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

Edited by R. Newton Mayall

PAPERS PRESENTED AT THE 49TH SPRING MEETING, MAY 27-30, 1960

The 49th Spring Meeting was held in New York City, May 27-30, 1960, at the invitation of the Amateur Astronomers Association (AAA) and the Hayden Planetarium through its director, Joseph M. Chamberlain. The Planetarium section of the American Museum of Natural History was our headquarters, and nearby hotels housed our members.

It was good to have our meeting on such a long weekend, for there is much to see and do in New York, and the comfortable weather - sunny and mild - made our stay all the more enjoyable.

Friday evening, between scheduled shows, James Pickering gave a special demonstration of the new Zeiss Projector, just installed in the planetarium dome. No lecture was given, but rather a pleasant demonstration of what the instrument could do. Several variable stars were observed, a nova rose to first magnitude, and the planets and their motions were faithfully reproduced. All in all, the new projector is a great improvement over the old. In addition to this special showing, our members were invited to attend any of the regular shows. It was good to see Jim Pickering take such an active part in our meeting, as his father, Dave Pickering, did for many years.

After dinner we gathered in the classroom of the planetarium. In the absence of Mr. Chamberlain, James Pickering delivered the official address of welcome. No set program was arranged, but various members had slides, pictures, and other items of interest to talk about - and best of all we had a good opportunity to get to know each other better. Also, the well equipped workshop of the AAA was open for our inspection.

Saturday morning we gathered once more in the classroom to listen to reports and the reading of papers, which continued into the afternoon.

None of us could read the announcement of the dinner without having the feeling that we would miss something if we didn't attend. About 75 members of the AAVSO and AAA dined at Mayor's Restaurant on West 79th Street. It can be said truthfully that no one went away dissatisfied. What with door prizes for both ladies and gentlemen, and a fine roast beef dinner topped off with impromptu doodles by Ed Paulton, it was a banquet that will long be remembered.

It was good to see the James Ellerbe's, just back from several years in Saudi Arabia; and Carl Kurtz, just returned from a brief trip to the same part of the world. New members Dr. J.Lansing Hicks, Donald Bradley, Jon Dahlquist, Joel Levine, Joseph Kammel and Stephen Ungar attended the meeting and were welcomed into the AAVSO. To all those of the AAA and Planetarium staff who made this happy weekend possible, go our sincerest thanks.

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RANDOM COMMENTS, by William G. Cleaver

Every mature person can look back in retrospect upon important events in his life which stand out as milestones along the road. In the field of nature, there were three significant happenings in my life which left an indelible impression and, I believe, profoundly affected my philosophy of life - the microscope revealing the world of the infinitely minute; the telescope, revealing the universe inconceivably vast; and exploring the ocean floor of Harrington Sound, Bermuda, where life was a veritable wonderland. These were glimpses of but a few of the wonders of nature with which our world abounds, and which are here for our edification and enjoyment.

My experience at the Yerkes Telescope whetted my appetite for more in the realm of astronomy, but many years passed before the opportunity presented itself. A chance remark to a total stranger resulted in an invitation to join the Astronomical Society of New Haven. Attendance at the monthly meetings brought me into contact with amateur and professional astronomers. At first, I had a feeling of abysmal ignorance, but I floundered into an assignment, to participate in the timing of an occultation of the Pleiades. This proved to be a thrilling experience, and I set out to acquire both the instruments and the skills essential for occultation work. For several years there was not a single "prediction" - no matter at what hour of the night - that I did not cover. My interest has since expanded to include observing of aurorae, meteors, and to a very limited extent sunspots and variables, but my main effort has been and still is observing and reporting lunar occultations.

Most of my observing has, of course, been done during the long winter nights, sometimes with the temperature around zero or below; but it is no less trying than to endure the raids of insects and mosquitoes on a hot summer's night. However, lest I create the impression that I regard observing as a hardship, let me hasten to say that most observing is fascinating and often awe-inspiring. There come those clear silent nights, when it seems as though every lamp in the firmament is lighted. There have been times when I have literally gasped in awe and wonderment at the great spectacle. I would not exchange such experiences for anything on earth. They are moments of high communion when all things take on their proper perspective.

It seems to me that upon the shoulders of the astronomer, be he amateur or professional, rests a great responsibility, namely to help bring to all the nations of the world a sense of brotherhood and unity, so that we can somehow live together in harmony. This must have been in the mind of Raymond Fosdick when, at the dedication of the Hale Telescope he made the following comments: "This great new window to the stars will bring us into touch with those outposts of time and space which have beckoned from immemorial ages, it will bring into fresh focus the mystery of the universe, its order, its beauty, its power. It will dramatize the questions which mankind has always asked, and to which no answers have been found and perhaps can never be found. Why are we here on this dwarf planet? Are there other planets that have burst into consciousness like our own? Is there an answering intelligence anywhere in space? Is there purpose behind the apparent meaninglessness and incomprehensibility of the universe? What is this divine spark of awareness which we call consciousness? And finally in the words and spirit of the Psalmist, what is man?

"In the face of these supreme mysteries and against this majestic background of space and time, the petty squabbling of nations on this small planet is not only irrelevant but contemptible. Adrift in a cosmos whose shores he cannot even imagine, man spends his energies in fighting with his fellow men over issues which a single look through his telescope would show to be utterly inconsequential.

"We need in this sick world the perspective of the astronomer. We need the detachment, the objectivity, the sense of proportion which this great instrument (the telescope) can bring to mankind. This telescope is the length and the shadow of man at his best . . . there is nothing which so glorifies the human race or lends it such dignity and nobility as the gallant and inextinguishable urge to bring this vast illimitable complexity within the range of human understanding."

A CHECK LIST FOR LOCATING VARIABLE STARS, by Patrick V. Rizzo

The eye has an aptitude for comparing the relative brightness of points of light. For example, the unpracticed observer can tell that Pollux is the brighter of the Twins, even though there is less than a magnitude difference between the two stars. Possibly, for the beginner in variable star observing, a more difficult problem is the locating of the variables. For this, the AAVSO "Manual for Observing Variable Stars," and the AAVSO finder and "type a" charts are indispensable.

An additional help may be provided by making use of another aptitude of our sense of sight, one which has played an important role in the development of the principles of Gestalt Psychology. It is, namely, the ability to conceive definite form, shapes or patterns, connecting points of light, such as stars, even when there are no real, visible lines connecting such points. The following list* embodies this principle. It deals with selected variable stars which,at times,can be seen through binoculars, the easiest instrument for the beginner. It describes briefly where each variable star will be found in relation to naked-eye stars in its vicinity. The position of each variable is further described by placing it on a unique point of some conceived asterism, formed by the variable and the naked-eye stars.

A brief glance at the following list will show that it is not enough to specify that a star makes an equilateral triangle with two other stars. The additional information, stating whether the variable is east or west, and sometimes north or south of the other stars, is necessary to uniquely define the equilateral triangle. Also, it can sometimes lead to error to say that the variable can be found at the vertex (i.e., opposite the base) of an isosceles triangle formed by it and two other stars. Stating that the variable forms an isosceles triangle with two other stars does not determine its position. It is to be emphasized that the following list is a supplement, not a substitute for finder charts, since many of these stars are very close to others that might be confused with them.

001620 T Cet forms an equilateral triangle with Iota Cet and Omega 2 Aqr; T South.
023534 W Tri forms a parallelogram with 7, 14, and 11 Tri.
203847 V Cyg forms right isosceles triangle with 56 & 31 Cyg(see Note)vertex V;V No.

NOTE: The star 31 Cyg is probably the most obvious example of the inadequacy of specifying a star's position solely by stating that it is at the vertex of an isosceles triangle. In the Dec. 1955 Journal of the British Astronomical Association, Dr. J. G. Porter pointed out that Norton's Star Atlas (1950), Schlesinger's Catalogue of Bright Stars, and others have involved this star in an erroneous designation. 31 Cyg is Omicron^2 Cyg. These authors have assigned o^2 to a more northerly star, 32 Cyg. This error probably was started by Admiral Smyth's true but misleading statement that o^2 is at the vertex of a low isosceles triangle formed by it and Alpha and Delta Cygni, a very low triangle.

(* Only a few of the stars from Patrick Rizzo's check list are given here, to indicate his system. The list is published in full in The Eyepiece for June 1960. ED.)

R COR BOR AND NOVA HER 1960, by Margaret W. Mayall

The recent minimum of R Cor Bor has revived interest in this star which has been called the ideal irregular variable star,with times of minima distributed absolutely at random, according to the laws of pure chance. I have drawn its light curve from 1843 to 1960 (published in JRASC, Vol. 54, No.4, August 1960), to show how completely it has been observed.

Nova Herculis 1960, discovered by Olaf Hassel of Arvoll, Norway, on March 7, has been beset with errors almost ever since its discovery. In several places an incorrect position was published, and there was even doubt as to which constellation it was in. The AAVSO preliminary chart, with admittedly poor comparison star magnitudes, but the only ones available, was found to have a bad error in the bright star nearest the nova. When we got good photoelectric magnitudes determined by Paul Roques and Thomas Crang, the sheet listing them gave the position of the nova as north of the 8.89 star when it is actually south of it.

The photoelectric sequence goes only to 9.89 magnitude, but very soon we expect to have a good photometric sequence, based on photoelectric comparisons, down to the 17th magnitude. Fortunately the nova seems to be cooperating with us, and the slope of its light curve has levelled off around the 9th magnitude.

The correct position of the nova is:

$18^h\ 52^m\ 44\overset{s}{.}4\quad +13^\circ\quad 6\overset{'}{.}6$ (1900); $18^h\ 55^m\ 2\overset{s}{.}4\quad +13^\circ\quad 10\overset{'}{.}3$ (1950)
and it is 2' south of BD +13°3827, 8.89 PE Magnitude.

VISUAL OBSERVATIONS OF MOON'S SHADOW - OCT.1959 ECLIPSE, by William H. Glenn

As a part of the eclipse program a questionnaire was distributed throughout the path of totality. Permission was granted to revise Stewart's questionnaire used in 1945 for visual observations. Stewart figured that 0.8 ft-candle of light would fall on a vertical plane. A result of the questionnaire was that the shadow was visible 325 miles outside the path of the eclipse. Stewart, who went to Nashua, New Hampshire, reported color to the west. (ED.)

A SOLAR FLARE, by Ralph N. Buckstaff

White solar flares are rare. Only 17 have been observed in the last 100 years. On Dec. 3, 1959, I observed a white flare. Photographs taken at the Naval Observatory and at McMath-Hulbert Observatory show it. The McMath photos were taken 15 minutes after the time of my observation.

WHITE FLARES, by Harry L. Bondy

Among the rare phenomena observed on the sun are white flares. Buckstaff's observation of a white flare on Dec.3, 1959 was recorded by SEA. It was one of the most prominent SEA's recorded. The only white flare found in the literature is in Carrington's book published in 1859. We should try to observe the sun for white flares. It is particularly important to observe their beginning and end. Otherwise they may be permanent faculae.

THE STAMFORD (CONN.) OBSERVATORY, by Richard W. Hamilton

A new observatory is being constructed at the Stamford Museum's Nature Center in Connecticut. It is being constructed with volunteer help and local manufacturers are donating many parts and services. When finished the observatory building will be equipped with a Gregory-Maksutov telescope with electronic controls, a darkroom, lecture hall seating 125, and a closed television circuit. (Architect's drawings were on display. This will be a fine observatory when completed. ED.)

INSIDE STORY OF A NOVA, by Florence Glenn

Only 150 novae have been recorded in our Galaxy. The number of novae seen in M31 in a year has been 26 plus or minus 4. Insofar as our Galaxy is concerned, we can observe only a small fraction of it, i.e., 3 arms out of say 7 or 8, and only a part of the circumference of these arms. Therefore, if we assume that our Galaxy has as many novae as M31, we may expect 3 or 4 novae to be visible a year, if we catch all of them. The Nova Search people should be very busy.

The galactic novae seem to be concentrated in the direction of the galactic center, and they populate a flattened spheroidal disc. This distribution identifies the novae with an "intermediate" population, between Population I and Population II, probably the Disc Population.

Evidence that novae in pre and post outburst states occur at $M_V \doteq +5$ places the novating stars considerably higher in luminosity than the subdwarf region on the H-R diagram. The poor accuracy with which the quiescent pre-novae may be placed on the H-R diagram does not warrant their inclusion in any particular diagram. From the small amount of data available, however, they seem to be very blue stars, perhaps almost like the central stars of planetary nebulae, in their non-outburst stages, and it suffices to state that they fall in the hot blue dwarf region.

At maximum most novae have temperatures between 7000 and 15,000°K. The spectrum undergoes remarkable changes during the outburst and becomes very complex. The spectrum at minimum may show a temperature range from 20-40,000° for these very hot blue stars.

The spectral data permits a rough estimate of the dimensions of the stellar photosphere. The average nova is about 100 times the sun's radius at maximum, and about 1/2 sun's radius at minimum.

The typical nova brightens suddenly, probably within a few hours, by about 12 to 13 magnitudes. The curve passes from the (1) pre-nova stage through the rapid initial rise; (2) the pre-maximum halt; (3) the slower final rise; (4) the early decline; (5) a "transition" stage marked by one or more fluctuations in brightness; (6) a smooth final decline to the post-nova stage, which is similar to the pre-nova stage.

The whole process occupies a few years for a fast nova, and may last a century or more for a very slow one. A survey of novae in M31 by H. Arp has established a relationship between apparent maximal luminosity and rate of decline. The observed absolute magnitudes range from -8.5 for VF; -7.5 for F; and -6.1 for S.

And now to apply some of these few facts to Nova Herculis 1960:

Position in Galaxy:	Galactic Plane
Rate of Decline:	Fast
Position on H-R Diagram:	Probably Blue Dwarf
Spectra:	Not yet announced.

Not until it reaches its post nova stage will its spectra and position on the H-R diagram be known precisely.

HEAVENLY HUES, by Albert Ullmann

Without color, our world would be a drab place in which to live. Through the centuries, men have looked for color in the heavens above and except for a few isolated cases, they have found none. Even with our largest telescopes, the eye is not sensitive enough to distinguish colors in objects of low light intensity. Astronomers were only able to distinguish the shapes of the gases in different kinds of light with the use of filters. But they were not able to see the full glory of the objects in one photograph.

Astronomical objects shine by one or more of four processes. The moon, planets, and sometimes clouds of dust shine by reflected light, their color largely determined by the illuminating source. The stars shine as a result of their own heat and their color indicates their temperature. Nebulae absorb ultraviolet light of hot nearby stars and re-radiate the energy by fluorescence. Nebulae shine also as a result of the collision between atoms and/or electrons.

With the development of fast color film, man was able to view the full glory of the heavens above him. The first color pictures of the heavens were taken with the 200-inch, and the 48-inch Schmidt telescopes on Palomar Mountain. This work was pioneered by Walter Miller, research photographer for the Mount Wilson and Palomar Observatories. The culmination of two years' work was dramatically announced in May 1959 with the publication of his photographs in both Life and National Geographic.

What is the value of color photographs? At present, they serve only an aesthetic value. Only time will tell if they will have a scientific value. (Beautiful color photos of Jupiter, Saturn, and the Andromeda, North American, Veil, Ring, Crab and Orion nebulae were shown. ED.)

RADIO TELESCOPE SIMPLIFIED, by Kenneth Weitzenhoffer

Within the past decade a new and powerful instrument for astronomical research has been developed. The radio telescope has taken its place beside the optical telescope, the spectroscope, and the photographic plate, as a tool of the astronomer. Sensitive radio telescopes are now detecting galaxies far beyond the reach of the 200-inch Palomar reflector. Indeed, the National Radio Astronomy Observatory is now using a radio telescope in a search for intelligent life elsewhere in the universe. While the radio telescope is a highly complex electronic instrument, one does not need a knowledge of electronics to understand how it works. Let us compare it with a conventional telescope.

The radio telescope and the optical telescope are identical in their basic operation. Each has three functions to perform: energy must be collected, the energy must be magnified, and a permanent record must be made. Each basic part of an optical telescope has a corresponding part in a radio telescope. This relationship is illustrated in the following table:

Function	Optical Telescope	Radio Telescope
Collect Energy:	Objective	Antenna
Magnify:	Eyepiece	Amplifier
Permanent Record:	Camera	Voltmeter/recorder

The operation of a radio telescope is quite simple. Radiation from the object under observation is collected by the antenna and is fed through the coaxial cable to the amplifier. In the amplifier the weak radiation (called a signal) is amplified many millions of times. It is then of sufficient strength to operate a meter or a recording voltmeter. The permanent record of radiation intensity may then be analyzed by the astronomer at his leisure. Radio telescope antennas are of many different designs depending upon their function. Large parabolic antennas are used to detect signals from the weakest of radio sources. Another type of antenna is the stacked array. It looks like the complex antennas one sees in television fringe areas. The stacked array has good resolving power, but is not as efficient a collector of radiation as the parabolic dish.

Radio telescope amplifiers serve the same purpose as those in a conventional home radio. The signal from the antenna must be amplified so it is strong enough to operate a recording device. The amplifier must be tuned to the frequency of the stellar radio source just as a home radio must be tuned to a desired station. A third function is performed by the amplifier: that of changing the nature of the received signal into a voltage that will operate the recording instrument.

Once the incoming radio signal has been sufficiently amplified, a permanent record can be made on a standard laboratory type recording voltmeter. The actual record looks similar to that obtained from a barograph, or a seismograph. The radio telescope record sheet shows fluctuations of signal intensity as a function of time.

Unlike an optical telescope,a radio telescope can be operated at any time. Observations can be made in the daytime or at night, in cloudy weather or when it is clear. The radio astronomer can sit in the control room and make reams of observations by the mere pushing of buttons. But lines on graph paper can never compare with the beauty of the night sky.

REPORT OF AAA OBSERVING GROUP, by Edward G. Oravec

The Observing Group of the Amateur Astronomers Association is now completing its 7th season. The activities of this group continue to be as numerous and varied as in the past. Registered membership is now 76, a gain of 16 members over last season. All observations made by members and contributors to the Observing Group are sent to the various recorders who keep records of this material. Articles, papers and reports are written by the recorders for publication in our bulletin "The Eyepiece" or for discussion at meetings. All observations are forwarded to various national and worldwide organizations - the ALPO, AMS, AAVSO, and IGC. The recorders of our group cover these fields: Aurorae, Comets, Lunar, Solar, Planetary, Meteors and Variable Stars.

During the year 12 monthly meetings were held with an average attendance of 35, as reported by our Program Director, Edward DeGennaro. We had 3 guest speakers during the year. John Gregory of the Fairchild County Astronomical Society told of the construction of their observatory (see paper by R.W.Hamilton), James Pickering of the Hayden Planetarium staff, and Edgar M. Paulton,President of the AAA, also lectured to the group. There were a number of short talks by OG members and guests as well as regular reports by our recorders and committee chairmen. Patrick V. Rizzo directed the instruction period on observing techniques and other topics of current interest.

A "Phenomena Chain" was reactivated under the leadership of Arthur E. Pearlmutter. This service enables all participants to be notified of interesting transitory phenomena,such as aurorae or novae. Over one dozen members are on the active list.

The highlight of the season was the 7th anniversary dinner of the OG at Luchow's Restaurant. Forty-six attended this most enjoyable and entertaining evening. Dr. Kenneth Franklin of the Hayden Planetarium staff was guest speaker. The March eclipse was observed at the Fieldston School and the Kada Observatory. Forty members and guests observed the eclipse under perfect conditions. Hosts of the AAVSO Memorial Day weekend meeting are the American Museum-Hayden Planetarium and the AAA. All members of the AAA Committee on Arrangements are OG-ers and Roy Seely is Chairman. (The Observing Group of the AAA contributed 5057 observations to the AAVSO during 1959/60.)

PHOTOMETRIC OBSERVATIONS OF SKY BRIGHTNESS - 1959 ECLIPSE, by Victor Gogolak

During the Oct.2,1959 eclipse, we used a multiple photometer with RCA #7163 photo-conductive cells, to experiment with light curves for a sunrise eclipse. Our experiment was performed at Beach Bluff,Mass. The light changes were affected both by sunrise and the eclipse. Preliminary experiments showed that a sunrise curve is approximately an exponential. The eclipse function was theoretically derived from the geometry of one circle covering another. From the two curves it was predicted that the eclipse would put a single dip in the sunrise curve. But instead four dips were found. The first two dips (see diagram) -the large ones - proved to be the result of the sunrise eclipse phenomenon. The last two small dips will be neglected, for they seem to be due to secondary effects peculiar to the October 2 eclipse.

The first peak appeared at 6:38. The light intensity should then have decreased smoothly all the way to totality. However, a second peak showed up in the period from 6:39:30 to 6:43:00. The apex was at 6:41 and was at least equal to but usually greater than the first peak. Then the curve decreased to totality.

The second peak, at 6:41 was due to the actual sunrise at that time. Once the sun broke above the horizon, direct light affected the sky brightness. This burst of direct light was great enough to upset the normal decrease due to the eclipse.

In conclusion, I would like to point out that this double peak phenomenon should be observable at all eclipses since each eclipse is a sunrise eclipse at some point on the earth. Also, the effect of direct sunlight which caused the second peak is important in the analysis of observing conditions.