AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS

ABSTRACTS

OF

PAPERS

PRESENTED AT NANTUCKET MEETING

11 OCTOBER 1969

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AAVSO ABSTRACTS

Edited by R. Newton Mayall

The 58th Annual Meeting was held at the Maria Mitchell Observatory on Nantucket Island, Massachusetts at the kind invitation of its Director, Dr. Dorrit Hoffleit. Everything had been so well organized by Miss Hoffleit, that her delay in arriving, caused by fog, was no deterrent to our meeting, although we were sorry she could not be at our dinner. Her able assistants, Miss Nancy Gregg and Miss Janet Akyüz took good care of us. Miss Hoffleit arrived by boat Saturday night!

Many of our members arrived on Thursday, which was a beautiful day and night. The stars were out in all their glory as only Nantucket can produce.

Friday evening we enjoyed a talk by Dr. Walter R. Hampton, who told us of the activities at the Talcott Mountain Science Center, near Hartford, Connecticut, and of their cooperation with the surrounding towns' school systems. His talk was illustrated with color slides, showing the beautiful site, and the extent of the installation.

Saturday morning was given over to the business meeting, and the afternoon to the papers. In the evening, we enjoyed a wonderful dinner, with swordfish as the main course. Everyone was in a jovial mood. After dinner Janet Akyüz spoke briefly about the work of observatories in Turkey, and in particular about her own observatory at Ishmir. Following her talk Nancy Gregg set up the sound projector and showed us a film entitled "Eagle Has Landed - Flight of Apollo 11", which showed many pictures not shown on television.

Following the film Dick Davis got up, and with great oratory, extolled the 20 years service of our Director and presented her with a card designed and executed by Clint and Ellie Ford's daughter. On the back of the card were the signatures of all the members of the Council, with an admonition to get back to the office and start on the second 20 years. In addition, Dick conjured up a beautiful tripod for use with Margaret's Questar as a gift from the Association.

Sunday was a day for taking in the sea air and picture taking on this quaint Island off the coast of Massachusetts. In the early days it was a whaling center and the captain's walk on top of many houses attests to its former main industry. Today it is tourists, but at this time of year the Island is not crowded, most eating places have closed and it is just good fun to roam around. Even swim. And the fall color over the moors is delightful.

Several stayed over Monday, and Monday night was another clear sky. All in all the weather was perfect, with a little fog, sun, good surfing, and relatively warm. A good time was had by all.

The holes of the doughnuts for the longest distances travelled go to the Beardsley's, all the way from Deer Lakes, Newfoundland; the Adamses from Missouri; the Buckstaffs from Wisconsin; Gary Hampton from Florida and Walter Moore from Kentucky. To top them all, we might add Janet Akyüz from Turkey, for she extended her stay in the U.S. in order to attend our meeting, and left immediately afterwards to return home.

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RETIRING PRESIDENT'S ADDRESS 11 OCTOBER 1969
Frank J. DeKinder

Two years ago, you elected me President of this Association. I hope I have fulfilled the role satisfactorily. At least, I have acted to the best of my ability. In the name of my country (Canada) and in my own, I wish to thank you for the honor you have bestowed upon it and upon me.

Well do I know that the function of the president is largely honorary and that the real work of directing the activities of our Association is accomplished by our devoted and capable Director, Mrs. Margaret Mayall and her assistants. I take this opportunity to express to Mrs. Mayall, in the name of all our members, the praise and the thanks which she so richly deserves. Without her, our Association would probably not be what it is today.

I would like to address a word of praise and thanks to the other active and indefatigable permanent officers: our Secretary, Mr. Clinton Ford, and our Treasurer, Mr. Richard Davis. They, together with Mrs. Mayall and her husband Newton, perform all the really hard work in the A.A.V.S.O. and I cannot but hope that their association with our group in their present capacities will continue for many years to come.

The A.A.V.S.O. has a world-wide membership, but those usually attending its half-yearly meetings are from the North American continent. Our members come from as far away as Boston and Los Angeles. Miami and Tucson, Montreal and Victoria. We are all united by our common interest -- astronomy. It is only natural that people having the same avocation should want to discuss and further their hobby. There are all kinds of amateur associations. Some like culinary affairs, others sports, politics, postage stamps, etc. It seems to me our interest is of a somewhat higher order than the general liens that bind most people together. Our interest is of a wider scope. We are attracted by the stars of the Universe. We explore the nature of these far-off heavenly bodies and follow their behavior. We all know that the discovery of a new variable star or of a nova does not affect our lives or our day to day occupations. Yet, if our Sun were suddenly to double its output of heat and energy, all life on Earth would be wiped out. We can imagine what would happen to the inhabitants of some hapless planet if its sun were suddenly to explode into a brazier hundreds, yes thousands of times fiercer than its accustomed output. We have seen such things happen.

Modern astronomy probes far, far into the Infinite. The recent discovery of Quasars and Pulsars adds to the questions and enigmas of the Universe. With the present means at their disposal, professional astronomers probe bodies so far away that their light, travelling at the enormous speed we know, takes thousands of millions of years to reach us. And who knows what is behind them? Could it not be that at that distance one could find oneself at the outer edge of yet other universes as vast as the one known to us?

Quite evidently, our hobby is not of this world. When we see the "madding crowd's ignoble strife" all around us, we feel that mankind still has a very long way to travel before achieving worldwide peace and happiness. This summer, after our last meeting in Kentucky, I had occasion on my way home to visit several of our members in Ohio, Pennsylvania, New York and Ontario. Everywhere the same scene presented itself: a nice, quiet home, with a small (or not so small) observatory behind it, where my friends retire on clear and favorable nights to explore the stars and analyze their behavior. You come away from these places with the feeling that these are first class, worthwhile, law-abiding citizens, an honor to their community, giving the example of how not to participate in acerb arguments and contestations of which we have so much nowadays. While we are, the great majority among us, only amateurs in our field, we cannot help but feel that our activities lead to a higher way of life. We cannot expect everyone to develop a taste for the science of the heavens, but it seems inevitable to me that our example of peaceful and serious side-occupations cannot but have a beneficial influence upon our fellow citizens.

Therefore I am proud to belong to the A.A.V.S.O. and to have had the honor for the last two years to be its presiding officer. I wish godspeed and success to my friend and successor and long life to our beloved Association.

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MARCH 1970 ECLIPSE, by Cyrus F. Fernald

Mr.Fernald brought us up-to-date on plans for the eclipse in Florida on 7 March 1970. He informed us that the Elks would put on a dinner for us and the auditorium is being held for our use.

Also we wish to announce that this meeting will be our regular spring meeting instead of the usual date in May.

Notices and Reservation blanks will be mailed as soon as they are received from Perry Chamber of Commerce. We are supposed to make at least tentative room reservations (through the Chamber of Commerce) by December first.

OUR EXPANDING UNIVERSE, by Lewis J. Boss

The phenomenal success of Apollo 11, the lunar landing, the spectacular photographs of Mars by Mariners 6 and 7 while slightly over 2100 miles from that planet and the attendant publicity given these fantastic events has tended to obscure some other revolutionary achievement in the investigation of basic cosmological phenomena. These discoveries may perhaps, in the long run, outstrip in importance to galactic astronomy at least, the epic feats of the Apollo and Mariner spacecraft.

Reference is, of course, to recent experiments by astrophysicists and radio astronomers searching for confirmation of the original declaration by Dr. Edwin P. Hubble that other galaxies are receding from ours and are doing so at velocities which are greater the more distant the galaxy. This general regression forms the basis for widely different ideas as to the origin of the universe, such as the "big bang" cosmology and the steady state concept. The first of these suppositions holds that the universe was born some seven to ten billion years ago in a sudden and even violent explosion of matter which had previously existed in a superdense state, while the second theory declares that the universe has looked precisely the same throughout all time - past, present and future.

A rather vague hint that the universe might be expanding was given in a paper published in 1917 by Professor W. de Sitter in which he referred to the then only two year old General Theory of Relativity postulated by Albert Einstein. It was Einstein's conclusion that very massive stars, which were revolving rapidly, generated gravitational waves or radiation and that this energy form, traveling at the speed of light, would be propagated throughout space as the star's velocity increased. Over the years since then increasingly complex experiments have been made to test this theory and early this summer reports of what appear to be valid confirmatory results of two unrelated investigations were released.

Dr. Joseph Weber, of the University of Maryland, has been working on the detection of gravitational waves for a number of years and in a report to the American Physical Society this Spring produced some convincing physical evidence of gravitational radiation. The gravitational radiation detector Dr. Weber and his associates has a remarkable sensitivity that can register extremely minute stresses and strains caused by the detector's contact with the gravitational waves from remote space. To accomplish this it was necessary to adopt a means of separating the very low-energy gravity wave patterns from effects produced by much stronger terrestrial movements or by stray electromagnetic interference.

This delicate distinction was achieved by installing one observation station at College Park, Maryland, and a second, identical station at the Argonne National Laboratory near Chicago and almost 700 miles distant. At first, as anticipated, the recordings were random and at variance with each other. Finally for a few brief moments in December, 1968, the wave patterns snapped into synchronism and produced strikingly similar concurrent peaks. In the course of the next seven months more than 40 of these analogous movements have been recorded. Dr. Weber feels that the only possible explanation for these multiple coincidences is that his instruments have actually detected gravitational waves from far out in the galaxy.

The originating point in space has not yet been identified, but some massive object in the Milky Way is suspected. These preliminary results have led Dr. Weber to suggest that perhaps by constructing larger detectors more could be learned about pulsars and other fascinating mysteries of space. If pulsars are, as many astronomers believe, actually rapidly revolving neutron stars they would, according to Einstein, be generating the gravitational radiation that Weber believes he has recorded.

The second experiment was basically concerned with the cosmic radiation at microwave frequencies which apparently exists on a universal scale and envelops the earth from all directions. This radiation is fairly intense and can be picked up by radio telescopes and indeed probably accounts for some of the "snow" seen on television screens when distant stations are being received. It was called to the attention of scientists as early as 1937 by Janssen of the Bell Telephone Laboratory who thought that the source of this all-pervading radiation was in the earth's atmosphere. About four years ago workers at Bell accumulated evidence that this flood of electromagnetic radiation is very nearly isotropic; that is, its intensity is practically constant when measured in any direction and therefore could not possibly originate in our atmosphere or even in our galaxy. The characteristics of the wave forms do agree quite well, however, with those predicted by Dr. Robert H. Dicke of Princeton University who had suggested that it should be possible to detect the lingering radiation generated by the primeval fireball.

If, indeed, the birth of the universe did occur in some sort of primordial explosion billions of years ago, the Einstein theory says that the original radiation from such a primeval holocaust must have started out as tremendously energetic gamma rays. Several billion years later this radiation would have cooled to about -270^{o} Centigrade (3^{o} Kelvin) and continuing expansion of the fireball would have increased its radiation wavelength so that at the present time it should appear in the electromagnetic spectrum at about the location of today's microwave communication channels. This is just about where this extra-galactic radiation is presently found. Fortunately there is a "window" through which cosmic radiation can be detected and which allows wavelengths from one to about 20 centimeters to pass. Longer waves are washed out by radiation from our own galaxy and shorter ones are lost in atmospheric radiation.

We do know that the earth circles the sun at the average rate of 66,500 miles per hour and that our solar system revolves about a somewhat ill-defined core in the central part of the Milky Way (our galaxy) at a speed of nearly 481,000 miles per hour. It has also been calculated that the Milky Way rotates around a supercluster of some 2500 neighboring galaxies at the enormous velocity of 1,350,000 miles per hour. It is estimated that the sun and his family of planets will complete a single revolution about the axis of the Milky Way in a little over 200 million years. However, an appropriate frame of reference by which to measure the earth's pace through the universe as a whole has been lacking.

A radio astronomer at Stanford University, Dr. Edward K. Conklin, of the Radio Astronomy Laboratory, decided to make use of some newly developed electronic measuring devices in an attempt to find an answer. He was, of course, familiar with the work of Bell Laboratory scientists A.A. Penzias and R.W. Wilson who first detected the fireball radiation at around 7 centimeters as well as the discovery by R.H. Dicke, of Princeton University who found microwave radiation at 3.2 centimeters wavelength apparently reaching earth from galactic space. It seemed to Dr. Conklin that if some kind of celestial speedometer could be applied to these microwave signals they could be used to check our galactic velocity with respect to the rest of the universe and thus determine if it was consistent with the primeval big bang theory.

Two radio telescope antennas were set up facing in opposite directions at the University of California's White Mountain Research Station on a 12,500-ft. peak located in Yosemite National Park. Modified microwave receivers and recording equipment were connected to them.

For nearly a month these antennas probed deep into the farthest reaches of the cosmos, being reversed periodically to reduce the chance of any built-in electronic error in the equipment set-up. At the end of the 23-day observing period the slight variations in the wavelengths of the approaching radiation as compared to the receding radiation wavelengths were used by Dr. Conklin to calculate the earth's velocity with respect to the radiation suspected of being the remnant of the original fireball. This speed came out to be about 360,000 miles per hour. By combining all the other known movements of the earth, sun and Milky Way and the result added to Conklin's new universal velocity for the earth they appear to cancel out each other. Consequently the supercluster seems to be nearly stationary within the enormously larger framework of the universe - and this Dr. Conklin says is exactly how the supercluster should appear according to the big bang concept.

Heretofore much speculation has gone on about these galactic motions but valid measurements to tie them into the Einstein philosophy of gravitational waves and an expanding universe have not been available. Now, it appears that a logical foundation exists on which a sound concept of the origin of the universe can be built. For the present it is sufficient to say that the preponderance of the evidence available indicates that our universe had a violent and fiery birth.

UP-DATED REPORT ON NEW STANDARD CHARTS FOR LONG-PERIOD AND IRREGULAR VARIABLE STARS, by Clinton B. Ford

The chart-making projects previously reported in these Abstracts (May 1966; May and October 1967; June 1968) are continuing, and have been expanded to include new material. The mailing list for copies of these preliminary pencil-traced charts has increased to 22 observers with relatively large telescopes, some of them in foreign countries.

Tables I and II are self-explanatory and are in general supplementary to Tables I and II given in AAVSO Abstracts for June 1968. Most of the field star disc size revisions reported in the "Notes" columns have resulted from visual sky-checks made with the 18-inch reflector at Mt. Peltier (Wrightwood), California.

Table III contains new material, with sources indicated in the "Notes" column. In addition to the plates taken by Thomas A. Cragg with the Mt. Wilson 60-inch reflector, photographs of many of the Table III fields have been taken by Charles E. Scovil with the Stamford (Conn.) Observatory's 22-inch Gregory-Maksutov telescope. This instrument's camera is now equipped with a Schott GG-11 plate filter, to yield photovisual images comparable to those on the Mt. Wilson plates.

Efforts to program densitometric measurements of star images on both plate sets are continuing, with a view to obtaining accurate photovisual comparison star magnitude sequences. One of the Cragg plates, that for 224243 EV Lac, has been measured with a scanning spectrophotometer at Perkin-Elmer Corporation, through the courtesy of Mr. Ephraim Tobin of that firm's research department. Other less time-consuming methods and possibilities are being investigated.

Table IV indicates current progress on a new chart-making project undertaken in cooperation with Wayne M. Lowder, to produce standard-form preliminary charts for the many Mira-type and irregular variable star fields which Lowder has sketched, none of which are at present on AAVSO observing lists. Basic information for Lowder's sketches has come from a wide variety of sources in the variable star literature, including the Brun & Petit atlas of faint U-Geminorum variables published in the Russian Journal of Variable Stars (1957).

In addition to those listed in Table IV, fields for about 30 other Mira-type and irregular variables new to the AAVSO observing lists remain to be plotted from Lowder's data. Some of these fields will require confirming photographs by Scovil with the Stamford 22-inch.

Table V is self-explanatory. The continued cooperation of the Stamford (Conn.) Museum and Nature Center in furnishing plates and facilities for these chart programs, is again gratefully acknowledged.

See next page for Table I

TABLE I

REVISIONS AND ADDITIONS TO PENCIL-TRACED OLIVIER SEQUENCE FIELDS:--
COMPLETIONS, MAY 1968 - OCTOBER 1969

Design.	Name	New Chart Types	Photo By *	Sky Checks **	New Charts By #	Notes
012216	ST Psc	d	W	fin	F	Discs rev'd.
013300	SW Cet	b	W,S	fin	S	Discs rev'd.
013937	AR And	b,d	S	inc	S,F	Location of var corrected; discs rev'd; new tracing.
015505	TT Psc	d	W	inc	F	Discs rev'd.
023238a	UY And	b,d,e	W	fin	C,F	Discs rev'd.
034809	SW Eri	b,d	S	fin	S	Discs rev'd.
043322	VY Tau	d	W	fin	F	Discs rev'd.
044907	FG Ori	e	W	fin	F	Discs rev'd; 141 star is a variable?
045007	SX Eri	b,d	S	inc	S	More checks needed.
045715	GP Ori	d	W,S	inc	F	More checks needed.
051011	V341 Ori	d	W	fin	F	Discs rev'd.
051316	X Lep	e	W	inc	F	130 and 131 stars not in correct sequence?
052825	AD Tau	b,d	S	inc	S,F	123 star is a variable?
053800	GT Ori	b	S	fin	S	Discs rev'd.
053915	CP Tau	b,d	S	fin	S	Discs rev'd.
055610	DP Ori	d	W	fin	F	Discs rev'd.
065107	BG Mon	d,e	W	inc	F	Discs rev'd.
065510	BI Mon	e	W	inc	F	Discs rev'd.
070619	SY CMa	b,d	S	inc	S,F	127 and 122 stars are also variable?
073400	GK Mon	d,e	W	fin	F	Discs rev'd; faint stars added near variable.
073814	BE Gem	b,e	S	fin	S,F	Discs rev'd and added; location of BE Gem corrected.
075320	BP Gem	e	W,S	fin	F	Complete revision, from new Scovil photo.
081710	GG Hya	d	W	fin	F	Discs rev'd and added.
083013	UY Cnc	b,d	W	fin	L,F	Discs rev'd and added.
085202	WW Hya	d	W	fin	F	Discs rev'd and added.
085300	TU Hya	b,d,e	W	fin	C,F	New d traced; discs rev'd.
093320	ST Hya	b,d	S	fin	S,F	New tracing from Scovil photo.
094501	W Sex	b	S	fin	F	New tracing from Scovil photo.
111817	TZ Leo	d	W	inc	F	New chart; ltr. sequ. only.
124238	U CVn	d	HCO	inc	F	Est'd sequ. by Lowder; discs rev'd.
134000	WZ Vir	cd	S	fin	F	Ftr. sequ. needed; discs rev'd.
152703	WW Ser	b,d	W	fin	C,F	New b, from Cragg sketch.
155420	AH Ser	d,e	W,P	inc	F	New e, from Palomar Survey photo (Houston print); second variable plotted near AH Ser, denoted "-- Ser 155420b"; discs rev'd.
155502	BC Ser	d	W	fin	F	Discs rev'd; 131 star also a variable?
160710	DN Her	d,e	W,P	fin	F	New e, from Palomar print(Houston); additional sequence by Lowder.
162623	DO Her	d	W	fin	F	Discs rev'd.
165504	V855 Oph	d	W	fin	F	Discs rev'd.
171904	V759 Oph	e	W	fin	F	Discs rev'd.
175423	FU Her	d	W	fin	F	Addition of 175523 WY Her to chart; disc rev'ns; e chart in process.
182916	DS Her	d,e	W	fin	F	New e, expansion; final ck with 18", Mt. Peltier.
185316	EU Aql	e	W	fin	F	Discs rev'd.
190017a	V338 Aql	d,e	W	fin	F	Corrected; V338 = 110 star.
190017b	V807 Aql	d,e	W	fin	F	Corrected chart for V338 Aql; disc rev'ns.
192201	TU Aql	d	HCO	inc	F	Disc rev'ns; need new photo + e chart.
193408	EZ Aql	d,e	W	inc	F	More cks needed + f chart.
200706	TV Aql	d,e	HCO	fin	F	New e; disc rev'ns.
201209	RU Del	e	W	fin	F	Disc rev'ns.
201207	QZ Aql	d,e	W	fin	F	New e; disc rev'ns.
202512	RX Del	e	W	fin	F	Disc rev'ns.

202509	RY Del	e	W	fin	F	Corrected pos'n for RY Del; disc rev'ns.
202611	RZ Del	e	W	fin	F	New Chart; disc rev'ns.
203513	SS Del	d,e	W	fin	F	Disc rev'ns.
204104	BR Del	e	W	fin	F	Disc rev'ns.
210408	Z Equ	d	W	inc	F	Need new photo, more cks.
214306	EV Peg	d	W	fin	F	Disc rev'ns.
215247a	LX Cyg	b,e	HCO,S	fin	F	New vars. GY Cyg + FG Cyg added to b; disc rev'ns.
215247b	LY Cyg	b,e	HCO,S	fin	F	ditto.
215445	MP Cyg	b,e	HCO,S	fin	F	Discs rev'd and added.
215545	MS Cyg	b,e	HCO,S	fin	F	Ditto, from new Scovil photo.
215813	DG Peg	d	W	inc	F	Discs added; location of var. not confirmed due to comes.
223809	CSV5598 Peg	d	W	fin	F	Discs rev'd; var. is a const.?
233109	FF Peg	d	W	inc	F	Sequ. in error, need new photo; discs rev'd.
234315	DL Peg	d	W	inc	F	Ditto FF Peg; sequ. values are all too faint.

* W = J.L. Woods (Baltimore, Md.)
S = C.E. Scovil (Stamford Obs'y)
HCO = Harvard Obs'y
P = Palomar Survey

\# C = T.A. Cragg (Mt. Wilson)
F = C.B. Ford (Wilton, Conn.)
L = D. Lucas (Elyria, Ohio)
S = C.E. Scovil (Stamford Obs'y)

** fin = sky checks completed
inc = further sky checks needed

TABLE II

REVISIONS AND/OR EXPANSIONS OF EXISTING AAVSO CHARTS:--
COMPLETIONS, MAY 1968 - OCTOBER 1969

Design.	Name	New Chart Types	Orig'l Chart & Source *	Notes re New Charts
010621	X Psc	e	C	Final ck w/ 18", Mt. Peltier.
012350	RZ Per	e	d;A	Expansion, disc rev'n.
053920	Y Tau	c	C	New chart, from Scovil photo.
063100	CW Mon	b	AE	New chart, J. Thomas.
081617	V Cnc	f	e;A	Expansion, disc rev'n.
081935	X Lyn	d	c;A	New d, expansion, from Scovil photo; disc rev'ns.
135829	RZ Boo	b	H	Re-Trace, disc rev'ns.
164025	AH Her	e	d;C	Expansion, ck w/18", Mt. Peltier.
172809	RU Oph	e	d;A	Expansion, disc rev'n.
181141	V533 Her (N 1963)	f	d;A	New Chart, from Palomar print(Houston); disc rev'd; ltr sequ. near variable.
181103	RY Oph	e	d;A	Expansion, disc rev'ns.
183225	RZ Her	e,f	d;A	New charts, correcting position of var.; disc rev'ns.
184137	AY Lyr	e	d;A	Expansion; disc rev'ns.
184243	RW Lyr	e	d;A	Ditto.
185634	Z Lyr	f	e,A	Ditto.
185737	RT Lyr	f	e;A	Ditto.
192928	TY Cyg	f	e;A	Ditto.
193411	SV Aql	e	d;A (RT Aql)	Expansion; Cragg sequ. added for SV.
194326	Nv Vul 1968	b,d	S	New b and d, from Scovil photos + Stokes PEP sequence; need ftr sequ.
204846	RZ Cyg	e	d;A	Expansion; disc rev'ns.
220133b	RZ Peg	d,e	d;A	Ditto.
220912	RU Peg	e	d;A	Ditto.
221255	CP Lac	e	d;A	Ditto.
222924	SS Peg	d	c;C	Ditto.
231539	RY And	e	d;A	Ditto.

* A = AAVSO
AE = Atlas Eclipticalis (Becvar)
C = T.A. Cragg (Mt. Wilson)

* H = Hagen A.S.V.
S = C.E. Scovil (Stamford Obs'y)

TABLE III
NEW PENCIL-TRACED CHARTS WITH INCOMPLETE SEQUENCES, FROM MT. WILSON PLATES (T.A.CRAGG):--
COMPLETIONS, MAY 1968 - OCTOBER 1969

Design.	Name	New Chart Types	Star Period or Type	Notes re New Charts
000612	HV8002 Cet	b,d	UG(?)	Rev'd b from orig'l by Bornhurst; new d from Scovil & Cragg photos + Palomar print (Houston); ltr. sequ. near var.
005427	W Psc	d	189^d	Ltr. sequ. added.
010359a	HT Cas	c,f	UG(?)	Partial sequ. added; ltrs. near HT.
011638	TX And	d	233^d	Sequ. added from Lowder data (Martinov, 1951): var. position corrected, subject to confirmation.
011724	TZ Psc	d	?	Ltr. sequence added, near var.
012031	TY Psc	d	UG	Ditto.
012746	SX And	d	335^d	Partial sequ. added (Saladzius); ltr. sequ. near var.
040150	FO Per	c,f	11^d(?)	Ltr. sequ. added; FR Per added.
065209	EQ Mon	e	UG(?)	Location of variable unconfirmed; B&P Atlas disagrees w/ Mt. Wilson.
071628	AW Gem	f	UG	Identification uncertain; Darsenius sequ.; discs rev'd; further checks needed.
080428	YZ Cnc	d+	UG(?)	Rev'd chart, from new Scovil photo.
083126	AA Cnc	e	UG	From Scovil print of Cragg plate; sequ. partially complete.
092421	TU Leo	d	UG	Ditto.
113303	T Leo	e	UG	New chart; ltr. sequence only.
114003	TW Vir	d,e	UG	New plots from Palomar Surv. photos (Houston prints); location of var. corrected and confirmed.
124728	EX Hya	d,f	UG	From B&P Atlas + Cragg sketch; more sequ. data needed, visual.
143922	UZ Boo	d,f	UG	Ditto. Photo also by Herbig.
144339	RR Boo	c	194^d	Re-trace of Cragg sketch, from Hagen; disc rev'ns.
180514	UZ Ser	cd,d,e	UG	New charts; orig'l data from Herbig + Cragg sketches + B&P Atlas; disc rev'ns.
183138	LL Lyr	e	UG	Disc rev'ns; need ftr. sequence.
183423	V348 Sgr	f,g	?	New chart, expansion from Cragg photos; disc rev'ns.
184826	CY Lyr	b,e	UG	New b, J. Thomas; further disc rev'ns on e; ftr. sequence needed.
185036	SU Lyr	d,e	UG(?)	New charts; ltr. sequ. near var.
192121	WW Vul	d	RCB	New chart from Scovil photo; Cragg + Darsenius sequence.
195032	EY Cyg	d,f	UG(?)	New charts; Darsenius + J. Thomas sequ.; ident'n of var. unconfirmed.
195816	RZ Sge	e,f	UG	New charts; ltr. sequ. only; ident'n of RZ Sge not confirmed.
200473	AQ Dra	d	RW	Expansion + rev'n, from new Scovil photo.
200525	W Vul	c	234^d	New chart, from Scovil photo; Cragg + Darsenius sequence.
200647	SV Cyg	c	Irr.	From AAVSO b for 201647 U Cyg; Hagen sequence.
212503	VZ Aqr	cd,e	UG	New charts, based on Lowder sketch + B&P Atlas; ident'n of VZ Aqr still uncertain.
225859	UV Cas	cd	RCB	From Cragg sketch and sequence.

See next page for TABLE IV

TABLE IV

NEW PENCIL-TRACED STANDARD CHARTS MADE FROM DATA RESEARCHED
BY WAYNE M. LOWDER:-- COMPLETIONS AS OF OCTOBER 1, 1969

Design.	Name	New Chart Types	Basic Data *	Sky Checks **	Charts By #	Notes
114749	BC UMa	d	Sk	inc	F	Revision of sketch; discs added; sequ. partial, Lowder
123366	RV Dra	cd	HA;Sk	inc	F	HA sequ. + Lowder est's; more checks needed.
160825	VV Her	d	Sk,d:A (RU Her)	inc	F	Ditto.
165722	SY Her	c	H	fin	L	New chart, Lowder.
165912	UX Oph	d	H;Sk	fin	F	Ditto SC UMa.
170217	VY Her	d	HA;Sk	fin	F	Revised, checked w/ 18", Mt. Peltier.
175718	WZ Her	d	H;Sk	fin	F	Ditto.
183922	AE Her	d	HA;Sk	fin	F	Disc rev'ns; also shows 183923a DW Her.
190527	TY Lyr	d	H;Sk	inc	F	HA sequ. + Lowder est's; needs more cks.
190627a	UV Lyr	d	H;Sk	inc	F	Ditto.
190627b	FK Lyr	d	H;Sk	inc	F	Ditto.
190728	UW Lyr	d	H;Sk	inc	F	Ditto.
191517	W Sge	c,d	H;Sk	inc	F	d needs more checks; also shows 191717 T Sge.
192914	KX Aql	cd,de	BP;Sk	inc	F	Location of KX Aql not confirmed.
210558	UY Cep	d	R;Sk	inc	F	Disc rev'ns; Lowder est'd sequence in part; need more checks.
215548	FG Cyg	d	HA;Sk	inc	F	Ditto.
215848	GY Cyg	d	HA;Sk	inc	F	Ditto.
215648	CSV5499 Cyg	d	HA; Sk	inc	F	Ditto; also new photo needed.

* A = AAVSO
BP = Brun & Petit Atlas
H = Hagen. A.S.V.
HA = Harvard Obs'y Annals
R = Russian source
Sk = Sketch by Lowder

** (See Table I)

\# F = C.B. Ford
L = W.M. Lowder

TABLE V

NEW PENCIL-TRACED STANDARD CHARTS MADE FROM SOURCE DATA NOT INCLUDED
IN TABLES I THRU IV:-- COMPLETIONS, MAY 1968 - OCTOBER 1969

Design.	Name	New Chart Types	Sky Checks **	New Charts By #	Notes
034307	BR Eri	b	inc	F	Orig. sketch & sequence from Vattuone. Scovil photo made; rev'ns in process.
042625	UZ Tau	f	inc	F	Orig. chart, Herbig; ident'n of var. uncertain; Palomar Survey photo.
050130	RW Aur	d,e	fin	F	Orig. photo, Herbig; disc rev'ns.
050405	SY Eri	b	inc	F	Ditto BR Eri.
164025	AH Her	b	fin	JT	New b, from Atlas Eclipticalis.

** (See Table I)

\# F = C.B. Ford
JT = J. Thomas

A FEW LIGHT CURVES, By Margaret W. Mayall

We had on exhibit some of our large blueprint light curves of a miscellaneous group of variables. One of particular interest was of 180222 VX Sgr, done on computers for us by Barbara Welther of the Smithsonian Astrophysical Observatory. The long strip was cut and pasted together for publication in the Review of Popular Astronomy.

SOLAR DISTURBANCES AND POWER FAILURE IN WESTERN NEWFOUNDLAND, By Margaret Beardsley

One never knows where the AAVSO observing program will lead. Certainly, when we moved to Newfoundland-Labrador a few years ago, I never expected to find myself observing sunspots to help my husband in the Power business.

Bowater Power System covers a big part of central and Western Newfoundland. During the past eleven years they have experienced 16 unexplained outages on their system. The fact that strong displays of Northern Lights have been observed along with these outages has led them to believe that solar magnetic activity has a definite effect on power systems. Other power companies have come to the same conclusion, but so far there has been no complete documentation and no correlation of records.

In the fall of '68 I started watching the sun with my 3'' refractor, hoping to find some relation between sunspots and trouble on the line. On 31 October a suspicious spot group gave a warning of trouble. Within 36 hours there was disturbance on the system; and the frequency converter at Corner Brook tripped off twice within one hour. Checking with COTC it was found that there was a burn out of three carbon blocks on physical circuits in the same area. Also there was considerable and recurring ground current in the area.

During February and March of this year we were under a heavy cloud cover, so the magnetic storm of 23 March took us completely by surprise. Then there was a black out through all of the Atlantic Provinces. Bowater suffered a major disturbance on its system, and half of the big paper mill was shut down. (Wisconsin Electric had no disturbances on these dates.)

This all brought to light an interesting three part problem -- an inter-disciplinary problem:

1. (Astronomy). There was a need for solar geophysical activity predictions -- dependable predictions.

2. Engineers must learn how to build or protect power circuits -- or at least decide what steps to take when warned.

3. There is a need for Geophysicists to give a better analysis of geomagnetic and telluric field variations, because it is the rapid magnetic variations and their relation to telluric fields that concern power companies. Specifically, we want to know why our area in West Newfoundland is so vulnerable.

Of the three disciplines, I must say astronomy came forth nobly. In his book OUR SUN, Dr. Menzel said, "We are dreaming a dream in which solar research will play a practical role". So I called him by phone to see how the dream was coming along; and posing our problem. He put us in touch with ESSA, Boulder, Colorado, and within 24 hours Bowater started to receive daily forecasts from the Space Disturbance Center. These forecasts give the Fredericksburg index (an empirical number derived from all geomagnetic forecasts, observed solar activity and data from satellites), solar radio noise flux, sunspot number, and flare probability.

This forecast is of tremendous value to our whole area. Engineers are able to anticipate and reduce somewhat the disturbances on the system.

Newfoundland has a great fault running from Green Bay down through Grand Lake (very deep, below sea level) to Bay Saint George. The question that interests me is this: Why should this area be more vulnerable than other areas in Canada, United States, and in Newfoundland? Is it because we are farther north? Could it concern the fault? Are the ground currents influenced by geological conditions? These questions are for the geophysicists to answer. So far most of the research on telluric field variations is very theoretical and not published for the public.

Interconnections of power grids in North America are increasing. Will these large grids be more vulnerable to blackouts from solar activity? Obviously there is a need for more integrated research.

It is reassuring to me -- having started 25 years ago -- to find that all of the collected data from AAVSO and others can come back in such a helpful way.

VARIABLE STAR WORK IN SAGITTARIUS, By Nancy J. Gregg

The variable stars in the Sagittarius Region are of particular interest. There is a great similarity between variable stars, Nantucket weather, and work at the Maria Mitchell Observatory. All have peaks of maxima such as when a variable star is at maximum brightness, the weather is crystal clear and the period you are calculating looks promising. But, on the other hand, there are the low points of minima when the variable star is at minimum brightness, the weather is cloudy, foggy or hazy, and the period you thought looked so promising turns out to be spurious and you begin to wonder if you were imagining that the star varied at all.

I began the summer by estimating the magnitudes of D.H. variables 222, 223, 324, 324(a) in Sagittarius, from Harvard and Nantucket plates. From these observations I attempted to find a period for each. Var 222 appears to be irregular, Var 223, a possible eclipsing variable though without enough data for a period determination. Var 324(a) is a suspected W Ursa Majoris star. Its magnitude varies only 0.5 magnitude. I am still working with Var 324. It appears to be an eclipsing variable, but as yet I have not been able to determine its period.

Using the positive-negative method for finding variable stars, I searched one of the Nantucket plates I had taken earlier. Although I didn't discover any new variables, I did rediscover Saturn; two asteroids: Edburga and Harmonia; and several variable stars: DH Var 270(a), V915 Sgr, AX Sgr and V348 Sgr.

The rediscovery of V348 Sgr was of particular interest. The peculiar irregular variable V348 Sgr (Ref. 1) was examined by Mrs. Jean Hales Anderson (Ref. 2) at the Harvard Observatory on over 500 patrol plates between JD 2415000 and 35000. It has now been examined on over 450 Nantucket plates. These magnitude estimates confirm earlier observations that the star V348 Sgr is irregular.

References: (1) Herbig, G.H., Astrophys. J. Vol. 127, No. 2, 1958.
(2) Hoffleit, D., Astr. J. 63, No. 2, p.78, 1958.

TROUBLESOME SMALL RANGE VARIABLES, By Joann Lawless

I spent the summer of 1969 at the Maria Mitchell Observatory trying to find a period for two troublesome variables, #326 and 424 in Sagittarius.

#326 has a magnitude range of about 14.0 to 14.8. Most observations, however, are near maximum, 14.3 or 14.4; a large scatter complicated attempts to find a period. It is probably an eclipsing variable.

My estimates disagreed with those of two previous observers, who found a larger range of variability. Reestimates of the comparison stars using nearby sequence VII indicated that c and d varied, but both were probably due on closer investigation to poor plates and did not vary enough to affect the estimates of 326. The intervals between b and c and d, however, were found to be unequal.

A frequency distribution curve of magnitudes was used to determine the probable light curve of the star, in a method devised by Dr. Öpik and Dr. Hoffleit at Harvard. (See Harvard College Observatory Circular 393, "Some Statistical Aspects of the Study of Variable Stars.") Its magnitude distribution was most similar to a beta Lyrae type star, an eclipsing variable with a continuous change. Beta Persei with large error-dispersion was a lot similar.

The initial period of approximately 36 days was first revised to 9 days, to bring the minima together. 3.03 days is the best approximation I obtained, though the magnitude scatter of 0.5 is almost as great as its amplitude.

In working with reciprocal periods for #424, two possible values, neither entirely satisfactory, were found. 1.7292 works well only for some plate runs, other nearby values being more satisfactory for others. Accordingly, a straight line correction for a changing period was tried unsuccessfully.

Using the formula for spurious periods, $1/P = m/P_0 \pm n/P_1$, or, more simply, $1/P_0 \pm n = 1/P$, a reciprocal period of 2.7713 was found, requiring a correction of n^2k to bring the maxima together. More work needs to be done to reconcile these two values.

Two other variables, 463 and 464, were investigated. #464 seems to vary on Harvard A plates from a2 (14.1) to at least c1 (15.0) and possibly c6 or c7 (15.3). Estimates on B and MF plates proved impossible because of the blurring effect of a double companion on the right. Attempts to discover a pattern of coordinated variability between the variable and the double companion, using additional plates of this cluster area, proved unsuccessful. Like #326, #463 was found to have a small range and large scatter.

Addendum by D. Hoffleit to Joann Lawless' Paper

The provisional reciprocal periods determined by Miss Lawless for Var 424 ($18^h23^m58^s$ $-25^\circ38'$) are, as she stated, promising but not satisfactory. I have re-examined the data and find they are much better represented by the constant reciprocal period of 1.76857. The relationships between the accepted and the provisional reciprocal periods are of interest:

2.7713 = 1.76857 + 1.00274, showing the spurious period effects of the sidereal day interval between observations.

The other spurious period shows primarily the effect of the lunar reciprocal period (1/L = 1/29.53059 = 0.03386), but also the effect of seasonal gaps in the observations (1/Y = 1/365.24 = 0.00274). Thus

$$1.7292 = \frac{1}{P} - \frac{1}{L} - \frac{2}{Y} = 1.76857 - 0.03386 - 0.00548$$

The final period predicts maxima according to the relation Max = JD 2433858.392 + 0.565429n

SR VARIABLE WITH PERIOD OF 186 DAYS, By Ethel Richardson

During the summer of 1969 I worked at the Maria Mitchell Observatory on Nantucket.

During this time I was successful in determining the period of DH Variable 257 ($18^h15^m09^s$ $-23^\circ8'.4$) in Sagittarius. This star appears to be a semi-regular variable with a period of 186 days. Successive portions of the light curve vary in shape and amplitude. Two of the observed maxima are brighter than expected. Other maxima seem unusually faint. Hence there is some suggestion of a beat frequency phenomenon in this star. More observations will be needed to confirm this hypothesis.

Although unable to find its period, I suspect one of the stars I had been using as a standard comparison star is in fact a low amplitude variable.

TWELVE POSSIBLE PERIODS FOR AN ALGOL STAR, By Jan White

Using the positive-negative method for finding variable stars between two plates in the Coma Berenices region, I discovered, among others, a new variable of about 15 to 16th magnitude which became Coma variable 17 in Dr. Hoffleit's catalogue of variables discovered in this region. I became interested in this particular star and decided to attempt to find a period for it. I picked four comparison stars and tried to estimate the magnitude of Var 17 relative to those on the 50 NA plates available on the region. Only 39 were good enough to show the magnitude of this star.

From these 39 different observations (covering about 2,000 days) I graphed magnitude vs time (in Julian Days) and saw indications of a 12^d period and definite evidence of an Algol type eclipsing star. The best way to show a period for a variable star is to take the reciprocal of the suspected period (in this case 12^d) and multiply this by all the Julian Days, then graph the decimal part of this product on a scale from zero to one. This superimposes the phases of the star and enables one to juggle figures to bring the maxima or (in this case) minima together.

Although the two minima which I had to work with are really too few for accurate results, the graph of the 12^d period with the minima brought together showed gaps which could indicate a period which was a submultiple of 12. Therefore I next tried a 6^d period, which was good, as were 4^d and 2^d. The trials of 3^d and 1^d were negative. I decided to work further on the three promising periods -- 6^d, 4^d, 2^d, using the spurious period formulae for the daily and monthly spurious period effects. These formulae are of the form:

$$1/P^o \pm n = 1/P \quad (n = 1.002739,\ 2.0054758,\ \ldots)$$

for the daily spurious period (where P^o is one period that apparently satisfied the observations and P is another possible period) and:

$$1/P^o \pm n/29 = 1/P \quad (n = 0.033863,\ 0.067726,\ \ldots)$$

for the monthly spurious period effect. For periods of less than 30^d these are the most likely sources of error and any period must be checked to see if it is spurious or not.

I used the 1 and 2 day, and the 1 and 2 month formulae, which cover the best possibilities for this star. I tried several other periods, none of which worked.

This gives a wide range of possible periods for the star from about $0^d.5439$ to $7^d.4879$. With so few observations to go on it is impossible to accurately choose the real period so we are stuck with 12 possibilities until we get some more plates. These are all about equally good, with the 2^d and 4^d slightly better looking than the 6^d ones.

What we need for Var 17 are some more plates showing minima. Even one or two more good minima would probably clear out all the excess periods and reveal the true one.

Other results of my Coma study were the rediscovery of Coma Variable 10, which Dr. Hoffleit had found earlier in March, and the discovery of Variables 16 and 18. I measured Var 10 but it was below the plate limit on all but 11 plates which is too few for period determination of this star. I confirmed variability and checked it in the Variable Star Catalogue and believe it to be AB Comae, suspected of being a U Geminorum star.

Earlier in the summer I worked on three variables in Sagittarius -- DH Variables 428, 396, and 330. I measured them on A, B, and some MF plates. On all these stars I confirmed variability but they were faint and close to the plate limit. They are probably all semiregular variables so no period can be found.

I spent some time continuing the work Linda Deery began last summer on DH Variable 416. She found period of $0^d.5782736$ with a base period JD_0 23,500 and correction constant $K^2 = 4.5\times10^{-10}$. In my initial investigation I applied spurious period corrections but kept finding that her period worked best. Then

I found a period of $0^d.5782626$ with JD_o = 29,000 and $K^2 = 3.25\times10^{-8}$ which was about as good as Linda's but no better.

Addendum by D. Hoffleit to Janice White's Paper

I have re-examined the data obtained by Joyce Pascoe (1964) and Linda Deery (1968) for Var 416 ($18^h18^m 34^s$ $-24^\circ55'.8$) and the provisional periods that looked promising but were not altogether successful. Phases had been computed by the formula

$$\text{Epoch} + \text{Phase} = (JD/P) + k(JD - JD_o)^2$$

Previous results for 1/P, k, and JD_o were

	1/P	k	JD_o
Pascoe	1.72985	—	—
Deery	1.729285	4.5×10^{-10}	23500
White	1.729318	3.25×10^{-8}	29000

None of these is successful in representing all of the best observations.

The following parameters do satisfy the observations,

Hoffleit	1.729305	2×10^{-9}	28000

This corresponds to

$$\text{Max} = 28022.400 + 0.5782669E + 0.4\times10^{-9}E^2$$

RR LYRAE TYPE VARIABLES WITH TWO PERIODS, By Janet Akyüz

If one likes to solve puzzles, one of the best educational and scientifically rewarding puzzles is the determination of a period of a variable star. One such puzzle -- the determination of a period for Variable DH 390 at $18^h26^m54^s$ and $-25^\circ15'.8$(1900) -- was most interesting.

The brightness of this star was first estimated with nearby comparison stars, on the Harvard Plates ranging in Julian Days from J.D. 2423948 to 2433858 (1924 to 1951) and on the Nantucket Plates ranging from J.D. 2437824 to 2440417 (1962 to 1969). The brightness ranged from 14.0 to 15.7 magnitude. The variable is located near a bright star and has a fainter companion. These facts have an adverse affect on the variable star because on some of the Nantucket plates, where the plate limit is brighter than on the Harvard plates, the halo of the image of the bright star takes in the image of the variable, and in most cases the image of the variable is blended with the image of the fainter companion. This causes the variable star to appear brighter on the Nantucket plates than on the Harvard plates, (Fig. 3).

The variation of brightness of the variable on the plates taken on the same day gave a clue that the variable had a short period of less than one day. Numerous periods were tried, none of which gave a satisfactory light curve to fit all the observations. At this point all the Harvard plates and the Nantucket plates were re-examined and the brightness of the variable was re-estimated both with an eye-piece and under a Bausch & Lomb binocular zoom-microscope. Only the plates with good images were taken into consideration. When the reciprocal period of 1.870 was applied to all the good observations, a promising RR Lyrae type light curve was obtained, but the phases of the maxima for early and late Julian Dates did not coincide. When further corrections were made on P^{-1} = 1.870 by graphing the phases of maxima against Julian Days, the reciprocal period of 1.869755 was obtained. This P^{-1} of 1.869755 satisfied all the observations from J.D. 2423948 to 2433858 (1924 to 1951), with maxima at phases as shown in Table I.

TABLE I
Observed Maxima on Harvard Plates

J.D.2400000+	Phase
26564.347	0.820
28022.292	0.821
29520.355	0.831
30168.536	0.771
31638.315	0.898
32293.519	0.968
33836.398	0.774
33858.326	0.774

TABLE II
Observed Maxima on Nantucket Plates

J.D.2400000+	Phase
37824.756	0.027
38612.639	0.175
39272.737	0.397
40000 +	0.25 - 0.50

These observations gave a good RR Lyrae, subclass b type light curve; but it did not satisfy observations between J.D.2437824 and 2440417 on Nantucket plates (in that there was a shift of phases), (Table II).

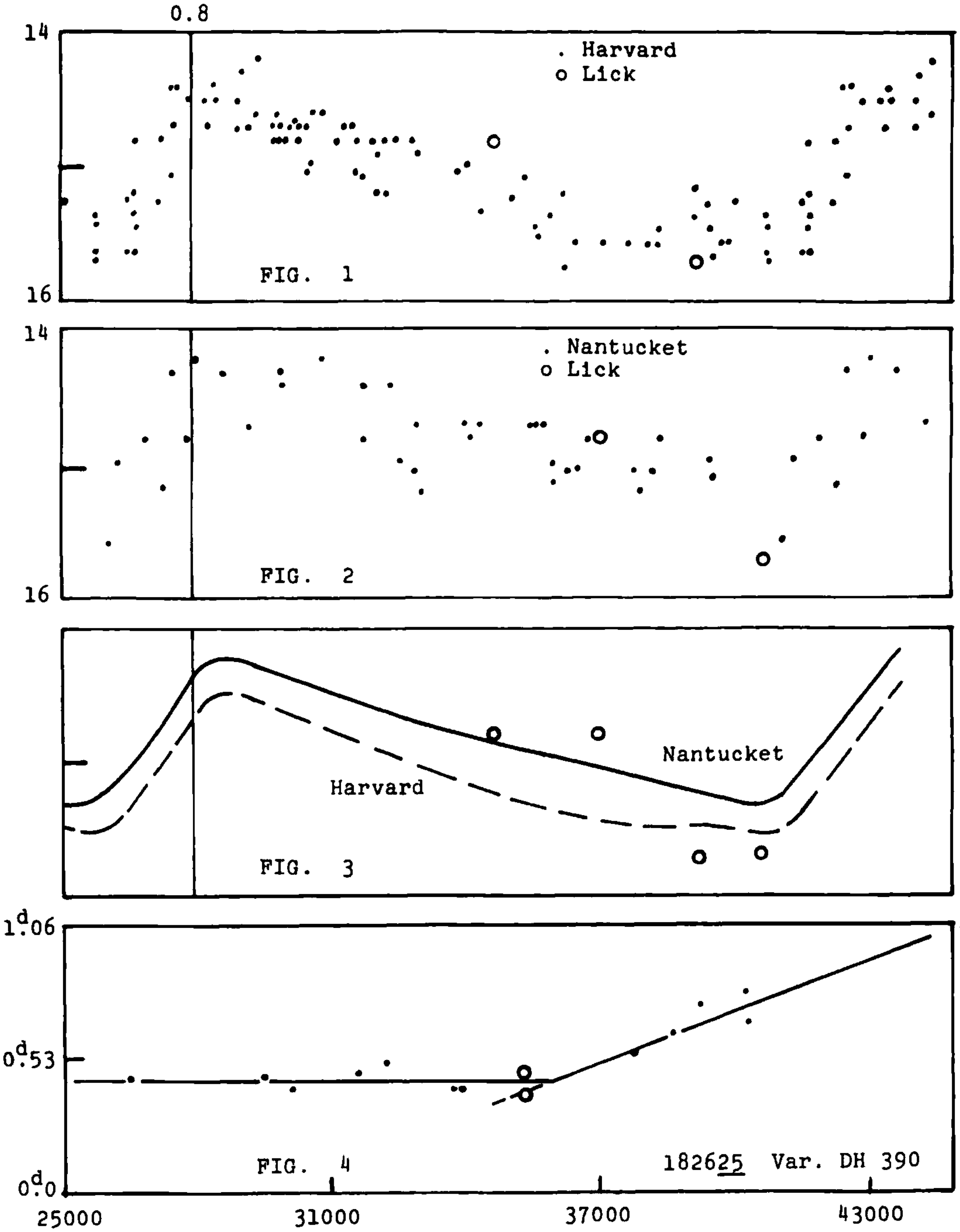


FIG. 1
FIG. 2
FIG. 3
FIG. 4

Again phases at maxima were plotted against Julian Days for p^{-1} of 1.869755. An attempt was made to fit the phases of maxima to a parabola, which would then have indicated a secularly varying period, according to the formula:

$$\phi = JD(p^{-1}) - [JD_o(p^{-1}) - n - (k^2 n^2 p^{-1})]$$

where

ϕ = phase
JD = Julian day of observation
p^{-1} = reciprocal period of the base period
JD_o = JD of the horizontal tangent of the deviation curve
n = number of cycles from JD_o
k^2 = correction constant

But no satisfactory solution of this type was found.

Further investigations on the plot of phase of maxima against Julian Days for p^{-1} of 1.869755 showed that the phases of maxima from J.D. 2423948 to 2433858 (1924 to 1951) fitted a straight line with a zero slope, suggesting a constant period; and the phases of maxima from J.D. 2437824 to 2440417 (1962 to 1969) fitted another straight line with a slope of 0.571, cutting the previous line at about 2435800 Julian Days (about 1956) (Fig. 4), suggesting another, different constant period in operation for these observations. This new reciprocal period is found to be 1.869616 and is related to the first reciprocal period 1.869755 by a relation:

$$p'^{-1} = p^{-1} - \delta$$

where

p'^{-1} = second reciprocal period

p^{-1} = first reciprocal period

δ = 0.000139

This proves that this variable operated with a reciprocal period of 1.869755 from 1924 to 1951, and sometime between the years of 1951 to 1962 an evolutionary change in the structure of the star must have taken place which has lengthened its period and since then the star is operating with a reciprocal period of 1.869616.

Since there were no observations available between 1951 to 1962, it is not possible to tell exactly when the change in the period occurred. According to the graph of phase of maxima against Julian Days, it took place about 1955-56. It just happens that the Lick Observatory Atlas contains two charts showing this variable, one on July 5, 1954, where the star appears to be of 14.8 magnitude and the other on July 13, 1955 where it is of magnitude 15.7. Although these two observations fit both of the reciprocal periods, they fit the second reciprocal period of 1.869616 better (Fig. 1 and 2), confirming the occurrence of the change of the period around 1955.

A similar case was reported by Prager (Harvard College Observatory, Bulletin 911, August 1939) on Z Canum Venaticorum. He reported that using Harvard maxima, the maxima of Blazko, Jordan, Florja and Soloviev he got two constant periods of $0^d.6538236$ and $0^d.6539052$ respectively operating on the star with a change occurring possibly around 1922-23.

Thus, the solution to my puzzle is that Variable DH 390 is an RR Lyrae, subclass b type variable with a period of $0^d.534829$ that operates from 1924 to 1951 and with a period of $0^d.534869$ from 1962 to 1969.

OF PERSONS AND PLACES, By Robert M. Adams

By means of color slides, Mr. Adams showed many interesting shots of places and members. Among them were Leslie Peltier in his revolving observatory; Tom Cragg relaxing in front of the 100 inch reflector; Cy Fernald and his 10-inch reflector; Clint Ford, at our Long Beach, California meeting; Walter Haas at a League meeting; and Bob Cox and Carolyn Hurless looking at Peltier's 12-inch refractor. (ED)

AN A-FRAME OBSERVATORY, By Walter R. Hampton

To permit maximum use of limited observing time, a permanent shelter for my 6" telescope became necessary. An A-Frame was selected initially because of appearance and ease of construction, but use has proved it to be an ideal design for an observatory, combining some of the advantages of a dome and a sliding roof.

The telescope rests on a cinder block concrete foundation, separate from the 8' x 8' wooden floor. The structure is 7' high in the center, allowing adequate headroom when closed. The side walls are hinged 1/3 from the ground, and each one can be lowered independently to any degree, depending on wind and lighting conditions. When open, the inner aspect of the walls provides an expansive working surface for charts and equipment. The sharply tapering nature of the "A" shaped ends obscures a negligible portion of the north west and south eastern sky. The main observing desk at the north west wall is provided with electrical outlets, red-safety light, and an intercom to the house. A shelf, one foot above the floor along the north wall serves as an equipment bay, where a 2.4" refractor is kept. The main instrument is a 6" Criterion reflector, but this is soon to be replaced by a new RV-8, 8" Dynascope.

The siding is 1/4" exterior ply, amply protected inside and out by several layers of paint. The peak is sealed from the weather by an 8' long piece of sheet aluminum, creased to fit the ridge. This is easily lifted off. The hinged portion of the sidewalls is sealed by a 4" wide rubber skirt.

I am chiefly interested in eclipsing variables. With completion of the observatory, I am now able to catch short periods of observing time, even after returning from 3 a.m. house calls!

SPECTRAL SCANS OF o CETI, By Michael Mattei

A spectrum scan of Mira on the night of September 21-22, 1969 when Mira was about 2.5 magnitude was compared to one taken in 1968 at minimum. The brightness of the continuum is greater at maximum and the absorption lines in the blue are deeper than at minimum. Do the other lines appear to be deeper at maximum than at minimum? By comparing the two scans of Mira, I find that there is not much of a change in the depth of the lines at maximum, which means the continuum gets brighter and the lines stay the same, or they change very little.

TELESCOPIC METEORS, By Jim Riviere

The Meteor Data Processing Center under the directorship of Dennis Haworth and myself has recently undertaken the study of telescopic meteors by computer techniques. This subject is open to much research for not much work has been done in the past.

In 1950 Dr. C.P. Olivier published a paper on telescopic meteors based on 3,326 meteors seen from the period 1928 - 1948 inclusive. This excellent report was the last major effort on telescopic meteors in this country. From that period there has been a great increase in the number of telescopic observations made to the AAVSO, but there hasn't been an increase in the number of telescopic meteors observed. There have been some observers who have kept up the task but there should be a great many more.

Telescopic meteors are any and all meteors observed through a telescope or binoculars. The majority of these meteors are from the ninth to tenth magnitude, but this conclusion is shaky because of the lack of observations. According to one source meteors below magnitude ten do not increase greatly in number as one goes fainter. In contrast to this, other sources state that they become more numerous by factors of from two to four per magnitude. Who should one believe?

These meteors seem to be most numerous during the months of Feb., April, August, and Nov. But even on this point there is great discord. The most abundant color was found to be white; but again this cannot have too much weight because no filters were used. It is generally believed that color determination of meteors with the naked eye is very inaccurate. As far as trails go, not much data has accumulated although some trails have been recorded with durations of up to ten seconds.

A very important aspect of telescopic meteors is radiant determinations. From such radiants orbits may be calculated that may prove to be very useful. The following is a table of American Meteor Society Radiants which appeared in Dr. Olivier's paper on telescopic meteors in 1950.

A.M.S.no.	Date (G.M.T.)	Meteors	Radiant R.A.	Radiant Dec.	Observer
3203	1931 Aug. 10.80	3	40°8	+54°4	Ford, C.B.
3201	1928 Nov. 11.57	11	10.0	+40.0	Smith, F.
3204	1932 Dec. 10.61	1	294.6	+49.4	O'Byrne, S.
3208	1934 Dec. 3.52	4	278.8	+ 8.5	Simpson, J.W.
3219	1937 Aug. 11.76	3	41.5	+56.2	Pruett, J.H.
3220	1939 Oct. 18.85	27	86.0	- 5.2	Houston, W.S.
3212	1936 Jul. 29.2±	5	30.8	+54.8	Inouyi, H.
3213	1936 Aug. 11.12	7	46.7	+57.1	"
3214	1936 Aug. 12.16	9	48.0	+57.7	"
3215	1936 Aug. 13.14	8	49.5	+58.1	"
3216	1936 Aug. 15.18	7	52.8	+59.0	"
3217	1936 Aug. 17.16	9	56.2	+59.9	"
3218	1936 Sep. 21.15	1	30.	+87.	"
3207	1934 Aug. 12.83	7	41.2	+56.6	Armfield, Le.
3209	1935 Apr. 20.85	1	303.7	+31.1	"
3218	1936 Jul. 5.74	3	346.9	+59.7	"
3211	1936 Jul. 5.83	4	295.8	+49.0	"
3202	1930 May 11.5	1	109.2	-59.6	Jessup, M.
3206	1934 Aug. 12.71	7	42.8	+55.1	Ford, C.B.
3205	1933 Nov. 22.92	1	0.0	-76.5	Geddes, M.

As one can easily see not much recent work has been done. The AAVSO observer is a person who can make a great contribution to this subject simply because he is in the right place at the right time. Most of his time is spent at the telescope making magnitude estimates, which is the ideal situation needed for the observation of telescopic meteors. The complete procedure for his observation is contained on the back of the observation blanks used for recording them, which are available from AAVSO headquarters.

New forms have just been printed up with a few additions to the previous ones. These are that each observer will be assigned an observer number once he has reported. Another is that the speed of the meteor should be recorded. Also the limiting magnitude of his telescope at the time the meteor was seen should be entered.

From this we should be able to determine a sort of coefficient of perception for each observer based upon the speed and magnitude of the faintest meteor seen.

Another thing the observer could do is send in a plot of the meteor's path through the telescope. This plot should contain the meteor's apparent movements indicated on some type of star chart. Be sure to include the chart epoch, for this is very important. These observations would greatly aid in radiant reduction.

Now for a few hints on their observations. You must always keep your mind aware of being able to ob serve a sudden object such as a meteor. The first few will be surprises but you will get accustomed to them. The faintest meteor you should be able to see is 2 magnitudes brighter than the limiting magnitude of your telescope. This may be refined for a particular observer if the coefficient of perception can be worked out.

Other than this, just go about your regular process of observing variables and if you see a meteor please record its characteristics and report them at the end of the year to: Meteor Data Processing Center, 356 Shaw Street, New Bedford, Mass., 02745. Here they will be processed and a statistical report will be forwarded to each observer. Anyone having further interest in the center should feel free to contact us. The center is now in the process of establishing a radio net to further aid in the study of meteor characteristics.

So PLEASE OBSERVE TELESCOPIC METEORS!

LONGITUDE DISTRIBUTION OF A-TYPE SUNSPOTS, By Ralph Buckstaff

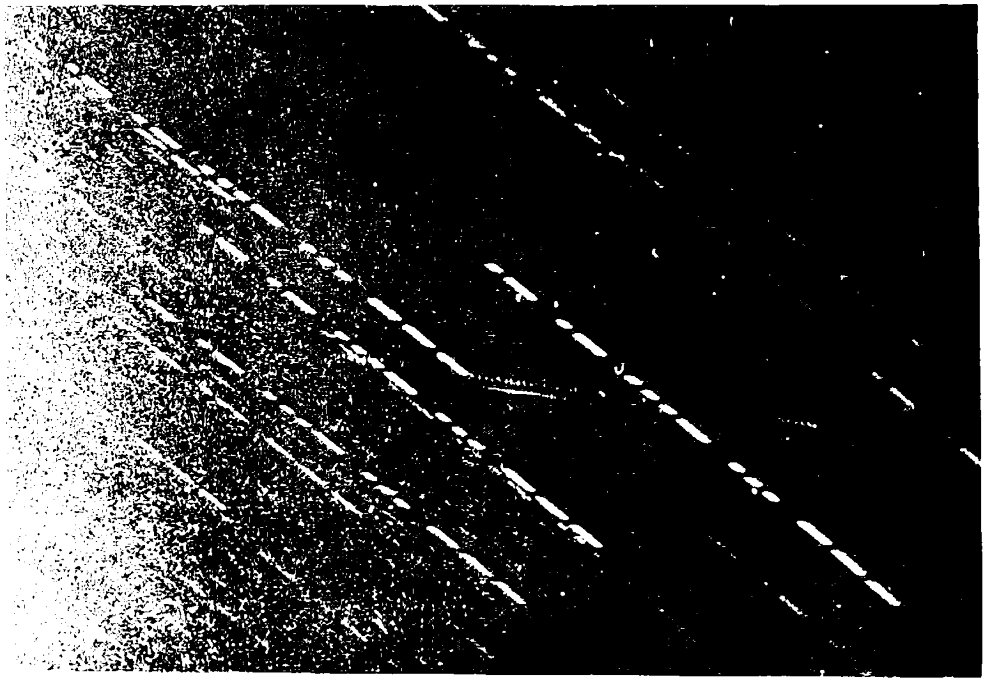
Mr. Buckstaff showed us an instrument he has designed for obtaining the correct longitude of sunspots. He is bring up-to-date his plot showing the distribution over many years, of the A-type spots. (ED)

A MESSAGE FROM THE STARS, By Erich U. Petersen

I first became interested in making Morse Code pictures of the stars about one year ago when I was photographing star trails and the shutter suddenly snapped shut leaving a very short trail on the film.

For these pictures a Zeiss-Ikon camera with an f4.5 lens was employed. Tri-X-Pan 120 roll film was used because of its many advantages. It is fast and one can take a series of twelve pictures at a time. Of course any other film may be utilized.

A stationary camera is needed for these pictures. To make a picture one merely covers and uncovers the lens continuously for predetermined periods of time. In the Morse Code a dot may be represented by a 30 second exposure, a dash by a 90 second exposure, a space between two characters by a 30 second covering, and a space between two letters by a 90 second covering of the lens. A 30 second exposure will make a round or square dot, but under extreme enlargement it will appear slightly elongated. Under all enlargements a 15 second exposure will always be a perfectly round dot. In addition, a 15 second cov-



ering is the shortest covering time conveniently useable. Anything shorter than this will blend one character with another unless you have a fine grain film, a long focal length lens, and extreme enlargement. With an f4.5 lens a 1st and 2nd magnitude star is generally too bright and over exposes the film, but a third magnitude star is about right.

One may record almost any message one wishes. They may say AAVSO (.— .— ...— ... — — —), 1969, NANTUCKET or simply NOTHING.

Pictures taken on the equator will always be straight lines. Curves are very hard to get unless one has a clock-drive. To show any appreciable curve and distinctiveness with a stationary camera one must aim at the North Pole and expose at least five times as long as one would at the equator. Many possibilities are achievable with a clock-drive.

These pictures have very little scientific application except possibly for testing film grain, or resolving power of a lens on film. However, they are fun to make and often result in interesting pictures and art forms.

1969 ECLIPSE IN PERU, By Dr. Ulrich Petersen

While visiting mines in Peru last summer, Dr. Petersen fortunately found himself on the center line of the Annular Eclipse of 12 September 1969. At that time, he was at 16,000 feet elevation. Naturally he photographed it and brought slides along to show us. One of particular interest was that showing bonfires which the Indians burn to give more energy to the sun, thus bringing the sun back... Dr. Petersen said the mountainsides were covered with fires... Also he remarked that the shadows were double. (ED)

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