The M A S Bulletin

Published monthly by the Milwaukee Astronomical Society

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Erwin Arthur de la Ruelle

1879—1934

THE Milwaukee Astronomical Society has suffered a great loss in the passing of its founder and president Erwin Arthur de la Ruelle, on Monday, December 24, 1934. Mr. de la Ruelle was born in Green Bay, Wisconsin, May 18, 1879. He received his education in Green Bay and Chicago. He had travelled intensively. Mr. de la Ruelle was an accomplished pianist and was possessed with a rich baritone voice. He had sung in opera and was a soloist with the Apollo Club of Chicago. Beside his talent for music Mr. de la Ruelle was interested in art and mathematics and especially in the science of astronomy.

Mr. de la Ruelle taught mathematics at the Milwaukee School of Engineering. Prior to that he taught at the old Academy of Sciences in Chicago, although he maintained his residence in Milwaukee.

Surviving him are his wife, nee Adeline Cassidy; two sisters, Mrs. Katherine Baldwin, Neenah, Wisconsin, and Mrs. Edward Shoemaker, Milwaukee, Wisconsin, and a brother, George, Green Bay, Wisconsin.

His father was a Belgian who was a member of the Waldenses, a religious sect, founded by Peter Waldo of Lyons, France about 1770 in the Western church. When the elder de la Ruelle was a boy of twelve, he and his father and mother were among a group of French people who emigrated to the United States, settling at Green Bay, Wisconsin, where they founded the first French Protestant church in the state.

Mr. de la Ruelle's mother was Antoinette Courville, the daughter of a full blooded Menominee Indian.

One of the legends treasured in the de la Ruelle family is that of the origin of the name. It is told that an ancestor who was a private fighting in Napoleon's army was accosted by the General one day:

"What is the hour, Captain?" demanded Napoleon.

Quickly as a flash the young soldier seized upon the advantage accorded him. Straightening up and saluting he asked, "Of what regiment have you made me Captain, my General?"

Amused and pleased at the young soldier's quick wit and boldness, Napoleon replied:

"From what walk of life do you come, from the boulevards?"

"Not from the boulevards but from the ruelles (or lanes)", acknowledged the soldier.

"Hereafter", said Napoleon, "You shall be Captain de la Ruelle", and the name then adopted has been carried with pride down to the present day.

In September 1932 Mr. de la Ruelle and a few kindred spirits met to form an astronomical society with himself as its chairman. The next month thirty people were present at his home, and there was born the Milwaukee Astronomical Society with Mr. de la Ruelle as president. Membership and enthusiasm in the infant society steadily increased. Members began making their own telescopes and started systematic observing with the result that the monthly meetings became semi-monthly affairs. When a highly successful year had passed and it was time for the election of officers, Mr. de la Ruelle was unanimously re-elected as president of the organization. In the second year a Junior Auxiliary was formed, and at Mr. de la Ruelle's home on Prospect Avenue, a library of Astronomical books and periodicals was installed for the use of the members. Beginning with the coming year, 1935, Mr. de la Ruelle had most interesting and ambitious plans for the work of the society, and although he did not live to see these plans carried out, his ideas will be faithfully followed by the organization.

It has been said by his friends, that Mr. de la Ruelle's greatest interest was in the society. At the time of his illness, when he should have been sparing of his strength, he planned a banquet at his home for the annual meeting, the last one which he was destined to attend.

During his last illness, Mr. de la Ruelle was in constant touch with members of the society, approving plans, making suggestions, listening with his usual enthusiasm to any news of astronomical import.

While Mr. de la Ruelle has taken but one step ahead of the members of the organization of which he was founder and president, he leaves behind the memory of his great love for the oldest of the sciences, his example of systematic research and the desire to share with others his interest and enthusiasm.

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Ten cents per copy, $1.00 per year. Contributions are solicited but cannot be paid for. Their publication, either in whole or in part, is solely at the discretion of the committee on publications. Address all communications to the secretary of the society at the above address.

This, the first issue of volume two of the M A S Bulletin, brings a change in style and an increase in material which we hope will meet with the approval of our readers. A rather lengthy article might well be written about the accomplishments of our first year and apologies made for our errors, but we feel that it will serve the interests of our subscribers to a greater extent by devoting that space to items of larger scope and interest. Just this one word—may we have your suggestions and criticisms whenever you have any? It is only by receiving and acting upon them insofar as we are able that we can publish a Bulletin of genuine interest each month.

The regular meetings of the society will be held at the University of Wisconsin-Extension Division on the following dates: January 3rd, Prof. F. R. Moulton of the University of Chicago will speak; January 17th, Miss Helen Pillans speaking on the subject "The Spectrum of the Sun"; and February 7th, Prof. M. J. W. Phillips will talk on "Early Astronomy". These meetings start at eight o'clock and all members are urged to be present and bring their friends.

Junior Society papers to be presented at their regular meetings are—"How the Heat of a Star is Measured" by Jack Huennekens, "The Life of Coblentz" by Chandler Jackson, "The Life and Teachings of Pythagoras" by Kern Jackson at the January 3rd meeting and "Asteroids and Bode's Law" by George Diedrich and "Mars" by Robert Bonebreak at the February 7th meeting. The meetings are called to order at seven P. M. and all Juniors are cordially invited to be present.

The society is glad to welcome to its mempership Miss Helen Pillans who majored in Astronomy at Yerkes Observatory. Her paper will be looked forward to with interest.

The maximum of the Quadrantid Meteor streams will occur on the 2-3 of January. The meteor section of this society is planning to continue their program by observing this shower. All interested in meteor observing should be out.

E. A. Halbach,who is our representative on the Milwaukee Hobby Council will have charge of the M A S exhibit at the Hobby Show which will be held at the Y. M. C. A. the first few days in January.

Through The Eyepiece

J. F. Loepfe

The Sun—Passes from Sagittarius to Capricornus during the month. On Jan. 5th, there will be a partial eclipse of the sun, invisible here.

On January 15th the sun will rise at 7:21 and set at 4:43.

The Moon—Phases: New Moon, Jan. 4th, 11:20 P. M.; First Quarter, Jan. 11, 2:55 P. M.; Full Moon, Jan. 19th, 9:44 A. M.; Last Quarter, Jan. 27th, 1:59 P. M.

Mercury—Evening star, not well placed for observation this month. In conjunction with Venus Jan.. 26th, 11:00 A. M. Separation 38′.

Venus—Evening star, visible in the twilight toward the end of the month. In conjunction with Saturn at 6:00 A.M. Jan. 31, and with Mercury at 6:00 P. M. Jan. 31.

Mars—Morning star in Virgo. It is gradually increasing in brightness and is now first magnitude. In conjunction with the moon Jan. 26, 10:22 A. M. Mars will rise at 11:30 P. M. Jan. 15.

Jupiter—Morning star in Libra. In conjunction with the moon Jan. 1st, at 2:40 A. M. It rises at 2:30 A. M. Jan. 15.

Saturn—Evening star in Capricornus. It will be in conjunction with the crescent moon on the evening of Jan. 7.

Uranus—Evening star in Pisces. On the 15th is in R. A. $1^h\ 43^m$, Decl. 10° 06′ N.

Neptune—Morning star in Leo. On the 15th is in R. A. $11^h\ 04^m$, Decl. 7° 02′ N.

Questions and Answers

(It is our intention to conduct a column of this sort if the interest in such a column will be sufficient to warrant devoting the space to this purpose. You will be the judges—if questions of genuine interest are received we shall continue, otherwise something else will fill this space).

What Is Polarized Light?

Light vibrates in every direction. When a ray of light is passed through one of the faces of a crystal of Iceland spar the property of the crystal is such that only light waves vibrating in one direction plus those which vibrate in a direction perpendicular to that of the first, are allowed to pass through; with the result that two different beams emerge from the crystal, one at the usual angle of refraction, the other displaced to one side. The first beam is called the ordinary ray and the displaced beam is called the extraordinary ray. If the crystal is rotated the first ray remains stationary in a normal way and the other circles around it. This splitting up of a ray of light is called polarization; the crystal is the polarizer. Other substances have the property of polarizing light, as evidenced by reflection from glass, or from clouds at a certain angle.

* * *

When an extraordinary beam is allowed to pass through a second crystal called the analyzer it is also split up and two rays emerge. If the second crystal is rotated even slightly these rays diminish in brightness while two others apear. As the second crystal continues to rotate, the first two beams continue to grow fainter while the second set grows brighter. Rotating this second crystal through an angle of 90° causes the first set to diminish gradually from maximum to zero and the second set to increase from zero to maximum, the amount depending upon the distance that the analyzer is rotated.

* * *

This phenonemon can be used astronomically by rotating the analyzer in a photometer until the varying beam of light equals the brightness of the star to be measured—the measurement being the angle through which the analyzer is turned to make the comparison light equal to the star's light.

Contrary to conventional opinion the greater part of the diffuse illumination of a clear night sky is not due to the integrated illumination of multitudes of faint stars in the background of the sky but is a permanent aurora surrounding the earth. Observations carried on since 1915 at Lowell Observatory have led to this conclusion.

DID YOU KNOW ?

Edited by E. A. Halbach

The Astronomical Discourse, Vol. 2, No. 1, December 1934, contains a very interesting and unusual article on the variable star, R Coronae Borealis. Also an article of interest regarding sun spots. This publication is issued by the Missouri-Southern Illinois Observers. Copies may be secured by addressing the M A S Bulletin, 6902 Grand Parkway, Wauwatosa, Wisc.

On Wednesday evening, Oct. 24th, E. A. Halbach gave an illustrated lecture before the Wisconsin Go Hiking Club at the Y. M. C. A. His talk was entitled "A Hike Through the Universe." Also on Sunday evening, Oct. 21st, he gave a short talk on "Our Universe" before a Christian Endeavor group at the Calvary Presbyterian Church, 10th St. and Wisconsin Ave., after which H. L. Grunwald showed the audience some of the heavenly wonders through his 6″ telescope.

M. M. Feinsilber, an active worker in the Meteor Section and on the staff of the Bulletin, is now in the Pine River C.C.C. Camp, Three Lakes, Wisc., where he is employed as a camp foreman. He is continuing his meteor observation with the aid of interested young men of the camp.

The Society has recently sent to the Mellon Institute, Pittsburgh, a group of six large photographs and a bound copy of the first volume of the M A S Bulletin for a display of its instruments and activities as part of the Amateur Astronomy exhibit at the convention of the American Association for the Advancement of Science, Dec. 27th to 30th, inclusive. E. A. Halbach had charge of preparing the exhibit.

American Meteor Society Notes

WISCONSIN-NORTHERN ILLINOIS REGION

L. E. Armfield

The reports of the Leonid Meteors submitted by members of the Wisconsin-Northern Illinois region clearly illustrates the great value of practical experience in meteor observing.

The participating members were arranged in groups and stations, their major objective being duplicate plots for real heights. All totals found in the table given below are of plotted paths only.

GROUP NO. 2.

Observer and Station	1934 Nov.	Began	Ended	Total
Station No. 1 Milwaukee Astronomical Society				
Plotter No. 1 E. A. Halbach (Leader)	14—15	12:00	15:00	11
	15—16	16:30	17:30	3
No. 1 Wm. Liebscher	14—15	15:00	16:00	8
	15—16	13:00	14:00	1
		16:00	17:00	1
No. 2 L. E. Armfield	14—15	12:00	15:00	12
No. 2 G. V. Gabris	14—15	15:00	16:00	4
No. 2 C. C. Steven	15—16	11:00	16:30	36
Station No. 2 Reedsburg Astronomical Society				
Plotters—Vida J. Niebuhr (Leader)	14—15	12:00	17:00	26
Jack B. Vinson				
P. M. Loofboro	15—16	11:00	17:30	55
Fred Niebuhr				
Lydia Luebke				
Station No. 3 Madison Astronomical Society				
J. M. English (Leader) **	14—15	11:50	14:00	23
	15—16	11:00	17:00	87
Station No. 4 Beloit College Students				
Prof. R. C. Huffer (Leader)	14—15	12:00	17:00	44
	15—16	Overcast Skies		
			Total plots	332

**The following persons participated in the work of the Madison station: Tom Binney, Mrs. Tom Binney, Walter Houston, J. C. Gamroth, Leslie Ketchum, Mrs. Leslie Ketchum, Clarence Draeger, John McClain, Walter Foster, Harold Jacobs, Henry Wright, Dr. Supernaugh, and Rev. Lookabill.

Twenty-one time coincidences were obtained on the night of the 14—15, and thirty-seven on the 15—16, a fairly good percentage. All stations reported overcast skies for the 16—17.

GROUP NO. 1.

Station No. 1—Milwaukee Astronomical Society				
Plotters No. 1—A. L. Peck	14—15	12:00	16:00	50
	15—16	11:00	17:00	60
	16—17	15:30	16:45	27
No. 2 C. P. Frister	14—15	12:00	16:00	26
	15—16	11:00	13:00	3
No. 2 Wm. Liebscher	14—15	13:00	15:00	9
	15—16	14:00	15:00	7
No. 2 J. V. Gabris	15—16	12:00	17:00	23
Station No. 2—Chicago				
Plotter—Miss M. E. Trimmier	Report unavoidably detained.			
Station No. 3—Oak Park				
Plotter—Edwin P. Martz, Jr.	13—14	12:00	18:00	14
Station No. 4—Watertown				
Plotter—Edward W. Kuenzi	14—15	12:00	13:00	2
	15—16	14:00	16:00	9
Station No. 5—Joliet Astronomical Society				
Frank Preucil (Leader)	No meteors plotted			
			Total	230

A. F. Boyd Timer-Recorder for all plotters in Group No. 1 and No. 2 at the Milwaukee station on all three nights.

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Recent Work At Washburn Observatory

Resume of talk given before the Milwaukee Astronomical Society by Dr. Joel Stebbins, Director of the Washburn Observatory, University of Wisconsin.

WE HAVE no means of finding out whether there are any non-luminous or dark bodies in the universe, except as they may, in the form of small particles like dust, obscure light coming to us. If a solid body such as the sun were halved its eclipsing power would be doubled; similarly, if it were pulverized its eclipsing power would be enough to obstruct all the stars in sight. So when light appears to be obstructed, as in certain parts of the Milky Way, probably the curtain that blocks it is due to dust. This matter allows some light to pass through and the result is a reddening of the light; in much the same way as the reddening of the sun at sunrise or sunset.

The center of our galactic system appears to be in the Milky Way at a point between Ophiuchus and Saggitarius and near Scorpio, where there are both bright star clouds and dark regions. The position of our solar system in the galaxy is probably in the median plane about two-thirds out from the center to the edge. We see a band of light, our Milky Way, all around the sky, and in some places it is divided by a dark band. We do not ordinarily think of our galaxy's having a central nucleus, similar to the spiral nebulae, but this core, according to Hubble, extends some 45°; because photographic plates cover only a comparatively small area the core is not seen on them as a whole, nor in the sky itself except under most favorable conditions.

The photo-electric photometer, perfected at the Washburn Observatory, has been known in principle for half a century, and the development of the thermionic tube as used in radio has made possible the detection of the most minute current. At Madison it was tested by a candle light placed one mile distant, the galvanometer showing a deflection of 150 millimeters. If the amplifier were attached to the 100 inch reflector it would register the light of a candle at a distance of 3000 miles.

With this instrument a study of 733 B-type stars of the Harvard classification were made, these being used because of their high degree of luminosity. As work progressed in the study of these stars it was found that the reddest were in the region of the Milky Way, usually within two or three degrees of the galactic equator, and that they are also the farthest away. Due to the absorption of the dust these B-type stars appeared reddened and their brightness was decreased by two stellar magnitudes. Hence, their distance is not as great as formerly thought, thus bringing the size of our galaxy to appreciably smaller dimensions.

Similar observations were made with globular clusters and it was found that they are also red near the galactic equator. Absolutely none are found in a zone about 7° wide extending along the galactic equator.

To determine what our galaxy is like we should examine others, but it is difficult to compare ours because of its size. The great nebula in Andromeda is near and large, hence the best for comparison. It is about 800,000 light years distant, and according to present photographs, its diameter seems to be some 40,000 light years. Our galaxy has been considered to be 200,000 light years in diameter, but taking into account the fact that the dark material reddens the stars in the Milky Way, making them appear more distant and enlarging the diameter more than it should be, we should cut down the size to some 120,000 light years. Besides, if we could prove that the Andromeda nebula were larger than it is, the difference between the two would be still less.

With the photo-electric cell, the procedure used was to compare the light of areas near the Andromeda nebula with regions of the sky several degrees distant and the difference between the galvanometer readings for the sky alone and those for the regions near the nebula would give the readings for the nebula only. As a result, the area of the nebula is believed to be at least twice as great as is shown on the photographic plate hence it is probably 80,000 light years rather than 40,000 light years in diameter.

Even though we are uncertain as to the size of our galaxy, we do know it to be a continent among islands. However, we are finding that it is not as great as formerly supposed nor is it the only continent.

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Your Calendar For The Month

Friday, 1—Mercury, greatest elongation east, 18° 20′ from the sun; seen in western sky after sunset, above the sun. Venus sets about an hour and one-half after the sun.

Sunday, 3—Partial eclipse of the sun, visible in Milwaukee about 10 A.M.

Monday, 4—Conjunction of Mercury and the Moon with Mercury 1° 47′ south at 5:30 P.M.

Thursday, 7—Junior Meeting, 7:00 P.M. "Asteroids and Bode's Law" by George Diedrich and "Mars" by Robert Bonebreak.

Regular M A S Meeting, 8:00 P.M. "Ptolemy" by H. L. Grunwald.

Sunday, 10—Aurigid Meteor Shower. First Quarter Moon.

Monday, 11—Jupiter in Quadrature, rising about midnight in the southeast.

Thursday, 14—Mira now past maximum, located in Cetus—due south about 7:00 P.M.

Saturday, 16—Mars rises about 10:00 P.M.

Monday, 18—Full Moon.

Wednesday, 20—Saturn in conjunction with Sun.

Thursday, 21—Technical Meeting, 8:00 P.M. "Notes on Photographic Photometry" by Lynn Matthias.

Tuesday, 26—Last Quarter Moon.

Wednesday, 27—Mars stationary in R. A. Will start its retrograde motion on this date.

C. P. Frister

Due to the untimely death of Mr. de la Ruelle, which we all deeply grieve, the Board of Directors has appointed the following: G. A. Parkinson as President, R. D. Cooke as Vice-President, and C. P. Frister has been appointed to fill the vacancy existing on the Board. We wish these members a great deal of success in their new offices and assure them of our heartiest cooperation.

Of unusual interest is the partial eclipse of the sun which will occur on Feb. 3rd. This eclipse will be visible in all parts of the United States; at Milwaukee it will start at 9:05 A.M., attain its maximum at 10:11, and end at 11:21. Totality at Milwaukee will reach fifty-seven percent.

The society welcomes James A. Henderson, 3003 S. Kinnickinnic, to its membership.

Through The Eyepiece

J. F. Loepfe

The Sun—During the month the sun will move from Capricornus to Aquarius. It rises at 6:50, and sets at 5:23, Feb. 15; rises at 6:28, and sets at 5:41, March 1.

The Moon—Phases: New Moon, Feb. 3, 10:27 A.M.; First Quarter, Feb. 10, 3:25 A.M.; Full Moon, Feb. 18, 5:17 A.M.; Last Quarter, Feb. 26, 4:14 A.M.; New Moon, March 4, 8:40 P.M.

Mercury—Evening star with its greatest elongation east, 18° 20′, Feb. 1. On Feb. 17 it will be in inferior conjunction with the sun after which it becomes a morning star but too near the sun for observation. In conjunction with the crescent moon Feb. 4, at 5:22 P.M., and with Saturn Feb. 13, at 4:00 A.M., Mercury being 5° to the north of Saturn.

Venus—Evening star. On the 15th its magnitude will be 3.3, and at sunset it will be about 20° above the horizon. In conjunction with the crescent moon Feb. 4, and again March 6.

Mars—Morning star about 5° north of Spica in Virgo. On Feb. 23, at 2:34 A.M. it will be located 8° 40′ north of the moon. Mars begins its retrograde motion Feb. 27. It rises at 10:10 P.M., Feb. 15.

Jupiter—Morning star in Libra. In conjunction with the gibbous moon Feb. 25th, at 5:40 A.M. It will rise at 12:45 A.M. Feb. 15.

Saturn—Poorly placed for observation this month being in conjunction with the sun Feb. 20.

Uranus—Evening star of the sixth magnitude in Aries. On Feb. 15th is in R. A. $1^h\ 45^m$, Decl. 10° 21′ N.

Neptune—Appears as an eighth magnitude star in Leo. On the 15th is in R. A. $11^h\ 1^m$, Decl. 7° 19′ N.

Questions and Answers

Miss Elizabeth Wight

WHAT ARE JULIAN DAYS?

Because our present system of reckoning time by years is not absolutely accurate, a system has been arbitrarily adopted by which days can be figured without bothering about the month or year in which they occured. The system began on January 1, B. C. 4713 and each day since that date is one added day. For instance the Julian Day corresponding to February 1, 1935 is 2,427,834.

Pickering first used this method for variable star work in 1890 and it is easy to see the convenience of such a system when observations over a long period of time have to be combined, as the use of calendar dates would be awkward.

Twinkle, Twinkle, little star
I know exactly what you are,
For seen through spectroscopic ken
You're helium and hydrogen.

INSTRUMENTS

(This is a column written by the individual members telling of their particular interests in astronomy and the development of instruments to satisfy that interest.)

LYNN H. MATTHIAS

The incentive for building the original telescope came as a result of an urge to become familiar with the construction of precision optical systems. A 6″ reflector was accordingly constructed with the object of using it for photographic work. This instrument is equipped with two flats inside the Newtonian focus; one flat being large enough to cover a 1″ x 1″ plate at the focus without vignetting; the other reflects light off the edge of the main flat to the guiding eyepiece on the opposite side of the tube from the photographic plate. This telescope is mounted on a German type equatorial mount equipped with circles, slow motions in Declination and Right Ascension and a vacuum tube controlled electric drive. The telescope and mounting are of all welded construction. Large, accurately fitted bronze bearings carry the moving parts smoothly. All parts are baked enamel finish or nickel plated. Two photographic objectives of 3″ aperature and 21″ focal length are used in cameras carried on the same mount. These cameras are identical optically and are adapted to take photographs simultaneously in two colors of the same area on 4″ x 5″ plates. These twin cameras are used mainly for photometric work on variable stars.

The equipment is driven around the polar axis by a 1/50 h.p. shaded pole motor. The motor drives, in addition to the telescope, a small inductor type alternator. At normal driving speed this alternator generates an e.m.f. of a frequency of approximately 600 cycles. This e.m.f. is fed into a very sharply tuned circuit, the resonant frequency of which is adjustable over a small range. The e.m.f. across the tuned circuit is impressed on the input of a vacuum tube voltmeter which has a relay in its plate circuit. This relay controls the power supplied to the motor. The control operates to keep the frequency of the small alternator constant—and hence the speed of the driving motor. Push buttons are provided at the telescope for increasing or decreasing the motor speed, independent of the control, for slow and fast motions in Right Ascension. This Driving system possesses the advantage of requiring only a single motor for both the normal driving speed and the slow and fast motions in Right Ascension.

This equipment is housed in a small dome constructed of galvanized sheet steel on a wooden framework. The dome has a 2½ foot slot with a removable cover, and the dome itself revolves on large rollers which run on a circular steel track.

Perhaps the most interesting instrument is the modified Schilt microphotometer. This instrument is used for measuring linear distances on the plates or densities of the star images and is capable of highly precise work. It consists of two rather elaborate microscopes, one serving as an illuminating system, and the other as an analyzer. Two photo-electric tubes serve as the light sensitive elements and measure directly through associated amplifiers and a reflecting galvanometer the density of a minute area on the photographic plate. The measured area can be varied from 0.00000225 to 0.000625 square inches, which covers the normal sizes of star images. A large micrometer stage holds plates up to 4″ x 5″ and has motions in two coordinates. This instrument can, with attachments, be used as a recording microphotometer for analyzing spectrograms.

Needless to say, this equipment is used entirely for photographic work. I am interested in the photographic method not because of any particular interest in photography as such, but because of the high precision of the method when applied to astronomy, its flexibility, the

permanence of the record obtained, and also the fact that for most purposes small equipment is more powerful photographically than much larger equipment used visually.

In addition to taking photographs of interesting objects, this equipment has been used on a variable star program in connection with the Harvard Observatory. At the present time the work in progress consists of an investigation of the Nordmann-Tikhoff effect in cooperation with Dr. Struve of the Yerkes Observatory.

An Impromptu Meeting Of The A. A. V. S. O.

The members of the Milwaukee Astronomical Society had the privilege of attending an illustrated lecture by Dr. Harlow Shapley, Director of the Harvard College Observatory, and given under the auspices of the Harvard Club of Milwaukee on Saturday, January 12, 1935.

Dr. Shapley's lecture was truly indicative of his unusual ability to present items of utmost technical importance in a manner readily comprehended by the general public. His inimitable sense of humour was predominately evident throughout the presentation, much to the pleasure of the audience.

Dr. Shapley greatly pleased the members and friends of the variable star section by offering to meet with them the following morning for a discussion of observational problems. Needless to say, this opportunity was gratefully accepted.

The Sunday morning session was opened by Dr. Shapley with a discussion of Nova Herculis, whose appearance and subsequent behavior added much to the present knowledge of these rather mysterious stars. According to Dr. Shapley the nova was discovered on the evening of December 13, 1934, by J. P. M. Prentice, a meteor observer of the British Amateur Astronomical Association. Spectrographs taken shortly after its announcement revealed a bright band spectrum, which, heretofore had been interpreted as an indication that the star had passed through the period of maximum brightness and that its light would gradually decrease; with fluctuations amounting sometimes to nearly a magnitude also taking place.

Further observation revealed however, that this star had been caught on its rise to maximum as it continued to increase in brightness after the original spectrographs had been taken, and, therefore, at a more early stage of development than any other nova. This then indicates that the spectrum of a nova at a given point on its light curve shortly before maximum is very similar to its spectrum at the corresponding position after the maximum, thus forging another link in the chain of knowledge.

This is the first nova to be found in the constellation of Hercules and, in comparison with other novae, it is located at a considerable distance from the equatorial plane of our galaxy. Its distance from the earth is not definitely known at present although it is estimated that it is probably on the order of 10,000 light years.

Dr. Shapley told of the diplomacy necessary in dealing with the news gathering agencies in order that the appearance of the new star would not be construed by the general public as a recurrence of the Star of Bethlehem. With the new star blazing forth so shortly before Christmas it was only natural that many people would readily correlate it with the Biblical star.

A lively discussion was then conducted by Dr. Shapley, punctuated with many witticisms, with the group concerning variable star work—past and future. The many observational problems, methods and theories which were presented to him were given due consideration and excellent suggestions for their solution rapidly given. In the scant hour and a half that he spent with us he cleared up every difficulty that was presented for discussion and in doing so left such a favorable impression on the members of the variable star section that each and every one has a new zest for his avocation.

As Dr. Shapley's time of departure was rapidly approaching he asked to see the equipment which he had glimpsed in the rear yard upon arrival. Everyone thereupon retired to the yard for an inspection of the telescopes, chart and auxiliary equipment being used by the members in their variable star work.

The splendid meeting ended all too quickly with Dr. Shapley kindly consenting to pose with the group for a photograph.

Dr. Shapley styled himself as an "emmisary from the Harvard Observatory" and it is an assured fact that every member of the group was not only highly pleased with the circumstances which permitted his presence but also deeply and sincerely appreciated his gracious kindness in spending a portion of his very busy life with them.

The M A S Bulletin

Published monthly by the Milwaukee Astronomical Society

Vol. 2, No. 3 March, 1935 Ten Cents

Proposal Of A Method Of Observing The Solar Corona Without An Eclipse

By A. M. SKELLETT

Bell Telephone Laboratories

Abstracted by G. A. Parkinson for the M A S Bulletin

THE problem of observing or photographing the details of the sun's corona without an eclipse has challenged the efforts of many able investigators during the past fifty years. None of them has achieved any degree of success except Lyot, who on one very clear day was able to obtain images which showed several faint irregularities of the light around the sun's disc. These irregularities apparently were coronal features. The excellence of his work leaves little hope that any appreciable improvement in his method can be made, and furthermore, his method gives no promise for any but the innermost parts of the corona.

In order to attack the problem, then, with any hope of success it is necessary to proceed along entirely different lines. Due to the intense brightness of the limb of the sun and the relative feebleness of the light of the corona, it is necessary to develop a method which will discriminate sufficiently in favor of the feeble light of the corona. It is immediately obvious that no ordinary photographic or optical method gives any promise of success. It is suggested that the mechanism of television can be adapted to this problem.

Let us suppose that the image of the sky around the sun's disc is scanned by a small opening behind which a photoelectric cell is placed, and that the scanning is done in a spiral path around the sun, starting from the left. As the spot passes over the hoods, arches, and streamers of the coronal image, the photo-electric current will consist of a number of components of different frequencies. Now, if we pass this current through appropriate electric filters we may eliminate the direct current components due to sky light and telescopic glare, as well as the lower frequency component which arrived as the result of the radio progression of the scanning hole, leaving, presumably, only the high frequency components due to the corona and the inhomogeneities caused by poor seeing.

From this standpoint it appears that the problem possesses no insurmountable difficulties, even though the ratio of intensities is of the order of hundreds of times since the various frequencies are widely separated. From this scanning the image could be reconstructed in the usual way from the current. The new image would now contain the details of the corona without any sky light glare. If bright stars happen to be in the field, they would shine out as dots of light the shape of the scanning hole.

We would thus be able to reproduce the major features of a solar eclipse at any time when the sky is clear. The faintness of the outer corona will set a limit on the size of the scanning hole which can be used with a telescope of given aperture and focal length. With a telescope of 10 centimeters aperture, which gives a solar image of 10 centimeters in diameter, a scanning hole about 2 millimeters square can be used. With this equipment careful computations indicate that only the inner part of the corona will be visible; for the outer corona a larger hole can be used advantageously to show up the great streamers. For a larger telescope, say with a 100 centimeter objective, the coronal details out to about 10 minutes from the rim of the sun will be made visible, and for a 100 inch telescope the theoretical limit could be moved out to about 20 minutes, and then by increasing the size of the scanning hole the general form of the long streamers could propably be observed.

At the suggestion of Dr. Herbert E. Ives of the Bell Telephone Laboratories this method was given a test in his laboratory, simulating the assumed conditions as nearly as is possible with the available designs of television apparatus. A lantern slide of a coronal photograph, taken at the eclipse of 1908, was imaged upon a 72 hole television scanning disc, using an illumination sufficient to give an image brightness of the order of magnitude considered in the preceding discussion. Under these conditions an ex-

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Your Calendar For The Month

Friday, 1—Sun is now 8° 1′ south of the Equator.

Saturday, 2—Venus now early evening object in Southwestern sky. Magnitude about -3.3.

Monday, 4—Opposition of Neptune. Planet visible all night. New Moon.

Wednesday, 6—Mars now visible most of night. Rises south of east about 8:30 P.M.

Thursday, 7—Junior meeting, 7:00 P.M. Papers on Jupiter, Globula Clusters, Sidereal Time, and Ptolemy.
Regular M A S meeting, 8:00 P.M. "Copernicus" by Frank Dieter.

Sunday, 10—Algol, eclipsing variable, at minima at 10:50 P.M.

Monday, 11—Moon in first quarter.

Wednesday, 13—Minima of Algol at 7:40 P.M.

Friday, 15—Mercury at greatest elongation west. Visible before sunrise.

Saturday, 16—Moon in apogee, greatest distance from earth.

Wednesday, 20—Full Moon.

Thursday,21—Technical meeting, 8:00 P. M. "Notes on Photo-electric Photometry" by L. E. Armfield.

Friday, 22—Conjunction of Venus and Uranus, 24′ separation.

Sunday, 24—Jupiter now seen in late evening. Brightest object in Southeastern sky.

Wednesday, 27—Moon in last quarter.

Sunday, 31—Watch time now 4 minutes 36.4 seconds faster than the sun.

C. P. Frister

Mr. Edward Dohr of Appleton, Wis., has completed an 8″ reflector and is busily engaged in learning the technique of variable star observing.

Through The Eyepiece

J. F. Loepfe

The Sun—Will be moving in a northeastery direction from Aquarius to Pisces. On March 21, at 7:18 A.M., the sun will cross the celestial equator from south to north. This event marks the beginning of spring. The sun rises at 6:04, and sets at 6:16, March 30th.

The Moon—Phases: New Moon, March 4, 8:40 P.M.—First Quarter, March 11, 6:30 P.M.—Full Moon, March 19, 11:31 P.M.—Last Quarter, March 27, 2:51 P. M.—New Moon, April 3, 6:11 A.M.

The moon will be at its northernmost declination, 26° 22.2′, March 11 at 7:00 P.M., nearly the time of First Quarter, making this month the best time of the year for its observation.

Mercury—Appears as a morning star during the entire month. Greatest elongation west, March 15. In conjunction with Saturn March 22, and with the moon April 1. It will be difficult to observe this month due to its southern declination.

Venus—Appears as a brilliant star in the west, about 25° above the horizon at sunset, and sets at 8:13 P.M. March 15. In conjunction with the crescent moon on the evening of March 6, Venus appearing about 7° toward the South.

Mars—Reddish star rising in the southeast and is steadily increasing in brightness. Its magnitude is now -0.7. An interesting phenomena will take place March 22, Mars will be in conjunction with the gibbous moon and with Spica. Spica will be south of Mars and the moon will be south of Spica. Mars will rise at 8:15 P.M. March 15.

Jupiter—Morning star in Libra rising in the southeast at 10:54 P.M. March 15. It will be in conjunction with the moon on the 24th.

Saturn—Morning star but is still too near the sun for favorable observation.

Uranus—On the 15th is in R.A. $1^h\ 50^m$ Decl. 10° 46′N.

Neptune—This is the best time of the year for its observation because of its opposition to the sun March 4. On the 15th is in R.A. $10^h\ 59^m$, Decl. 7° 37′N.

Sirius will cross the meridian at 7:04 P.M. March 15.

Nova Herculis will cross the meridian at 6:27 A.M., and will rise at 8:00 P.M. March 15th.

The recently organized Madison Astronomical Society is rapidly growing into a functioning organization. Some of the members are now cooperating with our meteor and variable star observers in various programs.

INSTRUMENTS

(This is a column written by the individual members telling of their particular interest in astronomy and the development of instruments to satisfy that interest.)

By R. D. COOKE

I seem, somehow, to have been born with a fascination for optical instruments just as some persons are fascinated by dogs or firearms or growing things. It is one of those things that probably result from some insignificant chain of happenings that is difficult to trace, some childhood incidents that chanced to come at impressionable moments and doubtless fitted into some congenital pattern. In my case it may have grown out of an early experience with a dollar Kodak, a mail order telescope and an intimacy with a young oculist, now, by the way, one of the leading optometrists of the State. I recall constructing a box camera before I was ten years old. I do not recall that it ever took any pictures. Perhaps after it was finished I could not afford to buy any plate holder, but at least it was a noble effort.

These leanings were not suppressed by later experience with microscopes, spectroscopes etc. and a more mature fling at photography. The immediate circumstances which aroused an interest in telescopes are not on record. About fifteen years ago I attempted to make a reflecting telescope, but with no proper guidance in mirror making the project was aborted. When the first edition of A. T. M. came along I took it up again in earnest, and in 1927 achieved a telescope that was all I had hoped for. But like a city it is never finished.

An interest in spectroscopy followed naturally enough, and it may be of interest to record some of the details of a home made spectroscope designed to attach to a conventional reflecting telescope. The slit is mounted in a tube of the same size as an eyepiece and is put in the eyepiece adapter. The light emerging from the slit is turned parallel to the telescope tube by a 90° prism and is collimated by a lens two inches in diameter and sixteen inches focal length, thus maintaining the same f ratio as the telescope mirror. The parallel rays are received on a replica diffraction grating rotable on an axis parallel to the rulings and after dispersion are returned through the same lens to a focus at the eyepiece near the slit. This arrangement serves adequately for observing prominences on the sun in the Ha line, but the grating is too wasteful of light to be of any use on stars. For the latter purpose a 30° prism is being made up having a clear aperture of one and three quarter inches. The back of this will be silvered, returning the light through the first face and giving the same dispersion as a 60° prism used in the conventional way.

Questions and Answers

Miss Elizabeth Wight

WHAT IS THE GREAT NEBULA IN OROIN?

This nebula is visible to the naked eye as a hazy patch of light—the middle star of the three in Orion's "sword." It is 600 light years distant; according to Kapteyn its parallax is 0".0055. Its bright part is 1 parsec or 10 light years in diameter, measuring about 1° across, although its outer nebulosity is greater than that of the Great Nebula of Andromeda. Its whole mass is ten thousand times that of our sun, and its mean density is one millionth of a billionth that of air—vastly less than the most perfect artificial vacuum.

It is receding on an average of 17.5 km. per sec., but the upper right hand arm and isolated patch in the lower right hand part is receding from 4 to 7 km. per second, while the opposite side is approaching. In the central part there are differences in velocity of 10 km. per sec. If observed radial velocities correspond to orbital motion, its period of revolution would be about 300,000 years. Its proper motion is too small for detection. (Taken from text books on Astronomy by Baker and Russell-Dugan-Stewart.)

Mr. Theo. Thompson is in the Milwaukee General Hospital for a rest. Wm. Liebscher has entered the Soldiers Home for hospitalization. Both are World War Veterans and have been active in the Society for several years.

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cellent image of the moon's disc and of the corona was rendered at the receiving apparatus. It must be granted that the conditions in this experiment were somewhat more favorable than can be expected in an actual test, and the author is quite aware that an actual trial in the observatory may uncover unforseen difficulties. It is felt, however, that the proposal has sufficient promise to justify a trial.

American Meteor Society Notes

WISCONSIN-NORTHERN ILLINOIS REGION

L. E. Armfield

Exceptionally mild weather and a brilliant sky was enjoyed by the Beloit, Madison, and Milwaukee groups on the night of the Geminid maximum. Very special commendations are due the observers and leaders of the three groups mentioned above for their loyalty, perseverence and cooperation. Duplicate observations for real heights was again the major objective.

A summary of only plots obtained is given below as the rate derived by counters at Milwaukee was discussed by E. A. Halbach, leader of the M A S meteor section in the January issue of this Bulletin.

Observer and Station		1934 Dec.	Began	Ended	Total
Station No. 1.	Milwaukee Astronomical Society				
Plotter No. 1.	Wm. B. Albrecht	12—13	12:00	13:00	13
	C. P. Frister	12—13	13:00	14:00	14
	George Diedrich	12—13	14:00	15:00	11
Station No. 2	Milwaukee Astronomical Society				
Plotter No. 1.	A. L. Peck	12—13	12:00	16:00	86
Plotter No. 2.	E. A. Halbach (Leader)	12—13	13:00	16:00	28
	Wm. Liebscher	12—13	12:00	13:00	3
Station No. 3	Madison Astronomical Society				
Plotter No. 1.	J. M. English (Leader)	12—13	12:00	14:00	21
Plotter No. 2.	J. C. Gamroth	12—13	12:00	14:00	23
Station No. 4	Beloit College (Prof. R. C. Huffer, Leader)				
Plotters	Beloit College Students	12—13	12:00	14:00	41
				Total Plots	240

A. F. Boyd, Wm. H. Liebscher and J. V. Gabris alternated in the timer-recorder position for the Milwaukee station.

The Quadrantids were conspicuous only by their absence. The sky was perfect from a standpoint of seeing and very faint meteors could have been readily observed, had there been any. In a three hour vigil by W. B. Albrecht, A. L, Peck, E. A. Halbach, and L. E. Armfield, of the M A S, on the night of January 2—3, between 14:00 and 17:00 hours, only nine meteors were seen. Five of these nine were members of the Quadrantid stream. A total of six meteors, three of which were Quadrantids, were seen by L. E. Armfield on the 3—4 between 14:00 and 17:00 hours. Such a scarcity of meteors, shower or strays, and especially during the early morning hours, is certainly rather unusual and warrants further investigation.

While in Milwaukee recently, Dr. R. C. Huffer, Professor of Astronomy and Director of the Beloit College Observatory, visited the A. M. S. regional headquarters. Much to my pleasure, we were able for the first time, to discuss meteors verbally, rather than through the medium of correspondence. Dr. Huffer, with the assistance of his astronomy classes has contributed much to the A. M. S. programs. He is at present engaged in the computations of real heights, using the data obtained by the observing stations of Group No. 2 for the 1934 Leonid network. The derived heights will be published in a later issue of this bulletin, as well as in Popular Astronomy.

The annual summary of the observations contributed by the members of this region during 1934 will not be published in these notes as Dr. Olivier will include them in his yearly report for the A.M.S. as a whole in a future issue of Popular Astronomy. Nevertheless, I, personally wish to extend my grateful appreciation to each and every member of th Wisconsin-Northern Illinois region for your most valuable contributions during 1934. It is indeed an honor to work with such a splendid group.

The M A S Bulletin

Published monthly by the Milwaukee Astronomical Society

Vol. 2. No. 4 APRIL, 1935 Ten Cents

Chemistry Borrows From Astronomy

H. W. CORNELL

It is an interesting fact, and one which is not known to the average astronomer nor to the average chemist, that Astronomy has furnished Chemistry with the names of seven of the chemical elements. No book on Astronomy which the writer has seen makes any mention of this, nor any book on chemistry except two chemicals dictionaries which have the information obscurely hidden away.

The metal Mercury takes its name from the planet Mercury in allusion to the rapidity of the motion of the planet and the quickness with which globules of the metal will run about. The metal was discovered some three hundred years before Christ, and, in the first century of the Christian era, was given the Greek name Hydrargyrum, meaning watery silver. From this its chemical symbol Hg is derived. In English its original name was quicksilver, and it was in comparatively modern times, due, perhaps, to the influence of astrology and alchemy, that the name Mercury was applied.

Great was the scientific enthusiasm aroused by the discovery of a new planet by Herschel in 1781. Since the other planets had mythological names, the name of Uranus, the father of Saturn in classical mythology, was given to it. Eight years later the German chemist Klaproth discovered a new element, and with commendable astronomical spirit named it Uranium after the planet. It is indeed fitting that an element which is today so important in radioactive research should have an astronomical name.

Then, in 1798, Klaproth discovered another new element, and, in contrast to Uranium, he named it Tellurium, not, as many suppose, because of any rare-earth affiliations, but because of the Earth's status as the most important planet.

In 1803 Wollaston, a famous English chemist, discovered a new and important metal. A few months before this, in 1802, Olbers had discovered the second asteroid, and, following the mythological rule, had given it its classical name from Pallas, the Greek equivalent of Minerva, the Latin Goddess of Wisdom. At the time the discovery was regarded as of the same order of importance as the discovery of Uranus. It was not until the asteroids became numerous that they were relegated to a minor status. Pallas was a new planet, a great scientific discovery, and Wollaston very properly named his new element after it, calling it Palladium. Today Palladium is used in the making of instruments of scientific precision of the highest grade; the standard meter at the Bureau of Standards is made of this metal.

But this was leaving a new planet neglected. For on the first day of the new century, January 1, 1801, Piazzi, a Sicilian astronomer, had discovered the first asteroid, and had named it after Ceres, goddess of fields and harvests, who in ancient times had been the patron divinity of the island of Cicily. Why should Pallas have a chemical element named after it and Ceres be neglected? It didn't seem right to Klaproth, discoverer of Uranium and Tellurium. Soon he had his opportunity to correct the injustice, for in 1804 he discovered another element and lost no time in naming it Cerium.

It would seem as though Juno and Vesta should have received similar recognition, but such was not to be. Perhaps the impressiveness of asteroid discovery began to decline, perhaps the next generation of chemists was not astronomically inclined; anyway, we haven't any Junium nor Vestium. Think how much more convenient, as well as interesting, such names would be than, say, Dysprosium or Praseodymium or Ytterbium!

However, there was soon to be another heavenly body honored with a new element, namely our Moon. In 1817 Berzelius discovered a new element and found its properties to be similar to those of Tellurium. As the moon and earth go together in their orbit around the sun, these two elements go together hence he named the new element Selenium, from Selene, the Greek word for the moon and also, by personification, the name given to Diana in her role as Moon-goddess. Today this element is of tremendous scientific importance, for it is its property of changing its electrical resistance under the influence of varying degrees of light that forms the very foundation of the science of television. The technology of the future is going to owe a lot to Selenium.

And our final case is a mighty one. Helium, the most important of the chemically inert and non-combining gases,

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High Diddle Diddle, the sun's in the middle,
Canopus. by Bert L Taylor.

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The regular meetings of the society are held on the first and third Thursday evenings of each month, at 8 o'clock, in room 603 Extension Division, University of Wisconsin, 623 W. State St.

At this time we wish to welcome the following as new members to the society;

Mr. W. L. Weifenbach, 1822 E. Marion Street.

Mr. Leon Sikorski, 2522 W. Mitchell Street.

Mr. Joseph E. Boehm, 3511 No. Seminary Ave., Chicago, Ill.

Your Calendar For The Month

Monday, 1—Moon in Perigee. R.A. of Sun 0^h 38^m Dec. 4° 06′ N.

Tuesday, 2—Minima of Algol (Beta Persei) at 9:20 P.M.

Wednesday, 3—New Moon 6:11 A.M. H. W. Cornell lectures at the Public Museum, Around the Year with the Stars, at 8 P.M.

Thursday, 4—Junior meeting, 7:00 P.M. Papers on Nebulae, Comets, Saturn, Galileo.
Regular M A S meeting, 8 P.M.

Friday, 5—Conjunction of Venus and the Moon at 6:06 P.M., Venus south of Moon.

Saturday, 6—Mars in opposition, Planet now visible all night in the constellation of Virgo, Magnitude about -1.2.

Monday, 8—Constellations of Leo and Hydra on meridian about 9:00 P.M.

Wednesday, 10—Moon at first quarter 11:42 A.M.

Friday, 12—Mars nearest the earth.

Monday, 15—Conjunction of Neptune and the Moon. Neptune 5° 02′ N.
Sun rises at 5:10 A.M. Sets at 6:34 P.M.

Thursday, 18—Full Moon 3.10 P.M.
Technical meeting, 8 P.M.

Friday, 19—Moon in Apogee. Greatest distance from earth.

Saturday, 20—Jupiter's Satellite No. 3 eclipsed at 9:41 P.M. Sun passes from Pisces to Aries.

Sunday, 21—Lyrid meteor shower maximum, see meteor section.

Monday, 22—Jupiter's Satellite No. 1, shadow ingress 12:05 A.M. Transit ingress 12:31 A.M.

Tuesday, 23—Jupiter's Satellite No. 1, shadow egress 8:44 P.M. Transit egress 9:06 P.M.

Thursday, 25—Moon in last quarter 10:20 P.M.

Saturday, 27—The sun is now 13° 27′ 50″ north of the equator.

Sunday, 28—Venus about 30° above western horizon at sunset.

Tuesday, 30—Watch is now 2^m 40.2 sec. slower than the sun.
Sun rises at 4:47 A.M. Sets 6:51 P.M.

Thursday, May 2—New Moon 3:36 P.M.

C. P. Frister

Through The Eyepiece

J. F. Loepfe

Mercury—Poorly placed for observation this month being in superior conjunction with the sun on April 27. After this it will be an evening star and by the end of May it will be visible just after sunset.

Venus—Evening star in Taurus appearing as the brightest object in the sky excluding the sun and moon. It will be about 30° above the horizon at sunset and will set in the northwest at 9:30 P.M. April 15. There will be an occultation of Venus by the moon May 5, which will be very favorable for observation due to its northern declination.

Mars—This is the best time of the year for its observation. It will be in opposition to the sun April 6, and will be visible all night. It reaches its brilliancy, magnitude -1.2^m April 9, and is nearest the earth April 11. It will be in conjunction with the full moon April 17.

Jupiter—Morning star in Libra rising at 8:45 P.M. April 15. On April 20, the following interesting phenomena of one of Jupiter's satellites will occur. Satellite III will reappear in eclipse at 9:41 P.M., will reappear at 11:35 P.M., will disappear in occultation at 11:44 P.M., and will reappear on the other side of the planet at 1:05 A.M. the following morning. Jupiter will be in conjunction with the moon April 20.

Saturn—Morning star in Aquarius rising at 3:40 A.M. April 15. In conjunction with the waning crescent moon April 28.

Uranus—On the 15th is in R.A. 1^h 56^m, Decl. 11° 22′ N.

Neptune—On the 15th is in R.A. 10^h 56^m, Decl. 7° 54′ N.

INSTRUMENTS

(This is a column written by the individual members telling of their particular interest in astronomy and the development of instruments to satisfy that interest.)

My Telescope

J. F. Loepfe

Since my early years in grade school I have been interested in the sciences, especially astronomy. The eclipse of the sun of 1925 left an impression upon me which I have since retained. With a constant desire to possess a telescope I made a refractor using a lens from an old pair of glasses for the objective and a lens from a broken down camera for an eyepiece. This was alright for observing the sun and moon but it was of little value for observing much else for it was afflicted with both spherical and chromatic aberration. It was two years ago, during my last year in high school, that I attempted to make a six inch reflecting telescope as a project in Physics. I obtained from my instructor two pieces of glass that had been worked on before and were spoiled. By turning them over on the flat sides I ground myself a six inch mirror.

After the mirror was parabolized I set to work on the mounting. My tube was constructed of white cedar wood and is in the shape of a duo-decagon. It is held together by corregated fasteners and glue. The inside is coated with a flat black paint and the outside was given a coat of light oil stain, then, after thoroughly dry, a coat of shellac. It is superior to a metal tube in that temperature changes do not readily affect the mirror nor does dew settle easily. The mounting is constructed of automobile parts secured from a junk yard. The rear axel housing from a Ford mounted on a large brake drum serves as a base and the polar axis is made of a piece of boiler tubing. The cradle for the tube is made of Ford brake bands and part of a Chevrolet carburetor. A babbitted shafting box serves as the bearing for the polar axis. As for eyepieces, I am using the finder lens from an old camera which serves well as a ¾ inch eyepiece. Our neighborhood jeweler supplied me with lenses of longer focal length for a few cents. These make eyepieces of low power. The mirror and flat which are silvered and lacquered still retain their refectivity well after nearly two years of use. Fainter than 12th magnitude can still be reached. I have found that the collection of dust on the reflecting surfaces is the greatest obstacle but an occasional dusting with a camel's hair brush removes most of the obstruction. The mirror is kept covered when not in use.

Many enjoyable hours have been spent observing the Moon, Jupiter with its four eclipsing moons, Saturn, Mars, Venus, Mercury, Uranus, Neptune, Pluto, sun spots, double stars, nebulae, clusters, occultations of the moon, and variable stars for the A. A. V. S. O.

At the present time some forty students of the West Allis High School are busy constructing four inch telescopes as projects in the physics classes.

H. R. Stamm, an instructor of the West Allis High School recently purchased 90 pounds of optical rouge and 20 pounds of pitch making available to all those interested in constructing telescopes some of the necessary materials which may be obtained from him at cost.

A STAR SWELLS UP and BURSTS by Henry Norris Russell, Ph. D., in Scientific American for March 1935.

This is a description of Nova Herculis. On Nov. 14th it was fainter than 13.8 Mag. It increased by 13^m or 160,000 times its original brightness within a month and probably in much less time. Its spectrum is like that of other novae in showing wide bright lines flanked with narrower dark components on the violet side. Shortly after its discovery the spectrum closely resembled a hot star of class A2, later changing to one of F8.

An enormous liberation of energy took place within the surface of the star causing the explosion, and the outside upper layers were driven outward in all directions. That outer layer will turn from opacity to transparency, and gradually fade away into space.

Struve concludes from the intensity of the K line of calcium that the star is about 1500 light years distant.

George Knott, a Junior member, has recently completed an f-16, 4" reflecting telescope. The instrument is unusual in that its focal length compares with that of refractors. Because of the unusually poor observing weather, it has not been tested to study its performance.

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takes its name from the Greek word Helios meaning the Sun, a name given also to Apollo as Sun-god. Lockyer's discovery of this gas in the solar spectrum in 1868 and its naming as a substance existing in the sun but not on the earth, and its discovery in the laboratory by Ramsay in 1895, and its subsequent great technical importance, will always form one of the romances of Science.

American Meteor Society Notes

Wisconsin-Northern Illinois Region

The meteor notes from the American Meteor Society by Dr. Charles P. Olivier, which appeared in the March 1935 issue of Popular Astronomy, included a series of tables which summarized the observational results of the members of the A M S for the year 1934. A review of these tables revealed some rather interesting information with respect to the activities of the various regions.

In the list of individual members, Mr. J. Wesley Simpson, Regional Director of the Missouri-Southern Illinois region who resides in Webster Groves, Missouri, achieved the distinction; and very deservedly so, of having observed the greatest number of meteors. He is a most assiduous observer, having obtained a total of 2319 observations in 76 nights. Mr. R. J. Wilson of Byron Center, Michigan, was second with a total of 1482 meteors in 26 nights.

Of the Regional Groups, the Missouri-Southern Illinois observers were first by a most comfortable margin; having amassed the large total of 9013 observations. The observers located in California barely crowded the Wisconsin-Northern Illinois Region out of second place by having 2470 meteors to their credit against the 2415 obtained by the latter group. The Michigan group submitted 1793 observations for fourth place. Other groups reported as follows: Kentucky-Tennessee, 1743; Arizona, 1641; Colorado, 1198; and the Texas Observers, 1100.

Among the members of our region; five were listed as having reported more than 40 observations, they are: Miss Trimmier and Mr. Armin Deutsch of Chicago, Mr. Preucil of Joliet; Mr. Peck of Milwaukee and Mr. Niebuhr of Reedsburg. Mr. Preucil was first in our region with a total of 417 observations. The meteor section of the Milwaukee Astronomical Society deserves very special mention for their efforts in obtaining somewhat more than half of the total number of meteors observed and submitted to Headquarters by this region.

This analysis was made only for the purpose of determining the status of our region as a whole in comparison with other regions who are similarily engaged in this very worthwhile activity, and not for the purpose of developing competition between regions. When one considers that you, as a group, have been banded together for slightly more than a year and that three-quarters of your total number of observations were plotted, you richly deserve and do receive much credit for the splendid achievments accomplished in such a short period of time. However, there is every opportunity for increasing our productivity during the coming year; not only in the number of meteors observed but also in the recruiting of new members. Let us endeavor to double our list of active members through the enlistment of one new member by each one of us.

The Olivier-Hoffmeister Program is now in full swing; the recording blanks are in the hands of the participating members and systematic programs of observation have been established. The meteor section of the Milwaukee Astronomical Society, under the very able leadership of E. A. Halbach, have voluntarily chosen and reserved individually, certain nights of each week for this work. The meteor section of the recently organized Madison Astronomical Society under the guidance of J. M. English have also inaugurated a pre-determined program of observation. No reports have as yet been received from our Reedsburg, Chicago or Marshfield stations, but we feel confident that similar courses of action are in progress at their respective locations. The weather conditions during the past five months have been most discouraging for any sort of continuous or regular work. This, however, makes it all the more important that every effort be made by each participant to observe on the clear nights as they occur, rather than waiting for their chosen night and taking a chance of it being just another cloudy night. We may of course return to our regular schedule when, as the season progresses, we may be more reasonably assured of favorable observing conditions existing for longer periods of time.

A most unusual meteor was observed by Edwin P. Martz, Jr., while he was observing the Leonids on the morning of November 14, 1934. At 14:25, while watching his area for duplicate height work his eyes passed over Regulus and much to his surprise he saw a very faint but large body about the apparent angular diameter of the full moon, proceeding quite slowly in a northwesterly direction. It passed leisurly over his head and disappeared above some trees in the direction of Cassiopea. The object was round with hazy, indistinct borders, a brighter nucleus being distinquishable in the center. The whole was a dull, drab, greenish hue, giving no evidence of burning but rather seemed to be glowing with an inner heat. No visible train was left. Its passage was utterly soundless, and was in a straight line from Regulus to Beta Cassiopea.—*L. E. Armfield*

The M A S Bulletin

Published monthly by the Milwaukee Astronomical Society

VOL. 2, No. 5 May, 1935 Ten Cents

The American Amateur Astronomical Association

By J. WESLEY SIMPSON
Editor, The Astronomical Discourse

The United States has many times been referred to as a progressive nation and an international leader in a multitude of fields. America can justly claim this honor in finances, trade, commerce and many of the sciences. This is due to a number of things but mainly to organization, co-operation and leadership of high quality. Once more the time has come for America to come to the front and show its progressiveness by effectively coping with a problem of pretentious dimensions.

We have all heard that the future holds more idle hours for us with no assurance of higher pay. With the realization of this truth, hobbies and many diversified forms of recreation are becoming and will continue to become more and more important. One of the first stipulations that the average person would make in choosing a hobby, would be—How much is it going to cost me?; others thoughtfully will reason—How much will I benefit by its inception into my life? These are important factors and ones which must be thoughtfully considered.

We have only to look at the ever increasing number of astronomical societies, associations, clubs and telescope makers organizations to see what a hold astronomy and its allied branches have upon the people of our nation. Astronomy, in the manner that it is usually followed, is quite inexpensive, is intellectually beneficial and is a pleasant hobby; thus it has gained a great many followers. While this great army of sky minded individuals marches on toward fanciful recreation—ever gathering new recruits to its ranks—a few are thinking of more serious things. Out of all of these many groups, all interested in the same science, one has only to visit their headquarters or to look over the reports of the American Meteor Society, the American Association of Variable Star Observers and other large, active and specialized international organizations, to see that there are two distinct classes, namely, those who are just interested enough to satisfy the inherent insatiability of man, concerning these empyreal regions above and those who are actively engaged in valuable scientific work.

There is, perhaps, one such group of active amateurs out of every twelve astronomical societies, associations and clubs that are now in existence yet we cannot forget the other eleven, since, within their ranks there may be and usually are, a few active individuals who do worthwhile work but who are handicapped by the fact that the rest of their group are not vitally interested in scientific astronomical work. At present, those interested in variable stars can get help from Harvard, those in meteors from the University of Pennsylvania; which are the headquarters for the AAVSO and the AMS, respectively.

The AAVSO and the AMS in particular are engaged in deriving important results from the thousands of observations which they annually receive from several hundred alert amateurs in various parts of the world. Their main work is the reduction of observations and the derivation of invaluable results therefrom, since they are the best prepared and equipped organizations in their respective fields to do this type of work. To answer the ever increasing multitude of letters and to meet and cope with the myriads of individual and group problems, taxes these two organizations tremendously and thus slows up the tedious work that must be done ere the many abstruse and abstract enigmas in their fields are resolved into one unified chain of knowledge with all links, many of which are at present missing, filled in. Thus it is self evident that the United States needs an amateur astronomical association which can by its very nature lift some of the load of correspondence off of the shoulders of the AMS and the AAVSO and stimulate greater group and individual activity in the programs of these two organizations.

Turn for a moment to Great Britain—They have their British Astronomical Association; this association embodies practically every prominent and active amateur astronomer in Great Britain and some of those from other countries. Its organization is such that its inauguration in similar form here in America would offer a solution to the rapidly increasing problem of how to take care of the many amateurs and their multitude of troubles. It is over this problem and question that several amateur astronomers have cogitated for many months. At present America has no real astronomical association for the active amateur. All present organizations of national form are either professional or

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The official monthly publication of

The Milwaukee Astronomical Society

2046 So. 59th St., Milwaukee, Wisc.

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Ten cents per copy, $1.00 per year. Contributions are solicited but cannot be paid for. Their publication, either in whole or in part, is solely at the discretion of the committee on publications. Address all communications to the secretary of the society at the above address.

The regular meetings of the society are held on the first and third Thursday evenings of each month, at 8 o'clock, in room 603 Extension Division, University of Wisconsin, 623 W. State St.

At this time we wish to welcome to the membership of the society Mr. James Conklin of the Public Museum Staff.

* * *

At the Popular meeting of the society to be held May 2, Mr. John Meyer will talk on the Life and Achievements of Tycho Brahe and Galileo.

* * *

The following subjects will be discussed at the Technical meeting to be held on May 16, Application of Astronomy to Navigation by Dr. G. A. Parkinson, and An Interesting Variable Star Study, by Lynn Matthias.

(Continued from page 17)

specialized such as the AAVSO and the AMS.

For more than four months Mr. L. E. Armfield, representing the Milwaukee Astronomical Society, and the writer, representing the Missouri-Southern Illinois Observers, have discussed this problem. At first, it was a hopelessly complex task but within the last month a solution has been found. Why not have an American Amateur Astronomical Association? To start from the bottom and work up to a large and efficient organization would be inexpedient but the suggestion growing out of Mr. Armfield's original idea is both practicable and highly desirable.

Thus having seen the necessity for such a group, that it is at present working successfully elsewhere, is practical and beneficial and that it is adaptable to our present condition, it was mutually agreed to act at once.

Mr. Armfield's idea that we combine the Milwaukee Astronomical Society, the Missouri-Southern Illinois Observers, and the Madison (Wisc.) Astronomical Society to form the nucleus of the proposed new American Association was the first step made. The first two groups lead the country in the field of meteors and variable star observations (that is, among similar groups and as sections of the AMS and the AAVSO) and certainly constitute an excellent backbone for the new organization.

The aims of the new association are to stimulate active participation of amateurs in a number of interesting and valuable fields, to stimulate participation in the respective programs of the American Meteor Society and the American Association of Variable Star Observers, to encourage original investigation into methods of observation and development of equipment, to form an instrument loan bureau, to form a library and to take some of the burdens of incidental correspondence off of the AAVSO and the AMS. Thus the new members of the new American Association will soon be able to present their problems to the association's sectional leader in the field in which the problem presents itself without writing to the above mentioned societies. The sectional leaders in the various fields will be chosen from the ranks of these two organizations (MAS and M-SIO) and are to be men who are familiar with the problems presented to the average amateur. In the event that the sectional leader cannot solve the problem, he will have recourse to the national authorities in the particular field in which the difficulty arose.

The new organization needs an official publication through which it could reach its members for the dissemination of current astronomical news and events. It has also been further suggested and adopted that the M A S Bulletin, official publication of the Milwaukee Astronomical Society; the Astronomical Discourse, official publication of the Missouri-Southern Illinois Observers and the Madison Bulletin, the official publication of the Madison Astronomical Society be combined into one publication, under one name, but still printed separately with careful planning to avoid duplication of material, for the price of one—which is at present $1.00 a year, post paid. The name of this publication shall be "Amateur Astronomy."

With the issuance of this—the first issue of "The Amateur Astronomy" the association's official publication, all members of the three original organizations and all subscribers to the above three mentioned publications become members of the American Amateur Astronomical

(Continued on page 20)

Occultations For Amateurs

R. D. Cooke

The prediction, observation and computation of occultations of stars by the moon offers a very fascinating and useful field of activity for the amateur astronomer, and with the closer relations now existing among the amateur groups of the middle west it is hoped that a cooperative arrangement can be accomplished for furthering this work. This article is an attempt to provide the amateurs, unfamiliar with occultation work, with such information as will enable them to decide whether there is an appeal in it for them. It is our hope that a group can be formed among the societies, which will concentrate on occultation study and thereby make a definite contribution to the science.

In a few words, the purpose of observing an occultation is to provide the data for an extremely precise determination of the moon's longitude. A large number of such observations taken throughout the year at stations all over the earth determine the moon's rate of motion in its orbit and serve to facilitate the compiling of future lunar tables. This branch of astronomy is under the direction of Prof. E. W. Brown and Prof. Dirk Brouwer of the Yale University Observatory, who compile and publish the final summary each year with due credit to all who take part in the work.

Of the two distinct branches of occultation work, observing and computing, the greater need is for volunteer computers to reduce the observations of those not able to do so themselves, but persons interested only in observing will certainly not be discouraged.

Observing an occultation consists in determining the time of disappearance of the star behind the moon to an accuracy of the nearest second. Predictions can usually be furnished accurate within a minute or two, which enable the observer to be prepared in plenty of time for the actual observation. The necessary accoutrements are a telescope, a good clock, a stop watch or other means of carrying the time from the telescope to the clock, and means for receiving radio time signals from Arlington. The time signals from broadcasting stations are not sufficiently accurate. It is also necessary to know the latitude and longitude of the telescope to within 1″ and 0.1s respectively. Because only dark limb disappearances are used (before full moon), this class of observing usually comes in the early evening and seldom after midnight.

We are especially eager to interest a number of people in the reduction of occultations. This calls for a knowledge of the rudiments of geometry and trigonometry and a certain amount of facility with the use of tables. It is necessary to have a copy of the Ephemeris and Nautical Almanac for the year in which the observation was made and a convenient log and trig table. A slide rule also helps to a certain extent. Beyond these there are only needed plenty of pencils and a certain amount of patience. An eraser is also a convenience. With the accumulation of a little skill the reduction of an occultation can be completed in somewhat less than an hour, but the beginner should not be discouraged if the first one takes two or three hours.

Amateurs who believe they might be interested in either phase of this work are invited to communicate with the writer at the address given below. Instructions and blanks will be furnished to computers and every assistance possible will be available to those interested in observing. During 1934 twenty good observations were made by members of the Milwaukee group and the reductions completed in duplicate. In addition to this, reductions were computed for seventy observations from other sources, about twenty of them in duplicate.

The predicted occultations for May, 1935 are appended. They are for the vicinity of Milwaukee, but can be used elsewhere if it is remembered that the times may be off a few minutes.

The occultations of Venus cannot be timed closely because it will not disappear suddenly as a star does, but will be a spectacle worth watching. The time for reappearance of this and for Antares are given also because of their unusual interest. First magnitude occultations are far more rare than eclipses of the sun. The last was in 1932 and occurred in the daytime. The occultation of 75 Virginis is doubtful. It will pass the moon nearly at a tangent and with the graphic method used it was impossible to predict whether it will be occulted. It undoubtedly will, as seen from points a little farther south.

Date	Star	Mag.	Immersion	P. A.	Emersion	P. A.
May 5,	Venus	-3.5	5:48 P.M.	150°	6:34 P.M.	231°
May 10,	83B Leonis	5.9	11:09 P.M.	80°		
May 11,	89B Leonis	6.3	12:34 A.M.	165°		
May 15,	75 Virginis	5.6	6:15 P.M.	28°		
May 19,	Alpha Scorp	1.2	1:46 A.M.	115°	3:00 A.M.	250°

(Continued from page 18)

Association without further payment of dues and henceforth will receive "Amateur Astronomy."

This plan has been thoroughly probed into and discussed by both organizations and thus it is that at the kind invitation of the Milwaukee Astronomical Society and its representative, Mr. Armfield, I have herewith outlined the necessity for the new organization, its benefits, scope and some of its aims. For the new members of the new association I have this to say—we have all combined to take a colossal stride toward what we consider a necessary and beneficial ideal. The organization is more than its motivating force—it is just what the association as a whole makes it. We have all heard that "A house divided against itself cannot stand", and this is thoroughly applicable here. We need, and there unhesitatingly ask, each member of these three groups for their whole-hearted and unselfish co-operation both in individual and group spirit, to assure the success of this plan. Let's all work to make this an event of historical significance in the development of the amateur, in the science of astronomy.

Locksley Observatory
Webster Groves, Mo.

Variable Star Notes

Hans D. Gaebler

There are many amateur astronomy associations in the United States, all more or less intimate with a number of professional astronomers but none of them forming a branch or section of the American Astronomical Society. The amateur observer of variable stars has, however, a direct contact with the professional through the American Association of Variable Star Observers, with headquarters at Harvard. In Europe the situation is quite different but the amateur observer over there submits to a more rigid program laid down for him by the professional association. This may account largely for the difference in observing program of the amateur there and here. In the British report covering 1920 to 1924 a limited number (51) of long period variables was observed. Professor B. P. Gerasimovic, in his report on amateur observing in Russia says in the April 1933 number of "Variable Comments" that some 60 selected long period variables are observed by amateurs . . . "accessible to instruments of medium size and not included in the regular programs of the AAV SO and other associations". In the General Instructions to Observers (circular No. 1) of the AAVSO the association is endeavoring to secure observations of some 500 variable stars of long period.

In an effort to get behind this program our Mid-Western groups are combining their bulletins as explained elsewhere in this number. The following recommendations are made: Every observer of variable stars should try to join the AAVSO if he is not already a member. This will at once entitle him to charts and other assistance from the regional adviser and he will find further assistance by joining the nearest observing group, Texas, Missouri, Madison, or Milwaukee.

After each observer has sent his observations to Harvard or done so through his group, he is to send a list of names of observers and the number of their observations to Hans D. Gaebler, Watertown, Wisconsin, for compiling a monthly report of the whole Mid-Western activities. It will assist the work of compilation if these are sent in by the first of each month. In the first report it may be well for each group and each individual observer to also indicate the kind and size of the instrument he is using.

It is hoped to include in this section from time to time, articles dealing with variable stars. Amateurs may send their articles here and a committee will take charge of them. An effort will also be made to report on some of the activities of foreign amateur observers as gleaned from their journals.

The following observations have been submitted for the month of March by the Milwaukee members of the AAVSO and who comprise the variable star section to the Milwaukee Astronomical Society:

D. Armfield, 5; L. Armfield, 197; G. Diedrich, 49; C. Frister, 12; E. Halbach, 155; J. Loepfe, 10; A. Peck, 145.

The M A S Bulletin

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Making Motion Pictures Of An Eclipse

R. D. Cooke and E. A. Halbach

In view of the interest shown in the motion pictures of the Feb. 3rd partial eclipse of the sun shown at the March meeting of the Society, it is believed it may be worth while to put on record some of the technical details of the work for the benefit of others who may want to do similar things.

The idea of making the pictures was conceived at such a late date that there was not time to develop the best camera shutter that might be worked out, and the one used should be regarded as more or less of a makeshift. The lens and diaphram were removed from an ordinary 16 mm portable movie camera, and rather than tamper with the original shutter it was replaced by a similar one with the centrifugal governor left off. A small flat electromagnet was mounted within the camera just below the shutter arranged in such a way that the armature engaged a stop on the shutter. A quick impulse through the magnet would release the shutter and catch it after one revolution. It was found to operate well only within a very limited range of spring tension on the motor, so during the exposures the motor spring was wound frequently by small amounts. Contacts for releasing the shutter were placed on a shaft of the equatorial drive running at a convenient speed, which happened to be 3 1/3 RPM. With two sets of contacts exposures were secured at intervals of nine seconds. A 45 volt battery was used to operate the release, and a condenser was bridged across the contacts to absorb the spark.

The lens used was a single element of 16 in. focal length and was stopped down to a .5 in. aperture or f 32. The chromatic aberration was not objectionable because of the small aperture and the very dark filter used, which was almost monochromatic. The film was regular panchromatic 16 mm movie film.

A series of test exposures made the Sunday before the eclipse served to determine the best shutter opening and the proper filter. The latter was composed of No. 4 and 7 standard Wallace filters used together and was a very dark yellow-green. The length of exposure has not been determined exactly but may be estimated at about .025 sec.

Guiding was accomplished by clamping the camera to a motor driven equatorial telescope mount and alignment was maintained by means of an auxiliary lens of 39 in. focal length throwing an image of the sun on a white card with lines ruled to correspond to cross hairs. The drive was accurate enough that very little manual guiding was necessary.

While we may claim that technically the expedition was a success, it was certainly less so from the artistic standpoint. Of the two hours and ten minutes duration of the eclipse about one hour was photographed, and much of that through fleeting clouds. The resulting motion picture leaves much to be desired pictorially speaking, but there will be other eclipses, and we hope the next one will be in clear sky.

More recently it has been possible to set up a very much more satisfactory device, which it is planned to use on the coming eclipse of the moon. An old motion picture camera in bad condition was secured at a very small cost. It was put in good repair and has been found ideally suited to this kind of work. The shutter release is made through a type K telephone relay that is very fast and positive. The contactor for operating the relay is driven by a separate motor whereby a considerable range of time intervals is available.

6911 Cedar Street
Wauwatosa, Wis.

The official monthly publication of

The Milwaukee Astronomical Society

2046 So. 59th St., Milwaukee, Wisc.

The Popular meeting of the society will be held on June 6th. At this time Mrs. Harriet O. Smith will give a talk on the Life of Galileo.

* * *

The Technical meeting will be held on the 20th. Notice of the program of this meeting will be sent to the members of the society.

* * *

The executive board has accepted the resignation of Mr. A. F. Boyd as editor of the Bulletin. We are sorry to have Mr. Boyd leave us as he did a great deal of work for the best interest of the society through his work on the publication.

* * *

We have received the first numbers of the publication, Southern Stars, published by the New Zealand group. This is truly a noteworthy publication. Our members will find it in the societies' library.

* * *

According to Harvard College announcement card 334 Nova Herculis increased in brightness two magnitudes between May 7 and May 17. A visual photometric set May 18.24 U.T., gives the magnitude as 10.8.

* * *

CCC Camp workers at Laona, Wisc., have contructed a nine-inch telescope and obtain the correct time on clear evenings by observing stars. Enrollment in the astronomy class has increased from six to sixty-five, and the youths are now making a 22-inch telescope.

— The Monthly Evening Sky Map.

* * *

The recent occultation of Antares by the moon was watched with a great deal of interest by several members of the society. Although the observing conditions were far from the best during the time of the occultation it was readily seen. We wish to call your attention to the occultations for June to be found on another page of this Bulletin.

In Memoriam

EDWIN BRANT FROST
1866 - 1935

Born at Bratleboro, Vt., July 14, 1866. A B. Dartmouth 1886, A. M. 1889, D. Sc. 1911. Studied at Strassburg and Potsdam. Married Mary E. Hazard 1896; three children. Taught astronomy at Dartmouth 1887 - 1902. Director of Yerkes Observatory 1905 - 1932; director emeritus 1932 - 1935. Member National Academy of sciences, American Philosophical Society, Royal Astronomical Society, American Astronomical Society, Astronomische Gesellschaft; fellow American Association for the Advancement of Science, American Academy of Arts and Sciences. Contributed articles to Astrophysical Journal of which he was editor from 1902 to 1932, Science, Astronomical Journal, Astronomische Nachrichten, and wrote in 1934 an autobiography entitled "An Astronomer's Life". Died in Chicago May 14, 1935.

Dr. Frost's place on the astronomical ladder was on the top rung. The Milwaukee Astronomical Society is made up of amateur astronomers, hence its place is at the bottom, if on the ladder at all. What in this case was the attitude of the higher toward the lesser?

He graciously accepted an honorary membership in the Society. He gave his time and effort to deliver to the Society and its friends a lecture at the Milwaukee Public Museum, in which he set forth his views on the origin of solar systems similar to ours. He was host on many occasions to members of the Society in his charming home on Lake Geneva. He gave advice and encouragement to the Society. A high school member of the Junior Society wrote him asking for suggestions as to what studies to pursue in order to become a professional astronomer, and he answered at length by letter written longhand on ribbon paper, signed with his usual "Edwin B. Frost (ipse)", giving practical aid to this unknown lad—advice which will doubtless be always remembered and followed if only because it was tendered by the beloved Dr. Frost.

When the man at the top reaches down from the heights to encourage and give help to those below, "even unto the least", that typifies a true love of mankind and a personification of the word "gentleman."

Finding My First Asteroid

I had read about asteroids, heard about them, and talked about them but I had never seen one. So one evening while going through the regular routine of observing variable stars I decided to "pick up" an asteroid. It had been cloudy the evening before so I had traced or rather enlarged a map of the region in which Ceres was to be found from a smaller map in Popular Astronomy. At the telescope I found the star, Castor, in the finder and located it in the eyepiece. Ceres, the asteroid I wished to find was at that time two degrees form Castor. Then I found Rho Geminorum from which I was to find Ceres. The map I had didn't have a scale, so I had to find out how much of the map was covered by the eyepiece field. I found a certain configuration but I couldn't place the other stars because as yet I didn't have a scale and besides there seemed to be an extra "star" in the field which confused me. This extra "star" I later found to be the asteroid, Ceres. I looked at the field and as my hands were getting cold I went into the house where I studied the map and found that I had beyond all reasonable doubt located Ceres. I showed my friends the asteroid and called it a good day's work. I had seen an asteroid. Looking at it a few nights later showed me that Ceres had moved and also confirmed my "discovery". I had received no outside help from anyone in the locating this my first asteroid and I considered myself "pretty lucky".

George Diedrich
Junior Auxiliary

Variable Star Notes

Hans D. Gaebler

In this month's issue we offer to the readers of the Variable Star Section an article by Professor C. M. Huffer of the Washburn Observatory Madison, Wisconsin. While not many amateur observers possess the Draper Catalogue it is always available at the nearest observatory library and Professor Huffer's excellent explanation of it should prove a great help when consulting the catalogue.

Questions and Answers

What point in the celestial sphere has both its right ascension and declination zero?

Ans. The vernal equinox—the first Aries.

What is the right ascension and declination of the north pole of the eclipse?

Ans. 18 h.R.A., and 66° 33′ decl.

When the sun is in the constellation Tarus, in what sign of the zodiac is it?

Ans. In Aries, because the motion of the pole of the ecliptic, due to the precession of the equinoxes, causing the equinox to move eastward 0″.11 per year, causes the signs of the zodiac to correspond no longer to the zodiacal constellations, and each sign has backed into the constellation west of it during the last two thousand years.

Why is it warmest in the United States where the earth is farthest from the sun?

Ans. When the sun is north of the equator, as it is in our summer, sunshine lasts more than half the day, and the mean altitude of the sun while above the horizon is greater. When the sun's rays strike our hemisphere in summer, they strike more directly or vertically, hence their heating efficiency is greater —its heating efficiency is in inverse ratio to the surface over which the heat is distributed.

How many times does the moon turn on its axis in a year?

Ans. The moon rotates on its axis once a sidereal month. A sidereal month is 27 days. Hence it would rotate about 13.5 times a year.

OCCULTATIONS: The following are the occultations visible during the first and second quarter of the June lunation. The data are for Milwaukee and vicinity.

Date	Star	Mag	Immersion	Pos. Angle	Mon's Age
June 5	54 Cancri	6.3	8:40 PM	90°	5 days
June 7	115B Leonis	6.5	10:19 PM	48°	7
June 14	A Scorp	4.7	6:40 PM	145°	14
June 14	3 Scorp	5.9	6:55 PM	109°	14
June 15	48B Scorp	5.1	12:11 AM	140°	14
June 16	118B Ophiuchi	6.2	1:44 AM	30°	15

R. D. Cooke

THE HENRY DRAPER CATALOG

About fifty years ago the Observatory of Harvard College began a survey of stars for the purpose of determining accurate magnitudes and to classify them according to their spectra. This work has grown to include nearly a quarter of a million stars. The nine volume catalog containing their positions, magnitudes, and spectral classification has been dedicated to Professor Henry Draper, who was a pioneer in the art of photography as applied to astronomy. This catalog is called the Henry Draper Catalog.

The positions of the stars are given to the nearest tenth of a minute of time in Right Ascension and to the nearest minute of arc in Declination, and are referred to the equator of 1900. They are arranged in order of Right Ascension; and for each tenth of a minute the Declinations run in order from north to south. If it is necessary to use positions for some other year, say 1935, these positions will have to be corrected for the change due to precession and the proper motion of the star. For this purpose no tables are provided in the catalog but must be obtained from other sources, such as Burnham's Catalog of Double Stars. The Boss Preliminary General Catalog and the Yale Catalog of Bright Stars contain this data for all the stars entered.

The photometric magnitudes are given to hundredths of a magnitude for those stars which have been accurately observed. These magnitudes have been carefully determined by the Harvard photometers and are quite dependable. For a large majority of stars, however, these measures have not been made; the magnitudes have been merely estimated and are subject to large errors, some of them by a magnitude or more. This is sufficient for the identification of the star but is not accurate enough for use as a comparison star. The photographic magnitudes have been derived from the photometric magnitudes by applying the Color Index as explained in all recent texts on astronomy.

It is sometimes necessary for the amateur observer of variable stars to make up his own field of comparison stars for the observation of some variable star. For example, suppose he wanted to observe Nova Herculis with a small telescope after it had decreased below naked eye visibility. Here the Draper Catalog is of value provided comparison stars brighter than about the tenth magnitude are to be used. Fortunately the position of the Nova was given in Right Ascension and Declination for 1900. This makes the task much easier. Otherwise it would have been necessary to look up the changes due to precession and apply these corrections to the observed place. Care must now be taken to correct back to 1900.

But since the Nova is given for 1900, we can go directly to the catalog and look for stars in the same field. It is sufficient to start in Right Ascension about five minutes preceding the observed positon and look for Declinations within say one degree of the Declination of the Nova. The stars found are as listed on bottom of page.

These comparison stars are quite satisfactory. They can be plotted on a scale selected by the observer and identified by the configuration. It would be better if we could find some stars brighter than 7th magnitude and fainter than 9th, but we have to take what we can find. They are located east and west and north and south of the Nova which is very desirable And the spectral types satisfy nearly all degrees of color, running from the white A0, through the yellow F2 and G5 to the red K0. If fainter stars are desired as the Nova fades, it may be possible to find magnitudes in other catalogs, such as the Bonner Durchmusterung or wait until lists of comparison stars are published as has recently been done in Harvard Announcement Card332.

This star, however, is an exceptional one. Many new variable stars are discovered every year, some of them in reach of the amateur with a small telescope. The same method of selecting comparison stars can be used by the observer. He may hope to find comparison stars with well determined magnitudes. Also it is desirable to compare stars of the same color if possible. But this will have to be left to chance, particularly if the variable is in a region where stars are scarce.

Observations for the month of April, by the Milwaukee group, are as follows: L. E. Armfield 147, George Diedrich 43 E. A. Halbach 53, W. S. Houston 11, George Knott 18, J. F. Loepfe 7.

510 Clyman Street,
Watertown, Wis.

							Ptm. mag.	Spectr.
	Nova	18^h	4^m	40.5s	45°	50′	40″	
H.D.	165523		1.3		46	26	7.98	G5
	166067		3.9		46	16	7.46	F2
	165718		2.3		45	41	8.06	A0
	166118		4.1		46	46	7.9	F2
	166559		6.1		47	6	8.22	K0