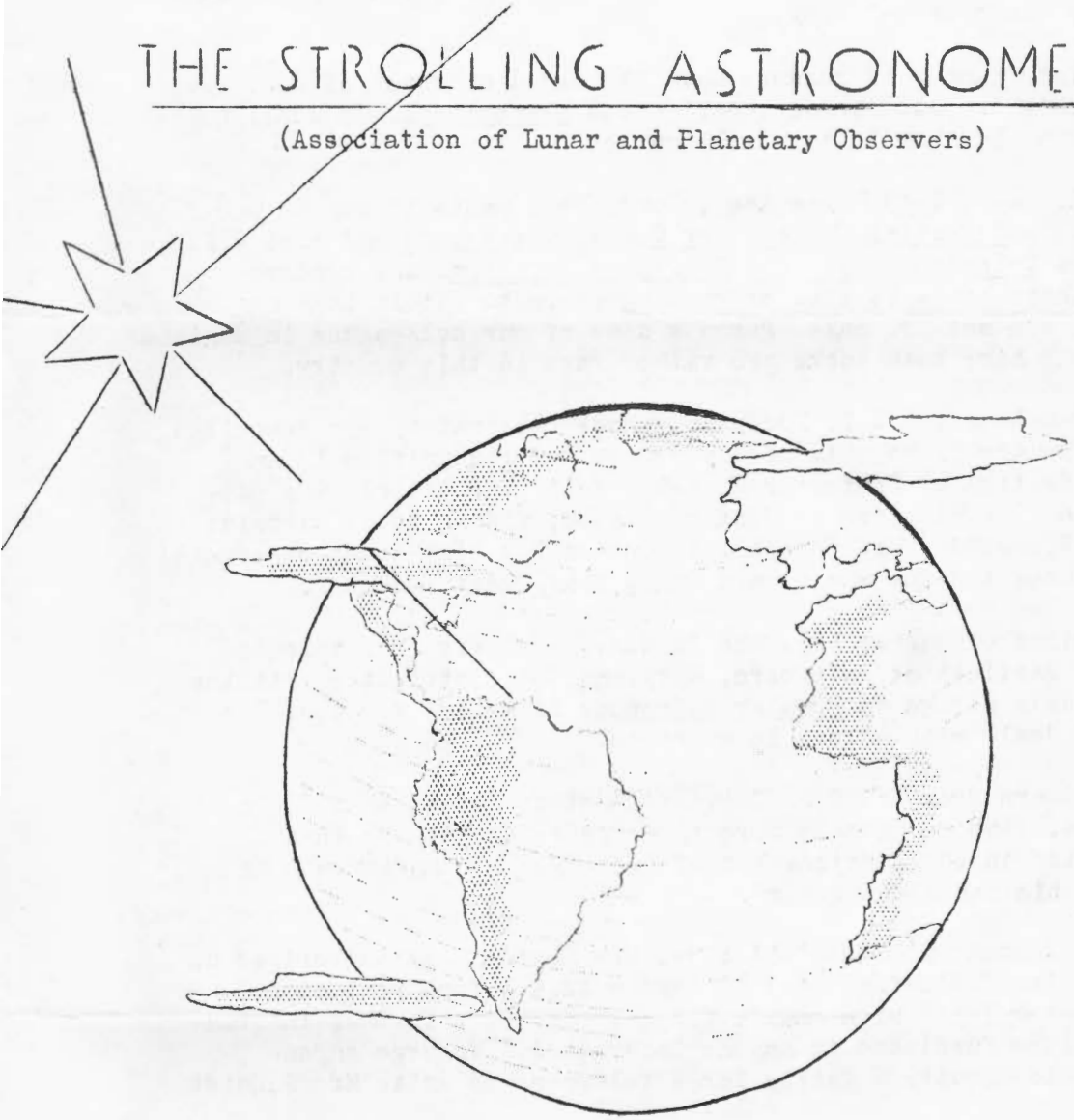
Volume 2, Number 4 April 1, 1948

THE STROLLING ASTRONOMER

(Association of Lunar and Planetary Observers)



Mailing Address

The Strolling Astronomer
Institute of Meteoritics
University of New Mexico
Albuquerque, New Mexico

NOTES

Several members have informed the editor that the price of the American Ephemeris and Nautical Almanac is $3.25. This price was incorrectly given as $2.00 in our December issue. The editor apologizes for this error; the raise apparently occurred just after he obtained his personal copy.

A fair number of readers have expressed approval of D.W. Rosebrugh's proposed terms lumarian and planetarian. We shall hence venture to use them in this publication.

T.R. Hake, 1553 Wayne Ave., York, Pa., wants to buy Volume I of T.W. Webb's Celestial Objects for Common Telescopes and also W.F. Denning's Telescopic Work for Starlight Evenings. Any readers having these books to sell or knowing where to obtain them are urged to contact Mr. Hake. Perhaps some of our colleagues in England could help him; both books are rather rare in this country.

Our subscriber E.L. Forsyth , whose Observatory was described in our January issue, has received deserved recognition in an article written by Professor J.Hugh Pruett. The article was published in 18 newspapers in Western states, with a total circulation of over 2,000,000. Mr. Forsythe is one of our best comet-observers; he was among the few who viewed Comet 1947_n last December.

Another of our members who is very, very far from idle is Dr. J.C. Bartlett at Baltimore, Maryland. He contributes articles on the sun's doings to Popular Astronomy from time to time. The last one deals with colors in sunspots.

We learn from Dr. C.P. Olivier's"Meteor Notes" that T. Scott of Nauvoo, Alabama, spends more time observing meteors than anyone else in the American Meteor Society. We congratulate Mr. Scott on his excellent record.

Mr. Raymond Schmidt, Chloride, New Mexico, has authorized us to print the following note: "I have a 12.5 - inch reflector, recently completed with mount, for sale at cost. Further information will be furnished to anyone interested." We urge anyone desiring to acquire a fairly large telescope to write Mr. Schmidt.

Another observation of the January occultation of Mars by the moon, discussed in the March issue, has arrived since we last published. It was made by C.L. Brown in Spokane, Washington, and is communicated by H.D. Thomas. Mr. Brown employed a 5 - inch refractor at 150x; both the seeing and the transparancy were good. He saw no lunar limb band at the bright limb immersion. This negative observation is perhaps the best one relating to the band made at this occultation. Mr. Brown timed contacts with a high grade stop watch checked with WWV only two minutes before the occultation. He obtained, in U.T. on January 28, 1948: first contact at $4^h16^m5^s$ and second contact at $4^h16^m55^s$. Pertinent geographical data are: latitude 47°38'41" N., longitude 117°25'3".45W.,

elevation 2270 feet.

H.J. Carruthers at Portland, Oregon, also observed this January occultation but could conclude nothing because of a high wind that shook the telescope.

A note on position angles given for occultations might be pertinent here. These are measured from the north point of the moon's disc, around through east and up to 360 degrees. The north point will seldom coincide with either the north cusp or the north lunar geographic pole. For example, at the February, 1948, occultation of Mars the position angle of the south cusp of the moon was about 225°. The north and south points of the lunar disc can be approximately determined by watching the east-west drift in the telescopic field of view. If necessary, stop the drive for a while.

THE FEBRUARY OCCULTATION OF MARS

In our March issue we mentioned a lunar limb band sometimes seen against planets when they are occulted by the moon. This band has been regarded as both a contrast-caused illusion and a lunar atmospheric effect and is important in our studies under either hypothesis. The occultation of Mars on February 23 (civil time date) was visible over much of the United States and Canada. We again requested reports. The response was excellent, and we thank all who assisted us.

D. Monger, R. Maag, M. Rosenkotter, G. Brown, and C.P. Richards had totally cloudy skies. Miss A.I. Hoth had skies too cloudy to allow useful views. There was only a tantalizing "near miss" instead of an occultation for W. Mullen at State College, Penna., N.J. Schell at Beaver Falls, Penna., E.A. Sill at Mamaroneck, New York, F.M. Garland at Pittsburgh, Penna., and T. Connors at Cicero, Illinois. Estimated minimum distances between the limbs of the moon and Mars at closest approach are 27" at State College, 14" at Beaver Falls, 27" at Mamaroneck, and 1' at Pittsburgh. We now list some pertinent information about the more successful observers.

No.	Station	Observers	Telescope
1	Cambridge, Mass.	J.P. Dow	9-inch refractor
2	Youngstown, Ohio	Hartenstein Grandmontagne McConnell	6-inch reflector
3	Chicago, Illinois	H.M. Johnson C. Gasteyer	6-inch refractor
4	Schenectady, N.Y.	M. Liston	6-inch reflector
5	Helena, Montana	T.J. Mentrum	4-inch reflector
6	Kenmore, N.Y.	R. Missert C. Stockman	6-inch reflector
7	Montreal, Quebec	F.P. Morgan D. Garneau	6-inch refractor 4-inch refractor
8	Waterbury, Conn.	D.W. Rosebrugh	6-inch reflector
9	Kimberley, B.C.	E.K. White	7-inch reflector
10	Norwich, N.Y.	Paul	6-inch refractor

At 2 and 8 there was the rare event of a partial occultation

of a planet. Mars was about one-half occulted at Youngstown and about three-fourths at Waterbury. If the slow tangential passage had been along the bright limb of the moon, there would have been an excellent opportunity for a prolonged view of the curious lunar limb band. Unhappily, Mars was visible in contact with the dark limb only at those stations. The same is true of 1, where Mars disappeared. The observers at 1, 2, and 8 hence saw the dark limb of the moon projected against the planet as a sharp and black band. They saw nothing additional imputable to either lunar atmosphere or contrast. Conditions for observing were rather poor at Cambridge, fairly good at Waterbury, and excellent at Youngstown; a drawing by Dow reveals Mare Sirenum, and Rosebrugh speaks of the north cap.

At 3, 4, 6, and 10 immersion occurred at the dark limb; emersion was very close to the south cusp. Position angles computed by G.B. Blair and data given upon pg. 403 of the 1948 A.E.N.A. suggest that emersion was one to three degrees on the dark limb side of the cusp. Liston and Gasteyer (who observed emersion, Johnson taking immersion) opine that it was on the bright limb instead. With the moon only about 16 hours from full, the exact location of the cusp may have been difficult to estimate. No bands were visible at either immersion or emersion to Paul, conditions being fair, nor to Johnson and Gasteyer, conditions being adverse. Johnson thinks that a limb band as conspicuous as the one which he saw against Jupiter on the afternoon of April 30, 1944, would have been seen. Johnson's view of Mars on February 23 was later good enough to reveal Propontis, Hades, the north cap, and a few other features. Missert saw Mars well enough that rough sketches by him show Sirenum, Propontis, and the north cap. During part of the dark limb immersion a bright band bordered the black limb for Missert; it was evidently due to contrast between the limb and the bright Martian deserts. Near the end of the emersion a dark band was apparently present but turned out to be Propontis-Hades. Conditions for Liston were very favorable; both seeing and transparency were just about perfect. He reports: "Just after the planet came from behind the moon, the upper half of the planet appeared hazy and slightly darker for about five seconds; when the two separated, this condition disappeared. I wouldn't call it a band, but something was there." An imperfect view of Propontis-Hades? Or a contrast-effect?

For 5,7, and 9 immersion was at the dark limb; emersion, at the bright limb and well away from the cusp. Mentrum and White could not observe immersion, and Morgan then saw nothing. At emersion Garneau and Morgan saw the disc of Mars apparently projected upon the moon and outlined by a bright blue band. This effect is presumably optical; similar appearances have been observed at occultations of Jovian satellites by their primary. Mentrum saw nothing; he reports that his small reflector has not revealed markings on Mars. White's report deserves discussion in some detail.

He observed just at sunset, with the bodies only five degrees high. Mars exhibited a north cap but no other markings. A definite

dark band adjacent to the bright limb of the moon was seen against Mars. This band was darkest at the moon's limb and grew fainter towards its outer edge, which was very diffuse. The width was about two seconds of arc. The color of the band was blue-black to gray; perhaps the blue was due to the bright sky. The band was presumably darker than all maria on Mars. It was seen as soon as the emerging Mars was noted, and it probably vanished at the moment of fourth contact. The band remained stationary relative to the limb of the moon throughout its period of visibility. These various appearances accord fairly well with past observations of the band.

If White's band is to be a lunar atmospheric effect, it is necessary to suppose that Morgan, Garneau, and Mentrum failed to observe the feature. That is perhaps admissible; for White is a veteran planetary observer, and in recent months his telescope has exhibited such delicate Saturnian features as Encke's Division and Cassini's in fromt of the ball. We must also here suppose that the lunar atmospheric effect was lacking (at least, unnoted) very near the south cusp and on the dark limb. It has been regularly invisible at the dark limb in the past. Is it due to absorbing lunar vapors or dust raised a few miles above the surface only when that surface is hot enough?

Was the band due to contrast? Computations based on the distances of Mars and the moon from the sun on February 23 and on their average albedoes make the moon about 4/3 as bright as the planet. Could this small amount of contrast produce a spurious band? Perhaps not, though some enterprising reader might approach this fundamental problem experimentally. Rosebrugh reports that Mars was dimmer than the moon; even the north cap was dimmer and pinker than the moon to him. He compares the two objects to a stack of fresh yellow hay standing in snow, though Mars was pinker than hay. White remarks on a pronounced difference in colors: Mars red-orange and the moon pale yellow. He and Johnson failed to notice which disc was brighter; the two presumably differed little. There is good observational evidence above that the difference in brightness near the south cusp of the moon did not cause a contrast-band. To blame White's band upon contrast, we must suppose the effect somehow lacking for all other observers.

We conclude with available exact timings, converted to U.T. on February 24, 1948:

Observer	Station	First Contact	Second Contact	Third Contact	Fourth Contact
E.K. White	Kimberley,B.C.				$1^h13^m46^s$
C. Stockman	Kenmore,N.Y.	$0^h40^m30^s$	$0^h41^m26^s$	$1^h8^m40^s$	1 9 23
H.M Johnson	Chicago, Ill.	0 34 48	0 35 41		
C. Gasteyer	Chicago, Ill.			0 59 38	1 0 24

Stockman and Missert worked together. Johnson and Gasteyer at the University of Chicago Observatory employed Naval Observatory time signals, a Riefler clock, a chronograph, and an electrical circuit key. Gasteyer admits that his third contact is late, and the same is probably true of Stockman in view of the same inequality of emersion-and immersion-intervals.

OBSERVING THE PLANET VENUS

by M.B.E. Heath

It is certainly very much easier to observe Venus than it is to observe the elusive and fugitive Mercury. To begin with, Venus is always by far the brighter of the two, and also it is generally at a greater apparent distance from the sun. In consequence it can be followed telescopically all around its orbit, even with quite small apertures. Probably the phases of this beautiful planet appeal most to the amateur who is just commencing his observing career, and these he can follow from the little round silver disc at superior conjunction, through the gibbous phase to half phase (dichotomy), and thence through the phase of greatest brilliancy to inferior conjunction. Although in the last-named position we see less of the illuminated surface of Venus than at any other time, the sight of the huge, but exceedingly thin hair-like silver crescent, generally extending a little beyond the semicircle, on the deep blue of a summer sky is one not soon to be forgot. Even with a 3-inch aperture it is so visible, whereas the crescent of Mercury at inferior conjunction is quite invisible even in large telescopes - at least the writer has never seen it with apertures up to 10 1/4 inches.

A word as to why the horns extend slightly beyond the semicircle may not be out of place. We see it so for two reasons. Firstly, and probably mostly, by refraction of the sun's light by the atmosphere of Venus (we know it has a very considerable one), and secondly, from the fact that the Sun, as seen from Venus is not a point-source of light but presents a disc a little more than one-third as large again as it does to us. As the orbit of Venus is almost circular it necessarily follows that the apparent distance of the planet from the Sun at greatest elongations can only vary between small limits - very different from the case of Mercury. Indeed it can be shown mathematically that the eccentricity of the Earth's orbit is the more potent factor in the determination of the amount of the elongations, which, even then, only vary from about $45^{\circ}28'$ to $47^{\circ}13'$ and that the stellar magnitude of the planet in these positions only varies between minus 3.93 and minus 4.08. Thus for the observer the best apparitions of Venus occur when the ecliptic makes a large angle with the horizon, that is when Venus is an evening star in spring and early summer or a morning star in autumn or early winter, in the temperate zone of the northern hemesphere. Such conditions occur during the present year.

Never attempt to observe Venus on a really dark sky or too near the horizon, for if you do, the intense glare of the planet will exaggerate every imperfection of your telescope and lack of homogeneity in our atmosphere. With an equatorial it is easily found, even at high noon, but those having altazimuth mountings should observe it as soon as it becomes visible to the naked eye in the twilight, or even a little before sunset or after sunrise.

The marking most easily observed on Venus is generally the terminator shading. This begins to show itself when the planet is about three-quarters illuminated, but is most prominent from a little before dichotomy to greatest brilliancy when an evening star, and vice versa when a morning star. The existence of this shading is more readily seen when thin cloud passes over the planet, the brighter limb being always the last to disappear. At the same time brilliant white patches, rivalling the limb, are seen frequently at one or both of the cusps, sometimes bordered by fairly dark "collars". Occaisionally also a blunting of one of the cusps, generally the South one, may be observed, particulary near dichotomy.

In addition we may often see very faint nuances of shade consisting of very slightly brighter or obscurer patches or streaks, but seldom with sufficient distinctness to be sure of the fact or to transfer them to a drawing. These are, in the writer's opinion, amongst the most difficult of all planetary markings. They remind me of Virgil's "aut videt, aut vidisse putat." whenever reasonably well suspected they should be recorded, as their possible confirmation by another observer is of considerable weight.

Determination of the exact date of dichotomy is best performed by noting the dates when the terminator is last or first seen very slightly convex, and also when it is first or last seen very slightly concave, as the case may be, and taking the mean date. This should always be done because, for a few days, the terminator will appear quite straight, the cusps equally pointed, even with high magnifications. To the writer the first signs of convexity or concavity sometimes appear at the cusps, a very slight roundness giving place to a very slight acuteness, or vice versa.

The maximum brilliancy of the planet occurs when it is a little over one quarter illuminated, the corresponding stellar magnitudes of the planet at this time, computed from Mueller's formula, varying between minus 4.38 and minus 4.18, according to the positions of the Earth and Venus in their orbits. The planet is then so brilliant that it casts a distinct shadow of the observer on a white-washed wall or on frosty grass, and its elongation from the Sun being then about 40 degrees, may be readily seen with the naked eye in full sunshine provided one knows exactly where to look. Occasionally conjunctions with the crescent or decrescent moon materially assist in its detection as an intense white point. When observing during daylight during the thin

crescent phase, the observer may frequently get the impression that the horns of the crescent contain within them something which is slightly darker than the outside sky. Various explanations of this, from optical illusion due to contrast, and from projection the sun's outer corona have been advanced. If the first of these is correct we ought to see a similar darkening on the sky outside the limb, and in the writer's experience this is not always the case. In order to see it to the best advantage a very small diaphragm should be placed over the usual eyepiece diaphragm. This is best made of a disc of thin black card having a fine hole burned centrally in it with a red hot needle. By making the hole only just a little larger than is necessary to see the whole of the crescent, the extraneous sky light is almost completely cut out.

The regular observer is amply repaid for his trouble by the diverse but always beautiful appearance of the planet as it speeds on its ceaseless round of the Sun, and may find many less profitable ways of spending his time than by devotion of a daily half hour to watching Venus, even with a small telescope.

POSTSCRIPT BY EDITOR

Mr. Heath has long been one of the most active observers in the British Astronomical Association, perhaps especially of Mercury and Venus. He would be glad to hear from readers interesed in Venus. His address is "Urania", Firleigh Road, Kingsteignton, South Devon, England.

Venus will be excellently placed in the evening sky during the next two months and in the morning sky during much of the latter half of the year. There will not be another equally favorable year for its study until 1956.

It may be worthwhile to remark that H.N. Russell concluded that the prolongation of the horns of the crscentic Venus was caused not by the refraction of sunlight but by its diffuse reflection (Ap. J., 9 , 284, 1899).

MARS AND SATURN AND STUFF

A very pleasing number of observational reports have arrived during the last month, and some of the work being done by members of A.L.P.O. is of excellent quality. We regret that lack of space again precludes a thorough discussion. We thank all contributors and ask their indulgence for possible failure to describe their observations here.

Although Mars will be rather remote during April, we supply a brief ephemeris of physical data for those wishing to follow it. Again D is apparent angular diameter; D ♁, areocentric latitude of the earth, positive when north; ⊙, areocentric longitude of the sun; C.M., central meridian of longitude. The Martian season will correspond to our June, and the summer solstice of the northern hemisphere will fall upon April 26. Quantity C.M. increases at the rate of 14.6 degrees per hour. Data are given for 7 P.M., E.S.T. (0^h on next date, U.T.)

Date	D	D♁	⊙	C.M.
April 5, 1948	10".5	+17°.1	81°	120°
April 10	10.0	17.5	83	74
April 15	9.6	17.9	85	27
April 20	9.2	18.3	87	340
April 25	8.9	18.8	90	294
April 30	8.5	19.3	92	247
May 5	8.2	19.8	94	199

Different observers agree that the north cap continued to shrink between late February and late March. E.E. Hare measured its diameter to be 20 degrees on drawings obtained near the middle of March. This cap is probably still very brilliant and hence still a snow-cap, though its precise appearance grows more difficult to judge in poor conditions as Mars recedes. A southern polar cap has been remarked by R. Missert, E.E. Hare, H.M. Johnson, M. Gerstenberger, T. Cragg, D.W. Rosebrugh, H.D. Thomas, and W.H. Haas. These observers agree rather well that the south cap is still usually smaller and dimmer than the north cap and that it is still extremely variable. In other words, the south cap is a cloud- or mist-cap, with the winter solstice of its hemisphere less than a Martian month away. Several persons have commented upon the diffuseness of the south cap, Haas sometimes noting that its size is very difficult to judge. Gerstenberger's observations (communicated by E. Pfannenschmidt) with an 8-inch refractor specifically state a lack of sharp edges. The north cap, on the contrary, is bounded by a sufficiently definite polar band, perhaps narrowing and lightening with the advancing season. H.M. Johnson on March 20 found the two polar caps not diametrically opposite, suggesting that the southern clouds are sometimes not centered on the pole.

Reported color observations are still somewhat scarce. Observers agree on white in the polar caps, though Gerstenberger with an 8-inch refractor suspected some yellow also on February 2. E. Pfannenschmidt with a 2-inch refractor in early February thought Syrtic Major and the north polar band grayish-brown. E.J. Reese with his 6-inch reflector

saw Acidalium more blue and less brown on March 13 and 14 than a month before. Haas with his 6-inch reflector from late February to late March usually called the southern maria gray, the north polar band brownish-gray, and the three prominent northern features (Acidalium, the Propontii, and the enlarged Casius) bluish gray.

The forks of Aryn look single to most observers, certainly being harder to separate than in past years when Mars was at the same distance. Cragg, however, saw Aryn double "positively without question" in one good view. Hare has observed a faint Solis Lacus on several dates. Syrtis Major is darker near its north tip than elsewhere. When seen best, Sabaeus is thin and black. Reese in March observed a brilliant "filament" between the north base of Acidalium and the polar band.

Transient bright areas, presumably Martian clouds, have been drawn near the edges of the disc by Hare, Cragg, White, and Haas. Some of them are visible even near the C.M. Missert on February 25 wrote of viewing a cloud over Nilosyrtis on the sunrise terminator and of sometimes watching it almost to the C.M. This cloud, if persistent enough, may handily explain the faintness of Nilosyrtis canal at this apparition. Cragg on February 7, made an unusual observation: he saw a large number of white spots all over Edom, Eden, and Arabia on the afternoon half of the disc. A blue filter showed them "quite well". In this connection, it is of interest that Reese in March noticed "a number of minute white spots around the north tip of Syrtis Major.

Dozens of canals have been drawn, many of them by two, three, and occasionally even more, observers. Among the easier ones are Cerberus, Hades, Nilokeras, and Nepenthes. We have not thought it necessary to waste time arguing in this periodical that the canals exist (as band-like markings, not necessarily as artificial waterways). Few or no serious students of Mars equipped with adequate telescopes have failed to record them, and originals of photographs have shown them unmistakably. Their precise aspect, Lowellian or Antoniadian, is another story. E.E. Hare as of February 17 had at least partially resolved at least four of them into component separate markings; the four were Erebus, Hades, Styx and Gehon. Yet Hare also commented:"Many of them are striking in uniformity and apparent continuity, often being free of accompanying murkiness in the deserts through which they run.

We turn now to Saturn and shall first concern ourselves with recent estimates of the width of the Ring C projection at the C.M. Here the width of Cassini's at the ansae will be the unit. E.K. White with an excellent view in his 7-inch reflector on March 6 obtained 1.0 or 1.1, W. Chandler confirming this value. R. Missert obtained about 0.5 in February with a 6-inch reflector. H.M. Johnson with the Drake Observatory 8-inch refractor and excellent seeing on March 20 got somewhat more than 1.0. E.J. Reese in a good view on March 13 obtained 1.2. E.E. Hare on March 19 wrote of finding 1.0 to 1.25. Haas obtained an average of 0.9 from four estimates between February 28 and March 16. D. Monger with the Kansas University 6-inch refractor estimated 0.7 on March 17 and 0.8 on March 20. It appears certain that the Ring C projection is observed wider now than in September - December, 1947. This result may be due to the present southward displacement of the shadows of B and C. In this connection, it may be significant that "hite and Haas

have recently thought the projection very dark. Reese, Johnson, Missert, White, and Chandler agree that Ring C at the ansae extends 0.4 or 0.5 of the way from the inner edge of Ring B to the globe. Missert in a good view on February 5 found C narrower at the left ansa than at the right (simply inverted view). Reese finds C to be bluish gray off the ball and reddish brown in its projection. Haas compatibly sees the projection as "rich dark brownish red" when the view is best. Because the longer light-waves are more successful in penetrating the Crape Ring?

Some February Saturnian shadows observations by E.K. White arrived too late for inclusion with others in the March issue. We outline them here. The shadow of the ball was visible but difficult in poor seeing on February 5. On February 11 and 12 (opposition on February 9) poor seeing permitted a view of a thin black line on each limb. That on the east limb, where true shadow existed, was the wider. On February 19 this east limb shadow was easy. The shadow of the rings was "very narrow" on February 5. For February 11 White noted: "The ring's shadow is a very thin gray line, difficult to see even in moments of seeing 5." On February 19 and later the ring's shadow was quite invisible. What puzzles the editor is that this shadow theoretically vanished on February 7. Hare suggests that what White observed on February 11 was the shadow of a dusky ring exterior to Ring A; such a ring's shadow would be present only for some days after February 7, he points out. Such an outer ring has been reported at times in the past and is even said to have veen photographed.

The doubled South Equatorial Belt of Saturn remains prominent, and the South Polar Belt is also easy now. Views by White, Reese, Johnson, and Haas indicate that it is now darker and stronger than normal in recent years. Other belts are difficult. An Equatorial Band in the bright Equatorial Zone has been observed by Cragg, Hare, and Haas. Cragg sees it as very thin- a mere line. The North Temperate Belt is certainly more difficult than before opposition. Hare and Haas are only occasionally sure of it, and an independent "discovery" by Cave and Cragg with the Griffith Planetarium 12-inch refractor on March 11 is hence very welcome. A South Temperate Belt about midway between the $S.E.B._s$ and the S.P.B. was recorded by Hare on March 12, 13, 17, and 18. He saw perhaps the same belt closer to the $S.E.B._s$ on March 1. Several observers continue to note delicate detail along the north edge of the S.E.B.

Some more Saturnian chit-chat: Many members of A.L.P.O. have observed the Third Division, a concentric shading near the inner edge of Ring B. In a lovely view with a 12-inch refractor on January 18, T. Cragg and T.R. Cave split this shading into two thin streaks. Confirmation is desirable. White tells us that his friend, W. Chandler, stated without foreknowledge that Encke's Division lies outside the middle of Ring A. Other observers have made this same estimate. Near the middle of March, White and Haas both thought the Equatorial Zone brighter than Ring B, which impressed Haas as abnormally dim. Confirmation or refutation by other observers is needed. Cragg's drawings show a small white South Polar Cap.

Jupiter is now as well placed in the morning sky as it will be this year. Reese observed the Red Spot Hollow on March 13: wide dark columns marked its ends. He found these longitudes (II): prec. end 218°, center 228°, and fol. end 239°.

Drawings of Venus have been made in recent weeks by Reese, Cragg, Cave, White and Haas. These observers agree on the bright north and south cusp-caps and find markings along the terminator vague and difficult. A drawing by Reese on March 14 may be compared with one by Haas four hours later. The two agree about some features: both depicted two circular whitish spots near the terminator, and both made the north cusp-band the darkest object on the disc. They also both drew the limb bright and bordered by a segmented dark band, perhaps a contrast effect.

SUBSCRIPTION RATES

12 issues		$2.00
6 issues		1.00
1 issue	(in print)	.20

S T A F F

Editor — Walter H. Haas, Instructor in Mathematics
Astronomer, Institute of Meteoritics
University of New Mexico
Albuquerque, New Mexico

Counsellor — Dr. Lincoln LaPaz, Head of Mathematics Department
Director, Institute of Meteoritics
University of New Mexico
Albuquerque, New Mexico