A A V S O   A B S T R A C T S

Edited by R. Newton Mayall

PAPERS PRESENTED AT 52ND ANNUAL MEETING, 11-12 OCTOBER 1963

The last few years our annual meeting has been held in the western part of Massachusetts, in the foothills of the Berkshire Mountains. This year our 52nd Annual Meeting was in the middle of the State, in Worcester and Holden. Our hosts were the Aldrich Astronomical Society and the Museums of Natural Science, in Worcester. Our headquarters and lodgings were in West Boylston, a country town.

Worcester is the second largest city in Massachusetts. It is a cultural, educational, and industrial center. Here are the Worcester Art Museum, known throughout the world; the famous Higgins Armory Museum; Clark University; Holy Cross College; Worcester Polytechnic Institute, and eight other schools of higher learning.

Among the many "firsts" that Worcester claims are: first dictionary published in the country was printed here in 1788; first negro lawyer admitted to the bar in 1845; the oldest public park in the country -- Elm Park; the Calliope was invented here in 1855; the first inter-collegiate rowing regatta was held on its beautiful Lake Quinsigamond in 1859; and the first liquid fuel rocket patent was granted to Dr. Robert H. Goddard in 1914.

Worcester has been Mother to many famous persons, among whom were General Artemus Ward; Eli Whitney; Elias Howe; Clara Barton; and Dr. Robert H. Goddard.

Each AAVSO member, upon registering, received a packet provided by the Worcester Chamber of Commerce, containing a variety of materials about Worcester and its Metropolitan area; and the Worcester County National Bank included a Bookmark-Ruler and a bright one cent piece mounted on a card with these words: "who says we don't give away samples."

Our sessions opened Friday evening at the Worcester Science Museums, where Richard Kleber, the Director, welcomed us, and Dr. Myron Lecar, Astronomer at the Institute for Space Studies, addressed us on the subject of The Moon. (See Abstracts)

Saturday morning we convened at the Aldrich Observatory in Holden, about 8 miles from our Motel. The observatory is set among the woods on the edge of a reservoir. It houses a ten-inch reflector and has a commodious meeting room. Nearly one hundred were present at this meeting. Mr. Arnold Nieuwenhoff, President of the Aldrich Astronomical Society gave the address of welcome at the opening of our various sessions.

The afternoon session was given over to papers and a special talk by Dr. Edward C. Olson of Smith College. (See Abstracts)

All during the day the ladies of the Aldrich Society had coffee, doughnuts, and pastry available in the nearby trail camp shelter, where a brisk and crackling fireplace was welcome in the crisp fall air.

New England had one of its longest seasons of fall color, beginning about the middle of August and extending to the middle of October. As we drove back from Holden to West Boylston, the country side was ablaze with color, made more striking by the setting sun.

Our dinner was held at the Franklin Manor, a well appointed Country Inn, in West Boylston. Following dinner Clint Ford showed some movies he had put together from his own collection and that of Claude Carpenter, from 1926 to the present. Many old friends passed across the screen and everyone enjoyed seeing them once again.

Honors for the farthest distance travelled go to our Canadian members Isabel Williamson, the De Kinders, Morgans, and Goods; and to the Stokes's and Diedrichs from Ohio.

We are grateful to the Aldrich Astronomical Society for inviting us to their newly completed observatory where we had a large and enjoyable meeting.

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LANDING ON THE MOON, by Dr. Myron Lecar of the Institute for Space Studies

Dr. Lecar introduced his subject by recounting many interesting facts, often forgotten, about the moon:

The moon being our nearest neighbor (average of 240,000 miles from earth, or about 1/400 distance of earth to sun) we know practically nothing about it. The distance is known quite accurately. Its mass is known to be about 1/80 mass of earth; and it is by far the largest satellite of any planet when compared with the mass of the primary.

The moon is enormously large, which leads to some interesting theories as to how it came to be. Its radius is about 1/4 the radius of the earth. Knowing the mass and radius we can find the volume and density. The density of the moon is about 3 1/3 gram /cc, or about 50% of the density of the earth. However, the surface rocks on earth are about the same density as the moon.

The density of the sun is about 1.4, or less than half that of the moon. But the moon is fairly representative of the solar composition if you take into account that most of the lighter gases which compose the sun would have escaped from the moon.

The surface gravity of the moon is about 1/6 the surface gravity of the earth. You would weigh about 1/6 as much on the moon as you would on earth. The escape velocity from the moon is about 2km/sec, or about 1/5 that from earth. And the moon has much less atmosphere than we would expect -- about 1/100 millionth that of the earth.

The moon should have formed, over its life, about 1/10,000 the number of Argon atoms as are found in the earth's atmosphere; but they are not to be found. Yet Argon, because of its weight, escapes very slowly. This was a puzzle for some time -- Why was there no Argon on the moon? However, this was solved recently by Jack Herring, of the Institute for Space Studies, who calculated the solar wind (the puff of solar protons that come off the sun) had sufficient energy to sweep the Argon off the moon. Because the earth is shielded by a magnetic field, the solar wind does not effect the earth in the same manner. This seems to indicate the moon has practically no magnetic field. In 1959, the USSR's cosmic rocket showed that the moon's magnetic field was very small, about 1/1,000 that of the earth.

One thing I want to point out is that slopes are very gradual on the moon. The shadows and contrast built up give a distorted picture of the surface of the moon.

One of the highest and steepest craters on the moon is only about 15,000 feet high, and the slope is about 10%. Compare that with the Cog Railway on Mt. Washington, which is about 45%. The lunar landscape would seem even flatter than this to someone on the moon, because its curvature is so great. At a distance of 60 miles you could not see a mountain 10,000 feet high -- it would be below the horizon. In most of the craters, the moon drops away so fast that if one sits in the middle of the crater he can't see the mountainous edge. So, to an observer on the moon, it will look very flat.

Dr. Lecar reviewed in detail the several theories as to how the craters on the moon came to be. The two most active are the impact and the volcanic theories. Russian scientists have been pushing the volcanic theory, and they have reported observing gas outbursts from a peak in Alphonsus on two occasions -- November 1958 and October 1955. These observations have not been confirmed. (Since our meeting Lowell Observatory astronomers have reported seeing outbursts on the moon ED.).

The more we learn about underground explosions, we find that the lunar craters could be meteorite craters, and even the peak in the center of a crater could be due to a meteorite. The story is, that if a meteorite is coming in very rapidly, it would penetrate the moon's crust and at that point it would begin to heat up. It can heat up to about a million degrees, and at that point it would vaporize the volatile material and it would explode. The explosion would erase whatever track it might have made on the way in. The result of such an impact would look like a crater.

We can't say what the origin of the craters is. Some think a few are meteorites and some volcanic.

As far as the surface of the moon goes, we know two things -- 1) it does not reflect light isotropically; that is, it doesn't reflect light as if the whole moon was covered with a surface like a sandy surface. If you shine something on the moon, most of the light comes right back in the direction from which it came and not much of it is scattered. 2) Another thing we know about the surface is that it is a goo insulator; that is, it does not conduct heat very well. This suggests that the moo is made up of some kind of porous material, at least on the outer layers. This explains why the light comes right back at us.

The theory of tides (not water tides) and the theory of capture were discussed. All of which was summed up in one sentence: The moon contains a record of the history of the solar system.

With this background, it is easy to understand some of the problems to be encountered when one attempts to land on the moon. Dr. Lecar then described the manner in which we will attempt to get to the moon:

Prior to putting the Apollo project into operation -- a man landing on the moon -- there will be a number of unmanned landings. The first series is called the Ranger Series. These will land on the moon hard. Five Rangers have been launched and we have had five failures.

Four more Rangers are planned. They will contain, among other equipment, very high resolution TV Cameras which will be able to resolve 2 feet whereas low resolution cameras can resolve only about 1/2 mile, anything smaller being burned out.

After the Ranger series, there will be the Lunar Photographic Orbiter, designed to take close up pictures of the lunar surface to help select landing sites.

The Surveyor landings will have color TV cameras and a large collection of instruments designed to enable us to find out what the surface is like.

The manned rocket will accommodate 3 men. It will stand 35 stories high, and will weigh about 3,000 tons. The first stage will contain about 2,200 tons of lox and kerosene and will have a thrust of about 7.5 million pounds. It gulps down about 15 tons of fuel per second. The second stage contains lox at about -300°F, and liquid hydrogen at almost absolute zero. The third stage is just a small one with about 300,000 pounds of thrust. It is the third stage that will go to the moon.

In conclusion, Dr. Lecar showed many slides depicting the step by step manner of getting the rocket to the moon, letting 2 men land, take off and rejoin the third man who was left in orbit around the moon, and the return to earth.

AN OBSERVATION OF COR CAROLI ON MAY 28, 1660, by Patrick Rizzo

The naming of Cor Caroli is described in W.H. Smyth's "A Cycle of Celestial Objects." In his volume "The Bedford Catalog" (1844) he states, "But it came to pass that it was named Cor Caroli by Halley, at the suggestion of Sir C. Scarborough, after a worthless man's heart. The popular story, or rather the vulgar one, runs -- how Scarborough, the court physician, gazed upon a star the very evening before the return of King Charles II to London, the which, as in duty bound, appeared more visible and refulgent than heretofore; so the said star, which Hevelius had already made the lucida of Chara's collar, was thereupon extra-constellated within a sort of Valentine figure of a heart, with a royal crown upon it; and so the monarch, it would seem, by this extraction, remained heartless. Though this pretty symbol appears as a tail-piece to the preface of the "Atlas Coelestis", Flamsteed has not honoured it with a place on the Hounds' plate."

Somewhat more sedately, R.H. Allen in "Star Names and Their Meanings", (1899), tells it this way, "This star, the 12 of Flamsteed's list of the Hounds, stands alone marking Chara's collar; but was set apart in 1725 by Halley, then Astronomer Royal, as the distinct figure Cor Caroli, not Cor Caroli II as many have it, in honor of Charles II. This was done at the suggestion of the court physician, Sir Charles Scarborough, who said that it had shone with special brilliancy on the eve of the King's return to London on the 29th of May 1660..." Cor Caroli is double; Alpha^2 is one of a group of A type stars called magnetic spectrum variables.

His observation of its "Flaring" has never been substantiated by anyone, and the star has never been observed to act up in that way again.

SOLAR ECLIPSE PHOTOGRAPHY, by Albert Ullmann

In my first attempt at eclipse photography, one problem came up which was totally unexpected. This was the predominantly greenish color of the corona. A corollary problem was the brownish color of the sky. After viewing other slides of the eclipse, the answer became apparent. This effect occurs in the use of outdoor film instead of tungsten or indoor film. Most outdoor color films are rated for about 6000°K, whereas the light intensity of the corona was much lower requiring the use of a film rated for use with a lower light intensity, namely, tungsten film. The prominences being of a brighter light intensity were much more realistic. Of the many guides available for eclipse photography, none suggested what type of film is best to use.

A NEW LOOK AT SHADOW BANDS, by Edgar M. Paulton

On 20 July 1963, the shadow band phenomenon that appears for a few moments before and after totality at a total solar eclipse, once again displayed its elusive characteristics. From sixty potential observing teams organized for observation of the shadow bands on a plane normal to the shadow cone axis, only four positive results were received. Despite this lack of success, these fragmentary reports have brought about a new and interesting approach to the problem.

For the first time observations at different locations were made under similar conditions that permitted direct comparisons. With all observations made on the same plane in relation to the shadow cone, confusion no longer existed. Two reports complete in every detail showed a reversal of direction of the bands before and after totality.

As expected, the orientation of the shadow bands showed a reasonably close relationship to the tangents at second and third contacts and their motion was at right angles to their orientation. The reversal of motion however does not conform to any straightforward diffraction patterns and other possible explanations are necessary. One that had presented itself as a result of the motion of the bands being outwards from the center of the shadow cone was the pinhole camera image, an idea that had been expressed by Dr. Andrew Young of Harvard Observatory. To what extent can this principle be applied to shadow bands?

The primary characteristics of a pinhole camera image is its inversion. A light source in motion under pinhole conditions therefore will project an image moving in an opposite direction. The transverse motion of the image will be proportional to the distance of the receiving screen, from the pinhole screen in relation to the distance of the light source from the pinhole screen. Since the duration of motion is identical the speed of the projected image across the screen will also be proportional.

To an observer on the earth the solar crescent closes just before totality as the moon's limb moves to cover the sun's limb. Light rays casting images of the crescent on a pinhole principle would be reversed on the earth's surface. This motion is from the shadow disc outwards and this has been repeatedly reported by shadow band observers. After totality the reverse takes place as the moon moves across the sun. The apparent motion is again in the opposite direction, outwards from the center of the moon, as reported. The pinhole image principle therefore does present a possible explanation as far as the observed reversal of motion is concerned. Equally important however, it offers a partial solution at least, to a problem that has persistently baffled shadow band investigators, namely to account for the widely variable velocities that have been observed. In general terms these estimates, made on a horizontal plane, have fallen for the most part between 4 and 12 feet per second. Unfortunately in the few seconds in which the shadow bands were observed in July, none of the observers was able to make anything more than a rough guess.

If the distances of the sun, earth, and moon are applied to the pinhole set-up the ratio of the speeds will be proportional to the distance of the earth from the moon, and the moon from the sun, with motion of the shadow band images a result of the orbital motion of the moon. This may be expressed as follows:

$$\frac{\text{Earth-Moon distance}}{\text{Sun-Moon distance}} = \frac{238{,}000 \text{ miles}}{92{,}762{,}000 \text{ miles}} = \frac{1}{390} \text{ approximately}$$

The speed of the projected image at the distance of the earth from the moon should therefore be $\frac{1}{390}$ of the moon's orbital velocity. The rotational speed of the earth -- in the same direction as the moon's motion, will reduce the observed velocities of the crescent images, or shadow bands, according to the latitude of the observer and the consequent speed of the earth's surface at the observer's site.

The following tabulation gives an idea of the speeds that might be observed at different latitudes.

VELOCITIES in feet per second

Moon's Orbital Speed	Earth's Surface Speed	Differential Speed	Ratio Speed
	@ 0^{o} Lat: 1510	1840	4.72
3350	@ 45^{o} Lat: 1216	2134	5.73
	@ 60^{o} Lat: 733	2617	6.71

Of particular interest is the fact that if this explanation proves to be correct,we have discovered a unique method of determining the astronomical unit. With modern electronic and motion picture techniques an accurate speed ratio between the speed of the bands at any location, and the differential velocity of the earth's surface at the observing site in relation to the moon's orbital velocity, may be determined.

$$\text{Ratio} = \frac{\text{Observed velocity of shadow bands on normal plane}}{(\text{Moon's orbital velocity}) - (\text{Velocity of earth's surface at observer's latitude})}$$

As in the pinhole set-up this ratio is in the same proportion as the distances involved. Cannot this ratio be applied to an accurately determined distance of the moon at the time of the eclipse to determine the distance of the light source?

Our next objective therefore is for accurately determined speeds of the shadow bands on projection screens set-up at right angles to the shadow cone axis.

ECLIPSE PICTURES FROM ATHENS, MAINE, by Joyce Sterling

Mrs. Sterling presented many color slides showing our eclipse site at Athens,Maine, the great variety of instruments being used, and a few pictures of totality. She showed the changing light by its effect on the color of an automobile.

A REQUEST FOR APHAKIC OBSERVATIONS, by Patrick Rizzo

In Sky and Telescope for March 1962, pg. 168, in an article by Robert E. Cox entitled "Further Notes on Multiple Extrafocal Images", it is stated that considerable interest had been aroused by the discussion of that same phenomenon in Sky and Telescope for April 1961 (pg. 236).

The phenomenon was originally brought to the attention of Mr. Cox by Mr. E. F. Wahlstrom who had described how several images of Saturn could be seen by slowly putting his 8-inch reflector slightly inside or outside of focus. Further movements inside or outside the focus resulted in the expected large round spot of light. Mr.

Cox had referred these observations to Professor Edgar Everhart who, after experiments of his own, concluded that the eye of the observer is the source of the multiple images.

Since men like Helmholtz, Donders, Purkinje and Young noticed practically every visual effect, one could therefore expect that some notice of similar multiple extrafocal images must have been taken by them. By the 20th Century, this phenomenon, called by such names as Polyopia monophthalmica, and polyopia monocularis, i.e., monocular multiple vision, was generally considered to be a result of irregular astigmatism traceable to the crystalline lens of the eye.

On the other side of the discussion, however, Mr. Cox received detailed reports from James R. McCullough, of the Pomfret School, on multiple image formation caused by telescopic or atmospheric disturbances. Mr. McCullough observed these multiple images in both reflectors and refractors. He stated that these images appear to exist in the objective focal plane of the telescopes and hence are not produced by the eye's apparatus. He adds that certain effects associated with the eye are visible but can be clearly distinguished from the multiple images produced by the atmosphere. Mr. Cox concludes that the question of multiple extrafocal images has no one complete answer, and that this is a good subject for further experimentation.

Past investigators of monocular multiple vision attribute it to the structure of the crystalline lens of the eye and have reported that the multiple vision does not occur where the lens of the eye has been removed as in cataract operations. It might be interesting to note what such an eye, the so-called aphakic eye, sees when it performs Mr. Wahlstrom's experiment at the telescope. If, in many instances, multiple images are seen at the same telescope by eyes that have been operated on for cataract and those not operated on for cataract, that would tend to confirm Mr. McCullough's findings. However if, as a rule, aphakic eyes do not see the multiple images where others do, then these multiple extrafocal telescopic images are just another instance of the traditional monocular multiple vision phenomena. Such observations could be attempted both with and without eyeglasses if the spectacles have no astigmatic component. Also in some cases an observer may not need a corroborating observer if only one of his eyes has been operated on and he still has good vision in the other eye.

It must be kept in mind that air currents in the tubes of the telescopes can cause double or multiple images of single objects. Photographs exist showing double images of single craterlets on the moon. Although the recent discussion has centered around extended objects such as Saturn and Mars, the older writers speak also of multiple images of points of light. However, the "points" were actually minute discs such as holes punched in cards. In small telescopes star images are small discs rather than points, so it might be interesting to note whether star images in such telescopes show multiple when slightly out of focus. Of course, irradiation and diffraction effects of the eye might hide the phenomena if the image is too bright. If too faint, the multiple images might escape notice, too. (Reports of such observations should be sent to P. Rizzo, 1881 - 61st Street, Brooklyn, N.Y., 10004).

PHOTOGRAPHIC OBSERVATIONS OF VARIABLE STARS, by Richard H. Davis

As a first step in an investigation of the usefulness of simple photographic equipment in the study of variable stars, an attempt was made to use photographic observations in the determination of the time of a minimum of the eclipsing variable RZ Cas. Such a project is about the simplest that can be undertaken since it is not necessary to convert the results to a true magnitude scale or to a standard color system. It is not necessary to combine the observations with those of any other observer and only relative brightnesses are of interest.

The basic observations consisted of a series of five-minute exposures at fifteen minute intervals over a four hour period on the night of September 1-2, 1963, beginning two hours before the time of minimum as predicted from published elements. All exposures were made with a standard 35mm. camera equipped with a 50mm. f/2.8 lens and a yellow filter, loaded with Tri-X. The camera was mounted with its optical axis roughly parallel to the optical axis of a small refractor which was driven with a clock drive. No attempt was made to correct for inaccuracies in the drive by hand guiding. The resulting 17 frames of 35mm. film were tank developed in D-11 and mounted in cardboard slide mounts, marked on the reverse sides with numbers identifying the particular exposure in the series.

The magnitude of RZ Cas on each exposure of the series, as compared with a series of standard stars, was then visually estimated with the help of a 10X magnifier, after the 17 mounts had been carefully shuffled. This process was repeated four additional times, thus yielding for each exposure of the series five independent magnitude estimates. Average magnitudes and corresponding probable errors were then computed for each exposure of the series, and the results were plotted as a function of time. The tracing paper method described in Sky and Telescope, February, 1957, was then used to determine the time of minimum. Reduction to heliocentric time of minimum was accomplished with the help of the table in the AAVSO Photoelectric Photometry Manual.

The heliocentric time of minimum, as thus determined, was 0.025 day earlier than that predicted from published elements. Visual observations of this same minimum by Dr. Ashbrook yielded a time of minimum 0.034 day early; and photoelectric observations of succeeding minima by John Ruiz and Arthur Stokes indicated that the September 1-2 minimum had been 0.030 day early.

The photographic observations of September 1-2, 1963 were hampered by strong moonlight and a rather low altitude of RZ Cas for the early exposures in the series. It is planned to attempt additional determinations of times of minima for this star by use of this photographic method under more favorable conditions.

DR. HAMPTON'S MAGIC EYE, by John J. Ruiz

Richard Davis has described his very interesting method of obtaining a minimum of RZ Cassiopeiae using a photographic method that shows great promise. I would like to describe briefly two other methods that have been used on this variable.

The first is the old fashioned method of comparing the variable visually with nearby comparison stars using nothing more elaborate than a small telescope. In the hands of a trained observer this method rivals the accuracy of the photoelectric photometer to be described later. I am showing here a chart giving the epochs for RZ Cas taken at different dates but all reduced to the epoch of the 2 September 1963 eclipse. You will notice that the estimate of Dr. Hampton differs by less than 3 units in the third decimal of a day, from that obtained by Arthur Stokes, of Hudson, Ohio using a photoelectric photometer. This is remarkable and shows not only good judgment on the part of Dr. Hampton, but also wonderful vision. This star almost disappears in a 7x50 binocular. Dr. Hampton used a 2.4" refractor. Only a person with magic eyes could achieve such accuracy.

Arthur Stokes used a 10" reflector and very elaborate P.E.P. equipment. I used a 12" Cassegrain and P.E.P. Our two epochs differ by only 2 units in the fourth place of decimals which corresponds to about 16 seconds. This is only a coincidence as the errors of observations are within this order of magnitude.

The conclusion is now reached that visual observations by a trained observer are almost as good as P.E.P. at least in a case like this, which should encourage many other AAVSO'ers to pursue their work with their unaided eyes.

SPECTRAL CHARACTERISTICS OF SELECTED ECLIPSING BINARY STARS, by Edward C. Olson
Department of Astronomy, Smith College

A surprising number of stars are binary stars. Perhaps 50% of the stars in the solar neighborhood are binary stars. The basic questions are: Why are there so many of them? How are they formed? How did they evolve? It is fair to say that at the moment very little is known about any of these questions. Before we can say much about how these stars are formed we must know something about the physical characteristics of the binary systems. Therefore I would like to confine my talk to the eclipsing binary systems, and particularly to the eclipsing systems where the primary is of early spectral type O, B, and A.

The characteristic feature of the Spectral Sequence is the very interesting strength of the hydrogen lines -- the Hγ and Hδ lines in particular. In the B stars, the hydrogen lines are seen. In the A stars they are stronger, and then as we go down to the cooler stars the hydrogen lines fall off quickly in intensity.

In spectroscopic and eclipsing systems, the spectra are composite -- made up of combinations of spectra of two stars.

High dispersion spectra must be used in studying eclipsing binaries.

A plate is drawn across a thin slit of light and the intensity of the spectrum is recorded on an electronic device. You can make up curves of this sort to show how the various lines change in intensity. By callibrating this with a standard spectrum, it will allow you to go to stars whose spectra are unknown, and read off the spectral type.

We have measured about a dozen such criteria from standard stars. This seems to be the only way to separate the two components. The spectra are consistent. In the double line spectra system you can see the lines; but in a single line spectrum, where you can't see the lines we can prove there is contamination. It is by this approach we can unscramble the two spectral types.

VARIABLE STAR DH73 IN SAGITTARIUS, by Diane Reeve

The period for the variable DH73 in Sagittarius, VSF193, (R.A. $18^h\ 15^m\ 20^s$, Dec. $-23^\circ\!.24$) has been determined to be $18^d\!.796$, on the basis of 500 observations from 1924 to 1963. The variable is believed to be a type II Cepheid, with an absolute magnitude of -2.48. Its photographic magnitude varies from 13.6 to 15.5.

SPECTRAL CLASS BETRAYS A VARIABLE WITH CLOSE COMPANIONS, by Elizabeth A. Dippel

This long period variable is interesting for two reasons: First because of the way the star was discovered, and second because of close companion stars which prevent the observer from seeing the variable as any fainter than magnitude 15.8.

Miss Nancy Houk, a graduate student at Case Institute, found this particular variable while examining plates of the Sagittarius region, at the Maria Mitchell Observatory.

A period of approximately 290 days was established, but when the light curve was graphed there seemed to be a great deal of unnecessary scatter between mag. 15.2 and 15.5. Discarding doubtful plates did not clear up the scatter, but upon examination of one of the better MF series plates I discovered that the star had a rather close companion. Miss Hoffleit re-examined the A series plates (which were the largest scale plates) and, on one extremely well-resolved one, found that this variable had not one, but <u>three</u> close companions! On all the A plates and four of the MF plates these companions could be separated from the variable, but on all others one or all the companions were blended with it. The brightest companion has an estimated mag. of 15.8, and this is the average estimated mag. of all three companions when blended together. Miss Hoffleit kindly did some calculations for me and found that no matter how faint the variable got, because of the companions it was never seen as fainter than mag. 15.8. For instance, if the variable alone was mag. 15.8, the blend of variable plus companions would be 15.0, and if the variable became as faint as 18.0 the blended companions would cause it to appear as mag. 15.8.

Therefore, the blended companions prevent us from measuring the brightness of the variable alone below mag. 15.8. The scatter which occurs between magnitudes 14.8 and 15.5 is evidence of the presence of these three companions.

A NEW VARIABLE STAR IN THE GLOBULAR CLUSTER M22, by Doris Austin

An exceptionally fine light curve was extracted from approximately 450 magnitude estimates of variable suspect DH #295 near M22 in Sagittarius. A brief description of two unusual difficulties encountered in the phase-computing process is included. The observations (NA, MF, B and A Plate Series) spanned 22,430 epochs. DH #295 was classified as a cluster-type variable with the following parameters: period, $0\overset{d}{.}625606$; median magnitude, 14.3; mean maximum, 13.7; mean minimum 14.8; amplitude of variation, 1.1 mag.; distance modulus, 14.3; Bailey subclass a. This paper concludes with evidence which strongly suggests that DH #295 is indeed a member of the globular cluster M22.

A SHORT PERIOD VARIABLE STAR IN SAGITTARIUS, by Laura T.C. Alford

Variable star DH146 in Sagittarius (R.A. $18^h34^m29^s$; Dec. $-25^\circ28\overset{'}{.}4$) (1900) was examined on 460 Harvard and Nantucket plates taken between 1924 and 1962 and was found to vary with a period of 1.53315 days between magnitudes +12.9 and +14.4. The length of the period and the unusual shape of the light curve indicate that this may be a Population II Cepheid. The high degree of scatter in the light curve may possibly be accounted for by the fact that the variable star has two very close companions, not discernible on the Harvard or Nantucket plates but seen on the Palomar Sky Survey.

MIRACLE AT GRAND MERE, by Lawrence Nadeau

I left Gardiner, Massachusetts, Friday evening for Montreal. The next morning I took a walk up Mount Royal and came down in time to get the Eclipse Train to Three Rivers, and to Grand Mere. The sky was mostly clear at that time (3 p.m.). Two brass bands were waiting to greet us: the Grand Mere Majorettes (girls band) and the Grand Mere

Conquistadores (boys band). These bands led the march up to the Arena next to where we were going to observe the eclipse. We set up our instruments in the field. I used a 3' reflector. Mr. James Perry Wilson of the Peabody Museum of Yale came with us to paint the eclipse. His paintings of the 1932 eclipse are famous. The Montreal Centre group passed out special eclipse glasses to all observers.

(From tape recording, illustrated by many interesting color slides of his trip, the marching bands, and of the eclipse. ED)

SOME INTERESTING VARIABLES, by Margaret W. Mayall

The large blueprints on the wall are a few I thought might be interesting. The plot of R CrB covers 117 years, from 1845 to 1962. Particularly interesting is the long minimum from 1860 to 1880. The star as we normally think of it, is bright (6th mag) most of the time, with sudden drops to minimum, followed by rapid rises. We are going through a rather long minimum now. It started in 1962, when it dropped to 13, then back to 7 where it stayed for a while, then dropped down to 13 again. It rose to a little brighter than 8, then down once more. The last reports show it a little below 13.5.

The famous bright long period V Hydrae has several superposed periods. The scale of the plot is condensed and shows observations from 1884-1963. It has a period around 400 days, and is fairly regular. In addition to that it has a long range variation which shows up nicely when you make a condensed plot of it.

There have been four novae in the constellation Hercules. The first one was in 1892, and there is doubt if it was a real nova. Three more were discovered in recent years. DQ Herculis 1934 had a rather slow drop of 3 magnitudes in 100 days, then a sharp drop to 13th magnitude, after which it rose to 7th again. At the present time it is about 14th or 15th magnitude. In 1960 another one, named V446, was discovered, -- it had a sharp maximum and sharp drop-off. In 1963, Leslie Peltier discovered another one which had pretty much the same drop but levelled off a little more gradually.

Here is another interesting long period, R Hydrae (1906-1962). This is one of the stars that has a very definite change of period. A lot of the long periods are suspected of having changes, but not too many are really certain. Quite often, for a number of years, you think the star is changing but something happens and you just can't tell what it is going to do. I have plotted the magnitudes at maximum for R Hydrae and the period has gone from about 550 days back in 1870's - 80's to about 390 days at the present time. A very definite change of period.

Copies of the large display blueprints may be purchased by members, at about 20 cents per square foot. They vary in size, but most are under $3.00.

PSYCHOLOGY AND SS CYGNI, by Walter Scott Houston

This brief talk is in the nature of a memorial for Joseph Meek a former Council member of the AAVSO, and in his day an observer of admirable techniques. His work on SS Cygni at minimum could have established SS Cyg as a flare star many years before the fact was realized. It would have also provided additional evidence that careful visual observations can still compete with more recent technologies.

Meek found in the early Thirties that SS Cyg did not remain steadily at minimum, but, in fact at odd intervals it would jump as much as seven or eight tenths of a magnitude. He faithfully recorded these variations as he found them, and some of his observing associates did so also.

Only a few years ago photoelectric observations rediscovered the phenomenon.

Meek's observations, of course were swamped in the normal means. Few observers actually made minimum estimates with his accuracy. And, as the flares are of the order of minutes of time, a single flare estimate could easily look like an error.

It is very difficult to be objective about an estimate when you know what that value "ought" to be. A survey of the records shows that many observers have "favorite" minimum values. Some always record 11.9, others split it equally between 11.9 and 12.0. Yet during these years the star was making sudden jumps at minimum way beyond the probable error of most observers.

The story is a comment on data handling, always a touchy problem. It is also encouragement for the observer to have a morality -- to observe in an extra careful fashion when a star is near a "known and accepted" value. It is also an encouragement for the reporting of values that depart from the traditional picture. When R CrB fell in the early Thirties some reported it at 6.0 for a week or more.

Because of psychological sets, because of the really intense pressure of previous expectations, each observer should treat any traditional value with more than normal suspicion. Our observers are actually in a fine position to unearth discoveries because of the nature of our operation. How well we do so will depend on the excellence of each individual estimate.

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ERRATA
Abstracts, April 1963

In report of Thomas Cragg's description of instruments at Mt. Wilson, pages 21 - 23.

p. 21 First paragraph, lines 4 and 5 should read "The off-axis mirror is 24" in diameter and gives a prime focus 7" Solar image."
p. 22 line 4, for 50 ft. read 30 ft.
" line 6, for 50 ft. read 80 ft.
" paragraph 3. The near fatal accident to the lens happened when Mr. Cragg had it out to be cleaned, and not during construction.
p. 23 line 8, for 100" read 60".