

Southern Skies

VOLUME 17, NUMBER 3

JOURNAL OF THE SOUTHEASTERN PLANETARIUM ASSOCIATION

SUMMER 1997

In This Issue

President's Message.....	1
IPS Report.....	2
Editor's Message.....	3
SEPA Membership Form.....	3
Featured Planetarium: Wetherbee Planetarium, Albany Georgia.....	4
Small Talk.....	5
Astro-Video Review: Special Effects Alive I.....	7
Her Own Space: Barbara Reynolds' Adventures in SEPA Land.....	8
Exploring the Solar System CD ROM.....	9
News from SEPA States.....	10
Mission to Mars Web Site.....	15
The Interstellar Medium, Nebulae, and Star Formation.....	17
Do Christmas Star Programs Support Belief in Astrology?.....	22
Exploring the Solar System CD ROM.....	25
Mission to Mars CD ROM.....	25
HST's Greatest Hits of '96.....	26

Southern Skies is the quarterly journal of the Southeastern Planetarium Association published for the purpose of communicating association news, reports, reviews, and resources to its members. Contents © 1997 by the Southeastern Planetarium Association and individual authors. Permission is granted to reprint articles in other planetarium, astronomy, or science related publications under the following conditions: 1. Attach a credit to the article stating, "This article was originally published in Southern Skies, journal of the Southeastern Planetarium Association;" and 2. Send courtesy copies of your publication to the Southern Skies editor and the author.

Officers

President
Mike Chesman
Bays Mountain Park Planetarium
853 Bays Mountain Park Drive
Kingsport, TN 37660
Voice: (423) 229-9447
Fax: (423) 224-2589
Email: baysmtn@triconnet

President-Elect
George Fleenor
Bishop Planetarium
20110th Street West
Bradenton, FL 34205
Voice: (941) 746-4132
Fax: (941) 746-2556
Email: Jetson1959@aol.com

Secretary/Treasurer
Duncan R. Teague
Craigmont Planetarium
3333 Covington Pike
Memphis, TN 38128-3902
Voice: (901) 385-4319
Fax: (901) 385-4340
Email: StarMarTNG@aol.com

Past-President
Kristine K. McCall
Sudekum Planetarium
800 Fort Negley Boulevard
Nashville, TN 37203
Voice: (615) 401-5077
Fax: (615) 862-5178
Email: mccalk@ten-nash.tenk12.tn.us

IPS Council Representative
John Hare
3602 23rd Avenue West
Bradenton, FL 34205
Voice: (941) 746-3522
Fax: (941) 747-2556
Email: jlhare@aol.com

Southern Skies Editor
Duncan R. Teague
3308 Bluemont Drive
Memphis, TN 38134-8454
Voice/Fax: (901) 388-3266
Email: StarMarTNG@aol.com

Associate Editors

AstroVideo Review
Mike Chesman
Bays Mountain Park Planetarium
853 Bays Mountain Park Drive
Kingsport, TN 37660
Phone: (423) 229-9447
Fax: (423) 224-2589
Email: baysmtn@triconnet

Digital Cosmos
Joyce Divina
Science and Space Theatre
1000 College Boulevard
Pensacola, FL 32504
Voice: (904) 484-2581
Fax: (904) 484-1865
Email: jdivina@pjc.cc.fl.us

Featured Planetarium
Dave Hostetter
Lafayette Natural History Museum
and Planetarium
637 Girard Park Drive
Lafayette, LA 70503
Phone: (318) 268-5544

Laser Talk
Mark Howard
Buehler Planetarium
3501 SW Davie Road
Davie, FL 33314
Phone: (305) 475-6681
Fax: (305) 474-7118

Reviews
Patrick McQuillan
Alexander Brest Planetarium
1025 Gulf Life Drive
Jacksonville, FL 32207
Phone: (904) 396-7062
Fax (904) 396-5799
Email: PatAstro@aol.com

Small Talk
Elizabeth Wasiluk
Berkeley County Planetarium
Rt. 1, Box 89
Hedgesville, WV 25427
Phone: (304) 754-3354
Fax: (304) 754-7445

President's Message

As I write this, it's just a couple of days past the fall equinox, summer just flew by, and each day sees more and more school groups arriving for an annual trip to the planetarium.

I know our facilities are all different. Theater equipment, seating capacities, presentation style and program content all vary. However, we probably can all relate to the similar experience of staring out into an audience of gleaming young faces. Do you sense their eagerness? Do you share their excitement?

As much as each fall has become a routine here at the planetarium, I still look forward to each new school year. I especially enjoy treating a new kindergarten class to their first planetarium show. But, I'm just as thrilled by all the new discoveries I can talk about to our third graders in this year's solar system tour. With older students, I can wander the expanse of the universe and discuss with them the many marvels that astronomers and space scientists study every day.

I do my best to make their visit a memorable one and in return, they provide me with an immense satisfaction for working in the planetarium. I know I'm not alone in this thought and that you, my community of colleagues, have played a part in shaping this personal attitude. Thanks!

I want to relate an interesting event that took me by surprise. In late August, I was called to speak to a school board about planetariums. What was unusual was that this was a board a hundred miles from Bays Mountain. As it turned out, three dedicated individuals had taken on the task of trying to get a school planetarium to reopen its doors after being closed and ignored by the school system for seventeen years. These folks took it upon themselves to restore a very neglected instrument over a period of several years.

Their results have been astounding. They now have a wonderful working theater and are keeping their project going by offering free monthly programs to the community. A final hurdle is to get the school board to find funds to hire a planetarian. The board meeting was held in the planetarium and began with a group

member putting the projector through its paces with a short demonstration. I then had the opportunity to speak informally with the board about the planetarium and to field questions, particularly about operating costs.

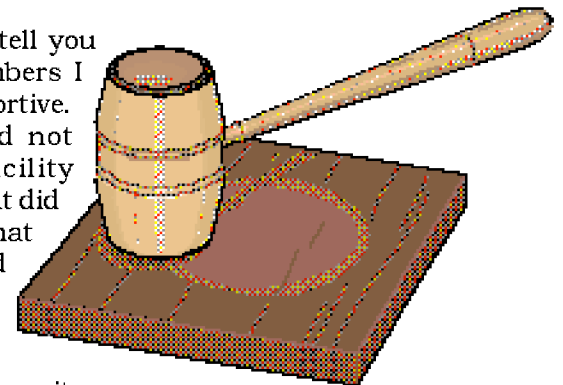
I am pleased to tell you that the board members I met were very supportive. Some members had not known that the facility existed and those that did had no expectation that the equipment could ever be made to run again.

To bring this story to a happy close, it appears that the school board is recommending that funds be made available and that Heritage High School in Maryville, TN, will soon regain their planetarium. Though the names won't be recognizable to SEPA folks, Henry Morgan, Bob Arr, and Bill Dargan certainly deserve our admiration for the time and effort they continue to pour into this project.

Now, on to some housekeeping chores. I hope you are aware that you can subscribe to the SEPA mail list and communicate with other SEPA members via your computer. The advantage to this setup is that you can reach all the SEPA subscribers with a single e-mail message. Of course, please use an individual's e-mail address to communicate one on one, but if you've got something to say that you think the entire group might find interesting, post it to the mail list. As I write, the system is undergoing some tests, so try it out and give us some feedback! Joyce Divina has single-handedly done all the technical things necessary to get us online, so you might want your first message to be a thank you to Joyce. George Fleenor tells me the SEPA web site still needs more development time but that it will happen in the not too distant future.

As of October 1st only two submissions had been made in the logo contest. If you missed the announcement please look at your last issue of Southern Skies. A fifty dollar prize is at stake and Council has

Mike Chesman
President
Bays Mountain Planetarium
Kingsport, TN



IPS Report

John Hare
IPS Representative

IPS distributed its Resource Directory to members in September. The directory is a comprehensive resource, listing hundreds of suppliers of various services, parts, and materials that are of interest to planetarians. IPS is also in the final stage of compiling a new and updated directory of all known planetariums, worldwide. These are just two benefits of IPS membership and are compelling reasons to be a member.



The 1998 IPS conference plans are proceeding on schedule. Specific plans for the conference are basically as outlined in the last issue of *Southern Skies* with one major exception. The visit to Jodrell Bank has been rescheduled as a pre-conference tour. The post-conference tour has been shortened by one day as a result.

The September 1997 issue of *The Planetarian* contains a preliminary registration form that the conference organizers would like returned in order for them to finalize some last minute details. Applications for papers, workshops, and panels must be

received no later than January 31, 1998.

Looking ahead to 2000, the last year of the century, Montreal was selected as the site for the biennial conference at the IPS Council meeting held in Osaka, Japan during IPS 96. No further information on Montreal is available at this time.

At the 1997 IPS Council meeting held recently in Strasbourg, France, invitations were received for the site for the 2002 conference which will be determined at the 1998 Council meeting in London. Vieing for the conference are the Hayden Planetarium, New York; the Bishop Museum Planetarium, Honolulu, Hawaii; Planetarium Morelia, Morelia, Mexico; and the Chabot Observatory and Science Center, Oakland, California. Technically speaking, the formal deadline for 2002 invitations is the 1998 Council meeting, but it is unlikely that any further invitations will be received.

The Adler Planetarium, Chicago, Illinois, submitted an invitation for the 2004 conference. The deadline for 2004 is still more than two years off, and it is very likely that additional invitations will be received. Let me know if you are in need of membership forms, registration forms, and/or additional conference information.

President's Message
continued

agreed to extend the deadline for ideas from October 31st to December 31st. Remember, you don't have to be an artist, just jot down some ideas and get them to me by the new deadline.

Your editor laughed at me when I asked you to start sending in materials for the members guidebook ASAP. He was right, it looks like everyone is going to wait until the last minute or worse yet ignore the request. I told him I have great faith in the membership; so prove Duncan wrong and send me your photo and biographical sketch now! The details were outlined in the prior issue of our journal or you can contact me for information.

I'm pleased to tell you that plans for the 1998 conference in Roanoke, Virginia are proceeding smoothly. As you may know, Hopkins Planetarium is a one person op-

eration, so Gary Close has been really busy working on conference activities. I want to thank the other facilities in Virginia and nearby that have been asked and agreed to assist Gary with some of the load. We have people working on the featured speaker, structuring the paper sessions and soliciting door prizes. As Gary would tell you, SEPA is nice folks. But of course, you already knew that!

THE DEADLINE FOR THE NEXT ISSUE OF *SOUTHERN SKIES* IS JANUARY 1. SEND YOUR SUBMISSIONS ON A 3.5 DISKETTE OR VIA EMAIL ATTACHED FILE TO STARMANTNG@AOL.COM OR TO STARMAN@NETTEN.NET

A Celestial Potpourri:

Slides, Dues, Grace Periods, and Web Sites

In the last three issues of Southern Skies, I described images available for distribution to members from the Space Telescope Science Institute (STScI) for 1996. These images are not files downloaded from the Internet and output to film. They're high quality, hi res, color accurate dupes of original STScI slides. They're still available, as are 30+ images to date for 1997.

In the next issue of Southern Skies I'll provide a list of 1997 images.

Paul Lewis also plans to offer a service whereby you can send him a roll of film and ask for specific images instead of acquiring them all. See the inside back cover.

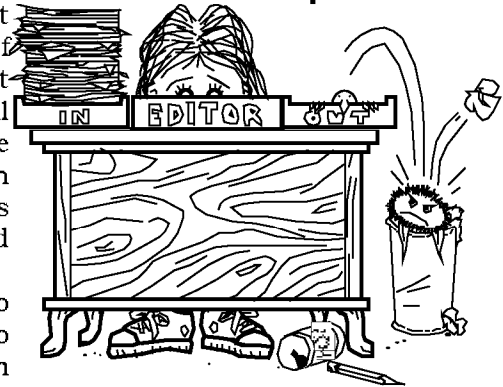
Your 1998 SEPA dues are now due and payable to your Secretary Treasurer. Please send a check for \$15 to the address on the inside front cover. At the Pensacola conference, SEPA Council voted to allow a grace period for dues payments, so that everyone who has been a member in 1997 will receive the issues which precede the annual conference. We should be able to continue this practice for as long as the

SEPA treasury is solvent.

Last year two of our planetarium interns were finalists in the national Thinkquest competition. Their entry, The Online Planetarium Show, was judged fifth place in the nation, and each student won an award of \$3,000. Thinkquest went international this year, and there were more than 4,000 proposals and 1,500 finished entries.

I'm very proud to announce that two of our planetarium interns are finalists again this year. Junior Kismet Kerley and 1997 graduate Elizabeth Shelly and Andrew Holbrook, protege of Geoff Holt at the James Madison Memorial High School Planetarium in Madison, WI, created Mission to Mars. The students could win \$25,000 each at the Thinkquest finals

Duncan R. Teague
Secretary/Treasurer
Southern Skies Editor
Craigmont Planetarium
Memphis, TN



Mike Cutrera

Send your \$15.00 check made payable to SEPA to the following address:
Craigmont Planetarium, 3333 Covington Pike, Memphis, TN 38128 3902

Name		
Planetarium		
Organization		
Address		
City		
State	Zip	
Area	Voice	
Area	Fax	
Position		
E-mail address		

Wetherbee Planetarium, Albany Georgia

“The Bear Has Wheels!”

Dave Hostetter
Featured Planetarium Ed.
Lafayette Natural History
Museum & Planetarium
Lafayette, LA

When I was told that I got the job at the Wetherbee Planetarium here in Albany, Georgia, I was elated. This seemed like the job for me because I was able to deal every day with a subject I was truly interested in, and I got to share my fascination and

cooperation helps everyone, and builds a sense of belonging not often felt in a business setting. No matter the size of your facility, gracious cooperation makes your place a more friendly place to work. This spirit is also felt by those you serve.

To illustrate this point, let me relate to you my recent experience with the bear. About ten years ago, a past county commissioner shot and had stuffed a seven foot brown bear which he proceeded to donate to our museum. The museum needed to be cleared out in order to begin renovations, so the bear had to go.

To appreciate fully the difficulty of this task, you must first understand that the bear and its base stands over nine feet tall and the doorway out is just under seven feet high. The whole bear exhibit weighs about two hundred fifty pounds, nearly two hundred of which is in the base. When the bear was moved in, there were ten people to do it; we now had three.

Our director has quite a genius for problems like this and soon came up with a plan to move it. We would build a frame around the bear, lash the bear to it, attach wheels to the back of it, then tip it over onto the wheels, and roll it out the door. Once we had the wheels on the bear, we knew that the rest of the job would be relatively easy.

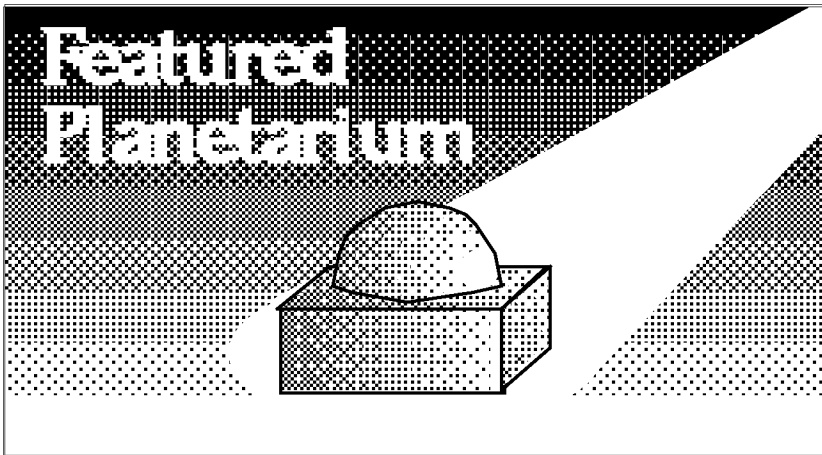
Getting to that point, however, took us close to three days; a great deal of wood and nails; a good length of rope tied to the back of my van; wooden and brick levers; the director, janitor, and myself; and, most importantly, cooperation. It is what made this job, and makes our organization, work.

When we finished the job, we summed up our cooperative effort with the simple phrase, The bear has wheels!

Now to the point.

Since I was hired, I've changed more than my share of bulbs. I've also learned how to set up a panorama system, how to mount and mask slides, how to produce a show, how to use video special effects, how to align the planets on my Spitz A3P, and just who to call to get help when I needed

(Continued on page 6)



Mike Cutrera

Thomas Finicle, Jr.
Author
Wetherbee Planetarium
Thronateeska Heritage Ctr.
100 Roosevelt Avenue
Albany, GA 31701

knowledge with other people. Although I only had a degree in Public Relations and just one year of astronomy in college, I had no planetarium experience. I did, however, have a strong interest in astronomy, which lead me to read many books on the subject; a great willingness to learn; and an inclination to try to fix things, but only if they were broken.

What turned out to be the key question in my interview for this job was, If a bulb burned out during a show, what would you do? My answer was a very simple, I would replace it. The other applicants for the job apparently did not give this obvious answer.

The planetarium is part of a larger facility called Thronateeska Heritage Center (now there's a mouthful). The center includes a physical science Discovery Center, an exhibit of model trains, and a museum of natural science and local history which is presented in a historic train station.

We have a very small staff, five people including myself, each of whom is responsible for their own area. Despite our respective responsibilities, the size of our staff makes it nearly impossible to operate without cooperation between the staff. This

Small Talk

1997 is a memorable year for me. Not only do I turn 40 years old, but I celebrate 20 years in the planetarium profession and 10 years as director of Berkeley County Planetarium.

Looking back on the ten years there is much to cheer about and much to boo, (not to mention boo, hoo).

Astronomy advances have been coming fast and furious over the last decade. Not only has the Keck telescope come on line, but so has a twin. Additional telescopes on Mauna Kea are being planned or being built, despite the fact that it already has the greatest number of telescopes of any observatory in the world.

During my ten years as Director of Berkeley County Planetarium, I've seen the Space Telescope finally launched, only to be found flawed and then repaired and upgraded by NASA astronauts. Images that are now commonly used in our domes were all taken by the new and improved HST.

This last decade saw dozens of Shuttle launches, including cooperative programs with the Russian space station Mir, only to watch the aging space station go through one catastrophe after another and finally have the end of its occupation set.

Famous astronomers who may have lectured within our domes or written programs that we have run, are no longer with us, such as Carl Sagan, Eugene Shoemaker and Clyde Tombaugh.

I watched a good number of lunar eclipses over the last ten years. The one of April 3, 1996 particularly stands out. Here in West Virginia the weather was clear and warm, perfect for watching the totally eclipsed moon rise over still bare trees. Also that night, Comet Hyakutake was in the sky along with Venus passing through the Pleiades.

Solar Eclipses were an entirely different situation. I attempted to see the total solar eclipse of 1991. I missed it, but many of you were luckier. I tried again to see the annular eclipse in 1994 and again was unsuccessful. (I'm going to try again in 98!)

I didn't even try for South America or India or Mongolia, but I did recreate those

total solar eclipses for my planetarium public.

Comet Shoemaker Levy 9 kept the phone ringing, although I never did actually see that comet, only its effect on our largest planet. I can vividly remember turning the telescope on Jupiter seeing those incredibly dark spots that looked like little eyeballs staring back.

I had no problem at all with comets Hyakutake and Hale Bopp, they were easy to see and many people called and came out to see them at public star parties. At long last those were the bright comets that I'd always read could occur!

Finally we explored further into our solar system than ever before with missions Voyager 2 to Neptune, Galileo to Jupiter (along with a couple of asteroids along the way) and most recently, Pathfinder's return us to Mars.

We seem to be pretty sure there are planets surrounding not only pulsars, but normal stars as well, and could that meteorite in Antarctica really be evidence of life on Mars? These will stand out as major discoveries when we look back at the last decade.

All sorts of new technology has entered the planetarium, computers, video players and projectors, laser disks, lasers, fiber optics, image processing, etc. Some planetaria are not content with one star projector, they need two. Most planetaria have their own website (I'm still waiting!).

There have been sad things happening too. Too many planetaria have closed their doors, Toronto stands out as an all too painful example. Other well known planetarium people have found themselves domeless. (Keith Goering, Mike Ryan, and Tom Stec immediately come to mind, but I know that there are many more I'm forgetting.)

And we were forced to say good bye to some in our number, George Brown, Garry Mallon, and Paul Campbell come to mind as people I've personally known. You may remember many others whom I'll never get the chance to meet.

Personally I've been lucky. I received selections to attend Harvard's Center For

Elizabeth Wasiluk
Small Talk Editor
Berkeley County Planetarium



Small Talk
continued

Astrophysics, not once, but twice for the now demised SPICA (Support Program for Instructional Competency In Astronomy). I also was selected for the POPS program (Participatory Orientated Programs in Schools) at the University of California at Berkeley where I met dear friends and colleagues at Chabot Observatory and Planetarium Center and the East Bay Astronomy Club in Oakland, California. I saw former SEPA and Harvard buddy, Mike Reynolds and GPPA friend Jose Oliverez take the helm at Chabot for a new renovation. It is good to see the dome closing trend reversing as chronicled by SEPA president Mike Chesman in the last issue. (How about sending in some details, pictures and stuff?)

It really has been ten wonderful years, despite the sometimes lack of an adequate budget, access to the Internet, lack of a decent computer etc. (This list could go

on too long and be too sad).

One of the best days had been when former co worker from Bishop Planetarium days, Joe Hopkins, in his new role as head gonzo electrical dude for JHE, put in my video system. I swear the first time I saw an image float across my dome, there were tears in my eyes, it was that beautiful.

It s also really cool when some kid comes in for a program and after viewing a video sequence of a Mars flyover says, Wow, that looks just like IMAX. Bless you child.

Well, here s to ten fun years and the hope of many more. I m sure some of you have already had a lot more and some much less, but just as memorable. Drop me a line with the info and I d be happy to feature your memories as well, small dome or not.

Wetherbee Planetarium
Albany Georgia
"The Bear Has Wheels!"
continued

it. I started from scratch; the previous director wasn t here when I was hired, and the one day I had a chance to speak with him, he was less than forthcoming. I quickly learned, though, that, in the planetarium community, he s the exception that proves the rule total, selfless cooperation. It s been my good fortune to

enter a profession where trade secrets are not only unguarded but also eagerly given away. I ve yet to meet a planetarian since who s not offered me any assistance within their power.

I m extremely grateful to all of you, especially to those whom I ve kept on the phone for hours with endless questions.

(Thanks Jim, John, and everyone else!) The spirit of cooperation and goodwill in the planetarium community is the spirit I thought was dead and buried. I was never more happy to be wrong.

This spirit makes the planetarium community work. I thank everyone for offers and donations of help and encouragement. I hope this spirit will always be present so we can proudly declare the results of our cooperation with the cry, The bear has wheels!



Astro-Video Review

Special Effects Alive I

This issue we have an unusual product to discuss. For certain applications this could be a very useful resource. I'm speaking of a relatively new laserdisc put out by The Rosler Group. It's called Special Effects Alive 1 and features a number of planetarium animations that have never before been offered. The disc is divided into three main subject areas, dinosaurs, science fiction, and mythology.

A couple of things immediately come to notice when you receive the disc. First, it is very nicely packaged in a vinyl and molded plastic library style jacket. This affords more protection than a standard cardboard sleeve and the hub design of the sleeve would also seem to insure against disc warpage. Think of it as an oversize jewel box like you get with an audio cd but not brittle or fragile. Second, the play side of the disc is an unusual color, not the bright silvery surface you're used to seeing on laserdiscs. A closer inspection of the disc reveals why. The disc is of a recordable format similar to a computer CDR. Company president, David Rosler, explains that this was done to maintain the highest possible video quality in the finished product. The animations are mastered onto high quality one inch broadcast tape and recorded onto the laserdisc as first generation copies. The group claims the best planetarium image quality on the market today.

A few of the dinosaur animations are truly spectacular. In fact, the tyrannosaurus that appears out of the darkness to stare down into your audience may be too intense for young children. An underwater view of a plesiosaur and a pterosaur in flight are also very nice. Several of the chapters provide groups of dinosaurs that are obviously meant to be projected over a horizon pan. Our video projector is aimed fairly high onto our screen, so many of these animations are not useful to us. If you have a video projector aimed at your horizon these sequences could add a lot to a program.

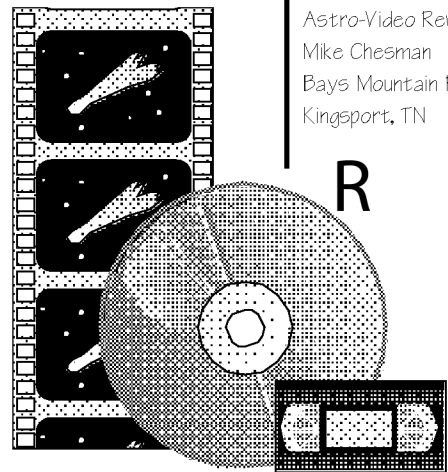
The science fiction section has some images related to H.G. Wells War of the Worlds, such as a tentacled creature and a Martian tripod fighting machine.

There's also a BEM (bug eyed monster for you non science fiction buffs), a Spielberg like glowing UFO and some imaginary creatures from Jupiter's atmosphere. You'll even find some planet rotations of alien worlds.

The mythology segments include Helios, driving his solar chariot; Diana, the lunar huntress; and all the constellation figures you need to retell the Andromeda story. Most of these look best to me when run at half speed. I appreciate the effort that was made to keep images throughout the disc within the video frame.

The only down side to the disc would be the poor quality and choice of sounds. The audio sounds like it was taken from an old sound effects library. It certainly is not up to today's expectations. For example, the dinosaur roar sounds like a wildcat with a thunder clap thrown in and a lightning bolt sounds like a thunder clap with a wildcat roar thrown in! Go figure, after the effort that was placed into the image quality the sound is a major disappointment. The concept of having a sound effect cued to the action on the disc would have made a nice feature. More likely, you will have to generate an appropriate sound effect on your show tape and sync the laserdisc to it.

Overall, there's some excellent stuff here to spice up a program. The theatrical nature of many of the effects should illicit squeals and gasps from your audience. I think The Rosler Group has hit on a neat concept and hope they will offer other product in the future. The laserdisc is not cheap, selling for \$799 but when you consider there's material here to do three very different programs it becomes justifiable. You can phone the company at 212 946 5357 or write them at The Rosler Group, P.O. Box 247, Mountain Lakes, NJ 07046.

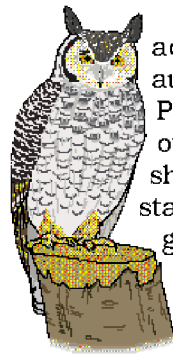


Astro-Video Review Editor
Mike Chesman
Bays Mountain Planetarium
Kingsport, TN

Her Own Space:

Barbara Reynolds' Adventures in SEPA Land

Barbara Reynolds
The Night Owl
Settlemyre Planetarium
Rock Hill, SC



A panoply of planets parade across the evening skies in autumn 1997. The Settlemyre Planetarium, along with the others in the region, has been showing off its starry dome to starry eyed students. Before we got ensconced in this annual fall ritual, we had an event filled summer with space cadet camp for 5th graders, vacation time for me out west, and, the week after SEPA '97, Director Glenn Dantzler conducted the Winthrop University Junior Scholar program. This is a program he and I developed several years ago, but it conflicts some years with SEPA, so he is carrying on the program for 9th graders, to allow me to represent us at SEPA. Our whole department will probably be able to attend some of the June 1998 Roanoke meetings because of the early date and proximity.

The first Monday after Labor Day, Glenn Dantzler, weekend assistant Sam Belk, and I drove to Gibbes in Columbia, SC for our second annual South Carolina Organization of Planetarians & Educators (SCOPE). I won the contest to name it in at our first meeting in 1996. An idea had been discussed at SEPA '96 that people could meet regionally during the year, and South Carolina may have been one of the first to do so. I know that the folks in eastern Tennessee get together too. The idea was conceived and carried off by Jeff Guill and Todd Slisher, both of whom attend the SEPA conference on a regular basis. We also had representation from border towns like Charlotte, NC and Augusta, GA.

Todd, Jeff, and their staff did a great job both years hosting the event at Gibbes, which will sadly be no more after June, 1998. SCOPE has drawn new people who cannot, for one reason or another, attend SEPA conferences. Next year, the second Monday in September, we'll have our third SCOPE meeting at Dupont in Aiken, SC. Gary J. Senn, Ph.D. is the Technologies Director at the Ruth Patrick Science Education Center (USC at Aiken) and will be our host. You can expect to see him

in Roanoke, VA June 9-13. You might say he picked our brains since he's new to the planetarium world; the Dupont has a two year old Digistar 2.

Augusta, Georgia sent Bill Dunwoody to the SCOPE meeting. Bill is Theater Manager at Fort Discovery:

The National Science Center. He says the center had 1000-1200 students per day the first few days they were open! They are using StarLabs in their outreach to younger students and have purchased a new lab which will seat 60 persons, to be set up on site. Science centers would seem to represent the wave of the future.

Our SCOPE day was spent sharing our latest programs and hearing about plans for the State Museum's new facility; Jeff Guill will be heading up the new planetarium, when it opens. Of course, we went to lunch, then toured the future home of Gibbes staff. We hope to see Doug Gegen from Greenville, SC and Jim Brown from Orangeburg, SC next year. They made every effort to attend, but you know how it goes in our profession: you say you want that done YESTERDAY? And, no... it's not James Brown, or we'd commandeer him to Roanoke for an informal after hours hospitality gig!

It was a productive day, with lots of sharing of ideas and a great way to connect between our annual conference. Try it, if you can. We have found that although there is never a good time, September seems to be about as good a time as any and well worth the travel and time away from the DOME.

By the way, I've been corresponding with some of Southern Skies readers: David Menke from the Buehler Planetarium has written twice (all's well in Davie, Florida.) My best SEPA buddy from Utah (where I grew up) Thayne Saunders, is thriving and busy in Jacksonville. As they say: Keep those cards, letters, and phone calls coming. Thanks again to Joyce Divina for supplying us with the 1997 SEPA list. I'd



Exploring the Solar System:

A CD ROM from American MPC Research

Exploring the Solar System is a good source of information for a teacher or student who needs brief facts on any of the planets or other solar system objects. The information is a good place to start, but it is not a source for extended research.

The graphics are excellent, and the narration is clear. If you click a disk icon, the current text displayed will be saved onto your floppy disk. If you click the printer icon, the current text will print. The screen display was well organized, but some screens are redundant. The music is annoying and monotonous, and there is no option to turn it off.

There were no instructions either on the CD liner or on screen about installing the program. After I figured it out, I went to the opening screen, an excellent effect of a zooming, revolving cube orbiting a planet. There was also an awesome rotating Earth in the bottom right corner of this screen. The developer might want to make it rotate in the correct direction.

The 14 title page icons were hard to decipher. A balloon, however, pops open as you move your cursor over the icon, and that helps. Some of these icons aren't needed. The first takes you back to the opening screen with the revolving cube effect. The third, a Table of Contents, is a duplicate of the main screen. The fourth shows the information one gets by exploring the planets. The tenth and eleventh icons seem totally unnecessary. The remaining icons are helpful.

The second icon introduces the disk with eye pleasing graphics and narration. Four others allow you to choose a certain graphic, slide presentation, or video that you want to view again.

Scroll bars that display the words the narrator is speaking go too fast for you to read. Finally there is help icon in case you're lost and an exit icon.

The Table of Contents has 10 buttons representing planets, asteroids, comets, and comet collisions. The sequence is confusing because sometimes two planets share the same icon. Sometimes other solar system objects are displayed between planets. Why not put the planets together, and then follow it with the other objects?

After clicking each icon, you receive good, brief facts about the object displayed in the picture to the left. Under this information text and more buttons give choices about additional information. The first was about a dozen excellent images you can view by continuously clicking on the icon. I believe captions would be a good idea to explain some of the images. The second button led to a slide show. Captions would also be helpful here. The third button provided short presentations. Great narration highlighted the information you see under each picture. The fourth and fifth buttons provided options for teachers or students for printing the provided information or copying the text to a disk.

This program was a fast and informative way to learn about the planets. It was user friendly but sometimes redundant. Information was excellent, but some was out dated. (The software is in the process of being updated.) The graphics are all beautiful and clear. The only major negative thing that I could find wrong with this program was the annoying, never ending music in the background of every screen. I recommend this particular program to anyone wanting to get a quick taste of the nine planets and other interesting objects present in our solar system.

Contact American MPC Research, 9816 Alburtt Avenue, Santa Fe Springs, CA 90670. Call 562 801 0108. See their Web site at <www.americanMPC.com>. The price of each CD in their catalog is \$12.95 including shipping. The CD is for Windows computers, but Mac users can still access all the pictures on the disk. At this price, it's really inexpensive clip art.



Exploring the Solar System title screen with revolving cube and backwards rotat

Alicia Cooper
Sophomore Intern
Craigmont Planetarium
Memphis, TN 38128-3902

News from SEPA States

Bishop Planetarium, Bradenton

George Fleenor
Bishop Planetarium
Bradenton, FL

George Fleenor reports that Christmas came early this year for the Bishop Planetarium. After several weeks of discussion and begging phone calls, the Board of Directors gave the planetarium staff permission and financial appropriation to upgrade its automation system. Each year the museum and planetarium close for maintenance. The amount of time the facility is closed varies between one and two weeks. This year, thank goodness, it was for two weeks. Included in the East Coast Control System upgrade were: controls for 2 carousel XY projectors, a zoom projector, 2 additional carousel special effect projectors, 2 additional wide angle carousel projectors, a video fader and source selector, and automation control for most all of the laser projection system.

In addition to the added automation, an additional scanner amp box was purchased for our recently purchased Cambridge scanners and a total make over of the white light head of the optical bench. The upgrade is 100% ILDA compatible and allows the facility to purchase/lease shows to run in our theater or sale shows produced in house. The final phase of the upgrade is the modification of the off line laser production bench to make it ILDA compatible as well. This should occur in November. (Right, Jon?) The benefits of the added system are endless, however, the upgrade has caused the staff to spend many hours updating the 70+ shows on file. Jon Frantz made the upgrade as easy as possible (He now has whip marks on his back.), and we reopened the planetarium on schedule. Formerly the theater ran on 4 computers. Thanks to the recent upgrade we have trimmed that number to 1.2 computers. The theater is now PC based(1), however, we still use an Apple][e (0.2) to operate general motion controls for our Spitz STP star projector.

On another note, the observatory is also getting a face lift, in addition to new equipment. Several large donations are making it possible for the installation of a new Wojcul II German Equatorial mount. Mark Wojcul, a member of the local astronomy club, fabricates a few of these

mounts each year, and they are highly praised by those who have been exposed to them. The mount has 5 shafts and could easily carry my weight, which I might add is no easy task! A \$13.2K doublet refractor is also being purchased to ride on the new mount. The telescope, which is being purchased from Milligan College in Johnson City, Tennessee, has spent the last 14 years at another SEPA site; Bays Mountain. Don't worry, Bays Mountain is not losing the telescope without replacement. A new 8" A.P.O. is planned for the near future in its place. The 8" doublet at the Bishop, will be combined with the current 6" f12 Astrophysics A.P.O. and the 6" f6 newtonian. The telescopes will continue to be used with general public observing sessions, as well as, H α , CCD and real time video imaging. The observatory is also getting a new observation deck, aluminum stair case and railing. Additional observing platforms and rear screen projection system are also planned.

Currently we are running Destination Mars in addition to The Red Planet. The Red Planet is a joint production between Bays Mountain Planetarium and the Bishop Planetarium. The show focuses on the exploration of the planet highlighting the recent success of the Pathfinder/Sojourner mission. The show features several 3D images from Pathfinder and museum patrons have the opportunity to purchase 3D glasses in the museum store. In addition to 3D images used in the star show, additional images are viewed in the Science Theater, located on the second floor of the museum. <<http://www.manateecc.com/planets>>

The Alexander Brest Planetarium Jacksonville

Patrick McQuillan says the Alexander Brest Planetarium is currently running JHE's Daughter of the Stars as our public program. It has been a well received compliment to our new history exhibit. This program is a series of Native American Sky legends. Also showing is the ever popular Fall Skies. This program is the live tour of the current night sky that I'm sure every one is at least vaguely familiar with.

Plans for the 1999 SEPA conference are progressing. We are narrowing down choices for the conference hotel. When one is chosen I will let you know location, costs, etc. But let me throw out a question to the membership as sort of a what if. If you had all the resources in the world to use to get a speaker for the conference, who would you get? E mail me with any ideas of who you would like to hear speak, meet, etc., and I will see if there is anyone

who gets lots of votes.

Finally, after a few long months, we have a full staff in the Planetarium with the filling of the Planetarium Lecturer position. The new Planetarium Lecturer is Jeff Potter. Jeff comes from the Ritter Planetarium in Toledo Ohio. He also comes at a great time to jump in and help plan the upcoming SEPA 1999 conference. Lucky him!

George Fleenor
Bishop Planetarium
Bradenton, FL

Freeport McMoRan Planetarium and Observatory, Kenner

The Freeport McMoRan Planetarium is currently showing the HPS Production The Sky Tonight Autumn Stars, Specialty Entertainment's Stars of the Night Sky and Bowen Productions MoonWitch along with other in house productions for autumn. We have changed our cove lighting system from Lumalines to a JHE installed system that incorporates more conventional incandescent (i.e., cheaper and more readily available) bulbs. Still no word on the proposed 50 ft. planetarium, I should have definite news by mid November however. The first phase of the long awaited space station exhibit will also be opening in November.

Our award winning Young Astronaut Program is also underway. We currently have more than 110 cadets signed on to this program. During the year the Young Astronauts not only participate in activities held in Kenner, but they also travel to the Johnson Space Center in Houston and The National Air & Space Museum in Washington, DC.

The Observatory is in the process of purchasing a Hydrogen Alpha Filter for its C 14 telescope. We are hoping that this will allow more people the chance to observe through the telescope. Southern Louisiana weather is not very conducive to observing, in fact our observatory is closed about 53% of the time due to weather, therefore we will begin opening during the day to help alleviate this situation.

Louisiana Nature and Science Center Planetarium, New Orleans

Mark Trotter and Dennis Cowles are rather busy. For the public they are running The Sky Tonight, Sudekum Planetarium's Planet Patrol: A Solar System StakeOut, and The Family Laser Show. On Friday and Saturday nights, they run laser shows including Pink Floyd's Dark Side of

the Moon, Led Zeppelin, Pink Floyd's The Wall, The Alternative Laser Show, Metallica, and Rush 2112. For school groups, they also run The Little Star That Could.

Mark has been busy fighting the budget wars, that traditional annual battle between the valiant Dome Dwellers and the Powers That Be. They seem to have survived the first hatcheting round with only minor cuts (It's just a scratch, for you Monty Python fanatics, Have at you!!) Mark and Dennis have inaugurated a new monthly topical program series in astronomy and the physical sciences that runs on the first Saturday of each month, so they have been busy writing and producing those programs. In addition, they are still working on a program on the Apollo Project, and they are working on several classroom programs to begin in 1998.

Dennis is happy to report that the Powers That Be have finally relented and are going to give him some money to start a planetarium meteorite collection (which just goes to show that whining and pleading will get you somewhere eventually, if you do it long enough and loud enough.) The Dome Gnome has been busy protecting the planetarium equipment from those pesky electromechanical gremlins, and has been doing a reasonably good job of it.

Mark and Dennis had a surprise visit from colleague Thomas Finicle of Albany, Georgia. Thanks for dropping by, Tom.

St. Charles Parish Library Planetarium, Luling

The coming of fall in the deep south brings a few changes, less heat and less grass to mow. Here at the St. Charles Parish Public Library and Planetarium, we finally have our new library computer system and running up to speed. It's now time to firmly glue my planetarium hat on my head.

With the school groups visiting the planetarium, I need to be able to devote

Michael Sandras
Freeport-McMoRan
Daily Living Science Center
Kenner, LA

more time to my little dark space. For this fall our programs include Life Beyond Earth and Autumn Skies for our nighttime presentations. For the kids, the Saturday matinee will continue be Planet Patrol.

Lafayette Natural History Museum Planetarium, Lafayette

David Hostetter reports they are currently showing Star Show and Target Earth. Besides these shows, David has been keeping busy preparing for programming in French. The Lafayette Planetarium is working in conjunction with planetariums in France, Canada, Belgium, Tunisia, and Switzerland in putting together a presentation for French speaking com-

munities. A very interesting part of the program is a one year long competition being conducted on the Internet for presentations authored by children.

Another interesting thing that occurred in the planetarium was the filming of a commercial. A diamond commercial for the Wilson s Jewelry store was shot in the planetarium.

David also reports that the much anticipated meteorite exhibit will finally open on October 17.

Michael Sandras
Freeport-McMoRan
Daily Living Science Center
Kenner, LA

Morehead Planetarium, Chapel Hill

Richard McColman reports approximately 1,500 people attended the Morehead Planetarium for the Live From Mars satellite broadcasts on July 6 and 9, 1997, produced by Passport to Knowledge and the American Museum of Natural History. Each program was a two hour broadcast, featuring images, interviews with Pathfinder project scientists and engineers, educational activities conducted at video linked sites, and pictures from Pathfinder. Morehead got lots of great radio, TV and print publicity in conjunction with the event.

In addition to its live constellation program, Sky Rambles, Morehead is currently running three original productions. Mysterious Solar System examines the fascinating aspects of the worlds populating our planetary system. The family program, The Travels of Terry Trasher, features a litter bug of a little boy who learns about the planets, and in the process, discovers why he should take care of his home planet. Another family program for young kids, Winnie the Pooh and the Golden Rocket, was recently upgraded from the program written by James Seebach of Charlotte s original Kelly Planetarium.

We re also running our adaptation of Oregon Museum of Science and Industry s Orion Rendezvous: A Star Trek Voyage of Discovery. The staff sometimes jokes that we seem to have been running Orion Rendezvous forever, but we continue to get enthusiastic crowds for this extremely popular program.

By publication time, we should have completed a change out of the diurnal slip

ring contacts on our Zeiss VI instrument

for which we d scheduled a two week shutdown in late August and early September. Because of the layout of the star machine and its slip ring contacts, this project won t be without its difficulties. In fact, Zeiss and Seiler inform us that the procedure has never been previously attempted on a Zeiss VI! Hopefully, our work will insure another 28 years of successful Zeiss operation.

Robeson Planetarium, Lumberton

Jim Hooks reports successful completion of a number of original public star shows which were greatly enjoyed and widely attended. He and his wife recently returned from a fifteen day tour of London. While there, they visited the London Planetarium which he reports is a great place for next year s IPS meeting just make sure you can maneuver The Tube. He is currently preparing for the coming school year.

Woodson Planetarium, Salisbury

Patsy Wilson reports Joe Hopkins Engineering has recently completed installation of a new and desperately needed cove lighting system as well as an upgrade to the sound system. During the fall season, school children will be viewing, Moonwitch and More Than Meets the Eye. We will also be running a kindergarten program called Backyard Stars and a fifth grade program, Starlit Nights.

Richard McColman
Morehead Planetarium
Chapel Hill, NC

South Carolina Organization of Planetarium Educators

The second annual South Carolina Organization of Planetarium Educators (SCOPE) meeting was held last September 8 at the Gibbes Planetarium in Columbia. Some good ideas to develop lines of communication using an e mail address list and a possible Web page were discussed.

Also plans were made to try to develop materials with an eye towards the South Carolina science framework. All in all it was a very positive meeting and I encourage other SEPA states not holding a statewide meeting to try it out. When we all share ideas, it enriches the entire profession.

Dupont Planetarium, Aiken

Gary Senn reports that they are opening the new Buhl show, Journey Into the Living Cell, for school and public groups. He has also been hard at work finding ways to fashion a permanent projection gallery without covering their current camera obscurae that projects onto their tilted dome.

Also, the Science Center of which the planetarium is a part will be undergoing a new expansion that will more than double the current classroom and work space. Hopefully this will allow for some production facilities for their theater. A possible future observatory is also in the works, stay tuned.

Settlemyre Planetarium, Rock Hill

Glen Dantzler, Barbara Reynolds and Sam Belk are working hard preparing shows for the school year. Many of their programs will be revamped to take advantage of the new automation system and ECCS slew installed this summer.

Current shows include Adventures along the Spectrum and Space Bus as well as others like PlanetQuest for the school season.

Gibbes Planetarium, Columbia

Here in the center of the state we are also preparing for the fall school season. The Sudekum Planetarium show, Our Place in Space will open in November for a short public run and also be available as one of 12 different school programs for groups during the year.

Other public offerings this fall include The Nights of Halloween, our home brewed seasonal show during October and the

Loch Ness production, Season of Light, during the holiday season.

Another activity that we are working on is a public observing session during the South Carolina State Fair. Yes, you can see some objects from under the glare of the lights of the big top.

With the help of two local astronomy clubs and other astronomy groups we provided fairgoers views of Jupiter, Saturn, and the Moon during the month of October.

Stanback Planetarium, Orangeburg

Jim Brown was very busy during the summer redesigning and relocating the planetarium's World Wide Web site. He has put together a nice package which includes materials from his NASA Teachers Resource Center. Try out his comprehensive site at the address <<http://www.draco.scsu.edu/>>.

For the fall school season the planetarium offers several shows including Our Place in Space, Larry Cat in Space, The Mars Show, and Life Beyond Earth. Public shows during the holiday season include Star of Wonder, and A Star for Santa's Tree.

T.C. Hooper Planetarium, Greenville

Doug Gegen and Jim Flood have been hard at work putting together instructional programs for the new school year as well. They plan to introduce Journey into the Living Cell as both a new school and public show this fall.

Current public offerings on Friday nights include a star show to go with their telescope observing and the Sudekum production, Planet Patrol. They are also still working on installing a Sky Skan All Sky system and a new projector deck/platform in their theater.

One other item of note; Rex Smith, their former astronomy educator, has transferred to another position within the science center. This means they are currently in search of a new astronomy educator. Interested applicants can reach them at (864) 281 1188 for more details.

News from SEPA States
continued

Todd Slisher
Gibbes Planetarium
Columbia, SC

Sudekum Planetarium, Nashville

The Sudekum Planetarium in Nashville missed the last deadline, so there is a lot of news to catch up. Rusty Rocket's Last Blast (a Sudekum production), and WSKY: Radio Station of the Stars (from the Hayden Planetarium in Boston) rocked the dome, seven days a week, all summer long to enthusiastic audiences. Meanwhile, Sharon Mendonsa and Waylena McCully, Planetarium Educators, taught science camps on topics ranging from science fiction to rocketry to Astronomer for a Week. Throw in a record number of Starlab bookings, and it made for a VERY hectic summer.

Pashur House, planetarium artist, resigned in late April to pursue his own interests. Ted Glaser, an intern from the O More College of Design, worked in the Planetarium throughout the summer performing a variety of tasks which really helped to fill the void until a new artist could join the staff. Finally, in late August, after a lengthy search and grilling of prospective candidates, Mayra McCloud was selected and has willingly assumed the responsibilities of Planetarium Production Designer.

In June, the Planetarium was asked by Mission HOME to host a public lecture by former astronaut Dr. Owen K. Garriott. Mission HOME is a national initiative, led by former astronaut James Lovell, to foster public understanding and support of space and space exploration. Dr. Garriott gave his talk in August to a full house. At the same time, he presented the Take Up Space Award to a local classroom teacher. Presentation of the award is based on how an individual promotes space interest and enthusiasm. Ironically Kris McCall was nominated for this award, but one theory for her not receiving it is that she just doesn't Take Up ENOUGH Space.

Kris McCall was the subject of a human interest, feature story on the Nashville Citysearch Web page in late July and early August. You can still read the story by going to <www.nashville.citysearch.com> However, it may no longer have all the nifty graphics and pictures that were in the original post.

September was a relatively quiet month in the dome with shows only offered on weekends, but there was a LOT of activity during the week. Waylena and Sharon are working on teachers guides and the 1998 edition of the Tennessee Sky Observer's

Guide. Kris and Waylena completed installation of the ECCS video automation, and all shows are being upgraded to take advantage of the new capabilities. Robert Rodriguez, technician, has been performing maintenance on everything from slide projectors to the zoom, since this is the first opportunity in months that there has been any down time.

School shows and regular afternoon matinees resume on September 30th. In October, Moonwitch (from Bowen Productions in Indianapolis) and Just Imagine (a Sudekum production) will be presented. Is There Life On Mars? (from the Adler Planetarium in Chicago) will open in November and play into early 1998. In January, Sandy, Pepper, and the Eclipse (from Bowen Productions in Indianapolis) and Seeing the Invisible Universe (from the Adler Planetarium in Chicago) will be featured through the end of February.

If anyone is coming to Nashville for the regional NSTA meeting in early December, the Cumberland Science Museum, home of the Sudekum Planetarium, will be hosting a major event on Thursday evening December 4th.

Craigmont Planetarium, Memphis

We are there! Yes, the Craigmont Planetarium newsletters Skylights and Twinkles are now online! Due to our past two years experience with the Thinkquest Web page design contest we have learned how to do the basic html programming. We thought, Why not publish our newsletters online? We could save some money in the cost of printing and mailing. You all know how every little bit helps when it comes to your budget.

Yes, it did take a little time and patience to learn the html, but after a few mistakes we were well on our way. It is so much fun to watch the page actually come to life. Twinkles, our elementary newsletter literally twinkles now.

Our student staff writers at Craigmont really enjoy showing their families and friends there work on the web page. Putting our newsletters online also allows us to stop editing articles for length. The students hate it when we have to edit half of what they wrote.

It is nice to be able to use color pictures that we couldn't use in our hard copy publication. Printing in color is too costly as most of you know. We have also included

Mission to Mars Web Site

Imagine this! You're about to launch a spacecraft to Mars! Think about how neat it would be to watch your own probe gather facts about a planet that's 34 million miles away. The tools you chose would be used. You'd be in charge of it all.

Now imagine this! You could win \$25,000 for college. Both of these things would be great, but how are they related? Thanks to the work of Andrew Holbrook, Kismet Kerley, and Elizabeth Shelly, you can find out for yourself what it's really like to send a spacecraft to Mars.

The three students created the Web site called Mission to Mars for the Thinkquest contest. Students in grades 7-12 collaborate to create an educational Web site and have a chance to win big bucks if they are selected as finalist in the Thinkquest contest. Wow, learn how to create Web sites and win money at the same time.

Please take a look at Mission to Mars at <http://library.advanced.org/11147>. Discover tons of information about Mars and have fun at the same time.

Once you get to the site, you'll pick a name for your mission and your very own password. Next, you'll be guided through the Mars Academy where you'll learn about the Red Planet and how it's different from the Earth. These facts and photos really make you feel like your out in space

looking at Mars. Before leaving the Mars Academy, make sure you print a certificate with your name on it for graduating.

Then the real fun begins! Move to Mission Headquarters and choose what you'll take when you launch your spacecraft to Mars. Detailed information helps you decide what instruments you'll need for your mission. Think of it as being given 200 million dollars to shop for what you'll take with you. Wow! It seems like so much money, but after you see what the instruments cost, you'll have to do some budgeting, the same as NASA has to do.

You'll also have to decide where you want your spacecraft to land. Every part of the mission is in your control! You can finish your mission in one day, or even come back a few days later and go on from where you last stopped. It's all up to you. Hope your launch gets approved! I had great fun and hope you look it up on the Internet too.



other interesting sites at the end of the Web page for easy access to other topics in the area of astronomy.

We are very proud to present our bi-monthly newsletters online at this time. Take a quick peak when you get a chance. We hope to develop them more as time passes and we learn more advanced Web

page techniques.

Skylights is at the address <http://www.people.memphis.edu/~dthomas/skylights.html>.

Twinkles is at the address <http://www.people.memphis.edu/~dthomas/Twink.html>.

Rachel Lim
Freshman Staff Writer
Craigmont Planetarium
Memphis, TN

News from SEPA States
continued

Lisa DuFur
Craigmont Planetarium
Memphis, TN

Arlington Schools Planetarium, Arlington

Although they are in operation only during the school year, Candice Scarano reports that their facility is a regional planetarium. They do sound like a very active and dynamic operation that effects the education of students over a large area. They perform on the average 4 school programs per day matched for the Virginia Standards of Learning. Public programs are offered in the evenings and on weekends. Coming soon is a program from the Adler planetarium called Is there Life on Mars? That show will run through Thanksgiving 7:30 pm Fridays and Saturdays, with Sunday matinees at 1:30 and 3 pm. On December 5 Tis the Season will return. It s a seasonal holiday program which talks about the Holiday and change of the seasons, as well as the winter constellations. Later they hope to be running Springtime of the Universe. She also says that they may get back into doing live concerts in the future.

Virginia Living Museum Planetarium Newport News

We are now into the planning stages for a new facility which should be opening in a few years, if fund raising goes as planned. We will be moving up to at least a 50 foot dome size.

School programs are picking up. An other roof leak left us with another stain on our dome. It will be touched up at some time in the future.

Currently in the theater we are running Just Imagine, a production of the Sudekum Planetarium in Nashville. One change from last year will be the addition of more live What s Up shows. The live show will be presented at 2:30 on weekends and 7:30 Thursday nights. Observatory sessions are daily, and follow the show on Thursday night, weather permitting.

We are pleased to announce that a new staff member Dr. Kelly Herbst will be joining us in October. Kelly is a long time planetarium volunteer, helping us out while finishing up her Ph.D. in physics at The College of William and Mary. She brings with her experience gained from her volunteer activities, a positive attitude, and needless to say, a strong science background. I look forward to helping her begin a new career.

With the Winter comes our perennial family favorite and 32nd showing of Star of Wonder (the 1990 production) which opens

on the weekend before Thanksgiving.

Ethyl Universe Planetarium, Richmond

Eric Mellenbrink says they have two new school shows: NightLights for pre school first grade, and EarthWise for second fourth grades. The Mars Show will continue through January 4. There is also a daily live sky show called Night Sky. It changes every two months.

They re still working on construction projects to improve the exterior of the building. Next spring the exhibit halls will get some work. Renovations of the theater will take place sometime in 1998. This will include new seats and new carpet.

Current Omnimax movies are Destiny in Space and The Magic of Flight which run through December 5. Starting December 5 is a film called Alaska. Former staff member Andrea Geonopolis left the museum to work for Astronomy in Milwaukee.

Hopkins Planetarium, Roanoke

Gary Close reports success with Autumn Skies, a local production. They ll also run Bowen Productions Moonwitch. A tour of the night sky called Skywatch began October 4. There was a Museum wide Halloween party for members the evening of October 25 with a special showing of Moonwitch.

On November 8 featured the workshop How to choose a telescope with a sky watch by former Director Britt Rossie. In December they hope to shut down for renovations till the first week in January to replace the aging automation system with one from East Coast Control Systems.

The building which houses the museum and planetarium includes many other muti cultural and arts groups, and they use the entire space for various fundraising functions. They have a major fund raiser each year called Fair in the Square. He says it is a really big event with several bands and food from 15 to 20 local restaurants. From 1000 1500 people attend each year.

Plans are underway for the conference, and Gary is looking forward to everyone coming up to Roanoke for SEPA 98.

Virginia Beach Schools Planetarium, Virginia Beach

Herb Teuscher s been busy. A committee is looking into renovations. He s recently performed Just Imagine from Sudekum.

Over the summer he conducted work shops, Summer Camps, and Day care

The Interstellar Medium, Nebulae, and Star Formation

Dennis Joseph Cowles
Louisiana Nature and Science Center
New Orleans, LA

In a nutshell, the stuff between the stars is the interstellar medium. The interstellar medium is interesting and worthy of our attention, both for its intrinsic beauty (think of all of those incredible nebulae) and its tremendous importance as the raw material for stars and planets. The interstellar medium (IM) is composed of both gas and dust. We shall first discuss the dust component of the IM and then the gaseous component. We shall examine the different types of nebulae and then examine the collapse of clouds to form stars. We shall conclude by discussing the origins of the material in the IM.

Interstellar Dust

Approximately 1% of the IM is dust. The density of the dust in space is very low, something like one dust particle per 1,000,000 cubic meters. We can see the dust directly when we look at the Milky Way. The dark lanes and rifts are not voids as was once thought but are enormous clouds of dust. We can also see the dust when the light from nearby stars is reflected by the dust, forming a reflection nebula. The nebulosity surrounding the Pleiades cluster is a textbook example of this type of nebula. Reflection nebulae are bluish in color because the blue portion of the spectrum is scattered more than light of other colors. Stars that are associated with reflection nebulae appear more red than they actually are and astronomers can use this as a measure of the amount of dust that is present between us and the star.

The Hertzsprung Russell diagram allows astronomers to predict the colors of stars based upon their spectral class (which can be determined from the spectrum). We can compare the observed color with the predicted color and determine the amount of reddening of the star. The amount of reddening is proportional to the amount of dust between us and the star.

Another way that astronomers can examine dust is using infrared telescopes. Visible light cannot penetrate through dense dust clouds, but infrared (IR) radiation can. Astronomers use IR telescopes to probe into clouds and get information

about the birth of stars. IR can see through dust but it can also see the dust itself because it emits light in the IR region of the spectrum. Dust emits IR when it is near a source of energy like a star. The dust absorbs energy in the form of visible light (which is why visible light cannot penetrate through the dust) and then radiates some of that energy back out as IR.

The current information on interstellar dust suggests that the dust particles are composed of small (0.05 μ m) cores called grains. The grains are probably made up of silicates, iron, graphite, or some combination of them. The grains are surrounded by a mantle of icy materials like water, carbon dioxide, methane, or ammonia. Covering the mantle may be a layer of chemicals that are derived from the ices. There is some laboratory evidence that this is a plausible model for the dust particles of the IM and there is spectrographic evidence for the presence of water in dust clouds. Allende carbonaceous chondrite meteorites contain inclusions in them that are believed to be composed of these interstellar dust grains.

There is a connection between dust grains and molecules in space. If you find dust, you always find molecules; if you find molecules, there is dust around. A hypothesis has been proposed to explain this fact: molecules are formed on the surfaces of the dust particles or in the ices of the mantles. Atoms that collide with a dust particle have a tendency to adsorb (stick) onto the surface. When the dust particle collides with another atom, there is a possibility that the atoms will meet and that a molecule will form. This mechanism is sufficient to explain the production of simple molecules, but another mechanism is needed to explain the more complex ones. This mechanism relies upon the ices in the mantle. As light falls on the dust, it heats up from the absorption of energy. This energy can drive chemical reactions in the ices which can make complex molecules like formaldehyde (H₂CO), methyl cyanide (CH₃CN), or even ethanol (CH₃CH₂OH). (At the end of this article is an appendix that lists common molecules found in the interstellar medium.)

The ices that compose the mantles of the dust particles probably condense on the grains deep within giant molecular cloud complexes, where the temperature is low enough and gas density is high enough to permit the grains to acquire a crust of ices. If the temperature is above a few hundred Kelvins, the ices will sublimate off of the grains. It is estimated that an interstellar grain can acquire a mantle of ices in about 100 million years.

Interstellar Gas

The other component of the IM is interstellar gas. This gas is, of course, mostly hydrogen although there are atoms of other elements present as well as some molecules. Interstellar gas tends to form into clouds in space and there is a diffuse gas present between the clouds. Interstellar gas can be divided into five different types. We will discuss each in turn and cover some of the relationships between them.

Much of the gas in interstellar space consists of neutral hydrogen (H I; see the note on nomenclature at the end of this article). Neutral hydrogen, or H I regions, can be detected with a radio telescope at a wavelength of 21 cm, the so called hydrogen line. Much of the H I is concentrated along the plane of the Milky Way. The average temperature of an H I region is 70 K and the average density is around 3×10^5 atoms per cubic meter. Clouds of neutral hydrogen produce characteristic absorption lines in stellar spectra; when an astronomer looks at the spectrum of a star viewed through a cloud of neutral hydrogen, absorption lines appear in the spectrum where the H I has absorbed some of the light. These absorption lines fall in the ultraviolet region of the spectrum and thus cannot be detected from ground based telescopes. Other gases have been detected by absorption lines in stellar spectra: potassium and sodium have been found, as have ionized iron and calcium.

Neutral hydrogen consists of a proton with an electron in orbit around it. If there is a source of energy available, there may be enough energy to kick the electron permanently away from the proton. A proton without a corresponding electron is ionized hydrogen (H II). There are H II regions in interstellar space, in addition to H I regions. The energy source for ionizing the hydrogen is usually a hot O or B class star. The ultraviolet light from the star is

absorbed by neutral hydrogen (H I) gas and can cause one of two things to happen: either the absorbed energy from the light is radiated out by the hydrogen in the form of visible light (mostly in the red region of the spectrum) or the electron is stripped from the proton, resulting in ionized hydrogen (H II). We can see this by examining the Great Nebula in Orion. Much of the nebula consists of neutral hydrogen; the central portion of the nebula, the part that we can see with a telescope or binoculars (or with our eyes if we are blessed with good skies), is actually an H II region. All bright nebulae consist of clouds of ionized gas; the colors of the nebula depend upon which gases are present. Most bright nebula are reddish in color, indicating the tremendous abundance of hydrogen. An average H II region has a temperature of 10,000 K and a density of 10^7 to 10^{10} particles per cubic meter.

As I mentioned above, the gas in interstellar space tends to form into clouds. Not all of the gas in the IM is found in clouds, however. The areas between clouds also contains gas, but at a much lower density. These intercloud gases have a density between 2×10^5 and 3×10^5 particles per cubic meter and temperatures that range from 7,000 to 10,000 K. There are regions within the intercloud gas that have much higher temperatures, around 1,000,000 K. Such regions are populated by intercloud coronal gases, so called because the temperatures are about the same as those found in the solar corona. These coronal gases contain very unusual types of gases, such as oxygen that has had 5 electrons stripped from it (O VI). Intercloud coronal gases have densities ranging from 10^2 to 10^3 particles per cubic meter. Intercloud gases can be observed in radio and ultraviolet and the intercloud coronal gases can be viewed in ultraviolet and x ray.

The last of the interstellar gases to be discussed are molecular clouds. Such clouds often lie near H II regions, and they are cold and dense compared with other parts of the IM. Molecular clouds have temperatures in the range of 10 K to 50 K and densities ranging from 10^3 to 10^{15} particles per cubic meter. Molecular clouds are, like other gases of the IM, primarily made of hydrogen, but it is in the form of molecular hydrogen (H_2). There are many other molecules present, as well. As we shall see below, the high densities of molecular clouds (compared with other regions of the

interstellar medium, that is) make them the sites of starbirth. Molecular clouds lie near H II regions precisely because they are the sites of starbirth. As stars begin to form out of a large molecular cloud, those stars heat up the surrounding gas and ionize it, forming an H II region.

Nebulae

As mentioned above, reflection nebulae are made mostly of dust, so called because they shine with the reflected light of nearby stars. They are bluish in color due to the preferential scattering of the blue end of the spectrum, which leads to a reddening of the spectra of stars. The amount of reddening is proportional to the amount of dust that is present, so astronomers can infer the density of the dust in a reflection nebula by measuring the amount of reddening. The Pleiades cluster sits in the middle of such a reflection nebula.

Emission (or bright) nebulae, on the other hand, are produced by the action of hot O and B class stars. The ultraviolet radiation emitted by these stars is absorbed by the gas and re-radiated as visible light. All emission nebulae consist of ionized gas because ultraviolet radiation has enough energy to cause electrons to be stripped from atoms, forming ions. The specific colors of emission nebulae are dependent upon the types of gas that are present. Most are reddish, indicating hydrogen; other colors and spectral lines indicate the presence of nitrogen, oxygen, neon, sulfur, argon, and other elements. Emission nebulae are among the most beautiful objects in the sky. Examples include the Great Nebula in Orion, the Eagle Nebula, and the Lagoon, Trifid, and Cone nebulae. Such nebulae are important for a reason other than their intrinsic beauty, however: they are the sites of starbirth.

The Birth of Stars

Why does a large, diffuse cloud of gas collapse to form stars? This is one of the central questions of astrophysics. If a cloud of material is large enough, the gravity of the gas in that cloud will cause it to collapse. But how big does the cloud need to be before that will happen? The British astronomer James Jeans worked out the conditions that are necessary for such a collapse to occur and came up with the following equations to describe the minimum size necessary to cause cloud collapse.

$$L = \sqrt{(\pi v^2 / G d)} \quad (1)$$

L is the minimum radius for a spherical cloud of density d , G is the gravitational constant ($G = 6.67206 \times 10^{-11} \text{ m}^3/\text{kg} \times \text{s}^2$), and v is the velocity of sound in the gas. We can calculate v using the following equation:

$$v = \sqrt{(3kT/m)} \quad (2)$$

T is the temperature of the gas in Kelvins, k is the Boltzmann constant ($k = 1.38066 \times 10^{-23} \text{ J/K}$), and m is the mass of the molecule. For the sake of simplicity, assume that all of the gas in the cloud is hydrogen (which is practically true anyway) and use the value of $m = 1.67381 \times 10^{-27} \text{ kg}$.

We can combine equations 1 and 2 into:

$$L = \sqrt{((3\pi k T / m) / G d)} \quad (3)$$

The implicit assumptions in equation 3 are that the cloud is spherical and of uniform density. These are, of course, not realistic assumptions, but the equation can still give us some idea about the collapse of clouds. Equation 3 gives a result in meters; to convert to light years, divide the answer from equation 3 by $9.46 \times 10^{15} \text{ m}$ and this will give a result in light years.

Playing around with this equation shows that the two main competing forces are the temperature of the cloud, which works to disperse the cloud, and gravity, which works to keep the cloud together. The equation is quite sensitive to the density of the cloud. When the critical minimum size L , called the Jeans length, is reached, gravity wins over the dispersive effects of the gas temperature. This is the main reason why starbirth occurs in giant molecular cloud complexes; such clouds have both high density and low temperature, ideal conditions for Jeans collapse.

If a cloud of neutral hydrogen, with a density of 10^{-21} kg/m^3 and a temperature of 70 K , is to collapse, what is the minimum radius that the cloud must achieve (the Jeans length)? Plugging our values into equation 3 gives us a minimum radius of about 955 light years. Even though the cloud has a very low density, there is enough material in a cloud of this size to make over 1.5 million solar mass stars. If the temperature of the H I cloud is, say, 25 K , then the Jeans length is only 570 light years and the mass of the cloud is

over 330,000 solar masses. Increasing the density by a factor of 100 (from 10^{-21} to 10^{-19} kg/m^3) at a temperature of 70 K also has a drastic effect; the Jeans length becomes a mere 95 light years, and the total mass of the cloud is 155,000 solar masses.

The general trend is clear: the lower the temperature of the cloud, the more easily it will collapse. As the cloud collapses, the density within the cloud will increase, making the Jeans length even smaller. This is why stars tend to form in clusters rather than forming huge stars. As a cloud collapses, areas in the cloud will develop that require a smaller Jeans length, so the cloud will break apart into smaller clouds that condense individually.

Origins of the Interstellar Medium

Where does the dust component of the interstellar medium come from? It is believed that the interstellar grains form in the atmospheres of cool supergiant stars. Many cool supergiants blow matter into space. As the material flows away from the star, the temperature decreases to the point where solid particles can form. There is spectrographic evidence to support this hypothesis. Cool giant stars also lose mass and contribute to the dust component of the IM. Some giant and supergiant stars of spectral class M have circumstellar disks of material in orbit around them; class M stars have the highest rate of mass loss among the different types of stars, up to 10^{-4} solar masses per year. They contribute both dust and gas to the interstellar medium.

The ultimate source of the gas in the interstellar medium is, of course, the period after the Big Bang when protons, neutrons, and electrons first combined to form atoms. The primordial gas mixture contained hydrogen, helium, and a trace of lithium. It would take the birth and death of stars to make more massive elements.

Most of the gas in the IM comes from stars. As stars produce energy from the fusion of hydrogen to form helium, they produce other elements as intermediate steps in the reaction process. The most common elements produced by the fusion process are carbon, oxygen, nitrogen, and fluorine, but many other isotopes will be produced. Heavy elements are produced in older stars, where there has been ample time to produce lots of elements heavier than helium. Many different types of reactions can occur that can produce

practically any isotope. When a star dies, either forming a planetary nebula or a supernova, these elements are returned to the interstellar medium. If a star ends its life as a supernova, a lot of new isotopes are created in the explosion and scattered into space. Most of the elements in the Universe were cooked up inside stars. When those stars died, they added new elements to the interstellar medium. The material that condenses to form new stars may eventually return to the interstellar medium. Thus, the Universe is the ultimate recycler.

Note on nomenclature:

Different atoms and ions are identified by the symbol for the chemical element and by a Roman numeral, like H I or H II. The numeral refers to the ionization of the atom. The Roman numeral I indicates that the element is in the neutral state, i.e., it still has all of its electrons. If one electron is taken away from the atom, turning it into an ion, the I changes to a II. If another electron is lost, the II becomes a III, and so forth. Thus, an oxygen atom that has lost five electrons would be symbolized as O VI.

Summary of Interstellar Gases:

Neutral hydrogen (H I)

Density: 5.02×10^{-22} kg/m^3

Temperature: 70 K

Ionized hydrogen (H II)

Density: 1.67×10^{-20} to 1.67×10^{-17} kg/m^3

Temperature: 10,000 K

Intercloud gases:

Density: 3.35×10^{-22} to 5.02×10^{-22} kg/m^3

Temperature: 7,000 K to 10,000 K

Intercloud coronal gases:

Density: 1.67×10^{-25} to 1.67×10^{-24} kg/m^3

Temperature: 1,000,000 K

Molecular cloud:

Density: 1.67×10^{-19} to 1.67×10^{-17} kg/m^3

Temperature: 10 K to 50 K

Common Molecules and Ions Found in the

Interstellar Medium:

Diatomic:

H_2	Molecular hydrogen
OH^\cdot	Hydroxyl radical
CN^\cdot	Cyanogen radical
CS	Carbon monosulfide
CH	Methylidyne
CH^+	Methylidyne ion
SiO	Silicon monoxide
NS	Nitrogen sulfide
SO	Sulfur monoxide
C_2	Diatomic carbon
CO	Carbon monoxide

Triatomic:

SO_2	Sulfur dioxide
HCO^+	Formyl ion
C_2H	Acetylene radical
N_2H	Protonated nitrogen
HCO	Formyl
HNC	Hydrogen isocyanide
HNO	Nitroxyl
O_3	Ozone
H_2O	Water
HCN	Hydrogen cyanide
H_2S	Hydrogen sulfide
OCS	Carbonyl sulfide

Tetratomic:

NH_3	Ammonia
H_2CO	Formaldehyde
H_2CS	Thioformaldehyde
C_3N	Cyanoethynyl
$HNCS$	Isothiocyanic acid
$HCNO$	Hydrocyanic acid
HC_2H	Acetylene

Pentatomic:

NH_2CN	Cyanimide
CH_2CO	Ketene
C_4H	Butadiynyl
CH_4	Methane
$HCOOH$	Formic acid
HC_3N	Cyanoacetylene
CH_2NH	Methylenimine

Hexatomic:

CH_3SH	Methyl mercaptan
CH_3OH	Methyl alcohol
CH_3CN	Methyl cyanide
$HCONH_2$	Formamide

Heptatomic:

HC_5N	Cyanodiacetylene
CH_2CHCN	Vinyl cyanide
CH_3NH_2	Methylamine
CH_3C_2H	Methylacetylene
$HCOCH_3$	Acetaldehyde

Octatomic:

CH_3C_3N	Methyl cyanoacetylene
$HCOOCH_3$	Methyl formate

Nonatomic:

CH_3CH_2OH	Ethyl alcohol
CH_3CH_2CN	Ethyl cyanide
CH_3CH_2O	Dimethyl ether
HC_3N	Cyanotriacetylene

Others:

HC_8N	Cyano octatetrayne
$HC_{11}N$	Cyanopentaacetylene

Sources and References:

Aller, Lawrence H. Atoms, Stars, and Nebulae. Rev. Ed. Cambridge, Massachusetts: Harvard UP, 1971.

Braugher, Joseph F. On Civilized Stars. Englewood Cliffs, New Jersey: Prentice Hall, 1985.

Consolmagno, Guy J. and Martha Schaeffer. Worlds Apart: A Textbook in Planetary Sciences. Englewood Cliffs, NJ: Prentice Hall, 1994.

NASA EP 127. Chemistry Between the Stars. Washington, D.C.: Superintendent of Documents, 1976.

Zeilik, Michael. Astronomy: The Evolving Universe. 7th Ed. New York: John Wiley and Sons, 1994.

Do Christmas Star Programs Support Belief in Astrology?

Astrology, a False Belief System

Astrology commonly is regarded by scientists as a pseudoscience and superstition. Christian theologians likewise usually classify astrology as a form of divination and therefore as an evil practice if it works at all. Neither group has much good to say about it. For example, a noted planetarian attacked astrology by saying: Astrology is not only unscientific, it is pagan and anti Christian (Mosley 1991, p. 19).

Not having defined astrology, one could agree or disagree with this last statement. As Dr. Arthur R. Upgren, John Monroe Van Vleck Professor of Astronomy and Chairman of the Dept. of Physics at Wesleyan University, remarked in his talk on Astrology: Science or Pseudoscience at the College of Charleston (Feb. 13, 1992), astrology can be considered as partly science and partly not. Clearly, if all one means by belief in astrology is belief in the alleged influence of celestial bodies on events on the earth, then science agrees with astrology that the moon causes the tides, that tidal effects at lunar perigee may be a partial agent in determining the time of volcanic eruptions and earthquakes, and so on.

On the whole though, let's agree that astrology is largely a false belief system (consult Culver & Ianna, The Gemini Syndrome for a persuasive case).

Use of Astrological Reasoning in the Planetarium

Despite the widespread condemnation of astrology in modern times by scientists and theologians alike, it is common in fact, almost universal to identify the Magi of the Christmas Star story (Matt. 2) as astrologers (cf. the New English Bible for example).

Deriving essential information from a literal interpretation of the biblical account, many planetarians conclude that the Magi interpreted the appearance of an unusual astronomical phenomenon to be the celestial sign that announced the birth of Jesus. The planetarian usually then proceeds to present a plausible line of astrological reasoning (Jupiter – the

planet of kings, Leo – the sign of Judah, etc.) to show how the Magi got the specific information that led them to know that a king had been born in the land of the Hebrews. Scenarios are also given to explain how specific scriptural verses are plausible astronomically (Matt. 2:9: went before... stood over – stood at upper culmination on diurnal arc, was on stationary part of its retrograde loop, etc.).

Finally, some planetarians give the audience the impression, intentionally or not, that there really was a star that announced the birth of Jesus and they have identified it!

In there any problem here? Does this approach give implicit support for pseudoscience? If done in a state supported planetarium, is there no problem with all the scriptural interpretation? Isn't the planetarian involved in Christian apologetics when such a program is done?

Common Rationalizations for the Use of Astrological Reasoning in the Planetarium

The fact that the audience is bound to learn some astronomy is one justification sometimes given. Of course, one could likewise give a lecture on interpreting the natal chart and claim redeeming scientific value for the lecture. One also could attempt to justify teaching creationist flood geology by noting that the audience learns a lot of scientific geology in the process.

A more frequent justification is to say that

- (1) We are merely expounding the fallacious beliefs of the superstitious, pre scientific Magi, rather than claiming those beliefs as our own.
- (2) We explicitly state in the program that astrology is a false belief system, at least from a scientific point of view.

These justifications are inadequate because:

- (1) The entire point of a Christmas Star program generally has been

to identify a plausible astronomical object that would be unique and significant enough (to the Magi) to act as a celestial sign to announce the birth of Jesus. Such celestial announcements are plainly a form of astrological portent, no matter what gyrations and rationalizations we want to go through to deny it. As Mosley has said, The star of the magi is probably the most famous astrological omen in history (Mosley 1991, p. 21)

- (2) The Magi are portrayed as successful in their quest. Do our audiences see this success as mere coincidence? Although the Magi were not completely successful in finding the child Jesus through their interpretation of the celestial sign (they got the more precise information to go to Bethlehem rather than Jerusalem from the scribes and their interpretation of Micah 5:2), they were in a general sense successful since they did go to Israel and they did learn, from their interpretation of the Star, that a King of the Jews had been born. Also notice that even if we deny that we are giving credence to astrology by suggesting that the Magi were generally successful in their quest, we often go on to allow that they got accurate information of Jesus's actual birth place from Biblical prophecy!
- (3) Claims to have identified the Star imply that indeed there was a real Star that announced the birth of Jesus. Planetarium astronomers often present such a good case for having identified the Star, that a disclaimer that it is mere coincidence that such an unusual series of events should happen at just the right time seems quite inappropriate and unbelievable. Only those having a strong naturalistic bias buy the argument, which is not generally the philosophical bias of our audiences.

Inappropriate Ways of Dealing with Astrology in State Supported Planetariums

Is astrology anti Christian? Many fundamentalist writers would have us believe so based on proof texting and questionable arguments. The main verses (Isa. 47:

12 14; II Kings 17: 16 18; Jer. 10:2 and so on) used to defend such a position involve the assumption that astrology is a worship of the stars and their objections to it are based largely on that assumption. Unless one stretches the meaning of the word worship to absurd lengths, astrology, in the sense that it is objected to by most astronomers, does not involve worship at all. Also, Rabbi Joel C. Dobin's arguments (Dobin, 1977) that the biblical tradition actually is pro astrology never have been answered effectively. Interestingly, many of the verses used against astrology equally could be used against astronomy: astrology is condemned as a source of knowledge other than God and the Scriptures (the definition of divination), but modern science, allegedly being philosophically based in naturalism, is also such a non divine source of knowledge. Although perhaps they should be, prayer and studying the Bible generally are not considered ways that the scientist goes about getting information about the world.

I'm not saying that astrology is in fact true nor that it is necessarily acceptable for an orthodox Christian following (Ankerberg & Weldon 1989; Bjornstad & Johnson 1971), but I am saying that the arguments used against it are often faulty. I agree that astrology is at least largely unscientific or non scientific, but then so apparently are Virgin Births and Resurrections from the Dead along with Balaam's donkey talking human language and the innumerable miracles of the Bible at least many planetarians would say so.

The real concern, however, is: Should a planetarian in a state supported institution defend a particular religion, Christianity, against pagans and anti Christians? Is not a state supported planetarium supposed to be neutral on such questions? Should we not leave our personal beliefs at home? Also, many astrologers and some theologians would argue that astrology is neither pagan nor anti Christian. What should matter to the planetarian as a scientist or science educator is not whether astrology is pagan or anti Christian, but whether scientific evidence favors it or not. Biological evolution, for example, is regarded by many Christians as pagan and anti Christian, but that hasn't stopped its being presented as truth in virtually every outlet of science education in the country! The pagans may be correct!

Implying amazing astrological fits in order to make a better story

One can find astrologically significant astronomical phenomena to fit almost any time in history (Mosley 1991). Thus arguing astonishing fits of the astrological meanings to astronomical events does not make the case for what the Star was any better (such fits are too easy to produce), but rather merely serve to give the impression that astrology really worked in this case and in a deceptive manner at that if the planetarian conveniently chooses not to mention that astrology can be made to fit anything.

One must be very careful here, because although our audiences may dismiss horoscopes as junk, they are less likely to dismiss the idea of signs in the sky because those who attend Christmas Star shows likely have a Christian religious interest anyway and, in many Christian views of the world, belief in signs in the sky is accepted (cf. Luke 21:25). We must be sensitive to what our audiences are hearing, not merely to what we intend to say.

If, on the other hand, we choose to say that belief in astronomical portents is just another aspect of the bogus belief system of astrology, we end up attacking the views of particular religions (cf. Mosley 1991, p. 26).

What Can Be Done?

The planetarian has several options:

- (1) Delete Star programs and replace them with less problem ridden ones (winter solstice programs?).
- (2) Admit that science can support or refute belief in astronomical portents (astrology) and continue giving Star programs.
- (3) Argue that there probably never was a Star appearing immediately before the birth of Jesus, so that astrology again fails to find support.

In geology museums, science educators freely argue there never was a global flood on Earth in historical times, so why not argue that there never was a Star: perhaps Matthew was writing pious fiction.

Questions for the planetarium science educator who does Christmas Star shows

- (1) Do I say the Magi interpreted the appearance of a star using astrology and then successfully find the Christ child? Do my Star shows give the impression astrology worked?
- (2) Do I make the case for a planetary conjunction so persuasive I make later claims it was coincidence unbelievable to the average audience?
- (3) Can I continue to do Star programs, given that the whole idea of the program is to present a plausible astronomical scenario for a Star acting as a sign of the birth of a great religious figure?
- (4) Am I sacrificing professional ethics at the altar of mammon by doing Star programs despite the numerous issues of concern?
- (5) Am I pushing my religious beliefs on the public or is my sole motive to benefit science education?

There may very well be good answers to all the questions and concerns raised here. Let's deal with these issues.

ACKNOWLEDGEMENTS.

I wish to thank Mr. Kent R. Johnson, philosophy professor at Purdue University (North Central Campus) for his very helpful critique of a preliminary version of this manuscript. The depth of his scholarship deserves much wider recognition than it hitherto has received.

REFERENCES

- Ankerberg, John & Weldon, John 1989, *Astrology: Do the Heavens Rule Our Destiny?* (Harvest House Publishers, Eugene, Oregon).
- Bjornstad, James & Johnson, Shildes 1971, *Stars, Signs and Salvation in the Age of Aquarius* (Bethany Fellowship, Minneapolis, MN).
- Dobin, Rabbi Joel C. 1977, *The Astrological Secrets of the Hebrew Sages* (Inner Traditions International, N.Y.)
- Mosley, John 1991, In Defense of Christmas Star Shows, *The Planetarian*, 20 (4), 18-33, (Dec.)

Mission to Mars:

A CD ROM from American MPC Research

When I first began Mission to Mars an eye pleasing page greeted me. Once I was in the program, the main screen came up. I wasn't impressed by the icon buttons across the top of the main menu. They could have been more detailed graphic choices. I did, however, like the automatic help bubble feature which captioned the icon whenever the mouse cursor rested on it. This feature is nice for people trying to figure out what the buttons mean.

There were some icons whose purpose seemed pointless, for example, the title page and table of contents icons. The main screen presents a Table of Contents automatically, and who needs to see the title page again after you're in the program? These icon buttons are unnecessary.

The Preface gives you a look at the content of the program. Another icon gives you a review of each chapter. I think that both these options are nice because you're able to get a quick summary and then a more detailed section on the different chapters. I noticed in the parts where there was written information, however, there were typos. It seemed there were excess spaces following a few words.

In the chapter review section there's an option for having text read aloud by a narrator. This is nice, but once the information is read, it should stop instead of repeating. I did like the feature where the information being read is highlighted while it is read.

A problem I saw was how the user gets back to the main menu. An icon button would make this an easier task.

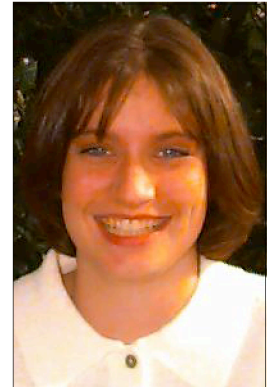
Two icon buttons lead you to the MPC Theater and to a Slide Show. Both are nice features to display the information, but they are very similar. By having both options it seems they are just space fillers.

After I finished using the program, there was an easy to find exit button. It sounds dumb, but anyone who has been in a program before without an easy exit will appreciate this feature.

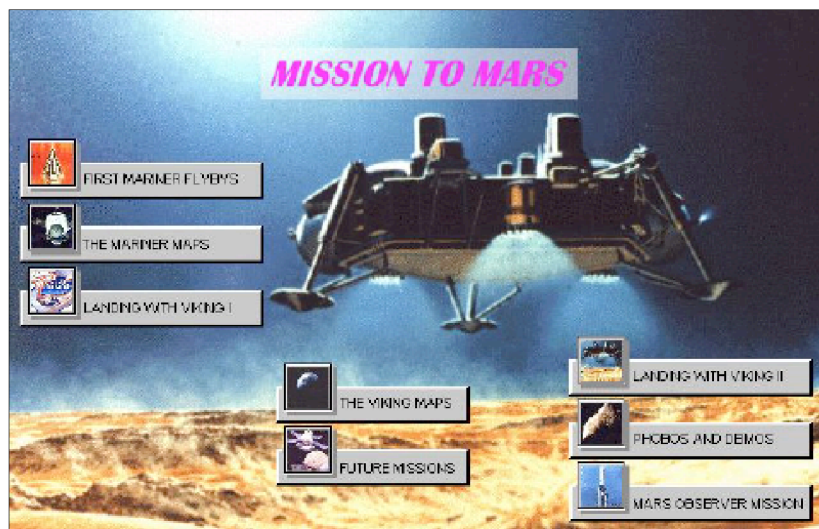
My biggest complaint has to do with the constant music playing. It gets extremely obnoxious after awhile. I could not find a way to turn it off within the program, so I had to go to my volume control for the computer and hit the mute button to stop the annoying, headache causing music. The music in the slide show background and in the theater background is okay, but the constant music will not make up for the other things the program lacks.

The information presented in the program is magnificent. It is easy to understand, and I believe it would be an excellent teaching guide. But a program is only as good as its presentation, and the few problems in this program keep it mediocre. With a few changes, however, it could be dynamite.

Contact American MPC Research, 9816 Alburton Avenue, Santa Fe Springs, CA 90670. Call 562 801 0108. See their Web site at <www.americanMPC.com>. The price of each CD in their catalog is \$12.95 including shipping. The CD is for Windows computers, but Mac users can still access all the pictures on the disk. At this price, it's really inexpensive clip art.



Elizabeth Spilman
Junior Intern
Craigmont Planetarium
Memphis, TN 38128-3902



HST's Greatest Hits of '96

Duncan Teague
 DT Publishing
 3308 Bluemont Drive
 Memphis, TN 38134-8454

The Space Telescope Science Institute (STScI) provides slides of Hubble images to individuals within regional affiliates who arrange to duplicate and distribute them. At our '96 conference, I was designated to receive and coordinate STScI materials and make them available to SEPA members.

Below you'll find a brief description of all 40 images distributed in 1996. Numbers next to the descriptions are shortened versions of STScI press release numbers, e.g., 21a refers to PR 96 21a.

The entire set of 40 slides is \$50, including postage and handling. Send your check or purchase order to the address at left.

- | | |
|--|---|
| <p>01.a Hubble's deepest ever view of the universe, revealing 1,500+ extremely faint galaxies in various stages of their development</p> <p>01.b Sample galaxies from the same Hubble deep field</p> <p>02 The inner region of a warped dust disk around Beta Pictoris once hidden because of the star's glare</p> <p>03 An image of the Egg Nebula taken by WFPC2; it shows the emergence of mysterious searchlight beams from behind a dying star</p> <p>04 The first direct image of a star other than the Sun: Betelgeuse.</p> <p>05 In more detail than has ever been seen before, the process a star like the Sun goes through when it dies</p> <p>09.a In clear, detailed pictures the first ever images of Pluto's surface; four views</p> <p>09.b Pluto surface map</p> <p>10 Gravitational lens effect captures image of primeval galaxy</p> <p>11 Images of globular cluster Mayall II, consisting of 300,000 old stars, in orbit around the Andromeda galaxy</p> <p>13.a The Helix Nebula, NGC 7293 showing collision of gases near a dying star</p> <p>13.b Helix Nebula detail with cometary knots surrounding the dying star</p> <p>14 A view of Comet Hyakutake that focuses on the near nucleus region of the comet</p> <p>15 Three layers of Uranus's atmosphere</p> | <p>taken with infrared filters; both clear and hazy layers created by a mixture of gases</p> <p>16 Image taken of Saturn where its rings appear edge on because of the position of the Earth in Saturn's orbital plane</p> <p>17 A view of several star generations found in the central region of the Whirlpool Galaxy</p> <p>18.a A rare view of Saturn's rings seen just after the Sun had set below the ring plane</p> <p>18.b A series of 10 images of several small moons orbiting Saturn</p> <p>21.a NGC 1365, a barred spiral galaxy located in the Fornax cluster</p> <p>21.b NGC 4639, a spiral galaxy located in the Virgo cluster</p> <p>22.a The Crab Nebula and a detail of the pulsar in its center</p> <p>22.b Sequence of three images showing changes in the Crab Nebula pulsar</p> <p>23.a Huge, billowing pair of gas and dust clouds in Eta Carinae</p> <p>23.b Expansion of Eta Carinae debris</p> <p>25 Hubble's 100,000th exposure captures an image of a distant quasar</p> <p>27 A vast nebula, NGC 604, which is known for a great starbirth region</p> <p>29.a 18 gigantic star clusters which may be building blocks for a new galaxy</p> <p>29.b Blue sub galactic clumps which may be galaxies under construction</p> <p>30 Jupiter's moon Io passing above turbulent clouds</p> <p>31 Clusters of stars and a fishhook shaped cloud of gases found in NGC2366, a giant star forming region</p> <p>32 Changes in Jupiter's auroral emissions</p> <p>33 Views of weather on opposite hemispheres of Neptune</p> <p>34 A Martian dust storm around the edge of the north polar cap</p> <p>35.a A survey of quasar host galaxies</p> <p>35.b A quasar caught in the act of colliding with its companion galaxy</p> <p>36.a Supersonic comet like objects in the Cartwheel Galaxy</p> <p>36.b Cartwheel Galaxy composite image</p> |
|--|---|

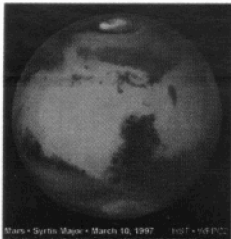
NASA/TSGC

Teachers Resource Distribution Center

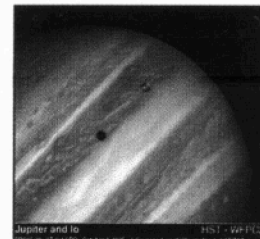


The University of Tennessee at Knoxville
Department of Physics and Astronomy
and The Planetary Geosciences Institute

Teaching space sciences, including astronomy and planetary explorations in class is now easier than ever before. Our center is dedicated to the task of providing the best and most current materials on these subjects. Videotapes, 35mm slides, audio tapes, lesson plans, computer software, study guides and a plethora of printed materials, all for you to duplicate and take back to your classroom to help you bring astronomy and space science alive. There is no cost to any educational institution because you use your own film and videotapes.

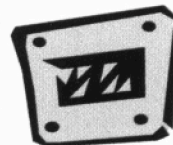


Audio Visuals



We have hundreds of hours of video from which to choose. Go on board the space shuttle for a lesson in space physics. Learn about living in space. See astronauts work in space retrieving and repairing satellites. Study the Earth's weather from space.

All of the beautiful Hubble Space Telescope slides are available for you to duplicate. See the moon through the eyes of the astronauts who walked on it. Investigate the craters on Mercury, the dried up riverbeds of Mars, the storms on Jupiter and the rings of Saturn. Complete slide sets are available on many topics including aeronautics.



Some of our slide sets come with audio cassettes for narration.

Select from tens of thousands of images from several laser disks to duplicate onto videotapes. Among the imagery are pictures of Earth from most of the space shuttle missions. Press release images from NASA from Mercury through the final flight of Challenger are also available.

