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INTERNATIONAL PLANETARIUM SOCIETY
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Volume 15, Number 4  
Fourth Quarter, 1986
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Editor:

The recent letter by James Rusk (Volume 15, Number 3, 1986) regarding the need for pronunciation guides has a ready solution. All of the names that he queries, namely Perseus, Halley, Io, Charon, Uranus, and Betelgeuse, are listed along with their correct pronunciations in the most recent edition of the Observer’s Handbook of the Royal Astronomical Society of Canada.

As noted by Rusk, Sky and Telescope magazine has been a frequent source of pronunciation guides for astronomical names. However, I know of no other ready reference than the Observer’s Handbook where a compendium of pronunciations for the constellations, planets, satellites, and bright stars can be found. In fact, I have used it frequently in the past to instruct the “voices” for my taped planetarium presentations in the correct pronunciations for the very words which James Rusk notes have frequently been mispronounced. It is also quite useful for refresher purposes, and over the years I have found myself making a conscious effort to use the correct pronunciations for all such words. In fact, with the correct pronunciation for Betelgeuse (which is not “beetle-juice”) I have rarely heard titters from my audiences.

Copies of the Observer’s Handbook, which is updated each year, can be ordered through the Astronomical Society of the Pacific, or more directly from the National Office of the RASC, 136 Dupont Street, Toronto, Ontario, M5R 1V2, Canada. I strongly recommend it as a constant desk-top companion for all planetarians.

Dr. David G. Turner
Department of Astronomy
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Halifax, Nova Scotia
Canada

Mr. Rusk responds:

As David Turner points out, the Observer’s Handbook contains suggestions for pronouncing difficult astronomical names and I should have included it in my list. However, I also failed to cite the 13-volume Oxford English Dictionary, a work which has much more scholarly weight (as far as words are concerned) than the Handbook.

My point remains the same: there is no accepted standard guide for astronomical names — and there ought to be.

Editor:

I found Dan Siemasko’s “Screwed-Down Scriptwriting” to cover the gamut of generalizations with the exception of the “screw” metaphor: the only specific instructional information in the piece. In contrast, I thought the “Scriptwriting Workshop” to be excellent. Francis Biddy’s section serves as an introduction that sets the pace of the workshop. As a comparison point, take Siemasko’s sentence on “Objective defining”:

“... involves choosing the specific areas of the problem to which media can be applied. The goal’s outline may be: Let’s produce a program that tells the audience items one, two, and three. After viewing, they should know four, believe five and practice six.”

Compare this with Biddy’s “In documentaries, we should not limit ourselves to the basics; it may be difficult to convey the joys of gamma-ray astronomy, for example, but it’s also important . . .”

Use of the specifics “gamma-ray astronomy,” and “joys,” and “basics,” conveys what I believe is the same message: far better than using “items one, two, and three,” etc. Combining the two authors, one could say, “Let’s produce a program that tells our audience the basics about gamma-ray astronomy, but also about the joys of the field so that they know the facts, believe the value of the science, and might even want to practice it (or a related area) some day.”

John Kenny’s section was the one I most identified with personally. His specific points include usable tools: “similes, alliteration . . . ,” his paragraph on the documentary approach versus the use of characters, the use of fantasy-adventure elements with children. Rather than presenting instructions, Kenny not only introduces his ideas but explains their relevance to what he is trying to do (“Up to 3 or 4 major new concepts can be presented in a show, after which overload occurs.”) Translation: here is what you present in a show, here is the volume of what you present, and here is why you keep to that volume of information. Contrast this with Siemasko’s statement on content: “As a scriptwriter, you must open your mind to all the appropriate possibilities before compacting considerations.”
A STATEMENT ON THE VIABILITY OF THE PLANETARIUM

John Hare IV
Bishop Planetarium
Bradenton, Florida

Are planetariums on the road to extinction?

Have planetariums fallen on hard times?

"...planetariums have fallen on hard times as they try — with questionable success — to cater to a generation whose visual-entertainment standards have been set by George Lucas movies and computer-generated commercials."

In this quote from a column in the June issue of Sky & Telescope, it is implied that because we have tried to cater to a new generation, we have fallen on hard times.

"As suddenly as it appeared, the nation's interest in planetariums waned. Support began to dry up. We are still on the down side of that curve."

In another article in the December 1985 issue of Sky & Telescope, it was stated that once we landed on the moon, the nation's interest in planetariums waned, support began to dry up, and that we are still on the down side of that curve.

Many planetariums set landmark attendance figures during the early days of Apollo, but it was by no means our pinnacle of achievement as a whole. In 1985/86, Comet Halley was responsible for an interest and attendance level that may never again be equalled. Are we in for another period of disinterest and decline? From certain statistical standpoints, one could infer that this was the case once again, but let's look at things in a more appropriate context.

Of the approximately 40 major planetariums in the USA, 17 have been built or upgraded since 1970. The latest planetarium directory lists 399 facilities with dates of 1970 or later. Still others from small to large size are under construction or are in the planning stages. While it's true that some facilities have closed and others have been cut back due to funding constraints, today there are more of us than ever before.

The services offered and the varied interests addressed in those services have expanded our potential audiences to levels never before possible. I believe that trend will continue.

When the planetarium was young, it was awe-inspiring in and of itself. It was a new and completely different experience available only in a few select locations and consequently became tremendously popular and successful. Since those early days, we have become an increasingly technologically-oriented society. Look at the modern automobile, home entertainment equipment, personal computers, the entertainment industry...; the list goes on and on. Today, the planetarium, rather than standing above everyone else, has become one of a host of equal technological marvels.

We're not trying through our operations to cater to a generation whose visual entertainment standards have been set by George Lucas and others. This is 1986 and, like it or not, our society as a whole is "a technological generation." We can bury our heads in the sand and wish for the return of simpler times or we can accept the situation that is and continue to evolve to meet the needs and expectations of our constituents.

Today, the planetarium, rather than standing above everyone else, has become one of a host of equal technological marvels.

I'm not suggesting that we have to abandon traditional roles or methods. Our underlying purpose has been and always will be to furnish astronomical information and education to those we serve. To achieve these goals under today's circumstances means that we must utilize our facilities as effectively and efficiently as possible. Such utilization, especially for the public planetarium, means diversity and, if successfully pursued, can result in a self-sufficient operation that produces results not otherwise possible.

In 1979, the Bishop Planetarium offered six public starshows and five school shows per week. The staff of 2½ served a total of about 14,000 for the year. Revenues from the planetarium didn't even cover salaries, let alone utilities and maintenance. Maintenance consisted of the replacement of lamps, the repair of basic equipment and nothing else. Since the operation was losing money, upgrading of equipment was non-existent.
In late 1979, a staff change took place and the Board of Directors made a commitment of several tens of thousands of dollars to begin an upgrading. In early 1980, an in-house laser show was opened which furnished additional monies for upgrading. Six years later, that upgrading continues on a pay-as-we-go basis.

Our current weekly schedule includes 14 public star shows, 16 school shows, and 8 laser shows. This schedule has been expanded each year since 1980. In addition, our observatory was refurbished and reopened in 1980 and is now open 4 nights each month. Staff now consists of 5 full time professionals and several full- and part-time support staff. In 1985, we served approximately 100,000 people with admission revenues approaching $250,000.

Since this past September (1985), we produced, in cooperation with two other institutions, a comet show with periodic updates which looked at Halley from a Florida perspective, and distributed it to Florida planetariums. We ran extra comet shows while at the same time maintaining our regular schedule of two different star shows in different time slots. (For instance, we were able to run both a Christmas show and a comet show concurrently.)

We ran adult evening classes in astronomy in the fall and winter. We produced a one-man play on Galileo which was performed in the planetarium. We included up-to-date comet and other information in our monthly Sky Reporter and produced two special Halley's Comet issues. We changed laser shows every weekend, rerunning many of the perpetually popular ones and producing 5 new ones. We preempted normal programming on January 24 to present an 8 hour seminar on the Uranus encounter. This was made possible by an arduous and sometimes frustrating undertaking of getting building code clearances to install a dish antenna system which was interfaced with our video projector, giving us gigantic images of the encounter on the dome overhead. This event was covered live by three of the Tampa area TV stations.

We ran comet observing sessions beginning on November 4 and concluding on May 11. Of the 42 scheduled sessions during that time, we were able to observe on about 80% of the nights.

It's true that we worked slightly harder this past year because of Halley but not all that much harder. If the comet wasn't there, we would have found other projects to occupy our time. Just ask Joe Hopkins, Joe Tucciarone or any other of our staff members.

In our situation, because of our diversity of programming and the foundation of support it has furnished to our operation, we were in a position to effectively handle the programming and personnel demands of Halley. We are addressing the needs and interests of those from the most dedicated astronomy freaks to the casually interested. We are reaching more people than ever before, furnishing more information than ever before, and doing more to further the cause of science and astronomy than ever before. Furthermore, we are not complacent in thinking that we have achieved the ultimate in any area of our operation. That's why three of our staff are here at this conference . . . to interact, to observe, and to learn in order to become better planetarians tomorrow.

Alan Friedman stated, "I am convinced that rather than becoming extinct, planetariums are evolving to higher and more effective forms;"

The key word here is evolution. We're not going to become extinct in the sense that we will die out. In the year 2016, the planetarium of 1986 will be as extinct as the planetarium of 30 years ago is today. There is no panacea that exists in and of itself unless it's the recognition that we must be diverse. All-sky films, lasers, video projection, a multi-disciplined staff and the like are just some of the many elements that combine to make us what we are today.

If you're a public planetarium in trouble, it's because your staff is either incompetent or lazy and/or your administration or board has failed to recognize the potential that exists under that dome.

No, George, we haven't forsaken astronomy for Led Zeppelin, and no, Richard, we are definitely not dinosaurs. We are captains of science and the ships we command will continue to expand the horizons of knowledge and understanding. Long live the Planetarium! □

LETTERS

Continued from page 5

Ray Villard's section goes beyond Kenny's in introducing examples of how a script interacts with audiovisual media. He fleshes out those points touched upon in Siemasko's list of questions with respect to script outline: "It's safest to assume a high school level of education . . ." to " Spend a fair amount of time planning the show's beginning and end, and tie them together conceptually," to " . . . better to scrap topics for lack of visual dynamics) than leaving the audience staring at a Kodalith graph . . ."

Elissa Malcom
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For some time now, there has been a great debate among ourselves regarding the role of the planetarium. Are these domed facilities that we work in intended for education or entertaining audiences? While we come from a wide variety of backgrounds as educators, astronomers, administrators, artists, composers, technicians, and many other professionals; we share a common goal. That goal is to enlighten our audiences about the wonders of the universe, and to help them develop an appreciation for the science of astronomy and the necessity of space exploration. How we can best achieve this goal has been the focus of the great debate.

A confrontation appears to have arisen between tradition and innovation. The traditional planetarium of the 1930's, 40's, 50's, and early '60's relied almost entirely on the star projector. In fact, this instrument was the planetarium for many years. Presentations in these early planetaria were performed live, and if someone in the audience were to close their eyes, it would have been difficult to distinguish these presentations from a lecture in a more traditional classroom setting.

Today, we find ourselves in the midst of a technological revolution that is having a dramatic effect on our industry. Computer automation, video projection, and many other innovations have come into use in a number of planetaria. Tremendous advances in astronomy: the discovery of neutron stars, quasars, and black holes; along with the revelations of our outer solar system via the Voyager spacecraft have made it essential that our planetaria grow along with our knowledge of the cosmos. This need for growth has resulted in a "genesis under the dome" through the increased utilization of special effects.

We must, however, proceed with caution because many critics feel we are trying too hard to compete with Hollywood. They argue that we are educators, not entertainers, and to a point, they are right. We should not allow special effects to be become the tail that wags the dog, and any attempt to mimic Star Wars or ET should be avoided since this is not our goal. Nevertheless, we should not shun the opportunities to be more creative with our presentations.

We are in a very real competition, but it is not one between planetaria and Hollywood. It’s not between large and small domes; school and museum (or independently) operated planetaria; the well financed and financially limited institutions. The competition is between us and the challenge to bring about a better understanding of and appreciation for the universe in which we live. Various audiences will have different needs and will require different types of programs. These can range from completely live performances to fully automated, multimedia productions.

"Our primary goal has been, and always will remain, education. Entertainment is merely a tool toward this goal . . . a means of capturing and maintaining the audience's attention."

Planetaria operated by school districts enjoy the luxury of having a class visit them more than once during a semester or year, and they can dwell upon planetary motion or star formation in detail. Other facilities must learn to make the most of the one hour per year that they have with students. Even public audiences may attend a planetarium infrequently, and we must capitalize on these visits if our customers are to return in the future. We cannot teach everything about astronomy in an hour, so we must learn to stimulate the audience to pursue knowledge outside the planetarium. Our primary goal has been, and always will remain, education. Entertainment is merely a tool toward this goal: it’s a means of capturing and maintaining the audience’s attention. Anthony Jenzano stated it quite well, “Planetariums utilize theatrics to provide entertaining education.”

During last October’s meeting of RMPA and PPA in Salt Lake City, someone mentioned the rationale that Steven Spielberg had for making the films Close Encounters of the Third Kind and ET — The Extraterrestrial. Spielberg admitted that his intentions were not to teach astronomy or the possibilities of life elsewhere in the universe. He simply wanted to stimulate our curiosity.
An astronomer studies the heavens: stars, planets, comets, galaxies, and so forth. In doing this work, s/he takes and studies photographs, writes articles, delivers research papers, and teaches students. But what are we? As one who works at a planetarium or science museum, are we astronomers? Or even scientists? One staff member of a Canadian planetarium sent me his business card stating that he was a “Planetarium Scientist.” Perhaps the term “Museum Scientist” might well be more appropriate.

However, there are those who have been trained, formally or informally, to be astronomers and they enjoy working in planetariums rather than in universities, but they would not call themselves museum scientists. These individuals are Planetarium Astronomers.

At the beginning of time, astronomers and astrologers were the same. But down through the centuries, a bifurcation resulted in the science of astronomy on the one hand and the pseudo-religious cult of astrology on the other. Astronomers try to predict the future of the universe, whereas astrologers use the stars and planets to try to predict the future of persons or cultures. Surely there is no confusion here, and we would expect to find few astrologers in the planetarium field.

The earliest planetariums of the 1920s (and later) usually had an astronomer. The first “shows” were astronomy lectures, and these were popular until the late 1950s when media specialists and technicians worked together with advanced technology to produce a more entertaining format. But here is the problem. Astronomical lectures tend to give too much information to the general public; there are usually too many facts, and the delivery is too dry. On the other hand, there have been valid arguments against the media-run planetarium that is virtually all “show” and little substance. Astronomers may be knowledgeable, but not entertaining; technicians may produce exciting programs, but they are not often grounded in the science of astronomy.

Many astronomers, looking for work after college, have found themselves accepting jobs at planetariums — as part of a museum or a university. Astronomy professors with planetariums are almost always given the responsibility of being planetarium directors. In reality, many of these astronomers are really not interested in the planetarium field at all — they would rather do research.

The opposite case also occurs: some planetariums hire directors and staff with little or no formal astronomy training. Thus we see biologists, historians, musicians, geologists, economists, and others taking the reins of the planetarium and becoming, in the eyes of the public, an “astronomer.”

Neither of these individuals, the research astronomer, nor the non-astronomer, is really comfortable or happy in the role, and yet the situation certainly exists.

The planetarium field . . . must cultivate and search for planetarium astronomers — those trained in astronomy . . . who really want to be a planetarian.

The planetarium field, and those institutions ultimately concerned with legal responsibility for planetariums, must cultivate and search for planetarium astronomers — those trained in astronomy (or a closely related field) who really want to be a planetarian. Incentives should be made available to someone who has planned and studied for a career in the planetarium field. After all, there are some one thousand U.S. planetariums, and many more in other countries. It is not likely that the field will collapse. The demand for knowledge is too great. The planetarian does not need to be a research astronomer “longing” for a “real” astronomy job. Neither should s/he feel uncomfortable in his job due to a lack of knowledge or credentials.

Planetarium astronomers are also much better at communicating with the public than either a research astronomer or a technician, and in fact, most astronomers and technicians prefer it that way. This is something that the planetarium astronomer loves to do — it’s his life.

To become a planetarium astronomer, one should earn a bachelor’s (or higher) degree in astronomy (or related field such as physics, earth science, or science education — with a good background in astronomy), and gain some experience in a planetarium or museum. This can be done by spending several years as a part-time staff member while attending college and/or by participating in one of several of the planetarium internships that are offered. After finishing the college degree and with some experience, one can then be ready to pursue eagerly a career as a planetarium astronomer.
In 1935, a new building for the science departments was added to the senior high school in Falun, Sweden. One of the rooms measured 5.7m x 3m (19' x 10'), had a 3m (10') diameter dome and was named THE PLANETARIUM.

In the center of this dome, on a high wooden pedestal, was placed a small planetarium projector, bought from Germany. There, by sitting on very high stools around the projector, some 15 students at the time could be taught astronomy.

The projector was designed by G. Kiehlman from Reichenbach o.L in Schlesien; this town is the present Dzierzoniow in Poland and is situated some 60 km (35 miles) SW of Wroclaw (formerly called Breslau). It was built by the engineering firm E. Unglaube in Glogau, 100 km or 60 miles NW of Breslau in Schlesien, today the Polish town Glogow.

According to the 1935 description, the projector had the following features:

- Starball with several hundred stars, the Milky Way, the Equator and the Ecliptic.
- Sun and moon projectors, mounted under the starball. The phases of the moon were automatically projected (animated by means of a half-blackened bulb) as well as solar eclipses when the new moon passed the ecliptic.

FIGURE 1: The Planetarium at the senior high school in Falun, Sweden, c. 1935.
• Planet projectors mounted on top of the starball showing Mercury, Venus, Mars, Jupiter and Saturn. These projectors were capable of displaying proper retrograde motion as well as varying light intensity (depending on the relative distance of the planet and the earth).

• Blue sky, evening and morning glow.

Diurnal and annual motions were driven by an electric motor; since the same motor was used, the two motions could not be run simultaneously. Latitude change was manual. The projector could be replaced on the pedestal with another machine, whose shadow images showed how the Copernican solar system was compatible with apparent (geocentric) planetary motions.

Then came new times. Curricula changed in the Swedish senior high schools during the nineteen-sixties, after which astronomy was no longer taught (astronomy is taught, though, in the compulsory junior high school). The planetarium projector was dismantled and put away in a cupboard.

The school moved to a new locality in 1983 and the planetarium projector has been put on temporary display. Our plans are to restore the projector and display it in the Kosmorama Space Theater at the Futures' Museum in Borlange.

This beautiful piece of machinery is very interesting for several reasons. To my knowledge, it is the first small planetarium projector constructed. It utilizes a starball with pin holes, a technique which Armand Spitz incorporated so successfully many years later. How many projectors Mr. E. Unglaube built I do not know, but the projector in Falun is said to be the only one that survived the Second World War.

FIGURE 2: The Unglaube planetarium projector as it looks today.
‘Good evening, and welcome to the Griffith Observatory. My name is John Mosley, and I’ll be presenting this evening’s show.

‘Tonight, we’re doing something different. In place of our regular planetarium show, we’re presenting ‘An Evening Under the Stars.’ This show is different from our regular planetarium shows which are presented Tuesday and Thursday through Sunday. Those shows are multimedia productions on a topic we’ve chosen in advance. You sit in your seat, learn about astronomy, enjoy the show, and go home, but you don’t get to participate. You can’t ask questions.

‘Tonight, we encourage you to participate, and we invite you to ask questions. This show will be about what you want it to be about. There’s no script; I don’t even have an outline.

‘I’d like you to think of yourselves as being seated around a campfire on a clear, dark night in the mountains. You’re with your friends, and there’s an astronomer present. He’ll be glad to talk about the stars and to answer any questions you might have. Tonight, instead of a campfire, we’re sitting around a Zeiss Mark IV Planetarium Projector. It’s not as warm, but it gives us control over the sky. We can use that projector to go places and see things that you can’t see from any campfire, and we’ll use it a lot this evening.

‘And so, let’s begin by letting the sky grow dark so that we can see the stars.’

This is a typical beginning to “An Evening Under the Stars,” presented each Wednesday night at 8 p.m. from September through May at the Griffith Observatory in Los Angeles. The exact phrasing changes from week to week because, like the rest of the show, the introduction has no script. The show lasts an hour and has the same admission price as our other shows. There are a lot of repeat customers.

“An Evening Under the Stars” is the result of an effort to solve several problems. It offers an alternative to our conventional planetarium shows for people who would like something different. It gives our friends a reason to come back more frequently than the public show changes. It gives us a good response for people who ask, after our regular show, “When do you talk about black holes?” or, “When can I see more constellations?” or, “Do you ever show the southern hemisphere stars?”, etc. We tell them to come back any Wednesday night. And, perhaps most important of all, it gives the Observatory staff a chance to talk to the audience and find out what they know and what they want to know. Often, the staff learns almost as much as the audience.

Yes, even in such a large theater, people do ask questions and participate. Sometimes, things get off to a slow start, and often I ask questions of the audience to break the ice, but this is never a serious problem. I always begin by pointing out bright planets, stars, and constellations in the current evening sky. If the audience is shy or tongue-tied, I think of something interesting to talk about and then ramble on. I don’t need many questions, and each becomes a topic for elaboration that could carry through for the rest of the hour, if need be. The hour is not a question-and-answer session, but a dialogue as it might occur around a real campfire. Generally, by quitting time, people have loosened up and there’s no lack of good material to work with.

... Most important of all, it gives the Observatory staff a chance to talk to the audience and find out what they know and what they want to know.

The single most common question is, “Would you tell us about black holes?” Others that reoccur regularly are, “Would you point out Leo (or Capricornus, or Virgo, or another constellation of the zodiac)?” and “Can you explain how we know how far away the stars are?” None of these have short answers. People will frequently ask about discoveries recently reported in the newspapers, so it’s a good idea to stay a step ahead and know what’s new in astronomy.

Our planetarium seats about 640, and attendance is between 100 and 200 — typical for an off-season weekend. Attendance has not gone up or down by a significant amount on Wednesday nights since the program started. A few regulars return almost every week, and a few catch every other or every third Wednesday. I’m sure the program would work better in a small and more intimate theater, but if it works for us, size is no barrier.
We steer the discussion toward things that we can demonstrate with our Zeiss planetarium, and try not to leave the sky in the same position for too long. If we’re talking about galaxies, I’ll rotate the sky to point out Andromeda and perhaps take us south to see the Magellanic Clouds. If someone asks about planets around other stars, I’ll point out where V838 is in Ophiuchus, and perhaps Beta Pictoris. If an eclipse is coming up, I’ll demonstrate why it happens. People are delighted to ask a question and see the mighty Zeiss moved to answer it. Where else can you go and have a million dollars worth of impressive machinery — and in fact, the whole sky — manipulated at your request?

We do use other visuals. We use whatever is available and can be called up manually, which includes a basic supply of stock special effects. Most of our slides (panoramas, all-sky, etc.) are under computer control and cannot be easily displayed, but I generally write a short program before the show that gives us a sunset over a panorama of Los Angeles. One very important projector is our Random Access Projector. It finds any slide in a Carousel tray in a few seconds, and allows you to prepare in advance a smorgasbord tray of slides you anticipate you’ll want, and to quickly go to any slide. Our tray includes a few slides each on the planets, meteorites and their impacts, black holes, the 13 constellations of the astronomical zodiac, bright Messier objects, and the like, plus any new visuals that recently appeared in the press that people might ask about. We keep a slide list handy by the reading light.

An exciting new addition to our visuals is a video projector and laser disc player controlled from the console. This system will be operational when we resume “An Evening Under the Stars” in September. This will give us access to tens of thousands of stills and dozens of movies as quickly as we can change the disk and flip through the index. People don’t mind waiting a few second if they get something for it, and the informality of the show helps (“You say you want to see some pictures of Uranus and its moons? Hold on a sec and I’ll show you a few hundred!”).

“An Evening Under the Stars” has been an ideal program for expanding our offering and for meeting the needs of the public. It works well in a large theater, and I think it should work even better under a small dome. Because it is inexpensive to produce in terms of both time and materials, it could be an ideal offering for planetariums that give infrequent public shows. What I like most about it is that it gives us a chance to chat with the audience and find out what they’re thinking.

**EDUCATION AND ENTERTAINMENT: STRIKING A BALANCE**

. . . continued from page 8

and provoke some thought. This was clearly accomplished by seeing the number of people who looked up into the evening sky upon exiting the theaters.

Catherine Buckley wrote, “Walking into the planetarium is like walking into another world for me. Everything is different and unusual . . . The [domed] theater itself is a place of wonder. Walking into a darkened room with a strange ceiling, highlighted with indirect colored lights, and an alien mechanical beast at the center of the chamber is a unique thrill.” 1 This initial impression is familiar to all of us, but do we dispel it with our presentations? For planetaria to survive and remain effective, education and entertainment must coexist under the dome. This can be accomplished by learning to strike a careful balance between the two. We need to capitalize on the initial impact of the planetarium by developing well-written scripts and effective soundtracks that are enhanced by special effects which serve a direct purpose in illustrating concepts. By all means, we should not bewilder the audience with complicated diagrams, or destroy the beauty of the starry sky with constant rectangular slide projections.

In conclusion, let’s remember that the planetarium is a unique environment for presenting astronomy to young and old alike, in a non-conventional manner. Relegating our presentations into a style that too closely resembles a classroom lecture is a disservice to our audiences, our institutions, and our profession. Above all else, we must not lose the ability to use our imagination; for if we fail to utilize our capacity to imagine and envision the future through the planetarium, we will never be able to impart that ability onto our audiences.

**REFERENCES**


IN INVOLVING THE PUBLIC (GASP!) IN SHOW DEVELOPMENT
Fran Biddy
Strasenburgh Planetarium
Rochester, New York

When we recently involved the general public in the development of a feature show, we reaped extensive public relations benefits, as well as experienced an interesting production process. The show, QUESTIONS, was based on surveys we conducted to determine what the public wanted to know about astronomy.

Surveys were conducted at our box office, at the reception desk of our museum, and by a local AM radio station. Additionally, we kept a two-month record of telephone inquiries from the general public. The question we asked in our surveys was, “If you could ask an astronomer ONE question (about anything except Halley’s Comet), what would it be?”

A total of 253 questions were generated by our surveys, with the majority (164) coming from the radio promotion. In our tabulation (see Figure 1), we’ve separated inquiries from individual members of the general public from questions submitted in groups by school classes. We distributed 500 survey forms at our box office (to each ticket purchaser) and got 42 back. Of the 500 forms available at the museum reception desk, only 10–15 were handed out, and 5 came back to us.

FIGURE 1

<table>
<thead>
<tr>
<th>SOURCE</th>
<th># of questions</th>
</tr>
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<tbody>
<tr>
<td>Planetarium</td>
<td>52</td>
</tr>
<tr>
<td>Museum</td>
<td>5</td>
</tr>
<tr>
<td>Phone calls (2 months)</td>
<td>32</td>
</tr>
<tr>
<td>Radio (public)</td>
<td>24</td>
</tr>
<tr>
<td>Radio (schools)</td>
<td>140</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>253</strong></td>
</tr>
</tbody>
</table>

We developed our outline for the show’s script by first separating the questions into seven general categories (see Figure 2): “backyard” astronomy (24 questions); solar system and space program (18 questions); galaxies and black holes (13 questions); other solar systems, extraterrestrials and UFOs (12 questions); telescopes and binoculars (6 questions); and “other” (a hodgepodge of 24 questions that didn’t fit into our arbitrary categories, and that we didn’t want to include in the show).

FIGURE 2

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th># of questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Backyard astronomy”</td>
<td>24</td>
</tr>
<tr>
<td>Solar system &amp; space program</td>
<td>18</td>
</tr>
<tr>
<td>Cosmology &amp; fate/shape of universe</td>
<td>16</td>
</tr>
<tr>
<td>Galaxies &amp; black holes</td>
<td>13</td>
</tr>
<tr>
<td>Other solar systems/ET’s/UFO’s</td>
<td>12</td>
</tr>
<tr>
<td>Telescopes/binoculars</td>
<td>6</td>
</tr>
<tr>
<td>Other (careers, evolution, joke &amp; bizarre)</td>
<td>24</td>
</tr>
<tr>
<td><strong>TOTAL (excludes schools)</strong></td>
<td><strong>113</strong></td>
</tr>
</tbody>
</table>

The first six categories above became the six major sections of our program. Each section was outlined to answer as many questions as possible within a smooth narrative form. We selected a total of 48 questions, many of which made frequent appearances in the surveys (such as the six variations of, “What kind of telescope should I buy?”

Examples of questions answered within the show...

- What causes a ring around the moon?
- Is it true that the full moon has strange effects on life?
- Why do stars twinkle?
- What are the possibilities of life on other planets?
- What’s inside a black hole?
- What is the shape of the universe?
- Where does space end?
The UALR 24-Inch Mobile Telescope

Paul R. Engle
University of Arkansas at Little Rock
Little Rock, AR

For over ten years, the university has owned a 24-inch telescope which was originally installed on a seven-story campus building under a 12-foot dome. But the viewing conditions on the campus were not good enough for an instrument of this size and the dome was too small to be operated efficiently with classes and the public. The instrument was then stored for several years, before the decision was made to convert the telescope into a mobile unit so that it could be taken to dark sky sites and utilized at different locations around the state of Arkansas.

The telescope is a Group 128 instrument with an extended German polar axis mounting. The optical system is a classical Cassegrain with an f/3 primary and an f/11 secondary mirror. The optics have been figured to a very high degree of accuracy, on the order of 1/20th of a wavelength, by Mr. Norman Cole of Tucson, Arizona. The mounting and drives have been refined to increase the accuracy of the telescope's tracking. Many details have been incorporated so that the instrument can be transported safely on a custom-built trailer. This trailer was carefully designed with an insulated fibreglass cover. It is planned to computerize the instrument at a later date to permit the use of a large memory bank of objects for rapid slewing to different positions in the sky. This should also eliminate any backlash in gear systems through pre-loading on both axes. The project has been conducted in the Department of Physics and Astronomy, and advanced students have played an important role in independent study courses using this instrument as their major project. The telescope is equipped with an offset guider and 4" × 5" plate holder camera of professional quality, and we plan to add a photoelectric photometer.

The telescope will be located at semi-permanent sites most of the year, including a state park about fifteen miles outside of Little Rock where star parties are conducted throughout the summer months. It is hoped that this mobile telescope can be taken to the Texas Star Party in 1987. We also plan to take the telescope into the mountains of northwestern Arkansas and to selected school sites from time to time. It will further be used in our minor program in astronomy and planetarium science, especially for some of the laboratory studies.

We feel that a large permanent observatory site in Arkansas is probably not warranted for several reasons, mainly due to the variable weather and the remote access from our campus in Little Rock. The expense of maintaining a dark sky site is also a major undertaking. So, great care has been taken in redesigning this instrument to transport it safely and with a minimum of change in the collimation of the optics.

One future possibility that we are considering is to establish a drive-up type of observatory a few miles from the city of Little Rock. Under a roll-off roof or dome, we could have a precise location for quick adjustment of the polar axis and yet could still drive the instrument to other locations throughout the state. We feel that this may be the best solution for having an instrument of this size nearby to the campus community, and still maximizing its aperture at other highly favorable locations.

We feel that this may be the best solution for having an instrument of this size nearby to the campus community, and still maximizing its aperture at other highly favorable locations.

This project has been made possible by the Friends of the UALR Planetarium, a grant from the V. M. Slipher Committee of the National Academy of Sciences, and resources from the UALR Planetarium.

It has offered a unique and once-in-a-lifetime experience for advanced physics majors in the independent study program. We hope that the instrument will prove to be of a quality sufficient not only for student laboratory work and public programming, but also for undergraduate research projects as well as faculty and staff research.
HANSEN PLANETARIUM 
OUTREACH PROGRAM

Ruth G. Lynch
Hansen Planetarium
Salt Lake City, Utah

The Hansen Planetarium outreach program is designed to teach space science to school children who live too far away to come to the planetarium in Salt Lake City. We also want to stimulate interest in the students to come to the planetarium with their families when they visit Salt Lake City.

The program got started at a time when the planetarium requested funding from the Utah State Legislature for school shows. Legislators from rural Utah weren't happy about contributing tax money for this purpose because their school districts were too far away to visit the planetarium. They said they would be happier if the planetarium had a program from which their school children would benefit. At the same time, staff members were notified that NASA had a van full of space science equipment from their Space Mobile Program to donate to a museum. The Hansen Planetarium wrote and received the donation for developing such an outreach program. NASA then decided to donate the equipment and provide training to the Hansen Planetarium.

The amount allocated for an outreach program was small at first. The planetarium received $30,000, which was sufficient for one person to go out on the road. A van was purchased from Hertz-Rent-a-Car and painted with the title "Astrovan". The number of students contacted during the first year was 30,000.

The program has grown from this humble beginning to include two full-time and one part-time lecturers going out on the road. We purchased a new van in 1985 and christened it the "Star Cruiser." Last year, we received $60,000 and contacted almost 59,000 students.

The program we present consists of an assembly before the entire student body in the school followed by classroom visits. The topics of the assembly have been rockets and living in space. The students are shown how a home-made hydrogen-oxygen rocket works in a very dramatic fashion! We then tie this in to the operation of the space shuttle. We next surprise students by firing a solid fuel rocket engine that is attached to a rotating arm.

Liquid nitrogen demonstrations help the students understand how cold rocket fuel really is and how those cold temperatures might affect rocket equipment. The classroom discussions which follow vary according to the age of the students. Elementary schools frequently request our portable planetarium presentations. The portable planetarium is inflated with a fan and can be set up in a multi-purpose room. A class of students then crawls inside and is given a star identification talk on the current night sky.

Secondary schools frequently request laser disc presentations on astronomical topics. We can also present a variety of slide shows and astronomical movies during the classroom discussions.

"We want to bring equipment, technique, and expertise (not necessarily in that order) to the rural areas of Utah that might not otherwise benefit from this type of program . . . Last year, we . . . contacted almost 59,000 students."

Next year, we plan to use robotics during our assembly program. This will demonstrate how robots help us in space exploration and astronomy research. We have a Gemini robot that self-navigates in a room using sonar. We want to compare this robot with a future Martian explorer. This robot can also detect motion or light, recognize voices, give weather reports, and do many other things. We also have a Scorbot robotic arm that can choose operational circuit boards from those that are not. This robotic arm can put out a fire and toot its own horn. In addition, we have a "people-powered robot" that operates on kid power. We want to demonstrate how the joints in a human arm are similar to the axes of rotation in a robotic arm.

All of the topics we present in our outreach program relate to space science. We want to bring equipment, technique, and expertise (not necessarily in that order) to the rural areas of Utah that might not otherwise benefit from this type of program. Our goal for the future is to increase our student contact and our program's diversity in a resourceful fashion.  

[End of extract]
Alberta, Canada’s Mobile Astronomy Program (M.A.P.) began with the idea in 1973 of creating an educational astronomy program capable of travelling throughout the large province. The major cities of Calgary and Edmonton are each served by very capable planetariums. Thus, the goal of M.A.P. has been to serve the outlying rural communities.

Many ideas were formulated to achieve this goal, one being the construction of a large van with expandable walls and dome — but that would have proven too expensive. The final design chosen was that of a wood-and-fiberglass dome structure that could be assembled within community buildings. This mobile planetarium was 4.5 meters wide and either 4 meters or 4.5 meters high depending on which of two different wall sections was used. The dome of this planetarium, along with its Spitz Nova III star projector, was purchased in the United States. The rest of the planetarium was designed and fabricated in Alberta. This unique planetarium program — the first of its kind in Canada — then began operation in 1976.

Although quite innovative, there were some major difficulties with this original design. The 159 kilogram dome required at least two people to assemble and 10 to 12 rather energetic individuals to heft onto the walls. The dome and walls were assembled separately, and so required approximately twice as much floor space as the planetarium actually occupied. The bulk of the heavy planetarium and its associated equipment required the use of expensive movers for each relocation. As a result of the difficulties, when the planetarium needed refurbishing in 1983 (due to wear and tear) a more versatile planetarium design was sought. This concept developed and grew out of the inflatable Starlab and Apollo domes used in our planetarium program (about which I’ll speak shortly). After design and development in Edmonton, Alberta, a prototype dome was built in the United States by Viewlex/Apollo.

The dome as delivered was initially completely black. When inflated by an industrial fan, it resembled a giant vibrating bug, all of 5 meters wide by 4 meters high. So, to make it less ominous, constellation outlines and a friendly wizard were printed on the dome’s surface. The wizard was so well received that he now serves as a recognizable symbol associated with all M.A.P. events.

The heart of our planetarium is a Spitz-Nova III star projector, which shows approximately 950 stars, the five naked-eye planets, sun, moon, sunrise and sunset glows, and three coordinate circles. Purchased in 1981, it is due for replacement this year. Also this year, we have had built a new projector pedestal, allowing simultaneous usage of four slide projectors or film loop projectors along with various special effects. The new pedestal will also accommodate a refined sound system, dissolve unit and possible computerization. Lighting consists of 8 red and blue variable flood lights, allowing for some exciting visual effects. Approximately 30 people may enjoy each show, seated on a plush padded carpet. In stark comparison to the old unit, the inflatable planetarium dome rolls up, like a tent, into a duffle bag weighing only 30 kilograms. In fact, the entire planetarium and peripheral equipment, including a 20 centimeter Celestron telescope, is transportable in a standard 1/2-ton van.

"The Mobile Astronomy Program’s strength lies in the intimate contact provided to the participants because of our small audience size and live presentations . . . Since 1976, over 140,000 people in more than 50 towns have enjoyed our programs."

During the last five years, the M.A.P. has expanded its operation to include a “loan-out” planetarium program. We have purchased Starlab and Apollo inflatable planetariums which are made available to schools and community centers throughout Alberta. These simpler and smaller units which easily fit into a small car, can accommodate 30 students. A M.A.P. staff member delivers these units to the various locations, and provides a two-hour in-service workshop to teachers. The Mobile Astronomy Program also makes available two resource books containing basic astronomy information, references, and student activities. Other M.A.P. publications include a brochure on the M.A.P., a youth brochure, and an annual wallet-sized astronomical events calendar.
Two permanent part-time employees perform the instructing for the large planetarium on a time-sharing basis.

In the past, the M.A.P. has sponsored and coordinated a number of interesting summer programs, including a travelling slide show/lecture series and observing sessions which covered nine provincial parks.

Since 1976, over 140,000 people in more than 50 towns have enjoyed our programs. This year, attendance of programs has been over 32,000. The importance of the M.A.P. is illustrated by the thousands in rural communities who might not otherwise have had the opportunity to travel to a planetarium facility.

The Mobile Astronomy Program's strength lies in the intimate contact provided to the participants because of our small audience size and live presentations. Many pictures and letters received from our students, teachers and the interested public attest to the enthusiastic response to our programs.
CINEMA-360 AND THE SUBSCRIBER PLANETARIUM

A Case History Involving The Davis Planetarium

Richard S. Knapp
Russell C. Davis Planetarium
Jackson, Mississippi

This paper is intended to present an inside look at what one planetarium has achieved with its commitment to hemispheric motion pictures utilizing the “Cinema-360” concept. It is a case study drawn from the experience of one of the so-called “subscriber” planetariums, of which there are eleven active at this writing.

The Russell C. Davis Planetarium in Jackson, Mississippi is one of four founding members of the non-profit Cinema-360, Inc. organization. A large facility with an 18.3 meter dome and a seating capacity of 230, the Davis Planetarium’s principal projection systems are: a Minolta Series-IV star instrument, a Century 35mm motion picture projector with Buchroeder lens, and a 42-projector multi-image system controlled by AVL equipment. The dome is in the traditional “flat horizon” configuration with a reflective index of 0.5.

Although large in physical size, the Davis Planetarium is situated in a fairly modest urban center of 340,000 people. Outside the Jackson metro area lies a sea of rural southern agriculture extending for several hours driving time in all directions. Consequently, the Davis Planetarium must rely primarily on a local audience to support its programs and to recover an acceptable percentage of operating costs.

Our commitment to some form of hemispheric cinematography was born out of that need. It was clear from the outset that this $2.5 million dollar facility would need to offer a breadth of program fare sufficient to interest a majority of local citizens — not just those with an interest in the night sky. Thus, our experience with the films, the projection systems, and the business end of producing and screening motion pictures goes back to our opening in 1978.

In 1986, the question to be asked is, “How are the films working out at the box office? Are the numbers really there to support this commitment?” There is simply no doubt about the fact that the hemispheric capability greatly enhances attendance at the Davis Planetarium. For us (as for other planetariums where the medium is an established and recognized attraction), film features tend to outdraw conventional programs by a factor of two or more.

“The Space Shuttle: An American Adventure” (a 31-minute color and sound release in “Cinema-360”) opened in early January, 1985, and played exclusively through April. It was re-opened by popular demand in July and played exclusively through September. Then, for the remainder of the year and continuing to the time of this writing, it has been offered on a limited schedule every week. It continues to draw well for us eighteen months after opening, once a day, six days a week even as we go on offering other programs around it. Somewhat to our surprise, the Shuttle accident in January, 1986, has neither dampened the interest in seeing the film nor adversely affected audience reactions to it.

Figure 1 presents this film’s performance at the Davis Planetarium box office during 1985. There were 618 screenings of the film and a total audience of 47,699. This amounts to an average attendance per show of 77 and an earned ticket revenue (for this film alone) of $77,862, exceeding the highest total annual ticket earnings ever reported for any previous year for all programs. Since the Davis Planetarium is required to admit local school children free of charge, such a high figure for ticket earnings implies that the film has a specific ability to effectively attract the adults to night and weekend programs. A more detailed analysis of the attendance data bears this out.

Figure 2 provides the overall operating statistics for 1985 at the Davis Planetarium, where there were 915 showings of all programs, a total attendance of 63,719 and a total ticket revenue of $93,933. Clearly, the Shuttle film was the overwhelming ingredient in our successful 1985 year, accounting for 75 percent of all attendance and 83 percent of all ticket revenue.

<table>
<thead>
<tr>
<th>Space Shuttle Film Showings in 1985 at R. C. Davis Planetarium, Jackson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of screenings .................................................. 618</td>
</tr>
<tr>
<td>Total attendance .................................................................. 47,699</td>
</tr>
<tr>
<td>Average attendance/show .................................................. 77</td>
</tr>
<tr>
<td>Earned ticket revenue .......................................................... $77,862</td>
</tr>
</tbody>
</table>

20
Another way to look at these figures is to separate the film program statistics from the non-film programs. Figure 3 sets forth the non-film program box office performance at the Davis Planetarium in 1985. There were 297 showings to an audience totaling 16,020. In this case, the average attendance per show is important, since it is less dependent on the number of opportunities we had to show non-film programs. Even so, the figure of 54 viewers per show is artificially high due to the fact that the vast majority of non-film programs in 1985 were school shows. Had we been offering non-film public shows in the night and weekend slots for more than just a few months of the year, this figure would have been much lower.

To put the 1985 figures into context, they need to be compared with previous years. Figure 4 is arranged in terms of calendar years, beginning with the fourth quarter of 1978 when the theater opened. It portrays the typical “big bang” effect of the opening year, followed by the normal attendance decline for what should have been only two or three years. In our case, the decline continued through 1984, apparently for two reasons. By 1982, when we felt that we should have started to see an upturn in attendance, we had exhausted all of the early hemispheric films that were then available and were without any films other than those we had already screened several times. This was (not entirely coincidentally) also the same year in which the Cinema-360 organization became a reality. The first new film in that medium became available in 1985, and its impact on our attendance is quite plain to see.

Jackson installed its 35mm projection equipment prior to the existence of contemporary designs, such as the one offered by the Radian Group, Inc. Prices for the hardware we chose amounted to $45,000 in 1986. However, our system required a special projection room beneath the theater floor, which added many thousands of dollars to the building’s cost. Including the cost of the elevator for the Minolta projector, Jackson spent about $100,000 to outfit its theater to show hemispheric cinematography. Ten years later, the cost is still about the same for similar equipment installed in new construction. Higher equipment costs are offset by improved designs that allow floor mounting and don’t require a separate projection room.
PLANETARIUM SHOWS FOR PRIVATE INDUSTRY
OR
HAVE PLANETARIUM — WILL RENT

David Falk
Los Angeles Valley College
Van Nuys, California

Planetariums operated by colleges and universities have long given shows to the public and for school groups. But there is another segment of the public that can be approached — employee associations from private industry.

Aside from providing an interesting and educational event for companies and their employees, planetarium shows for private industry offer a method to raise money for both the lecturer and the planetarium.

In offering private shows, the first step is to consider their feasibility in regard to the available facility.

At Los Angeles Valley College in Van Nuys, we have a planetarium that can seat 45 people under a 24-foot dome. This planetarium is in use during weekdays as a classroom, but is not used on weekends except for once-a-month public lectures. It is housed in a self-contained building with restrooms and is close to a parking lot. Thus, it is available for weekend shows and has the essential support services within the same building.

A final point to feasibility was checking with the college administration for the legal aspects and costs. As it turned out, the administration saw no problem with renting the planetarium, provided that it was done either on a lease basis (for a flat fee) or “sponsored” by an on-campus organization. In this case the “rental fee” would go toward that organization. The method chosen was sponsorship through the college’s astronomy club, with the “fee” being applied toward additional equipment for the planetarium. An extra advantage is that some astronomy club volunteers can be recruited to act as ushers.

It should be noted that some colleges or universities may not allow employees/lecturers at the college/university to put on independent shows for a fee. In this case, they may have to be “sponsored” by the school’s Community Services department. It is best to check with the administration on this point.

After negotiating a “rental fee” with the astronomy club, the next step was determining how much to charge per show. While this figure may vary with each planetarium, it should cover the cost of the facility rental, a reasonable rate of pay for the lecturer, and any costs for handouts, slides, and postage (for mailing out show information). The per-person cost (assuming a full house) was thus set to be slightly lower than the admission fee for Valley College’s regular public shows. Because the Valley College Planetarium is small, we offered an additional price break for successive shows given on the same day, to accommodate larger groups.

Offering the programs for a set fee puts the responsibility of filling the chamber on the company, rather than on the lecturer.

"Planetarium shows for private industry offer a method to raise money for both the lecturer and the planetarium."

With the fee structure set, it was time to select a topic. Obviously, a “hot” topic such as Halley’s Comet would be easier to “sell” than a dull one, but a safe bet might be a topic that has gotten a good turnout in previous public shows. The show should be limited to an hour, including a few minutes to answer questions.

With the fee and topic set, a standard “package” of literature was then prepared. This included a cover letter (with space to fill in the company name), a one page program description (suitable for quoting in a company newsletter), and a photograph of the planetarium chamber.

Targeting the companies to approach required some thought and a telephone directory. Technical companies with over 40 employees proved to be the most receptive. A local chamber of commerce might be a good source for lists of such companies. Classified ads placed by larger firms could be used as “leads”.

Initial contact with the firms was brief and involved finding out who handled employee recreational activities (usually someone in the personnel department). After an introduction, they were asked whether the company would be interested in a planetarium show. If the answer was yes, the “package” (cover letter, synopsis and photo) was mailed to them. As this process involved some salesmanship, one had to be prepared for an occasional rejection!
INVOLVING THE PUBLIC (GASP!) IN SHOW DEVELOPMENT

... continued from page 14

Some of our favorite questions from the "other" category were ...

- How does it feel to be surrounded by strange-looking things?
- How many things threaten the very heart and soul and existence of the universe?
- What is sex like in space?
- What does your mama eat for breakfast?

(And that's why the "other" questions never made it into the show.)

Response to this unique production process was gratifying in part because a number of people expressed their appreciation of our involving them, and in part because the production filled a need — we answered the questions people wanted answered.

An important additional benefit was the enormous amount of free publicity we received. The radio survey (a 60-second promotion) aired six to ten times per day for three weeks, on a station with one of the highest local ratings. Following that survey, we randomly chose five "winning" questions. Each winner received ten guest tickets to QUESTIONS. We recorded the answer to each winning question, and the answers were aired six to ten times per day for an additional week, giving us a total of four weeks of concentrated radio coverage (for free).

CINEMA-360 AND THE SUBSCRIBER PLANETARIUM

... continued from page 21

generally purchases a minimum of two new prints of each film, and the cost usually falls in the $500-$1,000 range, per print. In any case, the cost to us is exactly what it costs Cinema-360, Inc. to fill the order. The organization charges no mark-up over the lab cost, and is often able to give us the benefit of the lab's quantity order pricing.

Finally, we may need to pay a nominal user fee based on some portion of the ticket receipts or attendance attributable to the film. In the case of the Shuttle film, the fee amounts to $.25 per paid admission.

To review, then, our start-up and continuing expenses include the initial cost of the projection equipment (in the $100,000 ballpark), a $1,200 per year subscription fee, print costs, and a nominal user fee (when applicable). There are no hidden personnel costs since the expertise needed to operate and maintain the film projection equipment is below the threshold level of technical expertise needed to operate and maintain our other primary theater systems.

As a specific example, consider our figures for the most recently completed calendar year (1985). The bottom line for film-related programs in Jackson in 1985 is shown in Figure 5. Ticket receipts for "The Space Shuttle: An American Adventure" amounted to $77,862. To obtain our net revenue, subtract print costs of $4,500, the subscription fee of $1,200, user fees of $8,750, and equipment amortization (ten-year straight line basis) of $10,000. This leaves a net earning for the year of $53,412 attributable to the films.

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<th>Figure 5</th>
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<td>R. C. Davis Planetarium, Jackson</td>
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<td>Film ticket receipts .................. $77,862</td>
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<td>Less print costs ...................... 4,500</td>
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After only four months of 1986, our attendance for the year had already passed 20,000, but the impact of two new Cinema-360 films was still to be felt. "The Magic Egg" opened to excellent reviews and strong attendance on June 10th, and the "Great Barrier Reef" will open in October, to be followed by "Genesis" sometime in 1987. Early expectations for what a hemispheric film capability would add to community interest and enjoyment of the Davis Planetarium seem to have been borne out, and the economic advantages offered by a not-for-profit film supplier are enabling our facility to post dramatic increases in net revenue.
Mentor School District has over 10,000 students located in 16 buildings. Grades 1–6 are all scheduled for one annual visit to the planetarium. Each program takes approximately one month to get through all the schools. Programs are also presented to 7th grade and 9th grade. In addition, we provide special programs at the high school level for such things as Biology, Chemistry, Physics, American History, American Government, and others on request. I see approximately eight to nine thousand students each year. I have four modules of 90 minutes each to present these programs. That's the background; let me tell you how I found a way to handle this situation.

Students play a key role in making this situation a workable one. My philosophy has been that it is very important for me to be able to interact with the students visiting the planetarium. I found this difficult to do from the console (behind the students). They need eye contact and so do I to make sure that they are understanding the material I am covering. Therefore, I do most presentations live with one or more students controlling the various equipment that will be used during the program. Students are very useful in preparing programs, setting the instrument, and sorting slides. They are vital in allowing me to expand our program. (When I started 7 years ago, I only saw first, third, and fifth grades.)

Students assistants come from a wide variety of backgrounds. Some are National Merit Scholars and others I am hoping will graduate. I have had three assistants from two families. Each has provided an important role in the planetarium.

Students have also played a very important role in making the planetarium a very pleasant place to visit. They have provided equipment and materials for the planetarium. Since many have talents in a variety of areas, I try to make use of these as much as possible. Painting, photography, and computer programs are all areas in which students provide assistance.

I would find it very difficult for my program to function without the use of student aides in the planetarium. If you are not using them, I suggest you take a look around at the possibilities. You may even find a future planetarium director in the making!

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**PLANETARIUM SHOWS FOR PRIVATE INDUSTRY...**

...continued from page 22

One week after mailing out the information package, a follow-up call was made. If there was acceptance of the idea, a date and time for a show was set verbally. (Most companies like to book one to two months in advance, and preferred weekend shows.) This information was then inserted in a standard contract, which was mailed along with a map pinpointing the planetarium's location.

The contract need not be lengthy, but should include the following: the date, name and address of both the lecturer and the company the show is for, the date(s) and time(s) of the show(s), and where the presentation will be given. The fee should be specified, and if a deposit is required (strongly recommended!), then it too should be specified, along with the time it is due. A cancellation fee is also strongly recommended, with a similar deadline. The contract should note that refunds of the deposit will not be made after the deadline. A statement was also included to the effect that the deposit would not be refunded if the company cancelled, but would be refunded if the lecturer cancelled. Any special conditions, such as whether or not transportation is included, should be noted.

Two copies signed by the lecturer were sent, along with a self-addressed, stamped envelope to facilitate the return of one copy after the company representative had signed it.

A couple of days before the show date, the company was again telephoned to double-check the arrangements. If everything worked out, little else remained except to give the show! (If time permitted, signs welcoming the firm were made and placed in the planetarium ahead of time.)

After the program, the firm was sent a letter thanking them for their involvement and requesting payment for the balance due.

The response to the programs has been favorable. Many of the companies liked being able to sponsor an event for their employees that was different from the usual picnic. Some people became so interested that they started attending the Valley College Astronomy Club meetings!
This will be my last message to you as President of IPS. Has it really been two years? I’d heard the more events that occur in an interval, the shorter that interval is perceived to be. It’s true: boring lectures always last longer than exciting ones, and now I know the same rule holds for one’s tenure in an IPS office.

Events we’ve had aplenty:
- The IPS Council held its first overseas meeting, in Ireland.
- Halley’s Comet came and went, and many of us saw it (or thought we saw it).
- The Eighth Biennial Conference of the Society took place in Tucson, so well run by Lonny Baker that revenues slightly exceeded expenses, resulting in a small surplus turned over to IPS for future conference use.
- Major new or newly renovated planetariums opened in Paris, St. Louis, Salt Lake, and other cities around the world, while the popularity of portable planetariums continued to inflate (pun intended).
- Jeanne Bishop took the chair of a new Committee of Fellows of the Society. My congratulations to all; and if you believe you or one of your colleagues qualifies but has not been included, please don’t be shy. The Awards Committee awaits your letter.
- We had a long, vigorous, and open discussion about three excellent proposals for our first European conference site, just resolved with a council vote in favor of Sweden.
- I wish to publicly thank them all here. The IPS President of the Past-President and her successor, Jeanne Bishop, who helped me get started and at my request advised me throughout my tenure; to Jordan Marché II, retiring editor of the Planetarian, who made the journal a truly professional and respected publication in its field; and to Von Del Chamberlain, for being ready to take over as my term expires.


Editor’s Note

It has been my pleasure to serve in the capacity of Executive Editor of the journal for the last five years. Our journal is now a respected, timely publication that continues to grow and change; along with the field that it mirrors. But only through your contributions will it keep such a reputation.

While appreciative of the praise given to the magazine’s appearance by IPS. President Alan Friedman (and others), I cannot in fairness accept it alone. For it is due chiefly to the unsung labors of Marjorie J. Birch, typesetter extraordinaire at Innovative Ink, Lancaster. She has given each issue a professional attention to detail, brought unity to the typefaces and styles of its regular departments, and performed wonders in bringing final layouts to the required number of pages. Many of the illustrations have been carefully redrawn by graphic artist David Stirba. Managers Norman and Linda Shore have also been very gracious in their services, offering many a creative solution to a printing problem. I wish to publicly thank them all here. The Planetarian would not have been the same without them.

I now leave the editorship in the very capable hands of John Mosley of the Griffith Observatory. John’s proposal to produce the journal by in-house “desktop publishing” may help to save IPS considerable funds in the future, without sacrificing the quality we have to anticipate. You can help John by submitting your articles on computer disk or via modem, and save additional typesetting costs.

I look forward to seeing the results.

Jordan D. Marché II
Beginning with the next issue, this column will be written by Steve Mitch of Benedum Natural Science Center, Oglebay Park, Wheeling, WV 26003. If you edit a regional newsletter, please add his name to the mailing list.

Great Lakes Planetarium Association (GLPA) — GLPA's next conference is scheduled for October 29 to November 1, 1987, in Merrillville, Indiana.

The Henry Crown Space Center of Chicago's Museum of Science and Industry opened on July 1, with an attendance of 90,000 in its Omnimax Theater in the first month of operation. Also in Illinois, Parkland College is building a new planetarium, expected to open next year.

GLPA noted with regret the passing of Ruth Howard, formerly planetarium director at the Kalamazoo Museum in Michigan, on the summer solstice of 1985. Ruth was active in GLPA from its founding in 1965 until her retirement in 1977 and after.

Nordic Planetarium Network (NPN) — NPN held its third meeting on September 8 in Stockholm at the Naturhistoriska Riksmuseet. The program included several short reports on Nordic planetariums, presentations of the most recent Spitz, Zeiss, and Digistar projectors, and a visit to the planetarium at Sjokrigsskolan.

Plans are advancing for a planetarium with a 12 meter dome in Tromso. The planetarium will have unidirectional seating and a Cinema 360 system. Plans call for the planetarium, located on the campus of the University of Tromso, to open in 1988.

In Copenhagen, plans are also advancing for the Tycho Brahe Planetarium, with an anticipated opening date of Christmas, 1988. The planetarium will include an Omnimax movie projector and a Zeiss-Oberkochen star projector.

Rocky Mountain Planetarium Association (RMPA) — Newly-elected officers of RMPA are: president, Carolyn Collins Petersen, and secretary-treasurer, Katherine Becker. Petersen was currently elected a Fellow of IPS.

RMPA reports that, while the Boulder Valley Schools Planetarium is officially closed, it is unofficially open for the use of Jim Moravec and his student group, the Association for Astronomy Students. Jim is heading a pilot science education program at Valdez Elementary in Lafayette, Colorado. In his spare time, he is advising students on planetarium operation.

Gene Ammarell of Fiske Planetarium spent part of his summer in Borneo collecting star lore from the native tribes.

Gates Planetarium has installed a new series of school shows and held an Educators' Night presentation on September 29.

Hansen Planetarium opened a new children's show called "Sky Pirates" in August. The show uses several new and unique Digistar effects to illustrate the concept of constellations. Hansen’s current public presentation is "Star Pioneers."

Hansen's publications manager Glenn Taylor has left to take a job in the Virgin Islands as a dive safety officer for an oceanographic institute. Ruth Lynch has joined Hansen as education specialist. Elsewhere in RMPA, Maggie Holliday has retired as director of the planetarium at San Juan College in Farmington, New Mexico. Lonny Baker, organizer of the last summer's IPS conference in Tucson, has resigned from the Flandrau Planetarium.

Southwestern Association of Planetariums (SWAP) — Tom Arnold of Science Place Planetarium in Dallas reports that a new planetarium is planned, but details are not yet firmed up. Science Place has been running two concurrent productions — "Mars: A World Untamed," and "Texas Sky Lore."

Wynn Godwin, formerly of the Richardson ISD Planetarium, now works for the audio-visual production department of the Richardson School District.

Bob Wollman of King High School Planetarium in Corpus Christi reports that he has found a solution for replacing yellow lumiline lamps that are no longer manufactured. Planetarians may write to him for the solution.

In conclusion, this paper has outlined a method for arranging planetarium lectures for private industry. Some advance preparation and persistence are required, but the payoff is increased public interest and additional income for the planetarium.
This installment of "Gibbous" features only one news note, and a vast number of notes about people in the field. In a way, this is fitting, because I'd like to briefly discuss planetarium people, and one very special person in particular.

Those of us who work under—or for—domes do share a common bond, if only in a technical sense. Yet, I know of few fields where there exists so much built-in diversity. Just as there is today no set formula for building or running a planetarium, there also seems to be no standardization in the people who are drawn to the field. As any recent demographic study of planetarians has shown, we're a "crazy quilt" lot.

I see such diversity in planetarium plants and personnel as a good thing. How boring this field would be if we all conformed to one set of criteria in background and behavior! Still, diversity has its drawbacks, for we planetarians also work in relative isolation. Sure, some of us stay in some contact with friends at other institutions, and groups of us gather for a few days every year or so to swap stories and down drinks. But, how often do we really poke our heads out of our domes to see what others are doing? Laziness or overwork aside, we truly are in isolation from our colleagues.

While our dark adaptation may be slightly better, planetarians are basically no different from other human beings. We're social creatures. And, while we can't group together all the time in a physical sense, we can seek a sort of spiritual collectiveness. In the planetarium, such collectiveness is identified by various acronyms—BAP, CRAP, MAPS and IPS. Such organizations, informal as they sometimes are, publicly stand for the advancement of the profession. But, for a group like IPS, there's a basic, underlying private advantage in membership—to foster the sense of belonging, to combat the feeling of isolation.

Realistically, spiritual brotherhood alone can't be considered a good return on $34 a year. And so there are such IPS publications as the Directory and our quarterly Journal, the Planetarian. They're tangible signs of a return on an investment. But such publications are much more. They're our communications links to each other in our attempts to group together. As such, they're vital parts of the organization.

For five years, Jordan Marché has been the editor of this Journal. He took it over in almost crisis circumstances, when the editor before him suddenly left the field. He changed the look of the publication, giving it a new consistency and cost-efficiency. He cajoled copy out of reluctant neophyte journalists and saw to it that the issues got out on time.

Some of you have never met Jordan. I usually only spoke with him four times a year, when he'd call to find out where my (invariably late) copy for this column was. We didn't always agree with each other and, in fact, got mad at each other a couple of times. But, I always admired Jordan for performing such a difficult task so admirably.

All of the volunteer officers and workers for IPS—outgoing, static, or incoming—deserve our thanks for giving to us their time and their talents. But Jordan Marché deserves a special thanks, for it was he who kept the regular communications link between us open so that we could feel we belonged.

ONCE MORE AROUND THE WRITER'S BLOCK

Griffith Observatory has announced the 15th annual Awards for Popular Articles in Astronomy, Astrophysics, and Space Science, sponsored by the Hughes Aircraft Company. The awards will go to those whose original articles "best communicate to the average reader material of current historical interest in astronomy, astrophysics, and space science." Cash amounts of the awards are: 1st prize — $650, 2nd prize — $300, 3rd prize $200, 4th prize — $150, honorable mention — $50 each. The deadline for submissions is March 1, with the awards to be made on May 1. The winning articles will appear in the Griffith Observer. For more information and criteria for entries, contact: Griffith Observatory / 2800 East Observatory Road / Los Angeles, California 90027 / USA.

STAR TRAILS

Planetarium pioneer Julius D. W. Staal died on July 2 after a long illness; he was 68. Born in what is now Jakarta, Indonesia, he began his long planetarium career prior to World War II, as a student working at the original dome in The Hague. Following the war, he immigrated from Holland to England, securing a position at the London Planetarium, authoring books on astronomy and space travel and eventually becoming a Fellow of the Royal Astronomical Society. In 1960, he became assistant director of the Planetarium of Witwatersrand in South Africa, as well as joining the faculty of the University of Rhodesia and producing a physics film series for the Rhodesian Ministry of Education. He moved back to the northern hemisphere five years later to open three new planetarium facilities—at the Marine and Technical College in South Shields, England, in 1965; at the Louisiana Arts and Science Center in Baton Rouge, in 1967; and,
also in 1967, at the Fernbank Science Center in Atlanta, Georgia. He remained director of the Fernbank facility for the next decade, retiring in 1978, only to purchase a mothballed Spitz A2 projector and start yet another planetarium in Decatur, Georgia, at Agnes Scott College’s Bradley Observatory. In recent years, he has turned once again to writing books on astronomy, including the Chinese astronomy treatise *Stars of Jade*, an (unpublished) *Atlas of Chinese Constellations*, a soon-to-be released update of his 1961 *Patterns in the Sky and Compendium of Constellations from Aratus to Zeiss*, which was nearing completion at the time of his death. He is survived by his wife Mickey, daughters Anne and Susan, son John and grandson Willem. (Information submitted by John Burgess.)

Paul Twomey died in New York on June 28 after a long illness. Starting as an usher at the New York Hayden, he went on to be one of Hayden’s first interns. After leaving the Hayden, he worked on the staff of the Andrus Planetarium in Yonkers, New York, and, for over a decade, had been on the staff of the Franklin Institute’s Fels Planetarium in Philadelphia. (Information submitted by Tom Carey.)

Word has reached the planetarium field of the death of Ruth Howard on June 21, 1985; she was 67. A founding member of the Great Lakes Planetarium Association, she worked at the Kalamazoo (Michigan) Public Library from 1949 until her retirement in 1977. In addition to developing the Museum’s planetarium and presenting its classes and lectures, she also supervised the Museum’s loan collection, conducted summer craft classes for children and gave weaving demonstrations in the Museum’s Pioneer Cabin. (Information from the autumnal equinox ’86 issue of the GLPA Newsletter.)

James Manning has assumed the directorship of the planetarium at Parkland College in Champaign, Illinois; the new facility is expected to open in mid-1987. Jim had been assistant director of the Morehead Planetarium at the University of North Carolina in Chapel Hill.

Clint Hatchett has left San Diego’s Fleet Space Theater to become producer at the New York Hayden. The Fleet is currently seeking a replacement for Clint as director of production services.

After two decades as professor of astronomy and science education at West Chester (Pennsylvania) University, Dr. George Reed has joined Spitz Space Systems as director of worldwide planetarium operations, where his duties will include sales, marketing and product development. George will continue as director of the Spitz-West Chester University summer planetarium institute, the next installment of which is set for July 20–31, 1987.

School officials in Russiaville, Indiana have closed the planetarium at Western High School. The facility’s director, Gail Bouslog, has been reassigned to teach 3rd grade.

Greg Rawlings, whose position at the Roberson Center planetarium was reportedly axed due to budget cuts, is the new director of the Sunrise Planetarium at the Charleston (South Carolina) Children’s Museum.

Dr. Kim Chia has been named as planetarium director of the Singapore Science Center. The facility, sporting the second Spitz Space Voyager system, is slated to open in December of 1987.

Dennis Jennings, who had served as chief technician of the Cleveland Space Theater, has moved to France to join the planetarium staff of the Parc de la Villette science center. Jean-François Delorme is planetarium director.

Raymond Bullock has left the Cranbrook Institute of Science’s McMath Planetarium. Replacing Ray as coordinator of astronomy is Jeffrey Bass, formerly production associate at the University of Michigan’s Ruthven Planetarium Theater.

Dr. K. B. R. Prasad is the director of the Sai Space Theater of the Sri Sathya Sai Institute of Higher Learning in Prasanthi Nilayam, Andhra Pradesh, India. The 15-meter Spitz 512-equipped facility opened early this year.

Neil Passey, formerly art director at the Hansen Planetarium, is the new full-time astronomical artist at the Griffith Observatory in Los Angeles.

The new planetarium director at Chadron (Nebraska) State College is Lois Beath.

Larry Mascotti is now director of the Mayo High School planetarium in Rochester, Minnesota.

Doug Alseth is the new assistant director at the Minneapolis Planetarium.

Ruth Lynch has joined the Hansen Planetarium staff as full-time education specialist.

Glenn Taylor has left his publications manager position at the Hansen to work as a dive safety officer for an oceanographic institute in the Virgin Islands.

Lonny Baker is said to be leaving her job as assistant education director at the Flandrau Planetarium in Tucson.

In other resignation news from the University of Arizona, Lauray Yule is reported to have left the Steward Observatory to co-host a local TV program in Tucson for the Sonora Desert Museum.

Maggie Holliday has retired as director of the planetarium at San Juan College in Farmington, New Mexico.

Bill Spargo succeeds Maggie.
Ken Taylor is said to be leaving the newly-opened Turkey Run Nature Center planetarium in Marshall, Indiana.

Maryann Gaudette has joined the staff of the Fort Worth Museum of Science and History’s Noble Planetarium. She previously worked at the Gengras Planetarium and the Copernican Space Science Center in Connecticut.

RMPA president Carolyn Collins Petersen, working through the Boulder Center for Science and Policy, has been awarded a V. M. Slipher grant to continue her Mars curriculum project work.

Another astronomical object has been named in honor of a planetarian. In a ceremony on September 24, the naming of Asteroid 3291 Dunlap was announced with a plaque reading: “Named in honor of Larry Dunlap, research assistant at the Lunar and Planetary Laboratory, who has published light curves of asteroids and is now teaching high school and other students the beauty of astronomy at the Flandrau Planetarium.”

THE 1986 “CASEY AWARDS”

To mark the close of the year, the usual “Kudos & Castigations” give way to the third annual “Casey” awards, celebrating some high and low planetarium-related distinctions of 1986. (“K & C” will return next issue.) And now, the envelopes please . . .

The Hit of the Year Award (tie) to the folks at Laser Fantasy and Audio Visual Imagineering, whose innovative “light show” effects had even the most critical pundits in conference crowds smiling.

The Fall of the Year Award to Laser Images, Inc., who this fall filed for protection under Chapter XI of the U.S. government’s bankruptcy codes.

The “Miss Congeniality” Award to any planetarian who didn’t catch a piece of comet tail in taking a cruise/tour to hype the hapless Halley.

The Worst Piece of Comet Halley’s Tail Award to Traditional Rags of Cincinnati, Ohio, for their “Comet Cap.” When Jeanne Bishop ordered hers for five bucks, she was expecting more than the cheapest of painter’s caps, which looked as if it had been hand-painted by a four-year old.

The Year’s Most Convincing Special Effect Award to the Maryland Science Center’s Davis Planetarium — but only if you’re into rainwater and raw sewage. The Planetarium’s staff had both this year, thanks to construction work on the Center’s IMAX theater addition.

The Grasping at Straws Award to Vail, Colorado’s Westin Hotel, which came up with the “Perseid Package,” a weekend of (as the Hotel’s ad copy read) “cosmic cocktails and sky watching followed [by] lectures, slide presentations and a laser demonstration by world-renowned astronomers . . . With the technical assistance of these astronomers and professional photographers, the excitement of this meteor and planetary show will be captured on film and in memory.”

The Most Unfortunate Wording of a Reasonable Request Award to Fred Schaaf, writing in the November issue of the Astronomical League’s REFLECTOR. In an update on efforts to curb light pollution, Schaaf wrote: “Both Rick Kurczewski and June LoGuirato have suggested we all demand planetarium shows devoted to light pollution and textbooks with full chapters on the topic (how many of either, they ask, have you ever seen?):” You folks sure won’t see any planetarium shows on the topic if you make demands of your local planetarium instead of suggestions.

The Jack Horkheimer Award for the Year’s Most Dubious Promotion of Planetariums to Elissa Malchin (formerly Hamilton), for her short story on a planetarium conference, “The S.O.B. Show,” which appeared in the December issue of Isaac Asimov’s Science Fiction Magazine. Sure made me want to go out and visit my local planetarium.

Finally, one last award, most serious and heartfelt: Planetarian of the Year. After receiving nearly a dozen recommendations from colleagues, all for the same person, there was no doubt as to this year’s recipient. Her dedication and caring for all of us in the field showed most clearly at the IPS conference in Tucson, a personal assignment she undertook diligently for the past four years — and under three different directors — at the Flandrau. Lonny Baker, the “award” isn’t much in return for the sacrifices you made in coordinating such a fine conference, but I hope you realize it comes from all of us. ☑
In the last column, I reviewed IBM astronomy software. This time, I'd like to look at software for the Apple Macintosh.

First, if you haven't checked out a Macintosh, please do. IBM may be the industry standard, but that's more for reasons of business conservatism than of computer merits. I understand that most IBM users learn to run a very few programs and quit there because it's too hard to play around with the machine and explore what it can do. It's quite the opposite with a Macintosh, and once you learn the operating system, you can run most new programs by feeling your way through. In general, the levels of sophistication and ease of use of the Macintosh astronomy programs reviewed here are very high, and some are surprisingly inexpensive.

This is what is available for the Macintosh as of September, 1986. Programs are listed in alphabetical order by vendor.

“Stargazer” (Arktos Enterprises, 130 Wilding Lane, Oakland, CA 94618) is a comprehensive program that gives you a chart of the sky plus information on the sun, moon, and planets. After selecting your locations and time, you're presented with a fixed view of half of the sky with a few hundred stars, the sun, moon, and planets. The map does not look terribly realistic, but it turns out to be quite useful. You’re automatically given the times of sunrise/set and moonrise/set and the coordinates of the planets through Neptune. By pointing the cursor at an object and clicking the mouse button, you’re given that object’s identification, coordinates, and rising and setting times. The calculations are made quickly and I find it a fast way to determine when, for example, Venus will rise on a certain date. The accuracy is very good even for the remote past and future.

“Sky Travel” (Deltron Ltd., 155 Deerhill Rd., Lebanon, NJ 08520) is another comprehensive program. I reviewed the Commodore version in the July, 1986 issue of Sky and Telescope. The Macintosh edition, due for release sometime this fall, shows the entire sky or a portion of it complete with sun, moon, and planets. You identify objects by clicking on them. Options let you see celestial coordinate grid lines, constellation outlines and names, and to accelerate time by up to 64 times (and watch the earth rotate and the moon drift past stars). You are not given rise and set times. The pre-release version I saw is very nicely done. It will eventually be packaged with a teacher’s guide.

“Astronomy” (E & M Software, 95 Richardson Rd., N. Chelmsford, MA 01863) displays side-by-side two views of the sky for the date and time you choose — an orrery view of the solar system as seen from above, and a planisphere-type plot of the sky hemisphere that is above the horizon. The orrery includes all 9 planets and the moon, but gives no reference marks to establish a coordinate system. The sky view is unique as far as I know, in that it shows the sky as seen from the outside, as you would look at a celestial globe with the earth at the center. The planets, sun, and moon plus a few dozen stars are shown. Each star is labeled — another curious feature — but too few are included for the constellations to be readily recognizable. You can zoom into either the orrery or planisphere. All in all, the program is pretty limited (although very inexpensive), and I’m not sure just what you’re supposed to do with it. It’s also terribly slow, even on a Mac+.

“MacStronomy” (Etlon Software, P.O. Box 649, Lafayette, CO 80026) is a sophisticated program that shows the entire sky or a small portion of it in detail. Objects can be identified by clicking on them, and you’re given rise/set times. The accuracy is very good. You have the option of two databases: one of about 1700 objects, or one of over 9000 objects (including the contents of the Yale Bright Star Catalog) that shows more detail but at the cost of speed. The larger database requires a second external disk drive or a double sided drive. You can add yet more stars (and planets!) if the 9000+ is not enough. The sky is exceptionally beautiful on the high-resolution b/w Macintosh monitor when the large database is selected. “MacStronomy” conforms to the standard Macintosh operating system, and you can transfer data and graphics between it and paint programs (to make modifications) and then to a word processor. I reviewed this excellent program in the November, 1986 issue of Sky and Telescope.

“Learn About the Solar System and Halley’s Comet” (Millett Software, 146 West 255 South, Orem, UT 84058) gives basic data on the planets (and Halley’s Comet). It includes an orrery simulation that shows the relative motions of the planets, but you cannot specify dates. It is apparently aimed for the middle/upper elementary grades.

“Starview” (Mousetrap Software, 336 Coleman Dr., Monroeville, PA 15146) is another simple program. It focuses on the bright stars and constellations which it plots on a rectangular map for the location and date you select. It’s essentially a quiz or display of the shape of the major constellations. 1200 stars are included, but the sun, moon, and planets are not.
“Astro-Macronomer” (Patterson, Graydon, 22 Weatherwood Crs., Nepean, Ottawa, Ontario K2E 7C6, Canada) supplies information in tabular form on the planets, stars, and some deep sky objects. The information includes general background data and calculated positions for a specified time and location. You can search through the database and, for example, print a list of planetary nebulae within a certain range of Right Ascension and magnitude. It requires 512K of memory and Microsoft Basic 2.0. The program is available at a very modest price as shareware.

“Tellstar” (Spectrum Holobyte, 1050 Walnut, Suite 325, Boulder, CO 80302) was reviewed in its Apple version in an earlier column (volume 12, #4). It’s a comprehensive program that shows the sky with bright stars and planets in their correct positions for the date and location you specify, and gives celestial coordinates, rising and setting times plus other miscellaneous data. It too is nicely designed and intuitive in use.

“Orion” (Robert P. Munafo, 8 Manning Dr., Barrington, RI 02806) is a novel shareware program. It is not sold commercially, but if you like it and use it, you are honor-bound to send the suggested nominal contribution to the author. Orion is a 3-dimensional database of nearby and bright stars that you fly within. You aim towards a familiar constellation, accelerate, and watch the stars separate and drift by. You’re given control over roll, pitch, yaw, etc. as well as acceleration. It’s sort of a mini-Digistar. It’s fun to watch the constellations distort as they pass by. I found it far too easy to get lost in space! As far as I know, this is a unique astronomy program.

Additional Macintosh astronomy software can be downloaded from the Mac Users Group and the Astronomy Forum of CompuServe.

Former Apple II owners who have upgraded to Macintoshes but kept their Apples, (or any Macintosh owner with access to an Apple II) will be delighted to hear about “Mac+II.” This program allows you to transfer Apple software to a Macintosh and then run them on the Mac. It consists of disks for both computers that contain transfer programs and an Apple-emulation program for the Mac. You’ll need a modem on each machine or another way of linking them. If it works as claimed, it opens a universe of good Apple software to Mac owners, and could well be one of the most significant programs around. There’s still an enormous number of wonderful astronomy programs for the Apple II that have no Macintosh counterpart. Note — the manual rates about 0.5 on a scale of 0 to 10. “Mac+II” is available from Meacom, PO Box 272591, Houston, TX 77277.

This is not limited to Macintoshes, but I’ve had an opportunity to examine a copy of Astronomy With Your Personal Computer by Peter Duffett-Smith. His earlier book, Practical Astronomy With Your Calculator, is now out of date — who uses a pocket calculator to make astronomy calculations in 1986? His new book, however, is a must for anyone with both a love of astronomy and a personal computer. In 250 pages, he takes you (line by line) through two dozen basic programs that make fundamental astronomy calculations — moonrise, planet rise/set, coordinate conversion, precession, parabolic elements from three positions, etc. The programs will run under “BASIC-E,” “C-BASIC,” and “BASIC-80,” but need to be converted to run in Applesoft. The publisher is Cambridge University Press, 510 North Avenue, New Rochelle, NY 10801.

This is my last Computer Corner column. In the three years I’ve been reviewing software, I’ve had the opportunity to see some marvelous programs and to watch the general level of sophistication rise by about two orders of magnitude. It’s exciting to be living at a time when, for a month’s salary, we can possess computing power that didn’t exist anywhere a generation ago. I’ll continue to review astronomy software on a bi-monthly basis for Sky and Telescope, on a quarterly basis for the Journal for Computers in Mathematics and Science Teaching, and on an irregular basis for the Griffith Observer and elsewhere, and I’ll continue to maintain and distribute a free comprehensive list of all astronomy software for microcomputers.

Keith Johnson will become the new Computer Corner editor, beginning with volume 16. Please send all questions, ideas, reviews, etc. to him at:

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THE USE OF A COMPUTER AS AN AID TO CONSTELLATION IDENTIFICATION

Bob Riddle
Lakeview Museum Planetarium
Peoria, Illinois

Most children seem to have a natural interest in the starry sky, and are a willing audience to learn more about space. This natural curiosity goes beyond just astronomy to include most sciences. There is, however, something that seemingly transcends even their scientific curiosity — the computer. In my experiences with teaching astronomy to children, I have found that the computer can be used quite effectively as a teaching aid in helping children to visualize the arrangement and patterns of constellations. The purposes of this article are: 1) to illustrate the usefulness of visual aids in understanding star patterns; 2) to briefly describe an astronomy class for children based upon this idea; 3) recommend computer software appropriate for this kind of study.

“Space Guides” is the name of an astronomy class that I teach to children ages 6–9. Classes are usually held in the morning, meeting one hour a week for six weeks in the planetarium. The class is offered four times a year, allowing some variation in the lessons according to the seasons, and what’s visible in the current sky. The overall goal of the class is to stimulate interest in space through the study of the starry sky, and to help them understand our ‘place’ in the universe. This is accomplished by involving the students in a variety of activities using a computer under the dome. The computer, an Apple IIc, is set up on the floor in front of the star projector, and most lessons originate from this location. The only drawback to this arrangement is that as I get older it gets harder to get up from the floor!

During these outdoor sessions, the students are also introduced to the four compass directions, using the morning sun’s position as a guide to the eastern sky. It is pointed out that using the sun’s position to find due east, or for that matter, due west is not very accurate. They learn in a later lesson how to make a sundial, and how to use the gnomon to determine south and north, and subsequently east and west more accurately.

Lessons under the dome focus on a study of selected stars and constellations for the current season. By limiting the number of celestial objects studied, the students do not get lost. The northern sky is the starting point for all lessons — moving out from the Big Dipper — Little Dipper — Cassiopeia arrangement in different compass directions.

One of the most effective computer programs that I have found for teaching about the north circumpolar stars is “Ursa”, from the Minnesota Educational Computing Corporation. The first part of this dual program focuses on the arrangement of the Big Dipper, Little Dipper, Cassiopeia, Cepheus and Draco, and how to locate Polaris using the “pointer stars” (see Figure 1). The program allows for the setting of dates and times so that the effect of earth’s rotation can be observed. Using the pencil as a pointer, the students trace out the star patterns and note their arrangements relative to Polaris. This computer simulation is run
forward for several hours until the rotational effect is obvious. The computer monitor is then turned off, and the star projector is turned on. Using daily motion, the northern sky is set to match the computer display, and then run forward so that the students can once again see the effect of earth's rotation. After a few minutes of observation, daily motion is stopped, and the lights are brought back up. The students then construct a simple rotating star map (see Figure 2). They will learn how to use it in the planetarium, and are instructed to try it out at home to confirm what was observed here.

In subsequent lessons, the students use the Big Dipper, along with the computer program Ursa, as a guide to finding other stars and constellations (see Figure 3).

To facilitate the students' understanding of star patterns, two other computer programs are used. One of these, "The Star Gazer's Guide" is a program that allows constellations to be drawn in two different ways. All constellations are first shown as "dots", much as they would appear in the planetarium or real sky. Then the stars may be connected together by lines according to the classical shapes. Several constellations offer an alternate view, one that produces a more recognizable picture. (see Figure 4). These displays come from the book The Stars, by H. A. Rey. This book also serves as a source of pictures for students to study while they are learning to recognize the constellation patterns. The procedures for using this program are similar to Ursa's except that star maps are centered on the southern horizon for the current month. The map is also used to show sky positions based on some simple identification rules: how bright are the stars; what compass direction to look towards; and how high in the sky to look.

A third computer program used during the lessons is "The Observatory". This is an outstanding simulation of the sky that displays much more than just current night sky views. However, for our lessons taught in Space Guides, this is all we use it for. The program's ability to specify dates and times, as well as latitudes and longitudes, provides for remarkable flexibility. A nice feature is that one can exit the program cleanly with the screen display intact. This means that a printout is possible, as
well as the ability to save the screen display to disk for later use. This is handy for providing star maps made to specific dates (see Figure 5).

"The Observatory" has two uses during the planetarium lessons. One is to give the students a view of the sky around a particular constellation being studied (the constellation outlines can be turned on and off easily). Another use of this program is to pinpoint the visible planets and the moon among the stars.

Children can and in most cases will learn constellation patterns quite readily. They are fascinated by the many stories relating to the placement of mythical creatures or heroes in the sky, and the arrangements of the stars in forming recognizable patterns. They have a natural curiosity coupled with an active imagination that has not yet been tempered by maturity. It is easy, therefore, to capitalize on their interest and stimulate it even further. Star gazing tied in with the use of computer simulations is an effective way to achieve this goal.

BIBLIOGRAPHY

Computer Software:


Lassiter, Gary J. *The Observatory*. Lightspeed Software. 2124 Kittredge St. Berkeley, CA 94704.

Books:


INTRODUCTION

_Treasure Island_ by Robert Louis Stevenson is a classic book often included in the secondary English curriculum. The notion of pirates, buried treasure, and adventure on the high seas tends to excite even some of the most reluctant adolescents.

In the Methacton School District, the book is part of the seventh grade English program. Students carefully read the book as part of class, but also attempt to understand the historical aspects involved in the story. In keeping with this philosophy, the following planetarium program was developed. "The Trip to Treasure Island" allows the students to examine the problems and techniques of determining one's location on earth, as practiced in the 18th century. The lesson was presented over a two day period, and the students seemed to love it.

On day 1, the students learned the mechanics of finding latitude and longitude, and on day 2, they attempted a mock voyage to Treasure Island. The students were able to manipulate the astrolabe in the planetarium with little difficulty and appeared to readily understand the use of the two clocks, for determining longitude.

In regards to the accuracy of using the astrolabe in the planetarium to measure the altitude of the sun, most students did very well if they stood to the immediate left or right of the star instrument (in line with the center of the projector). They could not stand in front of, or behind the instrument or their readings were off (by as much as 12°). One might suggest that an easier method would be to simply project the meridian and measure the altitude of the sun against it. Such a method, however, would remove the very important step of student involvement. The goal of the lesson is for the students to
experience the technique of how the altitude of the sun could be found. Simply giving the class the correct number
lets them do the “cookbook” problem (“just follow the recipe”) but deprives them of the knowledge of how the
numbers could be found. Thus, despite some of the difficulties and/or inaccuracies that might develop, by having
students use measuring devices in the planetarium, the educational advantages far outweigh any of the disadvantages.

If anyone would like to take a more in-depth look at the geometric problems of measuring angles in the planetarium with a sextant, they are urged to read the excellent article by Hubert E. Harber entitled “Planetarium Sights” (Harber, 1977). In this article, Harber examines the problem and offers a solution for using hand-held sextants in the planetarium. Once the method has been developed, it is possible to use sextants for a variety of lessons.

Finally, whether one uses an astrolabe, sextant, or other measuring device, the involvement of students in these activities will offer them an enriching and exciting educational experience such as “The Trip to Treasure Island.”

BIBLIOGRAPHY


Readers are reminded to please send any comments on this lesson, as well as submission of other lesson plans for the secondary level (grades 7-12), to me. In submitting lesson plans, please remember to use the following format: Title, Purpose, Objectives, Materials, Preparation, and Presentation. The sharing of your ideas will be greatly appreciated by your fellow colleagues in the field! Please share. Thank you.

PURPOSE:

To explore some of the navigational tasks that would have been encountered by the characters in the fictional trip to Treasure Island.

BEHAVIORAL OBJECTIVES:

By the end of the lesson, students will be able to:

1. determine their approximate latitude on earth by means of the altitude of the noon-day sun, given an astrolabe, the date, and an analemma (or a table of corrections for the year).

2. determine their approximate longitude, given the time in Greenwich and their local time.

3. plot their estimated position on earth by means of a map using latitude and longitude.

MATERIALS:

• Student Astrolabes (the worksheets explaining the construction of these should be distributed in advance of the planetarium lesson so that they can be constructed at home or in the classroom and then used in this lesson.)

• Student workbook with worksheet pages and maps.

• Earth globe for use in discussing latitude and longitude.

• “Time Clocks” for Greenwich and Local Time. (these are poster-sized clock faces with moveable hands for use in comparing local time and Greenwich time when discussing methods of determining longitude.)

• Slides (examples: navigational tools used in the 19th century, illustrations from Treasure Island, sailing ships from the 18th century, etc.)

• Pre-recorded Tape of “Fifteen Men on a Dead Man’s Chest” or other appropriate “pirate” music.

• “Treasure Candy” (gold foil-wrapped candy or other appropriate treat.)

PREPARATION:

• Planetarium instrument should be set for the home latitude. Stars should be off. The sun should be set for the Vernal Equinox at noon.

• If a geo-centric earth projector is available, it should be aligned to match the above settings.

• “Time Clocks” should be in a location that is easily visible to students.

• All other materials (worksheets, music, slides, candy, etc.) should be ready for use.

PRESENTATION:

Introduction: Greet students and explain purpose of lesson. Present to them the idea that to be able to fully understand the concept of pirates and the search for buried treasure, they need to be aware of the intricacies of determining one’s position on earth. Compasses may be useful in some situations, but magnetic north will vary from true north and this information will not let you know where on the earth a particular spot may be, or how to locate the same place again. Refer to passages from Treasure Island to support the importance of navigation to the structure of the story. (There would be no “Trip to Treasure Island”
if there was not some way of locating the island and traveling to it. The pirates knew this very well and thus Long John Silver’s preferred plan was to mutiny only after the treasure was recovered and Captain Smollet had charted their course for the way home.)

Coordinates — review the process by which we locate positions on earth: latitude and longitude.

Navigational Techniques:

Determining Latitude by the sun. Using the planetarium and geo-earth projector, explain the process of using the angle of the sun from the zenith to find one’s latitude. Explain the function of the astrolabe to determine the altitude of the sun at noon and how it can then find the angle of the sun from the zenith by subtracting the altitude of the sun from 90°. Refer to the change that occurs in the altitude of the sun through the seasons, and how they will need to know this, and adjust for it (use either the analemma or a correction table). 

Determining Longitude by Time. Explain the difficulties in determining one’s longitude on earth. Explain the use of the rotation of the earth and the local time for noon as a method of determining longitude. Use the time clocks to explain “Greenwich Time” versus local time for an unknown position on earth. For each hour difference, there will be a 15 degree difference in longitude.

Practice Session: After presenting information on the method of determining latitude and longitude, set up the following situation as a practice session for the students. Guide them through the practice, stopping and clarifying any misunderstandings. (Set planetarium for 40°N latitude; the sun should be set for September 3 at noon; the time clocks should be set for Greenwich Time = 5 p.m. and Local Time = noon. Refer to the student workbook for the worksheet page.)

The Voyage to Treasure Island: Starting at Bristol, England (51°29’N and 2°39’W) the students will attempt the “navigate” to Treasure Island. For the purposes of this lesson, Treasure Island will be defined as having the coordinates of 23°05’N and 73°43’W. (Actually, this is the island of Samana in the Bahamas.) The class will be divided into “crews” consisting of between 3–7 members. During the voyage, there will be three times when the crews will attempt to determine their position on Earth. Students will use their astrolabes to measure the altitude of the noon-day sun and then from correction tables, (or an analemma) determine their latitude. The “Time Clocks” will show them both the time in Greenwich and the local time and they will then determine their longitude. This information will be plotted on a world map and their course to Treasure Island will thus be charted.

At the end of the voyage, the maps will be examined to see if all of the groups were able to “navigate” correctly and which crew came the closest in its course. (The three positions that the planetarium should be set for are as follows:)

March 31, 1760

Greenwich Time = 2 PM Your Time = 12 Noon
(Longitude thus = 30°W)
(Altitude of sun at noon = 49°)
(correction for this date = 4°N)
(Latitude thus = 45°N)

April 16, 1760

Greenwich Time = 4 PM Your Time = 1 PM
(Longitude thus = 45°W)
(Altitude of sun at noon = 65°)
(correction for this date = 10°N)
(Latitude thus = 35°N)

May 8, 1760

Greenwich Time = 4:30 PM Your Time = 12 noon
(Longitude thus = 67.5°W)
(Altitude of sun at noon = 82°)
(correction for this date = 17°N)
(Latitude thus = 25°N)

CONCLUSION:

Congratulate the students for their work in navigation. Award the “treasure” (gold foil-covered chocolate candy coins) to the crew with the most accurate work. Summarize the major points involved: The system of coordinates that permits us to locate points on Earth; the use of the sun to determine latitude; and the importance of accurate time pieces to determine longitude on the Earth. Encourage the students to read “Treasure Island” with this new awareness of the problems involved in looking for “treasure.”

BIBLIOGRAPHY


THE TRIP TO TREASURE ISLAND
THE TRIP TO TREASURE ISLAND

Student Worksheet

Imagine that you are Captain Smollett aboard the *Hispaniola*. Your job is to get your passengers and the crew safely to their destination and then home again. To do this, you must have certain navigational tools and charts, and of course, the knowledge to use them. Each day during the two month journey, you would need to determine your position and compare this with your desired course, making corrections whenever necessary. This would be a very important task and could mean the difference between life and death for you and your crew! (So, Long John Silver's preferred plan was to mutiny only after they had recovered the treasure and Captain Smollett had charted their course for home.)

For our planetarium trip to Treasure Island, you will be working in small groups. Each group will be a different “crew.” During the trip, you will make observations for the position of the ship along the journey. This would have needed to have been done every day of the trip (about 62 times!) but for our work, you will do it three times. Each time, you will determine the latitude of your position by using the astrolabe to measure the altitude of the sun and the analemma to make corrections. You will determine your longitude for the position by comparing the time on the clock marked “Greenwich Time” with the clock marked “Your Time.” After determining the latitude and longitude for each new position, you will mark the position on the map and draw a line to it from the previous point. This will allow you to keep track of your course to Treasure Island. When the 3 positions have been determined and the courses plotted, you will compare your work with the actual figures to test your skills as a navigator and ship’s captain. A “treasure” awaits the crew that is closest in its work to the actual figures! Good Luck!

STARTING LOCATION FOR TRIP
Latitude = 51.5°N
Longitude = 2.5°W

DESTINATION (“Treasure Island”)
Latitude = 23°N
Longitude = 73.75°W

Plot the two positions listed above on your map, and then each time you find your position during the trip, plot those positions on your map. Draw a line from the beginning point and connect this line to each new position until you reach “Treasure Island.” This will show you the course of your ship.

Sample Problem

DETERMINING LONGITUDE:
If the time in Greenwich is ________ and Your Time is ________, then there is a ________ hour difference. To find your longitude, multiply 15° by the number of hours.

Longitude = (15° × ________ hours)
= ____________.
(If the Greenwich time is later than your time, then you are west; if it is earlier, then you are east.)

DETERMINING LATITUDE
If you measure the altitude of the sun and subtract this from 90 degrees, you will know your approximate latitude. You must also know the date and the correction for this date to accurately determine your latitude.

Altitude of Sun = ________
Subtract the altitude of the sun from 90 degrees to get the angle of the sun to the Zenith.

90 degrees
- ________ (altitude of sun)

______ = (angle of sun to zenith)
Since the height of the sun will vary with the time of the year, you must add or subtract a correction angle for your particular date. If the correction angle is north, then you must add; if the correction angle is south, then you must subtract.

______ (angle of sun to zenith)
+/— ________ (correction angle)

______ = Latitude

CONCLUSION
Your position on earth is:
Latitude = ________
Longitude = ________
Position 1  March 31, 1760
WORK SECTION
Longitude = (15° × _____ hours) = _________
Latitude = 90°
- _______ (altitude of sun)
= _______ (angle of sun to zenith)
+/- _______ (correction for date)
= Latitude

Estimated Figures  Actual Figures
Latitude _______  _______
Longitude _______  _______

Position 2  April 16, 1760
WORK SECTION
Longitude = (15° × _____ hours) = _________
Latitude = 90°
- _______ (altitude of sun)
= _______ (angle of sun to zenith)
+/- _______ (correction for date)
= Latitude

Estimated Figures  Actual Figures
Latitude _______  _______
Longitude _______  _______

Position 3  May 2, 1760
WORK SECTION
Longitude = (15° × _____ hours) = _________
Latitude = 90°
- _______ (altitude of sun)
= _______ (angle of sun to zenith)
+/- _______ (correction for date)
= Latitude

Estimated Figures  Actual Figures
Latitude _______  _______
Longitude _______  _______
To start out the new year, Hansen Planetarium announces its new calendar, Wonders of the Universe — 1987. Wonders ’87 will have the same easy-to-use format, but will be presented with twelve new breathtaking photographs. Retailing at $7.95 each, the calendar is also available for a discount in large quantity. Those interested should contact Mr. Sean Martin, Sales Representative, Hansen Planetarium, 1098 South 200 West, Salt Lake City, Utah 84101, or call 1-800-321-2369.

Halcyon Films and Video, 110 Beach Road, King's Point, New York 11024 announces a made-for-home-video documentary called, Seven Oays in Space. Designed to allow the viewer to experience an entire Space Shuttle mission on videotape, it may be previewed without obligation. Suggested retail price is $29.95, with discounts on large orders.

The Astronomical Society of the Pacific will be holding a joint conference with both the Astronomical League and the Western Amateur Astronomers. It will be held on July 11-17, 1987 at Pomona College near Los Angeles. More detailed information about the meeting will be available early in 1987. Also from A.S.P. is a new non-technical information package called, Astronomy as a Hobby. The 28-page booklet has practical “down-to-earth” advice about the steps to take, the books and magazines to read, and the local or national groups of amateurs which can provide support and information. The packet is available for a donation of $3.00. Contact the A.S.P. at 1290 24th Avenue, San Francisco, California 94122.

Jessica R. King, Director of Marketing for the NightStar Company, describes their NightStar as “the new star-finding tool that does what no other map of the stars can do.” It displays all eighty-eight constellations on its flexible domed surface. Many saw NightStar at the recent I.P.S. Conference. The company has also produced Educational Packets, an excellent “hands-on” activities kit for astronomy classes. They may be contacted at 1334 Brommer Street, Santa Cruz, California 95062.

Explorations in Space is a collection of space-related publications for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Many of the 50-odd items are paperbound reprints of classic NASA publications about the solar system. They’re an inexpensive way to enlarge your astronomical library.

Finally, a new packaged program is available from the Hansen Planetarium. Islands in the Sky charts the extraordinary success of navigational methods used by Polynesian explorers during the last few thousand years. The program was funded in part by the National Endowment for the Humanities. For more information, contact the Hansen at the address given previously.
"SEE YOU AT STONEHENGE"  
IN MEMORIAM

In today's mail, I received word that one of my favorite planetarians, Julius D. W. Staal, formerly of Fernbank Science Center in Atlanta and a host of other planetariums all over the world, has passed away. Among his accomplishments are several publications. A popular planetarium reference book on constellations, Patterns in the Sky, was published in 1961; The New Patterns in the Sky is soon to be released. His work on Chinese astronomy was eagerly awaited by planetarians and was recently published as Stars of Jade.

His wife Mickey wrote, "We hope that a legacy of his devotion to astronomy will remain among his friends and colleagues." I remember first seeing Mr. Staal at Fernbank in the early '70's at a Southeastern Planetarium Association gathering. I was a novice planetarian and aware of his lavish astronomy and planetarium credentials. I was in awe of his presence, and did not feel competent to speak to him.

Several weeks later, I was making my way through London's crowded Heathrow Airport when I glanced up and recognized Julius and Mickey. A hurried exchange: "What are you doing here?" "We're heading for Stonehenge at the Summer Solstice," he replied. "Me, too," I said. As we drifted apart, each pre-occupied with luggage location, Julius said "See you there!"

That chance meeting in the airport changed something. I saw the excited sense of adventure in his eyes, mirroring mine. From that moment, I realized we shared something which had nothing to do with credentials: a love of the Universe and man's attempt to comprehend it. We were kindred spirits in this, each committed to his own way of understanding.

The next time I saw him, I was not afraid to speak to him. Through the years, we shared ideas, anecdotes, trappings of the bond all planetarium folks feel.

We missed each other at Stonehenge somehow that day in June. They were there, as was I. But the "happening" atmosphere of the '70's had extended to that ancient site, and several thousand young people had camped out all night to peer through barbed wire to catch the solstice sunrise. The crowd scene, watched carefully by local constables, prevented us from meeting.

Julius taught me not to be surprised or embarrassed when I recognize that link between us planetarians, and to respect and enjoy each person's understanding of the Universe. Mickey Staal need not worry. If anyone bestowed such a legacy upon the rest of us, Julius certainly did.