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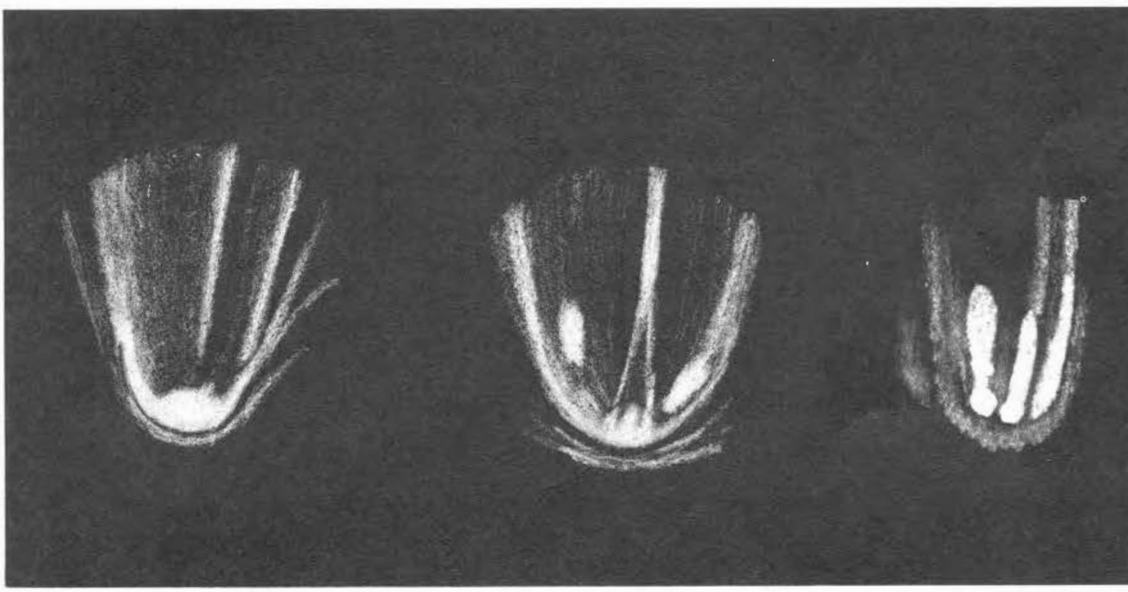

Sketches of the head of Comet West (1975n) by Charles F. Capen, based on his visual studies and on photographs taken with the 20-inch refractor of the Lowell Observatory. Left sketch on March 8, 1976, 12 hrs., 15 mins.-13 hrs., 15 mins., Universal Time. Center on March 15, 12 hrs., 10 mins.-12 hrs., 20 mins., U.T. Right sketch on March 16, 12 hrs., 10 mins.-12 hrs., 55 mins., U.T. Contributed by Dennis Milon. See also text on page 128.

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ASSOCIATION OF LUNAR & PLANETARY OBSERVERS
ALPO

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IN THIS ISSUE

VISUAL AND PHOTOGRAPHIC OBSERVATIONS OF SATURN: THE 1974-75 APPARITION

By: Julius L. Benton, Jr., ALPO Saturn Recorder

Introduction

The report which follows covers the observing period from 1974, July 15 through 1975, June 22, during which time the numerical value of B, the planetocentric latitude of the Earth referred to the plane of the ring system, varied from -23°.651 to -25°.468. Southern portions of the globe of Saturn and the ring system were hence visible to observers. Opposition of Saturn took place on 1975, January 6; and the apparent visual stellar magnitude of the planet on that date was -0.2. The major axis of the ring system at opposition was 46".65, while the minor axis measured 19".43; the equatorial and polar diameters of the globe on the same date were 20".71 and 18".54 respectively.

The following individuals contributed observational reports to the Saturn Section during the 1974-75 apparition:

Observer	Station	No. Dates of Observation	Telescope(s)
Benton, Julius L.	Clinton, SC	35	4" (10.2-cm.) Refr.
Budine, Phillip W.	Walton, NY	2	3.5"(9.0-cm.) Refl.
Doel, Ron	Evanston, IL	3	18.5"(47.0-cm.) Refr.
Fliss, David	Buffalo, NY	20	8"(20.0-cm.) Refl.
Haas, Walter H.	Las Cruces, NM	6	6"(15.0-cm.) Refl. 12.5"(31.0-cm.) Refl.
Heath, Alan W.	Nottingham, England	43	12"(30.0-cm.) Refl.
Parker, Donald C.	Miami, Fl	13	8"(20.0-cm.) Refl.
Pastore, Peter F.	Massapequa, NY	6	10"(25.0-cm.) Refl.
Pierce, William H.	Riverside, CA	3	4"(10.0-cm.) Refr.
Porter, Alain	Narragansett, RI	2	4"(10.0-cm.) Refr.
Price, Ronald S.	Garland, TX	8	12"(30.0-cm.) Refl.
Westfall, John E.	San Francisco, CA	8	10"(25.0-cm.) Refl.
		149 Total Observation Dates	

A total of 149 observation dates were reported to the Saturn Section by the persons listed above, and the following distribution by month of submitted reports will serve to indicate those periods in which observational attention was greatest:

1974, July	--		1975, Jan.	33
Aug.	--		Feb.	28
Sept.	--		Mar.	38
Oct.	3		Apr.	24
Nov.	5		May	8
Dec.	7		June	3
		Total: 149		

The greatest mass of observational data was thus accumulated from the month in which opposition took place (January) up to April. Little or no attention was given to Saturn at the beginning, and throughout the first half of the 1974-75 apparition. A similar, although less significant, lack of observational work was noted at the close of the observing period. The Recorder cannot help but urge observers to attempt coverage of the planet early in the observing season, following through systematically until conjunction approaches. The 1974-75 apparition came to an end as Saturn was in conjunction with the Sun on 1975, July 15.

The writer is most grateful for the continued support of the individuals mentioned in this report, without whose enthusiastic interest such a report would have been impossible.

The Globe of Saturn

The following discussion is comprised of general descriptive notes based on the mass of observational data received by the Saturn Section during 1974-75. For the sake of brevity, the names of observers have been omitted from the text of the report except in the cases where especially noteworthy or isolated observations are described. Those in the reading audience who would like some additional information on any aspect of the discussion, or with respect to a particular feature, should contact the Recorder. Reference to the accompanying illustrative material should assist the reader in his understanding and appreciation of the data and descriptive notes drawn therefrom.

Southern Portions of the Globe. Activity was moderate in the southern hemisphere of Saturn during 1974-75. Rather subtle brightenings in many of the zones were noticed during the observing season, as well as various disturbances and festoon activity in association with specific belts on Saturn. In the course of the 1974-75 apparition, it became apparent that the belts were no so dark as they had appeared throughout the previous apparition, although this difference was not significant except perhaps for the STeB (South Temperate Belt). The SPR (South Polar Region) was particularly noteworthy in 1974-75; it was considerably brighter than it had been in preceding years. This brightening was also noted in association with the SPC (South Polar Cap). Most of the zones were somewhat darker than in 1973-74, the only exception being the STeZ (South Temperate Zone).

A continuation of the comparative study of the average numerical relative intensity estimates of selected global features is presented below:

Zones:	1973-74	1974-75	Comparison
EZ	6.8	6.6	(0.2, darker)
STeZ	5.2	5.9	(0.7, brighter)
STrZ	6.1	5.7	(0.4, darker)
SEB Z	5.3	4.8	(0.5, darker)
SPR	2.9	5.5	(2.6, brighter)
Belts:			
SPC	4.6	5.6	(1.0, brighter)
EB	4.0	4.6	(0.6 brighter)
STeB	3.7	4.8	(1.1, brighter)
SEB_s	3.3	3.8	(0.5, brighter)
SEB_n	3.0	3.1	(0.1, brighter)
SPB	3.4	3.5	(0.1, brighter)

The above table is an extension of the one presented with the report for the 1973-74 apparition of Saturn (see Journal of the A.L.P.O., 25, (9-10), p. 185).

Accompanying this report is a sketch of Saturn (Figure 1) which shows the planet with its ring system, on which labels have been applied to the more commonly reported belts, zones, and ring components. Observers should note also that the ring inclination depicted is for a value of B - 25°000. Reference to the diagram should make understanding of the descriptive notes as they apply to the southern hemisphere of Saturn much easier.

In a personal letter dated 1975, May 14, Agustin Sanchez Lavega, Director of the Saturn Section of the Agrupación Astronómica de Sabadell (in Spain), noted that a relatively long-lived white spot had been detected in the southern hemisphere of Saturn. His account concerned an observation made on March 13 of the same year in the form of two photographic series taken by Luis Tomas Roig of the Observatorio del Teide in Tenerife, Spain. The 40.0-cm. reflector revealed in System II at longitude 280° a white spot of 10° length and 5° width, surrounded by a dark loop. The feature was located presumably in the SSTeB (South South Temperate Belt). The dark loop was visible on photographs taken in red and blue light, but the spot was not obvious on the photograph taken in blue wavelengths. Confirmation of the spot and associated loop took place on the 17th of March. Weather did not clear for additional work until April 21st. Three observers, Gomez, Reginaldo, and Llivina, tried to make a recovery of the spot from Observatorio de Fabra in Barcelona, Spain, using a 38.0-cm. refractor. Atmospheric turbulence did not facilitate photography, but visually the team of observers suspected a large and bright clear area covering the STeZ (South Temperate Zone) and the SSTeB (South South Temperate Belt). It is not known whether this bright area is the same as the previous spot sighted in March in this region or not. Confirming evidence by observers elsewhere has not been forthcoming, even though an alert was issued by the ALPO Saturn Section following receipt of the report from Spain. Readers who might have observed such a spot should contact the Recorder as soon as possible, especially if transit timings were attempted; as this report goes to press, some additional material on the feature has come in, but more will be

General Nomenclature for Saturn's Belts, Zones, and Rings during the 1974-75 Apparition

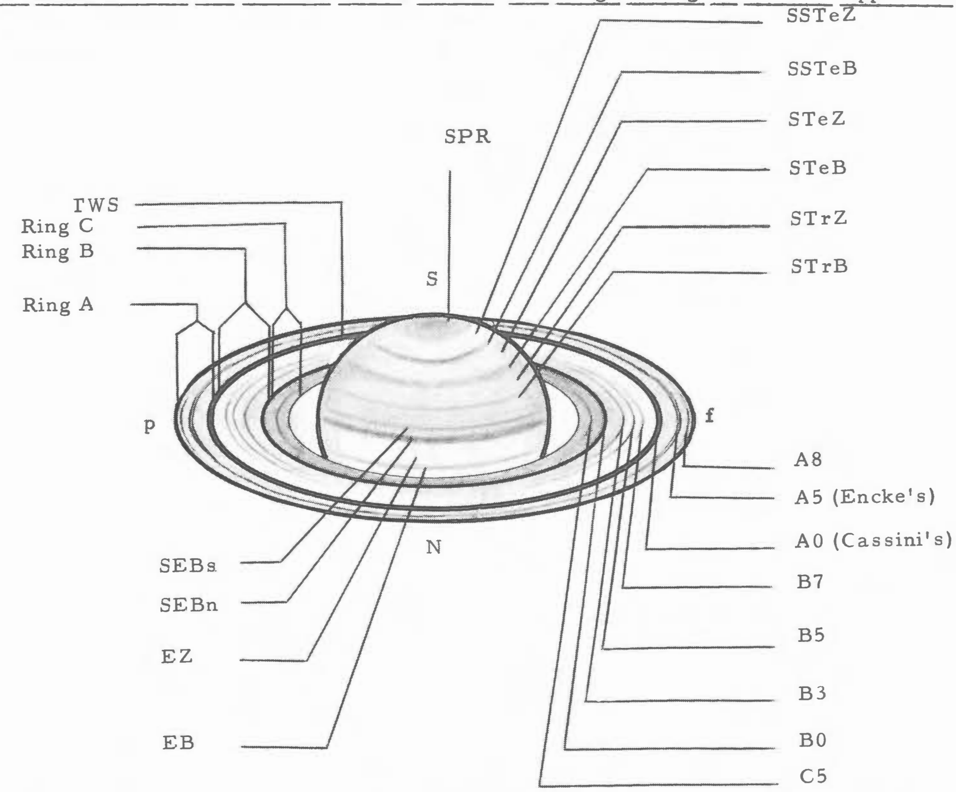

Figure 1. Prepared and contributed by Saturn Recorder Julius Benton. See also text of his report in this issue.

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needed for a proper analytical treatment of the data. A follow-up report will be warranted if enough good data are received.

TABLE I

Visual Numerical Relative Intensity Estimates of Main Saturnian Features for the 1974-75 Apparition with Accompanying Absolute Color Estimates

Feature(s)	Relative Intensity: No. of Visual Estimates	Derived Average Intensity	Estimated Color (Absolute)
ZONES			
EZ_s	13	7.1	yellowish-white
EZ_n	13	7.0	yellowish-white
EZ (as a whole)	4	6.6	cream to dull white
STeZ	10	5.9	yellowish-grey
STrZ	12	5.7	yellowish-grey
Globe, SPB to SEB	4	5.2	yellowish to greyish
SEB Z	6	4.8	yellow
BELTS			
SPC	1	5.6	light-grey
SPR	17	5.5	brownish-grey
STeB	2	4.8	brownish-grey

TABLE I (continued)

Visual Numerical Relative Intensity Estimates of Main Saturnian Features for the 1974-75 Apparition with Accompanying Absolute Color Estimates

Feature(s)	Relative Intensity: No. of Visual Estimates	Derived Average Intensity	Estimated Color (Absolute)
BELTS			
EB	4	4.6	brownish-grey
SSTeB	1	4.0	brownish-grey
SEB_s	9	3.8	brownish-grey
SPB^s	4	3.5	greyish
SEB (as a whole)	2	3.3	brownish-grey
SEB_n	14	3.1	brownish-grey
RINGS			
Terby White Spot	9	8.8	white, brilliant
Ring B (outer third)	17	8.0	white
Ring B (inner portion)	16	7.2	white, dull
Ring A (outside A5)	1	6.4	greyish-white
Ring A (entire ring)	3	6.3	greyish-white
Ring A (inside A5)	1	6.2	greyish-white
B1 (near ansae)	1	3.0	dark greyish
Crape Band	4	2.0	grey
Ring C (off globe)	10	0.8	very dark grey
B10 (near ansae)	7	0.3	black to very dark greyish black
Shadow Globe on Rings	9	0.1	black

Visual numerical intensity estimates are here based upon the ALPO intensity scale, where 0.0 represents complete black and 10.0 indicates the very brightest objects. The adopted scale uses as its standard of reference the brightness of the outer one-third of Ring B, with an assigned intensity value of 8.0, which appears to be very constant with time. Detailed discussions of the intensity scale may be found in the Saturn Handbook.

South Polar Region (SPR). The SPR did not exhibit any marked intensity variations throughout the 1974-75 observing season; and any detail, when suspected, was largely ill-defined in nature. The color of the SPR was always described as a very hazy brownish-grey; and the numerical relative intensity of the region showed strong evidence of a brightening trend since 1973-74 and earlier apparitions, even though no intensity changes during the 1974-75 period were noted. The SPC (South Polar Cap) was noticed by observers on a few occasions as a greyish, somewhat diffuse region, slightly brighter than the surrounding environment of the SPR. The SPC was bordered by a greyish and roughly linear, although frequently discontinuous, SPB (South Polar Belt) at times of good seeing.

South South Temperate Zone (SSTeZ). No observers reported this region during 1974-75.

South South Temperate Belt (SSTeB). Only a handful of individuals recorded the elusive, brownish-grey SSTeB during the apparition in question; the belt was linear, but it was continuous only at times of good seeing, and then only at the threshold of vision. Earlier in the present report the writer described a disturbance in the form of a whitish spot in the general vicinity of the SSTeB; confirmational reports were few.

South Temperate Zone (STeZ). The STeZ was quite prominent during the 1974-75 apparition, a little brighter than in 1973-74. Observers frequently described the region as being fairly wide, with a yellowish-grey hue. Ill-defined festoon activity was noted in the STeZ by contributing observers, and of particular note was the report from overseas relating the discovery of a white spot in the STeZ of suspected long duration. It was not possible for observers to follow the alleged disturbance systematically due to poor weather conditions. (See text above.)

South Temperate Belt (SteB). The STeB was suspected only on rare occasions, when seeing was better than average and when the atmospheric transparency was rather superb. This belt displayed a brownish-grey coloration when seen at all, and observers often though they saw a STeB substantially brighter than during the immediately preceding apparition.

South Tropical Zone (STrZ). Only under optimum observing conditions did any individuals report the STrZ in 1974-75. When observed, the STrZ was usually a yellowish-grey color, and it had been considerably enhanced in brightness since 1973-74. One or two contributors noted a curious array of dark and light spots in the STrZ, although such reports were accompanied by a statement indicating that the individuals were far from confident that their impressions were real.

South Equatorial Belt (SEB). As a single belt, the SEB was only slightly brighter throughout 1974-75 than during 1973-74. The majority of Saturn observers remarked, however, that the SEB was seldom a single feature; it was usually divided into the SEB_s and SEB_n (south and north components, respectively), separated by a less obvious and brighter SEB Z (South Equatorial Belt Zone). As had been the case during 1973-74, the SEB_n was consistently darker than the SEB_s throughout the 1974-75 apparition; in addition, the SEB_n was more distinct as a linear feature than the SEB_s, which was often diffuse. No detail of any real significance was seen in either component of the SEB during the observing season, but a few brightish areas were suspected in the SEB Z on occasion. The color of the north and south components of the SEB was brownish-grey; the SEB Z was always yellowish to yellowish-grey in hue.

Equatorial Zone (EZ). In 1974-75 the EZ was clearly the brightest zone on the planet's globe, as had been true in earlier years; it is apparent that the EZ was slightly darker during 1974-75 than in the immediately preceding apparition, but not tremendously so. The data show that the EZ_n was darker than the EZ_s by only a very slight amount throughout the 1974-75 period, and the EZ as a whole displayed a creamy-white to dull yellowish-white hue during the observing season. Some of our observers were able to see, but only with difficulty, the vague and elusive EB (Equatorial Belt or Band). It appeared to be only about one-half the width of the SEB_s or SEB_n when best seen. The EB was somewhat lighter, slightly more diffuse, and a linear feature in comparison to its appearance in 1973-74. Some people recorded spot activity in the EZ, such features taking on no particular form and merging peripherally into the general tone of the zone itself.

Shadow of the Globe on the Rings. The shadow of the globe of Saturn projected on the rings was black in almost every instance; the only time when there was any deviation from a totally black appearance was at times of poor seeing.

Latitudes of Saturn's Belts and Zones. Latitude estimates during 1974-75 were received only from one observer, Walter Haas, who has been sending in such quantitative estimates for several years faithfully. The writer regrets that more numerical data of this kind have not been forthcoming since a comparative analysis among different observers is badly needed, as well as a comparison of such results with latitude values found by more sophisticated techniques. The results submitted by Haas, after their reduction, have been tabulated and are presented in Table II.* Caution, as in the past, must be exercised in assuming too much from data obtained from only one individual; nonetheless, Haas has been utilizing the visual technique he alone developed for several years, and some expertise on his behalf has very probably been achieved. Even so, many more good visual estimates of Saturnian latitudes are definitely needed if one is to move safely away from subjectivity and sufficiently test the method in a critical manner. Direct comparisons with latitudes measured from drawings and photographs, as well as those obtained through the use of a filar micrometer, have in the past shown that, although very simple, Haas' technique is amazingly reliable. Interested observers are very strongly encouraged to contact the writer regarding participation in latitude programs; we need as many good observers as we can recruit in this aspect of Saturn studies.

The Ring System

In the same manner as in our discussion above of Saturnian global features, the following treatment of the ring system has been derived from the numerous visual accounts of contributing observers throughout 1974-75. As before, the names of individual observers have been omitted from the discussion where the inclusion of such would have little meaning in such a descriptive summary. In the case of isolated phenomena on Saturn and observations of particular note, the identity of the person(s) making them has been included in the text of the report.

With the current apparition report, it has been decided to introduce a comparative survey of various selected ring features and components in keeping with the similar

* The average latitudes in Table II depend upon at most six observed values.

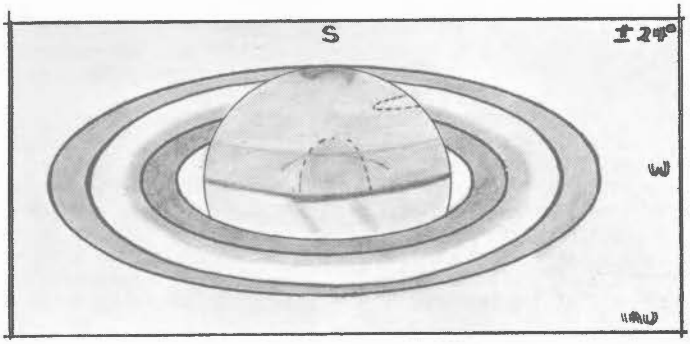

Figure 2. Drawing of Saturn by David Fliss, Buffalo, New York, on January 29, 1975, $3^h\ 55^m$ - $4^h\ 5^m$, U.T. 8-inch refl. (Celestron 8 with enhanced coatings), 200X, no filter. Seeing 5 on a scale of 0 to 10 with 10 best. Transparency 4, limiting stellar magnitude. Figures 2-4 show an inverted telescopic view with south at the top. All three drawings made on a Saturn Section form outline for an axial tilt of -24°. Suspected numerous faint belts in southern hemisphere, festoons drawn in EZ, outlined dark area near center of disc, and outlined light area on west (following) limb. The reader is invited to compare the drawings on this page to the photographs on page 92. The W near the right edge of Figures 2-4 denotes west as a direction in the Earth's sky; Mr. Fliss's drawings are reversed right-for-left because he used a diagonal in his optical system.

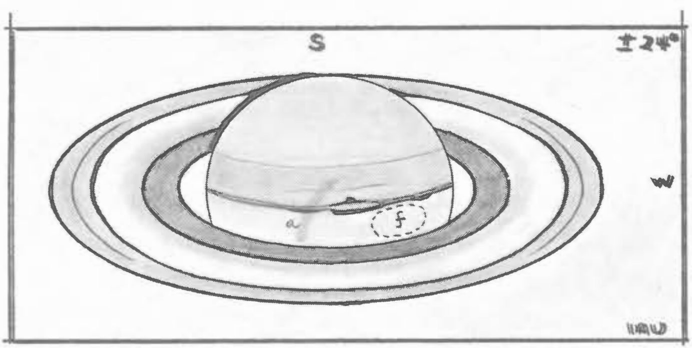

Figure 3. Drawing of Saturn by David Fliss on March 18, 1975, $1^h\ 42^m$ - $2^h\ 6^m$, U.T. 8-inch refl. (Celestron 8), 200X. Seeing 6 to 4, transparency 5. Dotted area in EZ suspected of festoon activity. Feature marked a suspected and here drawn twice as dark as other detail. Note shadow of globe on rings on east side of globe. Encke's Division is drawn near the ansae, and Ring B is dusky toward its inner edge.

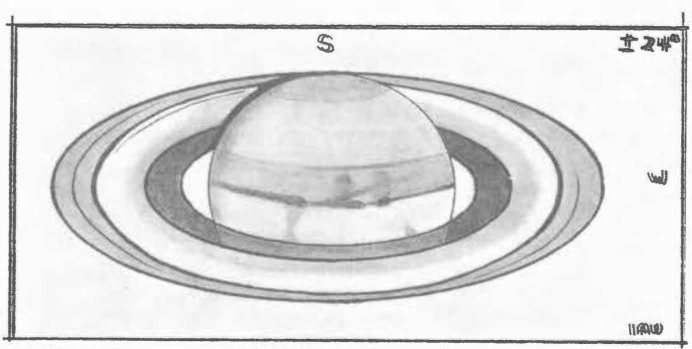

Figure 4. Drawing of Saturn by David Fliss on April 22, 1975, $1^h\ 26^m$ - $1^h\ 45^m$, U.T. 8-inch refl. (Celestron 8), 200X. Seeing 6-5, transparency 4.5. Suspected festoon in EZ and very narrow division near B8 position in southeast part of rings. Gibbous moon and bright sky. A complex mottling was glimpsed south of the SEB. Note the dusky South Polar Region. West ansa of Ring C less easily seen than east ansa, and outer edge of west ansa of Ring A fuzzier than east ansa. Selective seeing effects?

TABLE II

Latitudes of Saturnian Features During the 1974-75 Apparition

Feature	Eccentric Latitude	Planetocentric Latitude	Planetographic Latitude
N Edge Crape Band*	+26°164	+21°387	+23°684
S Edge Crape Band*	+20.519	+16.613	+18.478
Center EB	- 4.476	- 3.571	- 3.998
N Edge SEB_n	-27.266	-22.336	-24.710
S Edge SEB_n	-29.716	-24.466	-27.004
S Edge SEB_s	-34.558	-28.771	-31.590
N Edge SPB	-73.825	-70.007	-72.003
S Edge SPB	-80.008	-77.537	-78.837

*The latitude of this feature varies with the changing value of B, the tilt of the axis of Saturn toward the Earth.

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study of global features. At the outset, it is of some importance for the writer to point out that a truly valid and rigorous comparative study cannot be realized until observers begin utilizing similar techniques in a standardized and systematic program. In addition, effective response of observers in greater numbers is essential to our programs if a proper statistical analytical treatment of the data is to materialize. Thus, while our records may suggest some information in reference to ring phenomena over the years covered by the table below, one must be careful not to draw too heavily upon the limited data sampling that has accumulated. As we begin discussing the various ring components as they appeared during 1974-75, we shall make some references to the previous apparition (1973-74) where such is appropriate; some brief notes regarding the tabular data on numerical intensities of ring features in recent years presented below shall also be included in our discussion.

	1967-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
Ring B (outer third)	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Ring B (inner portion)	6.1	6.5	6.6	6.6	7.1	7.1	7.2
Ring A (outside A5)	---	6.5	6.3	6.2	6.1	6.3	6.4
Ring A (inside A5)	---	6.2	5.7	6.0	5.9	6.3	6.2
Ring A (entire ring)	5.3	---	---	5.9	5.9	6.4	6.3
Crape Band	1.5	2.0	2.1	2.2	2.0	1.6	2.0
Ring C (off globe)	1.5	1.5	1.2	1.0	1.2	0.9	0.8
B10 (Cassini's Division)	---	---	0.5	0.2	0.4	0.3	0.3
A5 (Encke's Division)	---	---	3.7	3.5	2.6	2.3	---
Terby White Spot	---	---	7.5	7.5	7.6	7.3	8.8

Ring B. As has been traditional for several years, observers made visual estimates of the numerical relative intensity of Saturn's global and ring features during 1974-75 using the outer third of Ring B as the reference standard at the assigned intensity of 8.0 on the standard scale. Of the three major components of the ring system, Ring B was the brightest (see the accompanying photographs of Saturn and its rings); the outer portion of Ring B was stable in intensity and was considerably brighter than the inner portion by about 0.8 intensity units (refer to Table I). The inner portion of Ring B has also been a little brighter since 1971-72 than in earlier apparitions. The color of Ring B, taken as a whole, was consistently white. No activity in the form of spots (other than the probably illusory Terby White Spot) or other features was noticed by observers during the 1974-75 apparition. Cassini's Division (denoted as A0 or B10) was always very dark grey to black in appearance, and it was seen all the way around the rings in good seeing; it was nearly always reported at the ansae. The occasional reports of intensity minima in Ring B included consistently the observation of B1 near the ansae, which had a greyish coloration on most occasions and was never totally black.

Ring A. Observers concurred that the overall brightness of Ring A remained stable throughout 1974-75; taken as a whole, Ring A has been brighter by a factor of about 0.3 to 0.4 units since 1972-73, but the portion of the ring component immediately outside A5 (the denotation for Encke's Division) has been fairly stable in brightness

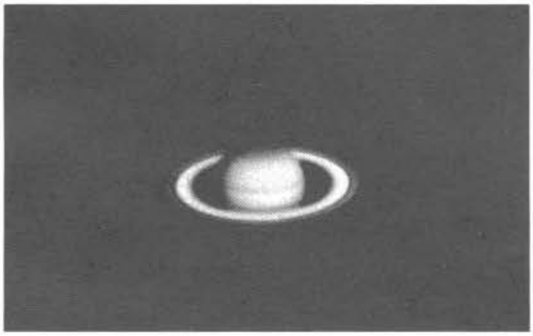

Figure 5. Photograph of Saturn by Ron Price, Garland, Texas, October 17, 1974, 11^h 0^m, U.T. 12.0-inch f/15 Cassegrain reflector. Seeing 8 on a scale of 0 to 10 with 10 best. Transparency 6, limiting stellar magnitude. Tri-X film. Exposure 3 seconds. Figures 5-7 are simply inverted views with south at the top. Some of the finer details on Mr. Price's original photographs may be lost in reproduction. Note how Ring B becomes duskier at its inner edge and how Ring A is much dimmer than Ring B. The shadow of the globe on the rings is here west (left) of the globe before opposition. The belt near the vertical center of the globe is the South Equatorial Belt, or more probably the South Equatorial Belt North. The Crape Band is present just south of (above) the projected Ring B, and the Equatorial Zone is brighter in its south half than in its north half.

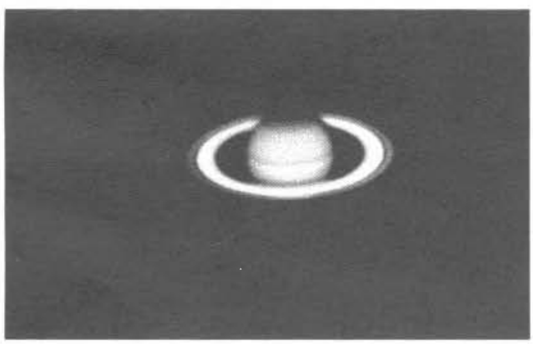

Figure 6. Photograph of Saturn by Ron Price on January 16, 1975, 6^h 0^m, U.T. Seeing 8, transparency 6. Exposure 4 seconds. Same telescope and film as for Figure 5. The shadow of the globe on the rings is here very narrow only ten days after opposition. Note the extreme duskiness of the South Polar Region. On the originals of Figures 5,6, and 7 a narrow Equatorial Band is faintly visible. Any belts between the SEB_n and the SPB are difficult to distinguish, even on the original prints.

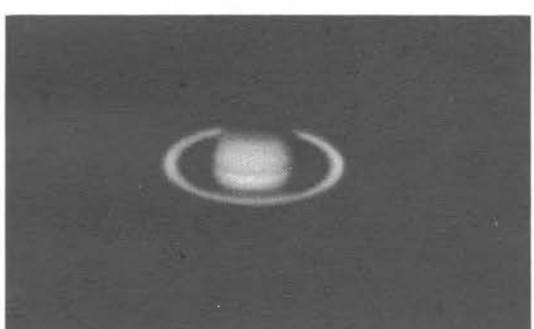

Figure 7. Photograph of Saturn by Ron Price on February 10, 1975, 4^h 30^m, U.T. Seeing 8, transparency 6. Exposure 3 seconds. Same telescope and film as for Figure 5. The shadow of the globe on the rings is here east (right) of the globe after opposition. The reader is invited to compare these photographs and the text of Dr. Benton's Saturn Report.

for several years, any brightening since 1972-73 being of relatively minor significance. The portion of Ring A outside A5 was always brighter in 1974-75 than the portion of the ring immediately inside A5; this fact has remained a consistent impression of observers since 1969. The color of Ring A throughout its entire width was described as being greyish-white during the present apparition. No activity other than a few suspected amorphous bright spots and dark splotches was noticed by anyone throughout 1974-75. Encke's Division (A5) was vague and ill-defined; it was seen only near the ansae in good seeing. No other activity or intensity minima in Ring A were reported during 1974-75.

Ring C. Observers with telescopes in excess of about 4 inches (10 cms.) aperture reported Ring C on a regular basis near the ansae. It was described as always having a very dark grey appearance with no sharp inner boundary (approaching the globe of Saturn). Those using smaller instruments were unable to see Ring C clearly, although at times of good seeing it was strongly suspected by a few people. Since 1972-73 Ring C has been described as being darker than it had appeared during the period from 1967 through 1972. Nearly all observers saw Ring C in front of the globe (Crape Band) as a greyish, linear streak.

Terby White Spot. A brilliant, white spot was seen where Ring B adjoined the shadow of the globe on the rings, and this feature is presumably a contrast effect involving the very bright Ring B and the exceedingly dark shadow of the globe on the rings. During 1974-75, the spot was exceedingly brilliant and conspicuous, much more so than in past apparitions.

Bicolored Aspect of the Rings. Quite a few people submitted observations of the rings of Saturn during 1974-75 in which color filter techniques were employed. Unfortunately, only a mere handful of our observers utilized filters of comparable color and of known transmission. Thus, a thorough reduction of the data from the standpoint of a comparative and confirmational analysis of the results was made most difficult or impossible.

The following are the results obtained by Haas during 1974-75 in his investigations of the curious bicolored aspect of the ring. Here E denotes the east arm of the rings and W the west arm as directions in the Earth's sky.

General Information	Wratten Filter 47 (blue)	No Filter	Wratten Filter 25 (red)
1975, May 15 02:30 U.T. 188X, 6" (15-cm.) Refl. S3, T5.5	E > W (E arm brighter)	E = W (2 arms same brightness)	E = W
1975, May 16 02:36 U.T. 188X, 6" (15-cm.) Refl. S3-4, T5.5	E > W	E = W	E = W
1975, May 27 02:50-02:53 U.T. 303X, 12.5" (31-cm.) Refl. S2-3, T5.5	E > W	E = W	W > E
1975, June 16 02:40 U.T. 202X, 12.5" (31-cm.) Refl. S2, T5	W > E	E = W	E = W
1975, June 21 02:40-02:47 U.T. 202X, 12.5" (31-cm.) Refl. S1-2, T5	E = W	E = W	E > W

Individuals should note that observations such as these need confirmation by as many persons as possible using the standard methods established by the Saturn Section; when a good set of simultaneous observations of the strange bicolored aspect is available, some conclusions may be drawn about the nature of the phenomenon, whether it is real or an illusion of some kind produced by atmospheric refraction, etc.

The Satellites of Saturn

Although numerous observers remarked that several of the brighter satellites of Saturn were visible in varying apertures, there was only a minimal amount of material available with respect to visual magnitude estimates of the satellites. As a result, it was not possible to perform a suitable analysis on the very sparse and largely unrelated data. Observers are encouraged to undertake visual magnitude work on the satellites of Saturn whenever possible, employing the standard observing techniques set up by the Saturn Section.

Concluding Remarks

As can be seen from the preceding report, our observers took part quite actively in the more general observing programs, which included disc drawings, intensity estimates, and photography of the planet Saturn. While the general observations are certainly an essential and fundamental part of our programs, so too are the more specialized endeavors (i.e., latitude estimates and measurements, satellite observations, observations using color filter techniques on the rings and globe, etc.). A critical need for more concentration on the more specialized areas of Saturn observing definitely exists, and observers are encouraged to spread out their work into these areas as soon as experience and time allow. Even more important than participation in more advanced work is the absolute necessity for observations utilizing the standard ALPO observing methods (e.g., intensity estimates using the 0-10 scale common throughout the ALPO, standard filters of known transmission in colorimetric work, and so on). Comparisons and the reduction of observational data by statistical methods is made exceedingly troublesome and virtually impossible when a continuity of techniques is not established and maintained at the beginning. Observers are being urgently asked to react to this appeal for standardization of technique; reference to the Saturn Handbook should be all that is necessary for familiarization with the proper programs and standard observing methods. The Recorder is always willing to help the serious observer get started on a meaningful program, and requests for assistance are cordially invited. Ultimately we hope to establish not only truly standardized programs throughout the Section but also a trend toward simultaneity in the observing endeavor. A future paper devoted to simultaneous observations shall appear, once the guidelines have been worked out.

Thanks again are in order to the faithful observers who made this report a possibility. The Recorder invites new members to the Section and he stands ready to help the novice or advanced observer get underway with a useful, standardized, and productive research program.

SOME REMARKABLY ACCURATE STATEMENTS ABOUT CONDITIONS ON THE PLANET MARS PUBLISHED 50 AND 70 YEARS AGO*

By: Robert E. Van Geuns

During the last quarter of the 19th century and the first quarter of this one no astronomical problem excited laymen more than the question of whether the surface of Mars is criss-crossed by a network of canals. It all started when the Italian astronomer Giovanni V. Schiaparelli (1835-1910), Director of the Milan Observatory, who had been studying Mars with a 8.7-inch refractor during the unusually favorable apparition of 1877, began to draw fine, straight lines on his Mars maps, which came to be called "canals". The name canal, of course, at once suggested that those unusual features of the Mars surface were the work of intelligent beings. The resulting excitement therefore was quite understandable. Later maps by the same astronomer showed more and more of those straight lines, which formed an intricate network on the surface of the Red Planet. The excitement increased when, after the apparition of 1879, Schiaparelli announced that one of the previously observed canals had split and now appeared not as one straight line but as two parallel ones. During the next apparition the Italian astronomer in one month discovered 17 more cases of such "gemination" of canals.

Very soon, on the basis of Schiaparelli's observations, the theory was developed that those canals had been created by intelligent beings with the purpose of bringing the water from the melting polar caps to areas at lower latitudes. On Mars water is a scarce commodity. It appears to concentrate at the polar cap of the hemisphere which is having its winter season. During spring and summer that cap melts, and the canals would transport the precious water to lower latitudes to irrigate otherwise dry, desert land.

This undoubtedly was an exciting theory, very well suited to arouse popular interest. It of course was exploited by science fiction writers. Percival Lowell (1855-1916) was the most ardent exponent of the canal theory. To investigate the problem under the most favorable conditions he had an observatory built for him near Flagstaff, under Arizona's pure and transparent sky. There he observed Mars first with an 18-inch refractor and later on with a 24-inch refractor, for those days large instruments, at an altitude of 7,200 ft. Because of his somewhat extreme defense of the canal theory it would be justified to call him the prophet of the

*Mr. Van Geuns contributed this article in April, 1976, and thus before the Viking I and II Missions, which have greatly modified our concepts of the nature of Mars.

canals.

Seasonal color changes, observed during the melting of the polar caps, appeared to confirm the canal theory. During that melting a darkening wave was observed, which started at the polar cap and moved at an average speed of about 28 miles/day towards the equator. Most observers agreed about that phenomenon, though they did not always give the same figure for its speed. However, there was much less agreement about the resulting color changes in the dark markings on the Mars surface. Observers like Lowell and Antoniadi noted green colors in spring and summer (see references at the end of this article: ref. 1., pp. 221,222) which turned brownish in midwinter, whereas de Vaucouleurs (ref. 2., pg. 51) noted brown colors in the warmer months. The appearance of brownish colors in winter, as reported by Lowell and Antoniadi, of course was compared to the similar changes occurring here on Earth. Therefore, the canalists stated that those color changes were the result of vegetation which sprang up when the melting snow from the polar caps reached lower latitudes through the canals.

Because of the intense interest in Mars generated by these observations and speculations, a number of its features and characteristics were assiduously investigated, such as the composition and density of its atmosphere, the temperature at its surface, the composition of the polar caps, and the nature of its light and dark surface markings.

The French astronomer Abbé Theophile Moreux (1867-1954) wrote, probably during 1906, a rather detailed survey of Mars observations and theories in two chapters of his book "Les Enigmes de la Science" ("Science Mysteries," ref. 3.). In 1924 he published "La Vie sur Mars" ("Life on Mars," ref. 4.), and he dedicated one chapter to Mars in his popular astronomy "Le Ciel et l'Univers" ("The Sky and the Universe," ref. 5.), which was published in 1928. We will discuss here at what conclusions Moreux arrived in those three publications to show that in many respects they check well with what our space ships have taught us about the mysterious planet.

But before we start on our investigation, a few words about Moreux. He was a deligent observer of Mars at his private observatory at Bourges, France. It was a small observatory, built in Moorish style, with one couple on top of a tall building. It housed his equatorially mounted 6.5-inch refractor, a fairly small instrument. He also made extensive series of observations of the Sun, especially sunspots, first at the well equipped, private observatory at Juvisy of his famous countryman, Camille Flammarion (1842-1925) and later at his own observatory. In 1900 he went with Flammarion to Spain to observe a total Sun eclipse there. In 1905 he directed a small group sent by the Bureau des Longitudes to study the total eclipse of the Sun on August 30 at Tunis. Like Flammarion, he wrote extensively in the field of astronomy and meteorology in scientific publications and popular books and lectured before scientific societies. Though his books never had the enormous circulation of those by Flammarion and, to the best of my knowledge, never were translated, they nevertheless were widely and appreciatively read. I have found a number of copies in Latin American countries. Though I do not always agree with his views, I always have read his publications with interest and pleasure. He wrote well and interestingly, in a simple and clear style. Almost always he kept his feet on the ground and stuck to rather level headed opinions. Yet he proposed a number of imaginative and original theories of his own. Though he worked under much more unfavorable conditions than Lowell, he had one great advantage over that "prophet". Moreux was an excellent pencil and crayon sketcher and a good water color painter. These were very valuable attributes for a visual observer who wanted to transmit his observations to his colleagues and the public.

Now about his opinions on conditions on Mars in the years 1906 and 1925. We will explain them systematically, by subject.

CANALS

The canals in general

In ref. 3., pp. 149-151 Moreux pointed out that the name "canal" was extremely badly chosen and was applied to rather dissimilar surface markings. Firstly, there are the very broad markings like Ceraunius (longitude 100°, between Ascraeus Lacus and Mare Boreum) and Nilokeras (between Mare Acidalium and Lunae Lacus). They hardly differ from the "maria". The only difference is that whereas the outlines of the maria mostly are well defined, the banks of those broad canals are blurred. Secondly, there are canals formed by a series of smaller and larger dots and irregular, short lines, which go in a certain direction. Finally, there are the fine, straight line canals of Lowell and Schiaparelli.

Moreux was convinced that the fine, straight line canals were the result of an optical illusion, ref. 3., pp. 126, 127. His conviction was based on two facts. Firstly, there were the results of the famous experiments by the Physician Evans and the astronomer Maunder, both British, performed in 1903. (Ref. 8 gives an incorrect date, 1913.) Secondly, very few of the observers utilizing what were then the world's largest refractors and reflectors saw canals. Moreux could have added that Lowell frequently had to reduce the aperture of his 24" refractor to about 8" to see canals (ref. 6., pg. 265 and ref. 7., pg. 87), which confirmed the conclusions which can be drawn from points one and two.

The Evans-Maunder experiment was conducted as follows (ref. 3., pp. 122-126 and ref. 6., pg. 259 and pp. 266-270): a large wall map of Mars was produced, based on a Mars drawing by Schiaparelli. It showed some of the classic dark areas but in the lighter areas an irregular pattern of dots and short, curved lines, instead of Schiaparelli's straight line canals. In front of that map were seated the 20 best pupils of a school teaching drawing, of ages 12-14. It was certain that none of those pupils knew anything about Mars canals. The pupils were placed at different distances from the map and were asked to sketch what they saw. Those close to the map drew it fairly accurately, but those farthest away replaced the irregular pattern of dots and short, curved lines by straight lines, very similar to those shown on Schiaparelli's original drawing.

Moreux repeated this experiment (ref. 3., pg. 122) with exactly the same results. When we combine this result with the fact that the largest refractors and reflectors seldom showed the straight line canals, the conclusion that we are dealing with an optical illusion is a fairly safe one. In smaller instruments, details like a canal are at the very limit of visibility. Under those conditions the eye, or perhaps more correctly, the brain, combines those vague details into a straight line, just like the drawing school pupils did.

The close-ups of the Mars surface taken by the recent Mariner space ships didn't show anything which corresponded with the fine, straight line canals. Some of the broad canals corresponded to canyons and valleys, as for example the enormous canyon Valles Marineris corresponds with the classic broad line marking Coprates. However, other broad line canals have no counterpart on the modern photographic Mars maps. This result shows that Maunder and Moreux were correct when they stated that the fine, straight line canals were the result of an optical illusion.

To have a true appreciation for Moreux's convictions, we have to take into account that at the time he wrote ref. 3., which, based on the dates of his references, must have been during 1906, Lowell's views still dominated the astronomical world, especially in our country. An even better appreciation for Moreux's analysis is derived from a comparison of his views with those of the industrial scientist and inventor, Wells Alan Webb, who published in 1956 the work "Mars, the New Frontier, Lowell's Hypothesis," (ref. 7.). In that book, written some 50 years after Moreux's study, Webb staunchly defended Lowell's ideas of canals created by intelligent beings. His main argument for the artificiality of Lowell's canal networks was based on a general study of both artificial and natural networks. Comparing the canal network drawn by Trumpler at the Lick Observatory with artificial and natural networks, he concluded that the canal network showed the same characteristics as artificial networks like railroad systems. This idea was very clever; but as happens not infrequently with such very clever ideas, they fail because something has been overlooked. Webb overlooked that the canal networks were created by the brain of the observer, interpreting details at the limit of visibility. It was this interpretation by the brain which created the artificial characteristics.

The gemination of some canals.

Here again Moreux was firmly convinced that the phenomenon of a particular, straight line canal's splitting up into two parallel straight line canals was an optical illusion. In a lecture he delivered in 1898 before the Astronomical Society of France he already tried to prove as much. Also in ref. 3. and ref. 4. he indicated several possible explanations for that strange phenomenon. On pages 43 and 44 of ref. 4. he mentions that the doubling might be caused by the variable density of air layers resulting from currents or temperature changes. During an observation of the Sun with a low power ocular he had noticed how a sunspot suddenly became double. He could not determine which of the two images was the real sunspot. That phenomenon lasted for five minutes. Thereafter, he only saw one sunspot.

Since the Mariner Mars close-ups didn't reveal any canals, they of course didn't reveal any double canals.

THE ATMOSPHERE

Density

Moreux knew from his own observations that Mars has an atmosphere, though a very thin one. He agreed with the estimate, current in his time, that the Martian surface atmospheric pressure could be of the order of 65 mms. of mercury or 87 millibars (ref. 4., pp. 78,79). He realized this value was only an estimate, based on a number of suppositions (ref. 3., pp. 173,174). The measurements by Mariner IX have indicated an average pressure of only 6 millibars, very much lower than had been expected. It will be interesting to see what the bicentennial Mars landings will have to report on the pressure at the Mars surface.

Composition

Moreux was sure that there was some water vapor in the Mars atmosphere because of the polar caps and because of the mists he had observed, which had sometimes blotted out surface details. At the time he wrote the books under discussion here, spectrum analysis had indicated that there was water vapor in the Mars atmosphere (ref. 3., pg. 194).

Strangely enough, Moreux didn't discuss the presence or absence of oxygen in the Mars atmosphere. He only mentioned on page 90 of reference 4 that oxygen in the Mars atmosphere is sparsely distributed. Such is still the modern point of view; Mariner IX found CO_2 to be apparently the main component of the atmosphere.

Clouds, mists

From his own observations Moreux concluded that the Mars atmosphere contained clouds and mists. He had observed clouds near the terminator; and frequently mists and fogs had blotted out, partly or wholly, the familiar surface markings. He assumed those clouds, mists, and hazes to consist of water droplets. I don't think that he was opposed to the idea of dust clouds; but he paid much more attention to normal clouds, for they appeared to prove the presence of water vapor in the atmosphere. He was convinced that the transportation of the melt water of the polar caps was affected by atmospheric currents. Present day thinking is that part of the clouds consist of CO_2 crystals.

The blue haze

Several observers have noted a mysterious blue haze on Mars, which at times covers large areas. Even today, investigators do not agree on an explanation of this phenomenon. Apparently there are two kinds of blue hazes. One, which is a true haze, makes surface markings less clearly visible; and another kind only lends a blue color to the surface below. Both types of hazes were observed by Moreux (ref. 3., pp. 156-159). He gave an explanation of the blue haze which is interesting, though it appears to me it applies principally to the haze which only colors the underlying surface.

Moreux observed that the blue haze occurred mostly at higher latitudes. Therefore, he felt it must be produced by the diffusion of light in the Mars atmosphere.

As is well known, the blue color of our sky is caused by diffusion or scattering of light rays in our atmosphere. The shorter the wave length of a light ray, the greater the amount of scattering or diffusion by the atmosphere. That means that especially the ultraviolet, violet, and blue rays are scattered. Seen against the pitch black of the universe, the atmosphere therefore looks blue. The Sun and the Moon seen through our atmosphere look slightly more yellow, sometimes even more reddish, than they actually are because the light they send to us has lost part of its violet and blue rays.

The effect described above is produced by air molecules. Larger particles, like dust particles and water droplets, give a whitish hue to the atmosphere as a result of the scattering produced by them. The dryer and purer the air, the deeper its blue color. Most of us have observed this effect.

Several facts check with Moreux's idea that the blue haze may be the result of light scattering in the Martian atmosphere. Firstly, he observed it mostly in higher latitudes, where we look through a thicker layer of the atmosphere, which would thus produce a deeper blue color. One objection can be that then we must see a blue haze all around the Mars disc because close to its rim we everywhere look through a thicker layer of its atmosphere. This objection, however, is answered by the following point 2. Secondly, at the polar regions the temperature is lowest, which means that the absolute humidity there also must be lowest. Humidity and dust turn the blue diffusion color into a whitish color. This might explain why only the polar regions of Mars show the blue haze. Thirdly, the blue haze we are dealing with here coincides with periods of almost perfect visibility of the Mars surface markings, pointing to a very pure atmosphere. As stated above, a very pure atmosphere is essential for the full development of the blue diffusion color.

Moreux further observed that the blue haze often actually is blue-violet. This would check with Mars' very thin atmosphere. In that atmosphere blue would be scattered less than in ours. It appears likely that an observer on the surface of Mars would see its sky as a dark violet-blue vault. Because of the weaker diffusion for Mars some of the pitch black of the universe would mix with the diffusion colors.

Admittedly the above is not proof that the blue haze is a diffusion color. Moreux's suggestion nevertheless has some merit and might be worth some further investigation.

TEMPERATURES AT THE SURFACE OF MARS

Moreux made estimates of the Martian surface temperatures which are recorded in ref. 3., pp. 162, 163 and ref. 4., pg. 84. Part of those estimates he published in 1906. They are remarkably close to later measurements by W.W. Coblentz. Moreux's estimates were:

polar regions,	summer	ref. 3	could rise above	5°C
polar regions,	summer	ref. 4	could reach	10°C
equator	summer	ref. 3	around	16°C
equator	summer	ref. 4	could reach	33°C

In ref. 3, pg. 164 he pointed out that his estimates must be lower than the actual Mars surface temperatures because he assumed equal atmospheric pressure at the Mars and Earth surfaces. Because of lower atmospheric pressure on Mars its surface receives more heat from the Sun than if its atmospheric pressure was the same as on Earth. This fact explains the higher estimated temperatures recorded in ref. 4.

Coblentz' measurements at the Lowell observatory at Flagstaff, made in 1926, are reproduced as graphs in fig. 3 and fig. 4 of ref. 2. Fig. 3 shows that at the equator the summer temperature reached 30° to 32°C. Fig. 4 shows for a Mars latitude of -20° maximum summer temperatures of 28° and 33°C and for latitude -80° maximum temperatures, again in summer, of -1°C and +10°C. These measures would appear to indicate that Moreux's estimates were pretty close.

His estimates were based on three sets of data. In the first place, he started from the average Mars temperature calculated by J.H. Poynting using the well known Stefan Law which rules radiation (Nature, Sep. 20, 1904). Secondly, he used temperature measurements by the Norwegian Arctic explorer and scientist, Fridtjof Nansen, who took air and surface temperatures at the same latitude in the Arctic. Finally, he used analogy with known Earth temperatures at the poles and at the equator.

THE POLAR CAPS

Moreux conceived the Mars polar caps to be composed of very thin layers of hoar-frost. In the center of the cap was a permanent layer of frost, surrounded by layers of frost which melted in spring and summer. Present day investigators are in agreement with a layered structure of the polar caps but think the impermanent part of the cap is mainly CO_2. It seems to me that this composition still has to be proved.

SURFACE MARKINGS, MOUNTAINS

Surface markings

As to the nature of the dark and light areas on Mars, Moreux shared the opinion of his contemporaries that the dark markings are lower regions, somewhat similar to the dark, flat Moon plains and that the light colored areas are higher, desert plateaus. Mariner IX has revealed that there are mysterious differences from Moon conditions. On the Moon the dark, flat regions show few craters and mountains, whereas the lighter areas are dotted with craters. This is not true for Mars. Comparison of the inside front and back covers of ref. 8. shows that the dark markings comprise both areas with few craters and areas with a great many craters. The present hypothesis is that the dark areas are caused by dust. It appears to me it would be more accurate to state that the changes observed in the dark regions are caused by dust storms. If the permanent part of the dark markings is the result of dust covers, it is hard to understand why after the tremendous dust storm of 1971 the well-known classical markings showed up again after the storm subsided. A more likely hypothesis would be that the darkness is the result of specific geological formations.

Moreux remarked correctly that the dark markings, in their main outlines, are remarkably stable (ref. 3., pg. 153). What is perhaps the most prominent one, Syrtis Major, was observed and sketched by the Dutch physicist, Christian Huygens, more than 300 years ago. Compare the map drawn by Schiaparelli in 1877 (ref. 8., pg. 5) with the modern map on the inside front cover of the same publication. Differences in the geological formations between the dark and light areas would better explain the stableness of those markings.

Moreux thought that the seasonal changes in color observed in the dark markings could be produced by some kind of primitive vegetation. This now doesn't appear very likely, but can not be completely ruled out yet.

Mariner IX found that, generally speaking, the light colored regions are not on a higher level than the darker ones. For example, the circular light marking Hellas is the lowest area on Mars observed by Mariner IX. On the other hand, some of the highest mountains on Mars are found in the light colored areas, Tharsis and Hougeria.

On pg. 137 and pg. 138 of ref. 3. Moreux made a statement which was truly prophetic. He there stated that we really knew almost nothing about Mars and that we could not pretend that our Mars maps revealed its true topography. One needs only to compare the classic Mars map on the inside front cover of ref. 8. with the new photographic map of Mars on the inside back cover of the same publication to realize how prophetic that statement was.

The dark wave

We already have dealt with the dark wave earlier in this article. Even today we don't have a good explanation of this phenomenon. Moreux estimated the speed with which it moved towards the equator at about 50 miles/day (ref. 4., pg. 88). He belonged to the group of observers who saw the darker markings become green or blue-green in spring and summer and brown in winter (ref. 4., pg. 87). Like most of his contemporaries, Moreux believed that the wave was caused by the springing up of vegetation when air currents brought the moisture generated by the melting or subliming of the polar caps to the dry lower latitudes.

Those who have studied the Mariner IX data think that the observed darkening is more probably the result of the fact that the light areas become lighter. They feel those areas are not actually green or blue-green but gray in color. Let us hope that the bicentennial landings will solve this mystery.

Mountains

In 1925, when Moreux published his studies, and even long thereafter, the general opinion was that Mars is not a mountainous planet (ref. 2., pp. 22, 23; ref. 1., pg. 225). The argument was that no mountains were observed at the Mars terminator. Moreux disagreed. He considered the absence of mountain silhouettes on the terminator as inadequate proof of the absence of high mountains. He pointed out (ref. 3., pp. 139, 140) that the maximum phase presented by Mars corresponds to the Moon phase about four days before or after Full Moon. The very feeble excrescences of even high mountains would be hidden by diffusion in the Mars atmosphere. In ref. 5, pp. 217, 218 he stated categorically that there must be high mountains on Mars because of the presence of white spots in certain areas which he attributed to snow-covered mountain peaks.

The Mariner IX pictures have fully confirmed his convictions. Mars actually has mountains higher than those on Earth. The highest one, Olympus Mons, has a height of 78,000 ft., compared with the 29,000 ft. of Mount Everest.

In ref. 5., pg. 217, he made another remarkable statement. He there expressed the opinion that the circular forms we observe on Mars can well be collapsed craters, similar to those on the Moon, like the Mare Crisium. Comparison of the Mars maps on the front and back inside covers of ref. 8 shows that this is true for Hellas Planitia and also to some extent for Argyre Planitia and Insidia Planitia. Furthermore he stated there that the smaller, Moon-like craters (French: <u>cirques</u>) would be too small to be observable from Earth. In other words he expected Mars to have a somewhat moonlike surface. A very remarkable prediction, which turned out to be largely correct!

LIFE ON MARS

This problem, the existence of life on Mars, undoubtedly is for laymen the most exciting one, especially if there might be intelligent life on Mars. Unfortunately, the existence of intelligent life there can practically be ruled out.

Moreux was convinced that if there was any life on Mars it must be a very primitive type of vegetation, like lichens, seaweeds, mosses, and mushrooms. (ref. 4., pg. 90). That means that 29 years before Dr. Hubertus Strughold, Professor of Aviation Medicine and Head of the Department of Space Medicine at the U.S. Air Force School of Aviation Medicine, published his remarkable study, <u>The Green and Red Planet, a Physiological Study of the Possiblity of Life on Mars</u>, Moreux arrived at substantially the same conclusions, which again shows that Moreux was a very level-headed person who did not let himself be carried away by exciting theories.

Some final words. The exciting idea that there are canals on Mars has had to be abandoned. However, we have made the equally exciting discovery that there have been rivers on Mars. This again suggests intriguing possibilities. I hope that we shall not again be so carried away by those possibilities that we lose contact with reality and common sense. Some articles I have read about the results of the Mariner IX expedition would suggest that we again may begin to pursue very exciting but rather far-fetched theories. The Mars canal theory is not the only example in Astronomy of the pursuit of a not very scientific theory.

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TWO EASTERN (EVENING) APPARITIONS OF THE PLANET VENUS:

1973-74 AND 1974-75

By: Julius L. Benton, Jr., A.L.P.O. Venus Recorder

Introduction

The following report covers the two eastern (evening) apparitions of the planet Venus outlined below:[1,2,3]

1973	April	$09^d 19^h$U.T.	Superior Conjunction
	November	13 10	Greatest Elongation East (47°)
	December	19 06	Greatest Brilliancy (-4.4)
1974	January	01 16	Stationary
	January	23 21	Inferior Conjunction
1974	November	06 13	Superior Conjunction
1975	June	18 16	Greatest Elongation East (45°)
	July	22 00	Greatest Brilliancy (-4.2)
	August	03 21	Stationary
	August	27 13	Inferior Conjunction

The following numbers of observations by period have been utilized to prepare this report:

1973, April 9 through 1974, January 23:	79
1974, November 6 through 1975, August 27:	175

A breakdown of the number of observations received by months for the two periods should prove of some interest to the reader:

1973	April	0	1973	September	4
	May	0		October	7
	June	5		November	15
	July	6		December	17
	August	12	1974	January	13

Total 1973-74: 79

1974	November	0	1975	April	22
	December	0		May	37
1975	January	9		June	46
	February	13		July	22
	March	19		August	7

Total 1974-75: 175

Upon examination of the two tables, it is recognized that the early part of each apparition suffered observational neglect; observers are encouraged to try to alleviate the lack of coverage during these times by beginning their observational programs earlier. The bulk of the data was received for the last three months of the 1973-74 apparition, with only moderate attention being given to Venus from about June 15 through October 30, 1973. For 1974-75, greatest emphasis was given during the period from mid-March, 1975 through the end of July. Numerous drawings were submitted for both observing periods, and most of these showed a marked improvement with respect to accuracy and realism. One cannot stress enough the importance of a long-term series of systematic observations in which there is a fairly reasonable degree of simultaneous work.

The individuals listed below contributed observational reports during the two apparitions:

Observer and Location	Number of Observations		Instrumentation
Benton, Julius L. Savannah, GA	7 10	(1973-74) (1974-75)	6 cm. (2.4") Refr. 10 cm. (4") Refr.
Dillon, William G. Springfield, VA	28	(1974-75)	11 cm. (4.25") Refl.
Haas, Walter H. Las Cruces, NM	15 10	(1973-74) (1974-75)	31 cm. (12.5") Refl.
Heath, Alan W. Nottingham, England	19 33	(1973-74) (1974-75)	30 cm. (12") Refl.
Hill, Ricky Greensboro, NC	5	(1973-74)	15 cm. (6") Refl.
Hull, Richard Richmond, VA	7	(1974-75)	17.5 cm. (7") Refr.
Pastore, Peter F. Massapequa, NY	8	(1973-74)	15 cm. (6") Refl.
Peterson, Thomas C. Gadsden, AL	15	(1974-75)	9 cm. (3.5") Refl.
Porter, Alain Narragansett, RI	22 11	(1973-74) (1974-75)	15 cm. (6") Refl.
Schaefer, Brad Littleton, CO	3 7	(1973-74) (1974-75)	6 cm. (2.4") Refr.
Smith, Michael B. Alamogordo, NM	54	(1974-75)	11 cm. (4.25") Refl. 8.3 cm. (3.25") Refr. 6 cm. (2.4") Refr. 15 cm. (6") Refl.

The writer would like to take this opportunity sincerely to express his gratitude to the eleven individuals mentioned above for their continued interest and support. The Venus Section programs are outlined in a brief observing guide, and prospective participants should contact the writer for details concerning the availability of this publication. As the years pass, more and more regular observers of Venus are developing the necessary skills which provide us with more accurate and reliable data; the more good observers we can interest in our endeavors, the more important our programs will subsequently become.

Visual Observations of Surface Details

In a previous Venus Report the writer outlined the conventional methods of studying visually the rather elusive markings on Venus's apparent surface.[4] Those who are not familiar with the observational methods employed should consult this reference, as well as the Venus Observing Guide.[5]

During 1973-74 and 1974-75, few ultraviolet photographs of Venus were made available to the Section for comparison with drawings by the various observers. Those that were submitted showed little detail, hardly enough to be recognized and which would show up to any advantage for reproduction here. In addition, there were no clear examples of simultaneous observations; no observations were made visually or otherwise at the times that the available ultraviolet photographs were taken. Consequently, the report presented here is based upon drawings made visually and photographs taken at visual wavelengths. A preliminary evaluation of the available data reveals that there is a suitable degree of continuity among drawings.

A rather exhaustive analysis of the tremendous variety of sketches and drawings of Venus during 1973-74 and 1974-75 demonstrated that nearly all classes of markings discussed in the literature[4,5] were represented, with the possible exception of the radial pattern more commonly revealed on ultraviolet photographs.

Following the format established with a previous Venus report,[4] the writer has prepared the following table based upon a survey representing an attempt to determine the percentage of observations in which each type of marking categorized was recorded.

TABLE I.

VENUS 1973-74 AND 1974-75: FREQUENCY OF OCCURRENCE OF TYPES OF SURFACE MARKINGS

Type of Marking	Percentage of Observations 1973-74	Percentage of Observations 1974-75
1. Banded Dusky Markings	15%	11%
2. Radial Dusky Markings	5	4
3. Irregular Dusky Markings	19	8
4. Amorphous Dusky Markings	25	33
5. Terminator Shading	31	56
6. No Markings	23	18
7. Bright Spots & Regions (exclusive of cusps)	15	7

k: 0.964 to 0.044 (1973-74)
k: 0.977 to 0.052 (1974-75)

Notes

1. Assuming that the bright illuminated portion of Venus is typically assigned a relative numerical intensity of 9.0 on the standard ALPO scale (0: black shadows to 10: brightest objects), it was discovered that the average assigned numerical intensity for the dusky markings on Venus during both periods was about 7.0 (items 1 through 5 in the table); bright spots and regions, exclusive of cusp regions, had an average near 9.5

2. Observers did not utilize the conspicuousness scale on enough occasions to yield any reliable figures, but examination of the data does reveal that during both periods the dusky markings were quite vague and frequently uncertain; bright areas were also not very conspicuous.

3. Seeing conditions, appraised using the standard ALPO scale from 0 (worst) to 10 (perfect), were found to be on the average near 5.0; most observations were made against a light sky (just prior to sunset) or twilight sky rather than against a dark background. Atmospheric transparency was usually fair to moderately good. The statements in this note apply to both Venus apparitions.

Although the foregoing analysis does represent at least an attempt to derive a quantitative evaluation of the data, there still remains an unavoidable incidence of subjectivity. Yet, several rather tentative conclusions may be drawn from the tabular information and from the bulk of observational evidence; we shall consider some of these inferences in the next several paragraphs.

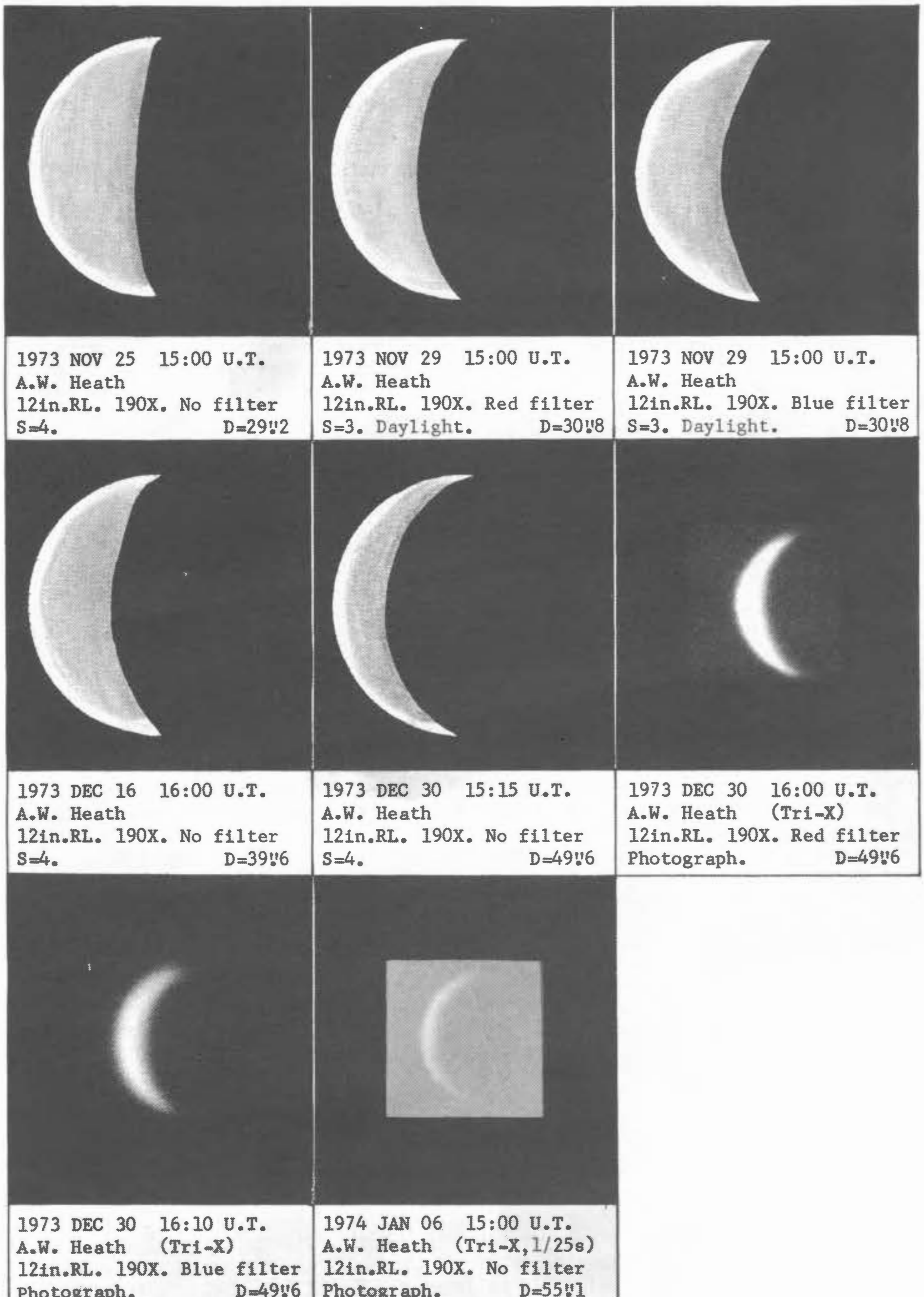

Figure 8. Selected drawings and photographs of Venus by ALPO observers during the 1973-1974 eastern (evening) apparition. Copied and arranged for publication by John E. Westfall. See also text of Venus Report by Julius L. Benton. Simply inverted telescopic views with south at the top. Seeing (S) on a scale of 0 (worst) to 10 (perfect). Diameter (D) in seconds of arc.

Reference to Table I reveals that during the 1973-74 and 1974-75 apparitions there were a substantial number of drawings depicting Venus as a totally blank disc, devoid of any markings. It is not uncommon for new observers to draw the illuminated portion of the planet showing absolutely no detail; once these individuals gain the necessary experience, however, it is possible for them to begin to detect the faint differences in contrast, often near the visual threshold. As a result, the incidence of observations in which nothing is suspected might be expected to decrease. Yet, this is not always the case, because experienced observers on occasion report a completely blank disc; and rarely is anyone truly certain of anything on Venus. Moreover, there is a tremendous dependence on one's contrast perception, instrumental peculiarities and additional factors too varied and numerous to mention.

The category entitled "Terminator Shading", while appearing to be of some significance, in truth has little to do with the nature of Venus. The results presented in Table I serve only to show that observers frequently detect a marked gradient in intensity from the planet's limb toward the terminator. Photographs show this effect as well, supporting the visual impressions.

During both apparitions there were few instances in which the faint radial pattern of dusky features on Venus was indicated. This conclusion is not at all surprising when it is recognized that such a "spoke" system is most commonly seen on ultraviolet photographs rather than being detected visually. Few ultraviolet photographs were available to the Section for analysis, and those that were submitted during 1973-74 showed no indications of the radial features.

A few persons throughout both observing periods reported seeing a number of bright, amorphous patches, lighter in intensity than the background of the planet's illuminated hemisphere. These bright areas were described exclusively of the cusp-caps and suspected cusp brightenings. Most individuals were in complete agreement that the bright areas noticed on Venus were usually well-defined, but it was not possible to be sure that they were real features or instead the result of some contrast phenomenon.

So, in conclusion, it is perhaps meaningful to note that visual observers did detect a variety of dusky and quite possibly illusory markings on Venus, most of the features falling into the categories in Table I numbered 1, 3, and 4. It was difficult for most individuals to tell, during both apparitions, if any of the markings were truly banded, thus the greater percentage in the category entitled "Amorphous Dusky Markings". We have seen also that it is not out of the question for one with experience at the eyepiece to see Venus totally devoid of any detail. Filter observations, chiefly using the Wratten 25 (red) and Wratten 47(blue) filters, revealed impressions similar to those in integrated light; some markings were enhanced in red and others in blue, but there was no way of telling what significance such observations might have when it was noted by observers that the filter results were inconsistent.

To accompany the discussion here are several selected drawings and photographs from both apparitions (Figures 8-10). These should suffice to illustrate the various types of features noticed during 1973-74 and 1974-75. One must also recognize that inherent in the drawings is a certain amount of variety in observational experience and drawing ability; also, different people see and record their results in a different manner. Thus, the vague, rather faint markings depicted on the drawings presented here constitute perhaps only an example of some of the multitudinous features which are seen and drawn on Venus. Clearly, here is a realistic example as well of some of the problems encountered by the analyst, who must ultimately interpret the observations and attempt to bring together into some kind of intelligible form the great diversity of results. Hopefully, the reader will find something informative about Venus here, but many years of continued painstaking observation must proceed before we can ever hope to derive much from what appears to be an emerging pattern for those features seen on the planet's visible surface.

Cusps, Cusp-Caps, and Cusp-Bands

Most of the comparatively prominent and contrasty markings on Venus appear at the cusps, especially the so-called bright "cusp-caps", which show up apparently more often when the numerical phase value (k) is between 0.8 and 0.1; they are frequently accompanied by bordering dark "cusp-bands", but not always, and there is some evidence to indicate that there may be a systematic fluctuation in the brightness and size of the cusp-caps and cusp-bands, but the results are inconclusive.

During 1973-74 and 1974-75 quite a few observations of cusp features were submitted. Table II is a statistical investigation of the visibility of the cusp-caps and cusp-bands, continued since the preceding apparition report.

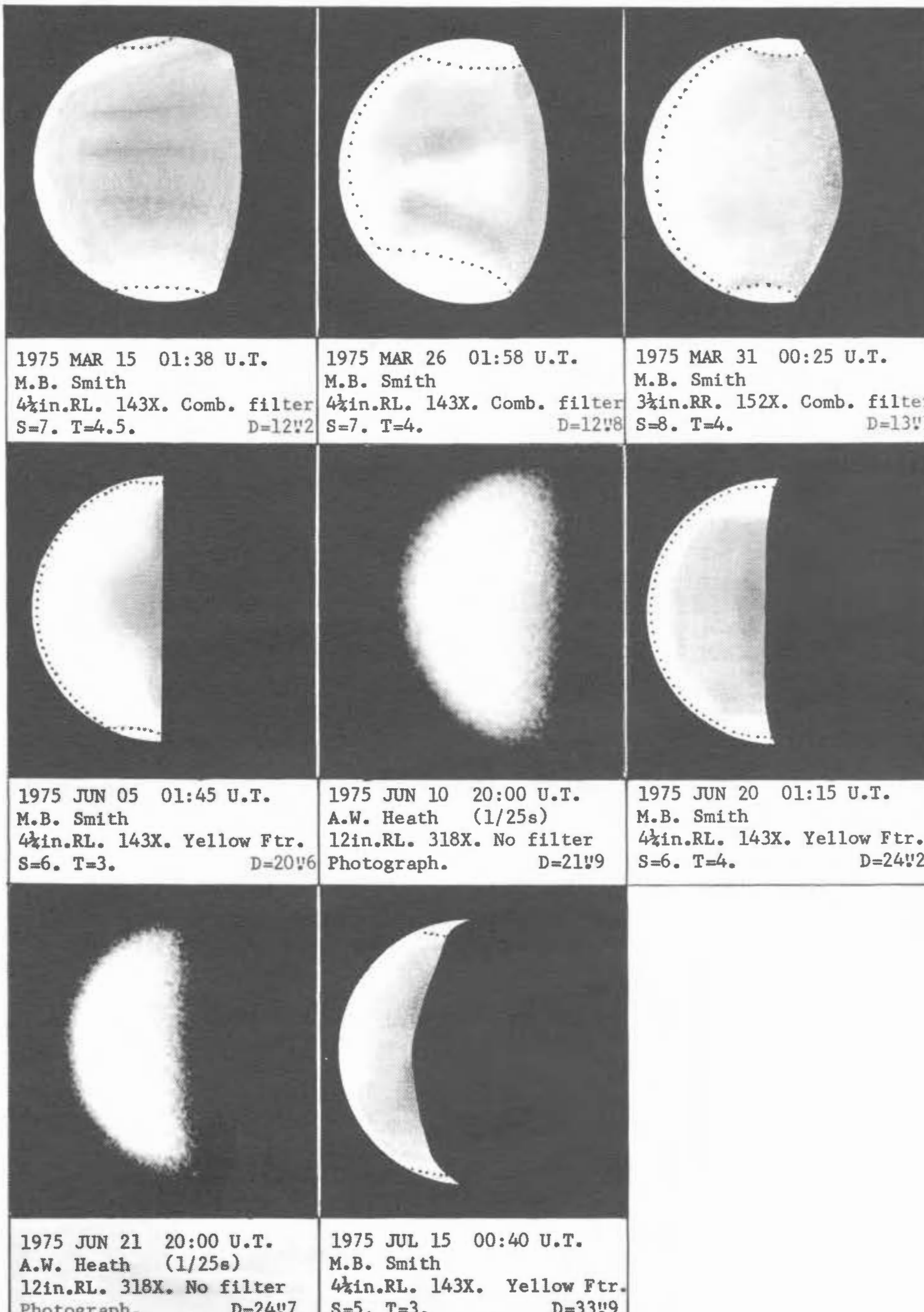

Figure 9. Selected drawings and photographs of Venus by ALPO observers during the 1974-75 eastern (evening) apparition. Copied and arranged for publication by John E. Westfall. See also text of Venus Report by Julius L. Benton. Simply inverted telescopic views with south at the top. Seeing (S) on a scale of 0 (worst) to 10 (perfect). Transparency (T) apparently on a scale of 1 to 5, with 5 best. Diameter (D) in seconds of arc.

TABLE II.

CUSP-CAP AND CUSP-BAND STATISTICS: 1973-74 and 1974-75 EVENING APPARITIONS

	1973-74	1974-75
South Cap Alone Visible	0%	<1%
Both Caps Visible	38	33
North Cap Alone Visible	0	1
Neither Cap Visible	32	43
South Cap Larger	4%	10%
Caps of Equal Size	41	20
North Cap Larger	<1	14
South Cap Brighter	14%	13%
Caps of Equal Brightness	38	24
North Cap Brighter	4	5
South Cusp-Band Alone Visible	0%	<1%
Both Cusp-Bands Visible	10	10
North Cusp-Band Alone Visible	0	3
Neither Cusp-Band Visible	76	75

k (1973-74): 0.964-0.044; 79 observations. k (1974-75): 0.977-0.052; 175 observations.

Notes

1. Assuming that a relative numerical intensity (using the scale discussed in Table I) of 9.0 is realistic for the standard for the illuminated portion of Venus' disc, it was found that for both apparitions the average intensity value for the cusp-caps was about 9.6; the value for the cusp-bands for the two periods was near 6.5.

2. Seeing for both the 1973-74 and 1974-75 apparitions was appraised to average about 5.0; the planet was often seen against a daylight or twilight sky, and the transparency was average at best (seeing is according to the scale introduced with Table I).

Even though the data in Table may appear a little ambiguous and recognizing that perhaps only a minimal amount of reliable information can be drawn from the material presented, the writer offers the following results, with some reservation:

1. Most individuals indicated that both cusp-caps were visible simultaneously rather than singly throughout both the 1973-74 and 1974-75 apparitions.

2. During 1973-74 observers were in general agreement that the south and north cusp-caps were of equal size and brightness on most occasions when they were seen; in 1974-75 this same conclusion was reached, although the percentage differences were not so pronounced as in the earlier apparition.

3. Observers saw the cusp-caps in integrated light (no filter) on most occasions; there is some evidence to suggest that a blue filter (W 47) improved their visibility on a few nights. This note applies to both apparitions.

4. The darker cusp-bands, seen to border the cusp-caps, were not commonly visible during either apparition; when they were reported, they usually were both seen at the same time.

5. No instances of short-term or other variations were recorded during the two observing periods.

Reference to some of the drawings in Figures 8 and 9 should convey some of the visual impressions of Venus observers during 1973-74 and 1974-75.

Extensions of the Cusps

During the two apparitions, there were several scattered reports of cusp extensions, usually measured to be about 8° or 9° at the most. Smith and Haas were the only two observers who reported these, and most of their observations were made in integrated light. No table has been set up, however, since many of the observations were either doubtful or are rendered questionable by the seeing. No clear indications of a halo surrounding the unilluminated portion of Venus were received. The phase angles at which the suspected cusp-extensions were reported lay between 85° and 120°, where the phase angle is the Sun-Venus-Earth angle.

Bright Limb Band

The limb of Venus opposite the terminator, particularly when k ranged from 0.8 to 0.2, showed an abnormal brightening when referred to the overall intensity of the illuminated portion of the planet. Haas and Smith quite frequently recorded a bright limb band during 1974-75, often describing this feature as extending from cusp to cusp, quite narrow, and having an average intensity of about 9.7. The use of a red (W25) filter and a blue (W47) filter revealed the bright band as it appeared in intensity with no filter, but there were a few instances when the red filter produced a thinner appearance of the band, the feature still running from cusp to cusp. In 1973-74 there were no obvious indications of a similar limb band.

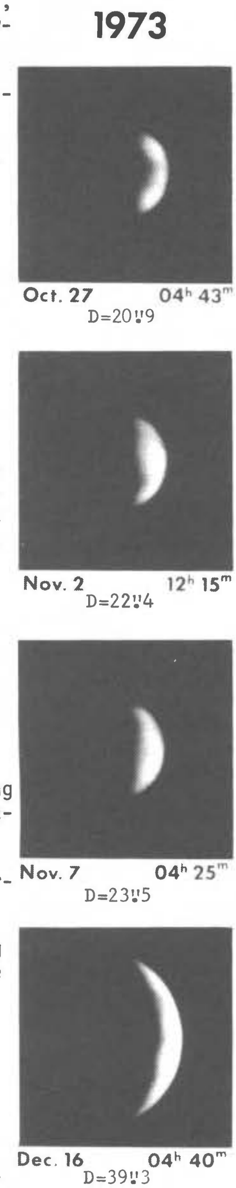

Figure 10. Sample of ultraviolet photographs of Venus during the 1973-74 evening apparition by the International Planetary Patrol Program, Lowell Observatory, Flagstaff, Arizona. D is the angular diameter in seconds of arc.

Teriminator Irregularities

During both apparitions of Venus only a small number of observations were received which clearly showed any hint of terminator irregularities. It was noted earlier in this report that the terminator shading was commonly described as an intensity gradient from the limb toward the line separating the dark and light hemispheres of the planet. Other than this effect, there were only vague suspicions of any localized deformations or other anomalies along the otherwise geometrically regular terminator.

Ashen Light and Other Dark-Side Phenomena

In 1973-74 and 1974-75 a few observers described the dark hemisphere of Venus as showing only a subtle variation in intensity; in many instances, the dark side was noted to exhibit an appearance similar to the surrounding sky. At other times, the unilluminated hemisphere appeared darker than the sky immediately adjacent to it, an effect probably attributable to contrast. Observations using an eyepiece with an occulting bar installed, shaped like a crescent, may prove useful and may well improve one's chances of seeing any genuine dark-side illumination in future apparitions.

Phase and Dichotomy Estimates

For years observers of Venus have recognized that there is an apparent discrepancy between the predicted and observed dates of dichotomy.[5] This variability is commonly called the Schroeter Effect, and it ususally amounts to between four and ten days.

During 1973-74 few instances in which dichotomy estimates were attempted could be found in the data, and it was not possible to derive a reliable observed value for the date of observed dichotomy. Nonetheless, Haas did note a relatively straight terminator on 1973, November $12^d 00^h 13^m$, U.T., using a 12.5" (31-cm.) reflector at 303X under poor seeing conditions. The calculated date of dichotomy was 1973, November 12.82.

For 1974-75 Westfall submitted a very extensive and useful statistical reduction of his own dichotomy estimates versus calculated values. He made a total of 48 observations between 1975, April 9 and 1975, August 3, using a 10" (25-cm.) reflector at

500 X. He not only made estimates in integrated light (no filter), but also employed a red (Wratten 25) filter; the red filter data, however, were not significantly dissimilar from the results using no filter (the mean difference between the red filter and integrated light estimates was +0.017).

Upon plotting the calculated and estimated phase values against time, it was noted that the observed phase values were less than the calculated (geometric) phase values from 1975, April 9 to June 24; and then from 1975, June 24 until July 25, the observed phase values were greater than the calculated ones. From 1975, July 25 until the 3rd of August, the observed phase values again were less than the calculated phase values, yet not on the whole significantly so. The so-called "cross-over point", as noted by Westfall, occurred at k = 0.47. At values in excess of this, the observed phase was less than the calculated phase; from k = 0.47 to 0.23, the reverse situation prevailed. It was noted that, although the phase value reversal occurred again (observed subsequently less than calculated) after July 25, the effect was not consistently appreciable.

Two methods of reduction were employed by Westfall to determine the observed date of dichotomy. A linear regression based on 13 no-filter observations from 1975, June 04.212 to July 03.177 yielded a date of apparent dichotomy of 1975, June 15.4; a linear interpolation based on 2 no-filter observations (1975, June 09.157 and June 18.171) yielded a date of 1975, June 15.2.

The difference between the predicted date of dichotomy, taken as 1975, June 17.7, and observed dichotomy (derived by these methods) thus amounted to 2.3 to 2.5 days. These figures have a somewhat higher reliability than those obtained by methods other than least squares. Individuals interested in the details of the techniques employed should consult the appropriate literature.[6]

Concluding Remarks

Although there was an attempt during the two apparitions in question to add some continuity to the data, there still exists a serious neglect of early portions of the observing periods. If possible, individuals are urged to start their work as soon as they can after Venus emerges from the solar glare, continuing as frequently as possible with their observing until conjunction with the Sun again takes place. The writer will be pleased to assist observers in their efforts, and he will be pleased to maintain active correspondence with those who desire a serious approach in their investigations of the planet.

Many individuals have written, giving the impression that their instruments are probably too small for Venus work. While larger apertures do show more on good dates of observation, the smaller telescope has the advantage of being usable on average to poor dates, when seeing conditions are wholly uncoöperative with the larger instruments. The writer is currently making all of his own observations using a 2.4" (6.0-cm.) f/15 Unitron refractor, and once the apparition ends (1975-76 western apparition), a report and analysis of his observations will appear in this Journal. As costs of instruments rise, it is obviously becoming more difficult for the beginning observer to purchase a large telescope at the outset; in fact, it is becoming difficult even for the seasoned observer to acquire a larger telescope as the price levels go up. Nevertheless, some encouragement for those limited currently to smaller instruments should be forthcoming; already the writer is having good results on Venus with the 6.0-cm. refractor at magnifications between 140X and 180X. Those readers who might wish to supplement this work should contact him at once; it will be meaningful if we can determine what other individuals might find with small to moderate apertures.

A further word of encouragement might be extended to those who have photographic skills; we very definitely need more ultraviolet photographs of Venus to supplement the data. An important program would be photography at various wavelengths, the programs being attempted while simultaneous visual work is done. We simply do not have enough simultaneous observations on hand to justify a detailed analysis of what can be seen consistently by several individuals at the same time, using either similar or different instruments.

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SOME WORDS ON THE RESEARCH GROUP ON PLANETARY AND GEOPHYSICAL VOLCANOLOGY AND ABOUT THE "GEORGIANA" LUNAR OBSERVING STATION

By Dr. Péter Hédervári, Budapest, Hungary

In January, 1974 a small, special research group with the name of the Hungarian Research Group on Geophysical Volcanology (HRGGV) was established at Budapest. The object of HRGGV first of all was to carry on certain theoretical investigations concerning the relationships between (terrestrial) volcanic eruptions and (tectonic) earthquakes. Two short papers were published about the creation of HRGGV, one in the Geological Newsletter, Vol. 1974, No. 3, pp. 226-227 and another in the Newsletter of the International Association of Volcanology and Chemistry of the Earth's Interior, No. 11, p. 13. Later on, a third short article about the existence of the Group appeared in Berita, the Geosurvey Newsletter of the "Direktorat Geologi" (Geological Management) of Indonesia.

After the world-congress of the International Union of Geodesy and Geophysics at Grenoble in August-September, 1975, the Group received a letter from Professor Jack Green of Long Beach, who is the President of the International Association of Planetology. I quote some sentences from this letter: "On the basis of our discussion at the Grenoble meeting of the IUGG, I am pleased to welcome the Research Group into the group of those societies with which the International Association of Planetology fully coöperates. As more and more return data become available from inner planets, the more the science of volcanology become more important. We are happy that your Group has been organized and extend an invitation to your members to join IAP and perhaps some of our Commissions."

The Group was very much obliged to Professor Green for this very kind invitation and accepted it with the greatest pleasure. Corresponding to personal discussion on the matter at Grenoble, the Group forms a working group of the IAP and is in close coöperation first of all with Commission 2, planetophysics and planetochemistry, of the IAP. At the same time it was decided that the Group's former name and abbreviation (HRGGV) will be changed to Research Group on Planetary and Geophysical Volcanology (RGPGV). As a consequence of this new status of the Group, a re-organization was needed. The members are the following persons: Professor K. Beneš, Ostrava, Czechoslovakia; Mr. J. Classen, M. Sc., Pulsnitz, DDR; Mr. G. Deák, M. Sc., Budapest, Hungary; Dr. P. Hédervári (as the leader of the Group), Budapest, Hungary; Mr. J. Komlós, M. Sc., Budapest, Hungary; Dr. J. Kovács, Budapest, Hungary; Mr. Z. Papp, Miskolc, Hungary; and Mr. T. Sato, Hiroshima-ken, Japan.

During our more than two years of activity many volcanological and seismological papers have been published or are in press, some of which are of planetological character, e.g., calculations concerning the energy problems of the development of lunar calderas. Other papers are on the flares of Mars and other phenomena which may have a volcanic origin; on the possibility of life on Mars and its relation to planetary volcanism; on great volcanic outbursts and the luminosity of the Moon during total eclipses, etc. In the meantime an excellent international relationship with individuals and scientific organizations has been achieved. We are now in contact with many planetologists, volcanologists, and other scholars of the world. In addition, we have a very fruitful exchange-program with the Central Library of the US Geological Survey in Reston, Virginia, with the Hawaiian Institute of Geophysics at the University of Hawaii at Manoa, with the editors of Berita, the Indonesian periodical mentioned above, published at Bandung, and last but not least with the Department of Scientific and Industrial Research, Geophysics Division, Wellington, New Zealand. Occasionally we have been in contact with many other scientific institutions as well, such as the Volcanological Institute of the Soviet Academy of Sciences at Petropavlovsk, Kamchatka, the Earthquake Research Institute of the University of Tokyo, and the Volcanological Observatory of Catania, Sicily. In addition, we have a good contact with the International Association of Volcanology and the Working Group I, Geodynamics of the Western Pacific-Indonesian Region, of the Inter-Union Commission of Geodynamics.

Since the Group was affiliated with the International Association of Planetology, forming a special working group within its frame, we decided that our further activity will not be limited to the investigation of the terrestrial volcanism and related geophysical phenomena but that occasionally we should occupy ourselves with research on the fields of cosmic volcanism as well, and not only by theoretical methods. That is, this aim demands some kind of astronomical observations, which are permitted for us under our very modest circumstances. Therefore, a small station for lunar studies was established recently at Budapest, capital of Hungary, called "Georgiana" Lunar Observing Station of RGPGV.

In this respect I wish to mention briefly that one of our members, Mr. J. Classen, is a co-worker of the Pulsnitz Observatory, DDR; and he is an expert on lunar studies. Another member, Mr. T. Sato of Hiroshima-ken, Japan, is also well known for his planetary studies. I asked these two gentlemen to coöperate with the "Georgiana" station in the observation of the Moon. This coöperation has been realized already. Thus we have a small net of lunar station: one at Budapest, one at Pulsnitz, and one at Hiroshima-ken; the last is called Second Lunar Observing Station of RGPGV.

In the next part of this paper I confine myself to a short description of the optical instruments of the "Georgiana" Station alone, and finally some additional description will be given about our astronomical program and the first results.

Comparing our optical instruments with those of great observatories, our telescopes are naturally extremely modest ones. All are refractors. In spite of their relatively small size, the larger ones are excellently useful for observations of the lunar surface. All but one were designed and constructed by the late J. Mike, former mechanic of the Urania Observatory of Budapest.

The Station is located on Buda (the hilly part of Budapest), just at the bank of the river Duna (Danube) in front of the central part of the beautiful and famous Margaret Island. Fortunately the light of the metropolis here is weak, and the atmosphere is relatively clear and free of dust over the broad river and the island; thus the observational circumstances are favorable. The Goddess of the Night, the Moon, is an extremely beautiful and magnificent sight over the dark river and the fir-trees of the island! The height of the Station above the medium sea level is some 100 meters, and its coördinates are approximately 47°32' N and 19°03' E.

For the time being we have the following instruments:

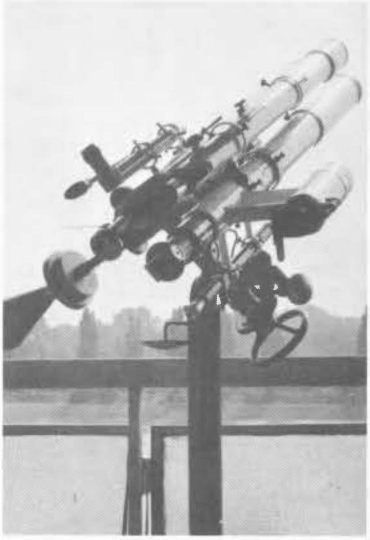
1. Refractor, 72 mm aperture, focal length (f. l.) 500 mm, magnification (M) is 50.
2. Refractor, 72 mm aperture, f. l. 500 mm, M: 180 approximately.
3. Lunette, 42 mm aperture, f. l. 440 mm, M: 120 approximately.
4. Zoom, 40 mm aperture, M: 12-40.
5. Refractor, 85 mm aperture, f. l. 1200 mm, M: 100 approximately.
6. Refractor, 85 mm aperture, f. l. 360 mm, M: 35 approximately.
7. Refractor, 72 mm aperture, with ultra-long focal length of 3400 mm, M: 340.
8. Refractor, 104 mm aperture, f. l. 1562 mm, M: 160 approximately.

Instruments Nos. 1, 2, 3, 5, 6 and 7 have MOM optics; No. 4 has Wega Lux Cern optics; and No. 8 has an A. Jaegers objective. This lens as well as one of the Erfle-type (wide-angle) eyepieces were gifts from the Atlanta Astronomy Club (Decatur, Georgia), of which I have been an honorary member for many years. The second Erfle-eyepiece was the gift of Mr. Takeshi Sato of Hiroshima-ken. Telescope No. 4 was the gift of Mr. P. Engel (La Tour de Peilz, Switzerland). For a more satisfying lunar-observation program we would need an astronomical objective of a larger diameter, say an A. Jaegers air-spaced objective, 6" aperture f/5 (30" f. l.) or 6" aperture f/8 (48" f. l.), which are advertised in *Sky and Telescope*. It is very regrettable that this plan is not realizable for us because to buy or to order such an objective is impossible, due to certain ordinances.

Telescopes Nos. 1 and 2 are twins. They are carried on the same azimuthal mounting; Nos. 3 and 4 have also an azimuthal mounting. Nos. 5, 6, 7, and 8 are on a common, massive parallactic (equatorial) mounting (see Figures 11 and 12), supplemented by two finder telescopes. Refractor No. 7 has a special internal structure: the light passes along a Z-like path with the help of two flat mirrors within the tube between the objective and the eyepiece. Thus in spite of the very great focal length, this telescope needs a relatively short tube only.

In addition to these instruments, we have a Zeiss 18 x 50 binocular telescope also on an azimuthal mounting.

Usually the Moon is observered with the refractors shown in Figures 11 and 12. Usually the total visible part of the lunar disc is monitored, and sometimes the parts in the ashen-light, too, for the existence of lunar transient phenomena (LTP or TLP), but with a special emphasis on such interesting objects as the Cobra Head of the Schröter Valley or such ring-mountains as Alphonsus, Aristarchus, Copernicus, Kepler and Plato, which usually are rich in LTP. In the framework of the LION (Lunar International Observers Network) operation, organized by the Center for Short-Lived Phenomena (Smithsonian Institution) during the Apollo flights to the Moon, I have carried out lunar observations of this type, the reports of which were sent to, and were published by, CSLP.



Figures 11 (left) and 12 (above). Four refractors on one mounting at the "Georgiana" Lunar Observing Station of the Research Group on Planetary and Geophysical Volcanology, Budapest, Hungary. Photographs supplied by Dr. Péter Hédervári. See text on page 110.

B.M. Middlehurst, J.M. Burley, P. Moore, and B.L. Welther have published a very interesting, comprehensive list of LTP, Chronological Catalog of Reported Lunar Events, NASA TR R-277, July, 1968. It contains all the reported LTP which occurred from 1540, November 26 to 1967, October 19. On the basis of this catalog the co-workers of Research Group on Planetary and Geophysical Volcanology have made a study about the occurrence of such events over different areas of the lunar surface. I think that this table would be interesting for the members of ALPO and readers of The Strolling Astronomer. Therefore, I summarize here the results. Events the exact place of which is unknown were omitted.

Area (beside or within the feature)	Number of events
Agrippa	1
Alpetragius	3
Alphonsus	17
Alps	2
Anaximander	1
Archimedes	1
Aristarchus	226
Arzachel	1
Atlas	2
Barker's Quadrangle	3
Bessel	2
Byrgius	1
Calippus	1
Carlini	1
Carpathians	1
Cassini	2
Cavendish	1
Censorinus	1
Clavius	1
Conon	1

Area (beside or within the feature)	Number of events
Copernicus	5
Cresps	3
Darwin	1
Dawes	1
Dionysius	1
Endymion	1
Eratosthenes	6
Eudoxus	3
Gassendi	16
Godin	2
Grimaldi	4
Hansteen	1
Helicon	2
Henke (Daniell)	1
Heraclides Promontorium	3
Hercules	1
Herodotus	1
Herschel	1
Humboldt	1
Hyginus	1
Kant	1
Kepler	6
Kunowsky	1
La Hire	2
Lambert	1
Langrenus	1
Leibnitz Mts.	1
Lichtenberg	4
Littrow	2
Macrobius	2
Manilius	2
Mare Crisium	17
Mare Humorum	2
Mare Nectaris	1
Mare Nubium	2
Mare Serenitatis	1
Mare Tranquilitatis	1
Mare Vaporum	1
Marius	1
Mersenius	1
Messier	5
Mount Blanc	1
Pallas	1
Peirce	1
Philolaus	1
Picard	4
Pickering	1
Pico	4
Pitatus	3
Piton	4
Plato	47
Plinius	1
Posidonius	6
Proclus	4
Ptolemaeus	3
Riccioli	3
Ross D	13
Sabine	1
Schickard	3

Area (beside or within the feature)	Number of events
Schröter	1
Schröter Valley + Cobra Head	18
Sinus Iridum	1
South Pole	2
Straight Wall	
Sulpicius Gallus	1
Taruntius	1
Taurus Mts.	1
Teneriffe Mts.	2
Thales	1
Thaetetus	3
Theophilus	3
Timocharis	2
Triesnecker	1
Tycho	13
Vitruvius	1
Walter	1

This table shows clearly that by far the most active region of the lunar surface is Aristarchus. Ring-mount Plato stands in second place, while in third place we find Schröter Valley plus Cobra Head. The fourth is Alphonsus and Mare Crisium; the sixth is Gassendi. First of all, these features merit the greatest attention on behalf of lunar observers. It appears to be important to note that none of them corresponds to the epicentral area of the moonquake-swarms (the epicentral distribution can be seen in Fig. 6 of the paper entitled "Geophysical Data and the Interior of the Moon", by M. Nafi Toksöz; Annual Review of Earth and Planetary Sciences, 2, 1974, pp. 151-177). In spite of this, it is not impossible that some kind of relationship does exist between the temporal distribution of transient events and moonquake-swarms. It is planned by RGPGV to deal with this interesting problem at a later time on a statistical basis. Therefore, we shall try to obtain data on moonquakes and transient events.

The observations of the Moon from "Georgiana" Lunar Observing Station began in early March, 1976; but as a consequence of the bad weather, only a limited number of observations were carried out. As the first result of the coöperation between "Georgiana" Station and the Pulsnitz Observatory, we have received the following report from Pulsnitz:

"+++1976.03.03. 18h30m-19h30m, Middle European Time: Lunar Transient Event in crater Aristarchus. Brightness: point-like. White. Observed in Sternwarte Zittau and in Sternwarte Pulsnitz. Moon's age: 2 days. Aristarchus was in the ashen-light of the Moon. In Pulsnitz: 200 mm refractor. In Zittau: 350 (?) mm telescope. J. Classen+++".

The report was immediately forwarded by "Georgiana" Station to Mrs. W.S. Cameron of the Goddard Space Flight Center, NASA, who is at the same time one of the Lunar Recorders of the ALPO. Any positive results of the observations made by our net will be reported through Mrs. Cameron to the ALPO in the future.

I am of the opinion that many of the lunar transient phenomena have an internal origin. Mrs. Cameron is on the same opinion, as described by her in "Comparative Analyses of Observations of Lunar Transient Phenomena", Goddard Space Flight Center, X-641-71-12, January, 1971. Those events due to internal forces might be postvolcanic phenomena in the form of sudden liberation of gases, helped perhaps by tidal forces of the Earth, as was pointed out by our President, Professor Green. In some rare cases the postvolcanic manifestations were accompanied by ash (volcanic) fall and/or the appearance of lava, as was observed by Kosyrev, Barr, and Greenacre. Now we know that volcanism has had a very important role in the development of terrestrial-type planets, including the Moon as well. Thus to search after present-day volcanic manifestations on these celestial bodies appears to be a very important task. This is the reason why we, who are dealing with volcanic phenomena, are interested so much about such events on the Moon. Therefore, the members of RGPGV will continue their astronomical observations, monitoring the lunar surface.

THE ALPO LUNAR SELECTED AREAS PROGRAM

By: Marvin W. Huddleston, A.L.P.O. Lunar Recorder

ALPO Lunar Selected Areas Program observers during the three year period starting late in 1970 and extending through 1973 obtained a total of 416 observations of 6 selected lunar features. Also during this period, one observer (John West) obtained 46 additional observations of Ross D, a feature recently added to the present program and which will be reported on at length in a future article.

The objservers participating in the SAP during this period are listed below, with the initials referring to the later table of observations:

Richard J. Wessling	(RJW)	Inez N. Beck	(INB)	Christopher Vaucher	(CV)
Frank Des Lauriers	(FDL)	Eddie Harris, Jr	(EHJ)	Russ Purdell	(RP)
Michael Fornarucci	(MF)	L. Stadler	(LS)	U. Hopp	(UH)
B. Gomes Casseres	(BGC)	Andreas Kreidler	(AK)	Chet B. Eppert	(CBE)
Alain Porter	(AP)	Pete Reinert	(PR)	Steve Szczepanski	(SS)
Paul Gruntmeyer	(PG)	Todd Hansen	(TH)	André LaClair	(ALaC)
Julius L. Benton	(JLB)	John West	(JW)		

This Recorder must extend his greatest appreciation to these observers for their contributions and support, and urges these to continue. Others who would be interested are asked to contact the Recorder, listing three of the features (including the two new additions: Ross D and Hell) they would like to specialize in; and the Recorder will supply instructions and observing forms. Should the observer not have a preference here, the Recorder will assign areas most in need of observation.

In the following summary of all SAP observations during the above period (excluding those of Ross D) (#) stands for the number of observations contributed by the observer, (%) for the percentage of all the observations by the observer for each feature, and (I) for the instrument(s) used. Here (R) & (r) refer to reflecting and refracting instruments respectively. The intention of this table is to allow members to visualize the degree of completeness for each of the listed features, making special note of the degree of contribution by each observer in relation to the total number of observations thus far received. Atlas may be considered as having the desired criteria for closing its study.

It is the hope of this writer that the following information contained in the table will enlighten potential observers as to the great amount of work which must be completed on these features prior to their being closed out. The program can then move on into new areas of investigation.

Observer	#	%	I	
		ARISTILLUS		
JW	30	29%	10"R;6"R	
INB	8	8%	6"R	
CE	1	1%	8"R	
ALaC	55	54%	3"r	
PG	2	2%	6"R	
PR	6	6%	4¼"R	
		Total Observations		102
		ATLAS		
CV	16	17%	8"R;6"R	
FDL	6	7%	4"R	
LS	30	33%	4½"R;4"R;3"r	
RP	4	4%	6½"R	
UH	1	1%	7"r	
CBE	4	4%	8"R;6"R	
INB	1	1%	6"R	
SS	21	23%	10"R	
PG	1	1%	6"R	
ALaC	8	9%	3"r	
		Total Observations		92
		ENDYMION		
JW	20	42%	10"R;6"R	
TH	4	8%	6"R	
FDL	24	50%	6"R;4"R	
		Total Observations		48

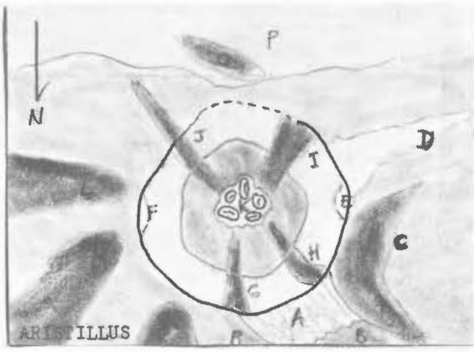


Figure 13. Drawing of Lunar Crater Aristillus by André La Clair on June 28, 1972, $6^h\ 0^m - 6^h\ 45^m$, U.T. 3-inch refractor, 70X. Seeing 3 (scale of 0 to 10, with 10 best). Transparency 5 (limiting stellar magnitude). Colongitude 111°.9-112°.3. Simply inverted view with direction of lunar north shown by arrow. The drawing shows unconfirmed dark bands within Aristillus; see also text of report by Lunar Recorder Marvin Huddleston. When numerical intensities are marked on Figures 13-20, they are on the Standard Scale of 0 (black shadows) to 10 (most brilliant features).

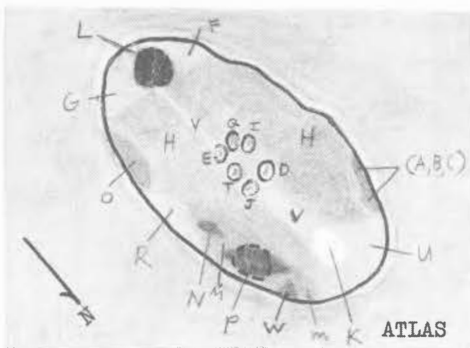


Figure 14. Drawing of Lunar Crater Atlas by Christopher Vaucher on October 3, 1971, $5^h\ 10^m$-$6^h\ 5^m$, U.T. 8-inch reflector, 113X. Seeing 6-7. Transparency 3. Colongitude 74°.4-74°.9. Simply inverted view with direction of lunar north shown by arrow. When letters are present on Figures 13-20, they are for convenience of identification in the Selected Areas Program and have no wider application.

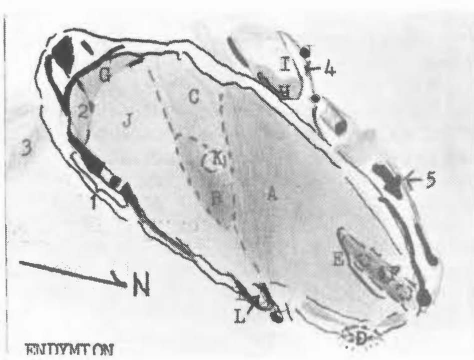


Figure 15. Drawing of Lunar Crater Endymion by Todd Hansen on February 20, 1972, $2^h\ 0^m$-$3^h\ 0^m$, U.T. 6-inch reflector, 160X. Seeing 6. Transparency 5. Colongitude 336°.3-336°.8. Simply inverted view with direction of lunar north shown by arrow.

Figure 16. Drawing of Lunar Mountain Pico by Richard J. Wessling on November 8, 1970, $1^h\ 10^m$-$1^h\ 30^m$, U.T. 12.5-inch reflector, 356X. Seeing 1-3. Transparency 3. Lunar south at top in a simply inverted view. Colongitude 21°.4-21°.5.

Note by Editor. The Sun's selenographic colongitude, as used in Mr. Huddleston's report, is a measure of the solar illumination of the Moon. It may be thought of as the lunar western longitude, measured along the Moon's equator, of the sunrise terminator. (West is here in the IAU sense where Mare Humorum and Mare Imbrium are in the west hemisphere of the Moon.) Colongitude is roughly 0° at First Quarter, 90° at Full Moon, 180° at Last Quarter, and 270° at New Moon.

Observer	#	%	I	
		GASSENDI		
RJW	1	2%	12½"R(Cass)	
LS	12	24%	4½"R;4"R;3"r	
AP	8	16%	6"R	
FDL	25	50%	8"R;6"R;4"R	
AK	1	2%	4"R	
PR	2	4%	4¼"R	
TH	1	2%	6"R	
		Total Observations		50
		PICO		
MF	16	49%	6"R	
ACP	10	30%	6"R	
PG	2	6%	6"R	
EHJ	1	3%	4"R	
FDL	1	3%	4"R	
RJW	3	9%	12½"R(Newt)	
		Total Observations		33
		PITON		
RJW	6	7%	12½"R(Cass)	
FDL	1	1%	4"R	
MF	76	84%	6"R	
BGC	1	1%	8"R	
AP	1	1%	6"R	
PG	2	2%	6"R	
JLB	3	3%	4"r	
INB	1	1%	6"R	
		Total Observations		91

Figures 13-20 in this report of the 7 features presently under study by the SAP may be considered typical, and were selected to illustrate the general appearence of each of the formations, as well as to be examples of various talents many of the observers possess. It must be noted here that artistic abilities are not necessarily the lunar observer's prime tool of success, for accuracy naturally tends to overshadow an unartistic drawing. Accurate intensity estimates and the accurate locating of an observed or suspected feature or anomaly on the drawing are of prime importance. Making observations for the program is a relatively simple task once a few methods and rules are mastered. The Recorder will be happy to answer any questions an observer may have concerning the program in general or the filling out of forms.

A note concerning André LaClair's observation of Aristillus (Figure 13) may be of interest to readers here. Mr. LaClair has on several occasions observed the suspected dark bands (J, I, H, and G). These bands are in need of confirmation, and observers are asked to obtain observations at as many colongitudes as possible. Instruments used should range from 3" up, providing an excellent opportunity for observers with small instruments to secure valuable contributions.

The observations of Ross D by Mr. John West (Figures 17 and 18) show one of the many unusual formations surrounding the crater, with the one in question here due south of the feature. This particular formation exhibits shape and size changes through the lunation (according to Mr. West's observations) and is thought to be a sunlit ridge having the mentioned associated shadow anomalies, (i.e., any deviation of a shadow from absolute black, often with accompanying coloration; also: an anomalous shape, or change in shape, of a shadow).[1] Other interesting anomalies are evident in these observations, particularly somewhat southwest, northwest, and southeast (IAU sense). Another interesting aspect of Ross D is that the central shadow has been reported on occasion by others as deviating from a true black. Also of interest, according to Winifred S. Cameron several reports have been made of LTP in the area, especially by Daniel Harris (Lunar and Planetary Lab., University of Arizona), although there has been some controversy concerning this. A detailed report on these possibilities is planned for the forthcoming report on Ross D.

In closing, it is with great regret that this Recorder must announce the necessity of charging for observing forms and for other future program material. With the ever

1. Refers to the Selected Areas Program feature classification system to be published at a future date.

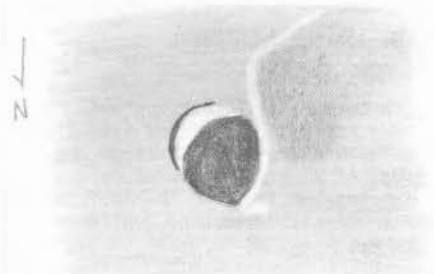


Figure 17. Drawing of Lunar Crater Ross D by John West on December 25, 1972. $7^h 10^m$-$7^h 25^m$, U.T. 6-inch reflector, 210X. Seeing 8.5 (on a scale of 0 to 10, with 10 best). Transparency 5.5 (limiting stellar magnitude). Colongitude 147°2-147°4, late afternoon lighting. See also text on page 116. Simply inverted view with arrow showing direction of lunar north.

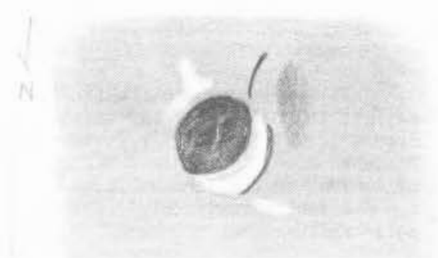


Figure 18. Drawing of Lunar Crater Ross D by John West on April 10, 1973, $2^h 55^m$-$3^h 8^m$, U.T. 6-inch reflector, 210X and 102X. Seeing 6. Transparency 5. Colongitude 355°4-355°5, early morning lighting. See also text on page 116. Lunar north at bottom as shown by arrow, lunar west in IAU sense at right.

Figure 19. Drawing of Lunar Crater Gassendi by Alain Porter on July 25, 1973, $7^h 10^m$-$8^h 10^m$, U.T. 6-inch reflector, 193X. Seeing 9 (very good). Transparency 5½. Colongitude 212°1-212°6. Simply inverted view with lunar north shown by arrow.

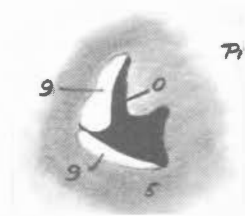


Figure 20. Drawing of Lunar Mountain Piton by Mrs. Inez N. Beck on November 11, 1970, $2^h 36^m$-$2^h 40^m$, U.T. 6-inch reflector, 152X. Seeing 9. Transparency 5-6. Colongitude 58°6. North at bottom in a simply inverted view. The shadow of Piton was pitch black to the observer, much darker than that of other lunar features at similar distances from the sunrise terminator.

* * * * * * * * * * * * * * *

increasing costs of printing and postage, this unfortunate situation has been found necessary. Therefore, observers are asked to send $1 with all requests for forms and other materials, for which they will receive 30 forms, a copy of Elger's Albedo Scale, and any other program material available. Observers' coöperation and understanding will be greatly appreciated here.

Note by Editor. Readers are heartily invited to take part in the Selected Areas Program. Mr. Huddleston will welcome correspondence at his address given on the back inside cover. While lunar observations by amateurs are admittedly less likely to lead to new discoveries than in the years before the Space Age, they can still provide many enjoyable hours at the telescope. If carried out with care and persistence, they may even sometimes lead to delightfully unforeseen results.

OBSERVED LATITUDES OF JUPITER'S BELTS AND ZONES IN 1974-75

By: Phillip W. Budine, A.L.P.O. Jupiter Recorder

Latitudes on planets have been expressed in several different systems. The easiest to compute for Jupiter is the Mean Jovian Latitude, sometimes also called the Eccentric Latitude. If y is the distance of a feature from the center of the disc measured along the central meridian of longitude, if r is the measured polar radius of Jupiter in the same units, if D is the jovicentric latitude of the Earth, and if $f = 1.0714$ (approximately) is the ratio of the equatorial radius of Jupiter to its polar radius, then the mean latitude L is given by:

$$L = \text{Arcsin}\,(y/r) + Df,$$

where y, D, and L are positive when north and negative when south. The jovigraphic latitude L' is found from:

$$\tan L' = f \tan L.$$

Readers further interested in the reduction of latitude measurements should study Appendix I, pages 269-271, in B. M. Peek's The Planet Jupiter.

In the tables which follow the belts and zones are shown with their customary abbreviations. In the "Edge" columns C is for center, S for south edge, and N for north edge.

Edge	Belt	1974 Sept. 8	Sept. 11	Sept. 17	Sept. 19	Sept. 26	Oct. 1(1)	1974 Oct. 1(2)
C	SSTB	---	-31°.33	-41°.30	---	---	---	---
N	SSTB	-30°.93	---	---	-36°.79	---	---	---
S	STB	---	---	---	---	---	-26°.89	-28°.79
C	STB	-25°.68	-27°.11	-28°.33	-30°.36	---	---	---
N	STB	---	---	---	---	-23°.13	-22°.59	-22°.76
S	RS	---	---	-28°.33	-30°.36	-27°.32	-26°.89	-26°.79
N	RS	---	---	-16°.59	-15°.99	-16°.58	-15°.17	-15°.41
S	SEB	- 7°.91	- 7°.07	-12°.68	- 9°.90	-10°.22	- 9°.21	- 9°.89
N	SEB	---	+ 1°.24	---	---	- 0°.16	- 1°.44	- 0°.64
S	NEB	---	---	---	---	+ 3°.98	+ 3°.59	+ 3°.94
N	NEB	+16°.01	+16°.30	+14°.43	+14°.00	+14°.53	+12°.51	+13°.97
S	NTB	---	---	---	---	---	+23°.38	+22°.75
C	NTB	+37°.24	+32°.04	+25°.97	---	---	---	---
N	NTB	---	---	---	---	---	+27°.59	+29°.47
C	NNTB	+40°.46	+41°.70	+38°.71	---	---	+37°.02	+36°.63
S	NPR	---	---	+54°.31	---	---	+52°.98	---

The latitudes reported in the table above are Mean Latitudes and were contributed by F. Jack Eastman of Englewood, Colorado, who was employing a 12½-in. refl. of Newtonian design. The measurements of Sept. 8, 11, 17, and 19 were made visually at the telescope with a micrometer. On the dates of Sept. 26 and Oct. 1 the measurements were made on photographs.

Edge	Belt	Average Jovigraphic Latitude	Maximum Recorded Deviation	Standard Deviation
N	SPR	-55°.3		
S	SSTB	-43°.7	-46°.2 to -40°.0 (6°.2)	2°.70
N	SSTB	-41°.9	-46°.1 to -35°.7 (10°.4)	2°.70
S	STB	-33°.7	-32°.0 to -37°.6 (5°.6)	1°.68
N	STB	-28°.1	-31°.0 to -25°.1 (5°.9)	1°.72
S	RS	-28°.4	-30°.2 to -25°.1 (5°.1)	1°.63
C	RS	-22°.6	-23°.8 to -20°.5 (3°.3)	1°.10
N	RS	-16°.1	-18°.2 to -14°.1 (4°.1)	1°.20
S	SEB	-10°.4	- 8°.8 to -12°.4 (3°.6)	0°.95
N	SEB	- 0°.1	+ 2°.1 to - 2°.7 (4°.8)	1°.38
S	NEB	+ 5°.4	+ 7°.6 to + 3°.8 (3°.8)	1°.40
N	NEB	+16°.6	+19°.9 to +13°.7 (6°.2)	2°.20
S	NTB	+25°.7	+31°.5 to +23°.0 (8°.5)	2°.85

Edge	Belt	Average Jovigraphic Latitude	Maximum Recorded Deviation	Standard Deviation
N	NTB	+30.°5	+36.°3 to +26.°2 (10.°1)	3.°15
S	NNTB	+36.°9	+43.°3 to +33.°4 (9.°9)	3.°38
N	NNTB	+40.°1	+44.°1 to +35.°2 (8.°9)	2.°93
S	NPR	+55.°7	+60.°4 to +53.°1 (7.°3)	2.°54

The above latitude data were reduced from eleven very good to excellent quality photographs by Richard Hull. A total of 374 measurements were made to better than .001" with a measuring machine built and designed by Mr. Hull. The eleven photos all had a disk diameter of 2" or more. A Hewlett Packard HP 25 Calculator reduced the drudgery of over 900 separate calculations used in finding Jovigraphic Latitudes.

Average Latitude of Center of Jovian Belts. 1974-75. Jovigraphic.

SSTB	-42.°94
STB	-30.°89
SEB	- 5.° 6
NEB	+11.°02
NTB	+28.°06
NNTB	+38.°54

Average Latitude of the Zone Edges. 1974-75. Jovigraphic.

SSTeZ	-55.°36 to -43.°70
STeZ	-41.°90 to -33.°70
STrZ	-28.°10 to -10.°40
EZ	- 0.°10 to + 5.°40
NTrZ	+16.°60 to +25.°70
NTeZ	+30.°50 to +36.°90
NNTeZ	+40.°10 to +55.°70

Note by Editor. The northerly latitude for the SEB and its comparative narrowness would suggest that what the observers measured was really the north component, the SEB_n. If so, the STrZ in the last table actually included the SEB Z, the space between the SEB components.

BOOK REVIEWS

Planets, Stars, and Galaxies, by S. J. Inglis. J. Wiley & Sons, Inc., 605 Third Ave., New York City, N.Y. 10016. 1976. (4th edition.) 336 pages with four seasonal star-charts. Price -- $11.95 softcover.

Reviewed by Paul K. Mackal

This is a basic fact book rather than a source book. The emphasis is on up-to-date facts about our universe, and it is designed for a one-quarter course in undergraduate astronomy. The level of difficulty is elementary. This book has several limitations for the advanced graduate student. It does not provide any very substantial mathematical treatment of astronomy, and the interpretations of the facts presented are too few and too brief. I also discovered two errors of omission. The first is on p. 42-- the four day atmospheric rotation of Venus was discovered by C. Boyer of Pic du Midi Observatory, France and co-discovered by E.J. Reese and T. Pope at New Mexico State University Observatory, not by Mariner 10! The second error is on p. 121--there are two new satellites of Jupiter, recently discovered at Palomar. In spite of these remarks, I wish to recommend this book strongly to all members of the A.L.P.O. as the best current text in general astronomy I have seen so far. It is comparable in severity and ingenuity to the five-volume Berkeley physics course published by McGraw-Hill. Esoteric points of interest with reference to the Solar System that I would have included had I been given the opportunity to collaborate in rewriting this book include the following. On p. 141, if meteorites of the iron type are cometary debris, then what is the source of the Solar System's indigenous comets? Comets are not asteroids. They appear to be the youngest members of the Solar System! According to the bi-focussed nature of cometary orbits with respect to either Jupiter or Saturn to some extent, I deduce that they are less stable than less eccentric ellipses. By way of a footnote, Inglis confutes the idea that the asteroids are debris from a disrupted planet.

To support this idea he metnions the Roche thesis on p. 145. This factor ought not to be confused with tidal bulge (Coriolis acceleration) which tends to produce rotating ellipsoids of deformation for low density planets or with three-body instability ranges far beyond Jupiter and near Mars! It is the latter fact which appears to account for the inability of the asteroids to accrete into a planet. Comparing p. 263 and p. 323: another point well worth making in regards to planetary bodies in general, rather than our Solar System alone, is that dark planetary companions of distant stars in our Milky Way system and other island galaxies, including galaxy groupings, constitute a sizable portion of the so-called missing mass of same! On a more exciting note, comparing pages 160 and 264, recently I made a statement to Soares of Brazil that extra UV radiation from blue stars speeds up evolution (by accelerating the rate of mutations) in carbon-based biochemistry. Even though the B-type stars are not long on the main sequence, they can produce some kind of life in my estimation. This life may be very sophisticated, as well!

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<u>The Solar System</u>, by C. Sagan, <u>et al</u>. W.H. Freeman & Co., 660 Market St., San Francisco, CA. 94104. 1975. 145 pages. Price--$8.50 hardcover or $4.50 softcover.

Reviewed by Paul K. Mackal

Quoting from the foreword: "This book presents a comprehensive picture of the new knowledge about the solar system gathered by man's first manned and unmanned expeditions beyond Earth's sheltering sky." Suitably, it is written by several authors rather than by one. Several of the papers appear better to this reviewer than the remainder because the former papers provide some of the basic assumptions of the Solar System. These assumptions, however, may be seriously questioned. Chapter 1 is entitled "The Solar System" and is by C. Sagan of Cornell University. Six models of our Solar System were constructed by him with S. Dole of the Rand Corporation. Model one (or "a") is very like the author's own, before it developed into model two (or "b"). First comes Mercury, a twin planet (viz., Earth and Venus), the asteroids (including Mars), another twin planet (Uranus and Neptune), a cold star system (Jupiter and Saturn in tandem orbits), planet 10 (which later collided with Neptune), and Pluto. In order for planet 10 to have collided with Neptune, it would have only to have travelled in a retrograde orbit which converged on the normal orbit of Neptune.

Chapter 2, by Cameron, is entitled "The Origin and Evolution of the Solar System." The formation of our Sun must have been fast indeed, for we can see no early stars in our own galaxy, only bright or dark nebulae. But if its mass were twice what it now is, as he suggests, then it could have begun as an F-type star, not a G-type star, some 9.6×10^6 yrs. ago. At any rate we agree that young G-type stars may be very much like F-5 type stars in old age since all stars lose mass on the main sequence. Furthermore, to produce the original Solar System, the proto-Sun must have lost one-half of its initial mass. This is more consistent with a Sun 9.6×10^9 yrs. old, not with one 4.5×10^9 yrs. old. The age of the Sun becomes the critical parameter!

R. Siever's article,"The Earth," is the one anthropomorphic contribution of this book. "All begins 4.6×10^9 yrs. ago" is the old refrain. Yet, to accept this classical idea of constancy in our Solar System, originating with Laplace, we must postulate that the Sun is a second generation star capable of effusing a wider and more abundant variety of heavier metals than is usual for either an F-5 or G-type star (rather than a first generation star). Perhaps the less massive, yet more abundant, amounts of hydrogen formed first into the proto-binary companion of the Sun, which I designate Jupiter-Saturn? The heavier elements were simply not present in large enough amounts to be important factors. And even if we drop the early formation hypothesis and assume that the Sun was always a G-type star, the lighter elements would coalesce first because of their greater abundance. The above is the exact obverse mechanism from the one usually implied or stated. However, the heavier elements probably had to be created in the proto-Sun, 4×10^9 yrs. ahead of the formation of Earth and the other Terran planets. The Jovian-Saturn companion may have split apart when it was ignited by the fusion process which generated helium from hydrogen. Accretion is an electrostatic process of attraction, unlike gravitational congealation, as originally suggested by Kant, and elaborated upon later by G. Kuiper. This view is supported by W. K. Hartmann, formerly the A.L.P.O. Venus Recorder, in his "The Smaller Bodies of the Solar System." However, he adds that collision is a major factor in the evolution of our Solar System, such that collisions of obverse groups of bodies in orbits about the Sun produce planetoids which collide by gravitational attraction to produce a larger planet. This process was essentially responsible for producing the larger "seas" of Mercury, the Moon, and Mars. (Consult: B.C. Murray's article "Mercury," J.A. Wood's article "The Moon," and J.B. Pollack's article "Mars.") According to van Allen, in "Interplanetary Particles and Fields," the Solar System was produced out of an intra-galactic gas cloud by virtue of the Sun's 20 revolutions about the Milky Way system, in which the extended magnetic field attracts massive amounts of gas in dust in the heliopause. Certainly this is a parsimonious assessment for the enormous number of comets in our Solar System beyond the orbit of Pluto. This is most consistent with the thesis that the major planets were formed roughly 8 x 10^9 yrs. ago, while the Terran planets were formed roughly 4.6 x 10^9 yrs. ago.

J. H. Wolfe's "Jupiter" is a masterful chapter based on the recent results of Pioneers 10 and 11. Jupiter is hypothesized to be a small liquid hydrogen body or cold star with a tiny core of iron-silicon surrounded by a large ellipsoid of liquid metallic hydrogen and a second ellipsoid of liquid molecular hydrogen (H and H_2). Notwithstanding this speculation, the author is confident that Jupiter does have crustal elements of a solid nature which may float on this surface under a deep rich atmosphere of methane, ammonia, diatomic hydrogen, and helium. (The ratio of the latter two gases is thought to be 10:1.) D. M. Hunten's "The Outer Planets" is more Wildtonian in outlook, by comparison to the above mentioned article by Pollack. Saturn is thought to be like Uranus and Neptune, unlike Jupiter, consisting of a rocky core surrounded by a spheroid of ice. But, ought we not wait for Pioneer's flyby of Saturn in 1979 to tell for sure whether or no this planet also generates thermal energy of its own, like Jupiter, before being so certain?

* *

Astronomy and Cosmology: A Modern Course, by Fred Hoyle. 1975, W. H. Freeman and Co., 660 Market Street, San Francisco, California 94104. 711 pages. 617 illustrations. Price $15.95.

Reviewed by Barbara Worcester, Texas Christian University

New texts in astronomy appear with each season and have through the years reflected changing currents in the scope and emphasis of courses in astronomy at the college level. Now one of the most eminent of today's scientists has written a text which conforms to the premise, stated in the preface, that "The time has come for astronomy to take its place as a major branch of physics." Strong emphasis is placed on the development of basic concepts of physics. Radiation is given a novel treatment which avoids the conflict of wave and quantum theories. Here, as throughout the book, an abundance of diagrams, simply executed and graded to illustrate the developing concept, attest to the author's keen interest in translating the complex into simpler language for the non-mathematically oriented student.

With more stress on theory, one is not surprised to note the omission of some traditional topics such as phases of the Moon and planets, the Moon's orbit, and the tides, or the lack of space accorded eclipses and the variety of surface features of the Moon and planets, or even the choice of material relegated to the appendices. Fully 175 of the 711 pages of the text are devoted to the appendices which follow each of the 6 sections into which the book is divided. These provide a ready reference to such topics as logarithms, the Doppler principle, and the spectral sequence, as well as eclipsing binaries, novae, and supernovae.

Problems appear throughout the text besides the series at the end of each chapter. The author does not lose opportunities to prod the student with thought-provoking questions on the material at hand, and to enliven the discourse with his humor, personal anecdotes, and curious paradoxes.

Since Dr. Hoyle is well known as a cosmologist and protagonist for the steady-state theory of the universe which has suffered considerably from recent observations which appear to contradict it, the final section of the book on cosmology is of special interest. Again, a minimum of mathematics and a maximum of diagrams are used to present this highly technical subject, along with an innovative approach to topics such as the red shifts and the nature and origin of the universe. The steady-state theory emerges salvageable, while its rival theory undergoes careful scrutiny and doubts are raised with regard to that ultimate "big-bang." The book concludes with a tentative view of a greater universe with implications for black holes and quasars.

Whether or not one always agrees with Dr. Hoyle, one must acknowledge the originality of his ideas and the power of his arguments, which make for fascinating study. Although designed as an introductory text, the book provides a wealth of material on the frontiers of astronomical thought that is challenging for the serious student, the interested layman, and the professional scientist who seeks a truly extraordinary text for the classroom.

* *

Black Holes in Space, edited by Patrick Moore and Iain Nicolson. W. W. Norton and Company, Inc., 500 Fifth Ave., New York, N.Y. 10036. 1976. 126 pages. Price $7.95.

Reviewed by Richard J. Wessling

This book, a most timely edition, is exactly what the phrase on the front cover says, "An investigation of the formation and implications of the most fantastic scientific phenomenon".

The authors begin the book with a brief description of the Black Hole Theory, an overall approach to the subject that nourishes the reader's interest for what is to follow: a setting of the scene about how Black Holes are formed. In everyday language the authors take the reader through the basic mathematics of our Solar System, gravitational effects, and some theories about our galaxy. The electromagnetic spectrum is introduced along with some important historical breakthroughs, such as Hubble's discovery that Cepheids in the Andromeda Galaxy are so remote that they can not possibly be in our own galaxy.

In this process of explanation the Hertzsprung-Russell Diagram is presented as well as the red shift, or Doppler Effect. Red Giants and White Dwarfs, Quasars and Pulsars, neutron stars, and Einstein's Theory of Relativity complete the background for the remainder of the book.

The strange description of what a Black Hole is thought to be unfolds. The Schwarzschild radius, the event horizon, and what would result if your spacecraft entered these limits of a Black Hole formed the most interesting part of the book for me. How time changes due to speeds approaching the speed of light and the intriguing realm of possibilities that exist as to the fate of a traveler unfold before your eyes.

Since the book is written with the layman in mind, Black Holes in Space will be a welcome addition to anyone's library.

* *

North Star to Southern Cross, by Will Kyselka and Roy Lanterman. The University Press of Hawaii, Honolulu, 1976. viii + 152 pages. Price $8.95 hardcover, $3.95 paperback.

Reviewed by John E. Westfall

North Star to Southern Cross is a brief and attractive introduction to astronomy and to viewing the heavens with the naked eye. Compared to most astronomy texts, theoretical aspects are briefly treated; the last third of the book covers the Solar System, stellar size and evolution, cosmological theories, and modern observing techniques. ALPO members will be disappointed by the summary treatment given the Solar System. The book's intention is not to convey detailed technical information. On the other hand, attractive illustrations and a clear, readable text should entice the beginner into pursuing astronomy further from more detailed sources.

This book is commendable in that it places our present astronomical knowledge in historical perspective. The historical development of rational cosmic models, as well as creation legends, is sympathetically and interestingly treated in two chapters.

Probably the amateur will find the central third of the book the most valuable, since it presents meridional evening star charts for each month, with north circumpolar charts for each season. These charts are well-done, attractive, and legible, even though each shows sixth magnitude stars and major Messier objects in a 6- by 9-inch format. Accompanying the monthly charts are descriptions of the major constellations, legends associated with them, and short descriptions of interesting objects. (Enlarged versions of the sky maps are available separately.)

North Star to Southern Cross is enjoyable to read and, although it does not go into depth, appears to be accurate and up-to-date as far as it goes. Only two misleading statements were noted. One (p. 74) implies that a 12-inch telescope is necessary to see Messier 57. Another (p. 105) may surprise Jupiter observers: "A century ago the Red Spot was definitely red, but now it is no longer highly colored." Also, readers should remember that the book is written for the latitude of Hawaii and thus should not be disappointed when they cannot observe the southernmost deep sky objects described.

This book is recommended as a means of introducing people (particularly young people) to, and interesting them in, astronomy and the night sky. Although little attention is paid to the Solar System, broader horizons are well and attractively described.

* *

The Dark Night Sky, by Donald D. Clayton, Quadrangle/New York Times Book Company, New York, N.Y., 1975. 206 pages. Price $9.95, hardcover.

Reviewed by Michael Mattei

Many amateurs may wonder what goes on in the mind of the professional astronomer, how he thinks, what his life work is like, and what it is like when he meets and talks with other scientists in his field. Dr. Donald Clayton gives us a personal view of his experience in his book The Dark Night Sky.

Dr. Clayton begins with his personal description of an experience while driving one evening on a Texas highway with his car lights off to avoid hitting rabbits on the road. The beauty of the night sky above caused him to stop by the side of the road and there enjoy a view of the stars in a sky which was unpolluted by the glare of city lights. He goes on to describe his interest in the sky as a young boy, through his years as a graduate student, and finally as a professional astronomer. Dr. Clayton presents a description of astronomy which few professionals have ever put into words. His work at Cambridge, England, with Fred Hoyle and his interesting journey around Europe are well detailed. His mountain climbing trip with Fred Hoyle and their discussion about the theory of the universe was an experience to remember.

The method Dr. Clayton uses to describe the universe and its workings makes easy reading for the layman. For example, he describes what it would be like if a ball game were to be played on a giant turntable with second base at the center of rotation of the turntable. He uses the Astrodome in Houston in his example. Assume that the players have lived all their lives in the dome and that they do not know that the dome is rotating. As you may guess, the game would be very interesting indeed. He also describes how Löys de Cheseaux tried to measure the distances to the brightest stars before the use of the parallax method. Löys de Cheseaux measured the brightness of the stars and compared them to the brightness of the planet Mars and the Sun in order to determine stellar distances. He came very close to the actual distances.

Dr. Clayton explains the big bang theory of the expanding universe by comparing it to a motion picture film running in a forward direction. We see the universe today running in a forward direction. Now we reverse the film. We know what the film will look like in reverse, but what will the universe look like in reverse? Some interesting thought is given to this view.

Dr. Clayton covers all aspects of astrophysics from theory to observations. The Dark Night Sky is well written, and the reader will enjoy this book.

NEW BOOK RECEIVED

By: J. Russell Smith

Frontiers of Astrophysics, edited by Eugene H. Avrett. Harvard University Press, Cambridge, Mass., 1976. 554 pages. Price $20.00 cloth, $8.95 paper.

Here is the most up-to-date information in the field of astrophysics. Each of the twelve chapters was written by a specialist in his field. The book is not for the beginner, but it is designed for one who has a good background in physics. Unlike the plan in many other texts, each chapter is an independent unit.

THE A.L.P.O. AT KUTZTOWN, PENNSYLVANIA

By: Phillip W. Budine

The A.L.P.O. had a most successful convention last summer when it participated in the National Convention of the Astronomical League, called Astro Con 76. The dates were August 19-22, 1976. The place was Kutztown State College, Kutztown, PA, in the beautiful Pennsylvania Dutch Country. The host societies were the Lehigh Valley Amateur Astronomical Society, the Astronomical Society of Harrisburg, and the Rittenhouse Astronomical Society. The General Chairman was Mr. Ernest Robson, and the Assistant Chairman was Mr. Kenneth Mohr.

Lodging was available in the campus dormitories as early as Monday, August 16; and some A.L.P.O. members arrived on that day, including our Director, Walter Haas, and the writer. Most of the A.L.P.O. members arrived on August 18 or 19, and the estimated total of 60-80 A.L.P.O. members in attendance appears to indicate a good turnout. The Convention as a whole attracted 653 delegates, thought to be a record for an amateur astronomical meeting.

The day of August 19 was highlighted by the Philadelphia Bus Tours, with the delegates having the choice between an historical tour and visits to the Frankford Arsenal and the Franklin Institute. The writer was on the latter tour, which included an inside look at the Franklin Research Labs. At the Institute we were given a very informative demonstration of the capabilities of the Great Zeiss Projector in the Fels Planetarium. The observatory includes a 10-inch Zeiss refractor, which was viewing sunspots, and a 24-inch Fecker reflector, aimed at the planet Venus.

The evening of the same day was marked by an informal discussion session among Jupiter Section observers, including Ron Doel, Richard Hull, Randy Tatum, John Barnett, Daniel Costanzo, the writer, and others.

The A.L.P.O. Paper Session was held on Friday, August 20. It contained the following papers: "Some Thoughts on the Amateur Observer - Past, Present, and Future", by Walter H. Haas; "Triple Disturbance on Jupiter in 1975", by Paul K. Mackal; "Jupiter's North Tropical Zone Disturbance", by Phillip W. Budine; "Observing Saturn: Where Do We Go from Here", by Julius L. Benton, Jr.; "Brightness Variations of Comet Kohoutek 1973f and Comet West 1975n", by Charles S. Morris and John E. Bortle; "Magnitude Observations of the Earthgrazer 1580 Betulia", by Alain Porter; "Dark-Haloed Craters: A Concluding Report", by Reverend Kenneth J. Delano; "Resolution and Contrast", by Rodger W. Gordon; "An Accurate Electronic Digital Sidereal Clock from 60 Hz Line Frequency", by Derald D. Nye; "The Skyview Observatory", by J. Russell Smith; and "The Great Red Spot - an Observational History", by Richard L. Hull.

The A.L.P.O. Business Meeting was held on Saturday, August 21, at 11:00 A.M. Thirty members were present. The most important decision was to meet with the Nationwide Amateur Astronomer Convention in 1977 at Boulder, Colorado.

More papers by A.L.P.O. members were given on Saturday afternoon, namely: "A System to Determine Solar Coördinates During Direct Observation (Filtered Observation)", by Harold J. Stelzer; "Solar Observing with Small Telescopes", by Robert A. Yajko; "A.L.P.O. Observing Program of Lunar Transient Phenomena", by Winifred S. Cameron; "The N.C.A. Nova Patrol Program", by Daniel Joseph Costanzo; and "An Update of SEB Disturbance Analysis", by Ron Doel.

Saturday evening brought what this writer considers to be the outstanding highlight of Astro Con 76: guest speaker Dan Matlega presented "200 Years of Observing Mars" and followed his lecture with a direct telephone hookup to the Jet Propulsion Laboratory and Mission Control-Project Viking for 45 minutes. Audience questions were invited and were numerous. We should perhaps remind readers that at this time Viking I was carrying on its life-seeking experiments on the surface of Mars.

The photographic and commercial exhibits were excellent. Many fine firms displayed their equipment, including Questar, Unitron, Vernon Scope, Rodger Tuthill, and Spacek. The A.L.P.O. Exhibit was well received. It included photographs and drawings by members of the various Sections, including Jupiter, Venus, Mars, Saturn, Lunar, and Comets. One display illustrated the history of A.L.P.O. Conventions. The Jupiter material included a sequence of strip sketches illustrating the development of each of the three major SEB Disturbances of 1975. The Comets Section material featured some beautiful photographs of Comet West. [The A.L.P.O. Exhibit was collected and arranged by Mr. Phillip Budine with some considerable help from Mrs. Joan Budine. They did a fine job. - Editor]

The morning of Sunday, August 22, brought a novel feature; workshops on various subjects were held. Those of chief interest to A.L.P.O. members dealt with comets, Mars, the Moon, meteors, Jupiter, and Minor Planets. Many persons commented that the workshops were one of the most outstanding features of this Convention. Secretary J. Russell Smith helped choose the workshop leaders.

We have naturally stressed in this article matters which may be expected to be of main interest to readers of this journal. Some other facets of Astro Con 76 should at least be mentioned. Miss Mabel Sterns presented a most outstanding exhibit called "200 Years of Amateur Astronomy in the United States". The Pulpit Rock Astronomical Park of the Lehigh Valley Amateur Astronomical Society was a striking example of what an amateur society can achieve. Six observatories and a meteor platform fill a scenic area 1,600 feet above sea level on the Appalachian Trail. The Kutztown State College Observatory and Planetarium were repeatedly made available to the visitors, thanks to the Director, Dr. Carlson Chambliss.

In brief, the Convention was a great success, not only because of the opportunity to meet personally astronomical colleagues. Meetings of this kind enable us to exchange theories and ideas, to discuss new projects, and to coördinate our observational programs much more effectively. The observing at Kutztown was no chore with seven straight beautiful clear nights - an astronomer's dream come true! Jupiter Section members even had the opportunity to sketch the first composite drawing of Jupiter based on the views with Bill Dickinson's 8-inch reflector.

SKETCHES AND PHOTOGRAPHS OF PERIODIC COMET d'ARREST

The illustrations on pages 125 and 126 were contributed by Mr. Dennis Milon, the A.L.P.O. Comets Recorder. We hope that readers will find them of some interest, particularly those who observed this comet. We hope to offer a more analytical article about Comet d'Arrest in a future issue. The information given in the captions of Figures 21-26 was supplied by Mr. Milon. They should serve to indicate some of the interesting activity of this comet last summer. Perhaps readers would like to comment on short pictorial articles of this kind, which hopefully can quickly follow the events to which they relate.

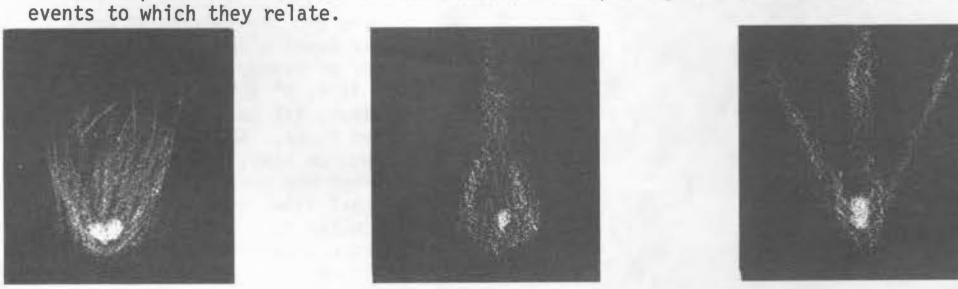

Figure 21. Three drawings of Periodic Comet d'Arrest in 1976 by Rick Hill of Greensboro, North Carolina. Left - July 25; center - August 1; right - August 17. All with a 6-inch reflector at 30X. On the first date the coma diameter was 8 minutes of arc; and the integrated magnitude in the 6-inch was estimated at 8.6, comparing to stars in the SAO Catalogue. By August 1 d'Arrest had brightened considerably, to 6.6 in a 14 x 50 refractor, and had a tail 15' long. On the 17th the magnitude was 5.5, and three tails were seen.

Figure 22. Drawing of Periodic Comet d'Arrest by Cavagna Marco on August 2, 1976, at $22^h 30^m$, U.T. He observed 30 kms. from Milan, Italy, with 20 x 80 binoculars and estimated the magnitude at 7.9, taking comparison stars from the SAO Catalogue. The coma was 8' across. The tail was 0.4 degrees long, and its central axis was at position angle 315°.

Figure 23. Drawing of Periodic Comet d'Arrest by Stephen O'Meara of Cambridge, Mass. on July 19, 1976 at 3^h, U.T. 9-inch Clark refractor. Magnitude of comet 9.7. The observer could distinguish a parabolic shape to the coma, which was 3' in diameter.

Figure 24. Two drawings of Periodic Comet d'Arrest by Thomas O'Hara of Fullerton, Calif. Left drawing on August 23, 1976, 9^h-11^h, U.T., 2.4-inch at 35X. The site of observation was Holcomb Valley at an elevation of 8,500 feet. The comet was elongated half a degree in position angle 313°, with a coma 15' in diameter. Extra-focal comparisons with SAO stars in 7 x 35 binoculars gave a magnitude of 6.7, but the comet was visible to the unaided eye. Right drawing on August 28, 1976, $6^h\ 30^m$ - $7^h\ 30^m$, U.T. Site of observation Trabuco Oaks. Coma diameter 10' in the 2.4-inch by the drift method but twice that size in 7 x 35 binoculars from comparison with the SAO Atlas. Central condensation nearly stellar. Total magnitude 5.9 in 7 x 35 binoculars.

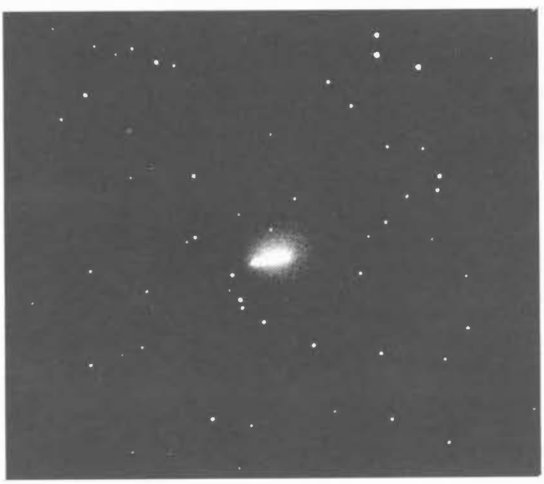

Figure 25. Photograph of Periodic Comet d'Arrest by Jim Soder of Sidney, Ohio on August 18, 1976, $5^h\ 35^m$-$6^h\ 15^m$, U.T. 10-inch, f/6 Cave reflector, prime focus. 40-minute exposure guided on star; the comet trailed against the star background. 103 a-F film, development for 4 minutes in D-19. Magnitude of comet estimated at 7.7 in 7 x 50 binoculars. Comet very diffuse in 7 x 50 binoculars and in 10-inch reflector at 60X. Seeing good, sky clear.

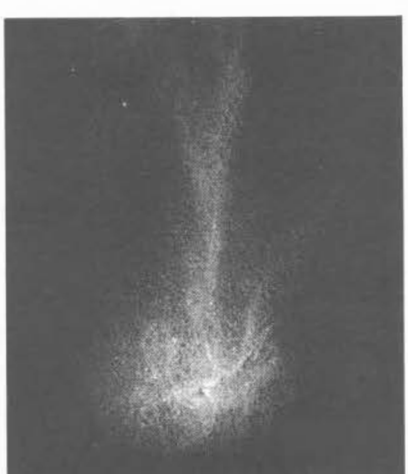

Figure 26. Drawing of Periodic Comet d'Arrest by Stephen O'Meara on July 26, 1976 at $2^h\ 15^m$, U.T. 9-inch Clark refractor. Main tail 15' long at position angle 260°, breaking off near its end, while there was also a fainter tail to its right. In a 3-inch finder the magnitude of the comet was 8.1. Compare to Figure 23, a sketch by the same observer seven days earlier.

ANNOUNCEMENTS

Sustaining Members (continued). The Sustaining Members for whom space was lacking on page 84 of Vol. 26, Nos. 3-4 are as follows: A.W. Mount, Charles B. Owens, Joseph P. Vitous, John E. Wilder, A.K. Parizek, B. Traucki, Lyle T. Johnson, H.W. Kelsey, Philip Wyman, Daniel H. Harris, W. King Monroe, James W. Young, Dr. Joel W. Goodman, Harry D. Jamieson, Commander W.R. Pettyjohn, Robert M. Adams, Orville H. Brettman, Brad Dischner, Dr. Juan Homero Hernández-Illescas, Dr. Julius L. Benton, Jr., Hoy J. Walls, Robert M. Peterson, Winifred S. Cameron, Charles S. Morris, Richard J. Wessling, Sheila B. Cassidy, Bill Pierce, Randall R. Wilcox, Robert W. Adams, Dr. Freeman D. Miller, Paul E. Stegmann, Dr. D.D. Meisel, Clifford J. Glennon, Harold D. Seielstad, Rodger W. Gordon, William Dave Hodgson, and Dr. Howard W. Williams.

Index-Gleanings for ATM's. Secretary J. Russell Smith calls attention to the fact that a copy of an index to "Gleanings for ATM's" from Sky and Telescope magazine, January 1953 through December 1974, is available for $1.00, postpaid, from Mr. John Cotton, 3717 Pardue, Dallas, Texas 75225. Mr. Smith further writes: "This is an eleven page index which is handy to have. You can find what you want immediately. It is organized with the following headings: Accessories, Cameras, Compound Telescopes, Drives, Eyepieces, Grinding and Polishing Machines, Miscellaneous, Mirror and Lens Making, Mirror Testers and Testing, Mountings, Observatories, Optics, Photography, Solar Observing, Telescope Articles-General, Telescope Making-General, Telescopes-Newtonian, Telescopes-Herschelian, Telescopes-Refracting, Telescopes-Springfield, and Using a Telescope."

Search for a Book Relating to Earth-Based Observations of Martian Craters. Readers are reminded of Mr. Rodger W. Gordon's article "Mellish and Barnard - They Did See Martian Craters!", J.A.L.P.O., Vol. 25, Nos. 9-10, pp. 196-200, 1975. In this connection Mr. Gordon is now anxious to find a copy of a book called Mysteries of Time and Space by H.P. Wilkins, published by Frederick Muller, Ltd., London, 1955. Anyone who has any information about the book is requested to write to Rodger W. Gordon, 637 Jacobsburg Road, Nazareth, PA 18064. The book would partly be valuable for Wilkins' possible original sources regarding Mellish's observations of craters on Mars. Wilkins was an outstanding British lunar observer, and during a lecture tour of the United States in 1954 he observed Mars with the Mount Wilson 60-inch reflector and the Yerkes 40-inch refractor. In the Yerkes instrument he noted "the oases, several of which were seen, suggested craters, presumably filled up with some dark material". Was Wilkins trying to confirm Mellish's observations, and did he succeed?

Helpers in Jupiter Section. Our two Jupiter Recorders, Phil Budine and Paul Mackal, wish to acknowledge the considerable assistance in A.L.P.O. Jupiter studies of these persons: Gary Seaman of Big Bear Lake, CA; Ron Doel of Maple Shade, NJ; and Richard Hull of Richmond, VA. Their help is greatly appreciated. A Jupiter Bulletin edited by Mr. Budine and Mr. Hull serves to keep Jupiter Section observers alert to current activities on the ever-changing Giant Planet.

OBSERVATIONS AND COMMENTS

Comet West on the Front Cover. Readers are invited to examine these sketches by an experienced observer employing a large telescope. Comets Recorder Milon has added a few comments. On the March 8 and 15, 1976 sketches a bright spine is seen to be developing behind the nucleus. On the 8th there appears to be a weak envelope in front of the head and side whiskers on the right. On the 15th several bright condensations were noted behind the nucleus. On March 16, only 24 hours later, three nuclei were seen, with a fourth condensation suspected. Each nucleus had its own short tail.

Should There Be an ALPO Solar Section? Mr. Robert A. Yajko of Leechburg, PA and a few others have urged the formation of a Solar Section in the ALPO. We quote a portion of a relevant letter from Mr. Yajko; reader comments are cordially invited. "Many observers who observe the Moon and planets are, I am sure, observers of the Sun. Solar filters can now be acquired relatively cheaply and open up a vast realm of study for solar work. Observations of sunspots, faculae, pores, polar faculae, and even flares can be conducted in white light. Sunspot counts, positional measurements of sunspot longitudes and latitudes, and the progression of the solar cycle would be fascinating areas of study for the amateur observer with very modest equipment. Even though the A.A.V.S.O. has a Solar Section, their studies appear to be limited primarily to sunspot counts and little else. It would be nice to have, in this country, a Solar Section where solar observers could send in their observations, drawings, photographs, etc.

"I have been doing solar work for several years now with the B.A.A. Solar Section under the directorship of Dr. V. Barocas and look forward to sending my observations to him each month."

The Strolling Astronomer

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