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

Edited by R. Newton Mayall

PAPERS PRESENTED AT THE SPRINGFIELD MEETING, OCTOBER 14 - 15, 1960

The 49th Annual Meeting of the AAVSO was held in the Museum of Natural History, Springfield, Massachusetts, at the kind invitation of the Director, Frank Korkosz. Although our meeting was a little later than usual the weather was warm and New England's greatest show - the fall color - was still putting on a good performance. Many members gathered at the Shelton Hotel for dinner, Friday evening. Following dinner we went across the street to the Museum where the lecture of the evening was held. Our own ace observer, Cyrus F. Fernald(Fe), was the speaker. Anyone who has made over 100,000 observations should have something to say about it. (See below)

After the talk we went upstairs to the Seymour Planetarium, which was designed by Mr. Korkosz. Mr. Reed, a member of the Museum staff, demonstrated the instrument and explained their method of lecturing. Eleven shows each week are given, but the lectures are not stereotyped. But what was of great interest to all of us was to meet and talk with three young men, 15 and 16 years old, who are giving their time and lecturing to the public, in the Planetarium. Mr. Korkosz is to be commended for not only training these young men to operate the planetarium but for giving them the chance. We were glad to have these young men attend our meetings.

On Saturday morning we received the annual reports of the various committees, and elected four new councillors: Robert M. Adams, Robert Brady, Peter M. Millman, and John J. Ruiz. After lunch the officers for the coming year were announced: President, Clinton B. Ford; First Vice-President, Dorrit Hoffleit; Second Vice-President, William G. Cleaver; Director, Margaret W. Mayall; Secretary, Clinton B. Ford; Treasurer, Percy W. Witherell; Auditor, Cyrus F. Fernald; Clerk, R. Newton Mayall.

Saturday afternoon was given over to papers. Saturday evening we gathered in the Shelton Hotel and sat down to an excellent meal, following which Jack Welch took us on a most inviting and attractive journey to Alaska via beautiful Kodachrome slides. It was obvious they had a good trip and a wonderful time. We were pleased they shared it with us.

On Sunday morning we worked our various ways homeward through fog that clothed the entire State of Massachusetts.

After many years, Walter Houston arrived at an AAVSO meeting; Peter Millman flew in from Ottawa; the Buckstaffs from Wisconsin arrived via Wilton, Maine, where they visited the Fernalds, who accompanied them to Springfield. The Diedrichs from Ohio complete the role of distant members.

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FOOTSTEPS ON THE WAY TO 100,000 OBSERVATIONS, by Cyrus F. Fernald

This ins't a lecture. It is an observer's talkfest. Undoubtedly my interest in astronomy was first aroused by Professor H.N. Russell's articles in the Scientific American (1912 to 1920). It is safe to assume that many others, as well as I, owe Professor Russell a deep debt of gratitude for starting their interest in astronomy. The desire to know more was so strong that I took a year of astronomy at Bowdoin College, with Professor Charles C. Hutchins. We didn't get very much chance to use the small refractor the college had, but what little time I did have with it, convinced me that I wanted a telescope of my own sometime. It was not until 1931-32 that I got the chance, and I bought a second-hand Springfield mount.

With my new telescope I began going over the lists of nebulae, star clusters, and double stars given in the old "Splendour of the Heavens," Barnes "1001 Celestial Wonders," and anything else of like nature. I think that this unconsious training in finding nebulae, etc. by the circles, was of great help to me later when I began trying to locate variable star fields by the same methods. You can be a good deal surer of a nebula, a star cluster, or a bright double than you can of one particular star, that at first has nothing to distinguish it from countless others. It was 1937 before I decided I wanted to do something more than explore, and as it seemed to me that variable stars was the field where I might be able to help, I sent in a few observations that I made. The first of these was made May 2, 1937, on R Leonis. The warm reception I received from Mr. Campbell convinced me I was on the right track -- the track that led me to my 100,000th observation of June 27, 1960, 23 years, 1 month and 25 nights later. As far as I know, Reginald de Kock of Capetown, South Africa, and A.F. Jones of the R.A.S. of New Zealand are the only amateur observers who have passed this mile-stone. Some years back Bob Greenley collected information on the number of observations made by each observer, and Bob's figures, plus Mrs. Mayall's annual reports are the source of the statistics for all observers except Jones and myself.

Over these 23 years I have made a good many changes in my equipment. Finally in 1957, after buying a 10" Cave telescope, I built the sliding roof observatory that I told you about in 1958.

If my observations are correct, the improvement in eyepieces brought about by the second world war, was one of the few real good developments to come out of the war. I can dimly recall the first of my variable star observing, with the relatively small field of the eyepieces then available. My relief was immense when the first of the really good war surplus Erfles came along in early 1945. In 1947 a slightly larger one made its appearance, and these two are the ones I use, in preference to all others. The small Erfle gives better star images over its whole field, but the slightly larger field of the second makes the two just about equal. I have purchased two even larger eyepieces, but find the large eyelens inconvenient. Harry Ross's M 1 of just over 0".75 focal length is the best that I have for getting that extra two or three tenths of a magnitude, when the Erfles can't quite do it.. The 16mm Brandon is about the same.

For lunar and planetary observing you will want some higher powered eyepieces, and probably a Barlow lens. It is only recently that I have tried the Barlow, and what little use of it I have had has been thoroughly enjoyable.

Another item to come out of war surplus that has helped the small telescope maker is the prisms. The 1".5 and 2" size interest me the most. Prisms seem better than diagonals to me, in that they never need recoating.

When I observe in the winter, I find a warmed eyepiece much better than a cold one. I have a small electric heater, one that was used to keep meters warm, probably a couple of watts or so, that does nicely. The only trouble is they do not make them any more, so I am being very careful with the one I have. I suppose a telescope purist would scoff at the idea,but it seems to me that to have the eyepiece warm reduces the temperature differential between an observer's face, and the eyepiece; and therefore improves the seeing. It seems to work out that way in practice.

In 1954 I bought a Questar. I have used this for almost all my solar observing since its purchase. I have tried it on variables, but the Springfield is so much better in light-gathering power and so much easier to use, that Questar has no chance. It is a fine instrument for bird study. In 1957 I got the idea I wanted one of Tom Cave's 10" Astrolas. About as soon as I saw the instrument, I realized it needed a permanent mount in an enclosure. Hence the observatory I mentioned a while back.

Now for my observing methods. After getting the Springfield in to operating condition, my first task of the evening is to set my watch to sidereal time. There are several objects whose R.A. I know, which can be found quickly by a sweep in declination, such as R Coronae Borealis, R Scuti, T Orionis, the Andromeda Nebula, R Leonis, which pretty well cover the sky. The hour angle of the star gives me the sidereal time and I am in business.

First I get the irregular variables that are above my horizon. If my eyes are not sufficiently light-adapted to see the fainter ones, they are postponed for twenty minutes to half an hour or so. Then I start my regular variables. There are many ways of listing these, and I have tried most of them. The one I have settled on is in order of R.A., with one modification. Some 54 stars of high declination are separate from the rest. These stars may be covered in say 10 months of the year instead of only 6. Normally, I start in the west and work east. With a run of about four good nights, I can cover the evening sky, three nights on those south, and one on the 54 northern ones. Depending on the season this will give something like 250 observations on 200 variables. If I can do that three times in a month, I call it a good month's observing for Maine. Of course there are many months particularly from December through June, that I am not able to do this, maybe not even once. Frequently the moon cuts down on the coverage on one or two of the month's sweeps, although occasionally it is possible to get quite faint stars with a bright moon in the sky. The pine trees that cut off my southern sky at about -10° often pay a dividend by putting me in their shadow when the moon is south.

I doubt if I can add much to what many observers have already said about finding particular variables. Experience is the best teacher. Of course, most of our stars have a pattern near them, a triangle, a square, a particular bright star, a bright pair, something that distinguishes the field. But be careful. There are many cases where a pattern will repeat, and occasionally quite near the variable field. In some cases a relatively small movement in R.A. or Dec. from the variable being observed will bring the next pattern into the field.

The thing that speeds up my observing most is getting two or three observations or more, before going back to the desk to record them. Finding and observing the star may take 20 to 30 seconds, recording it another 20 to 30 seconds. Recording two stars takes 25 to 35 seconds, etc. The gain is obvious, but be careful not to make mistakes. Ten to fifteen years ago I used to do more of this than I have over the last few years. It is more fun to take things a little more slowly, and I do not feel under the same pressure than I did during the war and a few years thereafter.

Probably here is as good a time as any to introduce some statistics. From May 2,1937 to June 27, 1960 is, by subtracting Julian day numbers, 8457 nights. I wish I could tell you how many of those I was out observing, but my accurate figures on that go back only to September 1, 1941. In the 19 years from then to August 31, 1960, there were 6939 nights. Of those I was observing 2368. On 1697 of those nights I made 20 or more observations. The most observing nights in any one month was 22 in October 1946. I had 20 in August 1944, and again in August 1947. I took off an average of the number of nights in which I made 20 or more observations. These figures were January 4.7, February 5.1, March 6.6, April 6.7, May 6.4, June 7.0, July 9.1, August 10.9, September 10.1, October 8.5, November 7.0, and December 7.0.

The first time I made over 400 observations in a month was in August 1940. Two years later I had my first 600 month, and another two years raised it to 800. In October 1946 I had the first 1000 month, and the next year in September had 1085, which is my high to date.

Of more importance is the number of stars observed in any month. My first "over 200" month was August 1941. The next year in October I went over 300 for the first time. The last four months of 1947-48 were over the 300 mark, with 331 in December 1948 as my high for number of stars observed in any one month. It is interesting to note that I had 317 stars in October 1944-6-7-8. 1949 was the best year, when I had over 200 stars observed all 12 months. This last year Tommy Cragg had some good weather in the fall months, and observed 362-458-405 stars in September, October, November 1959. That shows what use the new chart on T Orionis region(50 plus variables), and a southern horizon going down to -47^{o} will do.

Now it is time I told you of some of the satisfactions I have received from my connection with the AAVSO. First, I would mention the acquaintances and friendships that have come to me. If I were to talk about the pleasure and satisfaction I have found in knowing you and those who have gone before, and working with you for our common aims, I would be talking all night. One and all I count as my closest friends.

Second, is the sense that I am contributing in some degree to the increase of human knowledge by adding to the volume of data on which that knowledge is based. Although at present it is hard to see any connection between our knowledge of variable stars and our guesses of the reasons for their variability, and our everyday problems of life, the time may come when such information may be of great help in solving some of those problems. Just consider some of the questions that vex variable star astronomy, and the potential time it may take to gather the information on which an intelligent answer may be based, and you will realize that there is use for the AAVSO, as now constituted, for generations to come. To mention only a couple of these questions: Are the novae and super-novae only long period SS Cygni-type stars? Second, are the regular variables undergoing changes in period and changes in other characteristics of their light curves? The answer would seem to be "Yes", and considering that the observations of the last 100 years give only a sketchy answer, here again it is evident that our decendants will need observations collected over many hundreds of years to arrive at definite answers.

All this speculation might be better left for our 50th anniversary which comes up next year. And so I close with unanswered questions. (Mr. Fernald read letters from de Kock, Jones, and Peltier. De Kock recommends systematic observing, and setting aside one or two Saturdays or Sundays each month for observing both morning and evening. ED.)

OBSERVATIONS OF JUPITER, by Charles Morris

Charles Morris is the youngest of our new members. He reported on three observations of Jupiter, and exhibited sketches that showed the change in apparent size, and the orientation of the 4 brightest moons. The second observation showed one moon in eclipse. Estimates of magnitude were -3.0, -1.5, and -1.0 on J.D.7132.8, 7181.6, and 7200.7 respectively. (ED.)

EVOLUTION IN CLASSIFICATION, by Meredith Baldwin

The RW Aurigae-type variable stars have been known by a variety of names. Alternately referred to as nebular variables, Orion nebula-type variables, and T Tauri-type variables, these stars gradually have been grouped into a more clearly defined class. The interest generated in RW Aurigae-type stars by Joy's definitive work in 1945 has stimulated the discovery and re-examination of this type of variable star.

In the 1958 Transactions of the International Astronomical Union, the criteria for inclusion as an RW Aurigae-type variable are clarified. The classification includes stars of spectral classes B to M, of both emission and non-emission types. The stars inhabit the main sequence region of the spectrum-luminosity diagram, with some of their number in the sub-giant region. A large proportion of them are associated with both bright and dark nebulosity. The light curves are as varied as the spectral classes; however, the variations are usually irregular, rapid fluctuations of an amplitude of less than one magnitude to more than three magnitudes, interrupted by occasional periods of light constancy. There is a tendency to remain longer at maximum than at minimum brightness.

The T Tauri stars are a sub-group of the larger classification, and are distinctive because they are all emission type objects of spectral classes G to M, showing bright flourescent lines of singly ionized iron and "forbidden" lines.

Prior to their recognition as a separate class, 153 RW Aurigae-type stars were known as variable stars. It is interesting to discover how these stars, presently listed as RW Aurigae-type variables in the 1958 Catalogue of Variable Stars by Kukarkin and Parenago, were classified in 1937 by H. Schneller in his Katalog und Ephemeriden Veranderlicher Sterne. Of the 153 stars known at that time, 91 were listed as being of unknown type, and two of this number were assigned tentative periods of 140 days and 2.5 days. Twenty-seven stars were named irregular variables, and RW Aurigae itself was included in this group. Two other stars so classified were described as having peculiar spectra: SY Orionis, and TV Orionis, with tentative periods of 5.70 days and 4.02 days respectively.

Nine of the total number were thought to be short period variables, 4 to be long period variables. XX Scuti was classified as an RR Lyrae-type star, with a period of 0.33993 days. One star was indicated as being semi-regular, and two as belonging to the δ Cephei class. Six were listed as Algol-type variables, and 10 as R Coronae Borealis-type stars. Among the 10 so classified were T Tauri itself, T Orionis, and R Monocerotis, all of which are now particularly well known members of the RW Aurigae class. Finally, RR Tauri was labeled as being similar to RW Aurigae, and UZ Tauri was recognized as nova-like.

Of the 442 RW Aurigae variables discovered since the 1937 listings, 197 are in the constellation Orion, demonstrating the interest taken in this region. This study points up the importance not only of new investigation, but of continued study, both of light variation and spectra of known variables, particularly those situated in regions of suspected nebulosity.

SOME OF MY BEST FRIENDS ARE ASTRONOMERS, by Consuelo M. Ruiz

Those who attended our annual meeting at Nahant, Mass., October 1959, had the pleasure of meeting John Ruiz' sister. Since then she and John have been doing a bit of travelling and meeting many astronomers and AAVSO members. Just before our meeting Consuelo had to return to Cuba, but John had tape-recorded her talk and synchronized it with color slides. We watched a parade of familiar faces and listened to poignant references about each. However, one never knows what John will do when he gets hold of a projector and slides -- and a tape-recorder. We found out at the end -- it was the delightful voice of a friend and not Consuelo's. Our only regret was that Consuelo and The Voice could not be with us. (ED.)

HALO PHENOMENON, SEPTEMBER 17, 1960, by Herbert Luft

Mr. Luft reported on and described on a blackboard an uncommon elliptical halo around the sun, within which a fainter circular 22° halo could be seen. Also arcs of the counter sun were observed. Joseph Ashbrook noted the same phenomenon, but from his station he did not see it as elliptical. (ED.)

SOLAR PROMINENCES, by Walter Semerau

Those who attended our 1958 annual meeting saw some of Walter Semerau's excellent photographs of solar prominences, taken with a coronagraph which he constructed. Since then he has added to his equipment and today his talk was accompanied with about 20 minutes of solar prominences taken by time-lapse photography, in color, with a 16 mm movie camera. One can not help but admire Semerau's work and equipment. His motion pictures were of superb quality. (ED.)

CONJUNCTION OF VEGA AND ECHO, by James Henry Carlisle, III

At 9:00 p.m. E.S.T. on September 12, 1960 I was watching the satellite Echo through my four-inch reflector. It was traveling north to south. When it became too high to see on my porch I went out to the porch steps to see Echo overhead with naked eye. It went straight toward Vega and seemed to touch it. Then Vega and Echo merged into one star unseparable by naked eye for about a second of time. I was expecting that the combination would seem brighter than Echo alone, but actually the conjunction appeared yellow and much the same magnitude as Echo does by itself. Perhaps Echo was just then undergoing a diminishing of brightness, due to its wrinkles. After a second, Vega's bluish-white spark reappeared and Echo sped southward. It would be of interest to know if any other AAVSO member has seen Echo merge with a bright star.

IDENTIFICATION OF NOVA HERCULIS, 1960, by Thomas A. Cragg

The first news of the discovery of a nova of magnitude 5 by Hassel to reach the Mt. Wilson and Palomar Observatories offices was by a telegram on March 9, 1960, giving the position as $\alpha = 18^h51^m$ and $\delta = +13°00'$ (1855).

A 60-inch photograph was taken March 21 in order to obtain an accurate position of the nova. This being the first naked-eye nova since the essential completion of the National Geographic Society-Palomar Observatory Sky Survey, an attempt was made to identify the nova before outburst. By comparing the 60-inch plate with the Survey Atlas print showing the nova region, a faint image of about 16th magnitude was found near the correct position by Kraft and Cragg. The image on the Survey Atlas did not look perfectly round, but seemed to have two "ears" on it suggesting a multiple star.

The original survey plates were then consulted, and as luck would have it, a rejected pair of red and blue plates taken at an earlier date of the same region was found. The cause of rejection was a bad photographic defect in the corner of one plate, not affecting the area where the nova was found. The earlier plates (rejected pair) were 322-E and 322-0 taken August 22/23, 1951; the accepted Atlas pair were 544-E and 544-0 taken August 12/13, 1952. Upon examination of the earlier pair it appeared that the Atlas image was a triple star with each component of about 18th magnitude, at least one of which was a variable star with a range of at least two magnitudes. The five plates were measured to determine which star of the triple was the nova.

The position of the nova was measured on the 60-inch plate and referred to six astrographic stars in the $+13^\circ, 18^h52^m$ zone of the Bordeaux Astrographic Catalogue. The following position was found:

α		δ
$18^h52^m44^s.68$	(1900.0)	$+13^\circ06'32''.9$
$18^h55^m03^s.14$	(1950.0)	$+13^\circ10'26''.4$

For convenience, the three stars of the triple are labeled α, β, and γ (β, northern of group). The measures of the Survey plates were made on a 3X enlargement of each plate whereas the original 60-inch plate was measured. The reductions of the Schmidt plates were made to the 60-inch plate. The differential positions of α, β, and γ from the nova are found in Table I.

TABLE I

Star	$\Delta\alpha \cos\delta$	$\Delta\delta$
α	$-2''.26 \pm 0''.11$	$-2''.97 \pm 0''.28$
β	$-0''.29 \pm 0''.21$	$-0''.24 \pm 0''.27$
γ	$+1''.98 \pm 0''.04$	$+2''.54 \pm 0''.11$

Since the computed positions of the nova and star β are in such good agreement, star β must be the nova before outburst.

Although it is possible more than one star in the triple is variable, β is clearly the one with the largest range on the plates. Using the sequence established by Arp (Ap.J, 128, 166, 1958) in NGC 6664 as a criterion, rough estimates of the magnitude of β by Kraft (see Table II) from the Schmidt plates give a range of about 2 1/2 magnitudes in the blue and about 2 magnitudes in the visual. The color-index is about +0.5 magnitude when the star is bright.

TABLE II

Plate	
322-0	18.8 ± 0.3 (pg)
544-0	16.2 ± 0.3 (pg)
322-E	18.0 ± 0.3 (v)
544-E	15.8 ± 0.3 (v)

I am indebted to Drs. Robert P. Kraft and Seth B. Nicholson for stimulating discussions and suggestions regarding the reduction of data herein.

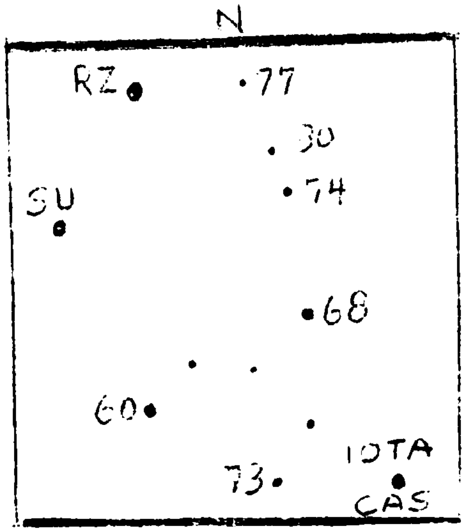
RZ CASSIOPEIAE, by Joseph Ashbrook

1960 position: 2^h 45^m.2, +69° 28'

Visual range: 6.4 to 7.8

Algol type: period 1.19525 days

Duration of eclipse: 4.8 hours



Scale: 1° = 1.1 inch

1. Problem. The period of this eclipsing variable undergoes large irregular changes, whose explanation is still unknown. During the last decade, the period has been shortening, and currently the minima are occurring about half an hour earlier than predicted by elements that were valid in 1954. A number of minima should be timed annually, to give a continuous record of this variable's unpredicted changes in period. Photo-electric observations are desirable, but careful visual work gives very useful times of minima.

2. Observations desired. Because of the brightness of RZ Cassiopeiae, 7 x 50 binoculars or large finders are adequate for magnitude estimates. On a scheduled night of minimum, make observations at roughly 10-minute intervals, beginning about 1 1/2 hours before the predicted time of minimum, and continue about 1 1/2 hours after it. The time of each estimate should be recorded to the nearest minute, the watch used being checked against time signals.

3. Reporting the observations. Mrs. Mayall asks that your RZ Cassiopeiae observations be sent to AAVSO headquarters, but on a separate report sheet from those on which your observations of other stars are listed. After the RZ Cassiopeiae observations are credited to your total, they will be sent to SKY AND TELESCOPE for derivation and publication of times of minimum.

4. Ephemeris. The following predictions are based on new elements from observations of 1954 to 1960. For minima occurring within hours of darkness in the United States, the expected time of midminimum is listed to the nearest 0.1 hour, in Eastern standard time.

October 19, 10.7 pm; 21, 3.4 am; 25, 10.1 pm; 27, 2.8 am; 31, 9.5 pm.

November 2, 2.2 am; 6, 8.9 pm; 8, 1.6 am; 12, 8.4 pm; 14, 1.0 am; 18, 7.8 pm; 20, 0.5 am; 21, 5.2 am; 24, 7.2 pm; 25, 11.9 pm; 27, 4.6 am.

December 1, 11.3 pm; 3, 4.1 am; 7, 10.8 pm; 9, 3.5 am; 13, 10.2 pm; 15, 2.9 am; 19, 9.6 pm; 21, 2.3 am; 25, 9.0 pm; 27, 1.7 am. (An article and chart will be published in November 1960 Sky and Telescope. We are indebted to Joseph Ashbrook and Sky & Telescope for permission to reproduce the chart. (ED.)

THE PRACTICABILITY OF COLORED FILTERS FOR VISUAL PHOTOMETRY, by Charles H. Giffen

The human eye adapted to stellar photometry is a curious organ. It is a rather sensitive instrument and has a very fast response time which makes it useful. Unfortunately it also suffers from a variety of defects. One such defect is that it must always be used as a comparator between two stars; for the ability of the eye to accommodate to varying levels of illumination prevents it from making absolute or direct brightness measurements. But this is not so serious a drawback.

The principal defects arise from the eye's reaction to color. The two sensitivity levels, day and night vision, have their maximum sensitivities in different colors--daylight vision is most sensitive to yellow at 5500 Å, and night or dark-adapted vision is most sensitive to the green at 5100 Å. The 'crossover' between these two sensitivities occurs from 2 1/2 to 4 magnitudes above the limits of one's vision. This is centered in the region in which most photometric observations are made with the telescope. The Purkinje effect describes the notorious defect of comparing stars of different colors: light of a given wavelength appears to the eye, as one increases the aperture, to become brighter relative to light of a shorter wavelength or to become fainter relative to light of a longer wavelength. Several other defects of color arise largely from the Purkinje effect -- one is that even with a given aperture the varying dark-adaption of the eye and fatigue caused by prolonged staring at the stars alter the effective aperture with which the eye sees, thus introducing the anomalies of the Purkinje effect in a matter of seconds, while at the telescope.

Two observers using 5" and 16" telescopes may record discrepancies of greater than a magnitude. In the past year and a half I have studied methods of eliminating the errors in visual photometry which arise from color. Interposing colored filters between the eye and the star led to the greatest reduction of errors.

The reason for using a filter is that the eye then sees monochromatically. Since the light is all the same color the Purkinje effect and other color defects of visual photometry cannot exist. In order to be at all practical the filter used must have its maximum transmission at the wavelength of greatest eye sensitivity. The effective wavelength of the eye-filter combination must remain quite constant whether the eye is seeing with day vision or with night vision. With extremely faint stars it should be possible to remove the filter and not alter the effective wavelength while making the observation. It is convenient for the effective wavelength of the eye-filter combination to be compatible with the Johnson-Morgan UBV photoelectric system; if possible the filter selected should screen out extraneous background light due to moonlight, city light, aurora, etc; and lastly, the filter should cause a decided improvement over observations made without one.

To control and check upon the accuracy of the observations, regular observations of photoelectrically measured standard stars were made; these stars were of a constant brightness, unknown to the observer at the time of observation -- they were selected from the Johnson-Morgan photoelectric standard regions such as the Pleiades, Beehive, and Hyades clusters. Such observations of standard stars together with actual observations of variable stars were made in order to determine the improvement which filters made and how they performed under typical conditions.

Careful investigations of two stars were made during the past summer, both as a test of the performance of the filters and as a rigorous pursuit of two interesting variable stars -- V Sagittae and AE Aquarii. Without a doubt the filters performed excellently. There were rarely any errors of more than 0.06 mag. with the filters; often the error was 0.04 mag. or better. And in observations extending over a considerable period of time in the evening, the internal error among the observations was frequently better than 0.04, approaching 0.02 in some instances. The results were good enough in the case of V Sagittae to conclude that, since the star is a very colored star, previous observations with the eye unaided by a filter, which purport to show rapid oscillatory behavior of the star in cycles of from one-half a minute to several tens of minutes with an amplitude of from one-tenth to five-tenths of a magnitude are to be doubted, and that probably this behavior does not generally exist upon the star. The observations do show occasional unexpected flare-ups of a few tenths, and two much larger flares -- one of 1.6m.

The advantages of using a filter for visual photometry, I conclude, are: 1) errors arising from color are very nearly eliminated; 2) the filters are inexpensive; 3) there need be only a minimum of alteration in procedure if the correct filter is chosen; 4) extraneous background due to moonlight and city light are actually removed to a great extent with the filters satisfying the above features; and 5) the filters perform well with various telescopes and levels of dark-adaptation of the eye.

On the basis of the greater accuracy of magnitudes which will be available at low light intensities with the Wratten 57 filter, it is the filter to be preferred for attempting to improve visual photometry with a single filter. The effective wavelength of 5100 Å is not totally incompatible with existing photometric systems -- not even the UBV -- and it is the one which best fits the eye and the problem of observing the stars. I intend to begin preparing photoelectric magnitudes of comparison stars of AAVSO irregular stars at exactly 5100 Å effective wavelength; and at the same time UBV magnitudes will be taken of the most erratic variable stars' fields for the use of those who wish to observe the variables photoelectrically or photographically.

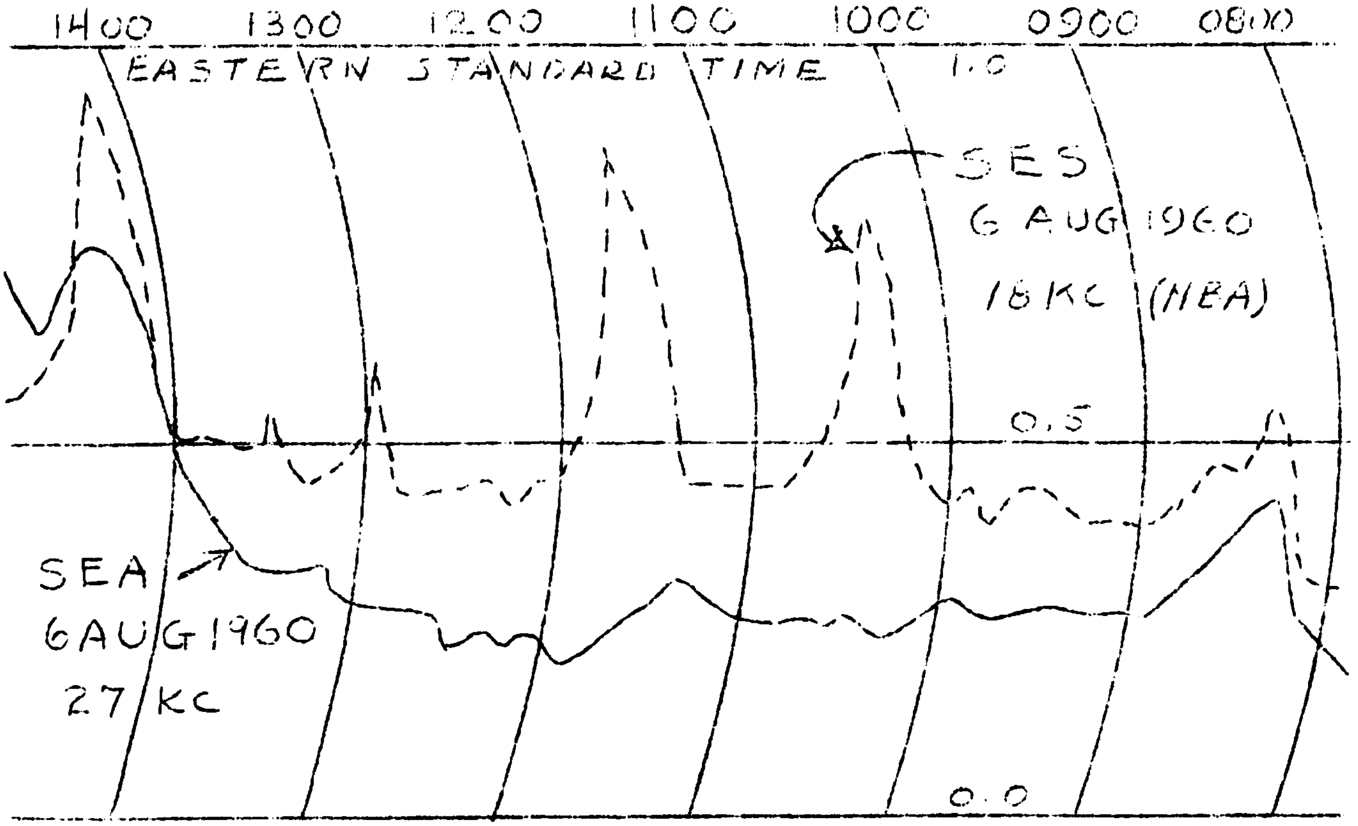
I therefore recommend that the AAVSO urge the use of a Kodak Wratten 57 filter for making observations of variable stars for at least one year and that twenty observers observing upwards of 200 stars per year use this filter religiously on erratic stars and a selected list of about ten long period stars whose periods are not known well. Because the filter color is green it is suggested that any observations made with a Wratten Filter be followed by G -- thus: 10.3G.

SUNSPOTS, by Harvey Hepworth

Mr. Hepworth described his exhibit of photographs of sunspots, enlarged from 35 mm film. These remarkable photos were made with a 6" refractor, Herschel wedge, infrared filter, and Zeiss split beam housing. Exposures were 1/75 and 1/100 second using Microfile film. (ED.)

SUDDEN ENHANCEMENT OF SIGNALS (SES), by Casper Hossfield

Those working on the SEA program are recording very low frequency noises in the 27kc (11,000 meter) band, which has a high pattern at night, dropping off during daytime. During the day solar flares give a jolt or jump to the noise level. The disadvantage is that the atmospheric noise level fluctuates, and the unpredictable changes in the level of atmospherics create a problem. Mr. Hossfield thought V.L.F. radio signals might prove a more satisfactory medium for flare detection than atmospherics, because of their constant level. NBA has very low frequency, 18kc, time signals which are sent out from Panama. Mr. Hossfield has hooked up a new receiver and recorder to



receive time signals and he has found sudden enhancement of these signals (SES). The new SES receiver supplements his SEA receiver. The present signal originates 2300 miles from his station and he says the farther away the signal, the more sensitive it is. The accompanying diagram shows the correlation between SEA and SES.

NOVA HERCULIS, by Margaret W. Mayall

Mrs. Mayall described and exhibited the curve of Nova Herculis 1960, to date. It shows a smooth, steady decline following the first 2-magnitude drop from March 4 to March 7. The first of October, it was near the 11th magnitude.

In addition, a complete light curve of R Coronae Borealis from 1845 to 1960 was on display, with a detailed plot of the 1960 minimum. (ED.)

THE CANADIAN IGY METEOR PROGRAM, by Peter M. Millman

On a previous occasion, when we met at Cornell University in 1956, Dr. Millman outlined a proposed I.G.Y. meteor program. The present paper is by way of a progress report on this program.

The completed Springhill Meteor Observatory, south of Ottawa, was shown. Here both radio and visual observing complement each other and are physically connected. When an observer sees a meteor, he pushes a button which records the observation on the recording made by the radar system operating at 32 mc/s. In this manner the radar meteors are correlated with visual meteors. One advantage of radar, from a statistical viewpoint, is that it records meteors 24 hours a day. Omnidirectional antennas, mounted over horizontal mats 105 ft. in diameter, record everything to about 15°

above the horizon. The largest number of visual meteors (over 1,000) observed in one night at Springhill was during the December Geminids, 1958.

A large number of amateur observing groups, particularly in the USA and Canada, have cooperated in this program at over 250 stations in a dozen countries. Over 100,000 visual records are on file and have been transferred to IBM punched cards. More than 3,000,000 radar meteor echoes have also been tabulated on punched cards and an analysis of the statistical results is being carried out. This program will be continued through the sunspot minimum period in 1964-65.

Dr. Millman's slides showed details of equipment used, methods of tabulation, and some preliminary results. (ED.)