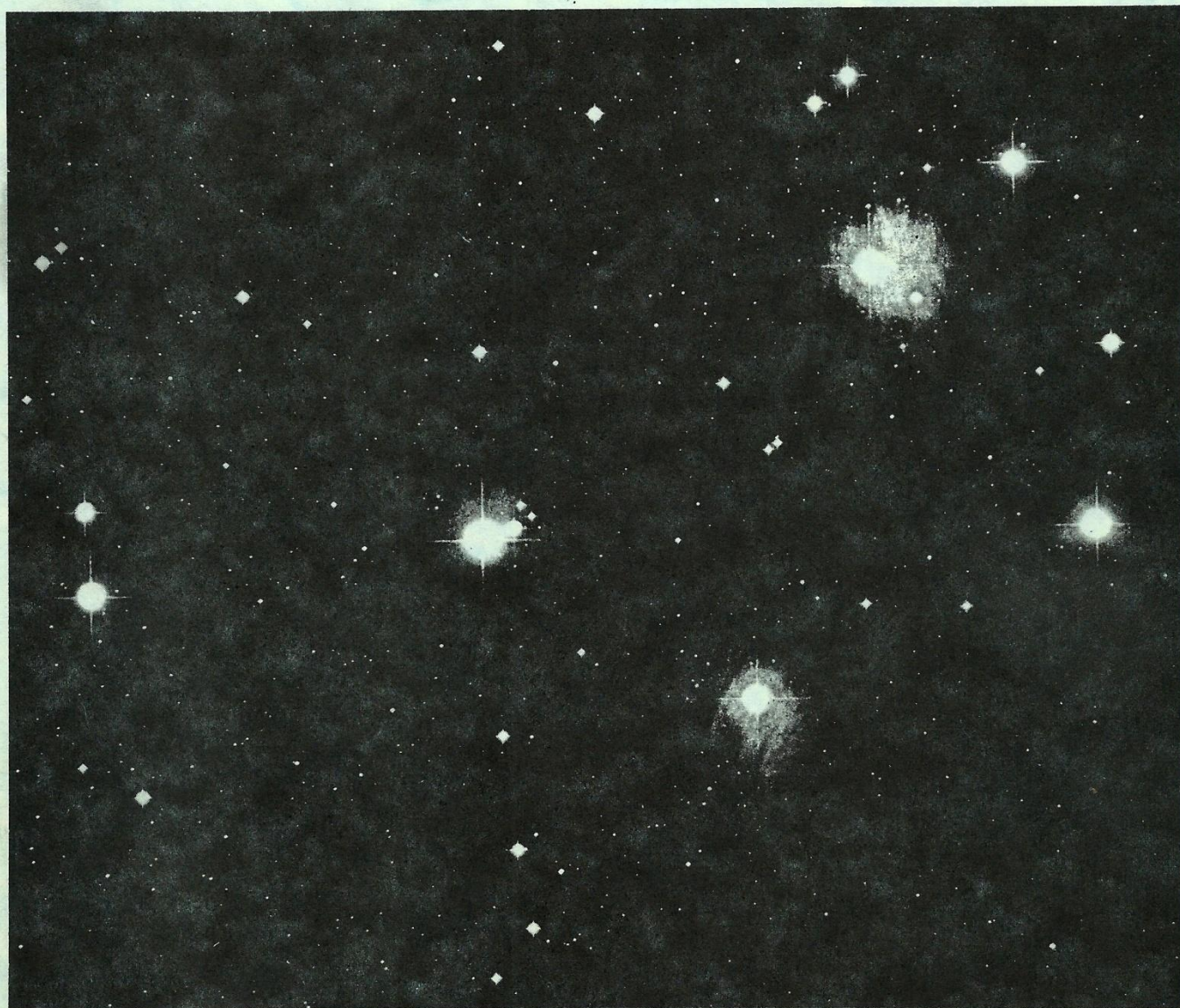




THE WASP

THE JOURNAL OF THE WARREN ASTRONOMICAL SOCIETY



Several hundred relatively youthful stars born no more than 20 million years ago comprise the magnificent Pleiades cluster in the constellation Taurus. The brightest stars are embedded in dust and gas that glows in the same way bright street lamps

illuminate hazy air surrounding them. Squandering their fuel at incredibly fast rates, the brightest of the Pleiades' inhabitants are doomed to short lifetimes, lasting only millions instead of billions of years.

FEBRUARY 1978

The Warren Astronomical Society
P.O. Box 474
East Detroit, Michigan 48021

The Warren Astronomical Society (W.A.S.) is a local nonprofit organization of amateur astronomers. Membership is open to all interested persons. Annual dues are as follows; Student- \$9.00, College- \$11.00, Senior Citizen- \$13.50, Individual- \$16.00, Family- 21.00, the membership fees listed here include a one year subscription to Sky & Telescope Magazine.

Meetings are held on the first Thursday of each month at Cranbrook, and the third Thursday of each month at Macomb County Comm. College, in the student union building.

The EDITOR: Roger A. Civic, 26335 Beaconsfield
Roseville Michigan, 48066- 776-8735

Assistant
to the Editor: Mike Newberry, 623-7284

OBSERVATORY SCHEDULE

Lectures for the coming month are listed below.

Jan.27/28 Pete Kwentus..... 771-3283
Feb. 3/4 Frank McCullough... 791-8752
Feb.10/11 Diane McCullough... 791-8752
Feb.17/18 Donald Misson..... 727-9083
Feb.24/25 Raymond Bullock.... 879-9458

The lecturer may select either the Friday or Saturday, depending on the Weather and their personal schedule.

In the future, some of our younger members will be assisting the senior lecturer. These members are, Bob Dennington, Dave Locke, Doug Holmes and Joe Tocco.

•buy – sell – trade•

WANTED: Used telescopes any size or type. Lou Faix as President has been contacted by many people about such items. Give Lou a call, 781-3338

WANTED: A new or used 8" mirror blank or tool to be used as a tool to grind my mirror with. Call Chris Edsall at 774-0007 with offer.

FOR SALE: 10" Newtonian telescope. Factory mirror, yoke equatorial mount that is portable. 70 power eyepiece. For only \$300.00, also a 40mm Polaris finder scope-12X, \$25.00. 18mm Kellner eyepiece, \$18.00. All in good condition. Call Doug Tracy- 882-4499.

The November 17, 1977 meeting of the Warren Astronomical Society was opened at 8:15 p.m. by our President, Lou Faix. After welcoming visitors, the business reports were given beginning with the Treasurer's report. Members were told that the bank balance is now at \$357. Gary Morin explained that the Great Lakes Regional Convention will be held in 1978 in Dayton, Ohio and will be hosted by the Miami Valley Astronomical Society. Gary has also donated a bookcase for our library. Roger Civic is working on a brochure about our own Society. The November Messier Contest was won by Doug Bock. Frank McCullough, who is in charge of the Christmas Banquet, took the floor to explain plans to members. He disclosed that there would be awards for Messier observations and an Amateur of the Year award to a member who has been the most significant contributor to our Society.

The December Cranbrook meeting will feature three films on the Universe, Jupiter and the Newtonian telescope. Dan Bobola gave a detailed, well researched and fascinating talk on the mass of Jupiter, its moons and a time study of the planet's moons. Doug Bock spoke on two 8-inch scopes that he built. Lou Faix commented on the fine craftsmanship of Doug's scope.

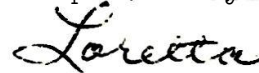
Financial aid was offered to all members in paying for the Christmas Banquet.

In January, Diane McCullough will give a report on the 1977 Eclipse off the coast of Hawaii.

Lou Faix closed the meeting by thanking the speakers as well as pointing to all members that Jupiter's bands are presently displaying extreme intensity.

The meeting was closed at 10:30 p.m. by our president.

Respectfully submitted,



Loretta D. Caulley, president

SPECIAL ASTRONOMY LECTURE SERIES

We are pleased to announce that James A. Loudon, University of Michigan astronomer will return to the Institute in February for a series of illustrated lectures to preview events of the space program which will happen in 1978-9. Discussion will include the space shuttle, space colonization, the next solar eclipse and Pioneer Venus.

Mr. Loudon will present "Coming Events in Space" on five consecutive Wednesday evenings, February 1 through March 1, from 7:30-9:00 p.m. Registration for the series is available to members at \$10.00 (students, \$7.00); to nonmembers at \$12.00 (students, \$8.00.) This series is recommended for senior high school students through adults.

Cranbrook Institute of Science
500 Lone Pine Road
Bloomfield Hills, Mich. 48013



Warren Society Celebrates Christmas

Forty-seven members and friends of the Warren Astronomical Society opened the holiday season by attending the annual Christmas banquet at Detroit's Paridiso Cafe on December 14th. The gathering brought together old and new members and refreshed the friendships between family members. Christmas music and projected views of holiday sights, familiar sky objects and dear friends served as a pleasant background for the cocktail hour and dinner. An invocation by Carl Noble and a toast to the Society members preceded the banquet arranged by Vice President Frank McCullough.

President Lou Faix began the program by introducing the current officers. Four past presidents, Gerry Alyea, Frank McCullough, Carl Noble and Peter Kwentus were also recognized for their part in the Society's growth. A special acknowledgement was made of Secretary Loretta Caulley's letters to Santa Claus (and a few astronomical equipment companies) which resulted in a bag full of goodies. Diane McCullough, assisted by Ginger Kwentus, raffled the gifts which included beautiful custom made table center pieces prepared by Jean Baldwin.

The annual awards ceremony began with the presentation of an Astronomical League Messier Club Certificate, endorsed by National President Robert Fried, to Michael Newberry. Douglas Bock was the recipient of the Kenneth Wilson Award for winning the final 1977 viewing competition. It was announced that Doug will also be joining the AL Messier Club. After briefly reviewing the history and growth of the W.A.S., plaques expressing the Society's appreciation for support and assistance were presented to Dr. Paul Strong and Macomb Community College as well as to Raymond Bullock and the Cranbrook Institute of Science. The high point of the awards program was the recognition of Peter Kwentus' achievements in observational and photographic astronomy, telescope making and service to the Warren Society, Astronomical League and community.

A rich tradition was preserved with the presentation of another of Frank McCullough's Christmas slide shows. This year Frank's program hit a new high with coordinated slides, motion pictures, audio track and background music. Entitled "The Amateur Astronomer", it depicted the interests, activities and adventures of our members against the background of close friendships and camaraderie which typifies the Warren Astronomical Society.



SKY PUBLISHING CORPORATION

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CAMBRIDGE, MASS. 02138

Telephone: (617) 864-7360

Cable: SKYTEL Boston

November, 1977

Gentlemen:

The present rate for astronomical societies that have adopted SKY AND TELESCOPE as a privilege of membership is \$6.00 per year. This has been in effect for two years, during which time we have incurred ever increasing basic costs in paper, printing and mailing.

Regretfully, it is no longer possible for us to continue the \$6.00 rate, and this letter is to notify your society that beginning with the July, 1978 issue, that rate will be increased to \$8.00.

We trust that this advance notice will cause your society the least inconvenience in adopting the necessary changes in your dues or by-laws.

SKY PUBLISHING CORPORATION

TOTALITY! TOTALITY!!

by: Diane McCullough

The 1977 Fairsea Eclipse Cruise was "totality" in many ways. Beginning with a warm and beautiful welcoming of fellow club members and families at the Detroit Metro Airport, the excitement continued while flying the friendly skies of United to Los Angeles.

The clouds parted and gave us a breath-taking view of mountain terrain and ribbon like rivers. For those of us who have never flown, including Ginger Kwentus, we lifted our "spirits" with a little help from the bar.

From L. A. Airport we reloaded our baggage and took a bus to the Sitmar Cruise dock. There awaiting us was a big, white, beautiful T.S.S. Fairsea. The next moment of joy came with the reunion of our fellow W.A.S. club member, Ken Wilson. Ken is now the Assistant Director of the Morrison Planetarium in San Francisco and made a special flight to L. A. to visit us. We shared some cocktails together on the ship and Ken waived us off on our 11-day "voyage to darkness".

One thing that stands out most when thinking of the Fairsea is FOOD. Food was abundant, five main meals a day with pizza and sandwiches in between, and delicious. Thanks to Jesus, Augus, Gino, Johnnie and Sevario, our waiters and busboys, the service was excellent and very personal.

Among the activities aboard the ship were fine lectures presented by notable scientists from various parts of the country. These included: Dr. Allen J. Hynek, Professor of Astronomy at Northwestern University; Dr. George O. Abell, Professor of Astronomy at University of California; Dr. Joseph Chamberlain, Cruise Program Coordinator from Adler Planetarium; and Dr. Jay Pasachoff, Director of Hopkins Observatory, to mention a few.

The activity list continues with swimming, sun-bathing, gambling (Kentucky derby racing, casinos, and cash bingo-ask Ginger and Ron), ping-pong and chess tournaments. (ask Dave and Frank), jogging, working-out in the gym, watching movies, dance lessons, saunas and masseuse, a special tour of the kitchen, night star-parties, a tour of the ship's bridge, captain's cocktail parties, a mardi-gras ball, much eating and drinking!

One of the main events for Lois Faix, Linda Harrington, and myself was the "Fairsea Eclipse Review," a variety talent show. It was a fantastic experience for the three of us to work together with professionals in the music field who were willing to help us with our song and dance routine. We decided to choose the song "Me and My Shadow" (keeping with the eclipse theme), with Lois portraying the sun, Linda the sun's shadow, and me the moon's shadow. Lois Faix ingeniously created the special lyrics to the song:

Me and my shadow, heading for our rendezvous
Me and my shadow, get your scopes - we're coming into view
We see some clouds below, how could that be
Cuz Sitmar promised - TOTALITY
So me and my shadow, could be seen from the Fairsea.

Second verse is same as the above excluding last line and inserting, "Never leave our memory."

The theme of the show centered on astronomy. "I got the sun in the morning and the moon at night. Sunshine brings me a lovely day, moonlight brings me a Milky Way! Where in the world would the songwriters be if it weren't for ASTRONOMY, and if it weren't for the sun, and the stars and the moon, where would you find the words for a tune ... like Twinkle, Twinkle Little Star, You are My Sunshine, Shine on Harvest Moon, etc." One of original songs that was shared with us was "Star Song" that was written by Mr. Jack Sweeney in San Francisco in the early part of 1970:

Star Song, a missile in an ark
My star song is whistlin' in the dark
If you're afraid when dusk comes on
Don't run inside - you've got it made, if you have stayed -
To stargaze while singing in the night
There are ways of bringing back the light
Just turn about and walk right out
Without a doubt
Your Star Song will bring on another dawn.

It was a very inspirational and fulfilling experience for me to share with friends, both old and new, and one I will always fondly remember.

The very main event, of course, was the beautiful and breath-taking view of the total eclipse of the sun. Located toward the bow of the ship, many W.A.S. members were huddled together next to tripods, cameras and telescopes. Although we were ready for action, the clouds were not, and played games with us for a while. The night before the eclipse we steered clear of two tropical storms and were led into fairly clear skies. Moments before the eclipse, four-letter words were flying (as attested by MCCC students who listened to Judy Strong's obscenities to the clouds over her husband's tape recorder). But suddenly, as larger chunks of the sun were being eaten away by the moon's shadow, darkness crept upon us and the glorious "diamond ring" appeared - heralding TOTALITY! Mercury and Venus with other stars were notably visible. The 2 minute and 40 second eclipse was interrupted by cloud cover just before the second "diamond ring" broke. But all in all, we were overjoyed with the spectacular event and applauding the captain who showed up on deck, followed by the raising of the 1977 Eclipse flag to show others that "we did it again!" Passengers of our twin-sister ship, the Fairwind, were sharing our enthusiasm while we merged in the middle of the Pacific for this glorious occasion.

The two ports-of-calls were Puerto Vallarta and Mazatlan, Mexico. The scenery was astounding, but so was the poverty. I enjoyed walking on the beaches and observing various ocean marine-life, as well as the unique rock formations and abalone shells. The mountains were filled with rich green vegetation. (Jerry Persha brought to the dinner table a fine specimen of a large, hard-shelled creature he discovered while hiking on a mountain path!) The cities, filled with shops, markets, cathedrals, plain adobe buildings, and Spanish-speaking people, were quite interesting.

The 1977 Fairsea Eclipse Cruise was a "total" success in many ways, and will be another fond memory for W.A.S. members to share for years to come. I would like to make a few notes of appreciation. First, a tremendous "thank you" to Chuck Meyers, our travel agent and friend, who showed professional dedication to insure that our baggage was marked "special handling," to get us all situated on the ship, and to compliment each cabin with a bottle of champagne. My thanks goes to Captain Augusto Logomarsini who steered our ship to "total darkness." A note of thanks is to my husband Frank who shared an eclipse with me that was as beautiful as our first. My heart-felt thanks is extended to my beautiful friends who showed me the meaning of love and gave me a treasured memory that I will always cherish. (We did it, Pete!) My final "thank you" is to God, for giving me my friends and for parting the clouds to show us his handiwork.

In conclusion, I will leave with you a poetic composition of some of my inner thoughts and expressions that were conceived while sailing over the ocean.

Me on the Fairsea

*From port to starboard, bow to aft
A mighty vessel, a beautiful craft.*

*The love of friends, the beauty of people
Man with nature, as an equal.*

*Food; wine, song and sorrow
I must live for today, and not for tomorrow.*

On these seas we have trod, I have seen my God.

His eyes are the stars piercing into infinity.

His nose reveals the intoxic fragrance of the sea.

His ears reflect the humble roar of the ocean walls.

His lips kiss the sun with warm new dawns.

Me on the Fairsea (continued)

His face appears as the man in the moon.

His arms extend as galaxies into the doom.

His fingers reach out as nebulous clouds of gas.

His legs bear the untimeless ecliptic paths.

His feet mark the planets that cycle our celestial mass.

His soul fills the depths of the ocean with undefined emotion.

His presence is revealed in the inner peace of mind and contentment of that time.

Then I ask, What is love? Who am I?

Dear God, hear my cry.

Searching to discover~ I am as child~ I am as mother

But life is not for me to smother.

I love to live~ I live to love~

I ask direction from above.

My mind is in circles as the swirls in the sea.

I need self-identity.

I want to be free.

I long to be me.

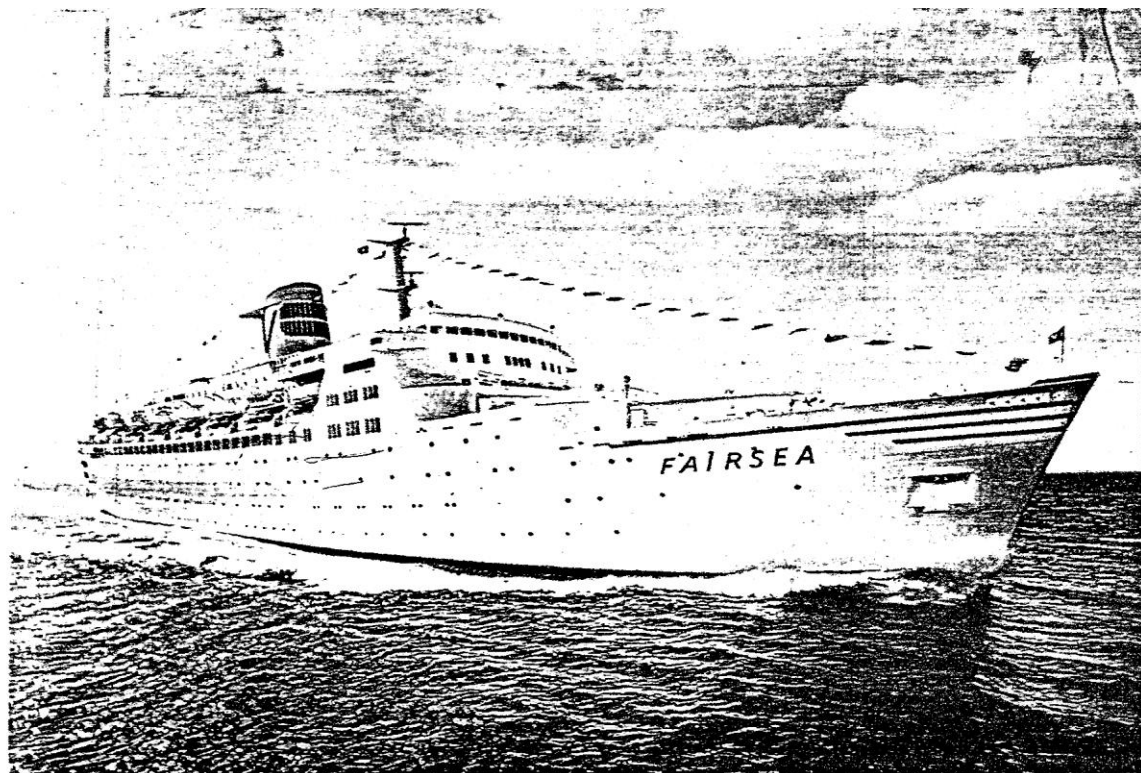
My home is where my heart is

My heart is there, and why do I care.

Just the ocean and me

in the depths of eternity

Aboard the Fairsea



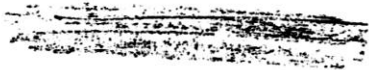
Alice Lee McCullough

"THEY'RE EVERYWHERE, THEY'RE EVERYWHERE!"

by: Diane McCullough

Returning to East Detroit from a hot and heavy tennis match with Linda Harrington (chasing many tennis balls!) on the morning of October 31, I heard "the man on the radio" say that it was a crystal clear night. When I parked the car, I decided to check out my "man in the sky", Orion. Indeed it was a beautiful, crisp night and the visibility was excellent. c In the northeast, however, I noticed a hazy cloud stretched horizontally. I then detected faint bands of white light a little farther north. I was hesitant in knowing if I was viewing the Northern Lights or just some obscure clouds playing tricks on me, but Mother Nature came through loud and clear, displaying a fantastic exhibition of the Aurora Borealis.'

The time of my observations was from 12:37 a.m. to approximately 1:05 a.m.



HORIZONTAL WHITE BAND

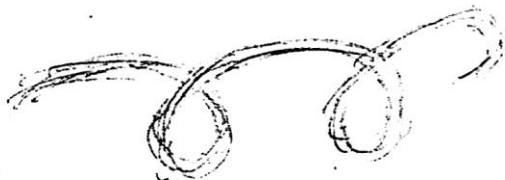


FIVE FINGER-
LIKE PROJECTION

This aurora was unique from others I have observed in that the northeast part of the sky took on five finger-like projections which appeared to be reaching out towards the north~ between 12:37 a.m. and 12:50 a.m. These projections then began dispersing and slowly formed loops toward the east.

This display of Northern Lights did compare to a previous showing I had observed, in that it appeared as far east as Orion. Also, stretched out to the west were faint bands of horizontal, white light and more projections in the northwest. It was not a "curtain-effect" so much as in other displays and did lack any significant color other than white.

However, it was exciting, and I enjoyed this beautiful, splendor in the night sky.



LOOPEE EFFECT



ORION

THE B.A.O. GUIDE TO EFFICIENT OBSERVING

Part II -Making an Observing Schedule

-R. Bullock

Last time the Bullock Astronomical Observatory discussed various sources where the serious observer can get information as to what to look for. This time we'll get it organized so you can proceed in a logical manner, and not wonder where in the sky you should start.

Since the Earth insists in rotating, you had better put any objects which are in the Western sky at the top of your list (for obvious reasons) then write down objects further to the East.

The B.A.O. suggests you break your time up into sections. The first section should include objects from the Western horizon to about 30 degrees EAST of the Meridian. This will cover about 8 hours of Right Ascension. Don't worry about the remaining 4 hours. You'll be seeing that part of the sky later when it has risen into a more favorable location for observing. As 8 hours will be about half of the entire sky visible to you for the session, this time period will have more objects listed -than any other period of the time you have allotted.

There are three ways you can organize your observing list:

- 1) List objects in ascending Right Ascension,
- 2) List objects constellation by constellation,
- 3) List objects which are in the same area of the sky.

Method 1 is the worst! Most books which list the variable stars, doubles, galaxies, clusters, etc., compile them from lowest R.A. to highest. This may be a good way to make a list, but it's a most impractical way to observe. The declination can vary from +90 to -40 degrees going from one object to another. (Example: Menzel's FIELD GUIDE TO THE STARS AND PLANETS. Under globular clusters we go from,

NGC 6205 (M-13) at 16h 39.9m R.A. +36 33' Dec. way down to,
NGC 6218 (M-12) at 16h 44.6m R.A. -01 51' Dec. back up to,
NGC 6229 at 16h 45.6m R.A. +47 37' Dec. for a total of 86 degrees change in Declination.)

Method 2 is better, but still has problems. (Example: M-1 in Taurus is only 34m R.A. from IJi-35in Gemini. But, as they are in different constellations, they get listed far apart from each other).

Method 3 is the best, allowing you the freedom to decide whether to go North from Taurus to Auriga, or South to Orion, or East to Gemini. You can usually combine method 1 and 2 to an extent. The list on the next page tends to follow ascending R.A. yet keeps together the objects in the same constellation.

The list is an observing guide that was prepared for November 1977. Unfortunately foul weather prevented any observing (All that work!).

There is obviously much more on the list than a person would expect to do. Much more time is going to be needed to find the faint objects, or photograph or draw them.

The benefit of such a large list is in keeping occupied. If you tire of trying to find the Horsehead Nebula you can go on to something else.

Better to have too much planned than too little. Just so long as you don't feel you're running a race and must have a cursory glimpse of everything. Take your time and enjoy.

However, once your schedule is prepared you will realize the challenge to cover it. How many of us leave the telescope in a closet for weeks at a time because we don't know just what we'd want to look at? Because we lack the challenge?

Let your observing schedule be a goal to aim for.

NEXT TIME: Recording your data.

OBJECT	CON	DESIGNATION	LOCATION
Polaris	UMi	Double star	01 22 +88
M-13	Her	Globular cluster	16 40 +36
M-57	Lyr	Planetary nebula (Ring)	18 52 +32
Epsilon	Lyr	Double star	18 41 +39
M-11	Scu	Open cluster	18 48 -06
Albireo	Cyg	Double star	19 26 +27
M-29	Cyg	Open Cluster	20 22 +88
M-27	Vul	Planetary nebula (Dumbbell)	19 58 +22
Gamma	Del	Double star	20 42 +15
M-2	Aqr	Globular cluster	21 31 -01
M-15	Peg	Globular cluster	21 28 +12
M-31	And	Spiral galaxy	00 40 +41
Gamma	And	Double star	01 57 +41
NGC 869&884	Per	Double open clusters	02 15 +56
M-34	Per	Open cluster	02 39 +42
M-45	Tau	Pleiades	03 44 +24
M-1	Tau	Diffuse nebula (Crab)	05 32 +22
Rigel	Ori	Double star	05 12 -08
Delta	Ori	Double star	05 26 -00
M-42	Ori	Diffuse nebula	05 33 -05
B33	Ori	Diffuse nebula (Horsehead)	05 38 -02
Betelgeuse	Ori	Super giant	05 52 +07
M-38	Aur	Open clusters	05 25 +35
M-36	Aur	Open clusters	05 32 +34
M-37	Aur	Open cluster	05 49 +32
M-35	Gem	Open cluster	06 06 +24
Castor	Gem	Double star	07 28 +32
M-41	CMa	Open cluster	06 45 -20
M-50	Mon	Open cluster	07 00 -08
M-44	Cnc	Open cluster (Beehive)	08 37 +20

POSITIONS OF PLANETS FOR NOVEMBER 12/13 1977:
 Jupiter in Gemini rises at 20:00
 Mars in Cancer rises at 22:26
 Saturn in Leo rises at 00:27

THE APPRENTICE ASTRONOMER'S NOTEBOOK

LOU FAIX

No winter observing season would be complete without a detailed study of the "Great Nebula in Orion". Not only is this nature's finest example of a diffuse nebula but is also one of the most beautiful of all celestial objects. Combining messier objects M42 and M43 and the stars of Theta Orionis, this splendid scene is found around the middle star in sword hanging due south of the "Belt of Orion", that famed hunter and gadabout lover of Greek mythology. The tripartite structure is composed of brilliant clouds of glowing gas, thick rivers of obscuring dust and that nest of young stars, a galactic duster known as the "Trapezium". A plethora of variables also surrounds the brilliant core.

Galileo apparently overlooked the Great Nebula and its discovery in 1611 is attributed to Nicholas Peiresc. A Swiss Jesuit priest named Cysatus observed it in 1618 but the object gathered little fame until 1656 when Christian Huygens published drawings and a detailed description of the Theta Cluster. Sir William Herschel observed and studied the nebula starting in 1774 and in 1825 his son, John Herschel, wrote the often quoted description likening the nebula "to a curdling liquid, or to the breaking up of a mackerel sky". Spectrographic observations were first made by Williams Higgins in 1864 and in 1880, the granddaddy of all amateur astrophotographers, Henry Draper, caught the image with a fifty one minute exposure in his eleven inch refractor.

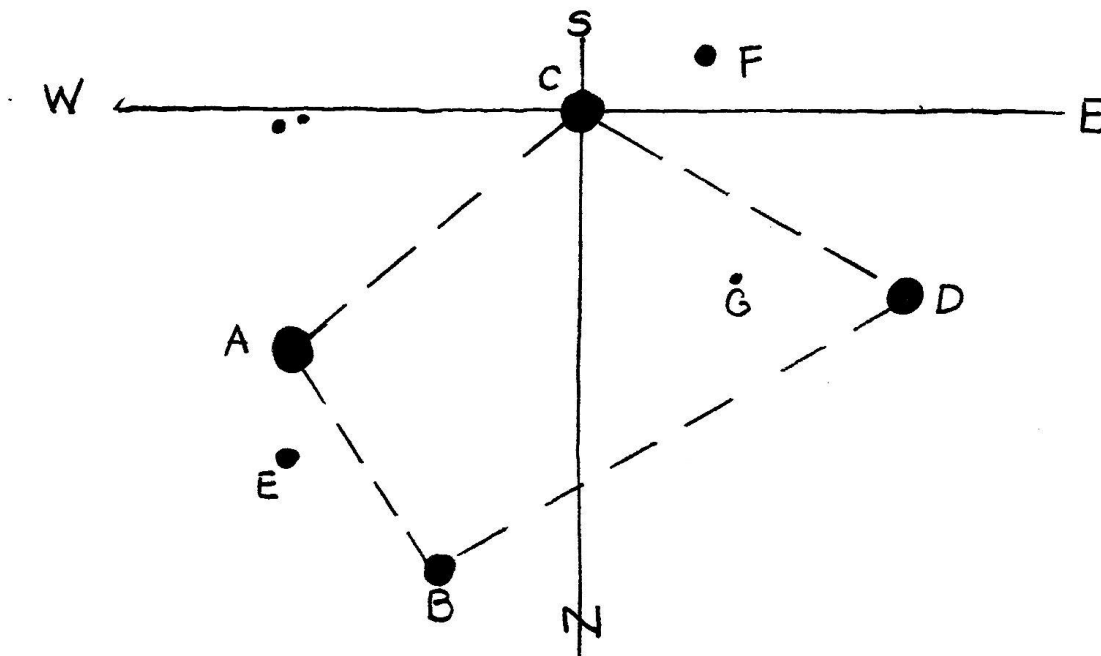
The Great Nebula is an easy object for even the smallest telescope and stands magnification well because of its great brilliance. Many an amateur has been bewildered by the objects intense emerald green visual appearance, while photographic images abound with hues of pink, red, blue and lavender. An explanation of the color contradiction lies in characteristics of the human eye and the strange, nonexistent substance "neblium". Green light at 4959 and 5007 angstrom wavelengths is radiated by doubly ionized oxygen and is currently known as a "forbidden radiation". The electrical charging conditions required for the energy emission require a vacuum a million times rarer than can be generated in any earthly laboratory. Until an understanding of the atom and quantum mechanics was developed early in this century, these unfamiliar spectral lines were thought to emanate from some new and unearthly substance vaguely labeled "Neblium". The redness of the hydrogen gas clouds stems from the radiation of the far more abundant hydrogen atoms. However, since the human eye has its maximum sensitivity in the green range, and the hydrogen radiation is just beyond the spectral frequency limit of the eye, we see a green cloud. Photographic plates see further into the red spectrum and record the predominant hydrogen light.

At a distance of 490-580 parsecs (about ten thousand trillion miles) the Nebula lies in another arm of our Milky Way Galaxy and engulfs an area of thirty light years across. Considering the size and brightness of the Orion nebula, it should be visible to advanced amateur astronomers gazing upon us from the Andromeda galaxy.

Dividing the glowing hydrogen is a thick obscuring vein of dust. Just north of the central portion of the Theta core area, the dust forms a strange dark protrusion popularly known as the "Fish Mouth". Indeed it does have the appearance of an open jaw shark about to consume M43 in gigantic swallow.

The four star Trapezium literally comes alive at 200X power. It is believed that these young, hot giant stars provide all the energy to illuminate the whole Nebula. The primary star (C) is a rare spectral class O-6 (magnitude 5.4) radiating with a power of more than two thousand Suns. At 25,000K, its surface temperature is more than four times hotter than our sun. An abundant outpouring of ultraviolet energy excites the hydrogen atoms throughout the gas cloud which in turn reradiate the energy at the red hydrogen alpha frequency. The less brilliant pair (A) at the west corner, mag 6.8, and (D) at the east corner, mag 6.3, are also strong UV radiators being of spectral class A7 and B0 respectively. The northern point of the trapezoid, star (B) is an eclipsing binary with a period of six days, 11.5 hours.

A real test of your observing skills and equipment will be to find the fifth and sixth members of the trapezoid. Star (E) and (F) are both eleventh magnitude. E lies 3.5 arc seconds due north of star A whereas member (F) lies four arc seconds southeast of the primary star (C). While they would be easy objects in an open field, their proximity to the four blue white giants will challenge the talents of most amateur astronomers.



Orbit established for Object Kowal

Object Kowal, the asteroid-sized body recently discovered between Saturn and Uranus (SN: 11/12/77, p. 311), is still an enigma: either a minor planet outside the solar system's known asteroid population or a comet that is not currently displaying a typical cometary appearance. Several weeks of study, however, have at least yielded the object's precise orbital characteristics, in the process enabling it to be located on previously made photographic plates dating back more than 80 years.

The first few weeks of observations suggest a possible orbit to Brian G. Marsden of the Harvard-Smithsonian Center for Astrophysics, who made the requisite calculations and passed the result along to the object's discoverer, Hale Observatories astronomer Charles Kowal. Though not quite on the button, this early estimate enabled Kowal to locate the object on two plates made in 1969, thus providing observations over a long enough arc of the object's motion for Marsden and colleagues to work out the orbit in detail.

The object gets as close to the sun as 1.21 million kilometers (8.51 astronomical units), bringing it inside the orbit of Saturn, where its next perihelion will occur in February 1996. The rather elongated path (eccentricity 0.38) also extends out just about to the orbit of Uranus, reaching an aphelion of 18.9 AU or about 2.8 million km from the sun, a distance it last reached in November 1970. Inclined 6.9° from the plane of the ecliptic, the orbit carries the object around the sun once every 50.7 years—at present. Perturbations caused by Saturn (and to a lesser extent by Jupiter and Uranus) actually produce a fluctuating period that varies between about 47 and 51 years.

Aided by these parameters, Kowal has been able to locate the object in a Palomar Sky Survey plate from 1952, while William Liller and Lola Chaisson of the Center for Astrophysics have found it in plates made in 1895, 1936, 1941, 1943 and 1976. The object was at perihelion in March 1895 and August 1945, Marsden points out; unfortunately he adds, it appears only as a faint streak in the '95, '41 and '43 plates, making it difficult to tell whether there is any of the diffuse appearance that would answer the question—raised by its distance from other asteroids—of whether it is a defunct or possibly a quiescent comet.

It is possible, in fact, that if the object is a comet, earthbound observers may never know it. A defunct comet—a “dead” comet nucleus—would already have given off most or all of the volatile material that would otherwise produce the familiar hazy appearance of the coma, to say nothing of a tail. In addition, however, Object Kowal always stays far from the sun by known cometary standards, so that it may never get warm enough to give off even an existing supply of volatiles. “We’ve never seen a comet beyond 11 AU before,” says Marsden, adding that most have been observed at less than 6 or 7. Object Kowal’s perihelion of 8.51 AU could mean that it will get warm enough to reveal a cometary nature when it comes around in the mid-1990s, but it may not. Frustratingly, the lack of visual and spectroscopic evidence will not prove that the object is *not* a comet.

Ironically, the object was actually singled out on the 1941 plate - and even marked with an arrow - in a study done in the early 1950s, about a quarter-century before Kowal’s “discovery.” It had been spotted by Ann B.

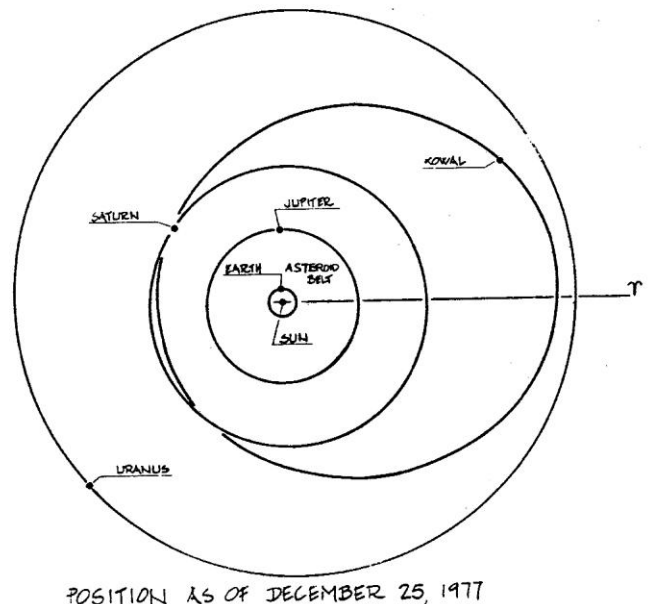
Hearn (now married to University of Maryland astronomer Thomas Matthews), working with the late Harlow Shapley on a search for distant galaxies. It was Kowal, however, who found that the object was circling the sun, thus earning recognition as its discoverer and the honor of giving it a name. Although the object’s nature is still in question, Kowal has in fact suggested a name: Chiron, one of the centaurs of Greek mythology. If other, atypically distant minor planets are found, he says, perhaps they might be thus categorized as “Centurian planets”.

SPACE SCIENCES

Object Kowal at Christmas

The determination of the orbit of Object Kowal, recently discovered between Saturn and Uranus (SN: 11/12/77, p. 311), has enabled this graphic representation of the object's position in the solar system as of Christmas day 1977. The orbital parameters (SN: 12/10/77, p. 388) and other data were provided by Brian Marsden of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass.

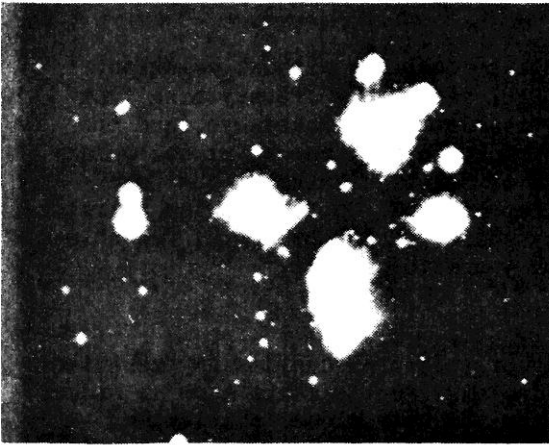
The object's orbit takes it as far as 18.9 astronomical units from the sun, and Uranus gets as close to the sun as about 18.3 AU. However, the most distant point of the object's orbit is less than 320 away (in the plane of the ecliptic) from the nearest point in the orbit of Uranus so that for the present, the two orbits do not cross. The most significant source of perturbations in the object's orbit is Saturn, made the more so, according to Marsden, because the object and Saturn appear to be very close to a 3 to 5 resonance. In other words, every time the object makes 3 trips around the sun, Saturn has made 5, giving the planet a regular cycle of influence on the object.



introducing.....

DEEP SKY MONTHLY

Journal for amateur observers



Photograph by Dr. Hans Vehrenberg

DEEPSKY MONTHLY presents

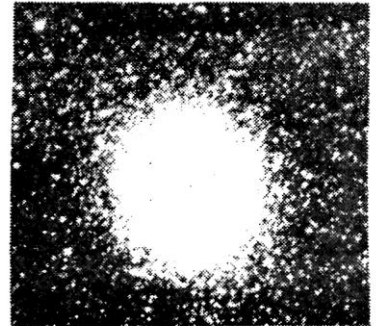
Five objects are looked at in detail each month. A concise monthly observing guide for five of the best deep sky objects which are in favorable positions for observing during the month. Staff Observers provide an excellent review of each object including: Size, Magnitude, background information, a finder chart, a telescopic sketch, and hints on observing the objects with success.

OPEN STAR CLUSTERS

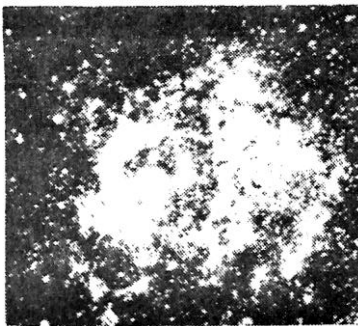
Open clusters from the brilliant, gas-filled Pleiades, (above), to the faint, compact clusters like NGC 2158, the companion to M35 in Gemini. Any of the numerous clusters that can be found in the Milky Way could be featured at any time. Instruments from a 2.4" refractor to a 16" reflector have been used to provide an interesting sketch and article whether you own a large, small, or medium sized telescope.

GLOBULAR STAR CLUSTERS

Globular clusters are reviewed with scrutiny from the spectaculars such as omega Centauri (right) and M13, the great Hercules cluster to the small fuzzy patches such as M30 in Capricornus and NGC 7006 in Delphinus. Different telescopes reviewing these wonders show different resolutions of the cluster's stars, so these clusters have an unlimited variety of reports with different instruments.



Photograph by Dr. Vehrenberg



Photos by Dr. Vehrenberg

DIFFUSE NEBULAE

Many examples of diffuse nebulae are featured throughout the year. Emission regions such as the bright Orion nebulae, (M42), Lagoon nebula, (M8), to the dim and elusive regions such as the Veil nebula, North American nebula, or the Rosette nebula (left). The continuous use of different size telescopes can provide a changing picture of these subtle gas clouds.

Reflection nebulae as well as emission nebulae are featured, such as the gas surrounding the Pleiades (see above), and NGC1977 around M42, the Orion nebula. Another type of diffuse nebulae is the Supernovae remnant, such as the Veil nebula and the Crab nebula (M1).

PLANETARY NEBULAE

Planetary nebulae such as M27, the Dumbbell nebula (left), and the magnificent M57, the Ring Nebula in Lyra are quite popular sky objects. These bright examples along with the faint ones such as the annular structure of NGC6781 and NGC7293, the Helical nebula could be feature objects.



GALAXIES

Of course, no study of deep sky objects would be complete without galaxies, separate Milky Way systems like our own. Millions of light years away, everything from the Great Andromeda galaxy, visible to the naked-eye, and the bright galaxy NGC 253 in Sculptor, to M51, the Whirlpool galaxy (left), and the many hundreds of faint galaxies in the Coma/Virgo cluster to faint galaxies like NGC 4565, edgewise spiral in Coma Berenices. Season by season, month by month, the shining color of unseen worlds is yours to observe.

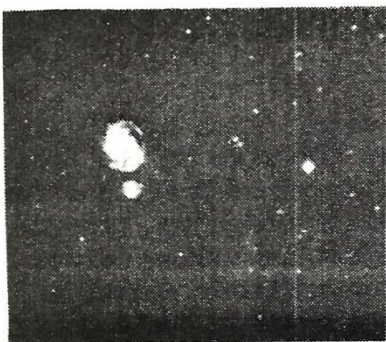


Photo by Dr. Vehrenberg

DOUBLE STARS

Each month an array of celestial doubles is presented to the observer. From the wide, easy double stars such as Mizar, Albireo, or gamma Andromeda to the very close, challenging doubles like gamma Leonis or alpha Geminorum, (Castor).

FEATURE ARTICLES

Each month two or three feature articles begin the issue. Feature articles cover a wide variety of subjects, from the history, theory, and observing techniques of deep sky objects to subjects covering general astronomy for amateurs.

ASTROPHOTOGRAPHS

Each month, several astrophotos are presented to highlight feature or prominent objects observable during the month. Photos are published which were taken by Hale Observatories, Dr. Hans Vehrenberg, and subscribers who submit photos.

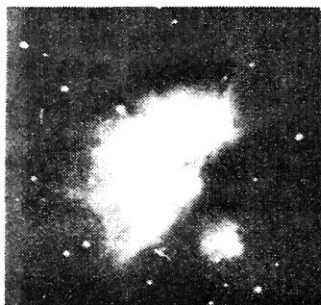
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