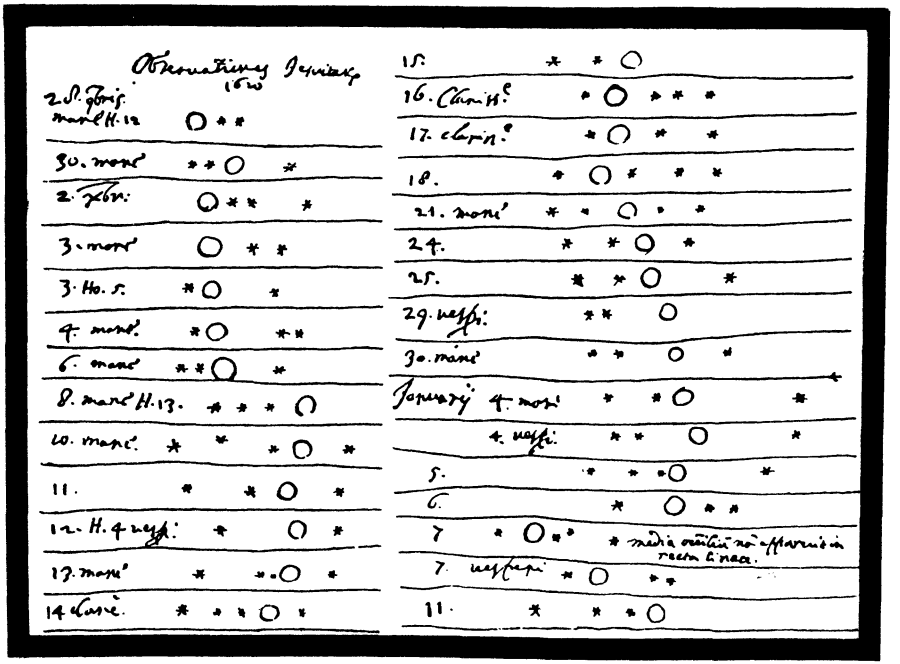
NOVA NOTES



Halifax Centre

Jan-Feb 1989
Volume 15
Number 1

1984 Halifax Centre Executive

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NOTICE OF MEETINGS

Date: Friday, January 20th : 8:00 P.M.

Place: Nova Scotia Museum: Meeting to be held in the lower theatre. Access from parking lot & side entrance.

Speaker: Patrick Kelly will be giving a lecture entitled "Ancient American Astronomy". He will be speaking about the astronomical history of the Plains Indians and the Maya.

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Date: Friday, February 17th : 8:00 P.M.

Place: Nova Scotia Museum: Meeting to be held in the lower theatre. Access from parking lot & side entrance.

Speaker: Dr. George Mitchell from Saint Mary's University will be our speaker for this meeting. One of his fields of research is comets and he will be updating our knowledge of these bodies

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REFRESHMENTS WILL FOLLOW BOTH MEETINGS !

Please note that this list is tentative and subject to change.

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About the Cover: The cover this issue shows a page from Galileo's notebook showing some of his observations of Jupiter and it's moons.

MINUTES OF THE OCTOBER MEETING

Executive Meeting: October 21, 1983

The following items were taken up during the executive meeting:

1. Future Speaker - Terry Danks on Globular Clusters in November or December.

2. Speaker Exchange - This was shelved for the time being.

3. Election of officers for the November meeting.

General Meeting: October 21, 1983

The speaker was Dr. Hugh Millward of the Department of Geography, Saint Mary's University, who is a member of the L5 Society. The L5 Society is a group proposing and investigating the colonization of space. His topic was: Proposals for Industrialization of the "High Frontier". Dr. Millard outlined proposals for the industrialization and settlement of high Earth orbits. He spoke of opening of lunar mines and also the taking of minerals from the asteroids. These minerals would be processed at a large manufacturing station.

The space stations could be made of up to six units: three residential areas and three farming areas. There would be high yield crops with possibly four crops per year.

He said that in the future there would be large silicon solar power cells. Some of the receiving dishes on Earth would be as large as nine kilometres in diameter. A big solar power station would have a capacity of 10,000 MW. (One wonders of their affect on both amateur and professional astronomers.)

MINUTES OF THE NOVEMBER MEETING

Executive Meeting : November 19, 1983

The following items were taken up during the executive meeting:

1. Future speaker - Pat Kelly on ancient American astronomy in January.

2. Observing session - Bridgewater has invited the Halifax Centre down on January 14th at 7:30 P.M. Alternate storm date is January 28. This session will be held at Park View Education Centre instead of the DesBrisay Museum. (To get there see map in seperate notice of observing session)

3. The cut-off date for members who have not paid their annual dues is the end of December.

4. Rule changes for the Burke-Gaffney Award. These rules are to be changed to parallel the rules for the Simon Newcomb Award. The presentation is to be from 1000-2500 words instead of 1000-1500, and the eligibility is now open to any RASC member of the Halifax Centre who is not a professional astronomer.

General Meeting: November 19, 1983

This meeting consisted of two parts: A talk entitled "The Christmas Star" along with a "trivia" night.

Cathy McLeod, our new Vice-President for 1984, presented a talk on possible astronomical explanations of the Christmas Star. She gave us several possibilities to explain the Star of Bethlehem:

1. A nova
2. A supernova
3. The conjunction of planets such as Saturn and Jupiter
4. A meteor/fireball
5. A comet
6. A planetary nebula

Reports of all of these have been documented with various degrees of brightness.

The second part of the meeting was a trivia question period conducted by Randall Brooks. Randall, Pat Kelly, Darren Parker and Kathy Oakley contributed the questions. It made many of us feel very humble, but it was fun and a nice way of getting more members involved.

MINUTES OF THE DECEMBER MEETING

Executive meeting: December 16, 1983

The following items were taken up during the executive meeting:

1. Future speaker - Dr. George Mitchell on comets in February.

2. The Canada Science Fair is being held in 1984 at Saint Mary's University from May 13-20. The RASC has been asked to provide judges and possibly prizes.

3. A bookcart is needed for the library. Randall Brooks is to look into this matter.

4. Dave Tindall reported that sales of the handbook are down from last year, possibly due to Reid Dexter not being on the air to put in a plug about the handbook.

5. It was asked at both the executive meeting and the general meeting for a new "cookie" chairman as Dave Tindall is stepping down as Vice-President and most of the refreshments had been looked after by Dave.

6. A letter is being sent to the National Office regarding the Halifax Centre's constitution.

7. One of our members has kindly made up an observing report form for the Messier objects. (see seperate notice for details)

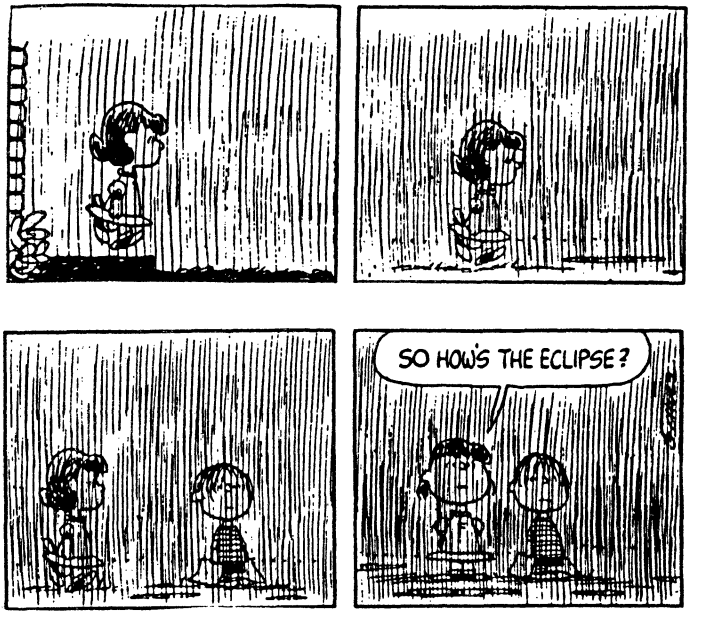
General Meeting : December 16, 1983

Our speaker for this evening was Terry Danks; meteorologist and part-time lecturer at Saint Mary's University. He spoke on globular clusters. He stated that most of the knowledge of the metallic content of individual stars in globular clusters was based upon photometric techniques rather than spectoscopic techniques. Detailed spectrograms required great expenditures of time on big telescopes. Up until 1980 there were only two high dispersion spectrograms, one in M92 & one in M13.

In 1980, two astronomers independently used electronic detectors coupled with 4 metre telescopes to obtain a wide number of spectograms of individual globular cluster stars. The clusters that were thought to be very metal rich turned out not to be. From these results, the accepted photometric results for the past 30 years are far too metal rich.

Wilf Morley

PLEASE TAKE NOTE OF THE RULE CHANGES FOR THE BURKE-GAFFNEY AWARD AS RECORDED IN THE MINUTES OF THE NOVEMBER MEETING !

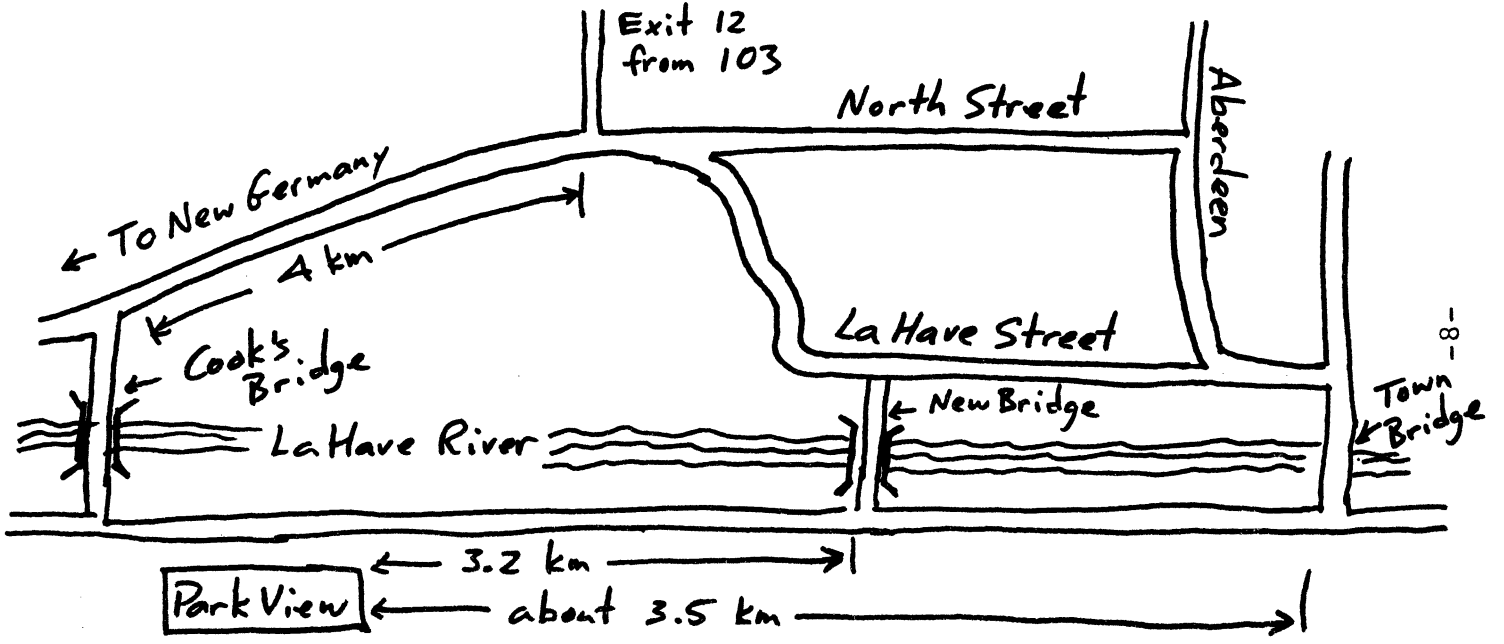


Reprinted from "The Peanuts Treasury"

NOTICE OF OBSERVING SESSION

As previously noted in the minutes of the November meeting, the Halifax Centre has been invited to an observing session in Bridgewater on January 14th at 7:30 P.M. The storm date is January 28th. This session WILL NOT be held at the DesBrisay Museum as in the past, but will be held instead at the Park View Education Centre , which promises to offer a darker sky. To find your way to Park View , use the map on the opposite page.

Note: NOT DRAWN TO SCALE



(ask John Buchanan for mileage!)

MISCELLANEOUS NOTICES

If your favorite pass-time is tracking down Messier objects, then we have just the thing for you! It is an observing form in which you can record your observations of all of the 110 Messier objects. Copies can be picked up at all future meetings, or if you send us a self-addresses STAMPED envelope, we will mail a copy to you.(see inside front cover for the address)

It was brought to our attention that two new excellent books on Percival Lowell, both by William Hoyt, are now availible. They are:

Planet X and Pluto $16.00
Lowell and Mars $14.25

If you would like to order either of these books, payment can be made to Laurie Burgoyne at the January meeting. PLease note that the prices include shipping and handling.

In case you missed it in the National Newsletter, the National Office has recently moved. Their new address is:

136 Dupont Street
TORONTO, Ontario
M5R 1V2

and the new phone number is (416) 924-7973.

Our Observing Chairman, in an effort to help make our observing sessions more enjoyable for all, would like you to know that he welcomes your suggestions and ideas. You can contact Gordon at 434-1787 or write to him. (see inside front cover for address)

WE'LL MISS YOU ! If you are moving, please let us know. Just send us a change of address form and we will make sure that you continue to receive NOVA NOTES.

ORION THE HUNTER, THE KING, THE GOD

As winter arrives in Nova Scotia we are once again able to see the constellation Orion. Although because of its striking appearance it is seldom very far from our minds, even during the summer months. The most recent reminder that Orion has still a lot of mystery to intrigue us is the revelation by IRAS (infrared astronomy satellite) that the giant gas and dust cloud, M 42, is indeed the birth place of new stars. In our modern day world we tend to look at Orion with a cold scientific eye. However this has not always been the case.

As perhapst the most noticeable of the major constellations, Orion has been observed, worshipped, feared and written about in poetry by people all over the world.

To the early people of Europe Orion was the armed warrior - hunter. This concept fit well into their beliefs and customs. It gave them an image of the favoured attributes of manhood.

The people of the middle east, in their myths and ledgends, associated Orion with the arrival of wintry winds, which is quite understandable. It is the ancient people of Egypt who made the greatest mention of Orion and put him in an exalted position, as the reincarnation of Osiris, god of the underworld. His name "Sahu" appears in many inscriptions on temples, pyramids and religious books.

To us, of course, he is still the legendary hunter with his jewelled belt and raised sword. A striking figure for a long time to come.

Peter Steffin

THE HALIFAX PLANETARIUM

Although not as visible as Saint Mary's observatory, the Halifax Planetarium provides a large number of people with an introduction to the night sky of Nova Scotia.

Originally, the planetarium was located in the formaer Nova Scotia Museum on Spring GArden Road. When the new museum was built on Summer Street, the planetarium was put into storage as the only area in the new building which had a ceiling high enough to hold the dome was the main exhibit area and it was felt that this space could be put to better use.

Fortunately, a search was started to try and find a new home for the planetarium, and one was found when Dalhousie University closed off one end of the main corridor in the James Dunn Building which provided a light-proof room in which to house it. It should be noted that despite the very high ceilings in the Dunn Building, a large section of the tiles still had to be removed in order to accomodate the dome! The dome is made out of cloth which is suspended in a metal framework. It has a diameter of about 7 metres and allows seating room for about 30 people.

The heart of any planetarium is the projector, and in the case of t he Halifax Planetarium, it takes the form of a Spitz Model A-1. Despite the fact that it was built back in 1950, it is an impressive instrument. The projector is set up much like an equatorial mounting in that it has a "polar axis" with the star projector on one end and the planet projectors on the other. Rotation about this axis simulates the motion of the sky during the course of the night or from season to season; while the axis can be rotated to show the sky as it appears from as far south as -70 degrees latitute.

The star projector is made out of metal plates which form a dodecahedron. Images of stars from magnitudes 2 to 4, as well as the Andromeda Galaxy and the Praespe cluster are produced by holes of different sizes. To produce sharp images of first magnitude stars, lenses are used. In addition, tiny slides mounted in lenses around the "globe" are used to produce the Milky Way and the Magellanic Clouds, and if desired, colored circles can be used to show the position of the sun at the solstices and equinoxes. A freely hung cylinder ensures that the light from the main bulb shines only on the top half of the "globe", as one usually does not want stars all over the floor!

Seperate projectors are provided for the planets, the sun and the moon (which can be shown in 14 different phases). These are all equipped with ingeniously simple mercury switches so that they are only visible when above the horizon. These can be positioned fairly accurately with a right ascension and declination grid which can be projected onto the dome. In conjunction with a projector for the north-south meridian this grid is used to "align" the sky for a given date and time. Two clusters of blue and orange lights are used to mimic sunrise and sunset. The main projector is supplemented by slides which can be projected onto the center of the dome. Last but not least is a "arrow" flashlight which is used to point out the objects and constellations being discussed.

Although public shows are given once a month, most of the roughly 4000 people who attend the shows are school groups, scouts, guides, etc. In conclusion, although the Halifax Planetarium is not as big as others in Canada, the live narration allows for a dialog between the operator and the audience and it is this that makes the Halifax Planetarium a valuable educational resource.

Pat Kelly

A VISIT TO THE ANGLO-AUSTRALIAN TELESCOPE

Part of the excitement of a trip to a foreign country for an amateur astronomer, is the opportunity to travel to astronomical facilities which one usually has a chance to visit only in print and in photographs.

Following the June 11, 1983 total solar eclipse in Java, I had the exhilarating experience of spending a week at the Anglo-Australian Observatory (AAO), at the invitation of the AAO's director, Dr. Donald Morton, who is also a member of the RASC. Before my trip I had made arrangements with Tom Cragg, Chief Night Assistant at the AAO, to stay with him during my visit, to tour the observatory, and to observe and photograph the southern skies from the AAO's scenic location atop a mountain in Warrumbungle NAtional Park, some 500 km northwest of Sydney.

The AAO consists of a dome which houses the 3.9 m Anglo-Australian Telescope (AAT) together with related support buildings, all sitting on lands rented by the governments of the United Kingdom and Australia from the Australian National University in Siding Spring. The university maintains several other instruments at Siding Spring, including a 48-inch Schmidt telescope which is the southern hemisphere twin of the northern hemisphere 48-inch Schmidt of the Palomar Observatory.

The 3.9 m AAT is the most advanced state-of-the-art telescope in the world. Fully computer automated for all forms of photographic and spectroscopic observations, the AAT features a CER-Vit primary of f/3.26, Cassegrain secondary configurations of f/8 and f/15, and a Coude room for the f/36 focus. Strategically situated at latitude 31.25 South in a location yielding 60% clear nights, and where the galactic centre in Sagittarius blazes in the

zenith overhead, the AAT has contributed enourmously to astronomical research since the beginning of its operation in 1975. Standing in the presence of such a behemoth is truly awe-inspiring: following my detailed tour of the telescope, computer and operations room, aluminizing chamber, and Mr. Cragg's explanations of the operations of the facilities, I can now understand why modern telescopes are so complicated that the astronomers themselves must rely on technicians and night assistants to run such instruments.

I learned some interesting facts: the AAT's mirror is removed,cleaned and aluminized during the week of the full moon every February,and in order to save the mirror's finish it is never overcoated. The unfortunate December and January observers must contend with a very dirty mirror indeed! The dome is coated with a special zirconium oxide paint, which reflects daytime sunlight but is transparent (or "breathes", like Gore-Tex fabric) to the infrared waves by which warm instruments and objects inside the dome shed their excess heat. As a result, the telescope and dome interior seldom differ in temperature from the outside by more than a few degrees, even in quickly changing temperatures, and only rarely does the telescope require more than 20 to 30 minutes to reach ambient temperature at the start of an observing session.

The AAO annually receives applications for over 1,000 nights of observing time from astronomers around the world, only a small fraction of which can be granted. All the observational data are the property of the AAO and are stored on computer tapes which Mr. Cragg is in the process of indexing. The astronomer who obtained the data has exclusive access to his/her data for a two year period following the date of the observations,following which the AAO's policy is to make the data available to the astronomical community at large.

The impressive instruments at Siding Spring are more than matched by the staggering brilliance of the night sky. Never in Muskoka,Arizona or Hawaii have I ever seen a sky so utterly black. The MIlky Way is almost frighteningly bright, with the starfields of Sagittarius, Scorpius, Centaurus and Crux directly overhead in the Australian winter. The brightest globular cluster in the heavens, Omega Centauri glittered a full half degree in diameter in my Meade 25 cm Schmidt-Cassegrain, which survived five flights to Sydney and provided me with a big "eye" with which to observe the southern skies. Even more impressive than M42 in Orion is the complex and dramatic Eta Carinae nebula, birthplace of new stars. Startling in its emptyness in the midst of the rich MIlky Way is the Coalsack in Crux, perhaps best seen with binoculars. The zodiacal light rising in the eastern horizon just before dawn, is as bright from Siding Spring as the Milky Way is on the best of nights at the Toronto Centre's observatory at Schomberg!

I could not let the week pass without attepting to record the wondrous southern sky on film. I had made advance arrangements to obtain dry ice from a company in Sydney, and took it with me to the AAO to do some cold camera work. More successful were the wide-field photographs taken on the new Kodacolor 1000. Guided 20 minute exposures using focal lengths from 24 mm to 750 mm produced some striking views of the sky. I am most impressed by the good color balance, high speed and relatively fine grain of this very fast film.

As you cvan guess, I am looking forward to returning to the AAO in the near future, where I have a lot of unfinished business!

Article by Michael Watson (Toronto Centre) and reprinted from 'Scope.

FINDING REWARDS & SATISFACTION IN ASTRONOMY

As we go through life we strive for set goals and achievements. For young boys who are "Cubs" in the Scouting movement one of these goals and achievements is to earn a Green Star. This star is given when a cub has demonstrated, by accomplishing various tasks, the necessary requirements proving that he has developed a certain amount of self reliance.

Requirement No. 11 for the green star asks the cub to "recognize and point out in the sky at least six constellations or draw or make a map of the sky showing some of the main constellations and some planets." This actually is quite a task for a young fellow (although some are very good at it) and to help out I am occasionally called upon to act as a resource teacher for the scouting movement.

My presentation usually consists of a short lecture on "The Place of the Solar System in the Universe." Then I have a participatory demonstration of the solar system with each cub becoming a member of the known system. The movements of the sun and planets are then acted out and everyone then becomes very familiar with the physical interaction of each object. If the sky is clear we then go out and locate the major visible constellations, concentrating on Ursa Major to assist in finding the North Star. This is followed by a look at some planets or the moon through my C-8 and then a film on astronomy.

I also achieve something, a lot of satisfaction in the fact that I have passed on some knowledge and made life richer and more interesting for these young boys.

Peter Steffin

OUR NEW MILKY WAY

Mounting evidence over the last several years is drastically changing the view that astronomers have our our own galaxy,the Milky Way. Ten years ago it seemed that both the size and the mass of our galaxy had been pretty well determined. The nucleus contained a large portion of the mass of the galaxy and had a radius of about 2500 parsecs; the disk containing the spiral arms,had an outer radius of around 12 000 pc; the halo which contains the globular clusters had an outer radius of roughly 15 000 pc; and the mass of the entire system was about 150 million solar masses.

Starting in 1973, however, new evidence from both theoretical considerations and new observational techniques began to force astronomers towards accepting the fact that the Milky Way was both larger and more massive than had been previously thought.

The major reasons for the change in our point of view along with their conclusions are given below, roughly in chronological order:

It was argued that since the Andromeda Galaxy is being pulled on by the Milky Way strongly enough for it to "fall" towards us at 300 km/s, the Milky Way must be more massive than had been thought. CONCLUSION: The mass of the Milky Way must be at least one trillion solar masses.

Dynamical studies of objects in the Milky Way showed that the galaxy could not hold itself together unless it was more massive. CONCLUSION: THe Milky Way must be enveloped in a massive corona.

The rotational velocity of objects in the disk,about the galactic nucleus, should fall off as one moves toward the rim of the disk, if most of the galaxy's mass is contained in the nucleus. (just as Pluto orbits the sun more slowly than the Earth does) At the sun's distance from the center (8 500 pc) the rotational velocity is 220 km/s. Evidence from newly discovered interstellar clouds showed that from 10 000 to 20 000 pc from the nucleus the rotational velocity INCREASED from 220 to 300 km/s. CONCLUSION: massive corona with an outer radius of about 25 000 pc

Radio studies of M31, M81 and M101 suggested that they had massive invisible coronas. CONCLUSION: The Milky Way should also have a massive corona.

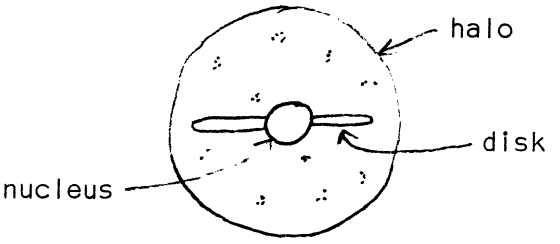
Radial velocity studies of twelve globular clusters lying from 20 000 to 60 000 pc from the nucleus showed that they would not be gravitationally bound to the Milky Way unless it was much more massive. CONCLUSION: The mass of the Milky Way must be at least 600 million solar masses.

Dynamical studies of outlying dwarf galaxies show that in order for them to be bound to the Milky Way the corona must be very large and very massive. CONCLUSION: The corona has an outer radius of 100 000 pc and the Milky Way has a mass of at least one trillion solar masses.

It can be seen that the galaxy is now seen to be much larger than it was only ten years ago, as can be seen from the diagram on the opposite page. In addition, these new findings will surely have an influence on the "missing mass" problem which has been puzzling astronomers for so long.

Patrick Kelly (condensed from Astronomy)

The Milky Way in 1973



mass = 150,000,000 $M_\odot$

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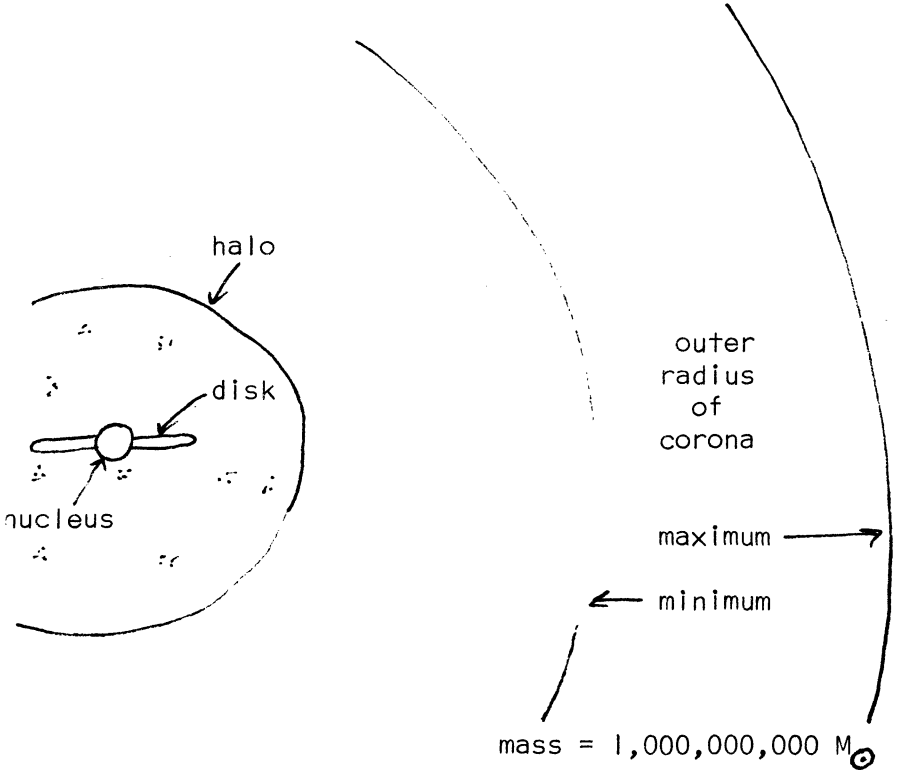
The Milky Way in 1984



SCALE: 1 cm = 10,000 pc

HAZARDS OF THE BRITISH ASTRONOMER

Our good friend Partick Moore is regularly advising would-be astronomers of the hazards of looking directly at the sun through a telescope. Admirable and responsible as this attitude is, it unfortunately overlooks the far greater hazards that lurk in the shadows around every astronomer's telescope. The author here produces startling disclosures concerning the hazards of astronomical work, in the hope that fledgling amateurs will join our association confident in their abilities to recognize and flee from them in terror.

HAIRY CADGE- At 2:30 in the morning your observing program is interrupted by the ominous sound of something loping towards you through the long wet grass. You turn around in apprehension only to see a vague shape dash past and bound off into the night. You were lucky! You have narrowly missed being stamped into the ground by a hairy cadge. In fact, there are very few reports of astronomers being found stamped into the ground and it has been concluded that the cadge is extremely short-sighted and has to run a very long way to be able to find a victim. There have been reports of solitary cadges bounding several hundred miles across the country in a single night. Most of them end up in the sea eventually, and are thus very rare. Precautions: none

HAIRY NIBBLER- Often described erroneously as a kind of aerial cadge,this hazard is much more common than the true cadge and is most likey the most abundant of all hazards. The reader has surely had the experience of quietly gazing up at the stars when something horrible suddenly drops from nowhere onto his face, scrambles around a bit and shoots off again. He has met the hairy nibbler. Nibblers are seldom seen in daylight as they live in colonies floating high among the clouds,drift-

ing where the wind takes them. Their night vision is extremely acute and they can spot lone astronomers from heights of several kilometres, whereupon they launch themselves into space on an elastic thread to attack exposed anatomy and then return to the sky. Precautions: football helmets,goggles, etc.

HANGING LURGIE - Just as shocking as the nibbler, but infinitely more revolting. An astronomer making his way to an observatory should take care to keep away from overhanging branches, lest he be slapped in the face by something soft, slimy and unmentionable. The effect is one of instant nausea and is likely to have an adverse affect on the reliablility of subsequent observations. This behavior has no survival value and it is now thought that the lurgie does it just for a laugh. Precautions: fencing masks, deep-sea diving helmets, etc.

SNAPPING SPORRAN- A small native of the Scottish Highlands and well known to the astronomers of that country. The sporran has the habit of creeping up on unsuspecting observers, especially meteor watchers, and delivering a sharp nip to the ankles before scuttling away into the thistles. Experienced observers have learned to detect the approach of a hungry sporran by its low grunting sound ('och,'och,'och) and shrill squeal when stepped on. Primitive astronomers soon learned that by hanging a tame sporran in front of their kilts they could repel cadges, nibblers, Englishmen, etc. and this tradition was soon taken up by the Scottish clans and survives to this day. Needless to say, this is an extremely unwise and foolish practice, so if the reader should ever see a Scotsman suddenly fling his arms in the air, hoot real,etc. he will know the sad fate that has befallen him. Precautions: trousers,rubber boots

Edited from the Jour. of the Brit. Ast. Soc.

NOVA NOTES INDEX

January-February 1984 Volume 15/Number 1

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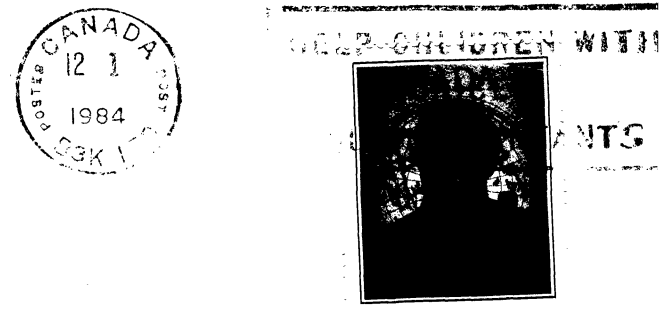

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