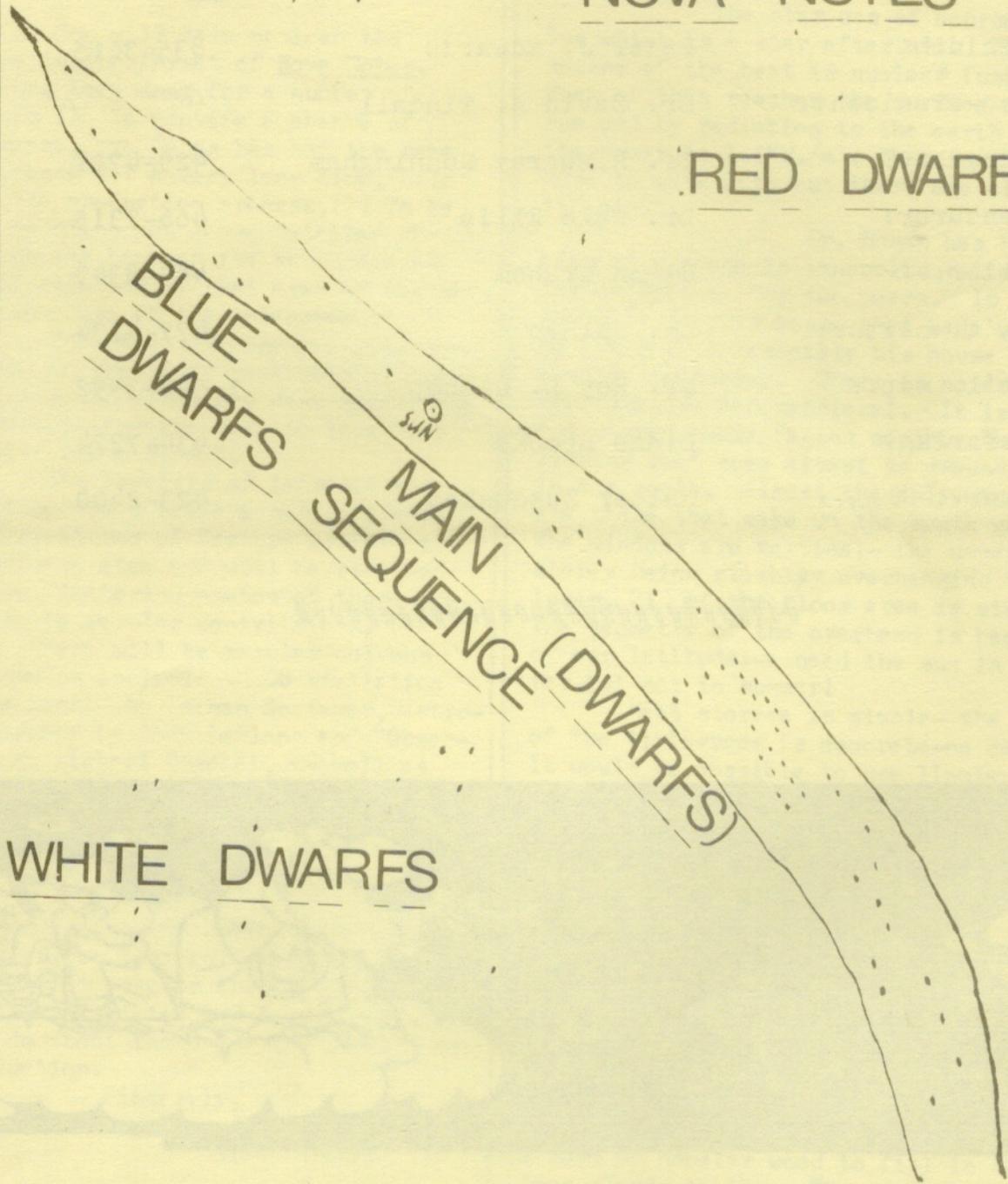




NOVA NOTES

RED DWARFS

ABSOLUTE VISUAL MAGNITUDE



IN THIS ISSUE

ED'S MESSAGE      SECRET OF UNIVERSE

JAN/FEB 01

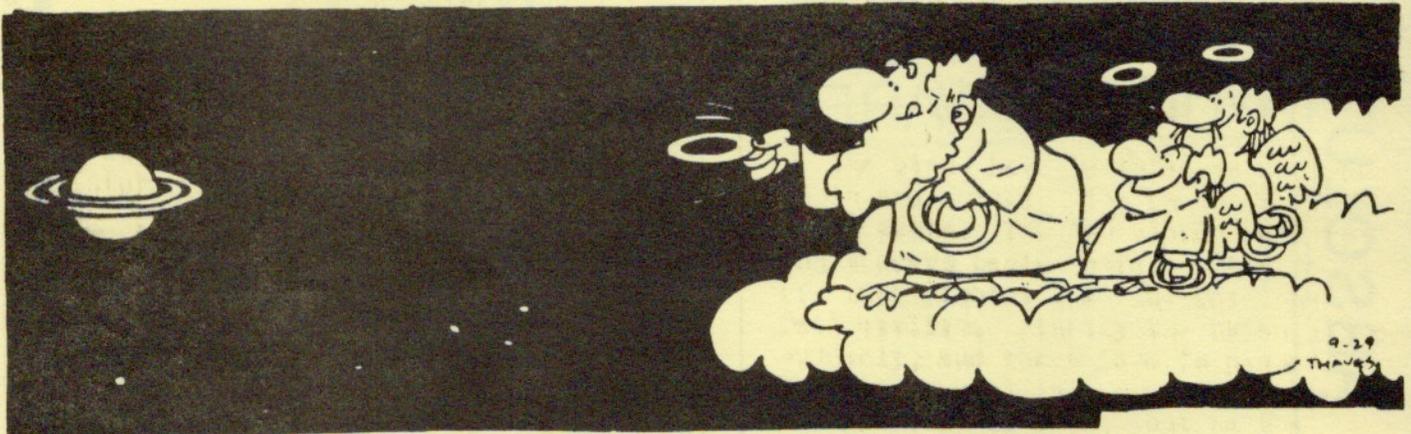
THE 1981 N.A.S.C., HALIFAX CENTRE EXECUTIVE

EFFECTIVE JANUARY 1 TO DECEMBER 31, 1981

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You will have noticed the change in the format of Nova Notes. This has been done for a number of reasons (1) To provide a change of appearance, Nova Notes has had the same appearance for a very long time, (2) To ease the production process, (3) To be able to bring you large detailed sky maps on the back of the same page as the description of that area of the sky (for easy use at the telescope).

The second change you will have noticed is the pages have been divided into columns. This was done solely for the sake of appearance; to look more neat and professional.

The benefits of letterset and lateral line are I believe self-evident. The caricatures of feature writers are a temporary item and will be replaced by more flattering photos of those who plan to be regular contributors.

There will be regular columns from now on including "Constellation of the Month" by Norman Scrimger, Astro-photography by Jody LeBlanc and "Observing" by Michael Boschet, as well as hopefully many more. Please contribute articles to me or Bill Calver at monthly meetings or send to 99 Sunnyhaze Ave. Hfx., N.S., B3K2G3.

P.S. Concerning the Astro-photo column if any of you have any great (or even not so great) photos they would be greatly appreciated and I will see what I can do about improving the quality of reproduction.

Sincerely,  
Your Editor,  
Glenn Graham

P.P.S. Starting next issue, depending on response there will be a letter to the Ed. column.

Speaker: Dr. Larry Bogan—Prof. of Physics at Acadia University.

Subject: Heating our homes with star light

The star was of course our Sun which is a star after all. The source of the heat is nuclear fusion. Much of this reaches the surface of the sun and by radiation to the earth where the power is  $1.4\text{KW}/\text{m}^2$ : That is what we have to work with but there are clouds and night.

Dr. Bogan has built himself a house in Annapolis valley and has enjoyed it for two years. It is the plan of this house that made up much of his talk. Basically his house is a passive collector. There is no external heat storage and retrieval. It is a two storey house facing south. The long sloping roof goes almost to ground level in the north. Almost the only windows are those that make up the south wall. The windows are vertical—the upper storey being slightly overhanging the lower. 25% of the floor area is window. The geometry of the overhang is because of our latitude—we need the sun in winter but not in summer!

Heat storage is simple—the floor of the livingroom is concrete—no carpets. It would be possible to use linoleum or ceramic tile. Beneath the concrete floor he has sand which also surrounds the house on the north. Insulation is superior R25 and vapour barriers are throughout.

The south wall is not all glass but large plastic translucent panels alternate very attractively. The radiant heat can be controlled by folding insulated panels. Air is circulated throughout the house.

He has a stove—a small woodburning stove and he needs just over a cord of poplar wood to fill in the long cloudy spells. The worst time is in April and May when it can be cold and the sun is now higher and less efficient for his vertical "collector".

A cosy "hole" and thought provoking to astronomers.

Speaker: Robert Roeder -Prof. of Astronomy at Univ. of Toronto.

Subject: Double Quasars?

Just in the last year or so there has been observed a "double" Quasar. This stirred up a great deal of conjecture because the spectral characteristics were identical. What could cause this? To find the answer go to a very recent issue of Scientific American. Dr. Roeder did more than this - he demonstrated it.

It all goes back to Einstein in 1915 when he said that light should bend around a massive object. In 1919 Eddington observed a solar eclipse and demonstrated this phenomenon. In 1936 Einstein again (in Science) wrote of the lens like action of a star. In 1937 Zwicky predicted that a galaxy should have just such an observable effect. Then in 1969 in the Am. J. Physics, Dr. Liebi worked out the optical analogue of this lens like effect. If one surface of a disc is planar the other surface should be as the logarithm of the radius.

Prof. Roeder did just that and with the help of the splendid machine shop at the U. of T. made galaxies, neutron stars and even a little blackhole which we all held in our hands.....all out of lucite! Remember galaxies are transparent- it's mostly space. So when we held up this 10" diameter "galaxy" and looked at a spot on the far wall we would see two spots or with care one small spot and a complete ring. Similarly for the "black Hole".

A spectacular slide show of this phenomenon made it all most believable.

This was our annual meeting and the ballots were counted and the results will be shown elsewhere in this issue.



What can a secretary report except that we meet with good attendance regularly and heard some splendid speakers, we went and peered at the heavens, we participated to some extent in public education. All very ordinary but we did it well under good leadership. That could be all of my report but we experienced a phenomenon here which still has us shaking our heads in disbelief. We did it! We held the BLUE-NOSE GENERAL ASSEMBLY. We have received many letters of commendation and many of these were published in the Nov/Dec. issue of Nova Notes. This secretary wants to say a little more.

I hope other centres read this because to host a G.A. is not easy. The strain on your wives and children, the late nights, the endless committees, it's not to be taken lightly.

We met with CASCA regularly for over a year- at first monthly then for almost six months weekly. There were about six subcommittees. There were strains as you can imagine with two societies trying to work together- one professional, the other amateur. They want to meet jointly again sometime so some other centre will have to work this out- it is possible. At first CASCA members could not understand our love of picnics, slideshows and song contests, but didn't you see many of them at these functions?

When I thought about this summary, I thought I might have some pearls of wisdom to the centres who may be planning a General Assembly. They have all left me now. Perhaps they were these. Everybody work together- forget about self. Work out ALL the details. You know the sun never shines in Nova Scotia except for a G.A.! Did you know that the lobsters at the banquet were the next larger size and this threw our budget all out. As a result we overspent 0.015% of our total budget of \$16,000.00 or so. That's what I call astronomical accuracy!



## THE LATE MR. BROOKS

My only experience with General Assemblies has been the two here in Halifax. Were these only five years apart? Don't choose us for a little while because it is exhausting. We wish the planners of other General Assemblies clear heads, hone and trust-if you give it your best it will pay off handsomly.

WE REGRET TO INFORM YOU OF THE  
PASSING FROM THE EXECUTIVE OF  
RANDOLF C. BROOKS MAY HE ALWAYS

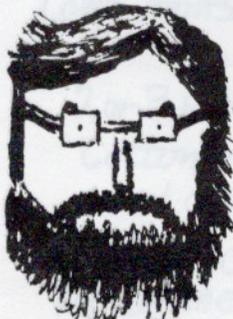
R. I. P.

January 16, 8.00 p.m.  
Nova Scotia Museum.

Topic: Member's Night

Speaker: Anyone and everyone

Featuring slides, more slides, movies  
and general all around merriment so  
bring the family



**NORMAN SCRIMGER**

Norman Scrimger.

There are a number of constellations in the neighbourhood of the easily spotted Cassiopeia, all of which have interrelated Greek legends. Some of these constellations also contain several interesting objects to view either with binoculars or with a telescope.

Andromeda and Pegasus are prominent in the winter sky. The great square of Pegasus is a well-known asterism. Andromeda lies due south of Cassiopeia, while Pegasus is to the west of Andromeda.

Cassiopeia was the beautiful queen (some say of Ethiopia), Andromeda, her daughter, and Cepheus, her husband. As told in ancient mythology, Cassiopeia boasted of her beauty, claiming to be unrivalled. The Nereids, or sea-nymphs of Neptune, took exception to this boast and complained to Neptune. The angry Neptune sent a sea-monster, Cetus, to terrorize the kingdom of Cepheus and Cassiopeia.

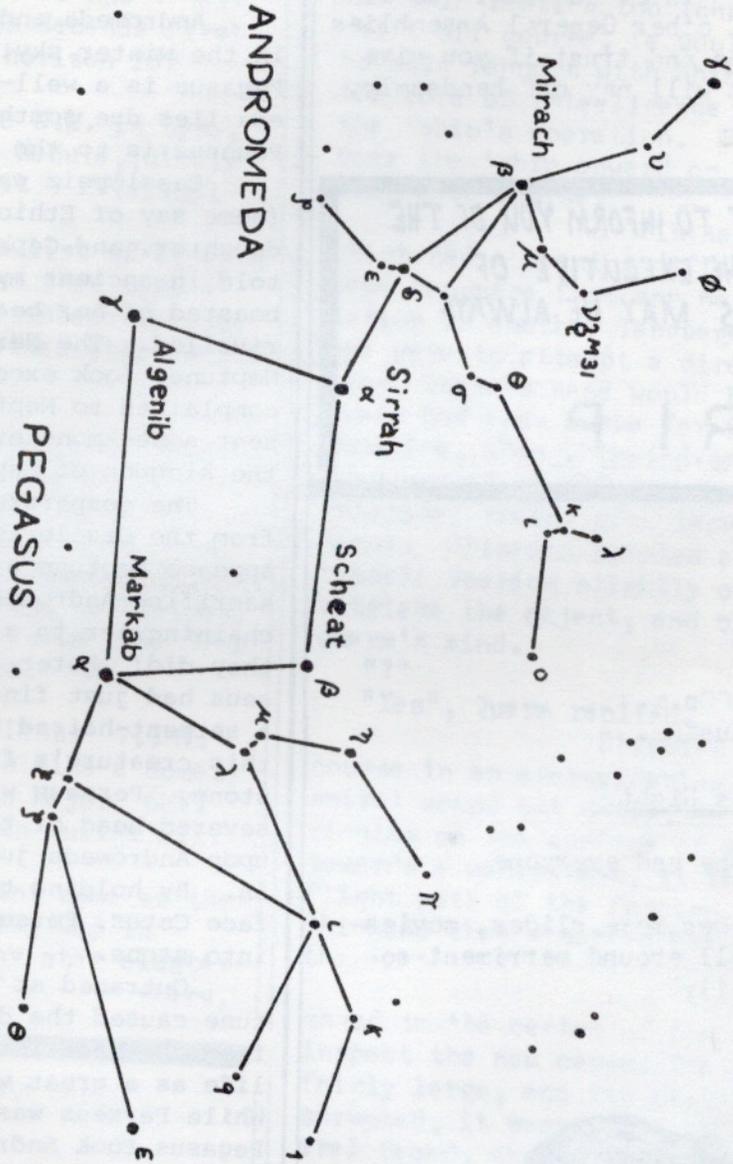
The desperate royal couple learned from the Oracle that the only way to appease Neptune and his sea-monster was to sacrifice Andromeda to the monster by chaining her to a rock by the shore. This they did! Enter the hero, Perseus. Perseus had just finished slaying the Medusa, a serpent-haired Gorgon. One look upon this creature's face would turn anyone to stone. Perseus was still carrying the severed head of the Medusa as he happened upon Andromeda just as Cetus was closing in. By holding the head over the sea to face Cetus, Perseus turned the sea-monster into stone.

Outraged at this turn of events, Neptune caused the drops of blood falling from the head into the sea to spring to life as a great white horse - Pegasus. While Perseus was celebrating his victory, Pegasus took Andromeda, chained to his back into the sky. To this day Perseus is chasing Andromeda and Pegasus.

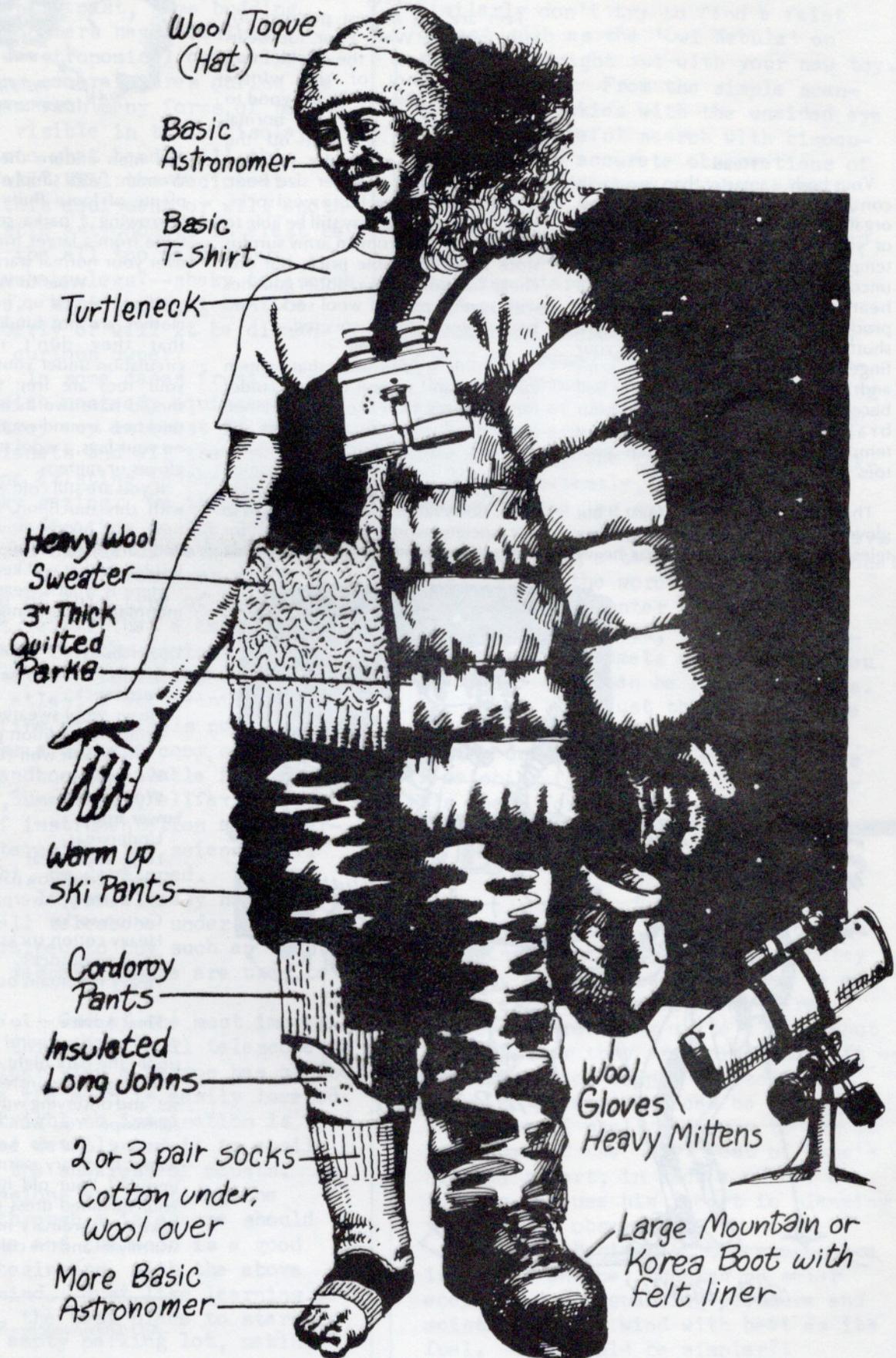
M31, the Andromeda Galaxy, is a superb object to view with both the unaided eye, and with some magnification. At just over 2 million light years away, it is the most distant object visible to the naked eye. It is marked very near to v Andromeda on the accompanying constellation chart.



GOOD  
OBSERVING



# CROSS SECTIONAL VIEW OF THE PROPERLY ATTIRED OBSERVATIONAL



especially if the temperatures are extreme. Damp skin can freeze (instantly) to metal parts when the temperature is 10° or below — the gloves protect you and keep you warmer, too.

#### Feet

Feet are the biggest problem for most people. Why? Poor footwear. The best footwear is the double boot or Korea boot of the winter mountaineer. It won't do any good to stuff more socks into your normal shoes; they will just cut off the circulation and make the problem worse. You need a larger size boot, with several layers of loose wool socks. If you're lucky, you may still be able to get Korea boots from an army surplus store at a reasonable price, but one cheap solution is large rubber goshes with several pairs of wool socks. And be sure your head is covered.

#### Women

Scientific studies show that women can withstand several degrees colder temperatures than men, and trained Japanese diving girls get colder still without shivering, but it is my experience that it is usually the women who are standing around shivering in night observation sessions. Perhaps in our society women dress more for looks than warmth, or perhaps it's just

#### Head

Your body is smarter than you are; it considers your head and vital chest organs to be the most important parts of you. It will try to maintain their temperature at all costs. If your uncovered head is causing you to lose heat faster than your body is producing it, your body will begin shutting down the circulation to your fingers and toes, and then your arms and legs. Your outer extremities will become frostbitten to maintain your brain at proper operating temperature. Moral: To keep your toes warm, cover your head.

#### Hands

Thick mittens are warmest, but gloves may be useful for adjusting telescopes and cameras. Wear heavy



that men endure the pain stoically. Women: you simply must pack on plenty of loose fluffy insulation. Try borrowing a parka several sizes too large from a larger friend and wear it over your normal warm clothing.

#### What to Wear

When "suited up," check that your clothes are not binding, particularly that they don't restrict blood circulation under your arms, and that your toes are free to wiggle. You should have two inches of insulation thickness around your torso, one inch on your legs, a wool stocking hat, and gloves or mittens.

If you are still cold when you go out with this much on, add more next time. No matter how cold-blooded you are, there is a thickness of insulation that will keep you warm.

Here is what I wear on a winter or mountain summer night:

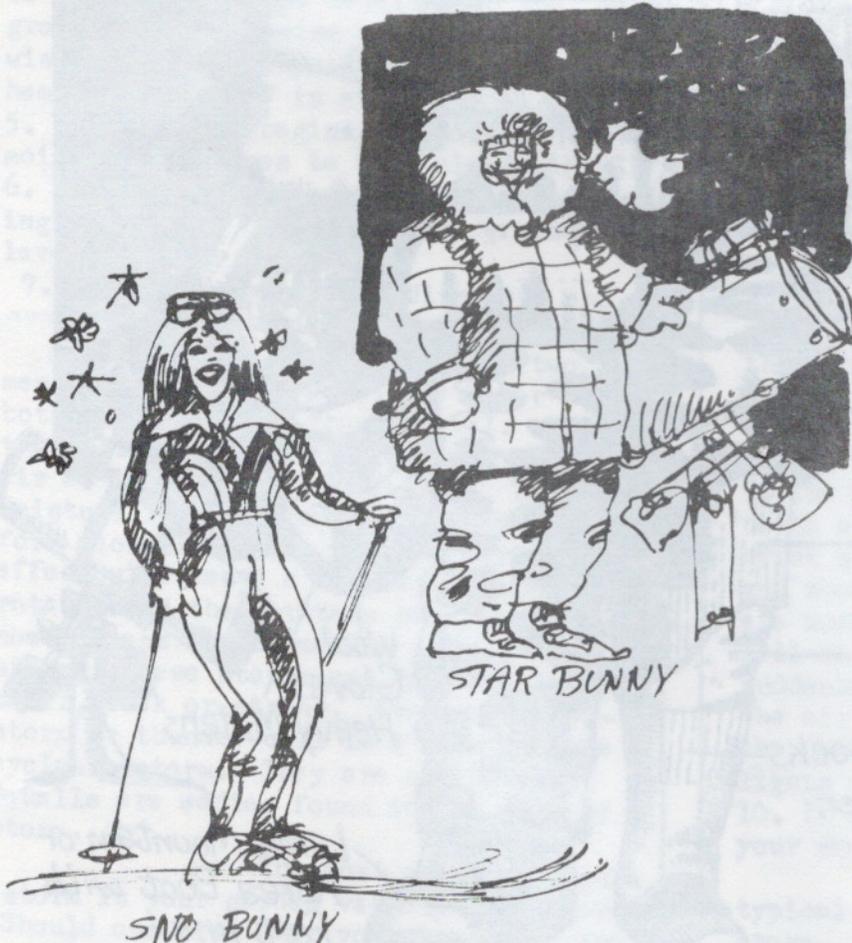
#### Upper body:

- T-shirt
- Turtleneck
- Heavy wool sweater
- Winter expedition parka 3" thick with wolf ruff
- Wool gloves
- Wool toque

#### Lower body:

- Underwear
- Long underwear
- Heavy corduroy pants
- Ski warm-up overpants
- Cotton socks
- Heavy cotton socks
- Ragg wool socks
- Heavy mountain boots

**Final Advice** — To enjoy stargazing, you'll want to spend many hours out under the dark night sky in all seasons watching the constellations rise and set, and observing with binoculars and telescope. You won't enjoy it unless you are able to keep comfortably warm. Ordinary warm clothing is not enough! Your old hunting jacket or your fur-lined dress coat won't do it. Take extraordinary measures to dress warmly — and the cold won't faze you.



STAR BUNNY

SNO BUNNY

Art Hufman teaches astronomy at UCLA.

With the Christmas season recently past, some budding amateur astronomers have possibly acquired new astronomical optical aid. While passing camera stores during the pre-Christmas rush many forms of telescopes were visible in their display windows. Into what hands will this equipment fall? Will the recipient benefit by this equipment or will another enthusiastic astronomer's interest be lost due to the all too well known syndrome of shaky legs?--shaky telescope legs that is. Will the equipment be treated properly or will it be dismantled by the curious owner?

In some cases frustration in dealing with unsteady equipment will quickly destroy any interest in the stars and planets and all the free entertainment existing in the past time of casual sky gazing. On the other hand a real dedication to the interest has a hindered chance of developing.

Proper research prior to the purchase of this type of instrumentation might reveal that a better choice of optical aid for the serious beginner might be a set of binoculars along with a good star atlas, a subscription to one of the fine periodicals now available and of course a current copy of the RASC Observers Handbook (available from the N.S. Museum, Summer St., Halifax) With this type of instrumentation and literature an interest in the science will without doubt, be developed.

If you already have received a small telescope under the tree or are determined to buy such an instrument do not despair, there are uses to put it to.

One of the most impressive sights through a small telescope is the first clear view a person has of the moon. Since the moon is easily located and fairly bright no imagination is needed to see detail, and it is easily followed by the shakiest of mounts. As first impressions are lasting, the first view through a telescope should be a good one and the moon is a good target for beginners, with the above reasons in mind. Just like learning to drive a car, the best place to start is in a large, empty parking lot, making

the new adventure as easy as possible. Similarly don't try to find a faint object such as the 'Owl Nebula' on your first night out with your new toy.

From the simple scanning of the skies with the unaided eye to a more careful search with binoculars, to the accurate observations of the stars and other wonders above, with the aid of a telescope, it must be kept in mind that in order to reap the level of desired entertainment from the stars, the viewer must be comfortable. That is to say, dress warmly and include some sort of lawn chair or ground sheet in your collection of astronomical equipment. Being in a state of discomfort while attempting observational studies can sometimes destroy the interest more quickly and permanently, than can the shakey tripod leg syndrome.

If you need an incentive for developing a talent in observational work, recall the words of that upper Canadian comet hunter who after his first discovery said, "there are probably some more comets up there for you to find"-- and then he found two more.

Just think of all the enjoyment that can be obtained from sitting outside looking at the sky as if watching for it to fall. Remember it's there for the gazing!

## WEATHER FACTS

"Everybody talks about the weather, but nobody does anything about it." ; Charles Dudley Warner, and this is true today to a large extent, however, there are those who are doing quite a bit about it. Whether they are forecasting it or altering it or simply monitoring it, there is plenty that can be done. In this paper I shall endeavor to try to take some of the "Why?" out of Rube's nightly report, in such a manner as to help you use his report in planning your nights observing.

Basically, the atmosphere is a heat engine; running on solar energy and manipulating pressure and moisture by the wind with heat as its fuel. What could be simpler?!

The sun generates enough energy to shower the Earth with 126 trillion horsepower every second. Depending on the surface conditions of the Earth where this energy is incident, various amounts are absorbed or reflected. Clouds will insulate the Earth and prevent over heating by day and excessive heat loss by night. This starts to hint at how clouds (ARRRG) actually form.

Warm air rises and cold air descends. Warm air can hold more moisture in evaporated form than can cold air. So here we go with the heat engine...

1. The sun heats the ground.
2. By conduction, the air nearest the ground warms up, picks up moisture and begins to rise.
3. Cooler air above this first air mass begins to descend.
4. We now have two masses of air moving past one another on a rotating planet. Under the Coriolis Effect, the air will be caused to rotate relative to the ground in a clockwise or counter-clockwise direction, depending on which hemisphere you are in at the time.
5. The warm air begins to cool and the moisture condenses to form clouds (ARRRG!).
6. The ground is shadowed by the forming clouds and heating at the ground level slows or stops.
7. The clouds gradually dissipate and ground heating begins again.

We now consider two masses of air, one warm, the other cool, both relatively at ground level. Again, the cool air will roll in under the warm air as the warm air is rising. The moisture in the warm air condenses to form clouds (ARRRG!), and the Coriolis effect will cause a counter-clockwise rotation in the northern hemisphere. We now witness the formation of a cyclonic storm. These storms can be large or small, weak or strong. Even a thunderstorm or thunder-cell is a version of a cyclonic storm. They are not squalls. Squalls are eddies found in the wake of a storm.

The most common cyclonic storm is your garden variety rain storm. Should one pass over your location, you might expect to witness the following...

1. High wispy Cirrus clouds will be seen approaching from the south or west about 24 hours ahead of the storm. The wind will gently pick up from the east or the south.
2. Within perhaps a few hours, a mackerel sky will form. These are Cirrocumulus clouds; these clouds are made of ice crystals and are usually at 20,000 to 25,000 feet altitude.
3. The next layer of clouds start to appear and the humidity becomes much higher. The barometer falls and it may become hazy.
4. Soon the lower clouds move in, and it will be noted that these clouds blow with the surface winds. The higher clouds move with the jet stream or, in other words, they move in the same direction as the storm.
5. The precipitation starts gradually and the wind picks up much more now, still blowing from the same direction.
6. Huddled in your storm cellar, you now sneak a peek outside to see the wind howling, the rain is pouring out of the clouds (and into your storm cellar).
7. Thunder and lightening is likely to occur now. Power may be lost and you start to lament the waste of these dark skies on such a stormy night (assuming it is night!).
8. The wind falls to a breeze, the skies begin to clear...

Now we know that Murphy is alive and well and still practicing law! It has been determined that the time required for the eye of a storm to pass is directly related to the time required to set up a telescope.

9. The winds have switched to west or north and quickly pick up to fairly brisk gusts. The low clouds move in and showers begin to fall. These are much lighter than the rain that fell earlier. Finally the skies clear suddenly, and the storm is passed. The air is cool and very clear... and the power is back on, just so the lights can appear that much brighter.
10. It is now safe to come out of your storm cellar!

Figure 1 shows a typical surface chart of a cyclonic storm. We transitted along the line AA'. Note also the warm and cold front.

They are just that; the front of the warm air mass and the cold air mass. Figure 2 is a cross-section of the storm to illustrate the relation of the fronts as drawn on the chart to the air masses. Notice the two transit lines I use: BB', and CC'. The key explains the other symbols which appear on the chart. Examine these symbols along the line AA' and then reconsider the event description of a cyclonic storm.

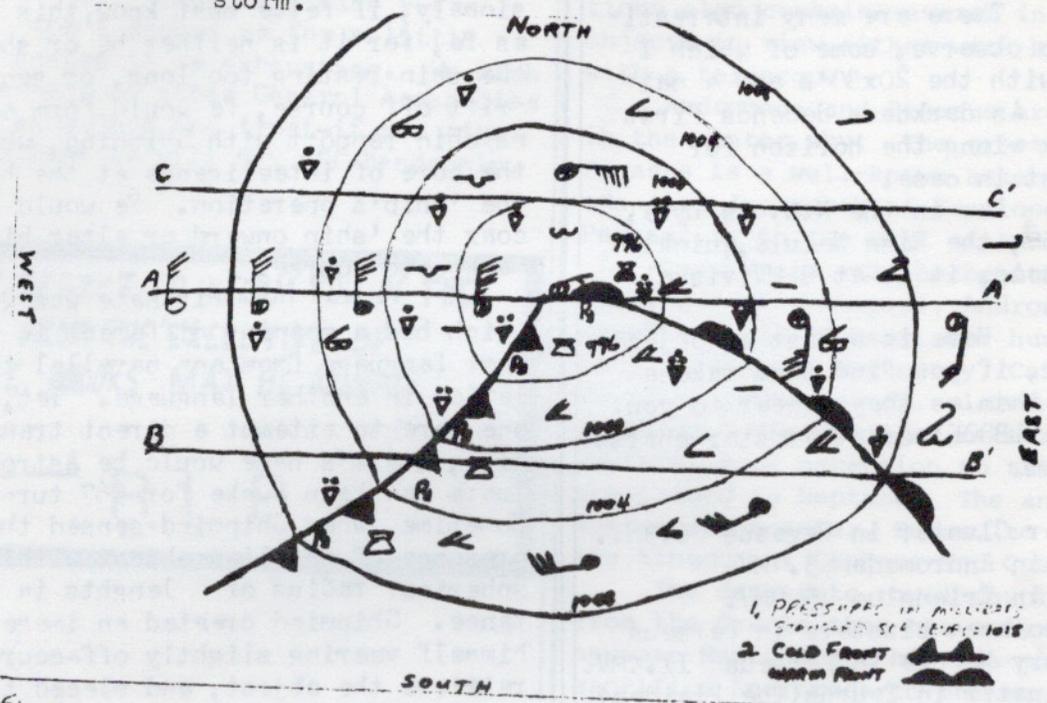


FIGURE 1; Low Pressure System (Cyclonic Storm)

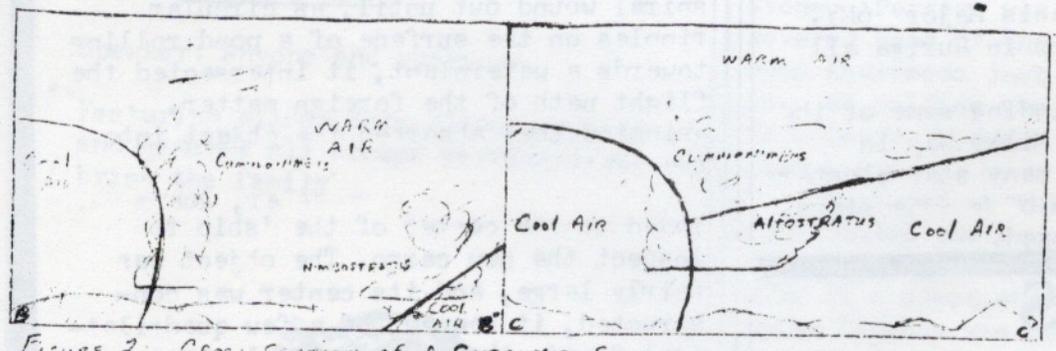


FIGURE 2; Cross-Section of a Cyclonic Storm

KEYS:

PRECIPITATIONS	CLOUDS	WIND SCALE
LIGHT SNOWS	CUMULUS	Calm 0Kt
RAIN	STRATOCUMULUS	Slight Breeze 1-5Kt
HEAVY RAIN	STRATUS	SAME BREEZE 6-10Kt
THUNDER SHOWERS	CUMULONIMBUS	Moderate 11-20Kt
* Snow is indicated by changing the (.) to (x) in the key	NIMBOSTRATUS	Whole Gale 21-30Kt
	ALTOSTRATUS	HURRICANE 70Kt
	ALTOCUMULUS	* Direction of wind is indicated by direction of the vertical bar
	CIRRUS	
	CIRROSTRATUS	
	CIRROCUMULUS	

NOW that the days are shorter, it's the best time to start viewing the sky. No matter what type of binoculars you are using I would recommend mounting them to a tripod. My 20x30 binoculars have to be mounted even though they weigh only 2.04 Kg., holding them by hand one can start to feel the weight after a few minutes.

There are many interesting objects to observe, some of which I have seen with the 20x30's and a pair of 7x50's. As darkness descends first take a look along the horizon for comets, just in case.

Low in the N.W. is Lyra, look for M57, the Ring Nebula, quickly before it sets, it is at 9 MV (visual magnitude).

Here is a list of objects to look for, if you find them make a drawing of them as they appear to you. Use the 'HANDBOOK' or other star charts to find them.

- M15 Globular Cluster in Pegasus 6.3MV.
- M31 Galaxy in Andromeda 3.7MV.
- M33 Galaxy in Triangulum 5.9MV.
- Two open clusters in Perseus
- M76 Planetary Nebula in Perseus 11.4MV.
- M45 Open cluster in Taurus (The Pleiades)
- M1 Planetary Nebula in Taurus (The Crab)
- M35 Open cluster in Gemini 6MV.
- M42 Orion Nebula
- M79 Globular Cluster in Lepus 7.3MV.
- M73 Nebula in Orion (Looks like a comet)
- M41 Open cluster in Canis Major 6MV.
- M36,37,38 Open clusters in Auriga all rated as 6MV.

After finding some of the objects just scan the Milky Way in Monceros and note the many star clusters and the various colors of single stars, you won't be disappointed.

## GREETINGS

Silence.

A soundless void. The dark and cold quiet of an ancient battleship resting, crushed, at the bottom of the sea. The stillness of a tombstone caked with fungi and strung with vines, lost forever in the corner of a forgotten cemetery. A dark airless quiet.

Deep space: Far beyond the tiny secluded Sol system, and far outside the Milky Way, a small starship was travelling on his journey home. Two smaller Kompyn were aboard, one of whom was temporarily dormant. The other was performing the routine tasks, required to keep the ship functioning properly. Little needed to be done, though. Occasionally, if he (we must know this Kompyn as he, for it is neither he or she) felt the ship resting too long, or sensed it drift off course, he would form a brief psychic rapport with Shipmind, who was the core of intelligence at the heart of the 'ship's operation. He would then coax the 'ship onward or alter his path back onto course.

His name was Quarm, which had a meaning different in the Home language from any parallel translation in another language. Yet, if one were to attempt a direct translation, Quarm's name would be Astronomer. Quarm had been awake for 567 turns, Hometime, when Shipmind sensed the presence of an alien object within a spherical radius of lengths in distance. Shipmind created an image of himself veering slightly off-course to retrieve the object, and placed this in Quarm's mind.

"?"

"Yes", Quarm replied.

Shipmind altered his course in an ever-widening spiral. The spiral wound out until, as circular ripples on the surface of a pond rolling towards a waterlily, it intersected the flight path of the foreign matter. Shipmind then absorbed the object into the center of the spiral.

Quarm moved to the center of the 'ship to inspect the new cargo. The object was fairly large, and its center was constructed, it seemed, of a few quadrilateral faced, three-dimensional shapes from which large, reflective surfaces extended on two opposite sides. The object was bilaterally symmetrical, and appeared dormant.

Yet it was not dormant. Upon probing the object, Quarm found that it had never been alive. It had no mind!

## CONT' COVER

# ASTROPHOTOGRAPHY

All the equipment you need to get started in astrophotography is a camera and a tripod. The camera should have a fast (small f-ratio, i.e. f2) lens. My comments will be directed towards those of you who have 35mm SLR's (Single Lens Reflex) since this type of camera is both very common and eminently suitable for astrophotography. Other non-reflex cameras can be used for certain types of astrophotography, such as discussed in this issue but for more sophisticated picture a SLR is almost a necessity.

A good place to start a foray into astrophotography is with star trails. It is worth your while to travel, if necessary, to get to dark skies. It is not a good idea to take star pictures when the moon is up!

Since you'll be exposing for several hours to get the trailing effect, a slow film will produce the most pleasing results. Kodachrome 64 is an excellent choice.

For most colour astrophotography I would recommend you use a slide film. Commercial photofinishers do not do a good job when printing astrophotos with slides you at least get back the original. (I once got a lime green print of Venus) Prints can be made from the slides later on and then the lab will have a correct original for comparison.

To continue with star trails: Point the camera towards the area of sky you're interested in, (the region centered around the North Star or around Crion give distinctive results) set the lens aperture wide open, focus on infinity using the scale on the lens (microprisms and other focusing aids do funny things when confronted with stars) set the camera's shutter speed to bulb and using a locking cable release fire the shutter, leaving it open for several hours.

Two words of caution on using the bulb setting. The "slap" of the mirror rising can shake the camera. To avoid this, some cameras have a "mirror pre-release" or "mirror lock-up" button but since we can't all own Nikon F's you may be able to employ the following dodge; by firing the camera via the self-timer the mirror (depending on the camera) may flip up and the lens diaphragm close down at the beginning of the self-timer's cycle. Then eight or ten seconds later the camera fires the shutter. If this doesn't work for your camera, you can avoid mirror slap by covering the lens--say with your hat--before firing the shutter, then firing the shutter, while keeping the lens covered. After all the vibration stops, gently remove the hat to begin the exposure.

Another possible problem is that modern electronically-governed shutters on automatic cameras can cause a continuous battery drain when set on bulb. Check to see if yours does this--it should be mentioned in the owners manual. If it does see if bulb will still operate without batteries in the camera. Otherwise you might exhaust a set of batteries in one night!

A similar type of simple astrophotography is taking constellation "snapshots". By using an ultra high speed film (such as Kodak 2475 Recording Film, a four thousand ASA black and white film) it is possible to "freeze" the stars apparent motion by using sufficiently short exposure times.

Recording film, as with any black and white film used for astrophotography, should be processed by hand for really good results. If you have never processed films before, consider it. It's easy, inexpensive (say 25.00 for equipment and chemicals to process negatives) and the quality of all your black and white prints will dramatically improve. It's

not necessary to immediately buy an enlarger as commercial labs can produce acceptable black and white prints if you give them a properly developed negative. If you're interested, I very much recommend the Kodak booklet BASIC PROCESSING PRINTING AND ENLARGEMENT IN BLACK AND WHITE (about 3.00).

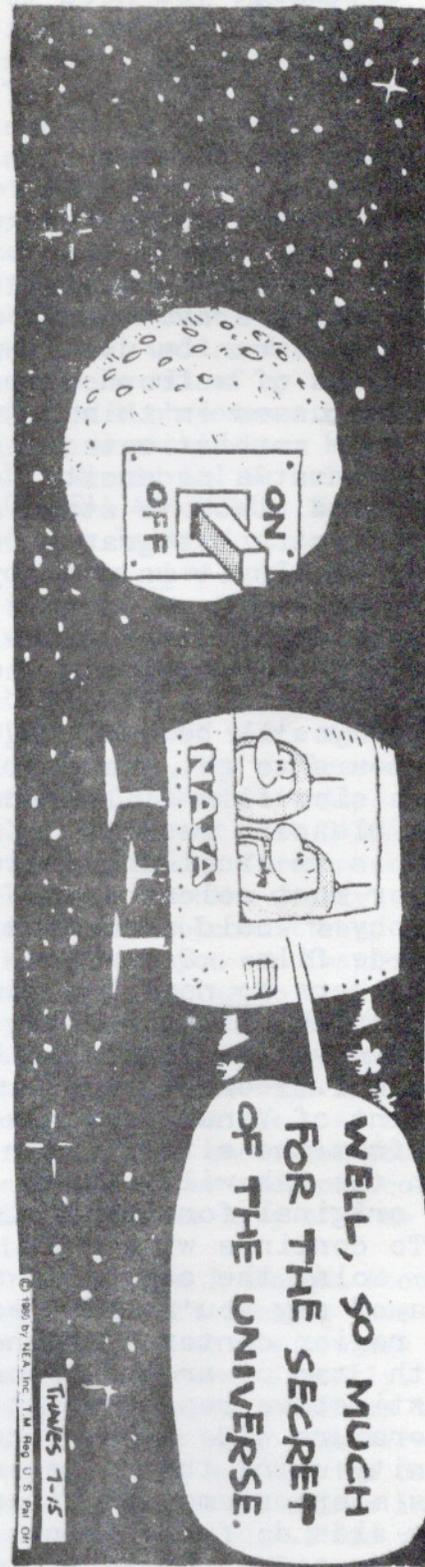
To take a constellation "snapshot" set up the camera as for startrails but expose (assuming you're using the 50mm standard lens) for between ten seconds for constellations near the celestial equator and twentyfive seconds for northern constellations. This difference in exposure times is due to the variance in stellar motion at various declinations.

Another factor affecting exposure times is the lens you use; you can use a longer exposure time with a wide angle but must use a shorter exposure time with a telephoto. The change in magnification provided by the lenses applies to image motion as well as image size hence then trailing will be less pronounced with the wide angle and more pronounced with a telephoto!

Whatever the focal length of the lens, it's a good idea to try several different exposure times (bracket) to find the longest possible exposure that still shows the stars without any evidence of trailing.

NEXT MONTH: HOW TO CHOOSE THE RIGHT FILM

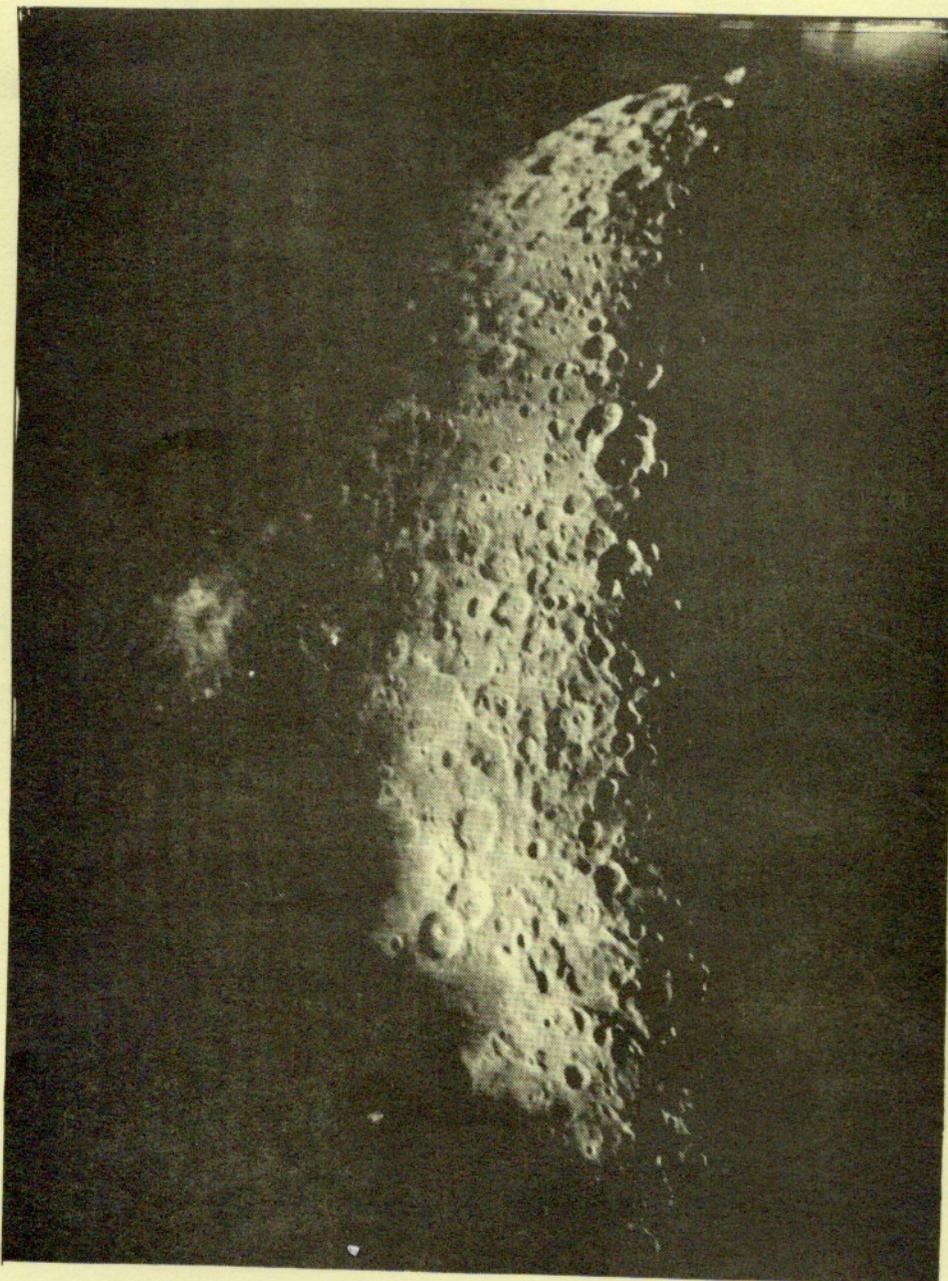
BY  
JODY  
LEBLANC



Strange! This was not the first time they had found some Mindless piece of matter. Still, at home, all things which had a function also possessed a Mind. All other things could not think, and therefore, for all intent and purpose, did not exist. Yet, this foreign matter contained no Mind.

Quarm's curiosity welled up within him. He wondered, what is this object? And if it can be identified, can it be traced back to it's source?

ED'S NOTE: FOR THE ANSWERS, THIS AND OTHER QUESTIONS, 'FLIP' HERE NEXT ISSUE WHEN YOU'LL HEAR QUARM SAY, "HOLY GALAXY SHEEPING WHAT CAN IT BE?"



Film - FP4  
Devel. MICRODOL X (1:3)  
CAMERA: RICH OXR2'S  
TELESCOPE: 16" PRIME FOCUS  
(F11)  
EXPOSURE: 1/60,000 Apx.

COURTESY JODY LEBLANC