the ASTROGRAPH



VOLUME 6 NO. 4 FEBRUARY MARCH 1975

THE ASTROGRAPH



VOLUME VI No. 4

Editor	Robert C. Price
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Contributing Editors	Dana Patchick, Martin Germano, Ralph Proctor, and John Sanford
Contributors	Ron Price, Kurt Rihm, and Richard L. Hull

Cover Photograph

SATURN

Photographer	Ron Price
Date	October 17, 1974(11:00 U.T.)
Instrument	12.0 inch F/15 Cassegrain
Effective F #	150
Exposure	3 seconds
Film	Tri-X
Developer	Microdol-X 1:3 Normal

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The ASTROGRAPH is published six times yearly as follows: No. 1, August-September; No. 2, October-November; No. 3, December-January; No. 4, February-March; No. 5, April-May; No. 6, June-July. Copyright 1975 by the ASTROGRAPH. Subscription rate is $4.00 per year in the United States and Canada and $5.00 per year for all other countries outside North America. Subscriptions and all manuscripts and photographs submitted for editorial consideration should be sent to the ASTROGRAPH, Post Office Box 2283, Arlington, Virginia 22202. NOTE: for persons submitting articles, please indicate if you desire your name or name and address to appear at the conclusion of the article.

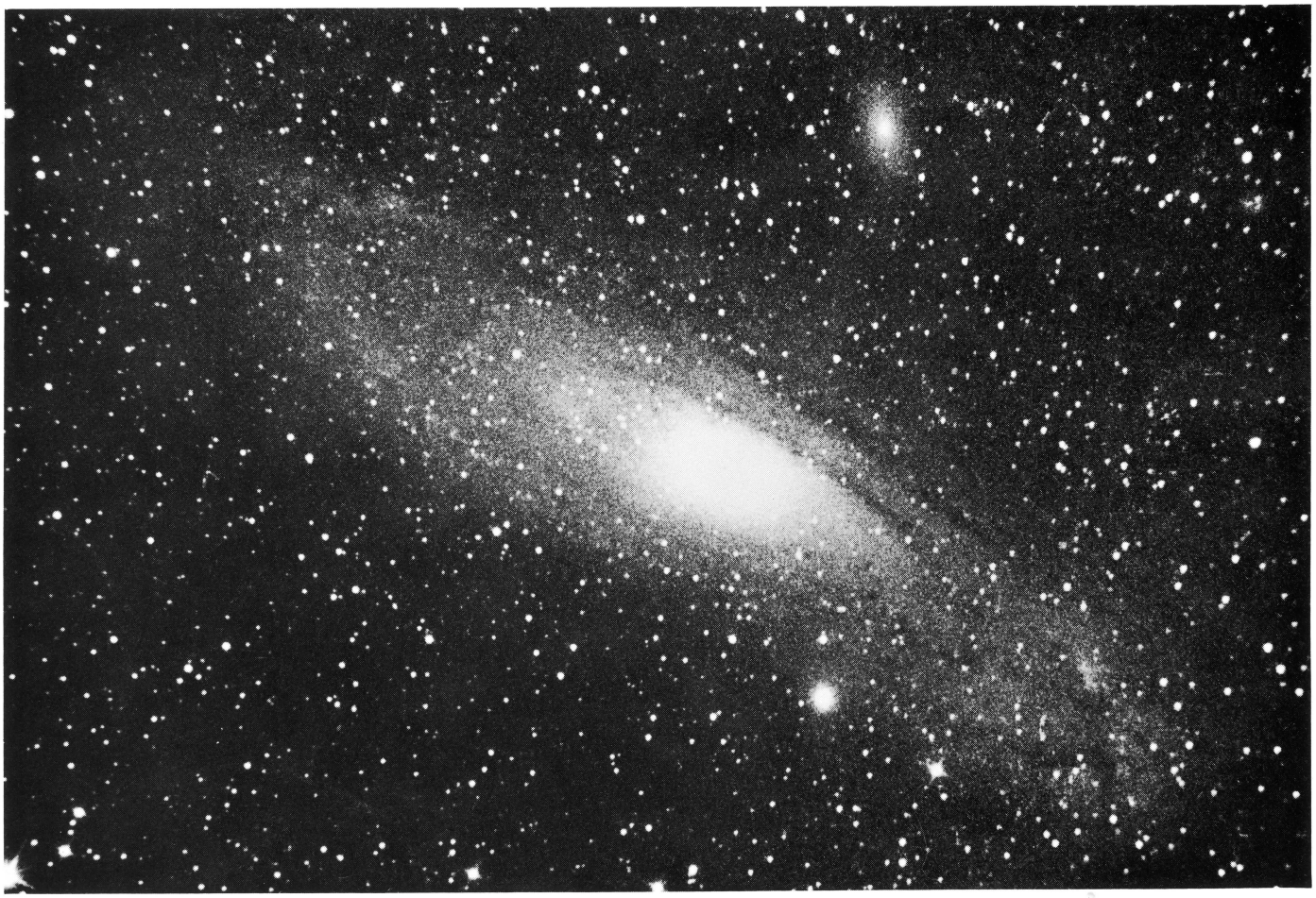
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ASTROPHOTOGRAPHY WITH A SMALL REFLECTOR

Two years ago I sold a 6" telescope and set about building an 8" Newtonian. The major optics purchased were the Pacific Instrument mount, electric drive, and manual slow motion control in declination, an 8" F/6.3 1/32 wave mirror and a 4¼" F/5 mirror by Superior Optics. Not having a supply of the necessary tools, my close friend and fellow astrophotographer, Mike O'Neal aided me in the construction of the telescope. (See the October-November issue of the ASTROGRAPH for Mr. O'Neal's article on Masking).

The camera I use for prime focus photography is a simple $40 second-hand SLR camera from Russia called a "Zenit-B". It has standard Pentax thread and is easily adaptable to the telescope with an easily abtainable adapter. So far it has been the most trouble-free of all my equipment. I do all of my developing, printing, etc., at Mr. O'Neal's darkroom which he set up last spring. Some of my pictures would not have been possible without his assistance or techniques. The film we both use is Kodak 103aF and occasionally 103aE for red-sensitive objects. Mr. O'Neal has spent long hours making tests with various emulsions and developer combinations and in the end we both agree that 103aF combined with MWP-2 developer is the ideal combination for deep-sky photography. We are still trying to find new and better ways, however. Our latest endeavors are taking us into the realm of color astrophotography with all of its dangers and pitfalls.

One of my main goals was to use equipment that had not been explored before for good deep-sky photography. For instance, my major instrument for shooting is a small, seemingly inadequate 4¼" F/5 reflector. By pushing its capabilities to the very edge, it has turned out some rather good photographs. Guiding is done at almost 300 power, with a crosshair size of less than one second of arc. Even though both axes of the mount are only a scant 1 inch in diameter, the machining done by Mr. Raehrs of Pacific Instruments is so good, guiding at this high a power is almost easy! Guiding at the highest of power and with the best of accuracy is a definite must, even with short focus systems! In general, fast systems have high resolution at the film plane. Most amateurs do not take advantage of this fact and ruin what otherwise would have been a great



ABOVE: M31 photographed by Dana Patchick using his 4¼ inch F/5 reflector. Exposure was 26 minutes on 103aF film, developed in MWP-2 for 9 minutes at 68°F. 5x enlargement on Brevira #5 paper.

shot except that the guiding suffered. One of the problems I have in guiding this set-up is the fact that the corrections in declination have to be made by hand, due to the manual slow-motion control. This works very well provided that the entire system is well balanced. At 300X, with cold hands, guiding with any accuracy in declination becomes very difficult at times.

Recently I acquired another camera (also $40) which is a German 35mm Praktica. I can mount it on the side of the main tube and photograph the same object at different focal lengths and/or in color. This has proven to be very difficult thus far because it is an envolved process to balance this already overworked setup.

I have plans in the near future to adapt a geared-down motor drive to the declination slow-motion control to facilitate guiding in that axis.

The rewards of all this work are indeed worth every bith of time and effort spent. It is hard to describe the feeling of accomplishment, of learning, but that is what I get out of this work.

Dana Patchick
958 Cantinela Avenue
Santa Monica, California 90403





ABOVE: North American Nebula (NGC 7000) photographed by Dana Patchick using a 4¼ inch F/5 reflector. Exposure was 37 minutes on 103aF film developed for 9 minutes at 68°F in MWP-2. Printed on Bromal ƒ4 paper.

LEFT: Dana Patchick's 8 inch guider and 4¼ inch photographic reflectors. Note guiding eyepiece and mounting bracket for extra camera are in place. Extra weights total 43 lbs.

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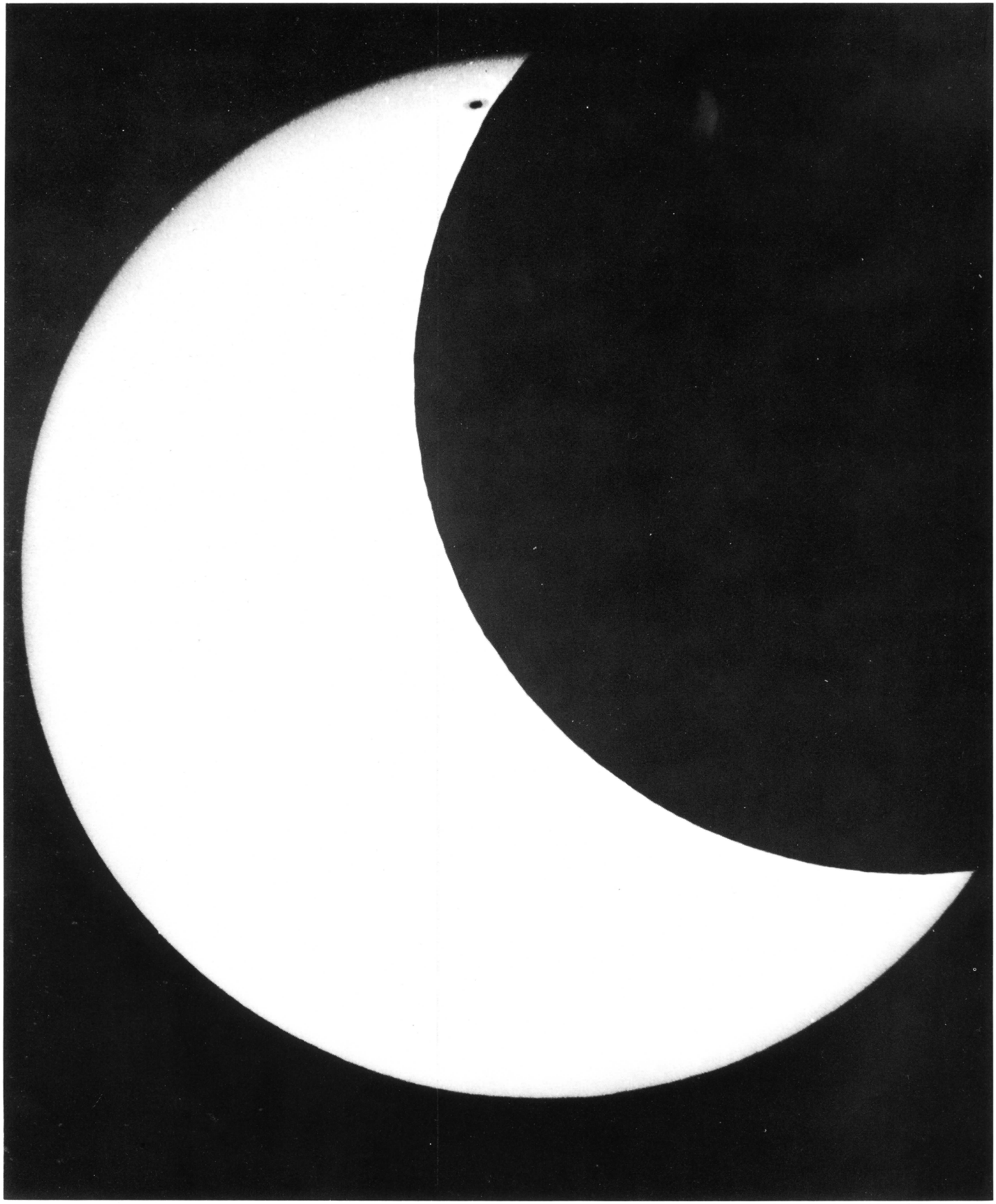
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ABOVE: M42 photographed by Dana Patchick using his 8 inch F/6.3 reflector. Fifteen minute exposure on 103aF film developed in MWP-2 for 9 minutes at 68°F. Printed using a mechanical mask to bring out internal regions.

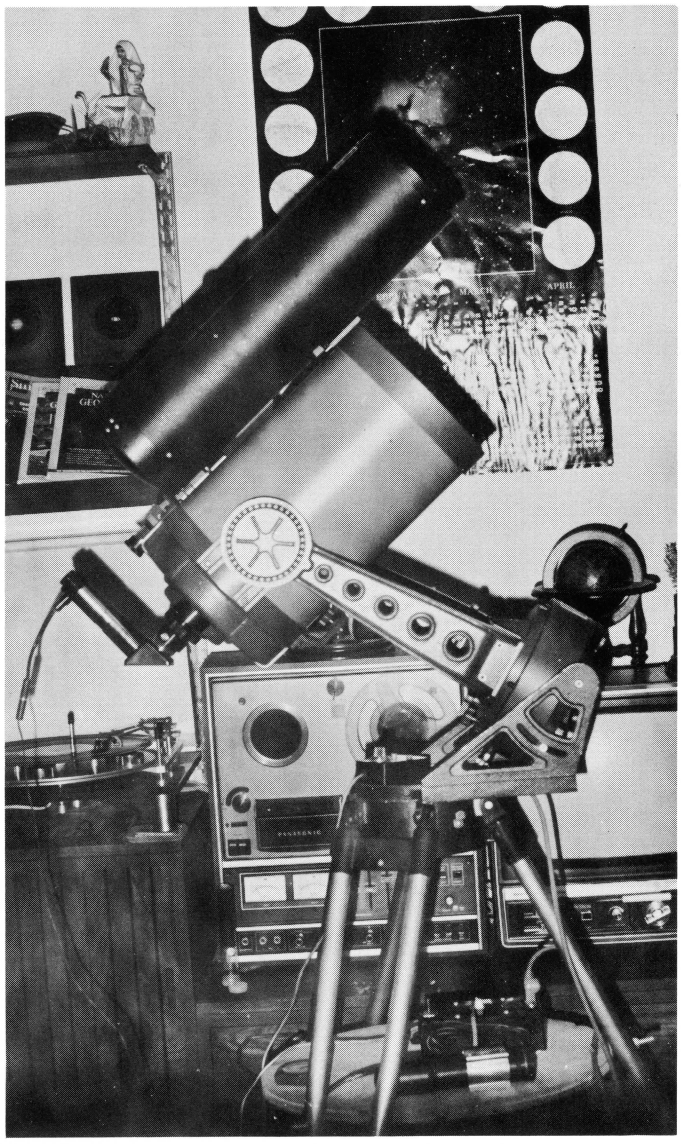


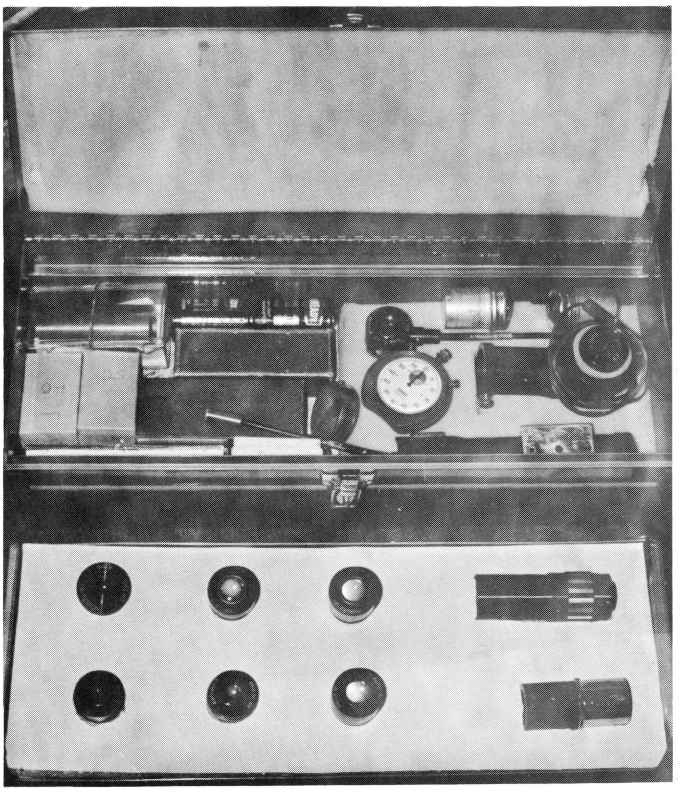
ABOVE: Partial Solar Eclipse of December 13, 1974 photographed by Richard Hull using a 4 inch at F/30. Exposure was 1/60 second on Pan F film developed in Ethol T.E.C. 10 ml./802 for 10 minutes. Printed on #5 paper.

ASTROPHOTOGRAPHY WITH A 5.5 INCH SCHMIDT

Most of the equipment is standard Celestron, with a few additions I added to make long exposure photography ($\frac{1}{2}$ hour or so) more bearable. For Schmidt photography, a celestron 8 is used on it's portable tripod as the guiding unit, the $5\frac{1}{2}$" is mounted on top. My additions include a plywood round mounted midway down the tripod (to hold variable frequency unit, eyepieces, and coffee!), a flex-shaft for the declination slow-motion, and an extension on the illuminated reticle eyepiece unit. For guiding I use a 12mm illuminated eyepiece and a two power barlow, giving an efl of about 330 inches. This may seem high for a 9 inch F.L. camera, but when a 20 to 25 power enlargements are made, the prints efl becomes 180 to 225 inches.

Martin C. Germano
Box 1681
Thousand Oaks, California 91360





ABOVE: Equipment box of Martin Germano.

LEFT: Celestron 8 on it's portable tripod and 5.5 inch Schmidt camera piggyback.

ASTROPHOTOGRAPHY SEMINAR ANNOUNCEMENT AND CALL FOR PAPERS

The growing sophistication of amateur astrographic instrumentation and techniques demonstrates the need for an in-depth look at current and projected programs for conduct by the amateur astrophotographer. To meet this need, the Ventura County Astronomical Society and the Orange County Astronomers (with endorsement of the Western Amateur Astronomers) have elected to co-sponsor a one day astrophotography seminar at the Campus Center of Moorpark College in Moorpark, California on March 15, 1975. The modern campus of Moorpark College is located within easy driving distance of the Los Angeles megalopolis in the picturesque Simi Valley, and should afford a convenient meeting site for attendees residing in Central and Southern California.

Both contributed and invited papers are being solicited, and all amateur astronomers and astrophotographers are cordially invited to attend the seminar. The daytime program will consist of technical papers on astrographic targets, projects, equipment, and techniques by authorities in the fields. The evening program will feature an around-the-table, open-ended discussion of audience generated topics with an enlightening critique of photographic materials submitted by amateurs. The evening session will be conducted by a panel of experts under the chairmanship of Mr. John Sanford. The morning and afternoon sessions will be chaired by Mr. Charles Townsend and Mr. Ronald Oriti, respectively. The registration fee of $5.00 per single applicant and $7.00 per family includes parking and a bound copy of the seminar proceedings.

For the instructions for the submission of papers, detailed registration information, and deadline dates, please write to either of the organizations listed below:

Ventura County Astronomical Society
Box 5728
Oxnard, California 93030
Attention: C. Townsend

Orange County Astronomers
10372 Pua Drive
Huntington Beach, California 92646
Attention: B. Groves

Your prompt inquity is encouraged, because all deadline dates will be strictly adhered to without exception.



ABOVE TOP PAGE: Coma Berenices photographed by Martin Germano using a 5.5 inch Schmidt. M98 upper right corner 1 5/8 inch from side M100 upper left corner. M99 lower center 2 3/4 inch from bottom.



ABOVE: M108 and M97 Owl Nebula photographed by Martin Germano using a 5.5 inch Schmidt. Bright star in upper left is B URSA MAJOR.

PUPPIS

Puppis is a recently added constellation, which was part of a much older and very large group called Argo Navis, or the sailing ship. That ungainly craft was broken up by the French astronomer Lacaille in the 1750's into Octans, Horologium, Mensa, Reticulum, Puppis, Norma, Pyxis, Vela, and Telescopium. These were supposed to be parts of the ship. Puppis, or the Poop Deck lies in a rich region of the Galaxy, and contains many open clusters, at least two observable planetary nebulae, a galactic nebula, and one dim globular cluster, as well as many interestingly colored double stars. For the astrophotographer, the galactic clusters have to be the interesting items. Even short focal lengths will show the existance of many of the clusters, with 200mm (on 35mm film) being enough to start to see some detail and form in the larger groups (see reproduction).

The Milky Way itself can be a subject for photography with short focal lengths, especially in color, showing thousands of stars scattered in front of the background glow of more distant suns. It should be noted that the recording of extended objects such as the Galaxy with short focal lengths (and nebulae, galaxies, and comets with longer instruments) is dependent on the speed of the photographic system. This would include the F/ratio (focal length divided by aperture), where F/3.5 or smaller ratios would be considered "fast", and the effective film speed (not always the given ASA). Tri-X pshed to 1200 or so, or 103a-F, or Fuji 100 or High Speed Ektachrome force developed, are fast emulsions. The capability of a system to record extended objects is only dependent on these factors, not on aperture or focal length. It should be remembered that if you can still have a fast lens and bigger film (such as the Aero-Ektar 7" f.l. F/2.5 or the 48" aperture F/2.5 Palomar Schmidt), the results will be superior to small film work, since the negative doesn't have to be enlarged so much to get the same image scale. Film $2\frac{1}{4}$x$3\frac{1}{4}$" is a good size with the Ektar, and the Palomar instrument uses plates 14" square.

There are a large number of new lenses on the market for 35mm cameras which combine a wide field with fast F/ratios, such as the 35mm f.1. F/1.4 Nikkor, and the new Canon 24mm F/1.4 aspheric. The standard F/2.8 ratio is available in a wide number of brands and focal lengths. Optics of this type would also be useful in photographing the Gegenschein or Zodiacal Light, which are faint, large phenomena.

OBJECTS IN PUPPIS

Star Clusters

Name	R.A.	Decl.	No. Stars	Size	Remarks
NGC 2298	06^h 47.2^m	-35° 57'	Globular	1'.5	Dim globular, only hint resolution with 20cm Sch/Cass. 100X
NGC 2422	07 34.3	-14 22	50	25	M47. Large, bright. 2 Struve doubles Naked eye
NGC 2437	07 39.5	-14 42	150	24	M46. Cloud faint stars. Planetary neb. 2438 NE quadrant.
NGC 2447	07 42.5	-23 45	60	25	M93. Stars form shapes. Sparse.
NGC 2451	07 43.6	-37 51	50	45	Pretty group around c Pup (3.6m).
NGC 2477	07 50.5	-38 25	300	25	Globular? 11-12/13m stars. Resembles M37 Aur. only fainter
NGC 2546	08 10.6	-37 29	50	40	Sparse group in rich area.

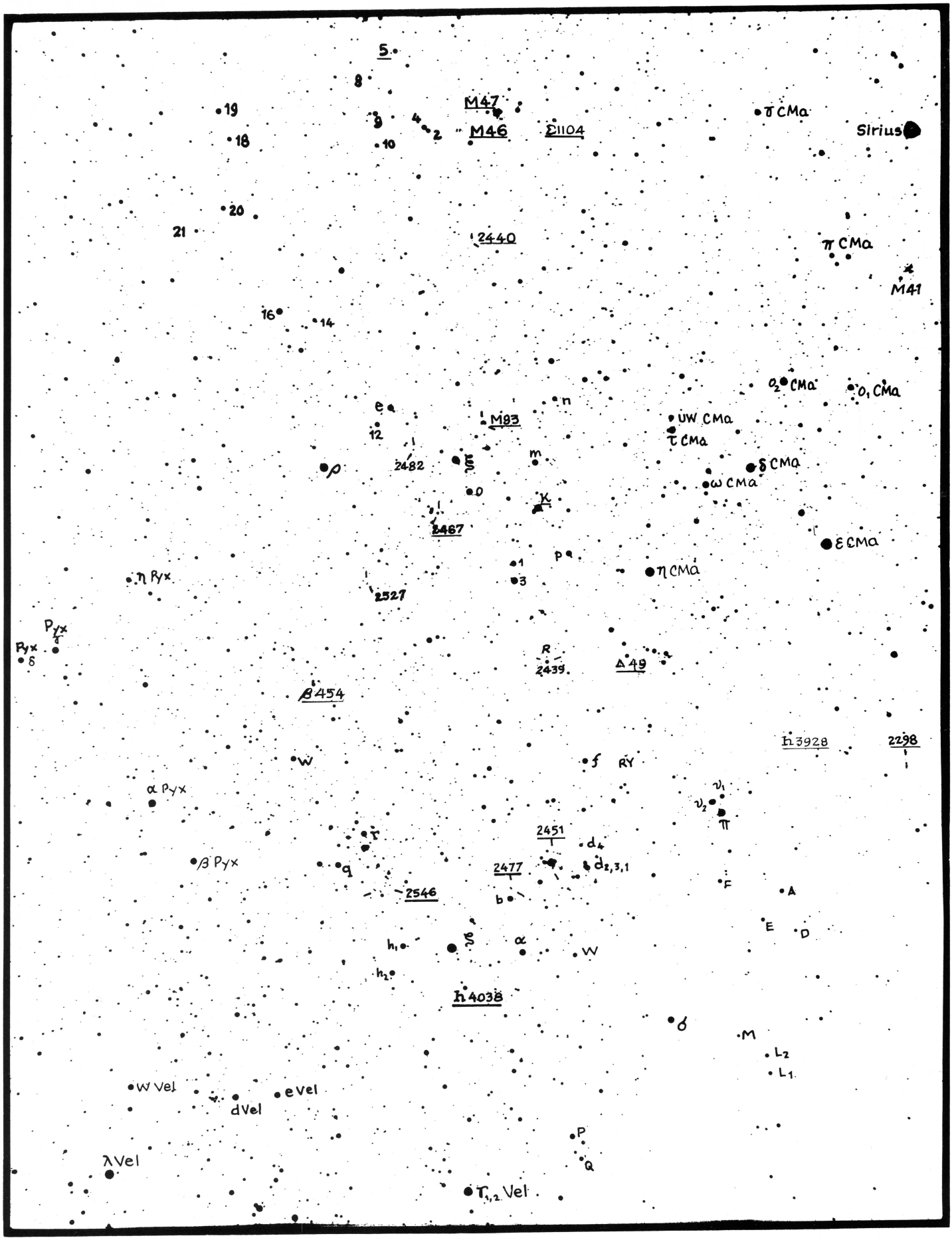
Nebulae

Name	R.A.	Decl.	Mag.	Size	Remarks
NGC 2440	07 39.9	-18 05	11.7	54"x20"	Looks brighter. Stands power. Elliptical envelope around round brighter blob.
NGC 2467	07 51.3	-26 16	12?	4'x4'	Round haze; 8.5 str. Not Planetary... reflection?

Double Stars

Name	R.A.	Decl.	Mags.	Sep.	P.A.	Remarks
h 3928	$07^h03.7^m$	-34°42'	6.7/7.8	3.1"	149°	
Δ 49	07 26.9	-31 45	6.5/7.2	9	53	Yellow and orange
∑ 1104	07 27.1	-14 53	6.2/7.8	1.9	1	
Sigma Pup	07 27.6	-43 12	3.3/9/4	22	74	G5-MO Penetrates low altitude well.
k (HIII 27)	07 36.8	-26 41	4.5/4.6	9.9	138	A gem for small apertures
5 Pup	07 45.6	-12 04	5.5/8.2	2.2	5	Close
h 4038	08 01.0	-41 10	5.6/8.5	27	346	Nice color contrast
β 454	08 13.9	-30 46	6.6/7.8	1.9	14	Not seen (poor seeing)

JOHN SANFORD



ABOVE: Constellation Puppis photographed by John Sanford with a 35mm camera and 200mm lens.



ABOVE: M47 and M46 (left to right) photographed by John Sanford using an F/1.65 5.5 inch Schmidt. Exposure was ten minutes.

ASTROPHOTOGRAPHY FOR FEBRUARY AND MARCH

MERCURY reaches inferior conjunction with the Sun on February 8th (09hr) and a Greatest Western elongation of 27° on March 6th (06hr). This elongation is not very favorable because Mercury will have a declination of -16°.

VENUS is too close to the Sun, sets 1 3/4 hr after the Sun on the 1st of March and 3 hours at the end of March.

The MOON will reach its highest declination on February 20th (17hr), March 20th (00hr), and April 16th (05hr). It reaches perigee on February 25th (22hr), March 26 (09hr) and April 23rd (13hr). The First Quarter phase of the Moon will be in excellent photographic position in February and March.

MOON

Phase	Date	Declination	Diameter
Last Quarter	Feb. 3 (06hr)	-18°	31'30"
New Moon	Feb. 11 (05hr)	-10°	29'25"
First Quarter	Feb. 19 (08hr)	+21°	31'02"
Full Moon	Feb. 26 (01hr)	+ 4°	33'31"
Last Quarter	Mar. 4 (20hr)	-22°	30'41"
New Moon	Mar. 12 (24hr)	+ 1°	29'28"
First Quarter	Mar. 20 (20hr)	+21°	31'38"
Full Moon	Mar. 27 (11hr)	- 6°	33'12"
Last Quarter	Apr. 3 (12hr)	-19°	30'10"
New Moon	Apr. 11 (17hr)	+11°	29'12"
First Quarter	Apr. 19 (05hr)	+16°	31'58"

MARS moves from Ophiuchus through Sagittarius and into Capricornus during February and March. It is too small for good photographic results.

JUPITER moves from Aquarius into Pisces, decreasing in diameter from 32 arc seconds on February 1st to 31.5 arc seconds on April 1st. On March 22nd (02hr) Jupiter is in conjunction with the Sun.

SATURN is very favorably placed for photographing in Gemini at declination +22°. Its diameter decreased from 18 arc seconds on February 1st to 17 arc seconds on April 1st. Saturn reached opposition on January 6th (09hr).

URANUS is in Virgo about -12° in declination. It is moving towards opposition on April 21st (04hr).

NEPTUNE is in Ophiuchus about -21° in declination. It is moving towards opposition on June 1 (13hr).

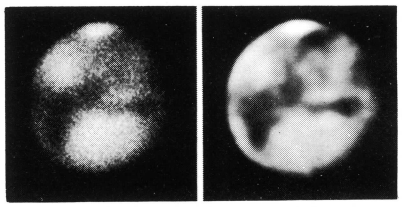
PLUTO is in Virgo at R.A. $12^h\ 59^m$, Decl. +12°11' on February 1st, R.A. $12^h\ 58^m$, Decl. +12°34' on March 1st, and R.A. $12^h\ 55^m$, Decl. +12°58' on April 2nd. Pluto reaches opposition on March 29th (05hr).

MINOR PLANETS

PLANET	MAGNITUDE	POSITION March 1	POSITION April 1
Ceres	8.6	0^h27^m -5°23'	1^h10^m -0°06'
Pallas	10.3-10.2	22^h01^m +0°11'	32^h40^m +2°21'
Juno	9.0-9.3	1^h32^m +1°10'	2^h38^m +6°42'
Vesta	7.7-7.5	20^h49^m -19°02'	21^h51^m -15°21'

EVENTS: Spica will be occulted by the Moon on March 28th (15hr) for the area of Antarctica. On April 1st (01hr) Neptune will be occulted by the Moon for the South Atlantic Area.

RALPH PROCTOR



PHOTOGRAPHIC PRINT ENHANCEMENT

The LINEAR RADIAL TRANSMISSION FILTER (Pat. Pending) allows anyone to make improved photographic prints! Above is an example of Mars. At left is a high-contrast conventional print, at right one with grainines dropped and detail enhanced by use of the LRTF. The LRTF and instruction book sells for $16.95. Order filter size equal to or smaller than your enlarger lens clear diameter. Standard sizes are 1/2", 3/4", 1", 1 1/4". To order or for more information, write:

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13 Burke Avenue
Newport News, Virginia 23601

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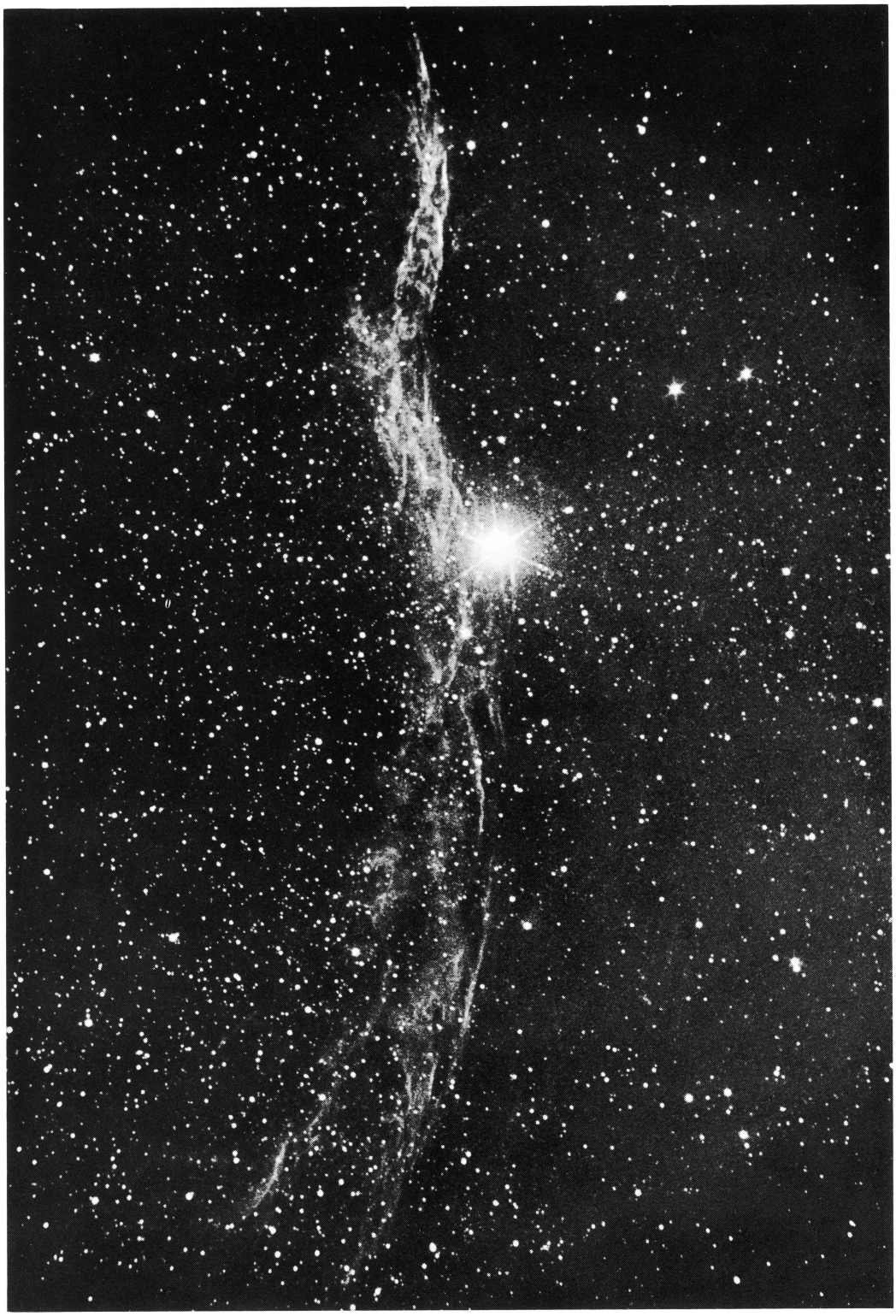
Send to:

John Sanford
2215 Martha Avenue
Orange, California 92667

Half the proceeds will go to the Orange County Astronomers Observatory project.



ABOVE: M33 photographed by Kurt Rihm using his 10 inch F/7.3 inch reflector. Exposure was 40 minutes on 103a0 film.



ABOVE: NGC 6960 Cirrus Nebula photographed by Kurt Rihm using his 10 inch F/7.3 reflector. Exposure was 40 minutes on 103a0 film.

KODAK IV-E SPECTROGRAPHIC FILM

The photograph below is a one second exposure of the Lunar Crater Theophilis taken on KODAK IV-E film A 12.5 F/6 inch reflector working via eyepiece projection at F/80 was used. Date was September 9, 1971.

The Film: This KODAK film is a fine to medium grain film whose main use was solar patrol photography of the solar disk in Hα light.

The Developer: KODAK recommends development for 2 minutes in D-19. The lunar photograph shown was developed in Edwal FG-7 for 10 minutes at 78°F. Normal development for a class II film (Plus-X - ASA 125) is 10 minutes at 70°F with a 1:15 solution of Edwal FG-7 and water. The lunar photograph shown was pushed by 50% increase in developing time (Normal was 7 minutes at 78°F).

ASA: KODAK rates IV-E at 100 ASA when developed 2 minutes in D-19. Development in FG-7 yields an ASA of 300-400. Equivalent developing time in D-19 is 6-8 minutes.

Gamma: IV-E has a normally high gamma, about 2.5 in D-19. When developed 8 minutes IV-E has a gamma of 6.5, which is very high and makes printing difficult. Development in FG-7 yields a flatter negative (lower gamma) which is easier to print.

Deep Sky Work: Development in FG-7 for 50% to 100% increase in development time is recommended.

IV-E is available only in 100 foot rolls. Cost of $28.50 per 100 foot roll includes Continental air shipment. $32.50 per 100 foot roll is the cost including air shipment to other countries.

Reduced cost for quantity purchase is as follows:

# Rolls	Cost with Continental Air Shipment	Cost with Air Shipment to other countries
1-3	$28.50	$32.50
4-5	27.50	31.50
6-7	26.50	30.50
8-9	25.50	29.50
10-15	23.50	27.50
16-20	21.50	25.50
over 20	19.50	23.50

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