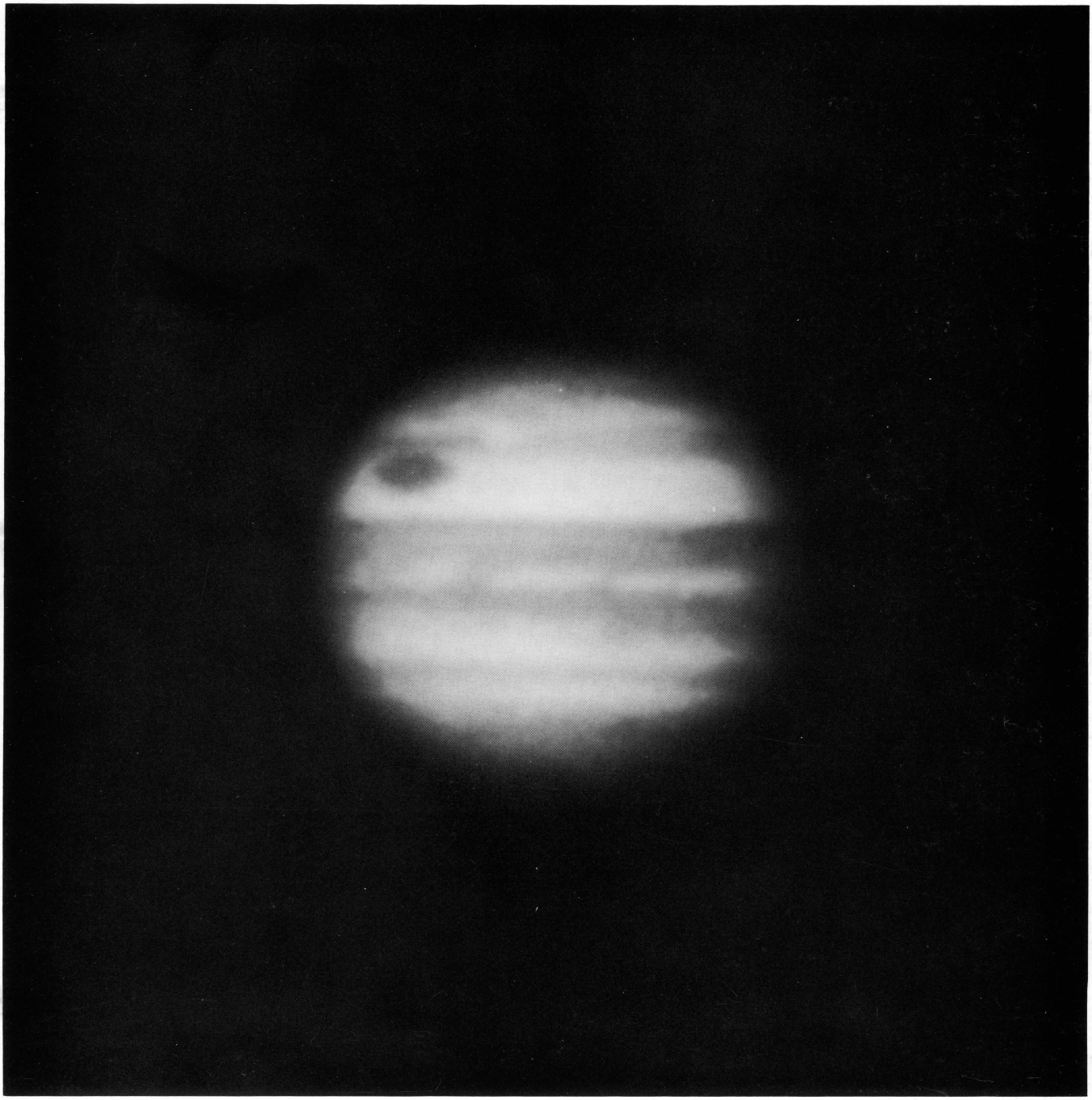
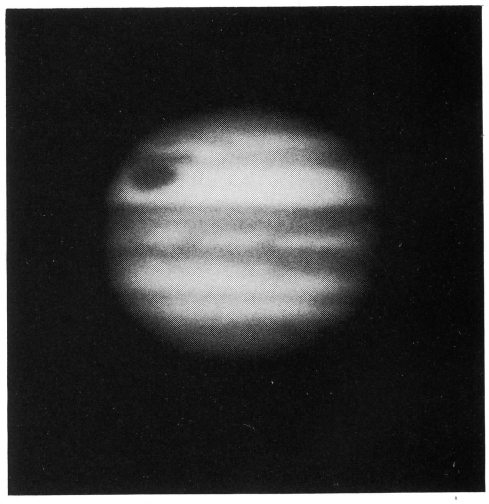
the ASTROGRAPH



VOLUME 6 NO. 3 DECEMBER JANUARY 1974/5

THE ASTROGRAPH



VOLUME VI No. 3

Editor	Robert C. Price
Assistant Editor	Susan K. Price
Contributing Editors	Kurt Rihm, Frank P. Andrews Ralph Proctor, and John Sanford
Contributors	Jim Rouse, Ron Price Howard Zeh, and G.A.T. Heillegger

COVER PHOTOGRAPH - JUPITER

Photographer	Jim Rouse
Telescope	8 inch F/7 Newtonian
F No.	80
Projecting Eyepiece	7mm
Exposure	5 seconds
Film	High Contrast Copy
Developer	H&W Control Developer

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ASTROPHOTOGRAPHY BY KURT RIHM OF WEST GERMANY

Most astrophotographers use cameras with focal lengths from one to twenty inches, seldom exceeding 20 inches. Guiding the camera is quite easy when one uses a telescope as a guiding scope. It was in this manner that my photographs of the Coal bag, the Magellanic clouds and Scorpius were taken. The camera was a VITOMATIC I from Voigtlander with a COLOR-SKOPAR 8/50mm F/1.2 lens. Although most objectives of the 24/36mm cameras are not very good, the Skopar is good even in the corners of the negative.

When using the telescope as the camera the difficulties greatly increase. The mounting must be very rigid and the R.A. drive must be very exact. Slow motion on both axis is a necessity. Most amateur mountings are not so equipped. They are constructed for observing and cannot be easily modified for astrophotography. Only a very few people know how to guide cameras having focal lengths greater than 36 inches. My Newtonian is a 10 inch F/7.3 which requires a guiding accuracy of $\pm$ 1.6 arc seconds for prime focus photography. This is equivalent to one inch at a distance of 3,583 yards or 1mm at 130 meters. This guiding tolerance must be maintained if stars are to appear as small round points on the film. The guiding scope must be large enough to show such deviation but should not be larger than necessary because the heavier the guidescope, the greater the possibility of deviation between both optical axis. Tubes made from plastic are not hard enough to carry a guiding scope. Progressive sagging of the guiding scope relative to the camera telescope will cause trailing or elongated star images.

I feel this is the greatest problem confronting the amateur astrophotographer. It is nearly impossible for an amateur by himself to build a mounting which is adequate for guiding a 36 inch or longer focal length camera, unless he has studied engineering and has access to the necessary large machinery. Without the help of Mr. Alt, a craftsman and specialist in building telescopes, I would not have succeeded.



ABOVE: Megellanic Clouds photographed by Kurt Rihm using a Color Scopar 50mm lens. Exposure was 25 minutes on 103aG.

I am able to double the focal length by using a barlow. This increases the guiding accuracy to 0.8 arc seconds and requires an exposure five times as long as without the barlow. This can be used only on such bright object as M57 if reasonable exposure times are to be maintained.

Concerning films, Mr. Griffith covered the subject very well in Vol. V, #6 of the ASTROGRAPH. I prefer 103a films because of their low reciprocity failure. In the first hour of exposure, the Schwartzschild exponent is near 1. They also offer good contrast and the ability to select specific spectral ranges. The nebulosity around the Pleiades is brought out on 103aO as on no other film. This is because 103aO is sensitive to blue and ultraviolet light. The Hα regions around the Horsehead nebula are best captured on 103aE film with a red filter. My 60 minute exposure on 103aE brought out this nebula far better than a 2.5hr exposure on Tri-X taken before I obtained the spectrographic film. Tri-X is not very sensitive to Hα light.

I minimize the grain in 103a film by using 2 or more negatives. Compare the two photographs of the Pleiades. One is printed from only one negative, the other from four negatives (the central part of the nebula areas were given more exposure in the printing.). The same technique was done with my photograph of the Merope nebula, seven negatives were used.

One might say that using so many negatives for one photograph is too time consuming. I prefer one good photograph to 4 or 5 medium ones. Since astrophotography is my hobby, I take the time necessary to obtain the best results possible with my equipment. The darkroom work also takes more time but I enjoy obtaining top quality photographs when I am finished.

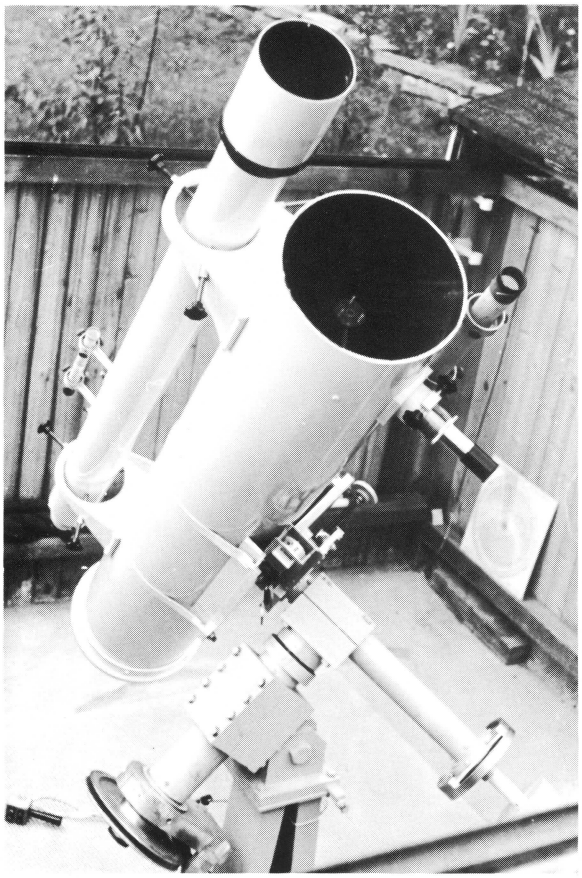
In planetary photography it has been well known for some time that compositing negatives minimized film grain.

When I read that professionals use this technique with stellar photographs, I decided to try it. You can see the results in my photographs

Kurt Rihm
6741 Leinsweiler
Sternwarte
West Germany



ABOVE: Scorpius photographed by Kurt Rihm using a 50mm Color Scopar. Exposure was 25 minutes on 103aG.



ABOVE: Kurt Rihm's 10 inch F/7.3 Newtonian and $4\frac{1}{2}$ inch guide refractor, which can be moved about 2 degrees. Mr. Rihm ground his own 10 n



ABOVE: Milky Way from α Centaurus to η Carinae including the Coal Bag and Southern Cross. Photographed by Kurt Rihm with a 50mm color Scopar lens and 25 minute exposure on 103a0.



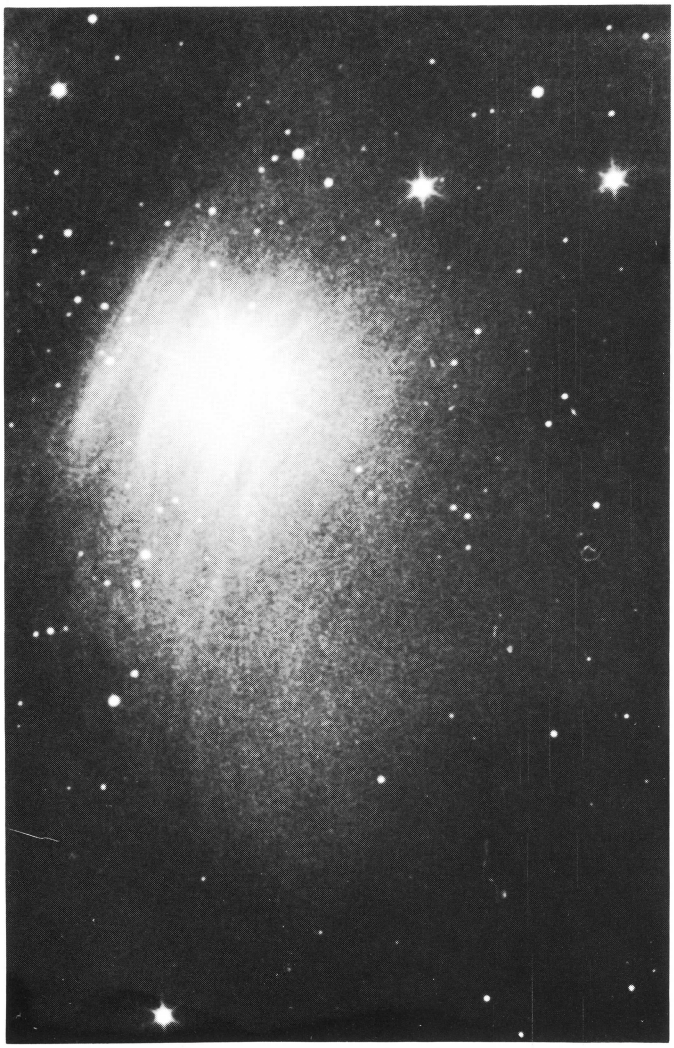
ABOVE: Double Cluster, h and chi Persei photographed by Kurt Rihm. Exposure was 30 minutes on 103a0



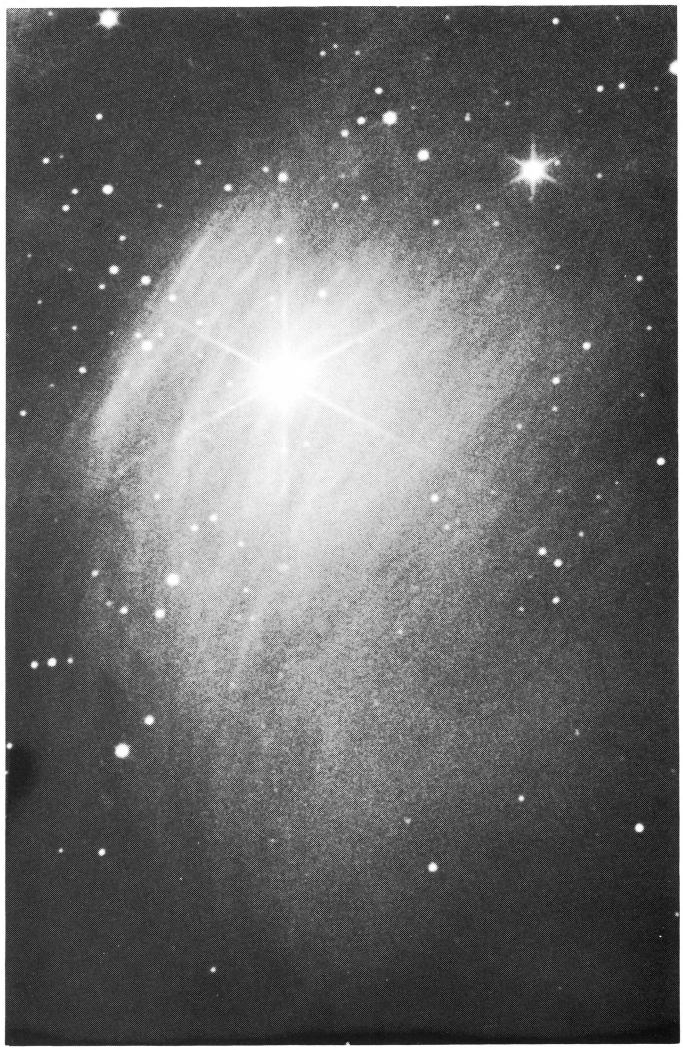
ABOVE: Pleiades photographed by Kurt Rihm. Exposure was 25 minutes on 103a0. Printed from a single negative.



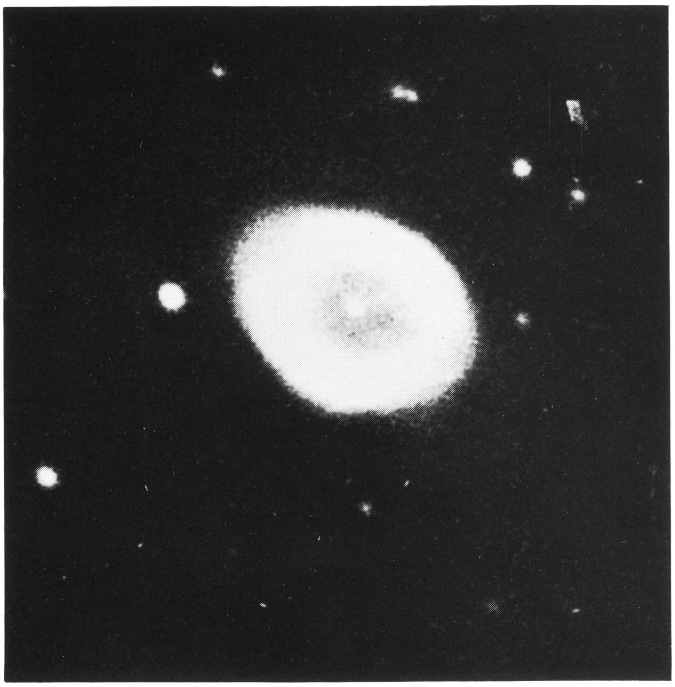
ABOVE: Pleiades photographed by Kurt Rihm. Same as above but printed using 4 negatives.



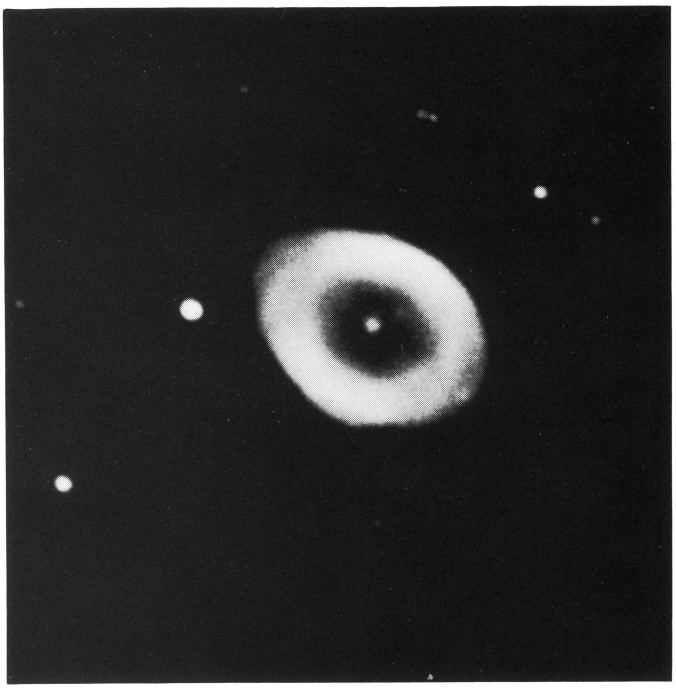
ABOVE: Merope nebula photographed by Kurt Rihm. Exposure was 40 minutes on 103a0 film with a minus UV film.



ABOVE: Merope nebula. Same as photograph to the left except it is a composite of 7 negatives.

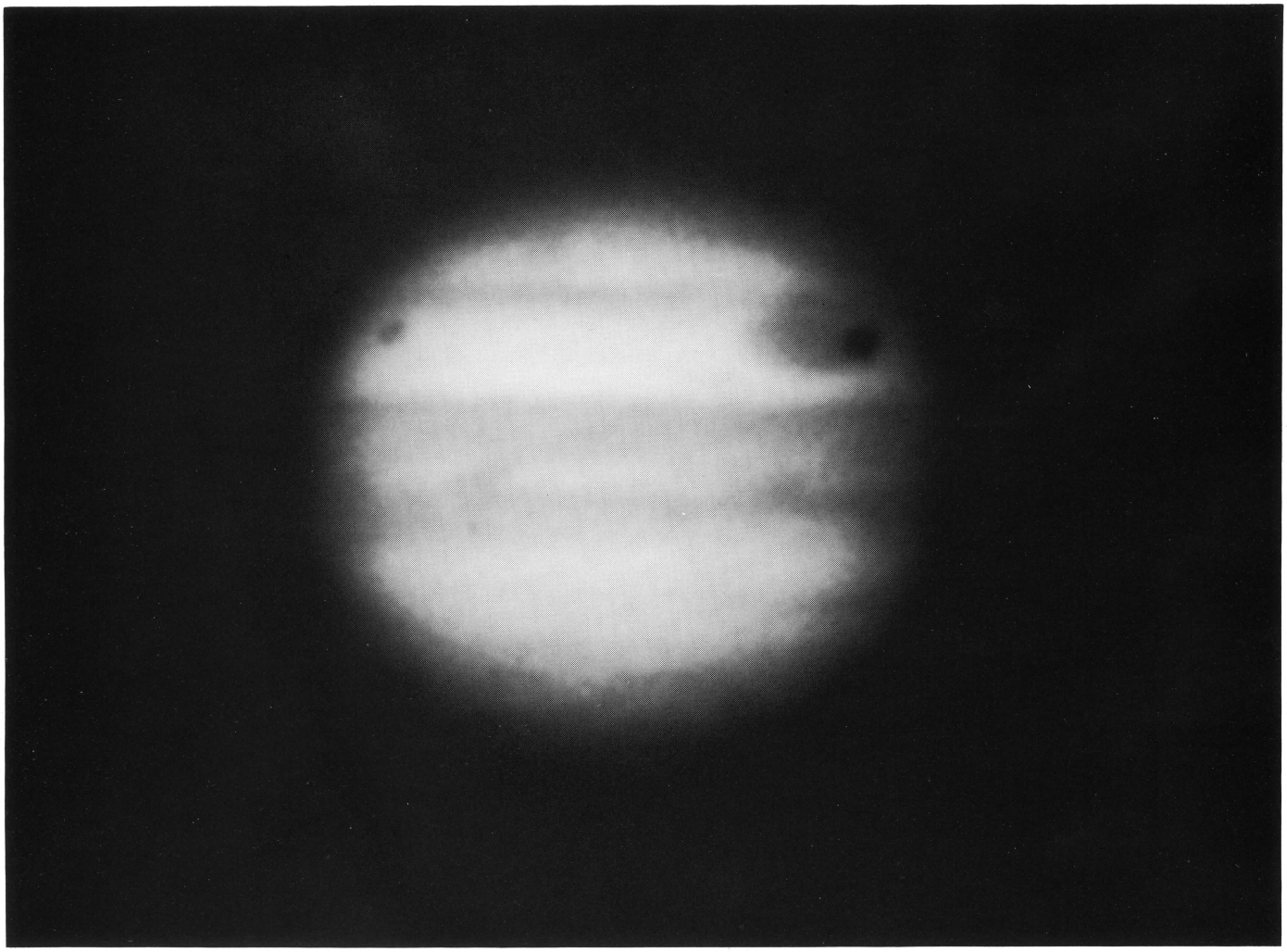


ABOVE: M57 photographed by Kurt Rihm. Exposure was 30 minutes on 103a0 film usig a barlow to double the focal length. Printed from one negative.

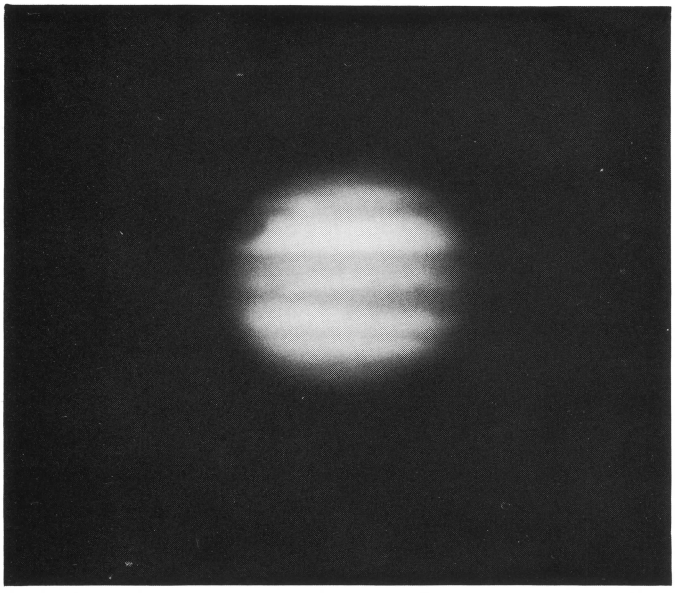


ABOVE: M57 same as on the left except it is a composite of 9 negatives.

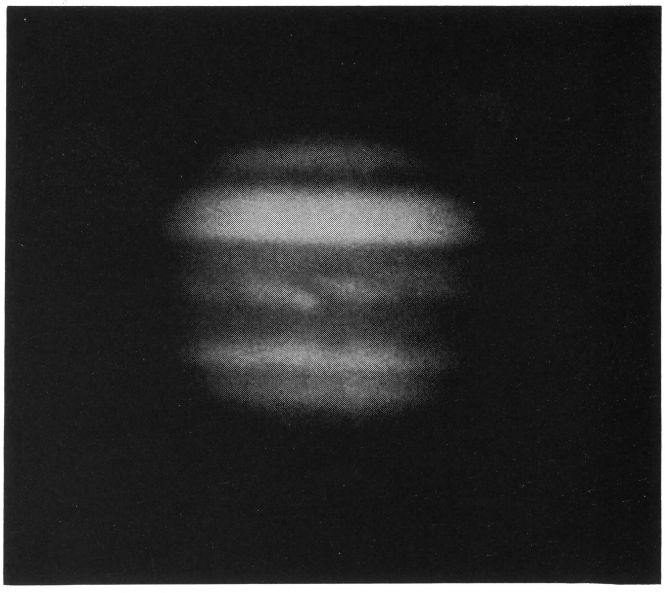
RECENT JOVIAN PHOTOGRAPHS



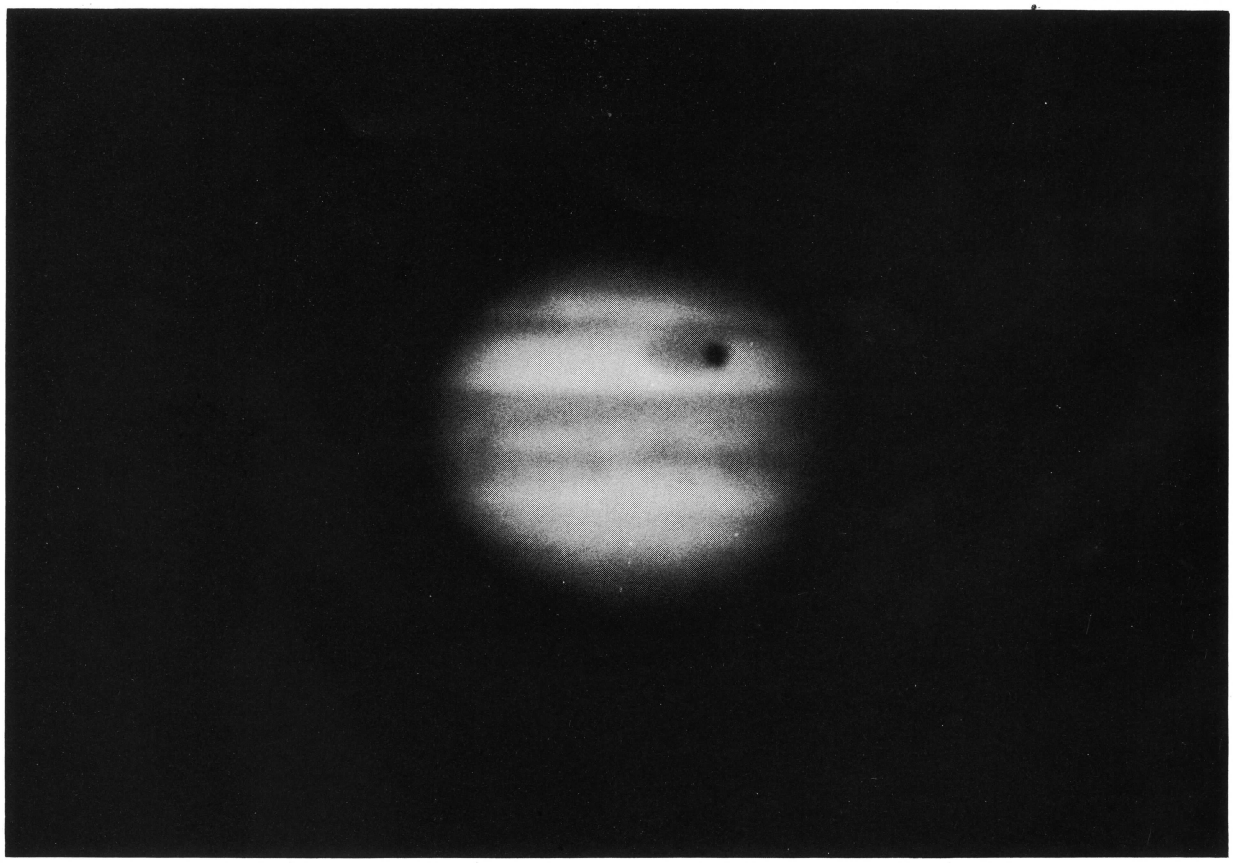
ABOVE: Jupiter and Transit of Ganymede and its shadow photographed by Jim Rouse on September 30, 1974 using an 8 inch reflector and 7mm eyepiece projection to achieve F/105. Exposure was 5 seconds on S.O. 410 film



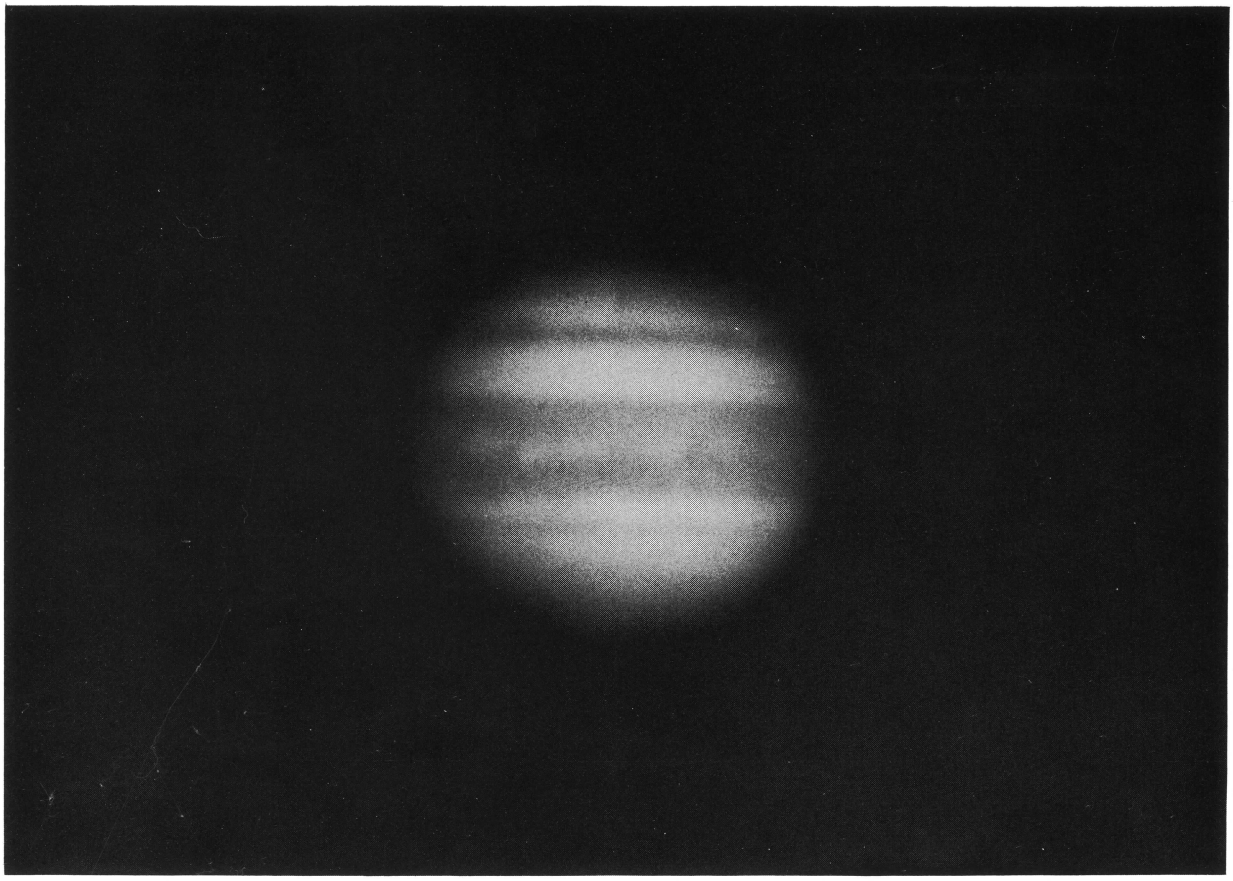
ABOVE: Jupiter photographed by H.F. Zeh on October 11, 1974 with his 8 inch Newtonian. Exposure was 3 seconds on VTE film at F/104.



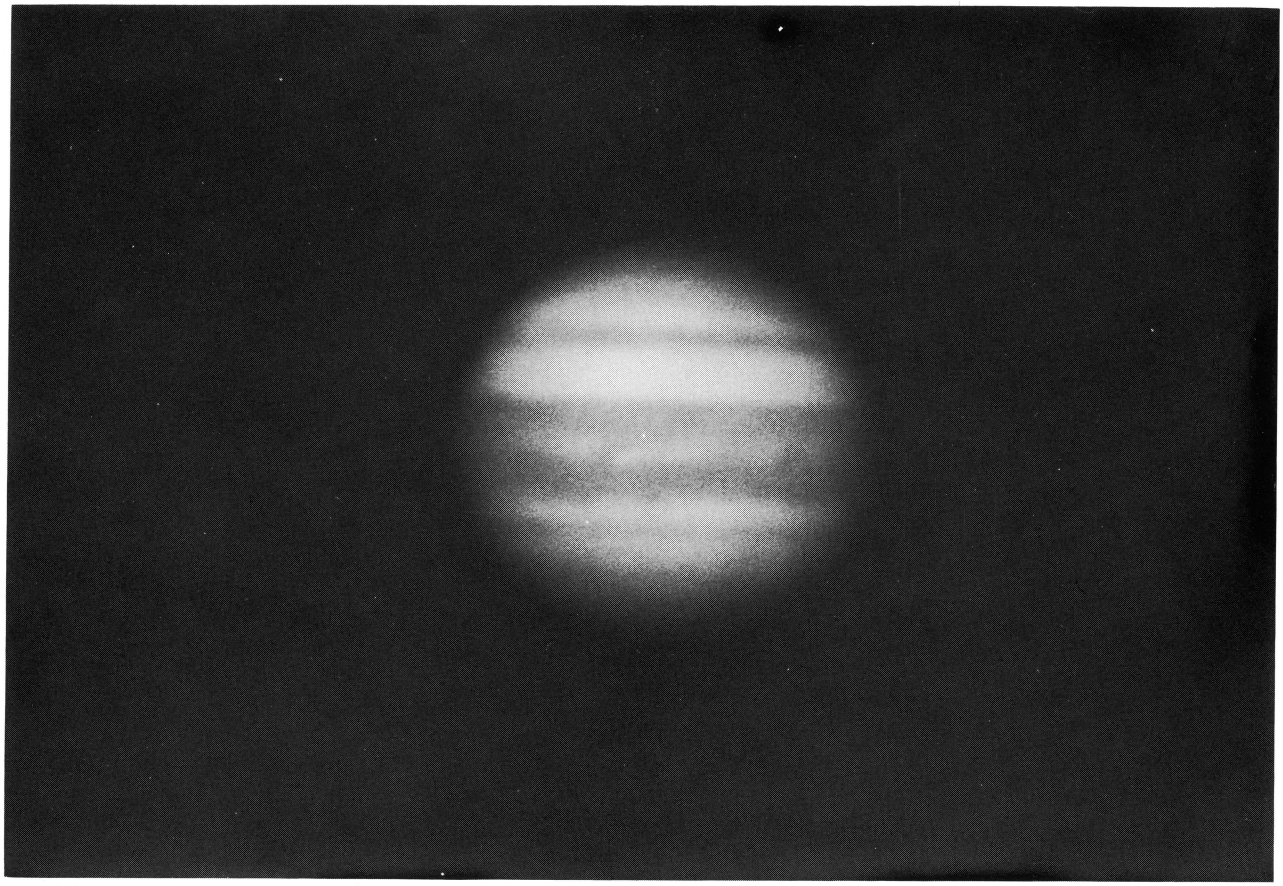
ABOVE: Jupiter photographed by Jim Rouse on September 17, 1974. Data same as above except 4 second exposure and #2 paper.



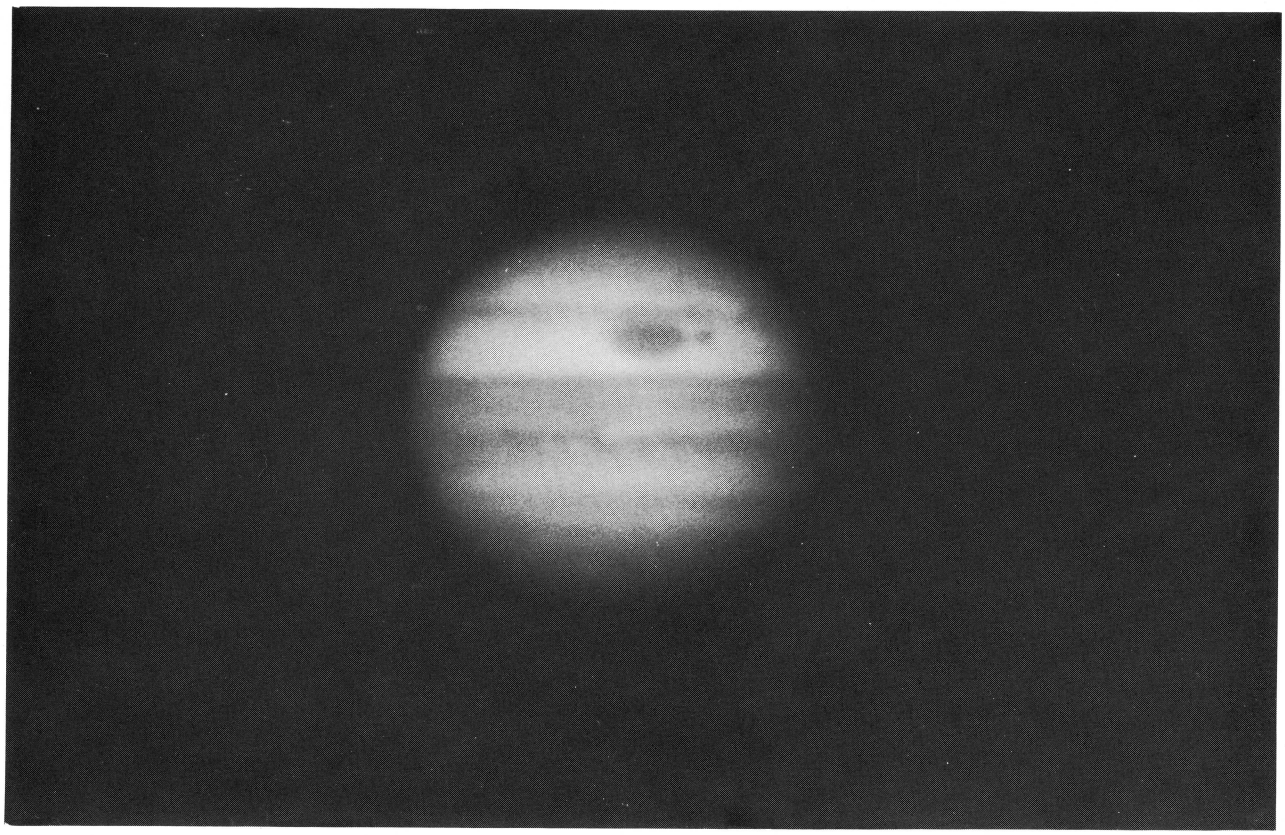
ABOVE: Jupiter photographed by Jim Rouse on October 1, 1974 with his 8 inch F/7 Newtonian. Exposure was 5 seconds on SO 410 film at F/109 (7mm eyepiece projection) developed in H&W Developer (15ml. in 8.5 oz.)



ABOVE: Jupiter photographed by Ron Price on September 30, 1974 using a 12.0 inch Cassegrainian at F/150). Exposure was 3 seconds on Tri-X (with 47A blue filter) developed in Microdol-X (1:3).



ABOVE: Jupiter photographed on September 20, 1974 UT by Ron Price using a 12.0 inch. Exposure was 2 seconds on Tri-X developed in Microdol-X (1:3).



ABOVE: Jupiter photographed by Ron Price on October 8, 1974 (6:30 UT). Data same as above except exposure was 1.5 seconds.

NITROGEN HYPERSENSITISING

Introduction - Hypersensitising photographic plates particularly for amateurs who often do not have elaborate darkroom facilities is usually a messy, hit and miss affair which produces rather inconsistant results and usually raises the fog level considerably. Recent experiments in film and plate storage techniques have lead to a convenient, consistant and relatively simple technique for using Dry Nitrogen Gas for "Hypersensitising" photographic plates.

Damp-A Problem in Plate Storage - Kodak and other special stectroscopic and astronomical emulsions have a notoriously short shelf life. Two factors seem to be primarily responsible: (1) Temperature (2) Humidity (Moisture)

Temperature - If plates are stored in a deep freeze, the life of these emulsions can be greatly extended but deterioration still sets in after a few months - depending on the type deep freeze, shelf varies from months to a year or so.

Humidity - If plates are sealed in air tight containers with a suitable dehydrating agent such as silica jel, life can be further prolonged.

Recently we decided to try storing our spectroscopic plates in sealed containers in an atmosphere of inert, dehydrated nitrogen gas. Tests showed that not only were the plates stored in this way keeping much better but were gaining in sensitivity. Tests showed a steady increase of about three time over a period of 4 to 6 weeks. Careful checks have shown no measureable increase of background fog levels. Beyond this time little gain in sensitivity occurred and the best gain for time was for periods of about one month. Best results were obtained when the plates were stored in a developing tank rack which gave best exposure to the dry nitrogen. If stored in the original pack, there was a tendency for the plates to be much more sensitive at the edge than the center due to the fact that the dry nitrogen had not penetrated between the plates when packed emulsion to emulsion.

Conclusions:

1. The use of Dry Nitrogen Gas as a storage atmosphere greatly improves shelf life and increases sensitivity of spectroscopic emulsions, particularly when coupled with cold storage.

2. The Hypersensitising effect is very uniform and predictable.

3. There are no messy ammonia treatments. Fog levels and shelf life are not effected in an adverse way.

4. If plates are kept in a suitable sealed container in racks, they can be cycled through the dry gas in the course of storage and use.

5. No cracking, shrinking or damage to the emulsion occurred.

NOTE: In our experiments, we used an old Army ammunition box constructed of steel with a knife seal lid. To this we fitted a developing tank rack which held the plates. Two gas valves were fitted to the lid which allowed purging and sealing of the box. Best results were obtained when the ben containing the plates was repurged with dry nitrogen once every two days.

On a recent visit to Australia I found that astronomers at Mt. Stromolo Observatory had made the same discovery as us. Their results confirmed out findings and also showed that plates with large surface areas can be successfully treated in this way with very uniform results. We intend to treat our 12" x 12" plates for the atlas in this way to reduce exposure time and give fainter limiting magnitudes.

Frank P. Andrews

ASTROPHOTOGRAPHY FOR DECEMBER AND JANUARY

MERCURY reaches superior conjunction on Dec. 19° (20hr.) and a Greatest Eastern elongation of 19° on January 23 (20hr.). This elongation will be unfavorable from a photographic standpoint. Apparent declination of Mercury on January 23 will be -15°.

VENUS is too close to the Sun for photographing.

The MOON will reach its highest declination on December 3rd (07hr.), December 27 (20hr.), January 24 (7hr.), and February 20(17hr.). It reaches perigee on December 3rd (07hr.), December 31st (00hr.), January 28 (09hr.) and February 25 (22hr.). The full and gibbous phases of the Moon, rising high on the ecliptic, will be in excellent photographic position in December and January.

PHASE	DATE	DECL.	DIAMETER
Last Quarter	Dec. 6 (10hr.)	+1°	32' 11"
New Moon	Dec.13 (16hr.)	-22°	30' 29"
First Quarter	Dec.21 (20hr.)	+4°	29' 51"
Full Moon	Dec.29 (04hr.)	+21°	32' 44"
Last Quarter	Jan. 4 (19hr.)	-9°	31' 48"
New Moon	Jan.12 (10hr.)	-18°	29' 44"
First Quarter	Jan.20 (15hr.)	+14°	30' 15"
Full Moon	Jan.27 (15hr.)	+14°	33' 21"
Last Quarter	Feb. 4 (20hr.)	-21°	30' 39"

MARS moves in the early morning skies through Scorpius and into Ophiuchus. It is very unfavorably placed for photography being small as well as low in declination.

JUPITER is in AQUARIUS at declination -9° to -5° during December and January. It is best placed for photography immediately after sunset. Jupiter's diameter decreases from 38 arc seconds on Dec. 1 to 32 arc seconds on February 1.

SATURN is very favorably placed for photography in GEMINI at declination +22°.

URANUS reached conjunction with the Sun on October 21 (22hr.) and is unfavorably placed for photography in VIRGO.

NEPTUNE reaches conjunction with the Sun on December 1 (22hr.)

PLUTO is in VIRGO rising in the early morning hours.

EVENTS

Mars will be occulted by the Moon on December 12 (02hr.) for the Antarctic region. It will pass North of the Moon for the rest of the Earth.

The Sun will be partially eclipsed on December 13 (16hr.) for North and South America, Greenland Iceland, Western Iberia and Northwest Africa.

MINOR PLANETS

Planet	Magnitude	Position Jan. 1 R.A.	Decl.	Feb. 1 R.A.	Decl.
Ceres	9.0-9.1	$23^h\ 12^m$	$-15^\circ\ 28'.5$	$23^h\ 50^m$	$-10^\circ\ 13'$
Pallas	10.8-10.8	20 44	-1 52	21 25	-1 16
Juno	9.6-9.8	23 39	-8 59	0 36	-3 56
Vesta	8.4-8.4	18 34	-22 42	19 48	-21 30

THE CONSTELLATION AURIGA

Auriga the Wagoner, is prominently placed in the Winter and Spring Sky. Culminating overhead at 10 p.m. in early January, the constellation offers several objects for astrophotography with amateur equipment. With wide angle cameras, the Winter Milky Way is prominent in this region, about galactic longitude 170°, almost opposite the center of our galaxy. The richest areas are in the Southern part, and long exposures under very dark skies will show much detail in the star clouds and dark dust lanes spreading northward from Taurus into this region.

AARG!

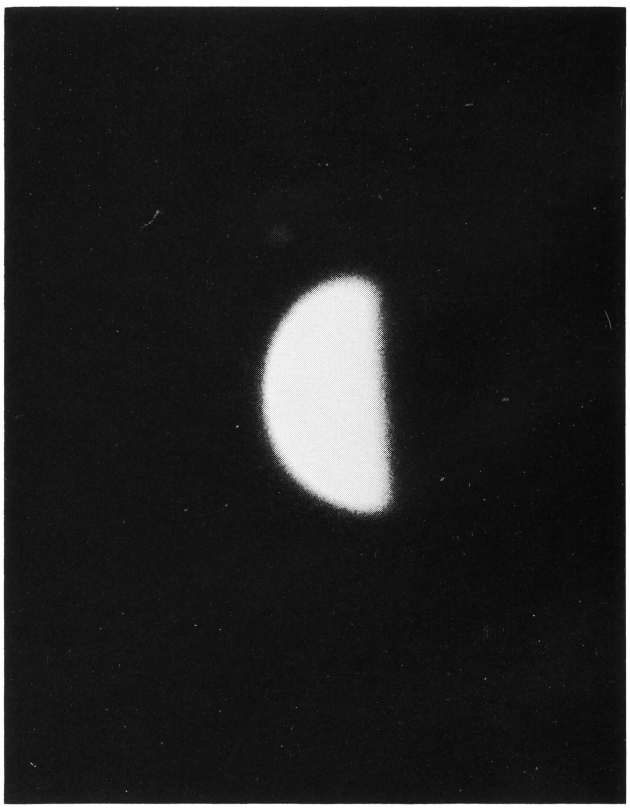
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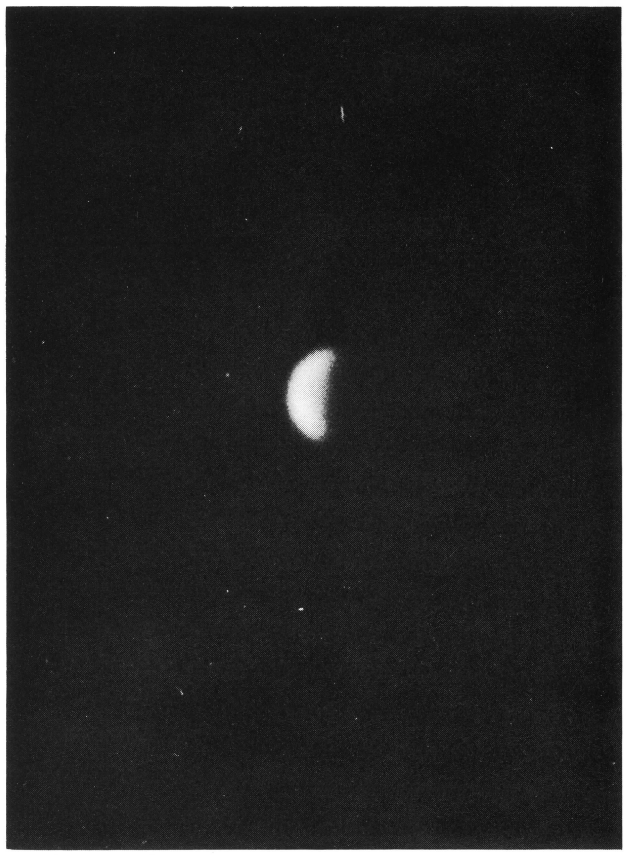
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ABOVE: Venus photographed by G.A.T. Heillegger of the Netherlands on April 11, 1972 with an 8 inch Newtonian. Exposure was 1/5 second of Plus-X with a red filter (factor - 2 stops) at F/96.



ABOVE: Venus data same as above except ultra-violet filter (factor - 5 stops) and at F/40. Exposure 2 seconds.



ABOVE: Venus on May 13, 1972. Data for this red light exposure same as photograph to the left.



ABOVE: Venus, data same as photograph on left.

Intermediate focal lengths (105mm-500mm) will show increasing detail in the several galactic (open) clusters in the Pentagon or in Messier 37 just outside the pentagon forming body of the constellation. A fast intermediate focal length lens or Schmidt camera will record the interesting area around the stars 14, 16, and 17. There is widespread faint nebulosity here, mostly undesignated in the Atlas Coeli except for Index Catalog 405, surrounding AE Aurigae, an interesting variable star. Probably the best cluster is M37, pictured here; although M36 and M38 have brighter individual stars, 37 is richer in numbers.

Double stars abound in Auriga. Only the most notable are mentioned here. Note that the unequal character of most of them makes them difficult objects for telescopic photography. However, perhaps short guide exposures on SO-410 or Panatomic-X at prime focus would be capable of recording some of the pairs. Double star photography is largely neglected by amatuers, although not particularly difficult technically. Color exposures are particularly interesting in that spectral classes of the components can be compared with their colors on slides or written descriptions. A film resistant to overexposure wash-out would be usefull here. One such emulsion is Fuji R100 which holds the star colors over a considerable range of magnitudes.

KODAK IV-E SPECTROGRAPHIC FILM

This film is now available in 100-foot rolls. Use it for both deep-sky and lunar-planetary photography. The editor of *THE ASTROGRAPH* uses it exclusively for lunar photography and on numerous occasions for deep-sky work. For Martian observations with IV-E film, see page 20 of the April-June issue of *CELESTIAL OBSERVER*; for lunar photography see pages 124-125 of the February, 1972, issue of *SKY AND TELESCOPE*. Cost of $28.50 per 100-foot roll includes continental air shipment. Send check to:

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OBJECTS FOR ASTROPHOTOGRAPHY IN AURIGA

DOUBLE STARS

Star	R.A.	Dec.	Mags.	Dist.	P.A.	Remarks
Omega	04h 55.9	+37 49'	5.0,8.0	5".3	359	
644	05 06.9	+37 14	6.9,7.0	1.6	222	Color Contrast
14	05 12.1	+32 38	5.0,11	11	352	7.2, 14", 225°
26	05 35.4	+30 28	6.1,8.0	12	268	A close binary
Theta	05 56.3	+37 13	2.7,7.5	3.0	320	
41	06 07.8	+48 43	6.1,6.8	7.7	356	
872	06. 12.3	+36 10	7.5,6.9	11.3	217	Yellow-lilac

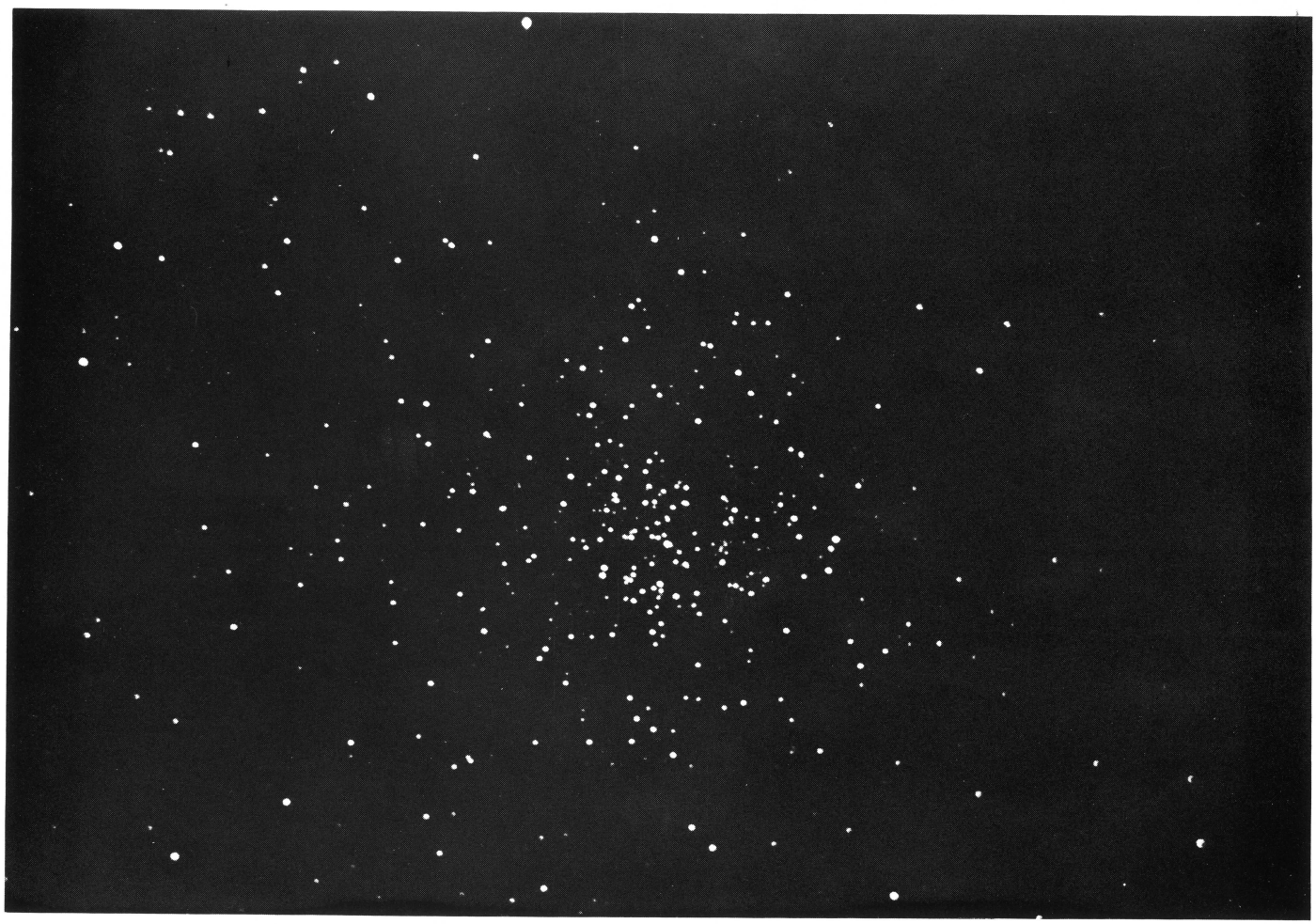
CLUSTERS

Object	R.A.	Dec.	Vis.Mag.	Dia.	No. Stars	Remarks
M38	05h 25,3m	+35°48'	7.4	20'	100	NGC 1912
M36	05 32.0	+34 07	6.3	12	60	NGC 1960
M37	05 49.0	+32 33	6.2	20	150	NGC 2099

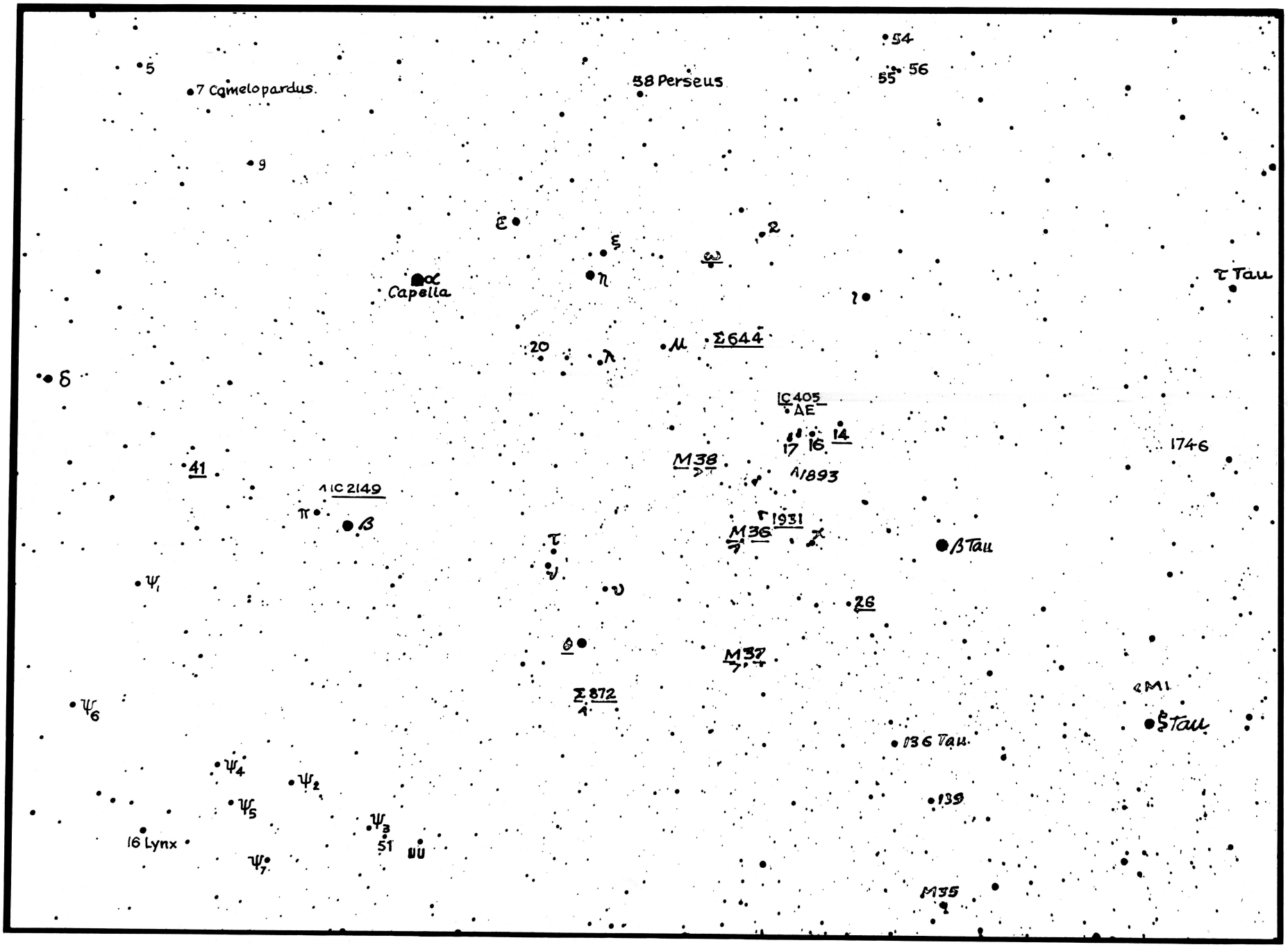
NEBULAE

Object	R.A.	Dec.	Photo Mag.	Dia.	Remarks
I.C. 405	05h 13.0m	+34° 16'	-	30 x 19'	Involving AE Aurigae
NGC 1931	05 28.1	+34 12'	12?	3 x 3'	Comet-like nebula Refl. neb?
I.C. 2149	05 52.6	+46 07'	9.9	15 x 10'	Planetary nebula Np Pi

John Sanford
2215 Martha Avenue
Orange, California 92667



ABOVE: M37 photographed by John Sanford with an 8 inch Celestron on November 10, 1974. Exposure was 10 minutes at F/10 on 103aF developed in Ethol Blue. North is to the right.



ABOVE: Constellation Auriga photographed by John Sanford on October 20, 1974 with a 35mm F/2.8 Nikkor P.C. lens at F/3.5. Exposure was 12 minutes on Fuji R100. North is left. Photographed at the Orange County Astronomers Site, El Cariso, Calif.



ABOVE: The Vail Nebula, NGC 6992 photographed by Kurt Rihm. Exposure was 50 minutes on 103a0.



ABOVE: The Southern part of M31 photographed by Kurt Rihm. Exposure was 60 minutes on 103a0.