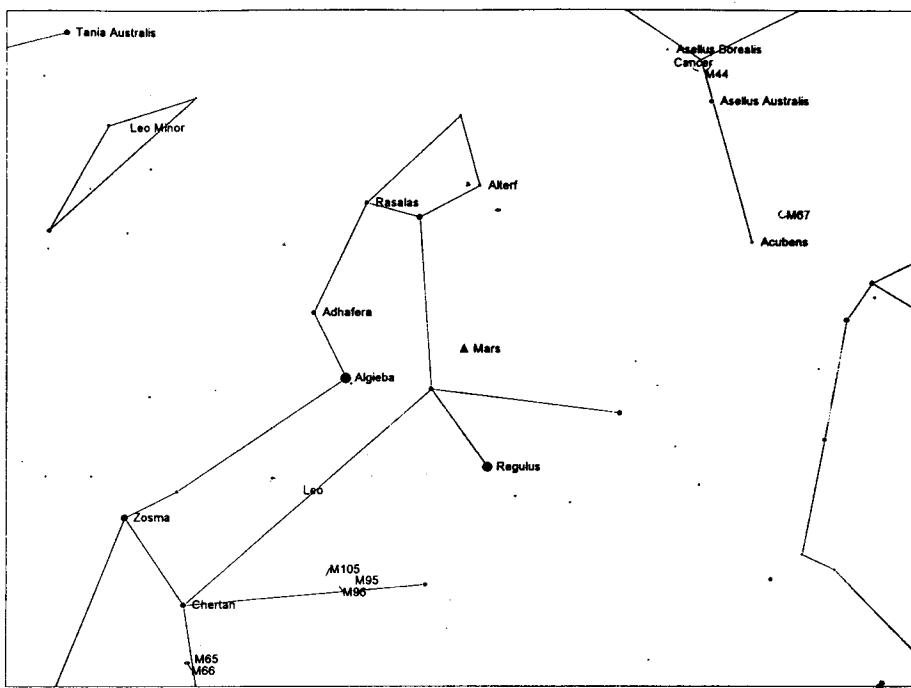


Volume 26 Issue 2  
February, 1995

# SASKATOON SKIES



## Mars in Leo



Saskatoon Skies is a publication of  
The Saskatoon Centre of the Royal  
Astronomical Society of Canada.

### Inside This Issue

**LOTS OF GOOD STUFF !!**

## **Minutes of the January Executive Meeting**

7:00p.m. Jan. 16, 1995, Room B-10 Health Sciences Building, U of S. Campus

Present: Ed Kennedy, Richard Huziak, Al Hartridge, David Cornish, Merlyn Melby, Mike Williams.

- 1) Meeting called to order at 7:02p.m....Rick Huziak
- 2) B. Hydomako, S. Ferguson, G. Brett send their regrets for non-attendance....Rick Huziak
- 3) Ed Rystrom has passed away. The centre should send a card, maybe a donation. Jim and Rick to approach Nelson about the future of the observatory. As contract was with Ed Rick and Jim will talk to Rystrom family about centre. Mike will send card....Rick Huziak.
- 4) Observer's group night Jan. 7 was clouded out. If clouded out the observer's group would be held the following Saturday night...Rick Huziak.
- 5) New observatory committee has set a date for first meeting to find a new site. Meeting set for Monday Jan.23/95 at Al Hartridge's house....Rick
- 6) The contract for the motorized telescope mount from CSA has been signed. The mount is to be retrieved. May build a roll off shed to house the new mount. May put the 16" on this mount for now....Rick Huziak
- 7) Annual reports due to National in January. Mike Williams and Bill Hydomako to prepare these. Jim Young to prepare an obituary for G. Patterson for National publications....Rick Huziak
- 8) National president, Doug Hube, is confirmed for visit here Feb.22/95. Meeting will be on Wednesday to accommodate him. Bookings need to change for both the room and in the newspaper. Meeting will be held in usual room A-226....Rick Huziak
- 9) Binocular beginners class. No information available at meeting time....Rick Huziak
- 10) Some members of the Edmonton Centre intend to request a change of rules for attaining a Messier certificate to allow the use of computer aided telescopes. All executive against this move. All feel it takes the spirit away of the Messier program. Did agree we could create a separate certificate for those using CAT's
- 11) Ed Kennedy gave discussion on the fact there is no astronomy courses in high school. In grades 1-8 there is some space and astronomy mentioned....Ed Kennedy
- 12) New Business...Ed Kennedy gave a discussion on the word "chairperson" in RASC constitution....Ed Kennedy
- 13) Meeting adjourned at 7:50p.m. Moved by Ed Kennedy...Second by David Cornish.

## **Minutes for the January General Meeting**

8:00p.m. Jan.16, 1995, Room A-226 Health Sciences Building, U of S. Campus

- 1) Meeting called to order at 8:00p.m....Rick Huziak
- 2) Dues are way past due. Official membership list has been sent to National. If you are not on it you will start to loose publications....Rick Huziak
- 3) Ed Rystrom has passed away. The centre will send a card. Jim and Rick will approach Nelson about the future of the observatory....Rick Huziak
- 4) Observer's group report. Jan 7 was clouded out. Should we have alternate days. Was agreed to implement alternate days.
- 5) National president Doug Hube is confirmed for Feb. 22. We will have the meeting on Wednesday in A-226. There will be no meeting on Monday Feb.20.
- 6) Binocular beginners class. No information available.
- 7) Some members of the Edmonton centre intend to request a change of rules for attaining a Messier Certificate to allow the use of computer assisted telescopes. All agreed the purpose of the program is to learn the sky. All agreed the use of CAT's was against the true spirit of the program.
- 8) Ed Kennedy honors Terence Dickinson's appointment to the Order of Canada. A letter of congratulations will be sent by Rick on behalf of the centre.
- 9) New business...On Internet there is good astronomy equipment for sale at a bargain price. Presentation on Intensified meteor Video Taping by Koji Meada. Presentation on Novembers Total Solar Eclipse by Don McKinnon.
- 10) Koji donated his meteor video tape to the centre following his presentation.
- 11) Meeting adjourned.

## The February General Meeting of the RASC

We are pleased to have as our guest lecturer, Dr. Doug Hube, National President of the RASC. Dr. Hube will present a lecture entitled:

### The Edmonton Centre's Grazing Occultation Expedition to Ft. Nelson, BC

In November 1993, members of the Edmonton Centre traveled to Ft. Nelson, BC, to observe a lunar grazing occultation. The unusual astronomical circumstances and the opportunity to promote astronomy in an isolated community will be described and used to illustrate how the mandate of the RASC can be met.

Dr. Hube was born in St. Catharines, Ontario and graduated from the University of Toronto (Ph.D. 1968). Positions Dr. Hube has held are: Visiting Astronomer, Radcliffe Obs., S. Africa 1966-67, Lecturer, Scarborough College, U. of T. 1967-68, NRC Postdoc, Kitt Peak Nat'l Obs 1968-69, Guest observer at DAO, Victoria and at CTIO, Chile. Dr. Hube is currently at the U. of Alberta, Department of Physics, (since 1968) and is Professor and Associate Chairman. His hobbies include middle distance and marathon running. He is also a luthier. Dr. Hube was also a founding member and past-president of Edmonton Space and Science Foundation.

This presentation is open to all members and the general public.

### PLEASE NOTE THE CHANGE IN MEETING DAY TO ACCOMMODATE DR. HUBE'S VISIT

**Date: Wednesday, February 22, 1995**

**Time: 8:00 p.m.**

**Place: Room A-226, Health Sciences Building, U. of S campus**

**(There will not be a general meeting on Monday, Feb. 20th. Executive members are reminded that the Executive Meeting will be held as usual at 7:00 p.m. in Room B-10 on Feb. 22)**

## Deep Sky....by Scott Alexander

This month you can try for the Galaxy M106 in Ursa Major at Right Ascension 12 hours 19.0 minutes and Declination +47 degrees 18 minutes. It is not a hard galaxy to find plus it has 6 galaxies clustered around it. The other galaxies are from magnitude 11.1 to 13.6. These companions are small but are visible in a 4 inch telescope.

Now lets try for a Nebula called the "Eskimo Nebula" or NGC 2392. This nebula is at RA 07 hours 29.2 minutes and a declination of +20 degrees 54 minutes. You can find the information on this object in the 1995 Observers Handbook Page 213. The chart to find the Nebula is in the Uranometria 2.000 Chart #139. The magnitude of this object is about 9.2. The Nebula is a small round disk and is a greenish colour.

The next object to try for is called NGC-188. It is an open cluster and happens to be the oldest know open cluster in our galaxy. It's at RA 00 hours 44.0 minutes and its declination is +85 degrees 21 minutes. It is a rich cluster and very pretty to look at. The magnitude is 8.1. The cluster is not hard to find as it is not far from the north star Polaris. Good luck and good skies.

## Observer's Group Meetings and Rystrom Observatory

Put these dates on your calendar and plan to attend. Jan7, Jan 28, Feb. 25, March 4, April 1, April 29, June 24.

Members are welcome to use the observatory at any time but please phone ahead. Call Nelson or Gloria Rystrom at 955-2370 before 9:00 p.m. if you intend on going out. This lets them know that someone will be roaming around their yard. If they do not answer the phone go anyway. Drive through the yard slowly, and dim your lights as a courtesy to others who may be observing.

## The 20th Century Hall of Fame....by Ed. Kennedy

In the October-November 1994 issue of The Beaver, columnist Christopher Moore raised the question: "Who were the great Canadians of this century?" A call for nominations was issued along with his request that each nomination was to be

supported by "brief reasons why." Respondents were limited to five nominations but there was an impressive response to his invitation. The summary of nominees, worthy to be called "Great Canadians of this Century" was published in the December 1994-January 1995 issue of The Beaver. This issue marked the 75th year in publication of this Winnipeg magazine.

A substantial proportion of the nominees submitted by Kupsch and Kennedy were distinguished Canadian astronomers. Condensed biographies of each of these scientists were extracted from The Canadian Encyclopedia in support of their nomination.

**C.S. Beals (1899-1979)**..His contributions to the study of interstellar matter and the identification of meteorite craters in Canada were outstanding. Dominion astronomer 1946-1964.

**A. Vitser Douglas (1894-1988)**..Biographer of Arthur Stanley Eddington. A leader in the International Federation of University Women and in her writings on the history of astronomy.

**Helen Sawyer Hogg (1905-1993)**..Leading world expert in the field of Globular Star Clusters. Minor planet no. 2917 has been named Sawyer Hogg for her.

**Andrew McKellar (1910-1960)**.. Research officer in the RCN and astronomer at the DAO, Victoria. A scientist distinguished for his interpretations of stellar mechanisms and his prediction of the temperature of interstellar gas.

While Dr. Foster and Dr. Herzberg were nominated to the 20th Century Hall of Fame as physicists, each contributed to our knowledge of astronomy. At the DAO, Foster collaborated with Douglas in a study of the Stark effect in B stars. While at the Yerkes observatory in Chicago, Herzberg studied free radicals in interstellar space and performed analyses of molecules present in cometary spectra.

### What happened in History in February...by Garry Brett

(Information obtained in the Space Almanac written by Anthony Curtis)

- 3) USSR Luna 9 made the first soft landing on the Moon in 1966.
- 4) Astronomer Clyde Tombaugh was born in 1906. He discovered Pluto 24 years later to the month.
- 4) In 1967, U.S. Lunar Orbiter 3 left for the Moon, going into orbit around that natural satellite February 8. It worked until October 9, 1967, sending back photos.
- 5) USA Apollo 14 landed on the Moon in 1971.
- 7) U.S. astronaut Bruce McCandless, first untethered spacewalk 1984.
- 8) Leonid Kizim, Vladimir Solovyev and Oleg Atkov, in 1984 in the USSR second-generation space station, Salyut 7, set an endurance record of 237 days in space which stood through September 1987.
- 15) Galileo was born in 1564.
- 16) Miranda, a moon of Uranus, discovered in 1948 by Gerard Kuiper.
- 17) In 1965, the deep space probe Ranger 8 blasted off from the U.S. for the Moon, sending back a total of 7,137 photos of Earth's natural satellite before crash landing at Mare Tranquillitatis.
- 18) The planet Pluto was discovered in 1930 by Clyde Tombaugh.
- 19) Nicolas Copernicus was born in 1473.
- 20) John H. Glenn Jr., in 1962 in Mercury-Atlas 6, was first from the USA to orbit Earth.
- 20) USSR launched third-generation space station Mir in 1986.
- 23) Supernova 1987a explodes in the Large Magellanic Cloud galaxy in 1987. Neutrinos blasted out by the supernova are recorded on Earth. On February 24) astronomers working in the Southern Hemisphere discover Supernova 1987a, closest supernova since 1604 and since invention of the telescope.
- 24) In 1969, the U.S. sent Mariner 6 to Mars. The probe came within 2,000 miles of surface July 31, 1969, sent back TV pix and data.
- 24) The first pulsar was reported in 1968.
- 25) In 1969, the interplanetary probe Mariner 6 left the U.S. for Mars. It came within 2,000 miles of the Red Planet July 31, 1969, sending back photos and information.

### Public Viewing at the U of S Observatory

The U of S Observatory will be open to the public Saturday evenings from 7:30 - 9:30 p.m. from October through February. Observatory assistants will be present to answer questions about astronomy and to assist in the viewing through the six inch telescope. For further information call Stan Shadick at 966-6434.

## Astronomy Week 1995....by Sandy Ferguson

This year International Astronomy Week occurs the week of May 1-7, with International Astronomy Day being celebrated on Saturday, May 6th. This is the nineteenth year in which Astronomy Day will be held in Canada. It provides an opportunity for all centres of the RASC to promote astronomy and our society, as well as to educate and inform the public. This year centres are encouraged to organize public events and activities with the theme "Light Pollution - a Very Serious Problem", emphasizing the importance of informing the public how light pollution affects our night sky and suggesting alternatives on how to control the amount of artificial lighting in our urban areas that will result in safe streets as well as successful observing.

For an information package to assist your centre in organizing Astronomy Day events in your community, including how your centre can apply for the Astronomy Day Award sponsored by Sky and Telescope magazine, please contact:

Sandy Ferguson  
238 Main Street, Apartment 11  
Saskatoon, Saskatchewan  
S7N 0B5  
Telephone: (306) 931-3184  
Facsimile: (306) 244-4423  
E-Mail: huziak@sedsystems.ca

## When is a Telrad Not Enough?...by Alister Ling

(reprinted from Stardust, Oct. 1994, Edmonton Centre, RASC)

Don't get me wrong, I think Telrads and other "one power" finders are great ... for what they do. They've revolutionized amateur astronomy by giving beginners the ability to "point and shoot" instead of getting frustrated by upside down and inverted images. Those lighted circles show exactly where the scope is pointing. If someone wants to find an object that I'm looking at, they just peek through my Telrad and almost instantly know where to aim theirs. Who could want more?

If you plan to find more than the bright Messiers and planets, you'll need a finderscope. I have come to that conclusion after a couple of years of experience with a "Telrad only" setup on my refractor. I first began to encounter difficulties when I was tracking down some Messiers from my backyard. They were located well away from bright stars, and the only way I knew how to find them was from their companion 5th or 6th magnitude stars. In the country this would not be a problem. Without a framework of easily visible stars, I couldn't point the scope accurately enough. For example, M13 is located one-third down the left side of the keystone of Hercules. But what if you can't see the keystone? Here is an object that I could otherwise see directly in a finder but now would require several minutes to bag by sweeping back and forth across a large region of blank sky.

Since moving my refractor out under dark skies, I can get my Messiers more easily. However, there are many places far from the Milky Way where there are few 6th magnitude stars. Comet Macholz was in such a place. It turned out to be a beauty, a bright fuzzball that I could easily have found in my finder, even more than a degree off its initial predicted course. But with the Telrad, I had to first get to the nearest 6th magnitude star then star hop my way to the predicted area, only to find it wasn't there. A bit of sweeping picked it up, but at 4:30 am I felt that the process should have gone much faster. My recommendation is for you to make sure you get a reasonable finderscope. 50mm is a minimum aperture, one with which I have become quite comfortable, since it shows stars down to the Uranometria chart limit, and from the city gets down to the Sky Atlas 2000 limit. Whether you prefer an amici prism, a straight through, or a bigger aperture is of course up to you. Ask the experienced observers what they use and why. Randy [Pakan - ed] has some excellent inexpensive 50mm finders if you're interested.

It makes sense to equip yourself with the right tools. Take away as much frustration out of the hobby as possible. You've only got so many minutes under the starry canopy; make the best of it!

## Question of the Month....What is Magnitude by Sandy Ferguson

Our modern system of measuring star brightnesses goes back to the days of the early Greek astronomers, long before the invention of telescopes in the 17th century. In those days the naked eye was the only instrument available to observe the sky and the Greeks determined a star's brightness or magnitude on a scale from 1 to 6. The brightest stars were designated magnitude 1 and the dimmest stars visible to the naked eye were designated magnitude 6. All other stars fell in between. Each degree of magnitude was 2.5 times brighter or dimmer than the previous designation. For instance, a 1st

magnitude star was 2.5 times brighter than a second magnitude star; a 6th magnitude star 2.5 times dimmer than a 5th magnitude star, and so on. So a 1st magnitude star is over 100 times brighter than a 6th magnitude star.

This system of measurement continues in use today. However, astronomers have expanded the magnitude system to include planets and deep sky objects. As some planets are brighter than 1st magnitude, they have negative magnitude designations. Now that telescopes are available for observing, stars and other celestial objects dimmer than 6th magnitude are easily observed and have designations from 7th magnitude to anywhere around 24th magnitude (the faintest objects visible in our modern telescopes).

With binoculars, under good skies, one can usually observe to about 8th or 9th magnitude, depending on binocular aperture and power. The magnitudes of some of the more easily observed objects are:

The Sun	-26
The Full Moon	-12
Venus at brightest	-4.5
Jupiter at brightest	-3.5
Sirius (Alpha CMa)	-1.5
Vega (Alpha Lyr)	+1
Polaris (North Star)	+2
Andromeda Galaxy (M31)	+5

You will, therefore, note that the brighter the object, the lower the number; the fainter the object, the higher the number. In astronomy, you will find magnitude referred to by two symbols:

**mv** Stands for visual magnitude, or how bright the stars appear to be to us at their different distances from Earth.

**Mv** Stands for a star's absolute magnitude.

Astronomers need to compare stars to each other in terms of a standardized unit of distance. Imagine a few hundred stars plucked out of space and lined up at the same distance from Earth. This distance has been selected as equal to 10 parsecs (PARallax of 1 SECond of arc). This unit is equivalent to 32.6 light years, or about 300 trillion km. At this standardized distance, the star's magnitude would be due to its power output rather than a combination of its power output and the effect of the star's distance from the Earth.

#### Swap...Sell....Wanted....Give-a-way

For Sale...One Meade 90mm f/11 Refractor. Comes with a 9mm and a 25mm eyepieces, right angle star diagonal, tripod with equitorial mount. This scope is like new. Price is \$600.00 Call 1-882-3811 and ask for Henry Friesen.

Wanted....two piece of 12" I.D. Sonotube. Need each piece to be about 16" long. Will buy larger pieces if you have them. Call 384-1807.

#### Book Review....by Garry Brett

The book that was chosen to review was "Astronomy from A to Z" written by Charles A. Schweighauser. It is available through book clubs at \$14.95 U.S. The book is well written and just like it's title, the book covers everything from A to Z that an amateur astronomer would ever want to know about anything concerning astronomy.

The author makes no claims that the book covers absolutely everything. As he states in the introduction of his book the information covered is based on the questions asked by his students over the years in his astronomy class and questions asked at many star parties at Sangamon State University Observatory.

Each of the topics is short and to the point and contains general information on the topic covered. Where needed the author has included either black line drawings or excellent black & white photo's. This is a book that everyone should have, especially any newcomers to astronomy. By the time you finish reading this book you will be surprised by how much you will know, and the next time you look through your scope you will find yourself saying "hey, I know what that is and why it happens!"

## CONSTELLATION OF THE MONTH - GEMINI

In the December issue of Saskatoon Skies we explored the constellation Auriga, one of the constellations in the grouping known as the "Winter Six". This month we are featuring Gemini, another member of the group, that contains some interesting objects suitable for beginners. Of the bright winter constellations, Gemini stays longest into the spring. When darkness falls in March, it is still high overhead, when the rest of the winter constellations are getting lower in the west.

### Naked Eye

Once again, it's always a good idea to familiarize yourself with the orientation of a constellation. At this time of year Gemini is relatively high in the sky on its "side". As you observe it over the next few months, you will see how it gradually uprights itself and eventually sets on its "feet" in the west late in the spring. Knowing how a constellation skews as it moves across the sky is a big help when you observe it at different times of year or different times of night, when it is in various parts of the sky.

Check out Castor and Pollux. Its two 1st magnitude brightest stars are yellow/white and are easy to identify. They form the heads of the twins. Compare the colours of these stars with others you see in the sky. You'll notice stars come in different colours.

### Binoculars

The nicest binocular object in Gemini is the Messier object M-35, a large open cluster in the area of the star Eta Geminorum (Propus), which forms the foot of Castor. At 5th magnitude it appears as a bright hazy patch in binoculars.

### Small Telescope

M-35 is easily resolved into individual stars. Another treat is the delicate little cluster, NGC 2158 .5 degrees southwest of M-35. They make an interesting pair in the same field.

NGC 2392, also known as the Eskimo Nebula, is a 9th magnitude planetary nebula near Delta Geminorum (Wasat). It's one of the brightest planetaries in the sky. A small scope will show a round disk with a central star, if the seeing is good.

If you have the opportunity to attend our observers' group meeting on February 25, which is also our next binocular group night, we'll feature Gemini, so that novices will get a chance to familiarize yourselves with the constellation.

Although not detectable naked eye or in binoculars, a small telescope will split Castor into a double and even triple star. Actually, it is a six star system, but the other stars are not detectable without sophisticated equipment.

## The First Meeting of the New Observatory Committee....by Rick Huziak

The first meeting of the committee to establish a new observatory was held at Al Hartridge's house on Monday, Jan. 23. A discussion about possible sights ensured, establishing general locations around Saskatoon that would be suitable for a new observatory. There are many concerns about a new location, such as accessibility, longevity, availability of power and telephone, security and other factors. A number of possible teaming arrangements were also discussed, such as teaming with a farmer, as the Rystrom Observatory has been, with the U of S, the MVA or other organizations. This is an alternate to a totally stand alone facility. At the end of the meeting, the four remaining members conducted the first official new site survey, driving out to Brightwater Camp (near Beaver Creek), where member, Gilbert Smith, gave us a tour of a possible location. Meetings and site surveys will continue until a new site is found. If you know of a potential site for a new observatory, please contact a committee member. We are: Rick Huziak, Al Hartridge, Jim Young, Garry Brett, Merlyn Melby, and David Cornish.

## Betcha Didn't Know....by Garry Brett

U.S. astronaut Franklin R. Chang-Diaz has applied American ingenuity to space shuttle coffee. He invented an outer space coffee Pot which brews a cup of Java in 45 seconds. It uses fewer beans and creates less mess in a weightless galley. Dubbed Elan Galileo, the machine was to get a real space test in October 1999 when shuttle Atlantis delivered the Galileo probe to Earth orbit. Galileo was to fly on to Jupiter, but the coffee maker was to come back down to Earth with Atlantis. Copies of Elan Galileo may even go on sale in Earth retail shops at \$100, just in time for the Christmas shopping season. Franklin R. Chang-Diaz flew to space in shuttle Columbia flight STS-61C on Jan. 12, 1986. With him for six days in space were Robert L. "Hoot" Gibson, Charles F. Bolden Jr., Steven A. Hawley, George D. "Pinky" Nelson, commercial passenger Robert J. Cenker and U.S. Rep. Bill Nelson, the first member of U.S. House of Representatives in space.

## Alternate Observer's Group Nights Reestablished

The next dates for Observers Group Meetings at the Rystrom Observatory are Feb. 25, Mar. 4, Apr. 1, Apr. 29, and Jun. 24. Since these occur only once a month, cloudy weather may postpone the events without notice. As a result, we

have reestablished 'rain-dates' for the OG meetings. If the OG meeting is clouded out on the scheduled night, it will be held THE FOLLOWING SATURDAY. For more information and confirmation, call Rick Huziak at 665-3392.

### Some Future Activities in the Centre

There are some events that members should know about. If anyone would like to help out at any of these, please contact Rick Huziak at 665-3392.

**February 21** Tour for Beavers at U of S Observatory  
**February 24** Starnight at Brightwater Camp for hearing impaired kids  
**April 25** Two Starnights in Martensville for Guides & general public  
**May 6** Astronomy Day Display and Starnight

### 1990's Space Excitement

If we can't yet travel out of our own Solar System, we certainly can explore where we are. Earthmen during the last 30 years have hurled more than 100 automated spacecraft into the vast emptiness between planets of our Solar System. These sophisticated robots have been the first to explore the Moon, the planets, the Sun.

The 1990's are going to be even more exciting for space watchers with space stations growing in Earth orbit and exploring machines on the way to the Sun, Venus, Mars, the Asteroid Belt, Jupiter, Saturn and comets.

#### Here's where we're going:

**The Sun.** The Ulysses spacecraft, designed by the European Space Agency to study the Sun at close range, will be carried to Earth orbit by shuttle in 1990 and blasted past Jupiter into orbit over the Sun's poles.

**Venus.** The Magellan spacecraft will orbit Venus, using radar to create maps of the planet surface. Japan plans to launch the Planet B spacecraft toward Venus in March 1996 atop an improved version of the Japanese MU-3S-2 solid-fuel space rocket. Planet B will carry out scientific studies. The U.S. Pioneer 12, launched in 1978, will continue to send back radar images of Venus until about 1992.

**The Moon.** Japan will send the Muses-A science, explorer around the Moon in 1990, dropping off a miniature lunar satellite as it swings by. The dual satellite Muses-A will be practice for future interplanetary spaceflights. Shaped as a tall cylinder with a miniature satellite attached to one end, Muses-A is expected to leave during a 20-day launch window in January-February 1990 aboard an MU-3S2 booster for one year of maneuvers in space between Earth and the Moon. As Muses-A swings around the Moon on the first of several fly-bys, it will drop its baby satellite into lunar orbit. The USSR, possibly in cooperation with the U.S. and other countries, may send cosmonauts to land on the Moon and establish a basecamp there at the end of the 1990's.

**Mars.** The last unmanned landings on Mars were made in 1976 by the U.S. Viking spacecraft. The U.S. Mars Observer will be launched in 1992 to orbit the Red Planet two years in 1993-94, sending back photos from 227 miles above the surface. Unlike the earlier Vikings, Mars Observer will not have a lander. The USSR may send from four to eight spacecraft, with landers, rovers, globe-hopping balloons and rock-sample returns between 1992 and 1998.

The U.S. may send a Mars Observer 2 with a lander about 1998. It would pick up and return rock samples to Earth. All of the unmanned Mars orbiters and landers from the USSR and the U.S. would be in preparation for a manned flight from Earth to Mars and back about the year 2005.

**Asteroids.** NASA is planning an interplanetary spacecraft to check out the Asteroid Belt on its way for a close-up look at a comet. The Mariner Mark H spacecraft on the Comet Rendezvous Asteroid Fly-by (CRAF) mission would have a camera and a dozen scientific instruments when it leaves Earth in the 1990's in search of clues to the origins of our Universe. Mariner Mark II would go beyond the orbit of Mars to that dangerous area of big rock chunks known as the Asteroid Belt. Asteroids are rocks, boulders and tiny planets traveling together in orbit around the Sun, filling a ring between the orbits of Mars and Jupiter. The Belt includes about 1500 rocky objects ranging in size from boulders up to minor planets of about 300 miles diameter. Under control from Earth, the CRAF spacecraft would fly by two asteroids in the Asteroid Belt close looks.

The Cassini spacecraft, launched by the U.S. and the European Space Agency in 1996, also will fly by an asteroid in 1997 on its way to Saturn. A pair of USSR Mars probes in 1998 may visit the Red Planet and then fly on for closer examination of several asteroids in 1999.

**Jupiter.** Galileo is a billion-dollar mothership which will fly for almost six years to get to Jupiter, then orbit the planet and drop a science probe on a parachute into the colossal planet's stormy atmosphere.

The Galileo mission to Jupiter was scheduled to leave from a U.S. shuttle in Earth orbit in 1989. The 1989 launch will use a lowpower inertial upper stage (IUS) solid-fuel booster rocket from outside the shuttle cargo bay. Galileo is heavy so NASA is planning a slingshot trip for the spacecraft. The IUS will be fired toward Venus. the craft will whip around that planet and back toward Earth. The gravity pull encountered in the Earth flyby at 800 miles altitude will fling Galileo at high speed toward Jupiter.

The Ulysses spacecraft, designed by the European Space Agency to study the Sun at close range and launched by U.S. shuttle in 1990, will whip by Jupiter on its way to polar orbit above the Sun.

The Cassini spacecraft, launched by the U.S. and the European Space Agency in 1996, also will fly by Jupiter in 1999 on its way to Saturn.

**Saturn.** The European Space Agency and NASA plan to fire an interplanetary probe in 1996 toward Saturn's natural satellite Titan, the solar system's biggest moon and the only one with an atmosphere much like ancient Earth.

NASA will launch the American-made mothership toward Saturn and its immense, mysterious, gas-shrouded satellite in April 1996. It Will fly by an asteroid and the planet Jupiter along the way.

The interplanetary craft will be named Cassini after the French-Italian astronomer who discovered several of Saturn's moons and the planet's rings. It will fly by the asteroid 66 Maja in 1997 and the planet Jupiter in 1999 on its way to an October 2002 rendezvous with the planet Saturn. At Saturn, Cassini will drop an ESA probe, named after Christian Huygens, the Dutch astronomer who discovered Titan and the rings of Saturn, into Titan's atmosphere.

**Neptune.** Continuing its magnificent tour of the Solar System, Voyager 2 was to sail within 3,000 miles of the planet Neptune on August 24, 1989. Voyager will have taken man's first close-up photos of Neptune. In 1986 the spacecraft provided exciting scientific data when it sailed past Uranus. Neptune is second most distant of the Sun's nine major planets. Uranus is third most distant. After its encounter with Neptune, Voyager 2, launched in 1977, will sail on out of the Solar System, headed for interstellar space.

**Planet X.** Some astronomers suspect beyond Pluto there may be another planet yet to be discovered by man. If so, that very-faraway body would be a tenth major planet in our Solar System. There are no plans to send a spacecraft to search for the so-called Planet X. There also are no plans for 1990's visits by spacecraft from Earth to Mercury, Uranus, Neptune and Pluto.

The U.S. Pioneer 10 and Pioneer 11 spacecraft, launched in 1972 and 1973, and Voyager 1, launched in 1977, are on their way out of the Solar System headed for interstellar space.

**Comets.** After passing through the Asteroid Belt, the Mariner m ark II CRAF probe will travel on out to rendezvous with a comet. Mariner Mark II will be ordered from Earth to slow down and fly alongside the comet for three years. Monitors in the spacecraft will analyze dust, gas and plasma around the comet as it nears the Sun and its tail glows. Information will be sent by radio to Earth. About midway through their tandem travel, in 1997, Mariner Mark II will be commanded to fire a probe filled with scientific instruments three feet deep into the nucleus of the comet.

**Space shuttle.** The U.S. will make more than 100 shuttle flights to Earth orbit through the 1990's. At least twenty at middecade will carry parts for the U.S.-international space station Freedom. The USSR will fly its shuttle Buran and sister ships. The Europeans and Japanese also are planning shuttles. The Japanese shuttle Hope could be in space by 1995.

**Space station.** In the 1990's, the U.S. and other nations will join the USSR as countries with space stations orbiting Earth. The USSR has had space stations since 1971. Its third-generation Mir station is currently in use. The U.S. had a station for a short time in the 1970's. A second generation orbiter-the U.S.-international space station Freedom-is expected to be manned at mid-decade.

The Europeans are building Columbus, a manned module to be attached to Freedom, which could be expanded to become a separate European station. The Japanese are building a module for Freedom.

# ASTROPHOTO CORNER

FEB. 1995

## PHOTO OF THE MONTH



### The Sombrero Galaxy M104

This massive edge on spiral galaxy is found in the south VIRGO CLUSTER. It is said to have a mass of about 1.3 trillion suns. It has a diameter of approx. 130,000 light years. The distance to this island universe is about 40 million light years.

This object can be seen in binoculars and small telescopes and in the C14 appears almost like it does in the photograph.

TECHNIQUE: A 60 min. exposure at f7.5 using a Celestron 14 and off axis guider with focal reducer on hypered Kodak Tec. Pan. 2415. Negative developed in D19 for 6 min. at 20 degrees C. Enlarged onto #5 Ilfospeed RC photographic paper.

### ASTROPHOTO TIP!!

If you are tired of getting piggy back photos with stars that look like blobs even though you paid meticulous attention to focusing, try using a MINUS VIOLET filter. These come in a variety of diameters allowing adaptation to different camera lenses. REMEMBER most lenses are corrected for yellow, green, red however ultraviolet and violet will focus at a different point causing a blurring of the star images. These filters can make a considerable improvement.

Clear Skies and Good Guiding ————— Al Hartridge