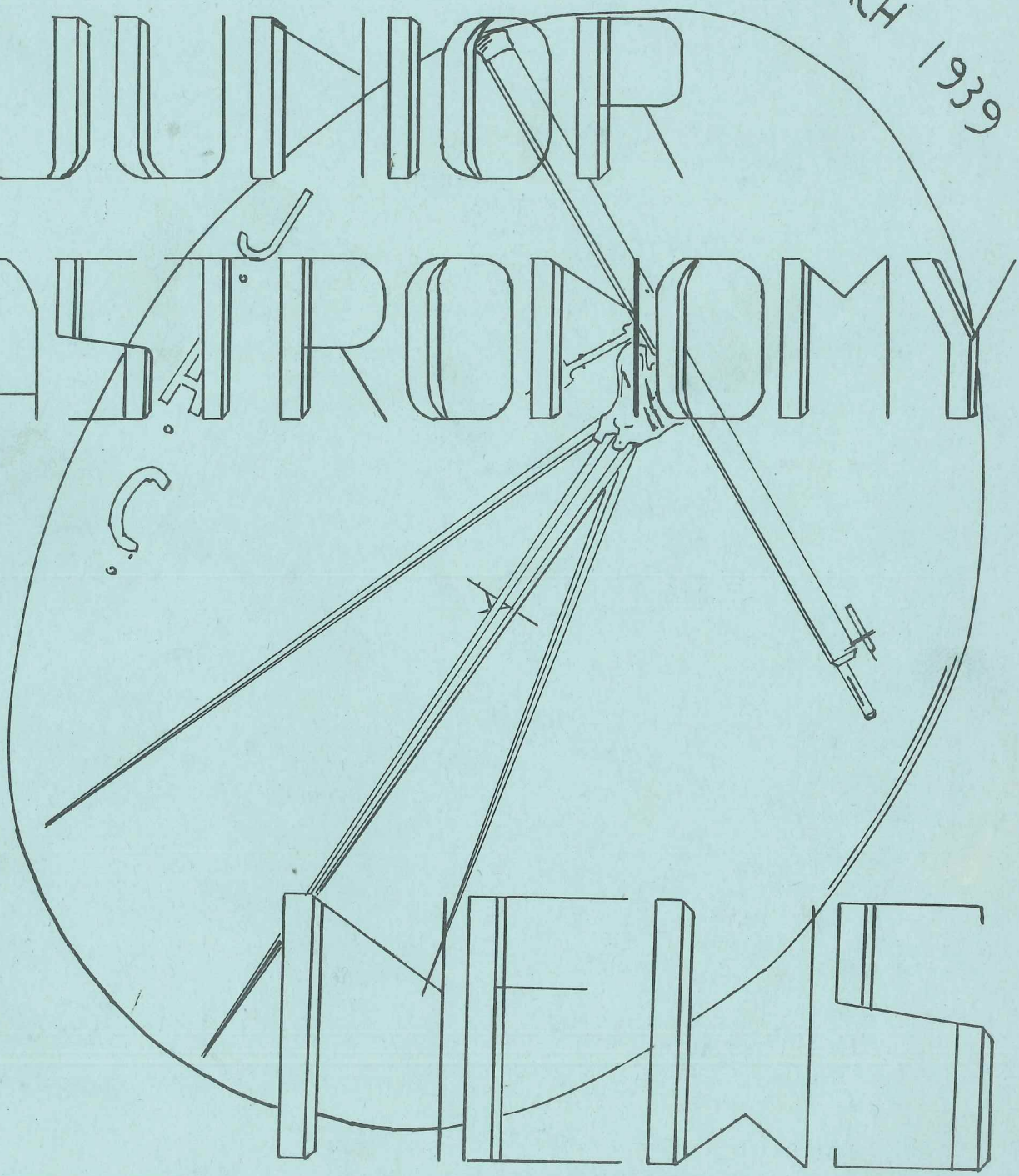
MARCH 1939

JUNIOR ASTRONOMY NEWS



TENTH ANNIVERSARY

JUNIOR ASTRONOMY NEWS

March -- 1939

Tenth Anniversary Issue

Published by
THE JUNIOR ASTRONOMY CLUB
Hayden Planetarium
New York, N. Y.

Issued monthly from December to May.
Annual subscription, six issues, fifty cents in the United States and elsewhere.
Associate membership is included.

EDITOR: Seymour Schinasi

Staff Artists
William Burgess
Henry Knoll
Sigmond Koch

Photographer: William Burgess

Scientific Associate: Hugh S. Rice

Planetarium Adviser
Dorothy A. Bennett

Associate Adviser
James B. Rothschild

Stenographer: Bertha Fay

COVER: drawn by Sigmond Koch

EDITORIAL

Grateful acknowledgment is made to the W. P. A. for stenographical assistance.

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To

Dorothy Agnes Bennett

the members of the Junior Astronomy Club affectionately dedicate this tenth anniversary issue of the Junior Astronomy News.

EDITORIAL

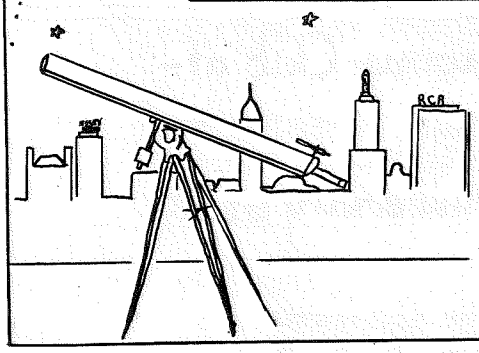
In the minds of many, as the days roll by, there is the hustle and bustle of the great city, New York, with its many peoples, subways, parks, and buildings, but in the minds of others, especially on Saturdays, there looms the great Museum of Natural History where there is to be found the office of the Junior Astronomy Club, an organization sponsored by the Hayden Planetarium, attracting hundreds of high school students annually.

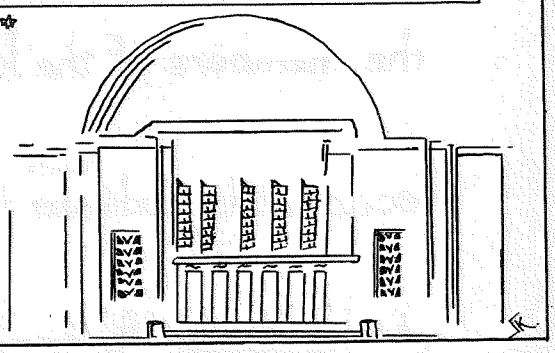
During the course of one Saturday, particularly one on which all of the Club's activities take place, there is a great chance for the outsider to see the effect of such an organization upon some of the youngsters living in and about the city. From early morning to late night Junior Astronomers keep tramping in and out of their headquarters, taking care of one thing or another. The actual word day usually begins at ten o'clock when the Production Staff straggles in one by one in preparation for the hard work that follows when the JUNIOR ASTRONOMY NEWS is put in shape for distribution at the evening meeting. With the hours passing, the Observers' Group, a bunch of enthusiastic amateur observers, drop in for their semi-monthly chat on their daily problems. After a few quiet moments behind closed doors, they are bombarded by the Production Staff who by now are spending their recently acquired recess time in trying to find something to do, their only natural course being up the steps and into the room where all good observers twiddle their thumbs. The newcomers are quickly absorbed and soon silence reigns again, but not very long. For, after a while, the Production Staff resumes its work and still later the group itself retires for the day.

Around two o'clock, amidst the strange noises that issue forth from the production room, five Junior executives appear on the scene and immediately go into conference, spending the next four hours in conducting the business affairs of the Club. By the time eight rolls around, everyone has eaten, and together with many other members the Executives, the Production Staff, and the NEWS staff appear in the huge lecture hall where they are entertained for another hour by a speaker, after which the Juniors proceed to the Library and then home.

So ends the day when at about ten in the evening the offices are locked up for the night. Twelve long hours have gone by. Twelve hours in which a day's work was put in by more than one person. Yet what has the club accomplished? What has the individual member gained?

In answer to the first question the Club has accomplished its purpose which was to spread an interest in astronomy among young people. It has, in achieving this aim, provided activities for many of the people enrolled in its files, and as a result of these activities it was able to give more and more to its members. The answer to the second question is not so easy, for there are many types of members, each taking from the organization in a different way. There are the members who come just for the pleasure of coming. There are some who come because they want to learn and work and out of these a few who try to master astronomy as a profession. There are still others who merely come for the sole purpose of mixing socially, but each individual, no matter for what he comes, leaves with the satisfaction of accomplishing his ends.



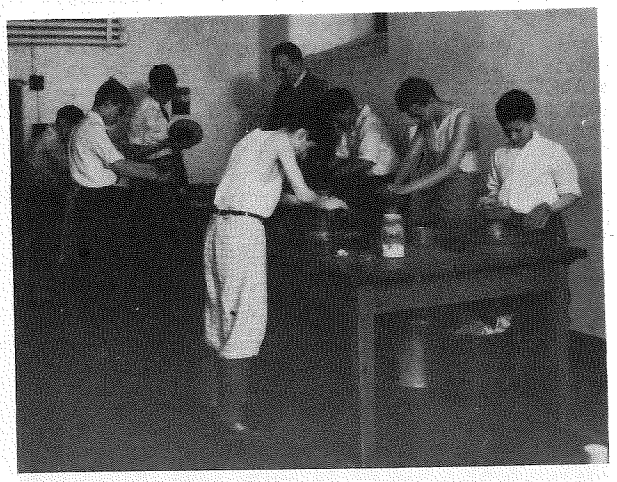


MAINE, PERU, AND ONWARD

Even today, in the world at large, it has become the custom to date a great many things "since the crash". The reference, of course, is to that fateful "Black Friday" of October, 1929, when the financial world collapsed so completely as to upset the orbital motion of every other sphere of human activity.

The Junior Astronomy Club, too, dates its history from the fall of 1929, for it was during those months when the rest of the world had gone mad that a group of high school students in New York City first met at the American Museum of Natural History in one session assembled.

True, they had met before - in the spring, on Saturday, March 30. That was the real beginning of the Club, in a way. But, if you were to liken the Junior Astronomy Club to a tree, then that meeting in March was simply one of the roots, together with a meeting held two weeks later on a Friday. For at that time the Club met monthly, in two separate sessions, the one on Friday being restricted to children of members of the American Museum.



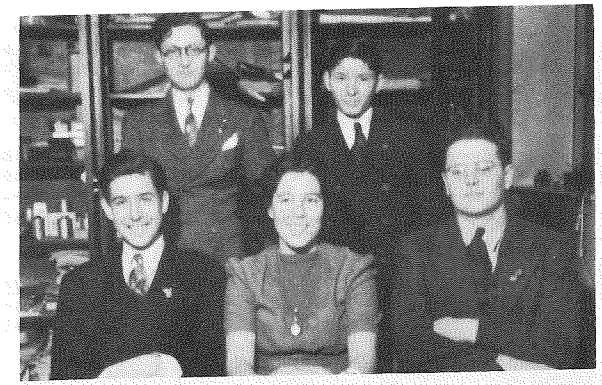
Club members make their own telescope mirrors.

Both groups were under the guidance of Miss Elizabeth Ann Eckels of the Museum staff, who organized the Club. And the first man to lecture before the Juniors was the man who is now Curator-in-Chief of the Hayden Planetarium - Dr. Clyde Fisher - who is still one of the Juniors' best friends.

Lectures alone, however, were not to occupy the boundless interest of the Club exclusively, and the Friday section pioneered in the field of publication, bringing forth the first edition of the Junior Astronomer that same spring. Not to be outdone, the Saturday group published a hurried magazine christened the JUNIOR ASTRONOMY NEWS. Before the summer began, a class in telescope making, under the direction first of Mr. Luman T. Thurber and later of Ramiro Quesada, was inaugurated.

And that was the beginning.

The roots came together that fall, and joined in the trunk of what was to be a very tall tree whose branches were to cover all the states of the Union and even spread across oceans. The meetings of both groups, formerly held on a once-a-month basis, were combined and held twice monthly. Junior members, as well as the visiting astronomers who had heretofore delivered the lectures, were permitted to address meetings.



The 1938-1939 Executive Committee of the J.A.C. From left to right, standing, Max Bonfeld, Treasurer, Seymour Schinasi, Editor; seated, Herbert LeBrescu, Vice-President, Madge Alk, Secretary, William Burgess, President.

Before Elizabeth Ann Eckels left to take up the different career of marriage, the two magazines were merged into the JUNIOR ASTRONOMY NEWS. Afterward, with its Adviser gone, the Club's ship of state became caught in the doldrums - until a fresh breeze, in the form of a new member of the Museum staff, sprang up.

That was Miss Dorothy A Bennett who still directs the destinies of the group. Shortly after she became Adviser to the Club, the JUNIOR ASTRONOMY NEWS gained an editor and was standardized in size at ten pages. Formerly it had been managed by the Executive Committee.

So the Junior Astronomy Club, finishing its third season, had lost an adviser and gained one, had twice changed the size of its magazine, and had passed, in the short time when there was no adult to guide it, through the major crisis of its existence. Now it began to prosper.

With the name of Hubert J. Bernhard, its first editor, flying at the masthead, the NEWS entered into a period of experimentation with the technique of publication and the matter of contents. It settled down before long into a steady schedule which, with a few minor changes, it follows to this very day. While this was happening, the annual election of 1932 came along. Henry Herman, President of the Club since its foundation, was unable to continue in office. James Rothschild and Vera Wolfson were elected as President and Vice-President. Each has maintained an active interest in the Club to this day.

Maine, Peru, and Onward, continued from the previous page

The staff of the JUNIOR ASTRONOMY NEWS was, perhaps, a bit too ambitious. It felt that it could do bigger and better things. And that summer it made its first attempt, presenting to what must have been a somewhat astonished public a 20-page booklet, a huge undertaking at that time, entitled Summer Fieldbook, 1932. An omniscient historian, pondering upon the process of cause and effect, might well come to the conclusion that that yellow-jacketed product of the mimeographer's art should be placed in a shrine for the veneration of Junior Astronomers.

Because, in all innocence, it began something that ended in the show-capped mountains of Peru. It contained an entire page devoted to a coming solar eclipse, visible in its total phase from such a far away spot as, for instance, North Limington, Maine.

That was all of 300 miles distant, but for a group of boys and girls in their 'teens it might just as well be on the moon. No matter, for when the sun rose on the morning of August 29, 1932, 30 Junior Astronomers and 10 adults were waiting in front of the Museum of Natural History to board busses that would take them there. It was costing each one of them $15, and some had worked hard for the money. But two days later they saw the eclipse, and made what they were pleased to think of as valuable observations. The strange part is that their notes were, indeed, welcome to astronomers, most of whom had been clouded out.

"Get your NEWS, fresh off the press", says Max Bonfeld as enthusiastic Juniors crowd into line for their copies.

Of course they had to return to New York. And of course, they had to talk together on that long bus trip. Nor was it unnatural that they talked of eclipses. There was going to be one, they remembered, in June, 1937, that would be visible from Peru. Now Maine, to the Junior Astronomer, may well have seemed as distant as the moon, but consider this strange coincidence.

If a light wave had deliberately chosen the time of the August eclipse to begin its long trip to the earth from the nearest star, it would, at its habitual speed of 186,000 miles a second, arrive on this planet at just about the time that people were starting to converge upon Peru to view this eclipse of the future.

That's how far away Peru was to the Junior Astronomy Club. But, again, no matter. Its members set to work, and in the ensuing years they did a number of things.

They went, a group of four, to the home of Dr. John A. Kingsbury, at Woodstock, N. Y., to observe with about 20 of his friends the Leonid meteor shower of November, 1932. Of the 901 seen by the entire company, 300 were counted by the Junior Astronomy Club contingent.

A Junior Astronomy Club Meeting

Sleepless, that same group prepared a radio script during the automobile ride home, and presented it over WYNC the next evening as the first of the Club's many radio broadcasts.

They organized a Discussion Group, to supplement the lectures delivered to the Club, and it flourished under the leadership at first of Dana K. Bailey and later of Annesta Friedman.

They prepared a special Eclipse Report issue of the NEWS, and its 21 pages were the biggest undertaking of the editorial staff to date. (This made money.)

They wrote and published a Summer Fieldbook, 1933, of 20-pages, similar to the fateful one of 1932. (This, also, made money.)

They continued extending themselves to the measure of 25 pages, and produced the Winter Fieldbook. For months they had trouble supplying the demand. (More money!)

They organized a Lecture Bureau, supplying the free services of tested Junior lecturers to outside groups, and were swamped with requests.

They inserted into the JUNIOR ASTRONOMY NEWS a calendar of coming astronomical events, prepared by Robert Fleischer. Annesta Friedman then became Editor of the NEWS.

Maine, Peru, and Onward, continued from previous page

They published, in 1934, a "Handbook of the Heavens", of 50-pages, usable the year round, with Hubert Bernhard, formerly of the NEWS, as its Editor. This took up the profits of the earlier ventures but it resulted in still more money.

They presented in the fall of that year, a series of radio broadcasts on Saturday afternoons, twice a month, over station WINS.

And, even with the JUNIOR ASTRONOMY NEWS selling at cost, their treasury grew, slowly but steadily. A New York publishing firm saw their "Handbook of the Heavens", liked it, and published it in grown-up book form. There were royalties, of course, and the treasury grew. That light wave from the nearest star was getting pretty close, now.

They watched Miss Bennett take another Club project, a revolving star map, and whip it into publishable shape. That sold too.

And then, as crowds in Times Square screeched a happy welcome to 1937, they took stock. They had enough money to send two persons to Peru as representatives of the Junior Astronomy Club.

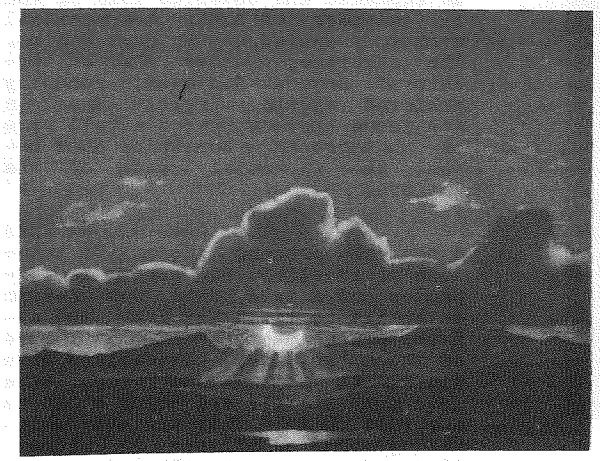
There was, they knew, just one person who had to go. That was Hugh S. Rice, a well-schooled astronomer who had given years of earnest effort to the Club, who was responsible above all others for the accuracy of its published material. Hugh Rice they wanted, more than anyone else, to go. But Hugh Rice couldn't, because he was working on a series of asteroid observations he didn't want to interrupt, because he was studying for an advanced degree, and because he was handling a difficult publication schedule.

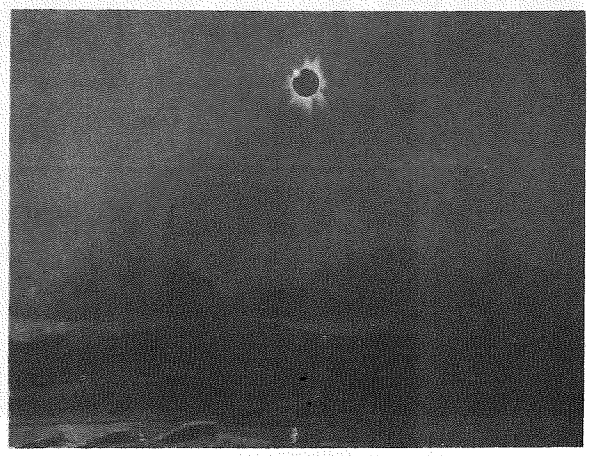
J.A.C. "alumni" gather with currently active members for an evening of reminiscences and plans and fun.

The Hayden Planetarium, meanwhile, had invited the Club to send its representatives along as members of the Hayden Planetarium-Grace Eclipse Expedition. Dorothy Bennett was already a member of that group, and with it finally the Executive Committee sent Dana K. Bailey, a Club member who had left to study at the University of Arizona, and who had won a Rhodes Scholarship while there.

The Planetarium expedition needed an artist - for at an eclipse a man of such experience can detect colors and shadings that are far beyond the reach of a camera. One was definitely needed for that eclipse, and this was a chance for the Juniors to do an outstanding service to the science they loved. They sent the late D. Owen Stephens as their second representative, and his paintings hang today in the Planetarium.

At just about the time that the Club was making its decision in this matter, the Hayden Planetarium began to publish its monthly bulletin as a popular magazine on astronomy. It was called "The SKY", and from its very first issue in November, 1936, the Junior Astronomy Club was represented - both in a regular department, which still continues, and in articles by Club members which appeared outside that department.





Total Solar Eclipse of June 8, 1937. Paintings of the "diamond ring" and the partially eclipsed setting sun by the late D. Owen Stephens, artist sent by the Club with the Hayden Planetarium-Grace Expedition.

Maine, Peru, and Onward, continued from the previous page

Active in helping to get this latest project under way was the "Bicycle Club", a group of more than a dozen alumni of the J. A. C. A decade from the Club's first meeting some members have graduated from colleges and others have long since taken their places in the world's affairs. Some continue study at Oxford, Harvard, Columbia, and other institutions. But, twice a year, the 14 members of the "Bicycle Club" reconvene to reminisce and to survey the work being done by the Juniors. And there is quite a bit to watch in the Junior Astronomy Club.

In May, 1937, and just for the fun of it this time, the members published "Special Eclipse Issue II" of the JUNIOR ASTRONOMY NEWS, and after the eclipse was over they began to cast about for other fields of endeavor. Things went on pretty much as they always had for the following year, and that was quite natural. A great effort had been made, and had succeeded, and a rest period was indicated.

Then, in the summer of 1938, with the NEWS still putting ideas into the heads of its readers, the interval of comparative quiescence came to an end. Under the guidance of Mr. Meyer Meadows, of the Amateur Astronomers Association, a group of Juniors began going afield to make observations of the stars, and they published their observations as "Sky Notes" in the Club magazine. Naturally, when the lunar eclipse of November occurred, they were watching.

A regular mimeographed edition of the NEWS is assembled by the Production Staff.

By that time, however, a change had been made. Even in the quiet period after the Peruvian eclipse, the normal activities of the Club had become so numerous and Miss Bennett's time was so fully occupied by her Planetarium duties, that James B. Rothschild was appointed by the Executive Committee as Associate Adviser of the Junior Astronomy Club.

Members observe through a 3-inch refractor after a Club meeting.

The group of Juniors who had been making observations during the summer established themselves, gradually, as a new Observers' Group. So their work continues, aided by frequent reference to the library of the Amateur Astronomers Association, which has been made available to members of the Junior group.

They were aided, too, by the contribution to the NEWS of an expanded and detailed form of the old calendar of coming astronomical events, prepared now by Hugh S Rice. The magazine, under the editorship of Seymour Schinasi, recently achieved another "first" when in one issue there appeared a full page of photographs - something once beyond the financial reach of the Juniors.

The Club continued during the present season its practice of inviting and paying the expenses of a well known out-of-town scientist to visit New York and address a Club meeting. The influence of these lectures, the Juniors have found, is stimulating. They have lots more to talk and think about as a result of it. They are even whispering about an eclipse in October, 1940. You might be able to see it from Brazil, they say . . .

JUNIOR ASTRONOMY CLUB

HONOR ROLL, 1929-1939

These members are among those who have contributed most to the success of the club.

Henry Herman
S. Vera Wolfson
James B. Rothschild
Hubert J. Bernhard
Dick Shirling
Robert Fleischer
Dana K. Bailey
Annesta Friedman
Ruth Fleischer
Dorothy Schoof
Robert Miller
Morris Davis
Louis Heynick
Alfred Alk
Abraham Shanes
Lois Saphir
Girard Bloch
Harold Levenson
Joseph Levenson
William Parks
Daniel Weiss
Madge Alk
Bernard Tunik
Marcus Christensen
Edwin Gales
Martin Freundlich
Seymour Schinasi
William Burgess
Herbert LeBrescu
Mona Saphir
Roy Glauber
Thomas Wojcicki
Sigmond Koch
Henry Knoll

"COVERING THE MEETINGS"

Resumes of Lectures before the Junior Astronomy Club

January 7, 1939, Mr. William H. Barton, Jr. - "An Astronomical Experiment"

Mr. Barton, Executive Curator of the Hayden Planetarium, conducted an interesting astronomical experiment with the help of Junior Astronomers at the meeting of January 7th.

Before the lecture started, each member of the audience received a pair of spectacles, one lens of which was red and the other green. They were for use on stereoptic pictures which were to be projected on the screen. These pictures were projected in pairs. One was in green and the other in red, overlapping so that when viewed through the spectacles they would appear as a three dimensional scene.

Stereoptic pictures of the sun, the moon, intricate machinery, spectroscopes, observatories, comets and other interesting objects, were flashed on the screen.

The principle of stereoptics is the taking of two pictures from points a slight distance apart, and viewing them through a stereoscope, which blends them together into one picture having great relief.

Mr. Barton closed the lecture by explaining how stereoptics might be used in the various fields of astronomy, stressing mostly studies of the solar corona's shape. - A. Fried

January 21, 1939, Dr. William A. Lynch - "This Trembling Earth"

On January 21st, Dr. William A. Lynch of Fordham University, speaking in place of Father Joseph Lynch, who had been called out of town, delivered an interesting lecture entitled, "This Trembling Earth".

One of the many topics referred to was the cause of earthquakes. Answering this rather important question, Dr. Lynch stated that the forming of new mountains caused the unbalanced layers in the earth. Troughs which are formed in the ocean bottom also cause earthquakes.

All seismographs depend upon the principle that a long or a heavy pendulum will not move as the earth trembles underneath it. This principle is made use of in a variety of ways to manufacture instruments which can measure both vertical and horizontal vibrations of the earth's surface.

In the old types of instrument, a pen attached to the pendulum was used to record the data on paper revolving on a drum. Today electrical and photographic devices replace the older method of recording.

There are three kinds of 'quake waves which the seismograph picks up, the "P" wave, the "S" wave and the "L" wave. The P and S waves go through the earth, while the L wave runs along the surface. The distance of an earthquake from a station is measured by the difference in recording for the S, L and P waves. Its location is found by drawing circles with radii equal to the computed distances from two or more stations; the meeting place is the focus of the 'quake.

Dr. Lynch showed actual seismographic recordings, taken at Fordham University, and explained many markings on them. - Abraham Fried

February 4, 1939, James B. Rothschild - "The Energy Concept in Astronomy"

On the evening of February 4th, amidst the flashing of our photographers bulbs, James B. Rothschild, Associate Adviser to the Junior Astronomy Club, delivered an interesting and instructive lecture about energy.

The speaker gave a rough definition of energy as "the ability to do things". He discussed various types of energy and the ways in which they could be transformed, one to another.

The energy of motion is an important point to be considered in problems about the orbits of the planets and the origin of the solar system. Contradictions in the energy equations led to abandonment of several early theories about the origin of the earth.

Our entire knowledge of the stars comes to us through interpretation of the radiant energy received from them in the form of light and heat. The photo-electric cell can be used to interpret some of the energy messages from the stars.

The speaker demonstrated some simple uses of the photo cell. The audience was greatly amused by some of the tricks performed. - Abraham Fried

SKY NOTES

From Presque Isle, Maine, comes the report of Roy Nickerson, a Junior Astronomer, who, on the evening of Friday, December 16, 1938, made observations of a bright aurora visible that night. The aurora was of immense proportions, consisting of bands approximately 120° in width. At times these streamers would shoot up almost to the zenith. As could be expected only the brightest stars in the northern sky could be seen during the display.

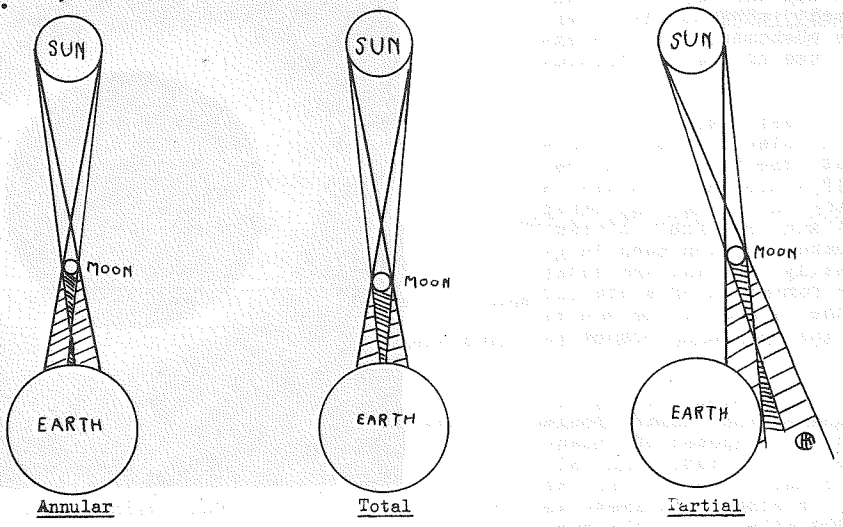
ECLIPSES OF THE SUN (Part II)

by David Bodansky

Three types of eclipses were mentioned in the first part of this article in the February NEWS, total, partial, and annular. The paths of total eclipses are usually about 5,000 miles long with the belt of totality having a maximum width of 167 miles where the shadow is at right angles to the earth, but over 200 miles where it strikes obliquely. The shadow moves along the surface of the earth anywhere from about 1,000 miles per hour at the equator to 5,000 miles per hour in other latitudes and near the beginning and ending of an eclipse. Near the equator the speed of the shadow is naturally least as it has to overtake the natural rotation of the earth.

The length of the period of totality is affected by both the relative distances between the three bodies involved, and the position of the path with reference to the equator and poles. Under ideal conditions the earth is at its aphelion distance from the sun. The moon just becoming new at a node is at perihelion distance, and the path of the eclipse lies as nearly along the equator as possible. At that time the length of totality can reach a theoretical maximum of 7 minutes and 58 seconds. Under less favorable conditions this period can dwindle to practically nothing. The average length is about 3 minutes.

The four important stages in total eclipses, namely the beginning of the partial phase, the beginning of the total phase, the end of the total phase, and the end of the partial phase, are designated respectively by the terms first contact, second contact, third contact, and fourth contact.



Three Types of Solar Eclipse. When the dark central portion (umbra) of the moon's shadow strikes the earth, a total eclipse occurs. If the apex of the umbra falls short of the earth's surface, a ring of the sun may be seen around the moon's shadow, and the eclipse is called annular. Where the lighter outer shadow (penumbra) touches the earth, a partial solar eclipse is visible.

Just before the first contact, the only thing that gives the observer any inkling as to the position of the moon is his watch, for obviously the moon is entirely invisible. The sharp outline of the moon can first be recognized shortly after first contact, but the exact moment of this first stage cannot be detected without the aid of a telescope. For about an hour the moon encroaches more and more upon the surface of the sun, the eclipse gradually approaching totality. About 5 minutes before second contact a very curious phenomena takes place. Faint bands of shadows can be seen moving over the ground. These bands are faint, wavy, parallel lines that move slowly in a certain direction. They can be detected best on some large flat, light-colored object. Observations in regard to these bands vary due to the short time they are visible which is only a matter of a few seconds. They are caused by the irregular refraction of the sun's crescent light in the earth's atmosphere.

Another queer effect is produced immediately before second contact. At that time the remaining crescent of the sun is nothing but a mere ribbon of light. Suddenly this ribbon is seen to break up into a string of bead-like particles. They are of course caused by the jagged surface of the moon which hides some parts of the sun's rim while revealing others. They are called Baily's Beads after Sir Francis Baily, who was the first person to describe them in detail. Baily's Beads can also be seen during some annular eclipses, as well as during partial eclipses that are almost total.

One quite awe-inspiring sight is the approach of the moon's shadow. If the situation is favorable you can see the rapid flight of the shadow coming towards you at a speed of over 1,000 miles per hour. Though compared with other celestial bodies the moon moves very slowly, yet the speed of its shadow far surpasses any other visible motion on the earth.

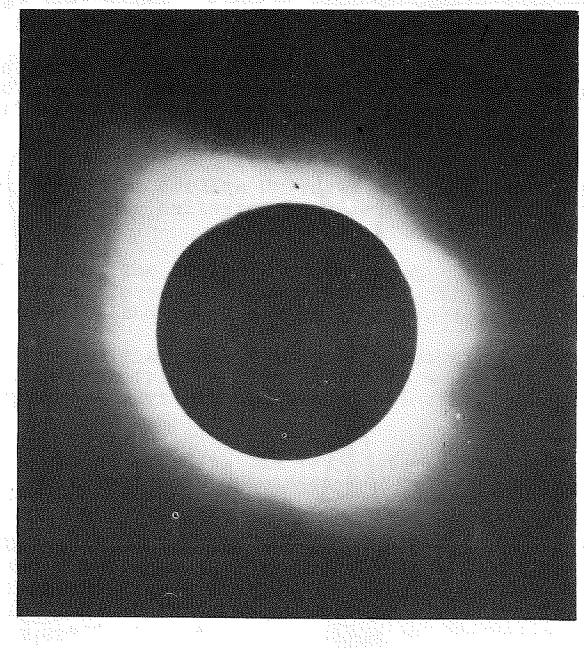
Another very interesting phenomenon connected with total eclipses is the flash spectrum. Above the surface of the sun, there is a layer of incandescent gases called the chro-

(continued on the next page)

Eclipses of the Sun (Part II), continued from the previous page

mosphere; the lower part being known as the "reversing layer". The ordinary spectrum of the sun has a bright, multi-colored background, broken up by the black Fraunhofer lines. Just at second contact, which is marked by the disappearance of Baily's Beads, the sun's spectrum instantaneously changes. The light background becomes black while the dark Fraunhofer lines are simultaneously replaced by brilliant colored lines. This is caused by the "reversing layer". However, as this layer is not very deep the moon quickly covers it, and the flash spectrum is over in a single second.

Then appears that most beautiful of all eclipse phenomena, as well as the most important, the solar corona. In contrast with the prominences, which on occasion can be seen both before and after totality, the corona is only visible when all the sun's light is blocked off. The corona is thought to be made up of tiny particles of matter which reflect the light of the sun, forming a sort of halo around it. There seems to be a definite correlation between the coronal shape and sun-spot activity. When the sun-spots are most numerous, the corona is regular and quite bright, but during the period of sun-spot minimum, the corona is in the form of streamers, bushy near the solar poles and longer and thinner near the equator. There is very little definite knowledge about the corona, since it has been possible to observe it only during the few minutes of totality. Very recently, however, the Lyot "coronagraph" has made it possible to study the corona at other times. Great advances in understanding this phenomenon may be expected from use of the new instrument.

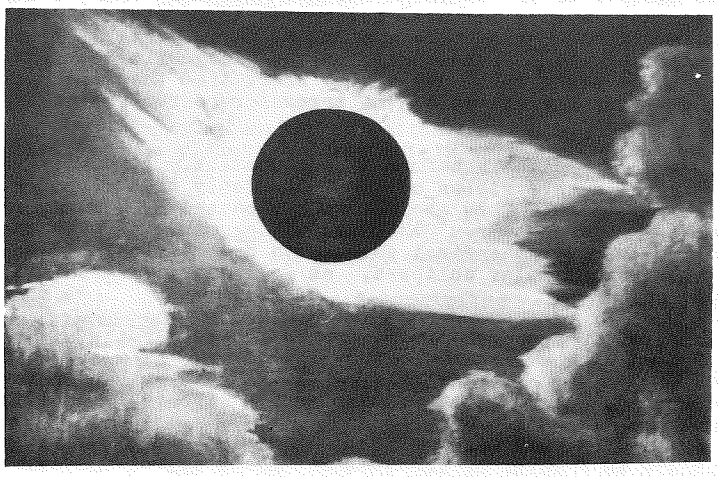


Total Eclipse of August 31, 1932 - Photograph of the Corona

Just before the sun reappears, its outer corona is blotted out, but the inner corona remains for half a minute as a yellow ring around the sun. When the first speck of the sun returns to view, irradiation makes it seem much larger than it really is, and the total effect is the formation of a diamond ring with the speck of the sun as the diamond and the inner corona as the ring.

Also seen during total eclipses are the solar prominences which are composed of incandescent hydrogen, helium, and calcium. These prominences appear as red "flames", rising sometimes as high as 500,000 miles above the surface of the sun. The most striking practical advantage derived from the observation of eclipses was the discovery of helium - an element of great value in inflating dirigibles and balloons. It was in a solar prominence that helium was discovered by use of the spectroscope.

Possibly the most interesting feature of all is the confirmation of one of Einstein's predictions made on the basis of the theory of relativity. Einstein said that due to the sun's gravitational influence, light passing near to it would be deflected. This of course would result in the apparent displacement of the stars which can be seen near the sun during an eclipse. Surely enough he was right. When photographs of the stars near the sun were compared with photographs of the same stars taken when the sun was no longer near them, it was seen that there was a marked difference very nearly equal to the amount Einstein had calculated.



Total Eclipse of August 31, 1932 - A painting by Robert Snedigar, a member of the Junior Astronomy Club Expedition

Of course, eclipses have played a historical role as well. In ancient times, this phenomena stopped battles, caused people to faint, and even die from fright, and once came to the aid of Columbus when he was arguing with the Indian chieftains. By successful prediction of an eclipse he so awed the savage tribes that they provided necessary food which had been withheld.

A S T R O N O M I C A L P H E N O M E N A

compiled by Hugh S. Rice

The Planets

MERCURY: in Aquarius and Pisces and is an evening star (in the west) for the entire month and until April 3. When it is at elongation on March 16, it can be seen in the western sky shortly after sunset, but the observing possibilities are not so good as during the next eastern elongation in July.

VENUS: in Sagittarius, Capricornus, and Aquarius, as a morning star observable (in the east) before sunrise. The planet is in the gibbous phase. There will be little change in its position relative to the sun, during the spring. The stellar magnitude is about - 3.6.

MARS: in Ophiuchus and Sagittarius as a morning star. On the 15th, it rises about 4⅓ hours before the sun, and its magnitude is 0.7.

JUPITER: in Aquarius as an evening star until conjunction with the sun on March 6, after which it is a morning star for the rest of the spring and all summer. In March, therefore, it is very poorly located for observation.

SATURN: still an evening star in Pisces until April 11. It can be seen soon after sunset in the west early in the month, after which it becomes lost in the sun's rays.

URANUS: in Aries, and visible with optical aid in the early evening.

NEPTUNE: at the Virgo-Leo boundary; and PLUTO is in Cancer.

March — Eastern Standard Time

day	hr	min		
4	6	--	a m	Moon in perigee
5	1	00	p m	Full moon
6	0	01	a m	Moon on celestial equator
6	5	04	a m	Conjunction of Neptune and the moon, Neptune 5° 16' north of the moon
6	7	--	a m	Conjunction of Jupiter and the sun
6	4	--	p m	Mercury on the ecliptic, in ascending node
8	--	--		Occultation of Spica, approximately 5:01 to 5:30 a m; magnitude 1.2
10-12				Zeta Bootid meteors
11	--	--		Occultation of Beta-one Scorpii, approximately 2:35 to 3:23 a m; magnitude 2.9
11	7	--	a m	Mercury in perihelion
12	4	37	p m	Last-quarter moon
13	0	16	a m	Conjunction of Mars and the moon, Mars 3° 33' south of the moon
13	6	--	a m	Opposition of Neptune and the sun
16	8	--	p m	Mercury at greatest eastern elongation, 18° 27' from the sun
16	10	--	a m	Moon in apogee
17	4	29	a m	Conjunction of Venus and the moon, Venus 4° 54' south
19	10	--	a m	Mars on the ecliptic, in descending node
20	3	01	a m	Conjunction of Jupiter and the moon, Jupiter 5° 17' south
20	4	23	a m	Moon on celestial equator
20	8	49	p m	New moon
21	7	29	a m	Sun enters sign of Aries, and spring begins
21	2	--	p m	Mercury at greatest heliocentric latitude north
21	2	--	p m	Quadrature of Mars and the sun
22	6	02	a m	Conjunction of Mercury and the moon, Mercury 1° 14' north
22	12	17	p m	Conjunction of Saturn and the moon, Saturn 4° 14' south
23	8	--	a m	Venus in descending node
24	2	--	a m	Mercury stationary in right ascension
24	8	38	a m	Mercury stationary in geocentric longitude
24	11	24	a m	Conjunction of Uranus and the moon, Uranus 0° 16' north
28	7	16	a m	First-quarter moon