SOUTHERN SKIES

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Southern Skies

SOUTHEASTERN PLANETARIUM ASSOCIATION

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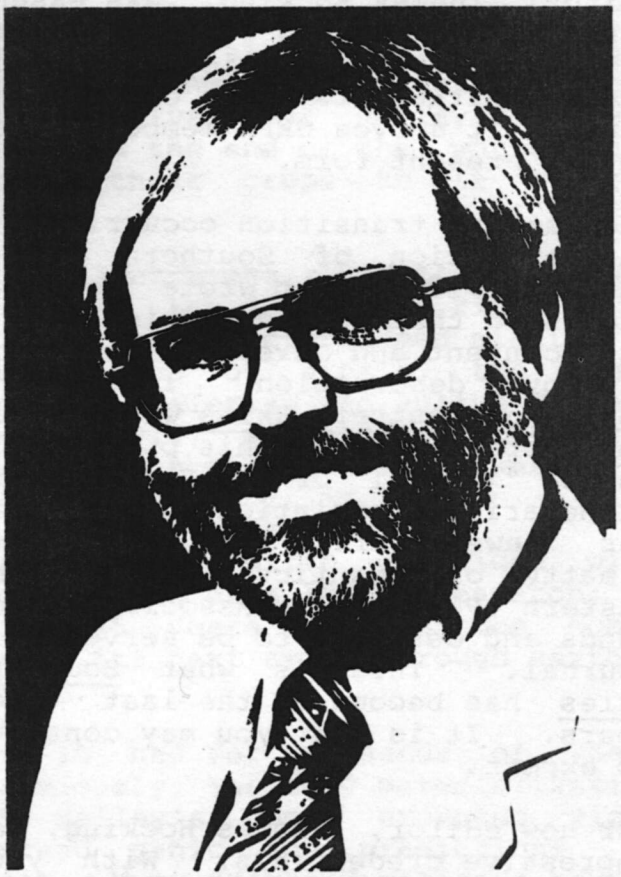
A Message From Your President

by Duncan Teague



I have always been impressed by the professionalism of the Southeastern Planetarium Association. Our annual conferences are well planned and efficiently conducted. Our quarterly publication is second to none. Our membership is responsive to calls to service in the organization, to individual requests for help, and to solicitations to share expertise. Other organizations may complain that a minority do all the work while the majority reap the benefits. Not so with SEPA. Positions of leadership and voluntary service are spread throughout the geographical coverage area of SEPA. The quantity and quality of papers presented at annual conferences and articles submitted to Southern Skies show that the SEPA membership is an active group of professionals - not just a bunch of folks with the same membership card.

This is starting to sound like a "State of the Association" message. I suppose it is. The state of SEPA is sound - even in this period of transition. And a transition is occurring in two areas.

You were informed in the fourth quarter of 1983 that Jack Fletcher is retiring as editor of Southern Skies. It is partly due to his efforts and partly due to the professionalism of the SEPA membership that we have such a fine publication. The membership has contributed its well-written articles. Jack Fletcher has contributed his valuable time and talent (including his infamous arm-twisting via WATS line) to assemble a publication that is first class in every respect: timeliness, format, and content.

I suppose no finer compliment can be paid than to be asked to quit doing what you're doing because you're doing it too well. Jack received a letter from a SEPA member who is outside our geographical area in

response to his announcement in the December Southern Skies. The letter suggested the following: Southern Skies should discontinue publishing technical articles, reviews, and commentary; Southern Skies should revert to announcements of Association news and other notices; and SEPA members should share their expertise with a wider audience through The Planetarian.

Jack's reply, after discussions with me and with our new Southern Skies editor, Thomas Hocking, was essentially, "Thank you for your interest, but Southern Skies will not reduce either its scope or its content. It serves SEPA members best in its present form."

The second transition occurring is the evolution of Southern Skies. The individual who wrote to Jack suggested that Southern Skies change its content and coverage to match its cover description. Instead the cover of Southern Skies will henceforth proclaim that this publication is the "journal" of the Southeastern Planetarium Association rather than its "newsletter." This is not just a matter of semantics. The Southeastern Planetarium Association demands and deserves to be served by a journal. This is what Southern Skies has become in the last three years. It is what you may continue to expect.

Our new editor, Thomas Hocking, has impressive credentials. With your help and under Tom's guidance, SEPA will continue to be served with a fine journal. If the International Planetarium Society wishes to reprint a Southern Skies article, then permission will be granted, so long as the author agrees. Authors should be so kind as to attach a note to your submissions granting or denying permission to reprint your work.

Now for some notes.

The IPS/Evans and Sutherland Project announced at Richmond is nearing completion. To refresh your memory, a 3/4-inch video tape has been prepared using the Digistar projection system. The ten-minute tape includes several astronomical subjects as suggested at the conference. They are as follows:

3-D Flight
Earth-Centered Orrery
Neptune/Pluto Orbit
Constellation of Orion as Viewed on a Flight to Aldebaran
Flight Around the Constellation of Orion

Probably by the time you read this message, the tape will be in the hands of the SEPA script library curator, Don Walter. Write to Don to borrow the tape. Unless you have a 3/4-inch tape machine, you will need to contact a local TV station to make a dub for you to a more convenient format.

Another IPS matter is the call for papers for the July 1984 IPS Conference in Monterrey, Mexico. John Pogue, the SWAP representative to IPS, will coordinate the English language papers. Send your submissions to John at the following address:

John Pogue
Grand Prairie ISD Planetarium
301 Warrior Trail
Grand Prairie, Texas 75051

Elsewhere in this issue you will find four more reviews of astronomy software for computers. Next issue two books containing BASIC programs which can be entered through your keyboard will be reviewed.

I've been busy adapting a program I wrote to inventory my stamp collection for use as an attendance log for the planetarium. The program assigns a log number to each program presented during a particular month. It stores user inputs of the day each program takes place, the category each program falls into (for example, school shows versus public programs), the name of the group, the (grade) level of the group, and the attendance. The information can be updated, displayed to the screen

or to a printer, searched, corrected, and saved to disk or tape. It saves me the time I used to spend by hand adding up attendance subtotals by category. The program is all in BASIC and should easily adapt to any computer which uses that language. If you're interested in a copy of the listing, drop me a note.

Have a good spring!

Editor's Note

by Thomas Hocking

Greetings from my little corner of the swamp.

As you've already heard, I've taken over as your new Editor. (A bloodless coup, really...) Jack Fletcher should be congratulated for the fine job he's done during his tenure as Editor. He has molded Southern Skies into a truly fine publication, and I hope to continue in the same vein.

As you can no doubt tell by some subtle wording changes, Southern Skies is now a journal. This is due to you, the members of SEPA, who, through your contributions (which I will continue to gently wring out of you...), have kept the quality of this ~~rag~~ publication consistently high.

Don't get me wrong, just because we're a journal, doesn't mean we're going to be taking ourselves too seriously. I encourage humor, especially cartoons. I know that there are a good number of artists lurking out there--don't be bashful, send your artwork in! Just remember, it has to fit within the confines of the 8½" x 11" page of the magazine. Also, your artwork should be camera-ready black and white. Sorry, but color cartoons aren't possible....

One more detail, take note of my address in the inside front cover. Do not send mail to 298 Lakewood Drive; send it to P.O. Box 975 instead. We live in a place where there are TWO 298 Lakewood Drives! Besides that, we're on a rural route anyway.

We've never really mentioned this before, so I'll say it now: The contents of Southern Skies are copyrighted. If anyone desires to reprint anything from an issue, permission must be obtained from the item's author, and credit should be given to the issue of Southern Skies in which it appeared. If you wish to write an author, but don't know the address, write to me, I'll have it.

Speaking of authors, I'll make a public appeal here: WE NEED YOU--KEEP SENDING THOSE WONDERFUL LITERARY GEMS! To paraphrase, journals do not live by editors alone.

If you have any comments or questions concerning my editorial style (or lack thereof), don't keep them to yourself, I like to get mail. For the most part, I will try not to change Southern Skies too much, but the changes I do make should make sense to everyone.

Now, enjoy your Journal!

Astro-Utilities

by Duncan Teague

"Astro-Utilities" is an astronomical events and coordinates calculator program for the Timex-Sinclair 16K Computer. It loaded for me on the second attempt and ran automatically, presenting a menu of the nine functions the program performs:

1. Location Set
2. Date Set
3. Change Preset Constants
4. General Rise/Set
5. Sidereal Time
6. Precession
7. Altitude and Azimuth
8. Moonrise/Moonset
9. Moon's Position

Six pages of documentation explain how each of the functions operates, how to format data requested by the program prompts, and how to customize the program.

A very nice touch was the preset constants in the program I received. My review copy already specified my hometown latitude and longitude within a second of arc. (Three out of four available locations are usually preset with one "other" left as unspecified.) The date is set with function two which also displays the Julian Date. The user can change any or all of the locations, the date, and the time zone for which calculations are made. The high and low latitudes for moonrise and moonset interpolations (see The Astronomical Almanac, pages A44-A76) can also be changed, and an annual update of the moon's position constants (see The Astronomical Almanac, page D2) can be made. The moonrise and moonset position data affects the operation of functions eight and nine.

Functions five and seven are straightforward. Sidereal time is displayed accurate to one second when the user inputs clock time and specifies AM, PM, or Universal Time. Standard time versus daylight savings time had already been requested when the user enters the date in function two. The altitude and azimuth of any celestial sphere position is displayed when the user enters right ascension and declination data.

Function six would be useful to observers trying to correlate sky maps with the real sky. Precession forward and backward in time is calculated from epoch 1950.0; the user enters where an object is supposed to be in right ascension and declination, and "Astro-Utilities" tells where the object really is.

The rise and set times of the sun or any object whose right ascension and declination are known is given with function four. I tried it for a Saturday in October, and the results were in perfect agreement with the morning newspaper's sunrise/sunset data.

Function nine gives the moon's precise position for those who are compulsively accurate. Function eight will interpolate moonrise/moonset times for those who need that information. The Astronomical Almanac has the same information, of course, but have you ever had to calculate several consecutive days? Its not difficult, but it is quite time consuming. Just wait till the next time a photographer calls your planetarium and asks at what exact time the moon will rise for several consecutive nights because he wants to photograph it rising behind his client's building. You'll be glad you have "Astro-Utilities." Or, perhaps, you can tell the photographer where he can acquire the program.

While "Astro-Utilities" has no slick graphics to make it showy, it is outstandingly precise, accurate, and useful. I suppose that should be what any "utilities" program ought to offer its user. The planetarian who needs to know coordinates of celestial objects and the times of celestial events can find them fast with "Astro-Utilities."

"Astro-Utilities" is $14.95 and is available from the author, Robert C. Moler, 5999 Secor Road, Traverse City, Michigan (49684).

Planets and Print-Planets

Remember those 'way out in the boondocks planets: Uranus, Neptune, and Pluto? People can't pronounce their names correctly. Few know which is eighth and which is ninth. You never see them in the sky unless you have an optical aid. I'll bet you've lost track of them. I'll bet you're wondering, "Where are they now?" Well, you can find out the current whereabouts of those three mysterious planets, and all the others too, with two more of Robert Moler's software programs for the Timex-Sinclair 1000 16K Computer. One is "Planets," which produces an

onscreen listing or display of the positions of the nine planets and the comet or asteroid of your choice. The other is "Print-Planets," which produces hard copy of the positions of selected planets or of the entire solar system.

Selection one from the main menu of "Planets" will provide an ephemeris of the heliocentric longitudes and distances in astronomical units of the nine planets for the date of your choice. Selections two, three, and four provide an "animated" display of planet positions. The user determines the size of the display, the screen position of the sun, the innermost planet to be plotted, and whether the scale should be accurate or "optimized" to show all the planets. I refer to this display as "animated" even though there is no motion on the screen. What does happen is that the planet's positions are calculated and plotted for up to twenty consecutive dates with the interval between displays determined by the user. Selection three adds the plotting of an asteroid, whose orbital elements are entered after appropriate prompts, or of a comet (such as Halley, whose orbital elements are provided with the program). Selection four allows the display to be altered at the user's whim without going through the set-up process again.

"Print-Planets" is similar to "Planets" in that it calculates planet positions. It is different from "Planets" in that it sends the information to a Timex compatible printer rather than to the screen. Either the Sinclair ZX Printer or the TS2040 Printer may be used. The software adjusts for the slight differences in the display scale of the two printers. Each selection from the main menu offers two options. Either the entire orbits of the selected planets will be plotted, or the scale will be increased to an optimum display in which the entire orbit is not necessarily shown, but the current positions of the chosen planets are plotted.

The four choices for your hard copy are the following:

1 - Inner Solar System (Mercury to Mars)
2 - Outer Solar System (Mars to Neptune/Pluto)
3 - Naked Eye Planets (Mercury to Saturn)
4 - All Planets (Not to scale, of course)

The user simply makes a menu selection, enters the date for the display, and decides "yes" or "no" on an "optimum" display. "Print-Planets" makes full use of the excellent string handing capabilities of the TS1000 Computer and the high resolution (256 x 256) of the TS2040 Printer. The printout is easily readable and reproduces will. The author has cleverly taught the computer to generate graphic symbols for each planet and to indicate the position of the vernal equinox on each map. Each map is labeled with a caption to indicate what part of the solar system it shows and for what date.

"Planets" and "Print-Planets" operate independent of each other, but they complement each other well. You can search for interesting planetary alignments or configurations with the former and get hard copy printouts of the planet's positions with the latter. The hard copy maps of the solar system can be used as originals to produce kodalith slides for display of an above the solar system view of our sun and its family of planets.

"Planets" is $9.95, and "Print-Planets" is $11.95; both are available from the author, Robert C. Moler, 5999 Secor Road, Traverse City, Michigan (49684).

Relativity

Your spacecraft leaves the earth slowly at first but its velocity gradually increases. You are accelerating at 1 "g" to keep conditions on the spacecraft as close to an earth normal environment as possible. By the time your velocity

has reached half light speed, your rocket has noticeably shrunk, but you can't tell. Everything looks normal to you. Your monitor displays the progress of your journey to the Andromeda Galaxy. Upon reaching the midpoint of the trip, the computer swings your craft around and decelerates at 1 "g" until you reach your destination. After a trek of less than a human lifetime, the earth, relatively speaking, has grown a couple of million years older. All your friends and loved ones have long since passed away. Nothing and no one will be the same when you return. At least four million years will have been counted on earth during your relativistic journey to the Andromeda Galaxy and back.

Is this a precis for a sci-fi star show? No, it's "Relativity," a demonstration/calculation/simulation program for the Timex Sinclair 16K Computer. What it demonstrates, calculates, and simulates is the effects of travelling at relativistic speeds: Lorenz contraction, rest mass increase, and time dilation. The program loads easily and runs automatically, presenting a menu with three choices.

Selection one displays a horizontal silhouette of a Saturn V rocket. Screen prompts then invite the user to "enter" a "velocity as a percent of c." The range of choices is 0 to 99.999999 percent c. If you try to outsmart the computer by entering a velocity greater than or equal to the speed of light, a screen message reminds you that "...you cannot go that fast." Once a velocity in the correct range is entered: the rocket shrinks in size by an amount appropriate to the velocity entered; the speed of the rocket in miles per second and in kilometers per second is shown; the increase in rest mass of the rocket is calculated; and the elapsed time for a 4.3 light year trip to Alpha Centauri is displayed in both earth and moving frames of reference. Again, if you try to "fool" the computer by entering a zero velocity, you are told that the trip to the nearest star will take "forever."

Selection two calculates the earth and spacecraft elapsed times for constant acceleration voyages of different distances. The user selects the distance and the acceleration (1 g is a reasonable choice). The neatest part of the whole program is the simulation of such a trip, accomplished by answering "yes" to a screen prompt. After identifying the name of the destination, the year of departure, and the age and name of a hypothetical twin who remains on earth, the user is shown his own sun and his destination on opposite sides of the screen. The rocket is shown as a blinking pixel which accelerates halfway to the destination and decelerates for the second half of the journey. (This is, of course, the optimum plan for making a relativistic journey.) As the journey progresses, earth and ship elapsed times are displayed. The ages of the relativistic traveller and the traveller's twin are shown. For long journeys the earthbound twin dies while the traveller merely ages according to his time dilated clocks. After arriving at his destination, the traveller may elect to stay for a length of time before returning home.

Selection three is also for simulating a relativistic journey, but it has three preset destinations: Alpha Centauri, Tau Ceti, and the Andromeda Galaxy. If the latter is chosen, the departure and arrival points are shown as little tiny galaxies rather than stars. The journey proceeds as with selection two.

This program, like "Orbit," could use a tutorial to explain the effects of travel at relativistic speeds. If it had such a feature, it could stand alone as an excellent instructional program. The alternative, of course, is to do a little lecturing at the chalkboard before utilizing "Relativity" or to include a lecture on relativistic travel within the documentation. If most computer users are as impatient as I

am, they will not want to digest a written examination of relativity before using the program. The explanation needs to be made a part of the program for those who need such instruction.

"Relativity" will be useful to the planetarian who needs to simulate a journey at relativistic speeds. The data calculated at intervals for each trip simulated can serve to chronicle such a journey, and it will add an element of realism to a science fiction star show or to a program like "The Universe of Dr. Einstein."

"Relativity" is available from the author, Robert C. Moler, 5999 Secor Road, Traverse City, Michigan (49684). Cost of the program is $11.95 including the program cassette and documentation.

Solar

"Solar" is a solar system data and celestial events calculation program for the Timex Sinclair 16K computer. In fact the program is so close to occupying the full 16K of random access memory that it takes six minutes and thirty-seven seconds to load. It does not run automatically as have other programs reviewed recently. The ten-page user's guide, however, is excellent. Page one explains that program execution is begun by entering GOTO 10.

Canadian developer Michel Lepage has offered the user a choice of seven time zones (from Alaska-Hawaii to Atlantic) to which calculations can apply and fifteen solar system objects (eight planets, four minor planets, the sun, the moon, and Comet Halley) about which calculations can be made.

After the user's time zone, latitude, longitude, and time of observation (including decimal hour, day, month, and year) are entered, the computer will calculate a veritable plethora of information:

1. the number of days elapsed since January 0, 1901
2. the day of the week
3. the sun's longitude in decimal degrees
4. the earth-sun distance in astronomical units and in kilometers

The veritable plethora is interrupted for the user's input, at this point, of one of fifteen "planets" and then prints:

5. the name of the chosen planet
6. the latitude of the chosen planet
7. the longitude of the chosen planet
8. the earth-planet distance in a.u.'s and in kilometers
9. the sun-planet distance in a.u.'s and in kilometers
10. the right ascension of the planet in decimal and in fractional degrees
11. the declination of the planet in decimal and in fractional degrees
12. the observer's sidereal time
13. the altitude of the planet in decimal degrees
14. the azimuth of the planet in decimal degrees
15. the time of culmination (= meridian transit) of the planet in hours and decimal minutes
16. the rising and setting times of the planet in hours and decimal minutes

Whew! If the planet does not rise or does not cross the meridian or does not set on the date chosen, then the screen displays 0 hours and 0 minutes under the appropriate heading. And, as if that weren't enough information, gentle user, if you had chosen the moon, the plethora would have continued, displaying the following:

17. the earth-moon distance in kilometers
18. the date and time of the last new moon
19. the date and time of the next full moon

20. the date and time of the next new moon
21. the date and time of the next solar eclipse
22. the date and time of the next lunar eclipse

If you haven't yet had your fill of information, you can now choose another planet or the same planet for a different date and time of observation. Positive responses return to the appropriate inputs, and the calculations begin again. Negative responses to both questions end the program.

Monsieur Lepage has certainly done his homework and has packed a great amount of information into his program. The program is also fairly accurate. It agrees with the 1984 Astronomical Almanac to within less than a degree on most position calculations, to within a few minutes on most time calculations, and to three decimal places on most distance calculations. The discrepancies are probably due to the values of the orbital elements of the planets, sun, and moon in the 1984 Astronomical Almanac, which has been converted to precession epoch J2000.0, versus the values for 1983.

The documentation consists of five pages of operating instructions, a three page printout of the BASIC statements, and two pages of string and numerical arrays (orbital elements). The numerical elements should be updated annually for greater accuracy. (See pages C1, D2, E3-5, and G10 in the 1984 edition.)

If the program did not do so much, there would be more free bytes for setting up a menu. A menu would help this program in terms of speed of use. Most of the calculations take from 65 to 140 seconds to complete. If you want only one piece of information, you must wait for the program to run its course. A menu would allow for the selection of a specific calculation. It would also make the screen less cluttered. When the screen is filled, the user must enter the command CONT to clear the screen and to continue with the calculations.

The only real problems I had with "Solar" was with the azimuth display. I usually got negative numbers. I'm just too dumb to understand an azimuth outside the range 0 to 360°.

I can hardly wait to put this program into my 72K computer. The additional RAM will allow for the addition of a menu, some additional prompts, and some screen-clearing routines.

What I like best about "Solar" is the solar and lunar eclipse calculations. No other program I have used deals with this kind of information.

"Solar" is available from the developer, Michel Lepage. Write him at LOGISOL, P.O. Box 398, Beloeil, Quebec, Canada J3G 5S9 for price information.

The Speed of Darkness and Other Large Numbers

by Keith Goering
CHS Planetarium
Chanute, Kansas

Some ancient cultures apparently did not consider themselves capable of comprehending numbers larger than some fixed value. One Egyptian system of numeration had symbols for all cardinal numbers up to one million. Any number greater than or equal to a million was denoted by a single symbol -- a crude drawing of a man holding his arms up in amazement. If we call that symbol "many" then we might say that there are many stars or that a quasar is many miles away.+ (Quasars are also, we suspect, many light years away.) "Many referred to anything more than a million. A 747 airplane costs many dollars, as does an MX missile. But a Porsche costs less than many dollars, although probably not a great deal less. I am told that

there was an American Indian tribe which had only one word for any number greater than five. Evidently any set which could not be counted on the fingers of one hand was a set of "many" elements. Other examples of such cultures probably exist. In fact, we may belong to such a culture. We have numerals for every finite cardinal; however, I'm not certain that I truly comprehend very large numbers. Every time I think I have a feeling for the rela tively small number one billion (that's an American billion or one thousand million), I find it to be larger than I previously imagined. And numbers such as googol, or 10^{22} stars, or Avogadro's number, these in some respects are just "many." I really have no intuitive grasp for such humongus values, yet large numbers are a constant fascination with me. I am always on the lookout for devices to help comprehend them.

I recall back in the first grade when each child was expected to stand before the class and count to ten. The reward for this was a silver star. We got a gold star by counting to one hundred. I seem to recall counting to a thousand but, if I didn't, at least I was certain I could. In fact, there was a time in elementary school when I was completely confident I could count to one million if given enough time. How long would that have taken? What kind of award would have been given for such a feat?

The first question is answered with simple arithmetic. Counting at one numeral per second (not unreasonable if you think about it), it would have taken one million seconds or about eleven and a half days. That's eleven and a half days and nights with no breaks for eating, sleeping or other bodily functions. Wow! And who but the gods can imagine what a wonderful star Miss Clark would have given to the pupil who counted to a billion? At one numeral per second it would take about thirty-two years. There are psychiatrists and planetarium directors who haven't lived one billion seconds. I think this clearly shows that not only is a billion a very large number, but it is a great deal larger than a million -- a thousand times larger.

Someone, I have forgotten whom but I think he was a biologist, once suggested every community should have a room with a million easily visible objects in it. I read his suggestion to my students, who took up the task. They typed 10,000 periods on a sheet of paper. This was duplicated 100 times to make a million dots. When hung on the wall one million period marks occupied about 65 square feet.

The one million dots became a popular exhibit. Students computed how much area would be required to exhibit larger numbers such as: one billion, the federal debt, and the number of years since dinosaurs were "stinct" (stinct being the opposite of extinct). A real eye-opener was Avogadro's number which, in dots, would have papered the entire surface of Earth about 7000 times. It was an enormous number but I really had no idea just how large.

Astronomers and planetarians are always dealing with large numbers. Depending upon whose estimate one uses, the stars number about 10^{21} to 10^{22} ("billions and billions"). Using our sheets of one million dots we would have to cover Earth about 120 times to get 10^{22} dots. 10^{22} seconds is over 10^{14} years, which may be close to the time since Big Bang.

In the 20s and 30s a notion was popularized that there are as many stars in the sky as there are grains of sand on the Earth. I made a few rough calculations, assuming an average grain of sand would occupy a cube 500 microns on a side, and found that 10^{22} grains of sand would cover the Earth's surface to a depth of less than 3 mm. I suspect this comparison is not a good one.

A few years ago, during a planetarium visit, a sixth grader asked me about the speed of darkness. Evidently he knew about the speed of light, but what happens when a light

is extinguished? How quickly does the corner of the room become dark after a lamp is turned off? We in the planetarium biz naturally comprehend the speed of light and darkness, but I suspect many others do not. Here are some devices I've used to illustrate the speed of light.

Take a stop watch. (I use an electronic model which reads to hundredths of a second.) Have the students mark of a short time interval by switching the clock on and off as quickly as possible. Most will be able to start and stop it within 0.2 sec. Then ask them to calculate how far light would go in the same interval. For many students light can circle the Earth in their time interval.

I find it useful to compare the speed of light with the speed of sound. Imagine sprinters lined up at the starting line. The starter fires his pistol and the runners begin their race. The gun produces a flash of light and a bang. The light will travel 1,690 miles before a sprinter 10 feet away hears the sound. (Since I am located about 1,600 miles from Seattle, I say the light will be in Seattle before the last runner hears the bang.)

The following device is probably well known, but I like it. It is attributed to a professor at Kansas University whom I can't recall. There is a spider which spins a web so fine that a strand girdling the Earth would weigh only one pound. Suppose that this spider spins a strand from Earth to Alpha Centauri. What would be the weight of the web? Answer: over a half million tons. Or put it this way. If a 60-foot rail car carries 40 tons, this web would fill a 13,000-car train, which would stretch 150 miles.

The fusion reaction on our sun consumes approximately 630 million tons of hydrogen each second. This calculates to about three times the mass of all the automobiles currently in the U.S. and Canada.

There is not a great deal of agreement as to just how much energy has been released by Mt. St. Helens during its most recent activity, but the figure ten megatons of TNT has been suggested. This is an enormous amount of energy. To illustrate, consider the explosion of 100 cherry bombs. In my part of the U.S., cherry bombs have been illegal for many years. However, they still appear each fourth of July. The important fact for our illustration is that everybody seems to be familiar with the powerful cherry bomb. 100 cherry bombs contain about one pound of gunpowder. One pound of TNT has about 100 times the explosive force of black powder. Try to imagine the blast of one pound of TNT. Now try to imagine a freight train extending from Las Vegas to Baltimore fully loaded with TNT, which if detonated, would produce an explosion roughly equivalent to the big blast from Mt. St. Helens.

An acquaintance of mine from Iowa has a Volkswagen which he intends to drive as far as the moon, about 238,000 miles. Thinking of an automobile with 238,000 miles on it gives one a new perspective of this distance.

I invite readers to check my computations and share with me any disagreements. Readers are also invited to share with me any similar analogies which you have discovered. I also direct your attention to Jeanne Bishop's article "Analogies for Teaching Astronomy" on page 10 of The Planetarian, vol. 10, no. 1.

La Villette

by Alan Friedman and Susan Kendell

Alan J. Friedman, director of astronomy and physics at the Lawrence Hall of Science, Berkley, recently spent six months in Paris working as a consultant to the La Villette museum project. When completed, La Villette wil have one of the world's largest science-technology centers.

The museum will include at least three planetariums. An Omnitheater/ Spitz Starball will be installed in a huge spherical building in front of the main museum. A second major planetarium with nontilted dome will be used specifically for astronomy education for the public and for schools. A Starlab planetarium is already in use for evaluation and has travelled all over France. Dr. Michel Charles, who is in charge of the astronomy theme of the museum, is planning numerous exhibits, most of them hands-on, dealing with modern astronomy.

"It is an enormous project that had been proposed to the French government in 1977," explained Friedman during a recent telephone interview on his experiences in Paris. "It is very impressive to realize that even though France has been through a great change in governments -- from conservative to socialist -- both governments have unwaveringly supported the museum project."

The La Villette staff (about 300 people) have been inspired by the activities and hands-on exhibits that ASTC members offer visitors. Many of the staff visit the United States each year for the express purpose of studying and consulting with American museums. The La Villette staff made frequent visits to the Lawrence Hall of Science, Berkley, where they met Friedman, and asked him to come to Paris for a week to exchange ideas about their project. After the initial trip, he was asked to return for six-months to serve as a consultant and trouble-shooter.

On June 16, the day of the telephone interview, Friedman said that he would be leaving the next day to visit Paris again, this time to participate in a conference that he helped set up involving museum professionals from all over the world. The other U.S. participants were Sheila Grinell, consultant to ASTC; Sally Duensing from the Exploratorium; Bernard Finn, Museum of American History; Jay Newlin, Franklin Institute of Science Museum; Robert Stein, Atari, Incorporated; and Victor Danilov, Museum of Science and Industry, Chicago. There were also representatives from Canada, Great Britain, Holland, Germany, Sweden, and two dozen professionals from museums or other institutions in France, in addition to La Villette staff.

"We'll be discussion how a museum can deal with social and cultural dimensions of science and technology," said Friedman. "For example, how could an exhibit on the steam engine be developed to explain that invention's influence on society? Should a text be written and posted? Should the exhibit try to use the steam engine as a springboard to explain how technological societies develop in general? Next week, we'll hear how museums all over the world handle these kinds of questions."

When asked how La Villette would differ from other French science museums -- Palais de La Decouverte, for example -- Friedman replied, "Part of the difference is sheer size. The museum at La Villette will be much larger, about the same size as the Museum of Science and Industry in Chicago or the Deutches Museum in Munich. La Villette will go into social and cultural dimensions of science, technology, and industry in a way that the smaller museums do not."

"Of course, the museum part of the La Villette project -- which will be called the Musee National des Sciences, des Techniques et des Industries -- has learned much from the Palais de La Decouverte, which has many hands-on exhibits. But the La Villette project is more than a museum. It will also have a music complex and include a new park, which will be the largest inside Paris."

The museum is being built in an enormous shell which was once intended to be used as a national slaughterhouse, but that project was abandoned. The building will include 440,000 square feet of exhibit

space. Plans are well underway, with construction begun this year and 1986 as the target opening date.

Friedman said he believes the La Villette project is very significant and will serve as a milestone in science museum history. "First of all, I think it is noteworthy that this is the first major museum to be built after the invention and widespread dissemination of microcomputers," said Friedman. "Other museums have had to tack them on, add them in, but La Villette is starting out by asking how we can make the best use of computers throughout the museum."

"The design process is unlike any other. The people conceiving the exhibits are primarily not museum professionals, but university and industrial staff. Many young French scientists were given leave from their universities to help design the project. And the entire, huge museum is to be opened complete, with all exhibits in place."

"It's really an ambitious undertaking," remarked Friedman. "When you consider the amount of financial support it is receiving, and the ideas that are being tapped internationally, it is very exciting."

Paul Delouvrier is the president of the Etablissement Public, Parc de La Villette, while Jacques Blanc is in charge of the museum. Friedman has been working with the exhibits conception department, whose chairman is Real Jantzen. Friedman also said that Brigitte Coutant, who works with international relations for La Villette, is eager to encourage continuing contacts with other museums to improve communications and share ideas.

"Whatever happens at La Villette will be of major importance for all science museums," predicted Friedman. "In a few years we can look to La Villette as a model, to see which new ideas worked as expected, and which did not."

La Villette plans to become a developing member of ASTC.

Adapted from the Association of Science-Technology Centers Newsletter, September/October 1983. Reproduced with permission.

NOTE: Mickey and Alan Friedman will be living in Paris from mid-September, 1983 until September, 1984. Alan will be consulting again for Le Musee National des Sciences, des Techniques et des Industries at the Parc de La Villette. Mickey will be working on her next novel. The best address to use to reach them is:

3, Rue Littre
Paris 75006
Tel: 548-68-72

At the Parc de La Villette, Alan's address is:

211, Avenue Jean Jaures
Paris 75019
Tel: 240-27-28

Mail sent to the Parc de La Villette takes a day or two longer, and you will probably have to speak French to get through the central switchboard. Airmail from the U.S. to France takes four to seven days, while surface mail takes four to seven weeks.

King Soup:

A Tale of Two Dippers

by
James E. Summers
Fernbank Science Center

(This ia a little story I wrote back in 1975. We have used it with some success in our first grade program at Fernbank.)

Once upon a time, long ago, in a tiny country far away there lived a king. He was known as King Soup because he loved to eat soup. He ate soup for breakfast. He ate soup for lunch. He ate soup for dinner. He ate soup for snacks.

He ate tomato soup. He ate potato soup. He ate beef soup and bean soup. He ate chicken soup and chowder. He even ate peanut butter soup.

One day the king called the royal cook and said, "Make me some soup." "Yes, your majesty," replied the cook.

Off to the royal kitchen went the royal cook. He put the royal pot on the royal stove and cooked up a big pot of hot, bubbling, boiling soup.

The cook took the pot of hot, bubbling, boiling soup to the king. "That soup looks yummm, yummm good," said the king. "I think I'll have some right now."

The king reached into the pot to get a handful of soup, but the soup was so hot it burned his hand.

"Ouch," said the king, and a few more things which should not be repeated.

After a few days the king's hand healed. Once again he called the royal cook and said, "Make me some soup."

Off to the royal kitchen went the royal cook. He put the royal pot on the royal stove and cooked up a big pot of hot, bubbling, boiling soup. The cook took the pot of hot, bubbling, boiling soup to the king. "That soup looks yummm, yummm good," said the king. "I think I'll have some right now."

"Be careful, your majesty," said the cook. "Don't worry," said the king. "This time I will use my bowl to get some soup."

So the king dipped his bowl into the pot of hot, bubbling, boiling soup. The king got some soup in his bowl, and he got some soup on the outside of his bowl, and he got some soup on his fingers.

"Ouch," said the king, and a few more things which should not be repeated.

After a few days the king's hand healed. Once again he called the royal cook and said, "Make me some soup."

Off to the royal kitchen went the royal cook. He put the royal pot on the royal stove and cooked up a big pot of hot, bubbling, boiling soup.

The cook took the pot of hot, bubbling, boiling soup to the king. "That soup looks yummm, yummm good," said the king. "I think I'll have some right now."

"Oh, please be careful, your majesty," said the cook. "Don't worry," said the king. "This time I am going to use my cup."

So the king held his cup by its little handle and dipped it into the pot of hot, bubbling, boiling soup. The king got some soup in his cup, and he got some soup on the outside of his cup, but he didn't get any soup on his fingers. Because the handle on the cup was so small, though, the king had to reach deep into the pot to reach the soup and the steam from the soup burned his arm.

"Ouch," said the king, and a few more things which should not be repeated.

After a few days the king's arm healed. Once again he called the royal cook and said, "Make me some soup."

Off to the royal kitchen went the royal cook. He put the royal pot on the royal stove and cooked up a big pot of hot, bubbling, boiling soup.

The cook took the pot of hot, bubbling, boiling soup to the king. "That soup looks yummm, yummm good," said the king. "I think I'll have some right now."

"Oh, please be very careful, your majesty," said the cook.

"Don't worry," said the king. "This time I have fastened a long handle to my cup."

So the king held his cup by its long handle and dipped it into the pot. The king got some soup in his cup, and he got some soup on the outside

of his cup, but he didn't get any soup on his fingers and he didn't burn his arm.

The king poured the soup from his cup into his bowl. Then the king tasted the soup. "This soup is yummm, yummm good," he said.

"That is a marvelous invention," said the cook as he looked at the cup with the long handle. "What do you call it?"

"I haven't given it much thought," replied the king. "Maybe I'll just call it my 'cup with a long handle that I use to dip soup from the pot.'"

"Isn't that name a bit too long?" asked the cook.

"Perhaps you're right," responded the king. "What if I just call it my 'dipper?'"

"That sounds much better," replied the cook. Then he said, "that is such a marvelous invention, you ought to tell every one in the kingdom about it."

"That's a good idea," said the king. "How might I do that?"

The cook thought for a while. "How about a commercial on television?" he asked.
"No," said the king, "television has not been invented yet."

The cook thought for a while. "How about an ad in the newspaper?"

"No," said the king, "newspapers have not been invented yet either."

This went on until well after dark, with the cook making suggestions and the king saying "No" to each one. Just when it seemed as if they were not going to find a way to tell people about the dipper, the royal astronomer rushed into the palace.

"Your majesty, your majesty," he cried, "I have just seen your dipper!"

"Of course you have," said the king, "it's right here on the table."

"No, no," said the astronomer. "I just saw your dipper in the sky."

"That's impossible," said the king. "I just told you that it is right here on the table."

"I'm sorry," said the astronomer, "that's not what I meant. What I should have said is that I saw some stars in the sky that look like your dipper."

"Where?" said the king, excitedly. "Show them to me."

So the king and the royal astronomer and the royal cook went outside and looked up at the night sky filled with beautiful stars. "Where are they?" asked the king.

"Look over here toward the north," said the astronomer, and he pointed to the seven bright stars that we call the Big Dipper.

"That's great," said the king. "Now when people look at those stars in the sky they will recognize my invention, so I think I will call that pattern of stars 'the King's Dipper.'"

"Wait a minute, your majesty," said the cook, "I think I can see another dipper there in the sky."

"Where?" asked the king.

"It's not too far from the first dipper," said the cook as he pointed toward the sky. "It's smaller and much fainter, but it still looks like a dipper to me."

"He's right," said the king to the royal astronomer. "What am I to do? I can't call both of them 'the King's Dipper.'

"Why not call the large one the 'Big Dipper,' and the small one the 'Little Dipper," suggested the astronomer.

"Sounds like a good idea to me,"

said the king.

That's how the dippers came to be in the sky. To this day, people look into the sky and see the two dippers and remember the story of King Soup and his marvelous invention.

Music for Planetarium Productions

by Luther Bradfute
Memphis Pink Palace Planetarium

Even if your planetarium doesn't produce its own recorded shows, chances are good you use music somewhere, some time in your facility. If you play mood-setting music as the audience walks into the room, that's music in the planetarium. If you use music as they leave, that's also music in the planetarium. If you run a soft background tape while a lecturer is talking, that's using music. And of course if you produce your own audio-visual presentations you use music quite a lot in your planetarium. This article will address these applications of music, but will not touch on one other way you can use music--laser light shows. That's a different ballgame altogether.

In general, walk-in music can be just about anything. At its best it sets the mood for the show by keeping within your thematic structure, or at least by not blatantly going against the mood you are trying to create. For instance, I recommend strongly against playing Black Sabbath as walk-in for a Star of Christmas show. Not only is vocalized music usually detrimental to the function of walk-in, but this particular music is known for its rather un-Christmas themes. You get the idea.

Walk-out music is similar in most cases to walk-in music, with one exception. During walk-in music, tha audience is completely unaware of the mood you are trying to set (unless they've been to the show already or your PR is incredible). They must be reassured, and at the same time prepared for what will happen during the show. Walk-out music doesn't need to reassure anybody. If anything, it needs to restate the themes of the show, without being too brash. Generally, walk-out music can come from the same source as the walk-n.

During a live lecture it's often pleasant to have a soft musical passage playing along, but just barely audible. This type of music must border on being unnoticable in order to keep the audience's attention on your lecturer and away from the sound. Yet it must not be such a droning bore that it puts everyone to sleep. Careful selection and experimentation will help you here.

There seems to be a commonly held belief that planetariums must use electronic music extensively or exclusively in their productions. While it's entirely up to you what music you prefer to play in your planetarium, consider some possibilities other than the whooshes and bleeps we all know so well. Much jazz music is border-line tonal and simplistic enough to use effectively as walk-in. A low intensity song with acoustic percussion and wind instruments might be a pleasant change as a mood-setting walk-in source. Again, be careful in your selections. Some experimental jazz can get rather "outside" at times. If you have a resident tape manipulator, try editing our sections that don't appeal to your needs. Also, by combining sections of many different tunes you can create your own new songs, as long as no particular piece is recognizably out of place. If cutting and splicing result in horribly abrupt transistions, try a crossfade instead. And some things actually sound better played backwards. Save this technique for the lecture portion, though. And be sure to preview all material before presenting it to the public. Themes can get confused and turn around easily, and you might put together something embarrassing.

And now to the last application of music in the planetarium--original productions. Your best bet is to buy a collection of theme music on discs. Several companies produce music libraries solely for radio, TV, and film production use. While the initial cost may raise an eyebrow, remember that a collection will serve you a long time with many applications. Plus they have the benefit of making the legalities much easier to handle. Please check these out thoroughly before buying, however. Some are designed for producing radio commercials, and the last thing you need is a vocal arrangement for dogfood or housewares. If you don't own a music library and you still want to produce your own shows, there is much music already commercially available on discs, but you didn't need me to tell you that. What you need me to tell you that anything recorded anywhere in the world will be copyrighted, and you must deal with this properly. What will save us all in the planetarium business is that we are non-profit educational facilities, therefore we're poor, therefore we're unattractive for lawsuits. Chances are slim you'll have to pay any one individual a great deal of money for using a copyrighted recording. But the safest way to cover yourself is to get a license from BMI (Broadcast Music, Inc.) and ASCAP (American Society of Composers, Authors, and Publishers), the two music licensing agencies for the United States. Their addresses are listed at the end of this article. For a reasonable yearly fee you may use any material to which they have the licensing rights. Not only does buying a license mean that you don't have to pay each time you use a record, it ensures that you're not violating present copyright laws by stealing someone's material.

As you produce your show, keep in mind the message you're trying to convey and fit the music to that message. Certain visual images will suggest certain aural tones, so let your subconscious be your guide. Also, take notice of how film music is used, how the score follows the action, and how the music reinforces the pictures. Film-scoring is almost a science now and you can learn a lot from the technique.

Using music in your planetarium can be a learning experience outside the scope of your personal listening habits. Electronic music is fine sometimes, and sometimes it's cliche and uninteresting. The main thing is to fit the music to the message, while keeping in mind that you're dealing with background music, not pop hits. There is music available from many sources, the best being in-house or independent composers working for hire directly with the production. But if you use someone else's music, be sure you do it legally. If you're like most educational facilities, you can't afford a lawsuit, but you can afford to pay for what you use.

Happy harmonizing.

BMI
320 West 57th Street
New York, NY 10019

ASCAP
One Lincoln Plaza
New York, NY 10023

Need Lumiline Lamps?

Timothy Bowen, the new director of the Settlemyre Planetarium, writes that he has lumiline lamps for sale. Timothy has approximately 75 lamps (half yellow and half blue). Lamps are slightly used and the asking price is $4.00 each. If you are interested, contact:

Timothy Bowen
Settlemyre Planetarium
Mt. Gallant Road
Rock Hill, SC 29730
(803) 329-2121

The Planetarium/ Spatial Ability Connection

by Mark Sonntag
The Science Museum
West Palm Beach

A completely, crossed, two-factor experimental design was utilized to compare the effectiveness of three different teaching methods (planetarium lecture, classroom-celestial globe lecture, and planetarium/ classroom-celestial globe lecture) and the effect of student spatial orientation ability (high, medium, and low ability groups) on the learning of selected positional astronomy concepts. Seniors enrolled in the elementary science methods class at the University of Colorado during the Fall, 1980 semester were randomly assigned to treatments. Spatial orientation ability of the students was assessed using the researcher constructed Spatial Orientation Ability Test (SOAT) prior to treatments. Those scoring in the top one-third were assigned to the high ability group, those in the middle one-third to the middle ability group, and those in the bottom one-third to the low ability group. The treatments (teaching methods) were administered, and the posttest was given to each group. The posttest was the Positional Astronomy Achievement Test (PAAT) and was constructed by the investigator expressly for this study. Group mean differences on the total PAAT and four subtests were tested for statistical significance using analysis of covariance with grade point average, number of astronomy credit hours, and class attendance used as covariates.

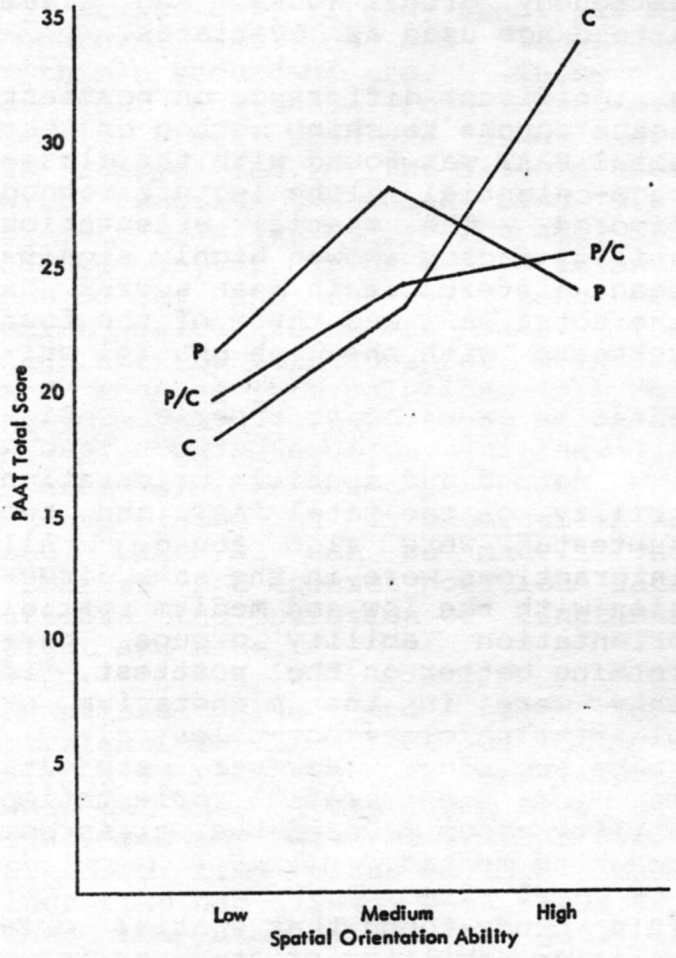
A significant difference on posttest means across teaching method on the total PAAT was found with the classroom-celestial globe lecture method favored. The spatial orientation ability factor showed highly significant differences in mean scores on the total PAAT and three of the four subtests with the high spatial orientation group being superior. Significant interactions between teaching method and spatial orientation ability on the total PAAT and two subtests were also found. All interactions were in the same direction with the low and medium spatial orientation ability groups performing better on the posttest, if they were in the planetarium or planetarium/classroom-celestial globe sections. However, students in the high spatial orientation ability group favored the classroom teaching method.

This study found that spatial orientation ability of students is a factor that should be considered

GROUP MEANS ON POSITIONAL ASTRONOMY ACHIEVEMENT TEST (PAAT) AND SUBTESTS AND STATISTICAL SIGNIFICANCES ACROSS TEACHING METHOD, SPATIAL ORIENTATION ABILITY GROUPS AND SIGNIFICANCES OF INTERACTIONS

	Total	PAAT Celestial Sphere	PAAT Diurnal Motion	PAAT Time	PAAT Seasons
Teaching Method					
Planetarium	25.17	4.02	7.63	4.66	8.75
Classroom	28.02	4.38	8.61	5.62	9.59
Planetarium/Classroom	23.31	3.87	6.88	4.84	8.11
Statistical Significance	0.033	0.480	0.079	0.220	0.257
Spatial Orientation Ability					
Low	20.28	3.31	5.81	4.27	7.29
Medium	26.63	3.96	7.98	5.40	9.27
High	29.59	4.89	9.31	5.45	9.93
Statistical Significance	0.000	0.002	0.000	0.131	0.012
Interactions					
Statistical Significance	0.001	0.007	0.106	0.210	0.002

when designing instructional techniques in college astronomy classes that teach positional astronomy. Two-thirds of the students in this study favored planetarium or a combination of planetarium and classroom instruction.



Interaction between teaching method and spatial orientation ability on the PAAT.

The results of this study imply that students who have low and medium spatial ability need the more observable and concrete instruction provided by the planetarium. Pretesting on the spatial ability construct should prove quite useful in prescribing the most effective teaching method to be used when teaching positional astronomy concepts to elementary teacher education students.

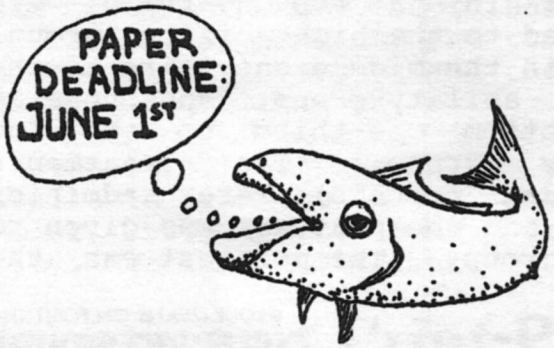
SEPA '84

Recent correspondence from John Hare down in Bradenton indicates that plans are proceeding nicely for the upcoming conference, scheduled for June 19 - 23.

As with recent conferences, attendance will be limited to those who pre-register, so you will need to mark your calendar and make your plans well in advance.

Conference housing will be at the Bradenton Resort Inn (Best Western), where John has arranged an "incredible rate of $35.00 single or double, or $40.00 triple or quad." Remember:

There will be a limited number of openings for papers, so let your intentions be known soon.



The registration deadline is the same:

For further information contact:

John Hare
SEPA'84
Bishop Planetarium
201 10th Street West
Bradenton, FL 33505

Halley's Comet Pills

by Gary Tomlinson
Roger B. Chaffee Planetarium
Grand Rapids Public Museum

Halley's comet is coming, and Halley's comet pills are here!

Available at the Grand Rapids Public Museum and Roger B. Chaffee Planetarium gift shops, the comet pills (actually a healthful snack of yogurt-covered sunflower seeds) make unusual gifts and delightful party favors. Each two-ounce jar is attractively packaged and bears a distinctive label filled with all sorts of Halley's comet lore--fact and fiction.

A perfect memento of the comet's 1986 rendesvous with the sun, the Grand Rapids Public Museum's Halley's comet pills are also a reminder of the comet's previous appearances in the days when superstition held sway over science.

Halley's comet is the brightest of all periodic comets and returns to earth once every 75 years. First sighted more than 2,000 years ago, Halley's, like the other bright comets that appear in the heavens, has long been associated with plagues, wars, natural disasters and the death of kings.

Halley's comet appeared in A.D. 66 when Roman armies were holding Jerusalem under siege. The comet's appearance in 1066 preceded the Norman Conquest by only afew months. The comet was again visible in 1456 as the Turks attacked the city of Belgrade. Pope Calixtus III offered prayers for the safety of Christian troops defending the city and excommunicated the comet in hopes of preventing disaster. In 1835, Mennonites in America, convinced that the arrival of Halley's comet heralded the end of the world, allowed their crops to die on the vine.

In ancient times, comets were said to mark the death of kings. In fact, comets were indeed sighted at the deaths of Attila, the Roman emperor Valerian and Julius Caesar. And in 1910, as Halley's comet drew nearer the earth, King Edward VII lay dying in England.

Mark Twain's birth coincided with Halley's comet's 1835 appearance; he died 75 years later as the comet made its next swing through earth's skies.

As it had for thousands of years previously, the 1910 materialization of Halley's comet provoked widespread panic and predictions of doom. Many frighted citizens bought gas masks to protect themselves against the cyanide gas discovered present in the comet's tail; others carefully sealed their doors and windows and a few even built special underground comet shelters. In a small Oklahoma town, only the timely arrival of the sheriff's department prevented a group calling itself the Select Followers from sacrificing a virgin to avert the cataclysm they believed would follow the comet's appearance.

While some folks prayed, other partied. Scientifically minded individuals purchased expensive tele-

scopes to see the comet for themselves; the superstitious bought comet pills, guaranteed by enterprising salesmen to ward off the comet's supposedly evil effects.

The return of Halley's comet in 1986 will be an opportunity for scientific investigation, not an occasion for alarm. And this time around, comet pills are being prescribed not as talismans against evil, but as a unique keepsake of a spectacular, once-in-a-lifetime celestial event and as a means of informing the public that there is nothing to worry about.

Comet Pills

by Ellen Arlinsky

Nineteen eighty-five is Halley's comet year.
It's only 1983, but Halley's comet pills are here.
Taken as the package directs
They'll ward off any ill effects
That touched off alarm
In those who believed that comets caused harm.

Earthquakes, eruptions, all manner of things,
Plagues, wars, disasters, even deaths of kings
Were by ancient men with comets associated
Although such events were not comet--related.

Halley's Comet's appearance in 1910
Set prophesiers of doom predicting again,
Fortelling that cyanide in the comet's tail
Would bring woes to earth in epic scale.
And one of the ways to avoid such ills
Was to dose oneself with comet pills.
Against evil effects from fatal to vexatious
The comet pills were guaranteed completely efficacious.

Halley's comet will next arrive
In November of 1985.
And though we know it will cause no ills,
Why not be certain with Halley's comet pills?
So, but the pills, we do exhort--
Your Public Museum they will support.

Astronomy Day-May 5, 1984

by Gary Tomlinson

Astronomy Day began in 1973 in the San Francisco Bay area of California. It was the seed of Doug Berger (from the Astronomical Association of Northern California). This idea was nurtured and fed in the hopes it would blossom. And blossom it did! Astronomy Day has spread all across the country.

This annual event (which varies in date) is held to share the joy of astronomy with people who seldom have a chance to observe, not only the sky, but all other facets of astronomy. Each event is planned locally to meet local needs. Activities are held and/or coordinated by local astronomy clubs, planetariums, museums, observatories and held in many of the above, in addition to shopping malls, parks, observation stations and open fields. Many local groups plan mall displays concerning current topics in astronomy, as well as how teachers can use astronomy in the classroom, how people can get involved in astronomy and the space program on the local and national level, and how to participate in the wonders of astronomy. In addition, astronomical art, jewelry, stamps and computer programs are often displayed, plus plenty of people are on hand to answer your astronomy questions, or at least try.

Both amateur and professional astronomers are supportive of and participate in Astronomy Day. The American Astronomical Society and the Astronomical Society of the Pacific both encourage the concept of Astronomy Day. So get involved. For more information contact: Gary Tomlinson, Astronomy Day Coordinator, Chaffee Planetarium, 54 Jefferson SE, Grand Rapids, MI 49503, (616) 456-3985.