

The Wasp

April 1969

The Warren Astronomical Society Paper

CLUB NEWS

Meetings:

April 9th-- there will be no meeting on this date as the school will be closed for Easter.

April 23rd-- the major portion of this meeting has not been definitely determined as of yet, but a stimulating program is promised.

Field Trips:

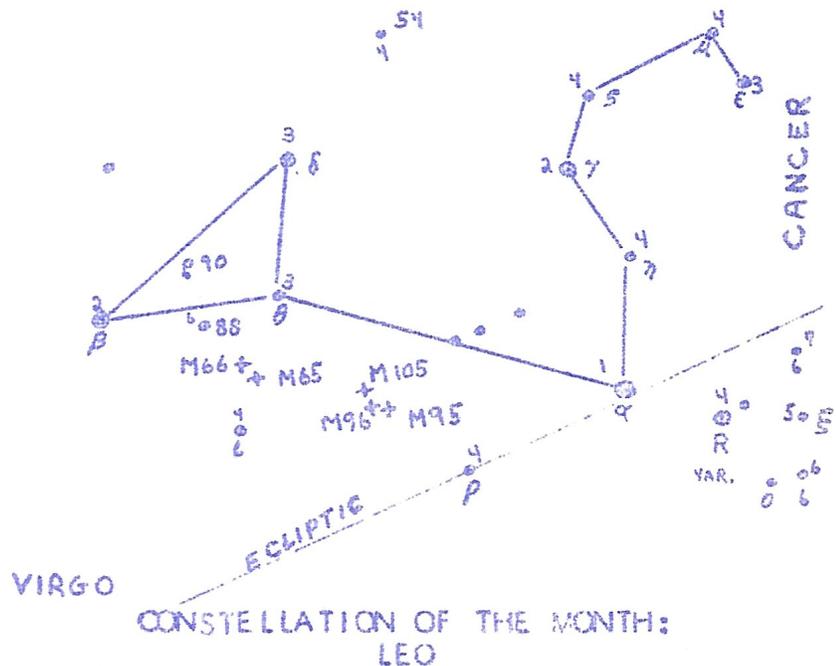
McMath-Hulbert Observatory-- Our club's visit to the solar observatory was very successful and will be described in detail next month in an article by Mrs. Alyea.

Occultation-- The club's excursion to Camp Rotary to time the occultations of the Pleiades was interesting to say the least. The weather was as exquisite as the hospitality, and even though few timings were made, the trip was a rousing success. If the evening skies that night were typical of the area, it should prove a superb site for our 12". In the future club members are reminded to bring counter-weights along with their telescopes.

Projects:

Spectrohelioscope-- materials have been ordered and work has begun. We need a speed control unit for the motor and would appreciate it if someone knew of one we could borrow for when the 'scope is in use.

Radio Telescope-- Jim Trombly has been in the hospital for over 3 weeks, and as such, progress along these lines has been impossible.



Location A line drawn from Pollux in Gemini to Cancrī, prolonged approximately 12° locates α Leonis, or Regulus. The 1st magnitude star in southern Leo, this star is the base of a number of stars which form a sickle or reversed "?" which make up the lion's head. The hindquarters of the lion are defined by a right triangle formed by θ , β , and δ Leonis or Denbola. This star lies 25° east of Regulus and 25° west of Arcturus in Bootes.

Description: The telescopic features of this constellation is the double star Leonis. It is considered by the late astronomer Otto Struve to be the "finest double in the northern sky". The observation of this object when the sky is not quite dark will show very well the yellow and green

THE ILLUMINATION SENSITIVITY OF THE EYE

The serious amateur gains much enjoyment and knowledge through his development of a variety of astronomical techniques and equipment. This continual quest for improvement must certainly lead, at some time, to questions like, "What really occurs when my eyes become 'dark adapted'?, What factors affect their illumination sensitivity? and How can I improve the light sensitivity of them?" Queries as the above cannot be overlooked, as the factors affecting night-vision play an important part in successful astronomical observation.

The light sensitivity of one's eyes varies (apart, of course, from naturally occurring differences in individuals) with several factors, the first being the degree of dark adaption. Within a second or two after the eye has been shielded from light the pupil (the hole in the front part of the eye through which light passes into the eye proper) dilates to a diameter of approximately 0.33 inches. Since, however, the area of the pupil changes only by a factor of sixteen, this dilatatory effect cannot be the prime cause behind dark-adaption as the sensitivity of the eye varies through a range of the order of one million.

The greater part of dark-adaption is caused through the eye's production of a substance known as rhodopsin, or visual purple, to which the rods and cones (nerve endings located in the rear of the eye) owe their light-sensitivity). Most of this substance is secreted within the first 20 to 30 minutes, though the process may continue more slowly as long as two hours. The visual purple disappears when the retina is exposed to light, but it forms again as soon as it is placed in darkness or faint illumination.

The production of visual purple is inhibited by a number of substance which produce a vitamin-A deficiency. Nicotine is

one of these, causing marked effects even one-half hour after being taken into one's body. This condition can be corrected through the eating of carrots or the consuming of cod liver oil, two items which might profitably be included in every amateur's diet.

The second variable which must be considered is the nature of the sky background. Whether the sky is more or less luminous may alter the threshold of perceptible illumination by as much as two magnitudes.

On a clear, moonless night the normal dark adapted eye can just see stars of magnitude 6.5¹. If, however, the sky is observed through a black screen which excludes all general starlight and skylight except that of the star under observation, whose light passes through a small hole, magnitude 8.5 can be reached². This surprising fact has been well substantiated in experiments under laboratory conditions, with artificial stars where all extraneous light can be removed very easily.

It may be noticed that the conditions occurring when an observation is made with a high-power eyepiece approximate those mentioned above. For this reason, published tables relating telescope aperture and minimum visible magnitude may be in error by as much as two magnitudes³, as they are constructed by extrapolating from naked-eye observations of the sky, which is considerably brighter than the field of an astronomical eyepiece.

To be continued G. Francis

¹Sidgwick, J. B., Amateur Astronomer's Handbook London, mcmly pages 437-438.

²Ibid., page 438.

³Ibid., page 438.

CLUB NEWS

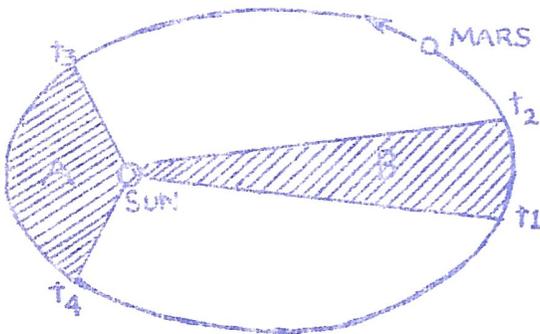
Optical Flat—Mr. Alyea has been working long and hard, and the mirror, polished out on both sides and flat to 10 millionths of an inch on one, should be ready to go to Tucson by the end of this week.

Camp out: The club will undertake serious observing at Bald Mountain during Easter vacation (April 7-13) along with other not so serious activities during the day. Hope to see you all there.

PHYSICS IN ASTRONOMY:
KEPLER'S THREE LAWS

Last month we saw how Tycho Brahe made painstaking visual observations of the positions of the stars and planets. Kepler was the man who took these observations, and with them, derived three basic laws of planetary motion. Here are statements of Kepler's three laws:

- I. Each planet moves in an elliptical path with the sun at one focus.
- II. The line joining the sun and the planet sweeps out equal areas in equal times.
- III. The ratio R^3/T^2 is the same for all planets, where R is the distance from the sun and T is the time necessary for one revolution.



Diagrammatic representations of Kepler's 2nd law. t2 equals t3-t4 Note that for the shaded areas to be equal, the planet must speed up at its closest approach, (t is an instant in time).

Test your understanding of these basic astronomical relationships by solving the following problem. The answer will appear in next month's issue of The WASP.

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CONSTELLATION OF THE MONTH

colors of the stars which make it up. This star system, along with numerous other doubles and fine Messier objects, M65 and 66, M95 and 96, and M105 make up the major objects of interest in Leo.

M65 is a 9th magnitude galaxy 8' by 1.5' in size. It is bright, large, and lies at a position angle of 165°. Its oval central region appears white and has a granular appearance in a small telescope.

M66 slightly outcores its neighbor M65. It has a size of 8' by 2.5' and is also bright and large, lying at a P.A. of 150°. In a small instrument, the central region of M66 appears mottled and nebulous.

The lion also contains the long period variable star R Leonis which is located on the diagram at "R". It varies in brightness from 5th to 11th magnitude in a period of 313 days. This one is well worth observing.

Notable Facts

Leo is one of the most ancient of the constellations.

Regulus is a white star of the Orion type, 71 light years distant and receding from us at 1.5 miles a second. It is about 100 times brighter than the sun. Also it is one of the stars from which longitude is reckoned, and it lies almost exactly on the ecliptic.

A meteor shower known as the "Leonids" radiates from the sickle of Leo around the 14th or 15th of November.

Gene Francis

Taken from Olcott's Field Book of the Skies.

If the entire sky were full of full moons, it would only be 1/5 as bright as daylight.

OBSERVATIONAL ASTRONOMY

THE GRAPHIC TIME TABLE
FOR APRIL

On Saturday, March 23, after the occultation was over, some of the club members decided to stay the night at Camp Rotary. Frank, Gene, Mike, and I, spent the early morning hours looking for deep space objects. Altogether we had an impressive array: an 8", 6", and 4 1/2" reflectors along with a 3" refractor. Frank, who had one of the smallest instruments, kept frustrating us by finding all of the faint galaxies before we did.

The night was perfectly still, with no wind whatsoever, and no mist as is generally present at Bald Mountain. The fainter stars within 30° of the horizon, however, were hidden by haze.

Jupiter was the first object to hold our attention, as it was only a few days past opposition, The view was astounding. Many times more detail than I have ever seen was visible on the planet's surface. The Red Spot was easily seen in all of the instruments, and before the night was over it had traversed the entire face of the planet.

The real thrill of the night for me came with the whirlpool galaxy. Never having seen this object before, I picked it up almost directly overhead, in the darkest part of the sky, only seconds after beginning the search.



If a galaxy ever looked like its picture, this one did. It was fantastic. Never having seen a spiral face on, all I was expecting were two faint patches for the nuclei. The patches were there, along with the rest. The entire system looked to be half as large as the full moon.

With dark-adapted eyes it seems that the

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PLANETS:

Mercury reaches superior conjunction April 8, beyond the sun from earth, and moves into the evening sky, where it sets about an hour after the sun by the end of the month.

Venus also reaches conjunction, though inferior, between the sun and the earth, on April 8th. The planet then moves into the morning skies, but it is too much in line with the sun for easy observation all month.

Mars rises late in the evening in Scorpius. The planet becomes better placed as the month progresses, reaching opposition on May 31st. The planet's disk, only 11".20 April 1st increases to 19".3 by the first of June.

Jupiter just past opposition (March 21st) The planet is well placed and easy to observe throughout the month.

Saturn reaches conjunction with the sun in Pisces April 18 and moves in to the morning sky, but is too much in line with the sun to be seen all month

Uranus Just past opposition, (March 22nd) this planet is well placed for viewing just to the south of Jupiter throughout the month.

SUN:

April 1st rises 6:15, sets 6:55
Twilight begins 4:43 ends 8:30

April 21st rises 5:45, sets 7:15
Twilight begins 4:10, ends 8:55

MOON:

FM=Apr. 2 LQ-Apr 9 NM-Apr 16 FQ-24
Perigee April 6 Apogee April 22

Lyrid Meteor Shower on April 23rd, a few more than the usual sporadic meteors will be seen.

PHYSICS IN ASTRONOMY

Astronomers have observed that Halley's Comet has a period of 75 years and that its smallest distance from the sun is 8.9×10^{10} meters, but its greatest distance from the sun cannot be measured because it cannot be seen. Compute its greatest distance from the sun, remembering that the distance R from the sun used in Kepler's 3rd law is equal to 1/2 the sum of the shortest and longest distances between the sun and the object.

It was Newton who told Halley how to compute the orbit of a comet. Halley found and calculated the orbit and period of the comet that bears his name in the course of a general analysis he made of comets' orbits.

---taken from PSSC physics text.

OBSERVATIONAL ASTRONOMY

spiral structure should be very evident, I am looking forward to seeing it through the club's 12".

Other objects seen that night include M81 and M82, The Owl Nebula (Gene's pride and joy), and many faint NGC objects which we did not identify.

The night was concluded with views of the old favorites, the Ring Nebula, the double-double, Uranus and M13, all of which were very striking, M13 showing many dust lanes which made it appear almost spider-like.

Camp Rotary seems the perfect compromise between dark skies, short travelling distance, and adequate protection. It looks like an ideal spot for the 12".

Martin Butley