs, Beef with Brocolli, Chow Gai Pan, Fortune Cookies, Tea or Coffee. Cost **$14.25** including tax. (price does not cover drinks and tip)



A Messier Marathon

Larry Bogan

Some amateur astronomers are zealous enough to try to see all 110 objects of the Messier Catalog in one sunset to sunrise observing session. I first learned of this contest, called the Messier Marathon, while visiting the Tuscon Astronomical Association in 1986. Their observing chairman had done three marathons successfully and encouraged members to perform this feat in late March when the least number of Messier objects are near the sun.

When Bill Thurlow suggested that some members of the Halifax Centre do the same thing, I said "Why not?", it might be fun, The Moon would be new and out of the way on the 19th so we planned to do it during the week of March 14th-20th. The crystal clear skies needed occurred on the 17th-18th of March and the wether forecast predicted no clear periods for several days in the future so I jumped at the opportunity. I had practised finding early evening objects but now realize that I was not as prepared as I should have been for the morning objects. A brief description of the Messier Marathon appears in the Observer's Page on page 81 of the January 1985 issue of **Sky & Telescope**. Perhaps my comments will help those of you who would like to perform this feat in a future March.

A determination of the altitudes of the most difficult Messier objects indicated that the marathon would be more of a challenge here at 45° N that at Tuscon, Arizona at 35° N. It was obvious that I would probably not be successful because M30 was 10° below the eastern horizon at the beginning of morning twilight and several other objects would be only a few degrees above the the horizon at that time. The marathon would be slightly easier to do at the end of March. At that later date, M74 would be a bit more difficult in the evening sky, but the morning observations would have a better chance at being successful.

Observing time is dictated by the end and beginning of twilight. On March 20th (from **The Observer's Handbook**):

end of twilight	= 8:07 P.M. AST
beginning of twilight	= 4:43 A.M. AST

The total time under dark skies is about 8.5 hours (510 minutes) and the number of Messier objects is 110. This means that on average one Mess object must be found every 4.7 minutes. Some objects require much longer than this to find, but this is more than compensated for by the quick observation of close groups and bright objects. An example would be the observation of the open clusters in Gemini and Auriga, M35, M36, M37 and M38 which can be seen with binoculars in a few

seconds. Similar quick observations occur in other areas of the sky such as Sagittarius.

Your western horizon must be good but it is not as critical as the eastern horizon in the morning because there is not a rush of objects setting. The list of critical objects that must be seen before they set in the evening is:

M74 in Pisces (the difficult one of this group)
M77 in Cetus
M79 in Lepus
M33 in Triangulum and
M31, M32 and M110 in Andromeda.

Once the above items have been seen and the skies are dark, you can settle into a systematic, steady search for the other Messier objects. Cover each region and move from west toward the east. You might try to time the observations of M68 and M83 so that they are nearest to your meridian when observed because they have large negative declinations. Not until morning, when the summer objects in Sagittarius and Scorpius rise will there be any objects low on your southern horizon.

Do not let the large number of galaxies in the Virgo, Coma, Leo and Ursa Major regions scare you, They are high in the sky and can be covered very quickly if you plan ahead and have a little practice finding them. I found the Astro Cards invaluable for these regions of the sky.

The most difficult period is just before the beginning of morning twilight. A multitude of summer objects are just getting above the horizon and yet there are dim objects in Sagittarius and Capricornus that must be found at the last moment before the eastern sky gets too bright. This is the reason that it is imperative that you have an excellent eastern horizon. The list of critical objects to get in the morning are:

M15 in Pegasus (easiest of this group)
M2, M72 and M73 in Aquarius
M55 and M75 in eastern Sagittarius and
M30 in Capricornus (must be seen in twilight).

I had done the whole Messier list so I knew that I could find all of them with my 150 mm Newtonian from my home in the Annapolis Valley. I would need a good horizon to the east with no light pollution. Unfortunately, I live just to the west of Kentville and a neighbour with a bright yard light. I tried to solve this problem during the marathon by moving my observing site and that gave me some difficulty.

I kept track of the time at which I found each Messier object. This has enabled me to make the list below, showing the time distribution and the rapidity of finding objects. My speed in finding objects varied from one to nine in the space of a quarter hour. During the evening I was able to include one and a half hours away from the telescope.

It was exactly the last seven morning objects that I was unable to observe. If I had had less light pollution at the site I moved to in the morning, I am sure I could have added M2 and M15 to my completed list. Light pollution lengthened the time required to find objects and was bright enough that I could not quickly locate the stars in Pegasus and Aquarius needed to hop to the last Messier objects. This was the most frustrating period of the session, since I knew the objects were there but I had not the time to hunt them out.

I observed 103 Messier objects in one night. Although I did not see every one of the 110 Messier objects to complete the marathon, I enjoyed the experience and found it valuable. I had been able to see all the objects that had taken months to do when getting my Messier certificate. I recommend the Messier Marathon to other amateur astronomers. It is a grand feeling to be out under the sky all night observing. When the blue and orange of sunrise brightened the eastern horizon, my effort ended and I felt relaxed and pleased. Well, also I knew that I could head home for my warm, cozy bed!

THE TIME DISTRIBUTION OF MY MESSIER OBSERVATIONS

Time	Messier Objects found in the 15 minute period								
7:30	36	37	38	41					
7:45	31	32	110	33	45	42	43	79	35
8:00	79				-twilight ends				
8:15	34	76	81	82					
8:30	52	103	1	74					
8:45	78	44	67						
9:00	50	46	47	93	48				
9:15	40								
9:30				Warmup period and time					
9:45				to snack and organize for					
10:00				the Virgo - Coma region.					
10:15	97	108							
10:30	101	109	106						
10:45	51	63							
11:00	65	66							
11:15	95	96	105						
11:30	3	94							
11:45	53	64	13						
12:00	58	59	60	61					
12:15	85	88	91	84	86	87	89	90	
12:30	98	99	100	49	104				

12:45	68	83							
1:00	57								
1:15			Time to warm up and						
1:30			organize for eastern skies.						
1:45	92								
2:00	102	5							
2:15	107								
2:30	9	10	12	56	71				
2:45	14	19	4	80	27	29	39		
3:00	62	11	26						
3:15			Packed up and drove						
3:30			to a site with a better						
3:45			SSE horizon.						
4:00	6	7	8	20	25				
4:15	16	17	18	21	22	23	24	26	69
4:30	54	70							
4:45			Morning twilight begins.						
5:00			Quit at 5:08. Ω						

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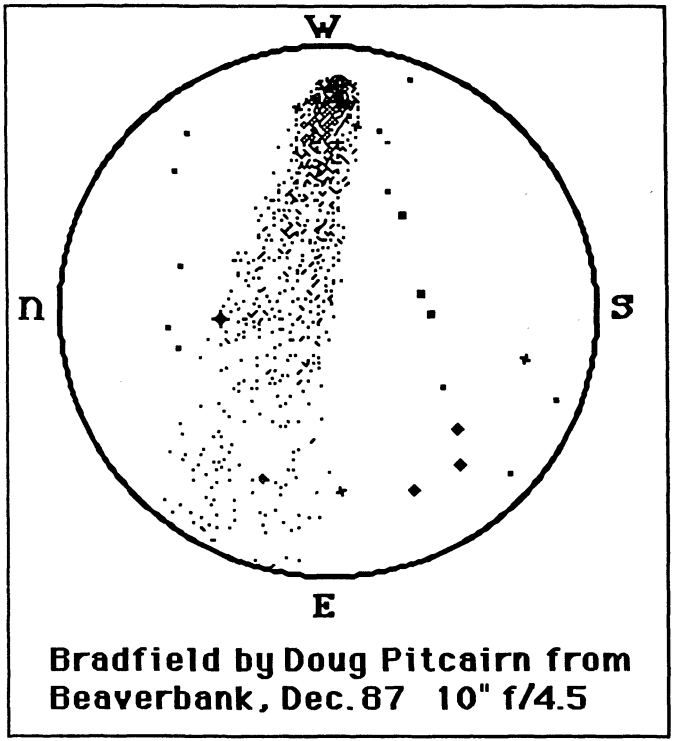
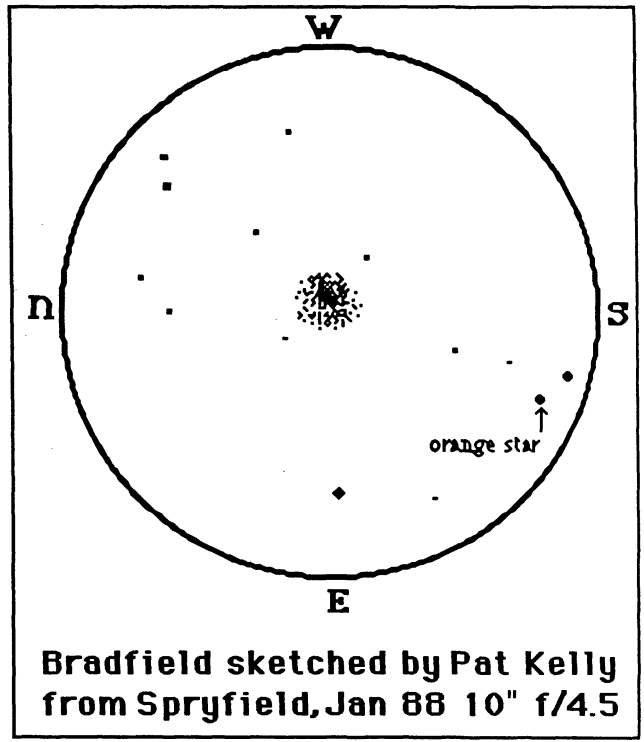


Bradfield by Doug Pitcairn from Beaverbank, Dec. 87 10" f/4.5



Bradfield sketched by Pat Kelly from Spryfield, Jan 88 10" f/4.5

Comet Bradfield: A Look Back

Patrick Kelly

Comet Bradfield shall not be soon forgotten by many of us. It put on a show which in some ways was better than that of Halley's Comet. It was not much brighter, but it was high in the sky and easy to find. You will no doubt recall its passage by M10 last fall. That was when I first spotted it. I was using 20x80 binoculars from the hill near my house and was going to hop from M12 to M10 and then to the comet. I actually found the comet while looking for M10! I have noted that it appeared about the same size as M13 but was more centrally condensed. I estimated its magnitude as 6.2 based on comparisons with M10, M12 and M13.

Michael Boschat sent in two reports on Bradfield in October. On the 9th he reported its appearance through his 80 mm refractor as similar to that of a small globular cluster at magnitude 6.4 and 8" in diameter. He also suspected faint jets at 90x. On the 13th, he observed an 8.5 magnitude point-like nucleus and a short fan shape at a position angle of 80° which could have been either the coma or the beginnings of a tail.

Perhaps most significant to me was the fact that Comet Bradfield was the first object that I actually made a sketch of even if it was only from my back yard. Doug also sketched it, (see preceding page) although he was at Beaverbank. The difference is obvious especially as both were made through the same telescope. I observed Bradfield often during the time that it was visible. My wife and children got a good view of it (their second comet) from the front yard. In addition, it was nice to compare Bradfield with Borrelly when they were both visible at the same time.

Although Bradfield has now departed and Comet Liller appears to be ready to take its place as "the" comet, I shall always remember Bradfield and the many times its sight filled me with wonder. Ω

Views of Comet Bradfield (1987s)

David Chapman

I must admit that my astronomical observing has fallen off quite a bit since coming to England, and I haven't been keeping up with the astronomical news, so I did not hear of Comet Bradfield until I opened up the *Toronto Star* for Saturday November 21. My wife and I were in Canada at the time, visiting her parents in Port Colborne, Ontario, and showing off the baby. I settled down to read Terry Dickinson's weekly column on astronomy; to my surprise, I learned of a naked-eye comet to be seen high in the Western sky after sunset.

As luck would have it, my in-laws are bird-watchers and own a pair of Bushnell 7-15x35 (zoom) binoculars, so after supper I excused myself from the table and went out for a look. Port Colborne has no large towns or cities to the west , so the night sky is pretty dark, even from in the town. Also, the Moon was new that night. Initially, there was a bit of scattered cloud about, so the comet search became a game of hide-and-seek.

There was only a crude finder chart in the *Star*, so I started by sweeping to the right and below Altair. I knew that there were few star clusters, nebulae, or galaxies in this area to be confused with so finding a comet, especially a bright one, would not be difficult. [Here we have a perfect example of how useful it can be to learn one's Messier Catalogue!] I soon found the comet, and convinced myself that I could see both coma and tail. My father-in-law, who abhors the cold, was summoned outside and, with a little guidance, also found the comet for himself in his binoculars. As a senior citizen, he was thrilled to have seen his first comet, especially having missed Comet Halley.

The rest of my stay was cloudy, and then I had to return to England, where it was cloudy until Thursday, November 26. The sky was quite different from my last observation: clear, but hazy, and suffering from light pollution from the 5-day Moon and the container port (Yes, Southampton has one of those, too!). The view in my Pentax 7x50 binoculars was good, but not as good as the previous Saturday. I consoled myself with the fact that for the first time I had viewed a comet from both sides of the Atlantic. Fortunately, I had my Celestron C90 on hand and it was called into service. The view in the telescope at 60x was much better: I could make out a large coma, a central condensation, and a hint of the fan-shaped tail. This was better than pre-perihelion Comet Halley.

I followed the comet for the next two nights, until the Moon and cloudy weather intervened. One night, I was out at a friend's place out of town, where the skies are much darker than in my back garden in the city. We stepped out for a few minutes with our binoculars (his were 20x50's), and he soon found his first comet, also.

In closing, I would like to make a few remarks on binoculars. I would never trade my Pentax 7x50's for anything, as the images are sharp and free of chromatic aberration. However, I was impressed by the zoom feature on the Bushnell 7-15x35's: the low power was good for scanning, but the higher power showed more detail once the desired object was found. The 20x50's were a little shaky to hold; they are normally used for target-spotting at a rifle range, and are typically tripod-mounted. My advice to anyone buying binoculars for astronomical use is to try out as many different models as you can at observing sessions, etc., and then to purchase the best quality your budget will allow. Cheers! Ω

Flights to the Stars: A Report

Patrick Kelly

Last November 11th, a public talk was given at Saint Mary's University by Dr. Wesley T. Huntress entitled *Flights to the Planets: Frontier or Fantasy?"* Dr. Huntress is a senior research scientist at NASA's Jet Propulsion Laboratory but is also involved in planning and management. His talk was attended by about 200 people and a summary of it follows.

He began by giving an historical perspective on the entire concept of space probes, beginning with the moon shots of the 1960's. The approach taken with the Moon was to start by sending a series of probes called **Ranger** to crash onto the Moon while taking pictures all the way in. This series was to be followed by a **Surveyor** series which would actually softland and send back panoramic pictures. The **Ranger** series had numerous problems. The first six probes failed and it wasn't until **Ranger 7** that photographs of the moon were actually returned.He points out that many people found it odd that at the same time that the U.S. was having a horrible time trying to get its act together sending shots to the Moon, they were already succeeding in sending probes to Venus! Although the first Venus probe, **Mariner 1**, had some problems (it ended up exploring the bottom of the Atlantic Ocean instead), **Mariner 2** made it to Venus in December of 1962!

Despite the "space race", Soviet and American space scientists were able to exchange information, although not always to the best advantage. After determining the temperature, pressure and later on, the composition of Venus' atmosphere, Soviet scientists refused to believe the "impossible" figures supplied by American scientists. As a result the Soviets lost quite a few of their Venus probes. After several softlanding attempts using burlap to connect the probe to the parachute, they finally switched to silk which stopped the probes from "dropping" the last leg of the trip. However, it took several tries after switching to silk to build a probe capable of withstanding the high pressures at the surface of Venus.

On the other hand, the Americans took a completely different approach to Venus . Having decided that Venus was not a very hospitable place, the U.S. abandoned it altogether in favor of sending probes to Mars instead! However, here they ran into an odd problem in that their early shots (as well as the Soviets) all stopped functioning at about the same distance from the sun. The failures were blamed on the "Galactic Ghoul" but the reasons for these early failures is still a mystery.

The topic then switched to that of the **Viking** landers and some of the "behind the scenes" action that went on after the landings. Before

any of the sequences involving moving parts were attempted on Mars, there were first test run on an Earthbound **Viking** lander which had been placed in "the sandbox". This was a replica of the site around the **Viking** lander as reconstructed by looking at pictures sent back from Mars. After any sequence involving digging, it was carefully groomed to match the new site. Many of the rocks in the model got nicknames, such as "Big Joe", "Beer Can" and "Volkswagen". Every Wednesday the crew would gather at the sandbox , munch on Mars bars and watch the test lander go through its sequences.

His talk then continued with a tour of Jupiter, Saturn and Uranus as revealed by the **Pioneer** and **Voyager** spacecraft. He also covered the recent probes to Halley's Comet. As this sort of information abounds in many sources I won't go into any further details about this part of the talk.

The last section of the talk dealt with planned missions, both American and Soviet. The Soviets have an ambitious program for Mars. They are planning a mission to Phobos, which will have a "lander" which will actually move around on the surface and determine its composition. In addition, they plan on sending a joint Soviet-French probe to Mars that would "hop" around the planet. It would do this by being suspended from a balloon which would heat up during the day and carry the probe to a new site and then land again in the evening as the balloon cooled. They may also be planning on sending a "hard lander" which would penetrate several metres into the Martian surface and radio back an analysis of the variations in the surface by depth.

The Americans have several missions planned for the near future. **Magellan** will orbit Venus and use imaging radar to produce a resolution of 1 kilometre. The **Mars Observer** will be comparable to a regular Earth weather satellite, but it will be placed in orbit about Mars. The **Galileo** probe will send a lander into the atmosphere of Jupiter while the main part of the probe stays in orbit about Jupiter and maps its moons to a resolution of about 100 metres. There are also two missions which are currently in the study phase. **Cassinni** which is a joint ESA-NASA probe to Saturn in which the European Space Agency will contribute a probe which will land on Titan while NASA will build the main section which will stay in orbit about Saturn and map its moons. The other is the **Comet Rendez-vous Asteroid Flyby** or **CRAF**. This probe will follow a comet throughout an entire orbit about the sun as well as send a soft lander to the comet's surface. The comet will be selected so that the spacecraft can intercept an asteroid and make a close approach to it on its way to its meeting with the comet.

All in all, I found the talk to be a very interesting one, and I hope that some day Dr. Huntress will be back to report on the successes of the missions that are currently underway. Ω

Galactic Forms

Doug Pitcairn

I have always been curious about the reasons for the different physical appearances of galaxies. I assumed the answer would be complex and planned to pursue the answer "sometime". I recently purchased a copy **Galaxies** by Paul Hodge. To my surprise, the problem of galactic form was far from the main topic of the book. Indeed, it was covered in about five pages! Allow me to summarize.

In the early days of the universe, as the primordial gas expanded, instabilities developed which led to "clumps" of higher density forming. Now the fun begins. The cloud contracts due to its own internal gravity. The cloud's mass, density and the amount of angular momentum (spin) it contains, decide what type of galaxy will result.

In the simplest case, where the proto-galaxy is a non-rotating uniform mass of gas, the collapse becomes a rush to nowhere. The entire cloud will collapse into a huge black hole, and that's the end of that. (I hope someone is investigating this as a possible contribution to the "missing mass"). If, however the cloud shows some initial rotation, as most things in astronomy do, there arises two possibilities.

As a slowly rotating cloud collapses, it does not rotate fast enough to offset the effect of gravity before the density becomes high enough to cause rapid, wide spread star formation. Over a short length of time, almost all of the gas in galaxy condenses into stars. Since there is little or no gas left to dissipate energy, the slowly rotating spheroid of stars ceases to contract. What we are left with is a spheroidal region of stars with similar ages and compositions, with little or no gas or dust present between the stars. A typical elliptical galaxy.

A fast rotating cloud contracts until the speed of rotation starts to cancel the effects of gravity. This happens first on the plane perpendicular to the axis of rotation. The rest of the gas continues to fall inward and the cloud assumes a flattened shape. Its contraction is interrupted by the "rotational limit"; the spin prevents the density of the cloud from ever reaching the critical level required for large scale star formation. The spinning disk spends the next ten billion years gradually forming stars. At any time in its life such a galaxy will contain young, recently formed stars, lots of gas and dust, and a mix of older type stars. The dynamics of these systems soon form the density waves which cause the formation of spiral shaped regions of increased star formation. The result is a spiral galaxy, such as our own, Milky Way.

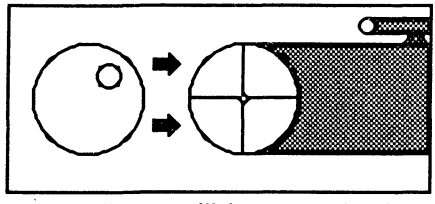
Simple eh? "Ah! but what about the irregular and odd types, the Cd types, the seyferts, etc.?" you may ask? If I told you everything, you wouldn't go out and buy the book! I highly recommend it. Ω

Mars and Your Telescope

Jim MacGuigan

The upcoming opposition of Mars (September 28th) will be the best since the great opposition of 1956 and the best until 2003 so it's time to get organized! Certainly the best telescope to have is a long focal length refractor (either achromatic or the three lens apochromatic) but you can improve the performance of any telescope.

The short focal length Newtonian (either equatorial or Dobsonian) with its vanes and large secondary mirror has real problems resolving fine detail. To solve this a planetary mask can be added. It is simply an aperture stop as diagrammed below. Be sure to place it so that the hole is not obstructed by any vanes! There is not much you can do with a Schmidt-Cassegrain as the size of the secondary mirror tends to degrade the image, however its long focal length is advantageous and a Barlow lens will help somewhat.



On all telescopes filters will improve the image. The use of an orange (#21) or red (#23A) filter will help increase the contrast of the dark areas. A blue (#80A) will help with the clouds and polar caps. You might also wish to try a green (#58) or yellow (#8) to see if they help.

In addition to filters, you will need MAGNIFICATION. The minimum power on Mars is 200x and if you can get 400x out of your telescope that is even better. High magnification is best accomplished by using a Barlow lens. This effectively doubles the focal length (eg. making an f/4.5 behave as an f/9). A 3x Barlow will, of course, triple the focal length.

Doubling the focal length has the effect of doubling the magnification as well as increasing the contrast between the object and the sky. In addition it allows for more eye relief by giving a bigger "hole" to look in to than using a lower focal length eyepiece. For instance, a 12 mm eyepiece with a 2x Barlow gives the same magnification as a 6 mm eyepiece used without a Barlow, but with better eye relief.

Starting in June, Mars will exhibit a sufficiently large disk to show details in amateur telescopes of 80 mm aperture or larger. At that time you should be able to see the polar caps and Syrtis Major and the detail will increase as the summer drifts lazily into early autumn. So, let's hope for clear and steady air for Mars' greatest opposition in years. Ω

Globular Clusters

Bob Seleski
reprinted from **Starseeker** - Calgary Centre

Huddled around the Milky Way Galaxy like moths around a streetlight are numerous balls of stars. Of course, these are the globular clusters and their story holds many interesting facts.

For a few years, I was convinced that the right pronunciation was glow-bue-lar; however, nearly everyone else used glaw-bue-lar. My reasoning was that their shape was like a globe, so the word would just be an extension of the base word. To verify this line of thought, I turned to Funk and Wagnall's. They ruled in favour of glaw-bue-lar, so I stand corrected...

It is true that they are spherical in shape. Stars from a few hundred to over a million will collect together using their gravitational pull to stay together. Depending on a star's age, and their individual velocities, the resulting cluster may be loose or tightly bound. Many clusters are thought to be quite ancient, as old as the host galaxy.

Globulars are catalogued on a scale of 1 to 12, using the Roman numerals I to XII as a means of designating density. One is compact , while twelve is open. Why there are 12 steps and not 10, I don't know, nor do I know how long this classification system has been used.

History does record that a German astronomer, Abraham Ihle, discovered the first one in 1665 while looking for Saturn. The comet-like smudge of light was about 2 1/4 degrees northeast of Lamda Sagittarii (Kaus Borealis, "northern part of the bow"). Today, we call it M22, a 6th magnitude object about 18' in diameter. Amongst globulars, M22 is surpassed only by Omega Centauri and 47 Tucanae (both southern hemisphere sights).

If you were wondering how to pronounce Abraham's last name, your guess is as good as mine, but Burnham's (book 3, page 1596) offers this thought: Ihle may be a misspelling of Hill, as an amateur by that name was registered as a member of the British Royal Society. It is odd and unfortunate that these errors crop up occasionally and end up being eternal before their discovery.

To get back to the topic, there are about 130 globulars surrounding the Milky Way. They have also been mapped around the Andromeda Galaxy (which has about 140) and the elliptical galaxy M87 which is parent to over 1000 clusters! From these studies, we know that they are arranged equally around the galaxy's nucleus within a radius of about 65,000 light years.

Since we are located about ten kiloparsecs (30,000 light years) from the Milky Way's centre, we should expect to see more clusters in

one direction, and indeed, the region of Sagittarius (direction of M22), Scorpius, Ophiuchus, and Ara (the Altar) in the summer skies is richer in globulars.

The closest one to us is the 7.3 magnitude NGC 6397 in Ara. At 8200 light years away, it's 50 light year diameter appears as a disc about 20' in diameter. An interesting feature of NGC 6397 is the absence of short period, pulsating variable stars; a common feature of other globulars. This type of star is useful in determining distances to these items of interest.

Knowing that the Milky Way is about 300,000 light years across, this should give the approximate distance of the most remote cluster. In Lynx, there is an 11 1/2 magnitude object thought to be 180,000 light years away. It might just be an intergalactic wanderer, drifting in the cosmos. It's distance places it out as far as the Magellanic Clouds!

As mentioned above, most globulars are contained within a 130,000 light year ball centered on the Milky Way's nucleus. NGC 2419 lies out side this sphere. The only other known exception is NGC 7006 in Delphinus (the Dolphin). It is also shining at 11 1/2 magnitude, but is closer at 150,000 light years distant. It is also considered to be an intergalactic nomad. Despite the enormous distances, both are visible in a 150 mm (6 Inch) instrument. Recent sky surveys hint at more of these unattached globular clusters adrift in deep space.

A lot of Globulars have found their way into Messier's list, accounting for 29 of the 110 objects catalogued. Several reasons converge to account for this. First, many clusters are relatively nearby and thus are fairly bright. Secondly, stellar density (stars per volume) increases towards the centre. This gives a bright core, fading towards the edges. And third, using the small crude instruments Messier worked with, individual stars in the globulars could not be resolved. Of course, today we can see individual members more easily.

For observers, globulars can take on different appearances, depending on your optics, sky transparency, and the compactness of the cluster. I recall my first view of M13, the Hercules cluster. At magnitude 5.9, it is close to the limit of naked eye visibility, but through a Celestron C14, it looked like a hive of fireflies. It is classed as VII, meaning that it is reasonably open. This allowed me to pick out individual stars around it's circumference. It was a most inspiring sight!

To appreciate the classification scheme, and maybe gain an appreciation of what to expect through a telescope, let's form a list of clusters starting with class I. In other words, the list will progress from a tight, compact grouping to what may be called an open cluster.

A good example of a class I cluster is M75 (NGC 6864) in Sagittarius. It is about 125 light years in diameter at a distance of 95,000

light years with a magnitude of 8.6. It is interesting to note that this is likely the most remote globular in Messier's Catalogue!

On to a class II cluster, M80 (NGC 6093) in Scorpius. It appears much like M75, but is brighter at magnitude 7.2 due ti it being only 36,000 light years away. M80 is also much smaller, about 50 light years in diameter. Other class II's include NGC 1851 (in Columba the Dove), M2 (NGC 7089) in Aquarius, and NGC 2419 in Lynx, which you may note, is the distant cluster discussed before.

For class III we can refer to NGC 104 which you probably know as 47 Tucanæ. At magnitude 4, it is very bright. Although Canadian observers cannot view this magnificent sight, it is certainly worthwhile to track down an astrophoto of it. This cluster is so brilliant because it is larger than most, and it is very close, being only 16,000 light years distant! As if this were not distinction enough, spectrum studies suggest that 47 Tucanæ is also younger than most globulars.

The purpose of listing all of these clusters is to illustrate the changes from class to class. To list and describe each class would make this article rather lengthy. So to save space, the editor's type setting fingers and your attention, I will list only examples for the next classes and pick up some commentary at the end. Try and compare them using photographs, or better still, actual observations!

Class IV: M15, M62, M92 and NGC 6453.

Class V: M5, M13 (the Hercules Clusters), M53 and M79.

Class VI: M3 (many feel this to be the finest globular in the spring sky! It also marks the midpoint in the classes).

Class VII: M10, M22 (the one discovered by Ihle or Hill)

Class VIII: NGC 5139, Omega Centauri - the brightest and grandest cluster of them all! It is close to 47 Tucanæ and the Magellanic Clouds in the southern skies. At the core, the stars are a mere 1/10 of a light year apart! Certainly ant planets here would never know night, but life probably cannot form because of the intense radiation.

Class IX: M4, M12 and NGC 6397 (closest to Earth).

Class X: M56 and M68.

Class XI: M55 - This 7th magnitude cluster in Sagittarius is about 20,000 light years away, a nominal distance. It makes a good example to compare with M75 or M80. By comparing them, you can see the great range in which globular clusters can appear!

I could not find any Class XII examples, but at this extreme they are virtually open clusters.

Noting the fine differences between classes help one appreciate globulars better. They rank as an interesting collection to read up on, and they are also abundant enough to warrant including in most observing sessions. Ω

Gawker's Report
compiled by Pat Kelly

Time: January 14th, 1988
Place: Elderbank Driveway Site
Observer(s): Glenn Brown
Equipment: 7x35 and 10x50 binoculars
MVM: N/R
Weather conditions: steady wind, temp. -21°C
Seeing: 10 on a scale of 10
Comments: It was a little cool but there was an excellent Aurora Borealis show. For a while there was an arc like a rainbow with stars clearly visible below it and curtain aurora running along the arc. At its largest point it covered 130° on the compass, from 300° west to 70° east and up to an altitude of 35°. The aurora also cast a very definite shadow.

Objects Observed:

Planets: Jupiter and three moons
Open Clusters: M50, M67, NGC 2335, NGC 2353

◊◊

Time: January 15th, 1988
Place: Elderbank Driveway Site
Observer(s): Glenn Brown
Equipment: 10x50 binoculars
MVM: N/R
Weather conditions: Temperature -12° dropping to -20°
Seeing: 10 on a scale of 10
Comments: Just a quick tour. Got set #1 of Astrocards and they work very well, but it got cold fast!

Objects Observed:

Nebulae: M42
Open Clusters: M45, M103, NGC 663, NGC 869, NGC 884
Galaxies: M31

◊◊

Time: January 22nd, 1988
Place: Elderbank Driveway Site
Observer(s): Glenn Brown
Equipment: 10x50 binoculars
MVM: N/R
Weather conditions: Temperature -8°, light wind, very high thin vapor
Seeing: 9 on a scale of 10
Comments: Very nice out. I have to put a clipboard on my binocular mount and modify my light system to accommodate the Astrocards so that I will only have to glance down to check the star field. These cards are great!

Objects Observed:

Open Clusters: M29, M39
Galaxies: M65, M95, M96

◊◊

Time: March 14th, 1988
Place: Beaverbank Observing Site
Observer(s): Nat Cohen, Paul Duval, Doug Pitcairn, Mary Lou Whitehorne, Joe Yurchesyn
Equipment: B&L 8000, Meade 2080, 250 mm Odyssey, C8 (for 30 seconds) 60 mm refractor and his 150 mm f/12 that Joe didn't bother to set up.
MVM: 6.2
Weather conditions: Cold and damp. Temperature -2°C
Seeing: So so
Comments: You can tell Leo is high up! Look at those galaxies! NGC 3872 is listed at m_V = 11.8 yet I could not detect it. Anybody who has observed this fellow, I'd like to hear from you (α = 11h 46' , δ= +13.5°) Sirius! Spectra was easily visible with Nat's prism dispersion eyepiece!! Including the Hα and Hβ lines. - D.P.

Objects Observed:

Planetary Nebulae: M97 (Owl Nebula)
Nebulae: M42, M43, NGC 2024
Globular Clusters: M3
Open Clusters: M35, M36, M37, M38, M45 (Pleiades), M44, Coma Berenices

Galaxies: M63, M65, M66, M81, M82, M95, M96, M98, M99, M100, M105, M108, NGC 3384, NGC 3389, NGC 3628, NGC 3659, NGC 3666, NGC 3705 (looked like a tiny globular), NGC 3773 ?? (very, very faint!), NGC 3810

◊◊

Time: Thursday, March 17th, 1988
Place: Beaverbank Observing Site
Observer(s): Nat Cohen, Paul Duval, Doug Pitcairn, Joe Yurchesyn
Equipment: Centre C8
MVM: ~6
Weather conditions: Cool (-4°C) and calm

Objects Observed:

Planetary Nebulae: M97, NGC 2392, NGC 3242
Nebulae: M42, M43, M78, Nebulosity surrounding NGC 2264
Open Clusters: NGC 2244, NGC 2251, NGC 2264, NGC 2420
Galaxies: M51, M63, M65, M66, M94, M95, M96, M101, M102, M105, M106, M108, M109, NGC 2903, NGC 3115, NGC 3310, NGC 3344, NGC 3384, NGC 3389, NGC 3521, NGC 3628, NGC 4449, NGC 4490, NGC 5195, NGC 5907
Double Stars: ζ UMa, 38 Gem, Σ1645 CVn, Σ1442 Leo

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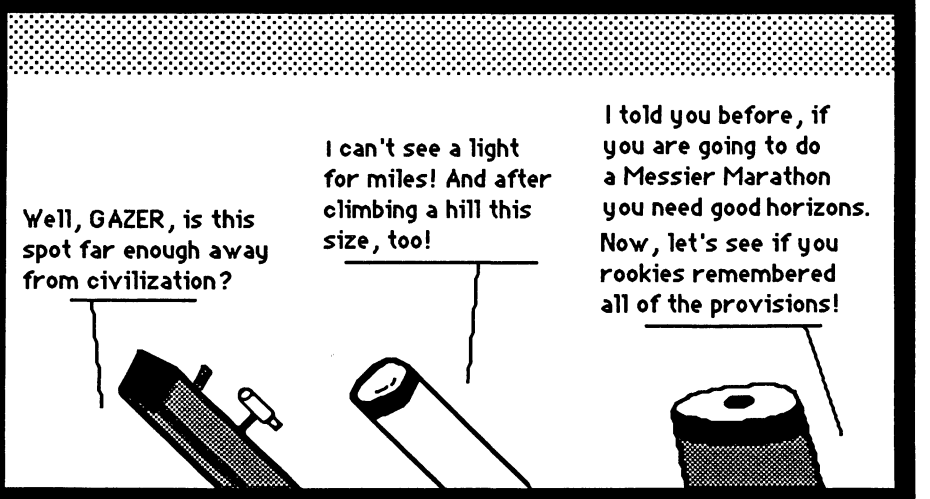
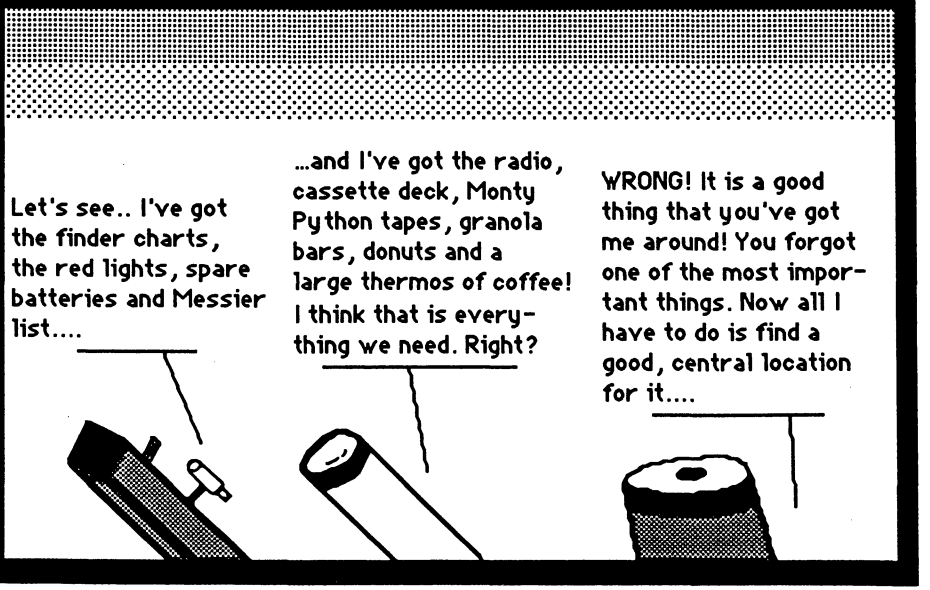
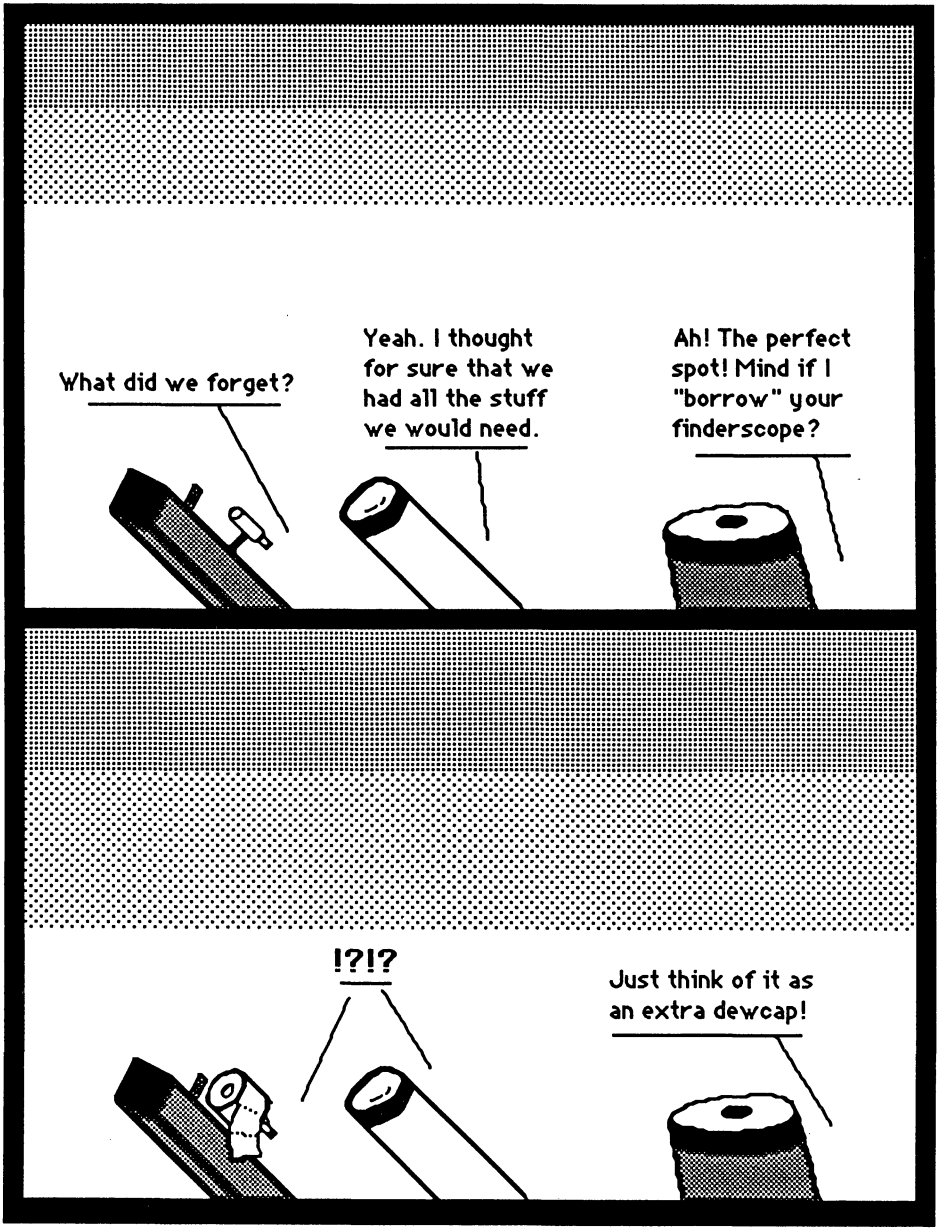
The dates of the best observing periods can be obtained from the "Calendar of Events" inside the back cover. Any clear night in this period is likely to find people at Beaverbank. If you wish to double check to see if anyone is going out, please call either the Observing Chairman, the Second Vice President or the NOVA NOTES Editor.

Members are invited to submit their observations to the Editor for inclusion in "Gawker's Report". In order to make the compiler's job easier, please list all information in a format similar to that used for the column. Thanks and clear skies. Ω

GA★ZER


Well, GAZER, is this spot far enough away from civilization?
I can't see a light for miles! And after climbing a hill this size, too!
I told you before, if you are going to do a Messier Marathon you need good horizons. Now, let's see if you rookies remembered all of the provisions!


Let's see.. I've got the finder charts, the red lights, spare batteries and Messier list....
...and I've got the radio, cassette deck, Monty Python tapes, granola bars, donuts and a large thermos of coffee! I think that is everything we need. Right?
WRONG! It is a good thing that you've got me around! You forgot one of the most important things. Now all I have to do is find a good, central location for it....



Patrick Kelly

NOVA NOTES INDEX

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HALIFAX CENTRE - R. A. S. C.
1988 CALENDAR OF EVENTS

May 1988

S	M	T	W	T	F	S
1	2	3	**4**	5	**6**	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	**27**	28
29	30	31				

June 1988

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	**17**	18
19	20	**21**	22	23	24	25
26	27	28	29	30		

July 1988

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	**19**	20	21	22	23
24	25	26	27	**28**	29	30
31						

August 1988

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	**11**	**12**	**13**
14	**15**	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Key to calendar:

Regular Meetings: **shadowed and outlined**
Beginner's Meetings: double underlined
Special days: **bold**
Possible observing sessions: **underlined**

Special Days:

May 4 - Eta Aquarid Meteors
May 6 - Venus at maximum brightness in evening(-4.5)
June 21 - Summer Solstice
July 19 - Venus at maximum brightness in morning (-4.5)
July 28 - South δ Aquarid meteors
August 11- Perseid Meteors
August 12-15 - NOVA EAST 88

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