No spring issue of the *GLPA Newsletter* was published this year.
PLANETARIUM PROGRAM FOR THE HARD-OF-HEARING

John J. Soroka, Director
Waverly Planetarium, Waverly, Michigan

During the Spring of 1972, I supervised a student teacher from Michigan State University. Since the University did not know where to assign a student teacher in planetarium work, we ended up with a group of special education teachers and supervisors. As part of my responsibility, I attended meetings at various schools for the hard-of-hearing, partially sighted, mentally retarded, and physically handicapped. On a tour of a school for the hard-of-hearing, I noticed and later investigated the Warren Auditory Training System.

This system basically employs a T-3-S/S Amplifier, Figure 1; a Walk-Away-Receiver, Figure 2; and a Channellator Loop, Figure 3. The system is essentially a lower power radio transmitter which provides the hard-of-hearing with undistorted sound levels at the ear. This enables the handicapped to hear at nearly the capability of the normal student. The unique feature of this system, in my opinion, is that the student is able to move about and participate in most classroom activities in a normal manner without trailing wires.

With the help of classroom teachers and teacher aides of the Woodcreek School, Lansing, Michigan, we brought the Warren System and the hard-of-hearing to the planetarium for an entertaining primary program. It appeared that this program was enjoyed much in the same manner as that of normal school visitors. Somewhat of a surprise was that the observed participation and behavior of the hard-of-hearing was undistinguishable from regularly scheduled classes.

The school provided the Warren Amplifier which was brought to the planetarium with the students. The output of the Fisher TX-100 amplifier was connected to an inductor, step up transformer, to produce a high level AC signal to the auxiliary input of the Warren Amplifier. The output of the Warren Amplifier was connected to the broadcast loop suspended from underneath the planetarium cove, Figure 3. The loop was made from #16 - 2 strand lamp cord and installed as in Figure 4.

The standard 1/4" jack was then plugged into the group phones output of the Warren Amplifier. The tape recorder was started as the students walked into the planetarium. Each student was able to adjust his individual Walk-Away unit to his own preference. Some students selected a normal hearing aid channel and listened to the planetarium sound system, as did their teachers and parents. Others selected the broadcast channel on their Walk-Aways and tuned into a high level radio signal which was controlled and adjusted to their comfort by the individual volume controls of the Walk-Aways. The entire program was taped and presented without interruption, as this was entertainment and not instruction.
The Warren System has the capability of adding voice input by microphone for instructional purposes. We hope to repeat this activity with our regular primary instructional units. I certainly enjoyed this opportunity to work with these children in a normal manner without the necessity of using an interpreter or designing a special program emphasizing visual effects and ignoring effective audio communication. At times I found myself completely unaware of their handicap and conducted the presentations in my usual style. This became very evident during one presentation when I added some verbal comments in a normal speaking voice and was totally ignored. The teachers and parents responded, but the children were in their own silent world.
TWO DOZEN POINTERS ON THE PLANETARIUM DOME

By Ken Perkins, Planetarium Director,
Vandalia-Butler City Schools, Vandalia, Ohio

After the first session of a series of visits to the planetarium it was agreed that the eighth grade science students needed some kind of illumination for note-taking during the successive sessions. Similarly, the high school Earth Science classes would need lights for note-taking in their up-coming series.

Two dozen two-cell flashlights ordered as a sale special at a local Western Auto store was the beginning of the solution. Two modifications and one addition were necessary. To convert the white lights to red lights, an old scrap of red theater lamp gel was employed. Discs of the red gel were cut to the diameter of the clear flashlight lenses. These were placed in a position between the existing lens and the reflector of each flashlight (see figure.) The red light produced was too garishly bright for note-taking. To reduce this brightness, one of the size D cells was replaced by a dummy which was made as follows: Into each end of a length of old broom handle, cut the size of a size D cell, a large shiny headed upholstery nail was partially driven. A piece of liberally bared copper wire was twisted around each nail head, thereby making a connection between the two ends. The nails were driven securely. The dummy cell was dropped into the flashlight to replace the bottom cell (see figure.) The flashlight's two-cell bulb was now operating on one cell at a greatly reduced brilliance. Each flashlight was then engraved with a number (01 through 24) on the barrel between the lens cap and the thumb switch.

In use the students were told that this was something new. As the flashlights were issued at the door, each was flashed on as a check and the student was told the number. Before the program was begun the students were told to snap the switch on and off several times, shine the light in their own eyes, their neighbor's eyes, the eyes of their teacher, the eyes of the lecturer, on the dome, on the floor -- "just to get it out of their systems." Lights off!

As the star field was projected, review questions were asked: "Can number nine find Vega? If so, point to it with your flashlight." Each flashlight would produce a well defined red spot making it a good student response pointer. "Number 14, point to Altair; number three, to Deneb." Three spots from whatever numbered flashlights would brilliantly highlight the Great Triangle with a safe red light. Continuing, other questions were asked and/or directions were given: "How many can spot Cassiopeia? Capella? Antares?" "You missed; it's over here." Almost instantly two dozen pointers would "home in" on that which was asked for.
Another session began with only the celestial meridian, celestial equator, and ecliptic in the planetarium sky. "Which line is the meridian?" "Scatter the lights along it; pick a number and stay with it." Meridian was turned off. "Which of these two lines (equator or ecliptic) is the ecliptic?" Pause. "Make up your minds; vote for one or the other." "Congratulations; You were unanimously wrong." Zip. Twenty-four lights changed their minds.

When the programs ended the students were asked to switch on the flashlights as they turned them in at the door. This was done to prevent someone's turning in a disassembled pointer for the planetarium dome.

NEWS NOTES

MANY MEMBERS of G.L.P.A. plan excursions and safaris to observe the great total solar eclipse of June 30th, one of the longest of the century. The path of totality crosses the Atlantic Ocean and the continent of Africa, where most of the scientific expeditions will be located. Many persons are taking advantage of several cruises into the path of totality and will be observing the event from shipboard. President Don Tuttle is leading a group of over 25 persons from his very active astronomy club in Elgin, and will be onboard the Cunard Line's luxury cruise ship, the Canberra, which will be off the coast of Mauritania. Your editor will also be onboard, part of a contingent of about a dozen persons from the West Michigan area. VonDel Chamberlain and Robert Victor from Abrams Planetarium in East Lansing will be part of a Caribbean cruise, and probably many others also have plans to see this great event. As part of this fall's convention, the closing session will be devoted to reports from the various groups and expeditions.

A MEMBERSHIP LIST, including all persons who had paid dues as of June 1st, is included with this "Newsletter." Keep it in a safe place for handy reference. Also, with this mailing, all those who are not members of the Association will be dropped from the mailing list. Therefore, if you don't find your name on the membership list, do not expect to receive future "Newsletters," or other G.L.P.A. correspondence.

A NEW PROCEDURE IN LABELING NEWSLETTER ISSUES is being instituted with this mailing. Your editor has become aware recently of some confusion in the labeling of issues of the "Newsletter." Up until now, the issue for a particular season (ie Winter Solstice or Vernal Equinox) was not issued near the time of the event indicated, but rather sometime later in the season. The heading was merely used to indicate a deadline for submission of material for that issue. With his busy schedule, your editor was not always able to get the material in print as quickly as he or the membership would like, and it seems that the log just kept getting longer and longer. So now, to avoid confusion and to hopefully establish something in the way of a publication deadline (though I am making no promises,) the following new labeling system is being instituted. The issue for a particular season will be mailed as nearly as possible to the beginning of that season and hopefully a week or so before the astronomical event indicated in the heading. Therefore, the "Summer Solstice" edition (this one), under the new system would have been formerly labeled "Vernal Equinox." So don't look for a "Vernal Equinox!" edition, though you will still receive four "Newsletters" this year, hopefully on time.

AT THIS YEAR'S FALL CONVENTION, new officers will be elected. The President would like to hear from those who desire to have certain individuals nominated, so that these can be passed on to the nominating committee when activated.
THE 1973 G.L.P.A. CONVENTION, October 25th, 26th, and 27th, will be headquartered at the Hospitality Motor Inn, on the outskirts of Grand Rapids, Michigan's second largest city. The location is convenient to the Kent County Airport and Grand Rapids' excellent expressway system. Transportation to and from events scheduled at the Public Museum and locations other than the motel will be provided by bus and car pool.

EXECUTIVE COMMITTEE AND CONFERENCE PLANNING REPORT

On March 31st, the executive committee and invited guests met in Grand Rapids to take care of Association Business, which primarily revolved around making plans for the autumn convention, October 25th, 26th, and 27th in Grand Rapids. The secretary's minutes of the meeting will be highlighted in the next "Newsletter." The report that follows primarily concerns convention planning and a tentative agenda.

It was the general consensus of the committee that a two and one half day conference would be desirable, with the first afternoon devoted to tours, workshops, and inspection of the many astronomical facilities concentrated in the West Michigan area. The conference this year will be somewhat more concentrated on educational problems, as item D in the questionnaire sent with the last "Newsletter" (How to teach certain concepts in the planetarium) and also item C (Discussion of educational problems) received a strong positive response from the membership. (See tabulation of the entire questionnaire below.) There will also be an effort to schedule committee meetings early in the conference, and to use the concept of concurrent sessions in a limited way so that each person attending will have an opportunity to be exposed to problems of particular interest to him.

The following is a general outline of convention activities. Remember that final arrangements are not complete so there may be some reshuffling of events and places.

THURSDAY, OCTOBER 25th

1:00-5:00 -- Tours of planetariums at Godwin High School (Goto Venus projector) and West Ottawa High School (Minolta projector). Possibility of sitting in on school programs and technical discussion.

Workshops on special visuals, slide doctoring, audio and music programming; under direction of LeRon Cobia, at Chaffee Planetarium and/or Hospitality Motor Inn.

6:00 -- Executive Committee Dinner Meeting

7:00-9:00 -- Open House and Planetarium show at Chaffee Planetarium and Grand Rapids Public Museum. Also tours and observing at James C. Veen Observatory.

9:30-11:00 -- Social Hour at Hospitality Motor Inn

FRIDAY, OCTOBER 26th

8:30-9:00 -- Coffee and Donuts - Chaffee Planetarium, G.R. Public Museum

9:00 -- Welcoming Session; announcements - Museum Multipurpose Room

9:30-11:00 -- Session for invited and submitted papers - Multipurpose Room

11:00-12:30 -- Committee Meetings - Planetarium Show and Museum "free time."
12:30-2:30 -- Luncheon and N.A.S.A. speaker - Multipurpose Room

2:30 -- Photo Break

3:00-5:30 -- Gadget Session - Chaffee Planetarium
   Gadget Session - Godwin High School Planetarium

6:30-9:30 -- Banquet and Spitz Lecture by Dr. George Pitluga

10:00-11:00 -- Tour and Observing, James C. Veen Observatory
   Planetarium Show - Roger B. Chaffee Planetarium

SATURDAY, OCTOBER 27th

9:00-10:30 -- Business Meeting, Museum Multipurpose Room or Motel

10:30-12:00 -- Education Session, under auspices and direction of education committee

12:30-2:30 -- Lunch and speaker, Motel

2:30-3:30 -- African Eclipse Report

3:30-4:00 -- Closing Session and Door Prizes

4:00 -- Planetarium Show, Chaffee Planetarium
   Tour of James C. Veen Observatory

PAPER SESSION is being set up by VonDel Chamberlain, chairman of the conference planning committee. If you desire to present a paper at the Friday morning session, please get in touch with Mr. Chamberlain at Abrams Planetarium, Michigan State University, East Lansing, Michigan.

THURSDAY WORKSHOPS are under the direction of Ron Cobia, also of Abrams Planetarium, with assistance from John Hare, chief Technician at Abrams Planetarium. If you wish to actively contribute to the workshop, please get in touch with Mr. Cobia.

GADGET SESSIONS will be under the direction of Larry Gwinn of the Chaffee Planetarium and David Hoffman, Godwin High School Planetarium. Special requirements for presenting visual effects should be directed to Mr. Gwinn in writing after September 15th.

THE SATURDAY EDUCATION SESSION will be under the direction of Mr. Larry Sabbath, Oak Park High School, 13701 Oak Park Blvd., Oak Park, Michigan. Mr. Sabbath would welcome suggestions from other education committee members and the general membership as to ways and means of making the education session of maximum value. Remember, in view of the results of the questionnaire, this session should be one of the highlights of the convention.

REGISTRATION FEE, though not yet established, will hopefully be $10 or less. Actual amount will of course be somewhat dependent on convention expenses. The executive committee voted at its meeting to establish a higher registration fee for persons who do not pay their 73-74 G.L.P.A. dues at the registration table, or who are non-G.L.P.A. members. A registration and information packet will be mailed before October 1st.
GREAT LAKES PLANETARIUM ASSOCIATION MEMBERSHIP QUESTIONNAIRE

TABULATION

Number of questionnaires mailed, 250; replies received, 52; (21% return)

Following numbers correspond to questions in the questionnaire. The question is restated only when necessary for clarity.

1. Number of respondents who attended the Youngstown meeting: 27 (52%)

3. Question who felt conventions are too "gadget oriented": 5 (10%)

4. Question: Should there be more attention to education matters at the next convention? YES, 21 (40%); NO, 10 (20%); Unsure or uncommitted or no usable response, 21 (40%)

5. Rank the following seven activities in order of preference and/or in value to you (1 for most valuable, 2 for second most valuable, etc., through 7 for least interest or value) at G.L.P.A. conventions. Ranking number is followed by number of respondents who chose it.

   A. Planetarium shows put on by the host: 1-5, 2-8, 3-6, 4-8, 5-10, 6-7, 7-5.
   B. Demonstrations of audio-visual devices and gadgets: 1-5, 2-8, 3-9, 4-12, 5-4, 6-5, 7-5.
   C. Discussion of educational problems and seminars: 1-5, 2-14, 3-9, 4-2, 5-2, 6-9, 7-5.
   D. How to teach certain concepts in the planetarium: 1-18, 2-8, 3-9, 4-8, 5-4, 6-0, 7-0.
   E. Lectures on current astronomy by astronomers: 1-9, 2-5, 3-8, 4-6, 5-12, 6-1, 7-6.
   F. Lectures by education and behavior specialists: 1-0, 2-0, 3-3, 4-4, 5-7, 6-13, 7-17.
   G. Papers on a variety of topics from fellow members: 1-6, 2-6, 3-7, 4-9, 5-8, 6-8, 7-3.

OBSERVATIONS: From the above, it can be seen that a 21% return is not particularly good, especially when one considers that the questionnaire was short. Therefore, people who are unhappy with conventions and other G.L.P.A. procedures should not be too vociferous if they did not respond. The feeling on certain questions is very definite, while several others have responses that are spread across the valuability spectrum. For instance, note that D received many 1 and 2 responses, and F many 6 and 7 responses. Therefore, we will attempt to deal with specific concepts and educational problems in the next convention but will shy away from talks by educational and behavior "experts." Lectures on current astronomy and papers from fellow members will be included, but will not be overdone, as suggested by the response. All in all, the questionnaire was considered helpful by the executive committee, though they are being cautious not to overplay its emphasis in view of the modest response.
WORKSHOP REPORTS

Your editor has received two reports of statewide workshops held this past spring. These are summarized briefly below.

ELGIN, ILLINOIS - Don Tuttle called for a meeting on May 5th, which he reports, ended up to be very brief. Perhaps due to the press of activities that occupy "planetarium types" in the spring, only one other person showed up. Don reports that he personally enjoyed working on the activities that had been prepared, and vows to try again. Fortunately, no guest speakers had been scheduled.

CANTON, OHIO - The March 24th workshop at the Hoover-Price Planetarium, from the sound of the report, must have been quite a happening, with 27 people in attendance. A number of intriguing and valuable subjects were discussed, according to a list received by your editor from Jane Mahoney and David Bertsch. The list is published below to illustrate what can be accomplished through regional workshops, and to spur other regional subdivisions of G.L.P.A. on to try similar activities. A list of regional chairmen was published in the "Autumnal Equinox, 1972" issue of the Newsletter. It is hoped that the people who did some of the following demonstrations and talks will come forward to "do their thing" again for the larger delegation at the fall convention.

GREAT LAKES PLANETARIUM ASSOCIATION

GLPA workshop: Saturday, March 24, 1973. 8 AM to 4 PM at Hoover-Price Planetarium, Stark County Historical Center, Canton, Ohio.

1) Inexpensive Cove lighting can be made with Christmas blue and yellow light strings, on dimmers.
2) Black-light can be used with fluorescent chalk and paint for maps, charts, and scenery on walls or behind perforated dome to give 3-dimensional effect.
3) Student participation by using red-flashlight pointers on dome. A do-it-yourself modification uses one D-cell plus a cell dummy.
4) Lightning and thunderstorm techniques, projectors, slides, and taped effects.
5) How to make projectors for super-nova, double star, stalactites, eclipses, and moon phasing, snowflake machine.
6) Use of manual operated projector to demonstrate a moving object as a flying saucer or LEM drop.
7) Single slide projectors; sources, demonstrations, uses.
8) How to build a slide-tape syncronizer.
9) Making Loop films using Super 8 cartridges.
10) Polarization of slides to produce motion in Easter Bunny and Santa & Reindeer.
11) A slide copier set up and demonstrated.
12) Horizon projectors and scenes shown: difficulties in masking off sky and reflection problems; problems of photographing, mounting and matching edges and overlap in transition from day and night. Projectors, projections, and sources discussed; Sheet zinc can be used for horizon silhouette. Toledo city horizon, day and night, is available to planetariums.
13) Special effects and concepts presented with overhead-projector: Coriolis and pendulum effects. Rheostat the light only, not the motor.
14) Magnetic board cut-outs of Moon and planets for charts to demonstrate morning and evening star concepts.
15) Use of slides and orrery in combination to produce motion (as through the Zodiac).
16) Class demonstration of parallax with meter stick and cork.
17) Use of planetarium as a multi-purpose operation, extending to mathematics, English, social studies, science, music, art, drama, speech, and adult education.
18) Unusual programs as "Psychedelic Happening" "Light, Color, & Sound" "Adventures of Tom Sawyer" complete with wave action and stalactite cave. Outlines of 3-5 grade presentations. Selected concepts and outlines of class projects for High School & College levels in classroom, planetarium, and outside classroom.

19) Slides from observatories shown and described.

20) Ron Miller space paintings for sale in slide form through Astronomical Art in Columbus. These slides were shown.

21) Upholstery for planetarium seats: best solution granite.

BOOK REVIEW


Several times each decade new astronomy texts come out, filled with rewrites of previous editions and ending with the latest color pictures from Hale Observatories and NASA. Most of them start with astronomy's historical background, and describe the contents of the universe from the earth outward. As the books pass through several editions the printing errors decrease, the outline becomes antiquated, and the most thrilling cosmology gets in only at the end.

This new text has none of those properties. It begins with a tour through the universe, and then takes its features from largest to smallest. Cosmology thus appears in the 4th of the 22 chapters, and its excitement pervades the rest of the volume. This outline poses some problems of explaining phenomena before the necessary techniques and physics are covered, but the authors have illustrated, written and arranged their way around most of these.

A number of very helpful phrases and illustrations show that this book does indeed avoid some major difficulties with earlier texts. It talks of "cosmic provincialism", "light, the raw material of astronomy," "the Hubble parameter," "calculations indicate." Analogies on map scales, the relative sizes of objects and their components, and atmospheric effects are quite clear. It is refreshing to see Chicago and Paris always used instead of New York and London. "Thought Experiments" are used to advantage. The illustrations show modern-looking people, well-labeled comparison spectra, and a number of clearly-drawn, if oddly illuminated, earth spheres.

But many other differences from previous practice permeate the book. The color spectra of the Hyades go directly from long, flat reds to brief yellows with no orange between. "Half-Earth" refers to pictures ranging from crescent to gibbous. Captions are hard to distinguish from text in some places, and hard to find at all in others.

But most of all this book is quite chauvinistic. It is extremely light-oriented, to the usual exclusion of other wavelengths. Frequent declarations of truth apply only to visible wavelengths, though the reader will not know better. Perhaps even more serious, the book is main-sequence oriented, to the point of calling phenomena of such stars "normal" and "most important" as opposed to other stars' phenomena.

Aside from at least 4 printer's and proof-reading errors, there are at least 4 more in numbers, in places where they count -- an exponent dropped to a subscript; 0.0006 became 0.006; 1.02 became 1.03; and 4000 BC became 3000 BC.

Worse are several mis-statements. These range from the implication that there are sometimes no visible sunspots (there are always a few), to saying the moon's absolute magnitude is 19 when it is really far dimmer. The book uses "liquid" and "solid" instead of "fluid" and "rigid". It ignores the fact that Jupiter emits more energy than it receives from the sun on one page, but mentions it on another.
Speaking of eclipses: "Just before totality is reached, the last rays of the sun are seen shining through the mountain peaks on the rim of the moon." The sunlight is blocked by the peaks. It shines through the valleys. In listing members of the local group of galaxies, both Maffei galaxies are included (one is too far away,) M33 is severely shrunken, and IC10 is omitted. There are at least 25 such mistakes.

In about 30 places statements should be made more conditional than they appear, to match current ideas. More than a dozen cases of rephrasing would also help the student -- reiterations ("innermost center") and faulty arrangements ("...every photon does not represent ") slow down some readers. Substituting "hazy" for "fuzzy" would convey the same idea without the titters. Parentheses should be used or better used in at least 4 places; commas in 4, and singular-plural agreement improved in 6. In all, more than 80 places in the text could be changed to advantage.

The illustrations are not much better. Page 264 clearly shows the oceans have far more water at spring tide than at neap tide, which of course is not true. The map of eclipses is the old, inaccurate one from Oppolzer. The modern Meeus plots are far better. The caption does not mention that most southern-hemisphere eclipses are omitted, including the June 20th, 1974 event. Star positions and magnitudes are badly distorted on three pages. In all, a dozen illustrations would be better for some change.

The book as a whole is quite a bit shorter than its competitors, because, the authors say, the end of the book is not often reached by most teachers. But won't teachers just go slower with the shorter book? One subtle way the book encourages slow reading is with its type font. The bowlegged W's, crippled S's and flared serifs are unlikely to promote speedreading. And how many people will be eager to pick up a book in pale tones of blue, violet and orange?

In attempting an exciting new approach to astronomy, the authors have made more errors than hits. Presumably, a second edition should correct the mistakes and improve the basically strong outline and thought that distinguishes this book from its more conventional predecessors.

Norman Sperling
Planetarium Director
Princeton Day School
Princeton, N.J.

THE GREAT LAKES PLANETARIUM ASSOCIATION offers membership opportunities to all individuals in any way connected with the operation of planetariums, regardless of geographical location. G.L.P.A. is an affiliate of the International Society of Planetarium Educators, and the National Science Teachers Association. Membership dues are $5 annually, payable at the time of the autumnal equinox. General correspondence and requests for membership should be addressed to Mr. David Batch, G.L.P.A. Secretary/treasurer, c/o Abrams Planetarium, Michigan State University, East Lansing, Michigan 48823. Submission of $10 additional payment with G.L.P.A. membership dues and completion of an appropriate application form entitles G.L.P.A. members to full privileges of the International Society of Planetarium Educators, including receipt of that organization's official journal, The Planetarian.

All G.L.P.A. members in good standing receive the quarterly "Newsletter." Contributions and notices for the "Newsletter" and Planetarian should be sent to David L. DeBruyn, Editor, Roger B. Chaffee Planetarium, 233 Washington S.E., Grand Rapids, Michigan 49502. Deadlines for contributions to the latest "Newsletter" fall at the beginnings of the four seasons.
PLANETARIUM INSTRUCTION - USING AN OPEN-SKY TEST

By Norman J. Dean and Gregory M. Lauck
Planetarium Specialists
Board of Education of Harford County
Bel Air, Maryland


In Harford County, Maryland, a wide difference in degree of planetarium utilization was noted among the elementary schools. Since these differences could not be correlated closely with distances from the planetariums, it was suggested that some administrators and teachers might not believe the planetarium to be superior to the classroom for the teaching of observational astronomy.

Earle B. Wagner, supervisor of science, suggested that the planetarium personnel carry out a small-scale experiment to determine whether or not the planetarium actually is more effective than the combination of classroom, chalkboard, and celestial globe for the teaching of those facts and concepts outlined in the curriculum guide for one of the grade levels.

Studies by Soroka (4), Wright (6), Tuttle (5), Rosemerry (2), Reed (1), and Smith (3) have compared the planetarium environment with that of the regular classroom. All but one of these studies were carried out on a scale far larger than we were administratively prepared to pursue. Interestingly enough, however, only two of the six studies reported significantly better results in teaching observational astronomy in the planetarium than in a conventional classroom. We have frequently heard some of these studies cited by those opposing the purchase, installation, or utilization of a planetarium; we jokingly refer to this attitude as "antiplanetarium-establishmentism."

We were skeptical of these studies for one main reason: In all cases, flat, two-dimensional, paper-and-pencil tests had been employed as measuring devices. We felt that a true test of whether or not a child has learned some elements of observational astronomy would have to be conducted out-of-doors using the real sky. This was the premise for our study.

The guidance department of the Bel Air Middle School identified two sixth-grade classes similar in scholastic aptitude, chronological age, and measured IQ as being appropriate for an experiment. We then obtained the approval of the school principal and the two teachers involved.

Each of the two sixth-grade classes selected for our experiment had 24 students. The control class was taught three consecutive lessons on observational
astronomy in the regular classroom, with the teacher using the chalkboard and celestial globe. The same teacher presented the same lesson topics to the experimental group during three planetarium sessions. All sessions lasted 45 minutes.

Testing was oral and individual. Each student was directed to do the following:
1. Look at the sky and indicate the four directions: east, west, north, and south.
2. Use a flashlight beam to point out the following constellations: Cygnus, Pegasus, Lyra, and Cassiopeia.
3. Indicate the approximate apparent path of the sun across the sky for tomorrow.
4. Point to the planets Jupiter and Mars.
5. Indicate the approximate position of Mars one hour from the present time.
6. Indicate the approximate position of Mars, relative to the star background, one month from the present time.
7. Use a flashlight to indicate the following on the celestial sphere: zenith, celestial equator, ecliptic, north celestial pole.

The arithmetic mean scores for the two groups were as follows:
Experimental, 9.15
Control, 6.42

The Fisher t was computed and found to have a value of 3.446+, indicating a significant difference between the mean scores at the .005 level of confidence.

For the teaching of selected aspects of observational astronomy, and within the limitations of this study, the planetarium is clearly and significantly superior to the classroom, chalkboard, and celestial globe. Although our groups were quite small, we are confident that a large-scale study would yield similar results.

Since our own situation is not appropriate for large-scale experimental studies, we sincerely hope that some researchers will duplicate our work with large numbers of students, either at the elementary or secondary level. Such a study should yield valuable, convincing, and valid results.

VOYAGE INTO DARKNESS

By David L. DeBruyn
Roger B. Chaffee Planetarium of the Grand Rapids Public Museum


EDITOR'S NOTE: Many people from within our G.L.P.A. membership saw the great solar eclipse of June 30th, either from the decks of several cruise ships that journeyed to the path of totality, or from various places within the continent of Africa. Because of the spectacular and historic nature of this particular eclipse, it is hoped that several reports can be included in "The Newsletter." An editor has an advantage in that he can publish his report first. I do hope that the following summary of the event, as seen from the decks of the Canberra, adequately expresses the intense feelings experienced collectively by the dozen or so G.L.P.A. members who were also aboard that memorable cruise. Now, for future publication, let's have some reports from persons who observed the event from other localities and aboard other ships.

************************************************************************************************************
When one has had the experience of a lifetime, it is sometimes difficult for him to completely express his feelings and reactions in words. This is the task that I will attempt here, as I recount the highlights of a "voyage into darkness" recently completed with a number of Planetarium colleagues and friends from the Grand Rapids Amateur Astronomical Association. We consider ourselves extremely fortunate to be able to tell a story such as the following.

On June 30th, one of the three longest total eclipses of the sun of this century occurred along a narrow path extending from the eastern shore of South America, across the mid-Atlantic and right through the middle of the continent of Africa. A total solar eclipse is unrivaled in all of nature for its drama and beauty, and it is very unfortunate that such spectacular events occur so infrequently in any given place. Most people are born and die without ever once seeing the magnificence of darkness at midday, the pearly white halo of the solar corona and other aspects of the greatest of celestial events.

Astronomers are known to travel all over the world, in order to take advantage of the few precious minutes when the sun's brilliance is blocked out by the moon. It is only under such circumstances that the rarefied and extremely hot outer atmosphere of the sun, the corona, can be studied to best advantage. In recent years, the trek of professional astronomers to faraway places has been supplemented by a growing number of amateur and semi-professional shadow chasers. Some are people who merely want to see a total eclipse before they die, and still others are astronomy enthusiasts, who, after seeing one eclipse, become addicted to the challenge of traveling to remote places to photograph and savor subsequent events. Fourteen West Michigan area astronomy hobbyists are now well initiated members of this latter band of "eclipse freaks" as they were dubbed by one member of the party.

These people, including this author and three of his colleagues from the staff of the Chaffee Planetarium, all journeyed to eastern Canada last summer to observe the ill-fated total eclipse of July 10th, 1972. We came home tired and disappointed when the event was largely obliterated by clouds. Yet, even as the sting of failure began to wear off, a dream began to take on a sense of credulence in our minds. We heard that a large British ocean liner was being chartered by a group of eclipse enthusiasts from the East Coast for observing the much heralded African eclipse of June 30th, 1973, an event not to be exceeded in length for 177 years. The plan was to follow the format of a highly successful cruise off the coast of Nova Scotia by the Greek ship Olympia for the 1972 eclipse, with resource people and classes onboard for the science buffs, conducted in a relaxed atmosphere of socialization and fun.

So it was that the dejected eclipse chasers took heart and began saving their pennies. Way back in October, 72, reservations were placed for the bigger and grander 73 "Voyage into Darkness." Then on June 22nd, we discovered that dreams can come true. We were among 1,800 passengers aboard the 45,000 ton liner Canberra, one of the largest and fastest ships in the world, sailing out of New York Harbor on a fair summer evening. A week later, we would rendezvous with the moon's shadow off the coast of Mauritania.

The list of science and cultural luminaries onboard, who would contribute to the stimulation of the two week scientific cruise, was truly impressive. It was headed by Neil Armstrong, the first man to stand on the moon, along with pioneer astronaut Scott Carpenter, who is now very active in exploration of the oceans, and who presented several stimulating lectures and seminars on oceanography. Noted science writers Isaac Asimov and Walter Sullivan were aboard for special lectures, as was Northwestern University astronomer J. Allen Hynek, who is particularly well known for his government studies of unidentified flying objects. The list goes on and on, and reads like a "Who's Who" in 20th century science and exploration.
ABOVE - Two photographs taken by Jack McCarthy Jr. using a 400 mm telephoto system. The initial diamond ring, marking the beginning of totality, is captured on high speed Ektachrome, with pushed processing to A.S.A. 400. The outer corona, with spectacular spikes, is recorded with a one half second exposure.

"Eclipse Freaks" watch the diminishing solar crescent with growing anticipation from the sundeck of the Canberra.

The Middle Corona is captured in this photograph by Mrs. Bonita Strach, using a 6 inch f4 reflecting telescope and high speed Ektachrome.
Mark Boyd took these two photographs with an f4 six inch reflector. The emerging limb of the sun produced the brilliant diamond ring marking the end of totality. The inner corona is recorded with fine detail on Kodachrome X film and a quarter second exposure.

14 West Michigan voyagers, including 4 members of the Chaffee Planetarium's staff, observed the eclipse from the decks of the 45,000 ton, 850 foot long Canberra, the fifth largest ship in the world.
During the first week at sea, excitement and anticipation slowly built to a crescendo. There were seminars on eclipse photography and phenomena associated with such events. Professor Edward Brooks of Boston, a noted meteorologist, conducted classes and eclipse weather briefings, using his easy going style and sharp wit to win the affection and confidence of those aboard. However, it can be said that very few sane persons would have relished this man's responsibility. It was his job, using updated satellite data and other information radioed to the ship, to direct the vessel to just the right place along the eclipse path for optimum viewing conditions. If he succeeded, he would be the unquestioned hero of the hour in the eyes of the eighteen hundred fellow passengers who were relying on his judgment and long intuitive experience in predicting the weather. If he failed, he would face the very real threat of being thrown overboard.

On the day before the eclipse, Dr. Brooks announced that the Canberra would be anchored some 300 miles farther out to sea than had been originally planned due to a raging sandstorm on the Sahara Desert, which was whipping up a haze that extended well out onto the ocean. The game plan was to place the ship between a bank of cloudiness to the north and the so-called tropical convergence zone, an area of humid unsettled air south of the path of totality. At about 8 P.M. on the night preceding the eclipse, the now familiar hum and slight vibration of the huge ship's powerplant became noticeably quieter. We had arrived in the appointed area and were lazily adrift on a quiet sea, awaiting tomorrow's great event.

That evening, Dr. Brooks gave his latest weather briefing, made most dramatic by a delay encountered as he rushed off to the ship's bridge to receive freshly transmitted data. The ship's imposing master, Captain Eric Snowden, predicted good conditions for viewing the eclipse based upon his years of experience at sea, and Dr. Brooks assured his faithful flock that prospects were good.

An unscheduled wave of apprehension quickly transmitted itself through the ship shortly after dawn on eclipse morning. Totality was scheduled for around 10:30 A.M. local time, and at 8 A.M., there was an ominous overcast. This was notably absent from Dr. Brooks' optimistic prognosis of the night before. There was the possibility of steaming off to a more favorable location clear of what appeared to be an isolated cloud bank, but by this time, many of the ship's systems had been already shut down so as to provide a minimum of vibration during the period when photographs would be underway. Dr. Brooks kept his cool, consulted the latest data, and concluded that we should stay put -- and hope! Movement of the clouds suggested that they would likely be out of our area or dissipated by the time of totality.

Happily, things turned out as predicted, and only a slight haze and scattered clouds were present as first contact of the edge of the moon was recorded upon the face of the sun at 9:15 A.M. For the next hour and ten minutes, the black lunar disk ate away at more and more of the sun's brilliant light, until at 10:20, only a slim crescent remained. Illumination on the deck of the ship was now reduced to an eerie greenish hue which is characteristic of the last moments before a total eclipse. Around us, feverish activities were abating, as more and more persons turned away from their poised cameras and telescopes and lifted their eyes toward the diminishing solar crescent.

Suddenly, the ship's great power system went completely still, and everything seemed to become dead in the water, as if in anticipation of a great event. A hush fell over the tripod jungle on the broad decks of the Canberra, with only the whirling of movie cameras and the clicking of shutters to disturb the almost unworlidy scene. A great shadow came racing across the ocean from the west, suddenly enveloping the huge ship in a false night. There were gasps of amazement as stupified eyes turned upward. Where the sun had been only a moment before, there was now only a black disk surrounded by a magnificent irregular halo of greenish-white light. The total eclipse had come.
Never before in the history of man had so many persons observed nature's greatest spectacle from such a restricted area. The scene was one of weird proportions, with the chatter of hundreds of clicking shutters. Muffled, awe-struck voices were occasionally interrupted by exclamations about the magnificent rays of coronal light emanating from around the eclipsed sun, resulting from high energy atomic particles spiraling along the sun's magnetic field. Even though this was one of the longest solar eclipses of the century, the end came all too soon. We could see that it was eminent when a slight brightening occurred along the western limb of the moon and the pinkish inner atmosphere of the sun (called the chromosphere) appeared. Suddenly, the climax, the most stunning aspect of the event, occurred. A brilliant plume of light, appropriately called the diamond ring, flashed into view as the corona quickly faded. The edge of the sun's fiery disk dramatically reappeared, and almost as suddenly as it had begun, the total eclipse came to an end. There were spontaneous bursts of applause and gasps of unbelief breaking the silence across the vast ocean waters, followed by shouts of appreciation, and much merriment.

All of this soon gave way to a feeling of nostalgia. The moon's shadow was now racing westward, entering upon the dark continent of Africa, where the eclipse would send some of the natives into a religious frenzy and would hopefully be seen by scientists of many lands who were fighting the wind and intense heat of the Sahara Desert in hopes of gaining up to seven minutes of valuable observations from a stable land platform. Back on the cool though agitated decks of the Canberra, nobody paid much attention to the emerging sun, as they had so intently done during the initial partial eclipse. After all the main event was over, and the moon's shadow could not be called back for a replay.

Soon the rumble of the ship's powerplant could be heard, and then a gentle swishing sound as she gathered steam and began to get underway. During the next week, there would be more interesting classes, panel discussions by our expert resource people on such subjects as life in the universe and the future course of human endeavor. There would be time for relaxation and socialization, plenty of good food, shore excursions to Teneriffe in the Canary Islands and the African port of Dakar. There would even be an exciting midnight rescue of a stricken man from an American merchant vessel, and time to stand up on the dark forward deck of the ship at night, staring off across the vast ocean, and upward toward the magnificent array of thousands of stars puncturing the black dome of the sky. It was all part of a total experience, one that would not soon be forgotten by those who were fortunate enough to participate.

POSITIONS AND PERSONNEL

VONDEL CHAMBERLAIN, for the past nine years associated with the Abrams Planetarium, Michigan State University, (Director the past five years) has assumed a new position as Chief of Presentations and Education Division, National Air and Space Museum, Smithsonian Institution, Washington, D.C. 20560. In his new role, Mr. Chamberlain will be a major force in development of a major planetarium in Washington. All of us who have known him and worked with him in the past ten years are sorry to see him leave this area, but wish him the best in this exciting new challenge. VonDel was one of the original founders of the G.L.P.A. in 1965, serving as the organization's first president, and more recently as chairman of the conference planning committee. He has been a principal guiding force in this organization, and though he will retain his membership, his future role with G.L.P.A. will be understandably more restricted.

MR. RICHARD THOMPSON, who for a period of one year from February, 1969 to March of 1970, was Curator of Planetarium Education at the Roger B. Chaffee Planetarium of the Grand Rapids Public Museum, will be reassuming his previous position early next year after a four year period of duty in the Air Force. MR. LARRY GWINN, the Planetarium's current education curator, will shift his emphasis to technical and administrative matters.
"Home-servicing of Spitz Projectors"

By Herbert J. Schwartz
Planetarium Director
Des Moines Center of Science and Industry

EDITOR'S NOTE: Here is the first in a continuing series of "technical tips" articles that will appear regularly in upcoming issues of the "Newsletter," providing contributions keep coming. Mr. Schwartz's article is both amusing and certainly of practical value to others who have encountered such problems. If you have had specific problems for which solutions have been found, share them with others in similar predicaments through the "Newsletter."

At one time or another, some of us have had problems with "The Instrument." The first thing I think to do when trouble strikes is get in touch with someone with more experience with that particular instrument. But there comes a time when the experience of one (or even two) is not enough. Sooo, wouldn't it be nice if all of us got together and published some of the problems we have had and how each of us has solved them?

Since I already have this space, I'll go first. The morning before the grand opening of the Christmas show, during a school show, one of the 4th graders noticed sparks flying out of the arms on the machine, (I have a Spitz A4, RPY). As I started back to the console, I heard the unmistakable sound of a breaker popping. The only motion that did work was presession. Since I needed daily, heading and annual motions that evening, my deodorant was working. After finishing the school shows, I plotted my course of attack.

Since the RPY circuitry is all interconnected, all one has to do is literally cut out the bad circuit and he should have two of the three RPY motions back. Not only that; since the breaker should stay "in" now, I should also have annual motion, as this is on the same breaker. The procedure was worth a try, and to put it simply; it worked! The procedure is quite simple and the whole operation takes about 15 minutes.

To determine which motion blew, you need to uncover the arms of the machine. Do this by simply taking them off. (It works every time.) Next, look on the P.C. card actually attached to the machine, the one with the potentiometer. This card is called the "Servo-Amplifier." What usually blows up are the two black epoxy diodes located on the right side of the card, by the big capacitor. An easy way to determine whether the diodes have blown or not is to see if they are in one piece. Usually they're not. The card with the bad diodes is obviously the card that needs to be cut.

Now comes the lobodomy. Holding the cutters in your right hand, you cut (or better yet, unsolder) the following color wires: RED, YELLOW, BLUE, ORANGE, RED/WHITE, ORANGE/WHITE, and YELLOW/WHITE. The machine will now move. The motion that will not work will be the motion the cut Servo-Amplifier controlled. But at least you will have the other motions. A better way, might be to disconnect one of the first three wires on Terminal Buss 2. But I haven't tried this, as all my diodes are in working order.

Another major problem is the sputtering arc. To put it simply: You turn on the switch and the arc just "spitz" at you. As amazing as it may sound, some Spitz instruments have the uncanny ability of giving the manufacturer's name when the stars are turned on. This can be fixed. To do this requires a mini-screwdriver, some patience and a free afternoon. However, besides fixing a sputtering arc, you can
also increase arc life and further, keep pin point images (the new arc look) for a much longer time.

The whole procedure is time consuming, and once you start it would be a good idea to follow through to the end. First, take the arc (cup assembly and starter assembly) out and attach the ammeter across the contacts the way you would if you were replacing a new arc. Now you are ready to "bias down" the transistor. To do this you must use either of the trim pots on the arc power card, (I used the outside pot.) The low end, with the switch just cracked should read about .9 and the high end, full power should be about 1.5 after you are done playing around with the trims. Now turn off the power.

Now comes the fun part! Under the cup, in the starter assembly you will find two wire loops spaced about 1/16 to 1/8 inch apart. This is the bleeder. Simply put, this controls the starting spark to the arc. To adjust the bleeder, simply adjust the distance between the loops. Before you start, however, touch the loops to ground. This will take whatever charge out of that big capacitor sitting next to the loops so that there will be no surprises. If the bleeder is too close you will hear a high whine, and the stars will not ignite. If the bleeder is too far you will hear a rapid sparking noise, and the stars will not ignite. What has to be done is constant experimentation until the arc starts. If at first the arc doesn't ignite, turn off power, take it out and adjust the bleeder, then put it back, and try again. The very worst that will happen is that you will gain a great deal of experience in taking out and putting in the arc. If the arc starts, turn off the power and wait until everything cools (approximately 20 minutes). Now comes the test. Turn it on. If it sputters, turn off power and play with the bleeder again.

Biasing the transistor operates the arc at a slightly lower level. Adjusting the bleeder in effect tunes the arc, (almost). If your arc is lasting long enough, just play with the bleeder until it starts. If you want it to last longer, then rebias the transistor. Our arcs have averaged about 500 hours of "actual star time."

How long the arc lasts also depends on how often it is turned on, but on the whole the arc should last a good deal longer and it should give that "New Arc" sky a lot longer too. I should also add that this procedure will give the best results with a new arc. Obviously a used arc will be harder to tune.

If you have any tips on how to make the A4 (or for that matter any make or model instrument) work better, you have a captive audience waiting to hear. Sometimes elements on one machine can be adapted for others. So don't keep that neat idea a secret, let the world know.

NEWS NOTES

A SUMMARY OF THE G.L.P.A. CONVENTION, complete with photographs and a list of those who attended, will be published in the "Winter Solstice" edition of the "Newsletter." The place and dates for next year's gathering, and hopefully, announcements of any spring workshops, will also be published in that edition. Deadline for submissions of material is December 1st.

IF YOU WISH A COPY OF THE GROUP PHOTOGRAPH, taken at this year's convention, please send $2. to Robinson Photo Studio, 7 Jefferson S.E. Grand Rapids, Michigan 49502, requesting the "Great Lakes Planetarium Association" photograph. You will also receive an identification key with the 8 by 10 black and white print.
NEWS NOTES

USUALLY, ANIMALS CAN BE REMOVED FROM THE PLANETARIUM DOME with the turn of a dimmer knob or at least the flip of a switch. Not so with a spider that appeared on the plaster dome of the planetarium of the Vandalia-Butler City Schools, Vandalia, Ohio. On a Monday or Tuesday a spider was spotted, a meter or so southeast of the zenith. By Friday it had moved an equal distance north of the zenith and then by the first of the next week it had moved to the southwest. Still it lingered not too far from the zenith through several programs including a psychedelic light show for a mod English class. Finally, the spider was removed humanely with an instrument consisting of three long cane fishing poles, two at the lower end and one sticking out at the top, all lashed together with masking tape and topped by an inside-out loop of the same sticky masking tape. A light touch was all it took. For a six meter ride the spider was safely hauled down from the artificial sky. With the loss of only one leg out of eight it was carried outside to a better food supply. (Thus ends the saga of the "Undimmable Spider," as submitted by Ken Perkins.)

PLEASE MAKE A NOTE OF THE FOLLOWING ERROR IN the Winter Solstice, 1972 issue of the "Newsletter." It was stated that BLACKGROUND PRODUCTIONS, headed by Ron Cobia, was operated out of Abrams Planetarium. Actually, this is incorrect. Mr. Cobia operates this service independently from his planetarium activities, and any correspondence or orders should be directed to "Blackground Productions," Box 707, East Lansing, Michigan and not to Abrams Planetarium.

HIGH QUALITY TRACKING CHARTS for currently observable asteroids plus Comet Kohoutek may be obtained free and without obligation by sending a long stamped, self-addressed envelope to J.U. Gunter, 1411 North Mangum Street, Durham, North Carolina 27701. You will receive the September/October issue of "Tonight's Asteroids," containing tracking charts for Comet Kohoutek, and the asteroids Marmonia, Davida, Peraga, and Iris.

MEETING REPORTS

CLEVELAND AREA PLANETARIUM INSTRUCTORS met for a one day session on September 12th, at the planetarium of Parkside Junior High School, Westlake. The following reports and presentations were made by some of the individuals present, as submitted by host, Jeanne Bishop:

1. Bud Linderman showed the film loop of the June 30 solar eclipse as we saw it from the ship Canberra...beautiful! (He is selling copies. Write to him at Midpark High School Planetarium, 7000 Paula Drive, Middleburg Heights, Ohio 44130.) Bud also showed some slides he and his students took of the eclipse. We had fun determining the stars and planets using copies of the June 30 sky area about the sun, prepared by Bob Victor.


3. The group discussed special programs of an educational nature, adaptable to a variety of classes within the school curriculum. Dave Sanford (Shaker Heights) shared his "The Last Question" by Asimov script, a program taped by the Shaker Heights Drama Club, which we had seen at an earlier meeting. He also discussed two language programs - "Der Himmel von Berlin" and "Scipio's Dream" (Latin Program). Dan Francetic (Euclid High, Cleveland) has a program based on the book The Little Prince by Antoine de Saint-Exupery (good for 2nd and 3rd year French). Doris Furror (Bay Junior Science Center) brought copies of her Spanish
program, typed with a Spanish typewriter, and the English translation. Bud Linderman presents his Christmas program in all the languages taught at his school. Points to remember in recording language programs are a) do not include material which will become soon out-of-date and b) have reader speak SLOWLY.

Bob Andress has developed several programs covering early cultures and astronomy, including Chinese and a discovery experience to put students in the "shoes" (bare feet?) of Primitive Man. Ted Stevens (Midpark High Planetarium) presents an oceanography program in which the dome becomes the sea, as he projects images of fish. Dennis Leonard (Bay Junior Science Center) explained that this is done with real fish for public programs at Buhl Planetarium in Pittsburgh.

Bill Kobel (Fairview Park High) gave details for a neat presentation he has done for English classes to some of the music of "2001 Space Odyssey." It is a completely non-verbal program, in which he begins his audience in total darkness. The projection orrery is then turned on, and the satellite projector is swept through the solar system to suggest visiting intelligence. Other parts of the 20-minute demonstration included slides suggesting scenes from the movie (inexpensive NASA photographs) and an ending with all motions on simultaneously, giving the viewer the feeling he really is in space.

Jeanne Bishop told of using a theme of words and expressions in the English language as the basis of programs for English Vocabulary and Mythology classes. A good source for this is Asimov's, Words from the Myths. Also poetry (with appropriate music) and excerpts from English prose and English translations of the classics can be presented for appreciation in the planetarium.

4. We shared information about sources. Jon Marshall (Strongsville High) told us of a new film produced by Time-Life, "The Crab Nebula," which is very good. Jeanne described sources of materials developed for the Keller Method and other personalized approaches to teaching astronomy. A number of other teaching aids were noted.

We had hoped to discuss possibilities for "mini-research" in the planetarium, but we ran out of time. This and other topics are planned for our next meeting, November 20, at Bill Kobel's school planetarium, Fairview Park. We adjourned for a buffet dinner at Jeanne and Allan Bishop's home.

THE GREAT LAKES PLANETARIUM ASSOCIATION offers membership opportunities to all individuals in any way connected with the operation of planetariums, regardless of geographical location. G.L.P.A. is an affiliate of the International Society of Planetarium Educators, and the National Science Teachers Association. Membership dues are $5 annually, payable at the time of the autumnal equinox. General correspondence and requests for membership should be addressed to Mr. David Batch, G.L.P.A. Secretary/treasurer, c/o Abrams Planetarium, Michigan State University, East Lansing, Michigan 48823. Submission of $10 additional payment with G.L.P.A. membership dues and completion of an appropriate application form entitles G.L.P.A. members to full privileges of the International Society of Planetarium Educators, including receipt of that organization's official journal, The Planetarian.

All G.L.P.A. members in good standing receive the quarterly "Newsletter." Contributions and notices for the "Newsletter" and Planetarian should be sent to David L. DeBruyn, Editor, Roger B. Chaffee Planetarium, 233 Washington S.E., Grand Rapids, Michigan 49502. Deadlines for contributions to the latest "Newsletter" fall on March 1st, June 1st, September 1st, and December 1st.
No winter issue of the *GLPA Newsletter* was published this year.