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

Edited by R. Newton Mayall

## PAPERS PRESENTED AT THE 44TH SPRING MEETING, MAY 27-29, 1955

The 44th roving spring meeting of the AAVSO was held in Pittsburgh, Pennsylvania, May 27-29, 1955. Our hosts were Dr. N. E. Wagman, Director of the Allegheny Observatory, and Arthur L. Draper, Director of the Buhl Planetarium. Between them they provided sumptuous meeting rooms, and a weekend of enjoyable activity. Those who had vivid recollections of the dense pall of smoke and smog so often associated with Pittsburgh and its mills had a grand surprise, for industry has done a wonderful job in making a cleaner city, and there is no longer a smoke-laden atmosphere.

We were sorry that Mr. Draper had to be absent, but his staff graciously made us feel at home and there was little that we didn't see and learn about the planetarium, from its disappearing Zeiss projector to the workshop of the Amateur Astronomers Association of Pittsburgh. Friday evening, Dr. Wagman welcomed us to Pittsburgh and gave the opening address, which was a most interesting talk on Flare Stars, followed by a brief history of the Allegheny Observatory, after which the AAA of Pittsburgh invited us to their workshop for coffee and doughnuts.

Saturday morning was given over to the business of the organization. After a very pleasant lunch in Boggs and Buhl department store across the small park in front of the Planetarium, we reconvened for the session of papers. Our spring dinner was held in the North End Methodist Church, under the direction of Mrs. Wagman, who gave us one of the most delicious and memorable meals in the AAVSO's gastronomical history. After dinner, Clint Ford showed his candid movies of our meetings, made over the past few years. At dusk we left the church for the Allegheny Observatory, where every door was opened wide to receive us. Dr. Wagman had his instruments operating, and we had a chance to look at the moon through the 30" refractor and light clouds; and the use of the blink comparator was demonstrated, together with other instruments in active use. Dr. Keivin Burns set up an interesting exhibit in his laboratory with all the spectroscopes in operation. The 30" refractor was made by John Brashear, whose ashes, with those of his wife Phoebe, are sealed in a crypt in the basement. A small plaque in the wall bears the following inscription that could well be a guide for all of us: "They loved the stars too fondly to be fearful of the night."

[redacted], once again we were favored with sunshine, and were glad to see Claude Carpenter who arrived from California, the Beidlers from Chicago, the Buckstaffs from Wisconsin, Bob Adams from Missouri, and Scauvageau from Michigan. Also we were glad to see so many of our new and young members, such as Charles Michael from Bucyrus, Ohio, and Samuel Terry from Harrisburg, Pennsylvania. This was a large meeting of our own members, and we were also glad to have with us many of the AAA of Pittsburgh. Chuck LeRoy is to be congratulated for his part in making it a success. Again our friends and members from abroad submitted papers, which were read. The Recorder outlined a busy year for all of us. Our final session was held at ten o'clock Sunday morning when we met at the optical plant of the J.W. Fecker Company, where we had a wonderful opportunity to see how the professional works, and to examine many new and interesting instruments being developed and made by them for a variety of astronomical purposes. We are grateful to the personnel of the Fecker Company, who gave so generously of their time. Goodbyes were said at Fecker's, and we all wended our various ways homeward.

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FLARE STARS, by N. E. Wagman

The Flare star is a new type of variable star. Interest in these stars at the Allegheny Observatory comes through the parallax program. When this program was started with the Thaw 30-inch refractor by Frank Schlesinger in 1914, naked eye stars formed the bulk of the observing list. Now the emphasis has shifted to the dwarf stars; and the flare stars are red dwarfs.

The typical flare star is UV Ceti, which was discovered to have a large proper motion by Luyten, October 19, 1947. It was found to be a 1".6 double by Joy the following August. The components are both red dwarfs of 12th visual magnitude. On a spectrogram taken by Joy September 25, 1948, there was a remarkable brightening of the continuous spectrum, and the following December a flare was photographed on a plate taken for parallax at the Steward Observatory, Tucson, Arizona. Measurements showed that the fainter component had flared to 12.3 times its normal brightness in less than three minutes. It was all over in 20 minutes, with the star having radiated as much extra energy as its total normal radiation for 67 minutes. The short duration and tremendous increase in energy are characteristic of the flare star. Seven earlier flares of this star were found on old Harvard plates, and six other recent flares have been recorded. Intensities of the flares range from two times (at Allegheny) to 100 times normal (Belgrade).

Ten flare stars have now been recognized. All have bright emission lines of hydrogen and calcium in their spectra, but there are noticeable differences in their characteristics. No periodicity of a flare star has been established, but a flare may occur at intervals of less than a day. The increase to maximum light has occurred in just a few seconds in some cases.

There are similarities between the flare stars and solar flares, T Tauri stars, SS Cygni stars and others, but the flare stars are evidently a different type. In the words of Shapley, these red dwarfs are "obviously...not cooling off monotonously."

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(The following abstract of Dr. Wagman's brief history of the Allegheny Observatory indicates that we met on historic ground. R.N.M.)

The present Allegheny Observatory was founded in 1859 by amateurs. Samuel P.Langley was director from 1867 to 1887, and he was interested in revising the then haphazard system of local time throughout the country. He promoted Charles F. Dowd's standard time system; and when Dowd's system was accepted and put into effect in 1883, it was the Allegheny Observatory clock that was used to synchronize all the clocks in the United States.

SOME COMMENTS ON VARIABLE STAR OBSERVATIONS, by Robert M. Adams

I was primarily interested in variable star observation because it afforded an opportunity to exercise my interest in astronomy. I took elementary astronomy at Columbia University and toyed with the idea of going into this field as a professional, but instead became an anthropologist and professional archeologist. As for variable star observing, I have reached my stride at about 2000 light readings a year. In the southwest part of Missouri near the Oklahoma line, the seeing is generally very good. There is no great diffused light such as one experiences in the large city. I resort heavily on my Becvar atlas to locate variable star positions. Incidentally, some of you might be interested to know that I have outlined all my variable star charts on my Becvar. This greatly facilitates locating variables. To achieve my monthly average of about 160 light readings, I spend one to two hours about ten nights a month. Each star takes about two minutes to locate and two minutes to record. I know some of my fellow observers run circles around me. I understand one of them averages one minute for the whole process. I can reach 14.2 magnitude on good nights. Sometimes I can get down as far as the 15th mag. on very rare nights, at the edge of the field of view.

Perhaps the greatest enjoyment I derive from variable star observing is the consciousness that I am competing with many others in looking for novae and watching for possible variables among comparison stars.

V Sagittae puzzled me last summer and autumn, for it seemed to exhibit some unusual fluctuations. When I picked it up in July 1954 it was steady minimum at 13.0 mag in the early part of the month, but toward the end of the month it brightened to 11.8. It hovered around 11.8 the early part of August, and the end of the first week dropped back to about 13.0. Then I didn't follow it again until September. I made a long series of observations in September, October, and December. It seemed to exhibit short-time variations around 11.5 to 11.8. In November it brightened up to around 10.0. This brightening may have occurred at Julian date 5002 -- at 6:12 p.m. it was 11.0, and at 7:00 p.m. it was 10.4. After about 12 days it gradually dimmed to 11.5 to 11.8. In December it seemed to fluctuate between 11.0 and 12.0. My observations are simply indications and need corroboration. Will V Sge be as temperamental this summer?

## WHO WANTS TO FIND A NOVA? by George Diedrich

Once upon a time all the members of the AAVSO were variable star observers. But now there are other active and important sections to our AAVSO. Whether you are a solar observer, visual or photocell variable observer, moon observer, planet observer, or just an occasional "looker," the AAVSO would like to enlist your help in the important program of looking for the next (and any other) nova. As the saying goes among us, "There's just got to be one soon." The early discovery of a nova (before maximum -- way before maximum) has never been accomplished. So if you have the urge to do something unique astronomically, here is your chance: find a faint nova "on the way up."

"No nova" reports have their value, too. It is gratifying to report to the professionals, after a nova has been found, that on such and such a night before it was found it COULD NOT HAVE BEEN brighter than a certain magnitude because one of our observers checked his (or her) region that night to that magnitude. Then too, statistically, it will be interesting for someone in the future to take our records and see how much of the sky was being watched for what number of days in the year.

Three to five minutes will often suffice to get a good observation of your region to the 6th magnitude (with binoculars). To the 4th or 5th with the unaided eye it ought to take you one or two minutes at most to make sure everything is in its place. One other phase of observation must be mentioned -- mainly because it appears on our monthly report forms. That is the "DOME" observation. In this case you endeavor to scan the whole "dome" for novae. This isn't as hard as it sounds.

To watch for a nova you need three things: (1) an observer; (2) an atlas, or at least access to one for a few days; we find Webb's or Norton's quite all right, and of course, the AAVSO Atlas too; (3) Vision, good enough to see the stars, and vision to see the value of this program. Report forms and how to use them, instructions,etc., are being prepared. Area designations and numberings will be ready soon. If you are interested, write to me: George Diedrich, 653 Weller Road, Elyria, Ohio.

SECONDARY OBSERVATION OF A VARIABLE, by R. Newton Mayall

It is not customary to observe a variable by not looking at the variable; nor is it customary to observe variation in what might be called the secondary observation of the variable -- or should we call it the variable observation of an unobserved variable? It can be done. The variable is the sun, and the secondary variable observation is accomplished by looking at a sundial. The sun is a variable star in one sense of variable; also it varies in other ways that were noticed by ancient man. Knowledge of this variation led to one of the earliest scientific instruments known -- the sundial -- which has been developed and refined through the centuries. Today we have the more precise heliochronometers that tell standard time just as our watches do. The sundial still has a practical value in this world of precision watches and clocks. (Illustrated with slides showing some recent dials that tell standard time.)

ON OBSERVING FLARE STARS, by Gunnar O. Darsenius

Very few flare stars are known, and they are all dwarf Me stars, therefore it is supposed that more stars of the same type are flare stars. Since the list of dwarf Me stars was published in Variable Star Notes in the JRASC January-February 1953 issue, two more of them, BD +43° 4305 (EV Lac) and BD +19° 5116, have been found to be flare stars.

Kruger 60 is a close double star, component B being about two magnitudes fainter than A; B has been photographed in a flare as bright as component A. As a flare can have a duration of only some few minutes, the observing technique must be other than ordinary variable star observing. Instead of a short estimate, one must look almost continuously during a long time, as for instance 10-15 minutes, at least some nights every month. Observations should be continuous, or at least two or three estimates every minute.

It is obvious that the chance to catch a flare with a single observation in the ordinary observing programme is extremely small. I have added to my observing programme, one flare star (Kruger 60B) and another dwarf Me star (DO Cep) from the list of potential dwarf M flare stars in the Variable Star Notes named before. Ten or fifteen minutes of continuous watching a few nights every month makes an observing time of about an hour a month. There are several nights when one cannot observe so close a binary star as Kruger 60, due to bad air; instead one can observe a potential flare star. The same can be done in the time around full moon when many observers don't like variable star observing.

Flares of as little amplitude as $0.3^m$ will be difficult or impossible to establish definitely, at least when one has no red comparison star. Every experienced variable star observer knows the difficulty of comparing a red star with a white one. One must be particularly careful when observing a flare star or potential flare star. During my observations I have found variations after some seconds of about $0.3^m$, but a careful control reveals the variation to be the Purkinje effect. This effect can be best studied in N-type stars as U Cyg, RS Cyg, U Lyr, or S Aur, which are very difficult to observe visually, as they are very deep red.

Perhaps this work with flare stars will not give the same satisfaction as usual variable star observing, but instead it will give satisfaction in the sense of knowing that a pioneer contribution is being made. As these observations require little time, and are easy to insert in an ordinary observing programme, I recommend them to other observers.

AN ELECTRONIC IDEA, by Morgan A. Thomas



The idea is to suppress the effects of atmospheric disturbances causing bad seeing and to improve the stability of the telescopic image by electronic methods. In brief,the method consists of directing the image from the objective (or mirror) into a television camera, which is positioned at principal focus; multiplying this image electronically; introducing a time lag between successive resultant images; and finally recombining selected images in the circuit to form one apparently steady image.

When the original or "prime" image is divided into several identical images of equal brightness by electronics, no light is lost as would be the case if optical means were used. If a time lag is introduced in the circuit by means of mercury lines and/or quartz crystals, and each of the several images formed above is made to appear "late" by a few milliseconds, the image light has been, in fact, chopped. Now, if the higher and lower intensities are removed and the images of mean intensity are recombined in the circuit, amplified and relayed simultaneously to the monitor,a fairly steady yet bright image results. This should be of great value in planetary observations.

THE PREDICTED LIGHT CURVE OF R GEMINORUM, by Margaret W. Mayall

The elements of a long-period variable given in the catalogues, consisting of an epoch sometimes many years old,and the mean value of the period, are often not of sufficient accuracy for the spectroscopist. In order to plan his program, he needs to know, in addition, something of the width and steepness of the rise and fall of the light curve of the star he plans to observe. At the suggestion of Dr. Paul W. Merrill in the latter part of 1952, I prepared a set of predicted mean light curves for the years 1953 to 1957. The basic curves were taken from the mean light curve computed by Leon Campbell, the late Recorder of the AAVSO, based on visual observations made by the members of the American Association of Variable Star Observers.

The star R Geminorum seemed to be one of the most regular of the group until the minimum in the fall of 1954. That minimum was about one magnitude brighter than normal, and occurred about 30 days earlier than the predicted time. The variable then rose rapidly to a very broad maximum about 40 days too early. The current maximum of R Geminorum at Julian day 2435171 is number 100, counted from the first maximum observed by Pogson, December 22, 1854. The mean period over the 100 years of observations is 365, although a period of 370 days fits the recent observations somewhat better than the shorter period.

NORTH TO THE ECLIPSE, by Jay Kunze, Robert Kemper, and Adam Ott

(Reported) These three young men saw the eclipse of June 30, 1954, from Labrador. Their site was one of 17 set up by Father Heyden, only one of which had clear weather. However, clouds did not bother PEP, so most of the sites were successful. Kunze pointed out that light intensity was less than expected,and it was almost dark as night at all sites. Kemper explained the various instruments used, and Ott provided the eye appeal with kodachrome slides that vividly showed the rugged terrain at their site.

THE IGY AND THE AMATEUR, by Harry L. Bondy

The International Geophysical Year, 1957-58, is stipulated for the purpose of making a concerted study of solar and geophysical phenomena simultaneously throughout the world. The first IGY was in 1883, and again in 1932. The professional will be involved in meteorology, latitude and longitude, cosmic ray, magnetism, oceanography, ionosphere, rocket exploration, air envelope, solar activity, and other problems. However, the amateur can contribute in several fields such as latitude and longitude through occultation observation, aurorae, solar phenomena,and perhaps as radio hams recording reception. The Solar Division is planning to coordinate observations on an "around-the-clock" basis on certain selected days in order to study the evolution of active solar centers.

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Abstracts
Fall 1995

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