

# President's Message

Wow! If you attended this year's conference in Winston Salem, you know this was my reaction to our banquet speaker, JPL's Nagin Cox, immediately after her presentation. If you could not attend, you missed a great conference and a fabulous speaker. I said it then, I included it in a letter of thanks to Mrs. Cox, and I'll repeat it. What follows is part of the thank you letter I would like to share with you.

In all of my 30 years of observational astronomy and in my last 20 years as a professional educator, I've had an opportunity to meet many scientists, engineers, astronomers, educators, etc. None of these has come close to offering as entertaining, thought provoking, exciting, passionate, educational, and informative a presentation as you delivered. Seldom do you see such a long, standing ovation for such featured speakers. It is one presentation that I will never forget, and I am sure that many attendees feel the same.

Planetarians are very passionate about their work. This is the main reason we do what we do. We love to share our knowledge and experiences. Your passion for your job is what inspires us to do ours. We were all touched by your enthusiasm and the enthusiasm of JPL. It is our job to bring astronomy and space science to the public in a way that is understandable and exciting. You touched the lives of 90 professional educators and inspired us to continue in our efforts. I would also like to thank JPL for giving you the opportunity to speak to us and for their support of such public outreach endeavors. Keep up the good work! Happy flying!

Duke Johnson, Karen Osterer, and staff did a superb job in hosting this year's event. Everything, though in their eyes it might have appeared differently, went smoothly without any problems. They put together a conference that was educational, informative, and fun with a great field trip. I want to thank those who presented shows, gave papers, or conducted workshops. Your participation is what makes our organization strong, and it is a sign of your commitment. I would also like to thank Dr. Lee Shapiro and all the staff at Morehead for taking the time out of their

busy schedules to show us around their historical museum, planetarium, observatory and production facilities. The shows, as always, were excellent.

The banquet also featured the presentation of the Paul W. Campbell Fellowship Award. To qualify for this award an individual must have been a member of SEPA for at least ten years and must display qualities in five areas: integrity, friendship, service, knowledge, and vision. This year SEPA honored Dave Hostetter and Joe Hopkins with this distinguished award.

Dave has served on various SEPA committees and as President Elect, President, and Past President from 1987 1992; Southern Skies book review associate editor from 1988 1993; Louisiana liaison from 1989 1994; and editor of our journal's Featured Planetarium column from 1993 1999. Dave's perception and efficient communication skills make him an asset to our organization. Ask him for help, and you will get immediate action with professional quality with attention to the finest details. A recent shining example of his work and dedication is his assistance with the SEPA star show.

Joe has helped SEPA tremendously, pouring his heart and soul into it, especially during my fledgling years of the 1980s. His dedication in supporting conferences is commendable. He has provided countless hours of instruction in many professional areas, conducting many workshops and clinics. If you look at many of the 1980s journals, you'll see examples of his unselfish support. It is hard enough to get your daily work done, but Joe would crank out many columns that required in depth explanations and illustrations to compliment them. He has always been willing to exchange ideas and promote our profession. I've built many of his projects from the Gadget Box to which he continually contributed ideas. And who can forget his famous penned song Dead People Underneath the Dome? Congratula

(continued on page 46)

George Fleenor  
President  
Bishop Planetarium  
Bradenton, Florida



# IPS Report

John Hare  
IPS Representative

I'm now half way between Montreal and Atlanta returning from the IPS conference. Our hosts in Montreal were outstanding. About 300 delegates from every continent but Antarctica and a diverse array of vendors attended. IPS offers the usual fare of activities that can be experienced at a regional conference, but because of the large number of delegates and the international aspect, conferences are more complex.

We learned of exciting new facilities in Europe, Asia, and Australia; heard about astronomy education efforts in such far flung locations as South Africa, India, and Italy; attended panel discussions on the future of the planetarium, technical standards, maintenance, and more; saw some absolutely spectacular demonstrations of cutting edge technologies, including several all dome video systems and a slewing laser video projector; had opportunities to interact with old and new friends, and... well, you get the idea. These are just some of the compelling reasons why you should join and/ or participate in IPS.

SEPA was well represented by Jane and George Hastings, Ken Wilson, and Eric Melenbrink from Richmond; Carole Helper, Jim Greenhouse, and Phil Groce from Macon; Lee Shapiro from Chapel Hill; April Whitt, David Dundee, and Jonn Serrie from Atlanta; Todd Slisher from Memphis; Dave Manness and Ken Moore from Newport News; Jon Bell and Kelly Quinn from Fort Pierce; Arnold Pearlstein from Miami; Patrick McQuillen from Jacksonville; Joanne Young and Robinette McLeroy from Orlando; Dave Menke from Fort Lauderdale; Al Peche from Tampa; Kris McCall from Nashville; and John and Linda Hare from Bradenton.

Two SEPA members were awarded IPS's highest award, the Service Award. This prestigious award has been given only 14 times over the 30 years of IPS history. Jane Hastings was recognized for her long standing contributions, most notably her editing of Jane's Corner, which has appeared in every issue of *The Planetarian*. Yours truly, John Hare was recognized for

his efforts as IPS Historian as well as other contributions.

Proposals for the 2004 conference site were presented. Melbourne, Australia; Valencia, Spain; and Oakland, California are the three choices. The selection will be made by IPS Council at their next meeting in 2001. I'll furnish details in a future *Southern Skies*.

Begin planning for the IPS conference July 14-19, 2002 in Morelia, Mexico. Details will be forthcoming.

For IPS membership information please contact John Hare by e mail at

SEPA members John Hare and Jane Hastings display their IPS Service Awards at the recent conference in Montreal, Canada. Photo by Jack Durn



# Tired and Refreshed, Old and New, Closed and Open

The SEPA conference surprised me. I arrived in Winston Salem worn out, but I left North Carolina invigorated.

I ended the 1999-2000 academic year exhausted from three intense, time consuming projects that had to be completed during the last two weeks of May and the first week of June. I also spent the weekend before we left for the conference taking care of last minute obligations, loose ends, undotted Is and uncrossed Ts. I was tired when I got there, but I became rejuvenated by the activities of the five day get together at SciWorks.

During paper sessions I marvelled at the energy of my colleagues who work with at risk youth, engage in collaborations on ambitious projects, and who find alternative acceptable means to worthy ends. Time after time I saw friends who not only concentrated on what they did best but also dared to try something new.

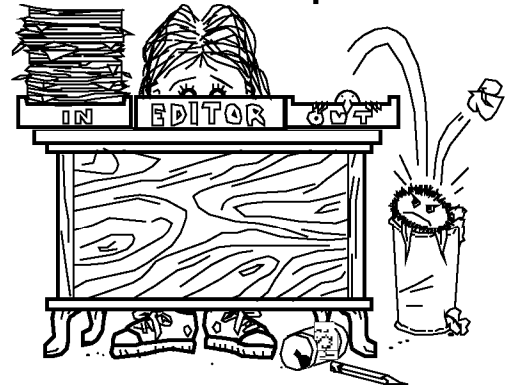
I was surprised to hear of so many job openings across our region, especially four positions available in Tennessee. The Friday before the conference I learned that

my co worker of ten years, Lisa DuFur, had accepted a position involving distance learning with the Shelby County Schools. Lisa was a breath of fresh air to the educational program at our facility. She was energetic, she loved to learn, and she showed me how to relate better to the younger patrons in our theatre. Lisa will be greatly missed.

Whenever one door closes, another opens. My new co worker is Donna Thomas, who moves from Craigmont Middle into our round, dark classroom. Donna is the West Tennessee Technology Panel representative and is pursuing her Master's Degree in Educational Technology from Walden University. Expect great things from her.

And expect great things from yourself.

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



Mike Cutrera

Send your \$25.00 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		

# Small Talk

Elizabeth Wasiluk  
Small Talk Editor  
Berkeley County Plan-  
etarium



Perhaps you remember my mentioning in my column last year that I attended the Ohio state planetarium meeting in Portsmouth, Ohio. West Virginia does not have a state meeting, and the people in etaria in Ohio extended an invitation tend their meeting last year at Bruce Zell's planetarium at Shawnee State iversity. I m not sure whether I just got n their mailing list or whether they extended another invitation, but I did get another invite to visit Ohio for a state meeting on April 29, 2000.

This time it was at the planetarium in Shaker Heights High School in Shaker Heights, Ohio, hosted by the ledgendarly Gene Zajac. Shaker Heights is near Cleveland and I had wanted to go to the GLPA meeting when it was held in Cleve land a few years back. My father lives in Cleveland, and I have not seen him since I was twelve. We ve exchanged Christmas cards, and I recently received a birthday card from him. He invited me to call him, should I ever be in Cleveland. As it turned out, we never got to connect, but I did have a terrific time at the Ohio State meeting.

Part of the reason I liked the Ohio meeting so much is that it was held in a high school planetarium, which is what my facility is. Regional conferences being what they are, they are just too big to be held in the normally smaller domes high school planetaria have. Not that Shaker Heights is small; it's much bigger than my facility.

It was great to see someone who does exactly what I do. Gene, like myself, teaches astronomy first period and runs the planetarium the rest of the day. So after a rather large spread for breakfast provided by Jeff Bowen Productions and a brief welcome, Gene talked about what he requires students do for a constellation presentation/ project. I was amazed at how similar it was to what I require my students to do. Basically it is a research project on the aspects of a single constellation, the mythology, bright stars and any deep sky objects, etc. Gene requires them to present the topic in class using anything they are familiar with such as Power Point, or just an artsy collage or poster. I ask my stu

dents to design a toilet paper tube viewer with aluminum foil on the end with holes poked in it so people can view through it. Later I keep them and distribute them to teachers in a workshop I call Astronomy with Cardboard Paper Tubes.

Gene Zajac is fortunate to have such interest and dedication among his staff. Here at Berkeley County Planetarium it is literally just me. If I am having a problem, I have to solve it myself. Gene introduced us to Joe Marencik and told us of the trials and tribulations of acquiring an old school bus from their school district and turned it into a travelling space simulation camp complete with computer workstations and experiments á la Challenger Center. He also told us how he and Gene put together a simulated lunar rover students got to roll all around the school until the battery pack wore out and they had to push it all the way back to school from the football field.

Also part of the talented crew is Kelly Jons. You may have read about him in Sky and Telescope magazine. He s a designer of some excellent telescopes. He put to gether a most useful list of telescope Web sites which I will reproduce for you here if you don t have time to browse or have access to a local astronomy club. Retired Cleveland area planetarian Bob Sledz had a lovely slide presentation on old 1952 trading cards. I had thought 1977 Star Wars cards were old!

Just before lunch, Clyde Simpson from the Cleveland Museum of Natural History made a presentation about sunspots.

Lunch was a sumptuous array of cold cuts, vegetable and fruit trays, and a variety of pies courtesy of Shaker Heights High School and a place called Country Delights from Chesterland, Ohio.

After lunch, the space bus mentioned earlier made an appearance as well as tele scopes of all sorts. A radio telescope a stu dent of Gene s built made an appearance with The Truth Is Out There emblazoned on it with a flat dish and struts of PCV tub ing on it. We also did some sungazing with the Gene s Sun Gun and the sunspotter I brought from my planetarium.

Jeff Bowen did a workshop about his



Astro FX a most useful planetarium tool. I wish I could afford one.

During lunch I got a chance to meet Jay Ryan of the cartoon Skywise in Sky & Telescope magazine. He did a lovely illustrated talk on a kids book he is trying to get together for publication.

International Planetarium Society president Dale Smith talked of his many travels and the upcoming 2001 conference with Arthur C. Clark in Sri Lanka. You can read all about it in the June Planetarian.

I did a talk on a pre school program I developed with a cookbook recipe to put together your own program.

David Hurd from the planetarium at Edinboro brought some of his famous Tactiles for the Planetarium used in teaching the visually limited. He had a hemispherical dome that contained raised stars participants could feel along with glow in the dark stars sighted people could see.

Chuck Bueter had more awesome devices made with paper plates.

Although we were suppose to be finished after the business meeting at 4:00 P.M., it was more like 7:00 P.M. when we got out of there. I stayed over and left Sunday afternoon, appropriately attending mass at St. Dominic before leaving. St. Dominic, in case you didn't know, is the patron saint of astronomers.

### Kelly Jons Favorite

#### Amateur Telescope Making (ATM)

##### Internet Sites:

##### Books, Journals, On Line ATMing:

- Amateur Telescope Makers Archive: <<http://www.system.missouri.edu/ics/staff/andy/ATM/searc.html>>
- Amateur Telescope Making Journal: <<http://www.atmjournals.com/>>
- Equipment Talk: <<http://www.weatherman.com/wxastrob.htm>>
- Frequently asked Questions: <<http://www.jacksonville.net/~deass/>>
- Mel Bartels: <<http://www.efn.org/~mbartels/>>
- Stellafane: <<http://www.stellafane.com/>>
- Sun Gun: <[http://america.net/~boo/html/sun\\_gun.html](http://america.net/~boo/html/sun_gun.html)>
- THE Telescope Review Website: <<http://www.scopereviews.com/>>
- Willmann Bell (books and supplies):

<<http://www.willbell.com/>>

- Yahoo: <[http://dir.yahoo.com/Science/Astronomy/Telescopes/Amateur/Telescope\\_Making/](http://dir.yahoo.com/Science/Astronomy/Telescopes/Amateur/Telescope_Making/)>

##### Telescope Parts:

- Astromart: <<http://www.astromart.com/>>
- Astronomy Mall: <<http://www.astronomy-mall.com/>>
- ATM's Resource List: <<http://www.freenet.tlh.fl.us/~blombard/>>
- Hollowood (wood tubing): <<http://www.brandnew.net/holwood.html>>

##### Inspirational Old Telescopes:

- Antique Telescope Society: <<http://www.tecs.com/OldScope/>>
- Leviathan Of Parsonstown: <<http://www.birrcastle.com/birr/astro/my/astframes.htm>>
- Yerkes Observatory: <<http://astro.uchicago.edu/yerkes/>>

A thousand pardons for leaving out Andrew Chaiken's name from the last Small Talk. He's the guy with the great book on the Apollo missions that was turned into a mini series on HBO with Tom Hanks. Andrew Chaiken is a regular commentator on <[space.com](http://space.com)>. Speaking about <[space.com](http://space.com)>, did you know Sally Ride is affiliated with it as well. I find them on a one stop shopping place on the Web to find out what is new in outer space. I highly recommend them.

I couldn't see everyone at SEPA this year, as I was at the Mason Dixon Star Party. I will also attend a workshop at Tufts University on the Chandra X ray telescope and take a graduate course at NASA Goddard.

Please note that our address becomes 109 Ridge Road North on July 1st.

# Digital Cosmos

## Orbital Origami



Erich Landstrom  
Digital Cosmos Editor  
South Florida  
Science Museum  
West Palm Beach, Florida

In the April 1990 issue of Sky and Telescope magazine, R. B. Minton of Littleton, Colorado scripted a BASIC program that facilitated three dimensional modeling of orbital elements. With the paper printout and a pair of scissors, you can create a quick and very inexpensive 3 D model of an orbit, plotting the path of planetoids and probes.

This program was brought to my attention by my assistant Kye Ewing. I had complained that all the renderings for Comet C/ 1999 S4 LINEAR on the Internet were just pictures, and what was needed was a depiction of the orbit beyond two dimensions. For the planetarium what was required was a model that showed the orbit of the Earth and how it related to the orbit of LINEAR, so that visitors could actually see how it went above the plane of the ecliptic, passed inside the orbit of the Earth to approach the Sun, and then dove back under on an orbit that would take millennium before we would see it again.

This Orbital Origami program did all that, so simply, beautifully, and frugally, that I immediately vowed to use it when ever possible. The results can be used in explaining how the Moon must be at new or full phases when crossing a node to cause an eclipse, how minor planets (as teroids) can have radically different orbits from inner planets, how meteor showers result when the Earth s orbit intersects the

trail of a comet tail, how spacecraft like Stardust and Ulysses pursue their own paths in space. For simplicity, I will just refer to comets here.

Designed to run on an IBM PC, the 100 line BASIC program asks for seven inputs. With the inputs, it can plot a face on orbit of the object and then the Earth on your video monitor. You may then print out a hard copy of each sheet, and follow three easy steps to success.

- (1) Cut out the paper versions of the Earth and comet orbits, and slice each one along the dotted lines.
- (2) Fit the two pieces together.
- (3) Swing the sheets apart to the angle of the comet s inclination.

Voilà! You ve got a model of a cometary orbit.

Admittedly, the paper model lacks great accuracy. The Earth is plotted as a simple circular orbit in the program, and plotting does not distinguish between leap years and common years. Gravitational influence of other bodies that may alter orbital elements is neglected, and a few comets follow slightly hyperbolic orbits eccentricity greater than 1.0 by the time they pass through the solar system. Crude, yes, but considering the cost in time and money, I ll take the rough approximation, thank you.

To function the program requires only seven elements: eccentricity ( $e$ ), perihelion distance, argument of perihelion ( $\omega$ , in degrees), longitude of ascending node ( $\Omega$ , in degrees), direct or retrograde direction, increment in days, and scale selection. The first five are determined by the comet s motion. The last two are plot display. Day increment creates tick marks; scale expresses in millimeters per astronomical unit. I find for comets with perihelion distance less than 1 AU a larger scale and a smaller day step better conceptualize peak viewing times on Earth, such as 40 mm per AU and 7 day steps. For better displacement of entire orbits for medium to long period comets (i.e., perihelion distances that exceed 10), punching in smaller scales and longer day steps is preferable, such as

10 mm and 30 day steps.

The program first displays the comet's orbit face on. A solid line extends from the Sun to the comet's perihelion point. A dotted line passing through the Sun represents the line of nodes (the point where the comet crosses the ecliptic plane). A line of finely spaced dots marks the descending node.

The program then displays the orbit of Earth, using the same scale value selected earlier (AU as mm). The start of each month is shown as a spoke on the wheel. A solid line or line of finely spaced dots marks the comet's ascending node. A coarse dotted line corresponds to the First Point of Aries, or 0° of ecliptic longitude. The Earth passes through this point, as seen from the Sun, about September 21<sup>st</sup> each year. Use this as your guide to writing in the months, proceeding from September to October, to November, and so on in a counterclockwise direction around the wheel of the year.

If you're satisfied with the scale and size of your comet's orbit with respect to Earth's orbit, print out a hard copy of both. You may want to capture the graphic on the screen and import the clipboard contents into a graphics program to massage the image before getting a hard copy. You will also want to print out on a heavier card stock or photocopy onto card stock if you're making more than one for classroom use.

Cut with scissors along the finely dotted lines of both (the ascending and descending nodes) and fit them together. The program always prints both the comet and the Earth as seen from above the ecliptic plane, that is, due north. To display the inclination of the ecliptic when fitting the orbits together, you may want to cut out a triangle of paper whose angle equals the given value for  $i$ .

From the input for direct or retrograde, you will be able to determine which direction the comet is moving. By convention, a comet's inclination is less than 90° for a direct, counterclockwise orbit. An inclination greater than 90° on the wedge implies retrograde motion in the direction opposite to that of the planets (or 180°  $i$  for a retrograde comet like Halley). Tape this wedge perpendicularly between the orbits. When this wedge is creased along its bisector, the model will fold flat for easier storage.

The program does not need to know the

date of perihelion ( $T_0$ ), but you should, if you want, label it. If, for example, LINEAR passes perihelion on July 26, you would label the comet's perihelion point and other marks according to the day step involved. If you used a 4 day step, label the marks in the direction of motion, July 30, August 3, and in the reverse direction July 22, July 18, and so on. Information to be gleaned from this is the approximate date when the Earth will pass through the plane of the comet's orbit. Dust and debris strewn along this plane may make the comet's tail appear brightest and most sharply defined around this time. It is also a good time to look for the anti tail, a sunward pointing spike caused by light reflecting off the debris left far behind in the comet's wake.

Data for comets can be found at the Comet Information and the International Comet Quarterly Website at <<http://cfa-www.harvard.edu/icq/icq.html>>. Just don't get so preoccupied with paper models you forget to go outside and look!

Name	Designation	e	q (a.u.)	$\omega$	node
Halley	1P/1982 U1	0.97	0.587	112°	59°
Hale Bopp	C/1995 O1	1.00	0.914	131°	282°
LINEAR	C/1999 S4	1.000086	0.765	151°	83°

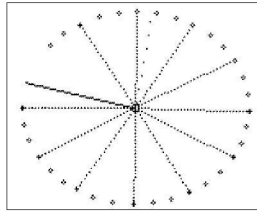
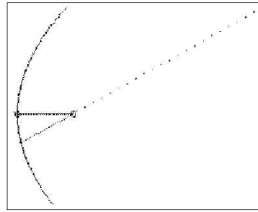
$e$  eccentricity, or shape of the orbit. Zero is a circle; all periodic comets have elliptical orbits with eccentricity between 0 and 1; A value of 1 would represent a parabola, as it appears to be the case with very long period comets; more than 1 indicates a hyperbolic orbit, in which a comet would be entering or escaping the solar system.

$q$  perihelion distance, least distance from the Sun. It measures in a.u. (Astronomical units, the average Earth-Sun distance)

node the longitude of the ascending node, angle from the March equinox point to the orbit's ascending node

$\omega$  the argument of perihelion, angle from the ascending node to the comet's perihelion. These give the comet's orientation. Node +  $\omega$  gives the longitude of perihelion important since if, for instance, perihelion is by the July part of the Earth's orbit, and the comet comes to perihelion in

## The BASIC Listing for Orbital Origami



July, it will be as close as it can be to Earth.

```

05 REM APRIL 1990 SKY AND TELE
SCOPE
10 REM MODEL A COMET ORBIT
11 F$- &HAAA : REM FINE DOTS
12 C$- &H1010 : REM COARSE DOTS
13 DR-3.14159265/ 180: K-.0172021
14 FC-1.575: LB-10: SD-360/ 365.25
15 SC-.82: REM ADJ FOR PRINTER
16 INPUT Eccentricity (e)? ;EC
17 IF EC>.99 THEN EC-1
18 INPUT Perihelion distance (q) ;QC:
REM PERIHELION DISTANCE
19 INPUT Argument of perihelion (w) ;W:
REM ARGUMENT OF PERIHELION
20 INPUT longitude of ascending Node
;OM:
21 INPUT (D)irect or (R)etro ;Q$
22 IF Q$- R THEN W-360 W
23 L-W+180: IF L>360 THEN L-L 360
24 INPUT Day increment (try 5 initially)
;ID
25 INPUT Scale (mm/ a.u.) (try 40 initially)
;MM
26 AU-MM FC: REM 1 A.U. in MM
27 AR-266 SD: OM-AR+OM
28 IF OM>360 THEN OM-OM 360
29 CLS: SCREEN 1: KEY OFF

30 REM MODEL THE COMET
31 IF EC<1 THEN FF-(1+EC)/(1 EC)
32 W0-3 K/(QC SQR(2 QC))
33 Q-QC AU: REM Q IN MM
34 X1-LB+Q: Y1-100: REM SUN LOCA
TION
35 CIRCLE (X1, X1), 2
36 F-0: GOSUB 77: REM PERIHELION
LINE
37 LINE (X1 Y1) (X3 Y3)
38 IF QC>.1 THEN CIRCLE (X3,Y3),2
39 FOR F-1 TO 359
40 IF EC-1 AND F-180 THEN 42
41 GOSUB 77: PSET (X3,Y3)
42 NEXT F
43 F- W: GOSUB 77

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44 LINE (X1,Y1) (X3,Y3),,VAL(C$)
45 F- L: GOSUB 77
46 LINE (X1,Y1) (X3,Y3),,VAL(F$)
47 FOR I-1 TO 5
48 T-I ID: IF EC-1 THEN GOSUB 92
49 IF EC<1 THEN GOSUB 84
50 GOSUB 77: CIRCLE (X3,Y3),2
51 F- F:GOSUB 77: CIRCLE (X3,Y3),2
52 NEXT I
53 PRINT COMET : Input Q$

54 REM MODEL THE EARTH
55 DIM T(12): REM START OF MONTHS
56 DATA 0, 31, 59, 90, 120, 151
57 DATA 181, 212, 243, 273, 304, 334
58 FOR I-1 to 12: READ T(I)
59 NEXT I
60 EC-0: Q-AU: X1-LB+Q: Y1-100
61 CLS: CIRCLE (X1,Y1),2
62 FOR I-1 TO 12
63 F-T(I) SD: GOSUB 77
64 LINE (X1,Y1) (X3,Y3),,VAL(F$)
65 CIRCLE (X3,Y3),1
66 F-(T(I)+10) SD: GOSUB 77
67 CIRCLE (X3,Y3),1
68 F-(T(I)+20) SD: GOSUB 77
69 CIRCLE (X3,Y3),1
70 NEXT I
71 F-AR: GOSUB 77: REM 1ST PT OF
ARIES
72 LINE (X1,Y1) (X3,Y3),,VAL(C$)
73 F-OM: GOSUB 77: REM ASCENDING
NODE
74 LINE (X1,Y1) (X3,Y3)
75 PRINT Earth : INPUT Q$
76 END

77 REM FIND POINT ALONG ORBIT

78 R-Q (1+EC)/(1+EC COS(F DR))
79 X-R COS(F DR): Y-R SIN(F DR)
80 X3-X1 X: Y3-Y1+SC Y: N-32000
81 IF SQR(X3 X3+Y3 Y3)<N THEN 83
82 X3-X3/ 10: Y3-Y3/ 10: GOTO 81
83 RETURN

84 REM ELLIPSE
85 M-T K/(QC/(1 QC))^1.5: E-M
86 DD-1 EC COS(E)
87 E1-E+(M+EC SIN(E) E)/DD
88 IF ABS(E1 E)<1/ 10000 THEN 90
89 E-E1: GOTO 86
90 F-2 ATN(SQR(FF) TAN(E1/ 2))/ DR
91 RETURN

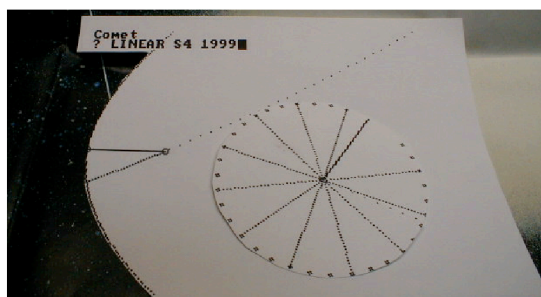
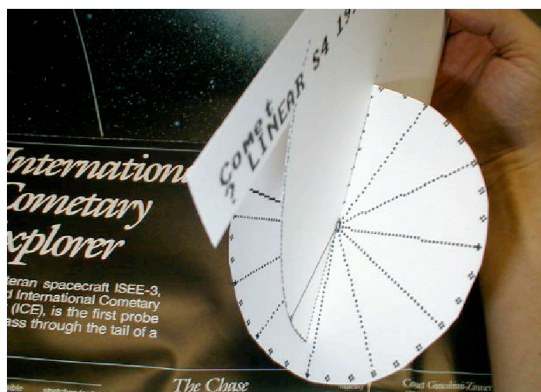
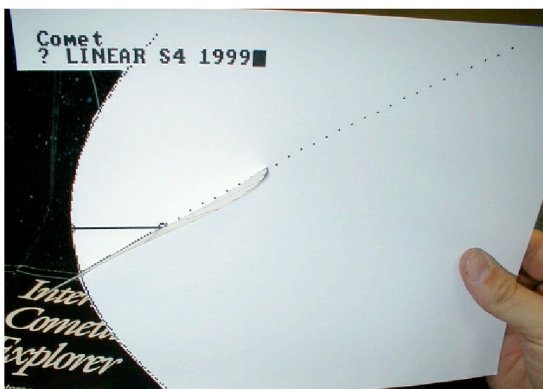
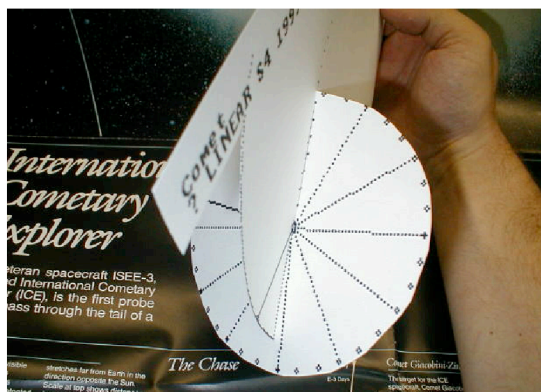
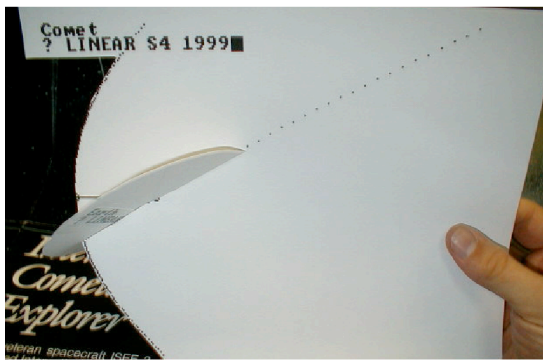
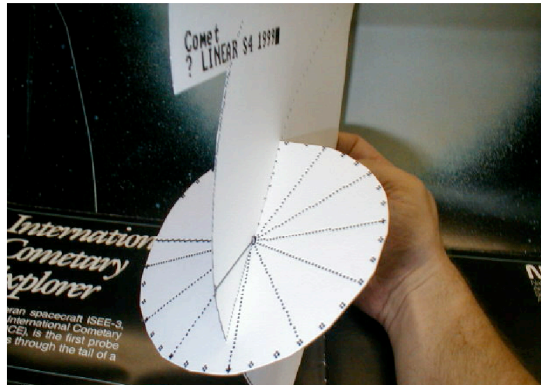
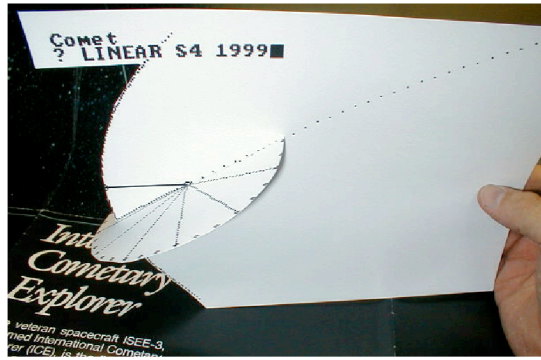
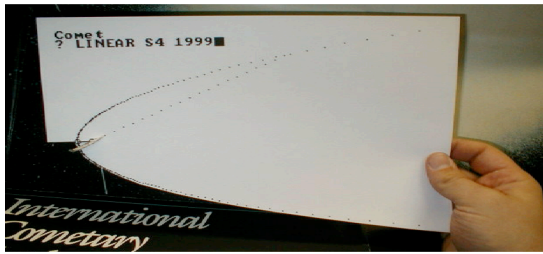
92 REM PARABOLA
93 W1-W0 T: S-0
94 S-(2 S S S+W1)/(3 (S S+1))
95 DE-S S S+3 S W1

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This series of digital photos by Erich Landstrom depicts the constructed model from different angles. It displays, better than two-dimensional diagrams, how the comet's orbit intersects the orbit of the Earth.

Orbital Origami  
continued



# Book Review

## Edwin Hubble: Mariner of the Nebulae

Patrick McQuillan  
Book Review Editor  
Alexander Brest  
Planetarium  
Jacksonville, Florida



If you were asked to name a 20<sup>th</sup> century astronomer, probably one of the first names that would come to mind is that of Edwin P. Hubble. Hubble is certainly one of the greatest astronomers of recent times.

He was the first astronomer to provide observational evidence supporting the idea that the universe is expanding. He confirmed the existence of other nebulae (now called galaxies) beyond our own Milky Way. He developed a scheme for classifying galaxies, and he provided the very first reliable evidence that the universe is homogeneous. Interestingly,

he did not like the word galaxy. He refused to refer to the nebulae that were great distances beyond our Milky Way galaxy as galaxies. Part of the reason for this was that a fellow astronomer coined the term, and Hubble was not very fond of him. The title of the book reflects Hubble's refusal to use the G word.

The author had access to all the letters and diaries of the Hubble family, and that is evident in the level of detail presented in the book.

If you are hoping to learn about the work in which Hubble engaged, this is not the book for you. You will not learn more astronomy by reading this book, but you will learn volumes about Hubble the person. In fact, the book has so much detail that you often feel as though you are getting a transcript of every dinner conversation Hubble ever had.

While this might sound incredibly boring, it is actually very fascinating.

Edwin Hubble and his wife Grace were very famous for their time. He was sort of the Carl Sagan of the 1920s and 1930s. Among his friends were practically every famous member of Hollywood and included Charlie Chaplin, the Marx Brothers, Anita Loos, Aldous and Maria Huxley, Walt Disney, Helen Hayes, William Randolph Hearst, and Albert Einstein.

I enjoy books that provide some insight into the person, not just the work of that person. Good ones usually have many anecdotes that can be used in planetarium programs that explain the astronomical work of the individual. This book is loaded with stories about Hubble, the man.

I'll bet you didn't know that Hubble was a star athlete in not one, but two sports in high school and college; was a coach for a short time; was a Rhodes Scholar; loved to fish; was in the military and almost saw action in WWI; helped design ballistics testing facilities during WWII that dramatically cut the cost of testing and mass producing new armament; and was an incurable Anglophile who enjoyed British dress and speech.

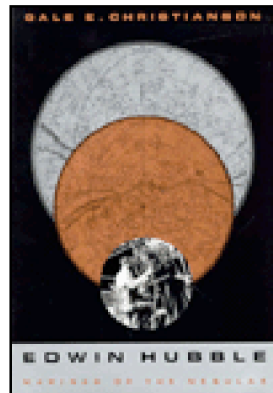
During his stint in charge of ballistics testing during WWII, he personally test fired over 100 bazookas to discover the design flaw that caused a soldier to get seriously injured.

Mr. Christianson has certainly done a fine job of portraying Edwin Hubble's exciting life. The access he had to the Hubble family's personal writings helped enormously. How else would Mr. Christianson have known that Edwin's two favorite books were King Solomon's Mines and The Hound of the Baskervilles?

This biography follows Edwin Hubble from the cradle to the grave, and I recommend that you consider adding it to your astronomy book collection. I'm sure you will refer back to it many times when you are looking for a neat fact or story about a great astronomer who for most visitors to the planetarium is just a space telescope that takes great pictures of the universe.

Edwin Hubble:  
Mariner of the Nebulae  
by Gale E. Christianson  
Farrar, Straus & Giroux, Incorporated  
Copyright June 1995  
420 pages  
ISBN 0-3741466-0-8

Reviewed by  
Patrick McQuillan



# Book Review

## Magnificent Universe

In a review of Ken Crowell's first book, *The Alchemy of the Heavens*, I mentioned that the only complaint I had was that there were not enough color pictures. I sent a copy of the review to Mr. Crowell. He wrote back, "If you want color pictures, check out my next book."

*Magnificent Universe* is the mother of all coffee table books—that is, if its mother happened to be the Universe. The entire book is filled with full color photographs of the most amazing sites in the Universe. I know that my comment had nothing to do with the creation of this book, but if Mr. Crowell had decided to create a work based solely on my complaint, this book would surely have been it.

The book itself is oversized (11 x 14 inches) and includes more than 100 photographs. Some of the photographs fill the entire page.

The book is divided into sections that take us farther out into the universe: The Planets, The Stars, The Galaxies, and The Universe. Most of the photographs you have seen before, probably many times. But it is nice to spread the book out on a table and just enjoy the beauty of the Universe.

This is not just a pretty picture book. The book has information about each of the objects in the photos. The information is organized very well. You could learn a lot of basic astronomy just by reading the book from front to back.

Most of the information sections are short and concise—just what you want when the purpose of the book is to show off the photos. The short text is quick to read, and it leaves more space for the pictures.

The only complaint I had with the book had to do not with the content, but with the layout. There are several places where the text for one picture runs onto the next page. Often several paragraphs are not on the same page (or a facing page) as the object they are describing or explaining. It was kind of frustrating to have to flip back to see the picture again. It would have been nice if some choice had been made early on in the layout phase that forced photos and text relating to the photo to be on the same page or facing pages. The text could

have been on more than one page, but it would have been nice to have a photo on both pages.

Since the book is oversized, I read it by spreading it out on the table and not by holding it. Thus for the entire section on the Sun, I was glancing over at the photograph of Mercury. One paragraph about Mercury was on the page facing the Mercury photo and the rest was on the page with Venus pictures.

The same problem occurred with the Venus information. I was staring at the Earth, while reading about Venus—a minor complaint, but I kept losing my place as I flipped back and forth.

Someone had decided early on in the layout process that every picture in the book would be shown on an entire page. This is great. It provides a book with large pictures that make the photos even more impressive. It also led to my earlier complaint about the text.

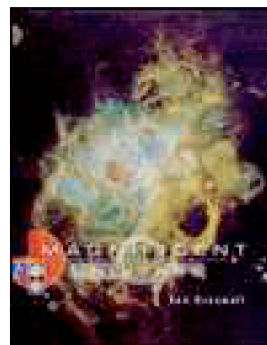
I would highly recommend this book to you if you have a table with some clear space on which to spread an open book—a rare commodity in most planetariums' offices and homes. This is one book that you probably will not rush over to reread or search for facts needed for that new script. But, when you get a few moments to relax, it is a great book to browse through and to reflect on the incredible beauty of the Universe we inhabit.

Patrick McQuillan  
Book Review Editor  
Alexander Brest  
Planetarium  
Jacksonville, Florida



*Magnificent Universe*  
by Ken Crowell  
Simon & Schuster  
Copyright September 1999  
210 pages  
ISBN 0-6848459-4-6  
\$48.00

Reviewed by  
Patrick McQuillan





# Book Review

## The Return

Patrick McQuillan  
Book Review Editor  
Alexander Brest  
Planetarium  
Jacksonville, Florida



The Return  
by Buzz Aldrin  
and John Barnes  
Tom Doherty Associates,  
LLC  
Copyright May 2000  
358 pages  
\$25.95  
(\$18.50 at <amazon.com>)

Reviewed by

The Return covers techno thriller territory familiar to readers of *Encounter with Tiber*. Many of the same elements are in both hard science fiction novels: a family involved for generations in spaceflight, a divorced couple driven apart by the demands of aeronautics, a disaster aboard an American space shuttle, an emergency on an orbiting outpost, and some bad guy communists. Some ideas are identical: realistic rocketry, an evaluation and a projection of the next decade of human exploration, ShareSpace as an advocate for civilian space travel, and the

struggle for the soul of the space program. Some plot devices are new: a courtroom drama, an international nuclear incident, and covert operations.

The result is something of a storytelling salad—a little of everything is thrown into the bowl, and it's all good for you. After a slow start, *The Return* becomes a quick, exciting read, with technical details explained in simple terms and characters given human dimensions. Unlike *Tiber*, which literally spanned time and space in first person narratives, *The Return* follows a more constrained literary approach. Only three narrators are used, childhood friends who have drifted apart and reunite as adults.

As a result the overall scope of *Return* is less grand than *Tiber* but certainly more readable. Aldrin is at his best with the details of the space exploration business, the lift capabilities, PR coups, long hours, exhilaration, and exhaustion. Barnes does an outstanding job in taking Aldrin's space strategies and spinning them into the story, around the high cost of machines and the higher costs to men and women as marriages fail and friendships are sacrificed. The authors are unique in their qualifications to comment on the current

state of the space program and to speculate with fictional events on what politics or profit margins will be prophetic.

There have been crises large and small to test the confidence and commitment to an American space program: the Apollo 1 fire; the Apollo 13 successful failure; the Challenger explosion; the troubles of the Hubble Space Telescope; the problematic space stations Skylab, Mir, and ISS; and the disappearance of the Mars probes. These historical hardships lend credence to the reaction surrounding the untimely tragedy in chapter two of *The Return*—the death of basketball superstar MJ in orbit. Our protagonist, former astronaut Scott Blackstone and CEO of ShareSpace, is set up to take the blame. In short order, Scott is fired and sued by MJ's mother for \$1 billion, while a nation grieves a slain celebrity and debates the risks of the conquest of space.

The Citizen Observer program was to bring Americans from all walks of life along on selected shuttle missions, so that schoolteachers, shop mechanics, and newscasters who dreamed of flying could go where senators, Saudi princes, and Scott Blackstone have been. There are those who do not want it to succeed for a variety of reasons: some sinister, some short sighted.

When no legal eagles will mount a defense for Scott, his older brother Nick pulls strings at aerospace company Republic Wright to dig deeper lest the well get poisoned for any rocket builder. This brings Nick back into contact with his childhood clique of Eddie Killeret, now at competitor Curtiss Aerospace, and Scott's ex wife, attorney Thalia Thally Pendergast.

Scott, Nick, Thally, and Eddie are preteen pals who dubbed themselves the Mars Four, vowing to get to the red planet by the year 2019. Nick hires Thalia to represent Scott and works surreptitiously to reunite the couple as a family with their ten year old son, Amos. The family's safety is threatened by anonymous threats, mourners, sabotage, and security breaches.

When a preliminary NASA report would acquit Scott, a cover up begins that culminates with a communist Chinese conspir



acy detonating a proton bomb. The bomb unleashes enough hard radiation to fry every satellite in low earth orbit, including the International Space Station. A daring rescue mission by the Mars Four would not only save the ISS astronauts, but also an aggressive space program, and American idealism itself. The Return concludes on a note of hope for a return to Apollo era fervor space exploration.

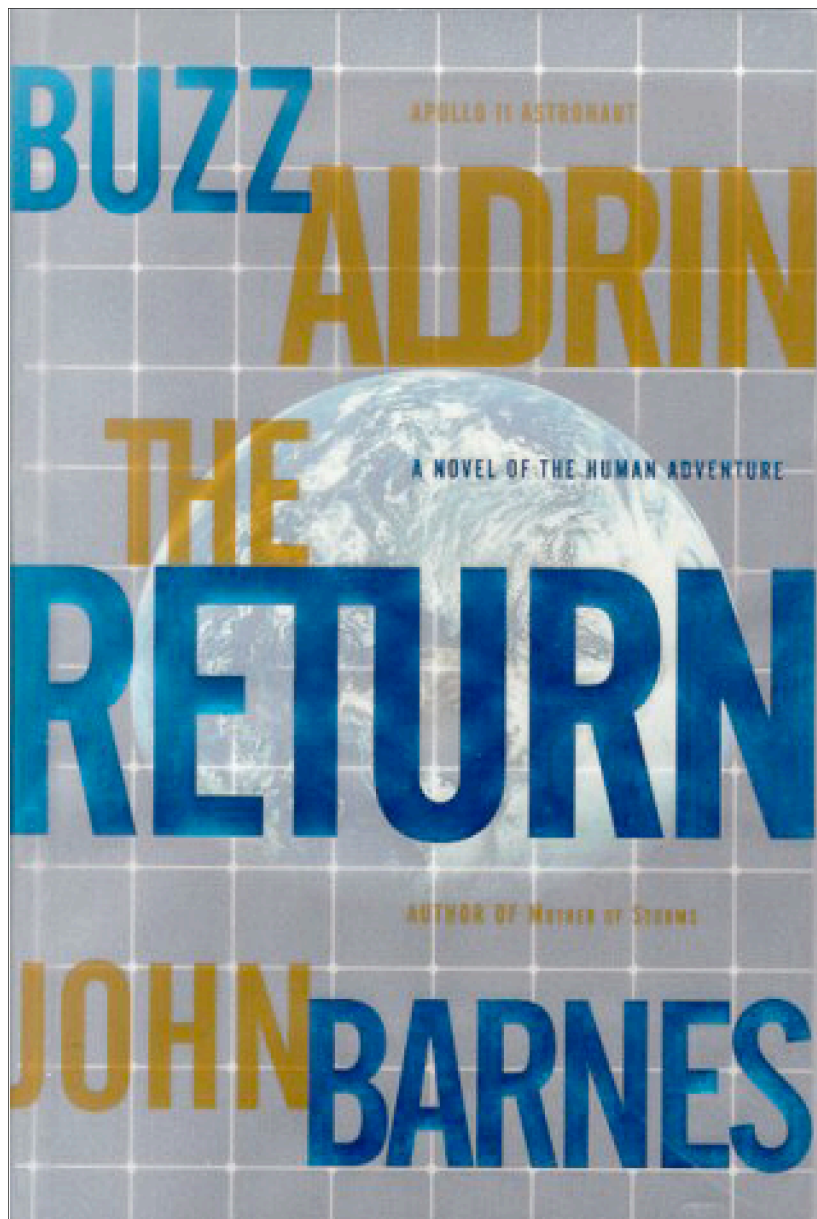
Buzz Aldrin is not just any astronaut. On July 20, 1969, he made human history when he and his crewmate Neil Armstrong became the first two people ever to walk on the Moon. The events of Buzz's life before and since place him in a league of his own.

In 1951, he graduated from West Point with honors. He flew 66 missions during the Korean War, shooting down two Russian MIG 15 fighters. In October 1963 Buzz was selected by NASA as one of the early astronauts. In November 1966 he established a new record for extra vehicular activity in space on the Gemini XII mission. He has logged 4,500 hours of flying time, 290 of which were in space, including eight hours of EVA. As backup command module pilot for Apollo 8, humanity's first flight around the Moon, Buzz significantly improved techniques for astronomical navigation star display.

He holds a Ph.D. in astronautics from the Massachusetts Institute of Technology. The techniques he devised were used on all NASA missions, including the first space docking with the Russian cosmonauts. To advance his lifelong commitment to ven-

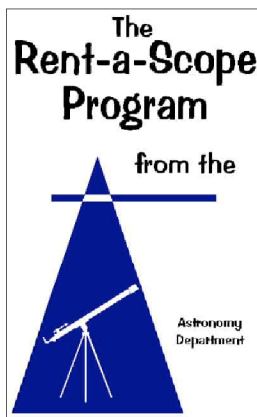
turing outward in space, he has created a master plan of evolving missions for sustained exploration utilizing his concept, The Cyler, a spacecraft system which makes perpetual orbits between Earth and Mars, and in 1993 he received a patent for a permanent space station he designed. Aldrin heads Starcraft Enterprises, where he pursues and discusses the latest ideas for exploring the universe.

Aldrin is a chair of the National Space Society and the ShareSpace Foundation and is on the editorial advisory board for Astronomy magazine. He has authored Men from Space (1989) and, with John Barnes, sci fi novel Encounter with Tiber (1996). He currently resides in Los Angeles. John Barnes is the award winning author of Orbital Resonance, A Million Open Doors, Mother of Storms, and many other



# The Rent-a-Scope Program at the Virginia Living Museum

by David Maness  
Director of Astronomy  
Virginia Living Museum  
Newport News, Virginia



You may have thought of renting telescopes but for various reasons put the idea aside. I had never heard of it before and naively believed renting out telescopes was an original idea. I was pleased that I had come up with something entirely new. The warm fuzzies didn't last long, as I soon found out that other institutions have tried it in the past with varying success, and some may still have a program like this in operation. I will relate to you how the program came to be and how it works for us.

The idea came about partly out of a bad habit. I accumulate things. I will accept almost anything someone wants to donate. My stash includes old Astronomy and Sky and Telescope magazines, old audiovisual electronics, toys, models, books, and a handful of telescopes. I thought I might find a use for the scopes in observational astronomy programs. Our limited space began to fill with scopes of various ages and wear. There were two fairly new Celestrons. One is a 3.1 refractor; the other, a 5 1/2 reflector. One has an alt azimuth mount; the other, German equatorial.

While on a trip to Florida, visiting other planetaria along the way, my trek took me to the Orlando Science Center. They have a fine facility and a nice observatory close to the downtown area of the city. As we made our way up to the observatory, we passed

by what looked like a used car lot, but for telescopes. My guide, Paul Trembly, told me they were part of a try before you buy program. If you could imagine a cartoon of me at that moment, you would have seen a big dollar sign flash above my head and the sound of a cash register going cha-ching.

When I returned from the trip, I formulated the idea of renting telescopes to the public. I tried to reach the folks in Orlando to learn more about their program but got no response. I should have asked the questions while I was there, but being on vacation and easily distracted by all the neat things to see, I didn't. We were on our own.

In talking with my staff, we decided what was needed to get the program off the ground. We needed a flier to advertise the program, and we needed a booklet with instructions for telescope set up, use, and care, as well as various information concerning interesting things to view.

In the booklet is a letter of introduction to the Rent a Scope program. The renter takes this guide booklet with the telescope as a handy reference. We needed a form with a statement leaving us blameless for any harm done by the use or misuse of the equipment, filled out and signed by the renter at the time of rental. We decided to photocopy the renter's driver's license

and write down their address and credit card number as security, in case the scope came back damaged or didn't come back at all. We put this at the bottom of the form. This part is given back to the renter when the scope is returned in good shape.

When I felt we were ready to make a go of it, we placed the fliers at the planetarium entrance. After a few inquiries

## Why Rent-a-Scope? Package Deal

Here are just a few reasons why you might want to rent a telescope!

- \* Family camping trip!
- \* Thinking of buying a telescope? Test drive one first!
- \* Special celestial events!
- \* Family get-togethers!
- \* Just for fun!



Your rental telescope will include:

- A 3 - 6 inch telescope (either reflecting or refracting)
- At least one medium range eyepiece
- An appropriate mount
- A finder scope
- Solar filter available with some kits
- Set up instruction sheet and parts list
- Tips on using the telescope and objects to look for

and a few weeks, we had our first reservation. (Scopes are rented on a first come, first served basis.)

The rental went forward without problems. The same gentleman rented two more times. This is how it works: a person calls to inquire about available scopes. We find out what type of scope they want and for what night or nights and check the calendar for availability. If one is available, we record the dates on a master calendar. The person comes to pick up the scope and gets a primer on set up, care, and use, stressing safety issues. When the scope is returned, we examine it for wear, damage, or missing parts. Our rental fee is \$5.00 per night. If all is in order we take the cash, check, or credit card for payment and send the customer happily on their way.

Problems have been few and minor. A scope was returned with a bent accessory tray. A few people cancelled because of weather. One customer wasn't made sufficiently familiar with the reflecting scope (with a cover over the aiming end) and tried to unscrew the mirror end. After he heard the nut drop into the scope, he stopped the procedure and gave us a call. A little common sense saved some repair on that scope. Another noted that we failed to tell her the telescope view would be upside down and reversed. We have since included a note to that effect in the information package.

I thought of subtling this article for fun and profit, but it turned out to be not very much profit. To date we have had 40 nights of rentals and have made a total of \$200, so there isn't much profit involved at this stage. In fact some think we are undervaluing the rental. That may be true. We need to figure in the cost of time to administer the

program.

Since this is just starting out, we needed to pick a price that seems a bargain. If we find that demand goes up, then the price can rise to meet the demand for the scopes.

People are generally pleased to be able to rent a scope. We've found they often do this when having visitors or there is an interesting sky event to view. It sure beats the cost of a new scope. I plan to approach local telescope dealers to see if they would like to sponsor the program for a donation. In return, we will add a note of thanks mentioning their business on our fliers.

All I can do is tell you how our experience has been. It may look like something you want to start up at your facility. If you need more details about our experiences,

Rent-a-Scope Program  
continued

# How Much?

Telescope rental cost is \$5 per day -  
much cheaper than buying your own!

## And Now, The Fine Print...

All individuals renting a telescope must be over the age of 18, and sign a statement releasing the Virginia Living Museum from responsibility for damages to persons or property incurred through the use or misuse of the telescope and its accessories. Additionally, renters must have a valid credit card which the Museum will imprint. In the event that the telescope is not returned (or is returned with pieces missing or broken), the renter agrees that the Museum shall have permission to purchase replacement items on the renter's account. Telescopes are rented on a first-come, first-served basis. Reservations are accepted.

**Reserve your scope today!**  
**Call 595-1900 X 31**

# Sample Rent-A-Scope Agreement

---

Renter: Please read the agreement carefully. Carefully print all of the information requested.

Name: \_\_\_\_\_ (hereafter called The Renter)

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone: Daytime \_\_\_\_\_ Evening \_\_\_\_\_

The Renter agrees to pay Virginia Living Museum the sum of \$5.00 per day for rental and use of a telescope package. A set of instructions regarding the proper use and care of the instrument is included in the telescope package. The Renter agrees to hold Virginia Living Museum and its employees harmless for any damage caused to either persons or property through use or misuse of the telescope and its accessories. The Renter agrees to allow the Virginia Living Museum to make an imprint of a valid credit card at the time of the rental. In the event that the telescope and/or its accessories are not returned by the specified date or are damaged while in The Renter's care, the Museum will charge replacement materials to The Renter's account.

By my signature below, I assert that I am over the age of 18 and agree to all the terms and specifications stated above.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

(To be completed by Virginia Living Museum staff)

Rental period: \_\_\_\_\_ to \_\_\_\_\_

Total days of rental (inclusive): \_\_\_\_\_

\_\_\_\_\_

Amount due at pickup: \_\_\_\_\_

\_\_\_\_\_

Telescope Package Number: \_\_\_\_\_

\_\_\_\_\_

Credit Card: ( ) VISA ( ) MasterCard ( ) Discover ( ) AMEX

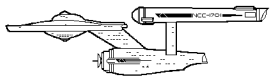
Number: \_\_\_\_\_

\_\_\_\_\_



Expiration Date: \_\_\_\_\_  
\_\_\_\_\_

Rent-a-Scope Program  
continued



Kelly Quirn  
(recently of)  
Hallstrom Planetarium  
Fort Pierce, Florida

(now at the)  
Bishop Planetarium  
Bradenton, Florida)

# Boldly Go!—The Science of Star Trek

**Boldly Go!** The Science of Star Trek, the planetarium program created by Jon U. Bell of Indian River Community College's Hallstrom Planetarium and Erich Landstrom of the Buzz Aldrin Planetarium, presents some unique challenges and opportunities for show presentation. When you're dealing with complex subjects such as the possibility of extraterrestrial life, matter teleportation, and faster than light travel, the possibilities are endless, the variables are innumerable, and the underlying scientific theories are elaborate.

When Jon and Erich invited me to join in their discussions about the direction their new project was taking and to read a rough draft of the script, I was not sure exactly what to expect. (Anything is possible when you get a couple of very enthusiastic Trekkies—ahem, Jon says the proper term is Trekkers—who also happen to be planetarians together!) After I reviewed the script and sat in with the authors on a read-through of the program, the project began to take shape for me.

Jon took the lead with Indian River Community College's Distance Learning (i.e., video production) Department, props began filling the nooks and crannies of Hallstrom Planetarium, work was begun on the soundtrack, and we began the process of storyboarding. It was clear from the beginning that original video was going to play a large part in conveying Jon's and Erich's vision to the audience; several segments of the program, however, cried out for the imaginative use of other planetarium systems.

During one portion of the program, our heroes contemplate various routes the starship Voyager might take to get back to the Alpha Quadrant:

**Jon:**  
I said, maybe we should play a little game here, called, 'Let's get the starship Voyager back to the Alpha Quadrant.'

**Erich:**  
Sounds like fun. Guess we ought to plot a course for them, huh?

**Jon:**  
Exactly. Now if they're in the unnamed

arm here, they probably ought to confine themselves to traveling through the galactic disc, instead of arcing up and over, or down and under.

**Star Trek Exec:**  
Why is that?

**Jon:**  
Well, they're probably going to want to get lots of supplies and meet a lot of alien folks who could help them along the way. If they go above or below the galactic disc, they won't find anywhere near the number of stars and planets that they could encounter in one of the spiral arms.

**Erich:**  
Although they would have some perfectly splendid views of globular star clusters, ancient collections of stars that permeate the galactic halo, a great spherical area surrounding our galaxy's disc.

IRCC's student computer graphics designer Alex Stein created an image of a Voyager-like starship that was superimposed over a panoramic view of the Milky Way projected along the spring line of our dome. The Spitz 512's star field provided a backdrop, the full dome allsky system contributed a halo of globular clusters, and the Sky Scan laser disc library contributed a zoom in to M13. The combination of all these different media and projection systems provided audiences with the unique experience of coasting above the galactic plane along with the Voyager.

Not only did we want to take our audiences along for the ride, we wanted to impart a better understanding of a few of the complex theories behind some of the science of Star Trek. During the final segment of *Boldly Go*, Jon and Erich find themselves in Quark's Bar on Deep Space Nine, just outside the Bajoran wormhole. After asserting the theoretical nature of wormholes (actually Einstein-Rosen Bridges), Jon and Erich attempt to explain to Quark why faster than light travel might be desirable and how it might be possible. An innovative use of root beer played an important part in this discussion:

Quark:

What do you mean bubbles? Like the bubbles in a carbonated beverage, such as that loathsome, sickeningly sweet concoction you Humons love so much. What's it called? Tuber something?

Erich:

Root beer.

Jon:

The idea is similar. Here on the station, as a bubble of gas moves upward through a liquid, the bubble travels much faster than the surrounding fluid does. Inside the bubble, all the laws of pressure are obeyed. Outside the bubble, all the laws of viscosity are obeyed. But between the bubble and the drink, the pocket of gas zips along. Not warp speed, but you get the idea, okay?

Quark:

I think so...

Jon:

A physicist named Miguel Alcubierre was able to demonstrate that it was possible to tailor a space time configuration wherein a spacecraft could travel at warp speed. When a starship like the Enterprise or Voyager goes into warp, it forms a warp bubble around itself, sealing itself off from the rest of the Universe. Inside the bubble, the space behind expands by a huge amount, so the star base left a few minutes ago is now many light years away. Ahead, space contracts or is compressed so the colony you are racing towards is now suddenly much closer to you.

After an introduction like that, it should come as no surprise that our audiences were treated to that classic Star Trek scene where the starship Enterprise crosses the star field and zooms off.

Quark:

Through space! Not around. Not across. Right through!

Erich:

Right! That hole into the fourth dimension is what we call a wormhole in space time. We are opening up a portal in two different areas of space, but they are connected to each by a straight line. It doesn't matter how many miles, kilometers, light years,

or parsecs lie between one end of the wormhole and the other.

ASH Enterprise's Warp Drive projector helped make the Enterprise convincingly zoom off into the star field.

Unlike most Star Trek episodes, Boldly Go does not have a happy ending for our heroes:

Jon (enthusiastically):

And finally, when we leave the space station, there are tribbles everywhere!

Star Trek Exec:

You mean those little furry things that make those cute purring noises.

Erich:

Yes, that's the ending. What do you think?

Star Trek Exec:

Hmmn. Don't like it. Don't like any of it. Get outta here.

The door to the Star Trek executive's office swooshes open à la the Enterprise turbolift doors, and Jon and Erich find themselves unceremoniously escorted out by armed Klingons.

Jon:

Space Rats! It's all my fault. I forgot that Klingons hate tribbles. But then, who knew they had a Klingon in charge of their script writing department?

Erich (dejectedly):

So that's that. Now what do we do?

Jon:

Well, we can always turn it into a planetarium show.

Both:

Naahh.

Or does it? I'll leave that question open for your interpretation.

By the way, I was the Klingon Star Trek executive. Jon told you about Indian River Community College's fine cosmetology (not to be confused with cosmology) program and the excellent job they did transforming humans into alien life forms. What he might not have mentioned is the effect that being transformed into a Klingon has on your personality.

Boldly Go!  
continued

The process of being made up is not quick and easy; it takes a couple of hours, many layers of face paint, goopy, smelly latex glue, a wax putty nose and cheek bridges, a glued on headpiece, bobby pinned wig, plastic teeth, and a complete attitude adjustment. Suddenly you look in the mirror and see an alien looking back at you. Yikes!

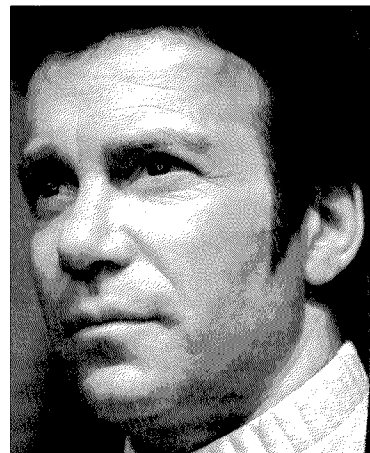
Walking across campus from Cosmetology to Video Production was a lesson in cross species relations. Suddenly, you're Klingon. Everyone else is a lowly P'tachk.

The videotaping passes far too quickly. Just when you are really starting to snarl like a true Klingon, it is time to attempt to wash off the makeup, wax, and latex glue. Back to reality. But, if you're lucky, a little bit of that Klingon blood still flows through your veins, and you serve ghak to your children for dinner on Klingon holidays.

After all the effort we put into creating a complete program, we got the opportunity to present Boldly Go to our first audience on February 18, 2000. Opening night was the usual rush of last minute checks, forgotten details, and anticipation of the audience reaction. Jon and I greeted patrons of Hallstrom Planetarium in original Star Trek uniforms—the better to prepare them for the mission ahead. Jon, dressed appropriately in the red shirt of engineering, held court behind the planetarium console, which many patrons mistook for a mock up of an Enterprise transporter console. I wore gold for command, and for a brief time, I outranked him, until Jon's wife Lisa added another set of gold braids to his sleeve.

We presented the program 22 times to a variety of audiences: patrons from the general public, an Indian River Community College faculty viewing, and even a couple of local school groups. Many audience mem-

bers responded to the program with great enthusiasm. Some were confused by the science concepts. A few were not familiar with Star Trek.



Three responded with consternation. They left in the middle of the star show.

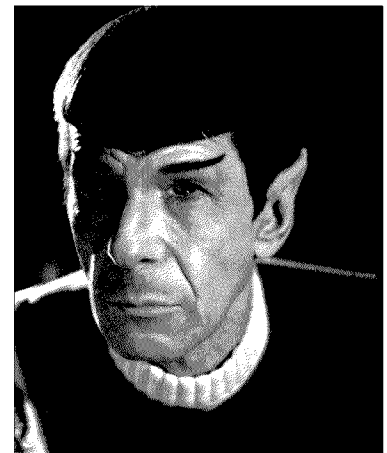
Co writer Erich Landstrom and his wife, Heather, attended four of our public performances to enjoy the fruit of all that time and attention to detail. Boldly Go was a fun program to present. It was a chance to pass along Mr. Spock's wisdom—Live long and prosper. It was a chance to thank people for beaming aboard and a chance for Jon and Erich to fulfill childhood fantasies of becoming Captain Kirk and Captain Picard.

As an extra component to Boldly Go we used a display case next to the entrance to the planetarium to showcase Star Trek memorabilia: props from our video segments, costumes, wigs, and headpieces backed by a schematic of the Milky Way galaxy.

The nine week Star Trek display generated a lot of interest in our efforts inside the planetarium. Indian River Community College's 40<sup>th</sup> Anniversary celebration and open house fell during that period, so our record crowd of over 640 visitors to the planetarium were treated to a live tour of the sky and a sneak peek at Boldly Go.

Our exhibit proved to be so popular that it's becoming a tradition at Hallstrom Planetarium. Following Boldly Go, we presented Bear Tales and Other Grizzly Stories as our spring public offering. Bear Tales takes place on a family camping trip, so we built our display theme around camping. We included a plethora of useful tips for naked eye and binocular observing, and we added a campfire and snacks of s'mores, complete with marshmallows, for our guests to feast their eyes on.

Boldly Go gave us a chance to work with a very talented crew, to explore new avenues for reaching out to our audience, and to ignite that flame of interest and enthusiasm. It was a rewarding mission for everyone involved, and it renewed our desire to boldly go on our continuing quest of reaching out to





# First Look:

## A First Time Attendee's Experience at SEPA 2000

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It seems like a just reward to complete my first year as director of the Robeson Planetarium in Lumberton, North Carolina by attending the SEPA 2000 conference. I first heard of SEPA in April 1999 in a conversation with my mentor, Dr. Smith T. Powell, under whom I worked as an undergraduate Physics Education major at Berea College. He strongly encouraged me to attend last year's conference in Jacksonville. Although I wanted to attend, I was in the middle of packing and moving 500 miles from Kentucky, where I previously taught high school physics and physical science. As soon as I started that July, I began to lay the groundwork for attending this year's meeting.

I am very fortunate to have had several people who prepared me for what was to come at the conference. While rebuilding our Spitz A3P in February, John Hare and Richard McColman filled me in on their past conference experiences. John Frantz and Drew Foster from ECCS continued my education in April as they did renovations to other equipment. By the time I arrived at SciWorks, I knew all about Woodchuck, George Fleenor, and the relaxed, open atmosphere of the conference.

Just in case, I arrived at the hotel in my shirt and tie, fearful of committing a grave social faux pas. I checked in, changed clothes, put on my name tag, and ran over to the reception for first time attendees. My wife and I felt very welcomed by Dennis Cowles, Carole Helper, and the others in the room. By the time the laser show finished, I knew the week was going to be a special experience.

Several things about the week made strong impressions upon me. As trite as it may seem, I was relieved that everyone continued to wear their name tags throughout the week. It served two purposes: 1., to help everyone remember others' names and 2., to let me know that people wanted to communicate.

It was wonderful to finally put some faces with many of the names I knew from Dome L. The warm collaborative atmosphere so evident in SEPA was genuine and should never be taken for granted. The conversations in which I participated

were golden. From learning more about how to use high school students effectively as console operators to asking for an illustrator's point of view on planetarium production, I listened carefully and learned many things, bringing home several ideas for things I want to try.

SEPA was also my first experience with StarLab, my first laser show, and my first Woodchuck. I finally learned how to build a Moon scale, and I enjoyed a brief introduction to digital audio editing, courtesy of JHE.

I learned a lot about light pollution, thanks to SEPA's Saving the Night and Sudekum's Night Lights. I laughed myself silly through the lunar bloopers and revisited my trekkie past courtesy of Jon Bell and company. The field trip to the Morehead Planetarium gave me some good ideas for the weather show that I've been trying to design. The vendor area introduced me to new products and left me scrambling to decide what to beg my administrators for next.

I'm very sure that everyone at SEPA underestimated what a tremendous speaker Nagin Cox would be. Her antecedents and knowledge of the Galileo mission brought such depth and perspective to the images we have received. It reminded me once again why I was first interested in astronomy and renewed my motivation to push forward with my vision for the Robeson Planetarium. It was a perfect pinnacle to an excellent experience.

For those of you who have never attended a SEPA conference or perhaps have not been in awhile, I encourage you to do your best to make sure you do not miss the joint 2001 GLPA/SEPA conference in Richmond, Kentucky. You might be missing out on the one new idea or one contact person who could make your life easier and more enjoyable. If nothing else, you are missing out on an opportunity to become a part of a wonderful family.

Matthew Perkins  
Robeson Planetarium  
Lumberton, North Carolina

# News from SEPA States

George Fleenor  
Bishop Planetarium  
Bradenton, Florida

Alexander Brest Planetarium, Jacksonville

Patrick McQuillen reports that the Alexander Brest Planetarium was very busy this summer! Not only were we running the usual astronomy program fare, but Cosmic Concerts (laser shows) were back. The laser shows started again in spring and have been so successful that we greatly expanded the offerings for the summer.

Since July 1 we have been running five different laser programs. Laser Fun 2 (from First Light Laser) and Backstreet Boys/ NSync (First Light Laser) are running during the day. Laser Fun 2 is our reduced price matinee show. The program is geared towards families visiting the museum. It has been well received and gives visitors a taste of what a Cosmic Concert is all about. Backstreet Boys/ NSync has been wildly popular with the 9-12 year old girl crowd (and others who are older but won't admit they're fans too). This program runs every day at 4 P.M. and has been consistently drawing in crowds of 50-70 per show (even on Mondays).

Our evening Cosmic Concerts are offered on Friday and Saturday evenings. Summer shows include Jimmy Buffett: Parrothead Jam (Bishop Planetarium, Florida), Classic Laser Rock (First Light Laser), and Pink Floyd: Best of the Wall (Bishop Planetarium, Florida). The evening attendance varies, but we haven't had less than 35 per show. Show times are 8 P.M., 9:30 P.M., and 11 P.M. Pink Floyd brings in the biggest crowds, averaging around 150 per show.

As for astronomy programs, Rusty Rocket's Last Blast (Sudekum) at 11 A.M., Search for New Worlds (Adler) at 1:30 P.M., and Get It Together/ Summer Skies (in house) at 2:30 P.M. Get It Together is one of our Star Station One™ programs. We talk about how the International Space Station (ISS) is being built, and then do a live night sky tour to show folks what they can see in the current night sky and how to find the ISS in the real sky.

The Alexander Brest Planetarium will be closed most of September for much needed repairs. The best technicians from Zeiss and the staff of JHE will be in to entirely

dismantle our Zeiss Jena planetarium projector and rebuild it from the ground up. (They can make it better, faster, stronger!) A majority of the repairs will focus on replacing some slip rings that have gone bad. New motors will be installed to replace motors no longer manufactured. Most importantly, a new star lamp system will be installed that will replace the present 24 volt star lamps with 110 volt star lamps. This should help to reduce greatly the amount of current flowing through the slip rings and also greatly extend the life of the projector as a whole. This work has been long coming, and I am looking forward to having a fully functioning machine by the end of September.

During the down time of September, the staff of the planetarium (in addition to repairing the projector) will be presenting Star Station One™ demos to inform the public about the progress of ISS. We'll also be doing lots of Solar and Lunar observing with our 8" scope (weather permitting).

Fall programs include Saving the Night/ Fall Skies and hopefully Explorers (Bishop Planetarium, Hawaii). To run Explorers your planetarium projector needs to have all axes working. We hope to be able to do that by the end of September.

Work also progresses on the next offering in the Hundred Dollar Wonder shows. This program does not yet have a title, but the content will cover a tour of the night sky for each season. Look for this offering in the near future.

Bishop Planetarium, Bradenton

George Fleenor is happy to announce that Bishop has a new staff member joining the team. Kelly Quinn, formerly of Hallstrom Planetarium at the Indian River Community College in Fort Pierce, Florida, is scheduled to begin her employment in mid August. Many of you know Kelly, and we are delighted that she has chosen to join our staff. I am sure Jon Bell did a fantastic job in honing her skills as a Planetarian. We are also targeting the reinstatement of our Technical Director's position in January 2001. Watch for postings of this position in the next issue of Southern Skies or check the SEPA Web

site for the latest details.

Snooty's Great Space Adventure was our featured children's/family star show presented Saturday mornings in July. We ran The Search for Life in the Universe from Buhl Planetarium at 1 P.M. and 4 P.M. daily through August. Snooty's GSA is a tongue and cheek show we produced over ten years ago that features our resident manatee Snooty. Although I would like to see this show disappear from our presentation list, it continually gets requests, so we have been slow in sending it to the shows from the past category. July also marked Snooty's birthday. He is now 52 years old. Our children's/family star show for August featured Larry Cat in Space from Loch Ness. Lunar Odyssey from Sudekum followed in September.

Our nighttime Skies Over South Florida features Saving the Night followed by a live tour of the evening sky. The Tonite Show, the observatory/telescope program, follows at 8:30 P.M., weather permitting. We have also posted literature from the International Dark Sky Association (IDA) on our console for visitors to take home. Among the literature is information sheet #122 that shows good lights/bad lights. I highly recommend this for your audiences. You can download it by visiting their Web site at <[www.darksky.org](http://www.darksky.org)>.

The matinee laser show for summer featured the Beach Boys. This family show has been well received by our audiences and features some of your favorite surf tunes. We continue to open or update our nighttime Laser Fantasies laser shows and have sold several shows to other facilities. Attendance is slowly picking back up and we are currently advertising with a lite rock radio station based in Tampa. We have been pushing our Jimmy Buffett Parrothead Jam show that's presented every Friday and Saturday evening at 8 P.M. It seems to be working, amazingly. This year marks the 20th anniversary of laser shows at the Bishop!

Upon my return from the SEPA conference, I learned that the City of Bradenton did not purchase the 50 Hubbell Sky caps as I announced at the conference. They bought 90! The city surprised me by shielding approximately 30 dusk to dawn fixtures next to the observatory on what is known as the Sand Pile. It was a pleasant surprise. This area will eventually have a 20 stadium seat movie theater complex and hotel built on it. The project was an

nounced a year ago. They still, however, have not broken ground. They do promise to install proper lighting when they do. The balance of the 90 shields (60) will be used to shield other dusk to dawn lights close to the observatory working away from the observatory area. When completed, nearly 400 lights will have been modified since our project began 1½ years ago. The city has talked about ordering 1000 of these fixtures in next year's budget. The nice thing about the skylights is that they are dark sky friendly, focus much more light on the ground, and are harder for vandals to break! Hmm, who could that be? The 90 fixtures cost approximately \$20 a piece. The city electrical staff was very happy with the price.

We no longer have a downstairs to our museum. The 5 million dollar remodeling project has begun. After Snooty's birthday, July 22, a large hole will be burst through the front of the building creating and expanding a new entrance. We are all very excited about this project. It has been needed for a very long time. Plans are to finish and open the first floor and then start the process over on the second floor. The whole project is expected to last at least two years. When the museum is finished, we are planning on a complete planetarium renovation which, by that time, will definitely be needed. Check out our Web site at <[www.sfmnp.org](http://www.sfmnp.org)> for the latest information.

Buzz Aldrin Planetarium, West Palm Beach

Erich Landstrom reports there is an important FlorPlan meeting on Saturday, September 30 at the Aldrin Planetarium. Join the informal Florida Association of Planetariums for a day of programs, laser shows, and discussion. The featured luncheon speaker will be Dr. Reyes from the University of Florida low power radio astronomy observatory.

Erich was honored and excited to have been selected as a Solar System Educator to attend NASA/Jet Propulsion Laboratory (JPL) Solar System Educators Institute August 1-5 in Pasadena, California. This prestigious professional development institute provided nationally selected teachers, administrators, and museum and planetarium personnel with the materials and skills necessary to increase the science and math performance of students by engaging them in the excitement of solar

News from SEPA States  
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George Fleenor  
Bishop Planetarium  
Bradenton, Florida

George Fleenor  
Bishop Planetarium  
Bradenton, Florida

system exploration. Best of all, it was all expenses paid! Solar System Educators will be trained to use science and math standards based educational materials from current NASA missions and programs managed by JPL. These include the Stardust Comet Sample Return Mission, the Galileo Mission to Jupiter, the Cassini Mission to Saturn, the Mars Exploration, and Outer Planets/ Solar Probe programs. Also included are the Deep Space Network, JPL Space and Earth Science Directorate, and the NASA Office of Space Science Solar System Exploration Education and Public Outreach Forum. Solar System Educators will receive regular updates on mission events and relevant classroom resources. Online training opportunities for the Solar System Educators will be delivered via the Internet.

SSEI participants will utilize the Solar System program materials to develop three train the trainer workshops for at least 100 additional colleagues in each of their home states. Dates for teacher training at the South Florida Science Museum will be September 23, November 4, December 9, January 20, March 10, and May 19. Erich will also host a two hour workshop at the SEPA/ GLPA conference in 2001. The SSEP is managed by Space Explorers, Inc. and the Virginia Space Grant Consortium, which is part of NASA's National Space Grant College and Fellowship Program. More details are available at <<http://www.ssep.org>>.

Free Fridays in September and October feature no general admission charges in the evening to see the exhibits and the McGinty Aquarium, but regular admission for planetarium and laser shows will apply. In order to accommodate the large crowds who will come for free on Friday, September 1, 8, 15, 22, and 30 and October 6, 13, 20, 27, the Aldrin Planetarium runs shows starting every 45 minutes. We close the Gibson Observatory to stop long lines from forming for the 14" scope and take multiple smaller telescopes outside so no one misses the sky. Speaking of being outside, Aldrin Planetarium will distribute Avon's Skin So Soft to visitors, thanks to a generous donation of 250 samples from local sales representative Mrs. Susan Toner. For those planning to view the December partial solar eclipse the Skin So Soft SPF 30 sun block should be deeply appreciated.

The Buzz Aldrin Planetarium sets songs from the cinema, classic rock, and Seattle

sounds this summer to 360" projection of lasers, videos, special effects, slides, and stars during our 3 D Laser Lightning 2000 laser light concerts from FirstLight Laser Productions. The schedule includes week end matineés of Laser Fun and Laser Fun 2, Friday and Sunday evening showing of Laser Beatles: Across the Universe, Laser Gater: 98.7 FM Classic Rock, and Laser Pink Floyd: Think Pink! and Saturday evening shows of Laser Dave Matthews Band, Laser Nine Inch Nails: Best out of NINE, and Laser Buzz: Aldrin Alternative Music.

We do still offer planetarium programs. Along with our daily live tour of the Night Skies over the Palm Beaches, we offered Bishop's The Explorers until the end of July while we worked for an August premiere of an in house program, One Giant Leap. Leap is in conjunction with our in house exhibit Frogs! (The UN toad Story), and studies gravitation on other worlds, including tidal influences. Wait until you see the bullfrog get sucked into a black hole!

The annual Drop It, Build It, Fly It competition will be held in Dreher Park on Saturday, March 31, 2001. The South Florida Science Museum and the Florida Engineering Society of Palm Beach County will test the engineering skills of students in creative ways. These include an egg dropping from four stories without being scrambled, constructing a wooden bridge that is lightweight and can support up to 100 pounds, and sending paper air planes aloft to see how far they travel in linear flight. Cash prizes go to the top three winners in each category. For more information, contact the Museum or call 753 0816. We're on the Internet at <<http://www.s fsm.org>>.

#### Calusa Nature Center and Planetarium Fort Myers

Jill Evans reports that summer camp was in full swing, and all the kids enjoyed the Planetarium. They are currently working on getting Rusty Rocket's Last Blast up and running as well putting together a few introductory slide programs that we can take to outreach programs at schools, libraries, etc. We are adding planetarium activities to our schedule from which groups can choose. Instead of, or in addition to our library of planetarium shows, teachers can choose from a few different activities like making planispheres, hunt

ing for meteorites, and making sundials. I'm hoping these hands on activities will get the kids more interested in astronomy. We are also doing more telescopic viewing programs and special events, and they are well received by the public. In general, we are having a busy, but good time in the Planetarium.

Seminole Community College Planetarium  
Sanford

Laurent Pellerin reports that their alternating Friday night series *Tonight's Sky and Myths in the Night!* continues to be very popular even after running for five years. There are at least two months between any repeats, so even our most die hard regulars have enough time between seeing the same show twice that they get something new out of it every time.

We just finished field testing the Holt (Berkeley) Planetarium's production *The Northern Lights* on Saturday evenings. This is a highly interactive, live show that thrilled audiences. They particularly enjoyed the hands on demonstration of the seasons where we passed out styrofoam models of the Earth and use a modified flashlight as the Sun. While this show is designed primarily for students, with a few minor modifications it was a very successful public show. I'd certainly recommend it when the final production becomes available, especially here in the South where the aurora borealis is so rare. Speaking of which, we had an aurora visible from Sanford on April 6th during the run of *The Northern Lights*. That evening we were, ironically, outside with 300-400 members of the public and the press. Fox News did a live remote weather cast as we watched the planetary conjunction. Unfortunately we were on the wrong side of the building and totally missed this rare opportunity.

This summer we showed our own new production *A Star to Steer By* on Saturday evenings. It is receiving rave reviews from boaters and Navy retirees, alike. And, it is relieving the traditional drop in summer time attendance.

We have suffered some major equipment problems. Our reel to reel tape deck heads have now degraded past the limits of providing a reliable time code for our old BCC automation system. This has shut down all of our automated shows. Luckily, 2/3 of our show library are live productions, so we are still in business while we try to

get our tape heads replaced. We're working on another solution that might help anyone else out there still using the old BCC system. While I'm good, I'm not good enough to key manually all of the slides and effects in an automated production to the split second accuracy needed. We're going to try connecting a PC computer to our BCC system Apple IIe computer. The PC will have the sound track and a timing program. At the appropriate times the PC will start the sound track and manually key the Apple IIe. This will not only solve our current problem, but also it will eliminate the use of tapes (Oh, Yes!) and allow us to make the jump to digital sound, even though we have yet to acquire the funds necessary to totally upgrade our facility. We're working on it.

Poinciana Magnet School Planetarium  
Boynton Beach

Kris Swanson reports she is no longer Planetarium Director at Poinciana. She's now a technology specialist working with all the elementary schools in the Palm Beach school district. The move is a promotion, but she does miss the dome.

Poinciana is an amazing place, with an administration and staff dedicated to kids. Kris had a great time working there the past six years, and she knows that whoever takes her place will have a great experience too. She's moved up to the school district office and will be close by to help in the transition.

As of Monday, July 10 the Palm Beach County School District will be advertising for the position of Planetarium Resource Teacher at the Poinciana Elementary Math/Science/Technology Magnet School. This position is responsible for operating and maintaining the Spitz A3P projector and ECCS lighting and control systems at Poinciana. The astronomy program at Poinciana has been developed to serve the 700 K-5 students there by instructing them in all aspects of astronomy, including mythologies from around the world, planetary science, and deep space astronomy.

The job is a 196 day teaching position, requiring a valid Florida Teaching certificate, or a B.A. and the ability to gain a temporary certificate while working towards a permanent one (this is not as complicated as it sounds). The starting salary for first year teachers in Palm Beach County is about \$30,000/year with annual

News from SEPA States  
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George Fleenor  
Bishop Planetarium  
Bradenton, Florida



George Fleanor  
Bishop Planetarium  
Bradenton, Florida

salary increases.

Experience working in planetarium theaters and teaching astronomy will, of course, be helpful. Also, experience working with younger students is highly desirable.

Beginning July 10 the position was posted as Teacher, K 12/Other for Poinciana Elementary at <<http://www.palmbeach.k12.fl.us/jobs/>> under the Instructional Jobs area. Follow online directions to apply to the district, and also mail or fax a resumé and cover letter to:

Karen Whetsell, Principal  
Poinciana Elementary School  
1203 N. Seacrest Blvd.  
Boynton Beach, FL 33435  
(561) 369 7091 (voice)  
(561) 374 7947 (fax)

Interviews were expected to take place towards the end of July.

#### SEPA MEMBER

#### ENTERS POLITICAL ARENA

SEPA member Ronnie Beck of Sunwest Space Systems has entered the race for Mayor of St. Petersburg, Florida. Ronnie was a SEPA conference regular in the mid 90s, giving us Alien Life tee shirts and partaking in a few Woodchucks. He has worked diligently since 1997 to position himself for this opportunity. He said it was difficult to move away from astronomy, though he stays in touch through Dome L and e mail with friends.

Ronnie has long had an interest in politics, and he made a close bid for city council three years ago. He was very interested in SEPA's new dark sky initiative, as he hopes to address the issue of sky pollution in his community. Perhaps a SEPA presentation will convince other St. Petersburg leaders, as well. Ronnie is a current SEPA member.

Anyone wishing to help may contact:

#### Agnes Scott College, Decatur

Dr. Chris De Pree is in charge of Georgia's newest planetarium. He will be working with Amy Lovell and Nola Taylor. The college has purchased a Zeiss ZKP 3 projector which will be installed in August in their new 30, 70 seat dome. They hope to have the planetarium fully operational by the start of college classes in the fall. Open house events are listed at <[www.agnesscott.edu/aca/depts\\_prog/info/physics\\_astronomy/bradley/openhouse.html](http://www.agnesscott.edu/aca/depts_prog/info/physics_astronomy/bradley/openhouse.html)>.

Jim Greenhouse  
and Carole Helper  
Mark Smith Planetarium  
Macon, Georgia

#### Oatland Island Nature Center Oatland Island

Max McKelvey reports that last year's Starlab attendance was 5,400. Cleanup of the Oatland Island site will continue next fiscal year. Until that time the general public is not allowed at the Nature Center. The Center has spent \$60,000 in habitat renovation, including new observation platforms for the bobcats, fox, and alligators.

#### Atlanta Public Schools, Atlanta

Bob Tate reports that Jim Summers suffered congestive heart failure and went to the emergency room. He was only away from his job for about three days. Jim has taken some tests and is awaiting the

results. He lost some weight, is on a strict, low salt diet, has more energy than ever, and is planning a month long trip out west with his kids and in laws.

#### Fernbank Science Center, Atlanta

April Whitt says that the staff worked with 60 rising seventh graders this June in their SpaceStation Fernbank program. Students cloned plants, counted sunspots, graphed heart rates, grew crystals, built robots, and traveled to Challenger Center in Columbus, Georgia and Marshall Space Center in Huntsville, Alabama. They used all their new skills to complete a space mission, and described their experiences during a mission debriefing to their parents.

Summer planetarium programs are Skies Down Under for general public audiences and Penguin at the Pole for children's audiences. The observatory's newly refurbished telescope continues to give visitors a chance to see through the eyepiece of a major instrument. Two students are using the observatory for CCD imaging this summer as well.

The NASA SEMAA program geared up in July and August with 600 students enrolled in morning and afternoon classes. June 26 brought NASA's Dan Goldin, Congresswoman Cynthia McKinney, and

county dignitaries to Fernbank for the official opening of the SEMAA Aeronautics Education Lab (AEL). It's a beautiful facility designed for use by students in grades 10-12. On August 28, the Georgia Association of Planetariums met at Fernbank.

#### Georgia Southern University Planetarium Statesboro

Becky Lowder finished public school shows at the end of May. The planetarium was open two nights in June for the GSU Science Camp. Middle school students had a fun time in the planetarium with shows and hands on activities. Saving the Night was shown twice only three days after the SEPA conference. Middle school campers, college students, and professors enjoyed the show, and asked for more handouts available on light pollution and good lighting. Thanks so much to SEPA, IDA, sponsors, and David Levy for this wonderful show.

The month of July was quiet in the planetarium due to cove light and electrical renovations. A new multimedia projector with excellent resolution, used for the computer and VCR, was installed, and two new slide projectors to replace the old worn out ones were purchased.

On July 8 the planetarium staff was at the GSU Botanical Gardens for a fun night of observing with the Statesboro Astronomy Club and the public. In August the planetarium will show pre-K college/adult shows for the new season with three new shows added to the schedule. In addition to the live solar system/constellation shows and The Explorers, HST: Ten Years of Discovery, and Stardate: Ancient Horizons will be added. Saving the Night will be offered as a pre show when time permits (Hopefully buses will arrive on time!) and at all of the monthly public

evenings. Those dates and presentations will be announced at a later date. Visit our Web site at <<http://www2.gasou.edu/physics/planetariumpage1.html>> for later updates.

#### Mark Smith Planetarium, Macon

The Mysteries of Egypt exhibit drew almost 40,000 people to The Museum of Arts & Sciences. That's about half the Museum's normal annual attendance, and they all came in seven weeks. The planetarium ran The Astronomy of the Great Pyramid for about 17,000 audience members. The soundtrack came from Cape Town, South Africa, and the visuals came from everywhere else.

The show kit came with slides originally produced for the Hansen show, Dawn of Astronomy. Carole and Jim added a few slides they made along with several slides from Stardate: Ancient Horizons. They also got a pan from the Sharpe Planetarium and video from Starlight Productions and Sky Skan Special Effects Laser Disk #8.

After the mummies flee the Museum, the planetarium will go back to showing The Explorers for another month. The next new show started in August. The Xtra Terrestrial Files from the Minneapolis Planetarium is scheduled to coincide with the new fall season of the television show The X Files.

Jim is so in love with the new Fostex D 108 digital recorder, it's rumored that he might propose to it. MSP is also getting an aurora projector from Ash Enterprises.

Former astronaut Guy Bluford will give a talk during the Museum's Day of Exploration on September 23. Since the Perseid Meteor Shower happens to peak this year when the Museum's observatory is open on Friday night (Aug. 11) and the monthly Saturday observing (Aug. 12) at the remote Brown's Mount site are planned anyway, there will be two evenings of viewing in

News from SEPA States  
continued

Jim Greenhouse  
and Carole Helper  
Mark Smith Planetarium  
Macon, Georgia

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#### Freeport McMoran Planetarium and Observatory, Kenner

Believe it or not we have finally received bids for our 50 planetarium. I should be able to announce the winner shortly. Currently we are playing HPS Productions Summer Colors and our in house production Quest for Space (a history of space travel). We are also involved, as we are every summer, with the University of New Orleans Space Quest Summer Camp. I am still in shock over being elected

SEPA's President Elect at this year's conference, therefore I have nothing else to contribute.

#### St. Charles Parish Library Planetarium Luling

Here at the Saint Charles Parish Library & Planetarium we are suffering through the end of summer. The heat, rain (we hope!), and a constant eye on the tropics keep us on our toes. Living as close to sea level as we do, one big storm could wreak

Michael Sandras  
Freeport-McMoran Plan-  
etarium  
Kenner, Louisiana

Michael Sandras  
Freeport-McMoran Plan-  
etarium  
Kenner, Louisiana

havoc on our community.

As of this writing we also have another pressing concern. We are due up for our millage renewal election. Since the Planetarium is part of the Public Library, we operate on tax millages voted in for ten years. With the increased use of technology in the library system and future plans for new branches, we are asking for a modest increase. We certainly hope for the best and our continued operation.

In the planetarium we are awaiting the go ahead for an upgrade/ repair to our old Viewlex/ Apollo (Goto E5) projector. It will certainly be nice to have such trivial items as the Sun, Moon, and planets visible again. I have recently tried an experiment with our audience.

Since our summer attendance usually sags a bit, I have offered the audience a choice of shows. They can vote for either the regularly scheduled production, usually a tape/ slide traditional show, or to have a live constellation show. To every audience I have offered this choice, every one chose the live show. Interesting. I will continue to offer this option for a while longer, but it looks like at least for my clientele, they want a live sky show.

#### Louisiana Nature and Science Center New Orleans

At the Louisiana Nature Center Planetarium in New Orleans, Mark Trotter and Dennis Cowles are still running an array of different programs. For the public they are offering The Sky Tonight, Cosmos, and the Family Laser Show. For school groups they offer, in addition to the above, Planet Patrol: A Solar System Stake Out, Little Star that Could, a program on the seasons, a program on lasers, and a program on meteorites.

On Saturday nights they offer laser shows, and the current line up includes Pink Floyd's Dark Side of the Moon, Led Zeppelin, Laser Thrash, Lollapalaser, Pink Floyd's The Wall, Rush 2112, Metallica, the Best of Pink Floyd, and Laser Fest.

They are still awaiting the arrival of an H  $\alpha$  filter which they ordered over a year ago. Hopefully they will get it before the solar maximum has passed.

Mark and Dennis managed to survive another Space Exploration Day on July 15. Lockheed Martin came to the Nature Center and did a marvelous demonstration on cryogenics and rocket technology, including a live firing of a hybrid rocket

motor. After their programs, Mark and the Lockheed engineers tried a little experiment with the liquid nitrogen that was left from the demonstrations. They filled a two liter soft drink bottle with liquid nitrogen, tightly sealed it, and waited a few minutes. The result was an explosion that startled Nature Center staff and visitors and, of course, shredded the bottle. Science geeks sure do know how to have fun.

Mark has had a few requests for the lunar bloopers tape, seen by SEPAnS at the conference in Winston Salem. If you d like to have a copy of the lunar bloopers tape, send a videotape to Mark and he ll copy it and eventually send it to you.

Dennis translated the abstracts from the French planetarium journal Planétariums into English for inclusion within The Planetarian. In the back cover of the French journal is a map of France showing the location of all domes in that country; Dennis expects this map to be useful during the next few months. (See below.)

Dennis and Mark submitted an abstract to the Concepts and Approaches for Mars Exploration; read the abstract online at <<http://www.lpi.usra.edu/meetings/robomars/pdf/6153.pdf>>. The abstract was accepted, and Dennis presented it on July 19 at Houston's Lunar and Planetary Institute. This workshop reformulated approaches for Mars exploration. Specifically, the workshop explored how to implement the national science goals for Mars. Major themes were what kinds of missions should be flown, what instruments are needed, how the goals are to be best implemented, and what kind of program architecture will guarantee the best scientific return.

The paper Mark and Dennis submitted dealt with outreach efforts and ideas on broadening them to include the general public, not just K 12 students. Dennis reports the workshop was very enlightening. If ten percent of the mission concepts discussed at this meeting are actually implemented, our understanding of Mars will grow tremendously in the coming two decades.

Mark is looking into getting a hard drive based system to run planetarium shows to replace the ADAT. The sync board on the back up ADAT failed and Mark found out that the manufacturer is no longer making them, so the back up unit is not repairable. Rather than buying a new ADAT, Mark decided to convert to a hard drive

system. Until the new system is in place, though, Mark and Dennis will be keeping their fingers crossed that nothing happens to the primary ADAT.

They continue to offer topical programs in astronomy and the physical sciences. Recent topics have included Jupiter, the Sun, meteorites, and a program on the failed missions to Mars.

Dennis continues to do regular programs at local libraries in both Orleans and Jefferson Parishes (counties to everybody else). Recent topics have included meteorites, the inner solar system, and a program on tabloid astronomy.

Mark and Dennis extend warm and sincere thanks to both Duke Johnson and Karen Osterer at SciWorks Planetarium for loaning them their slide set of tabloids; the program wouldn't have been nearly as complete or as interesting without their contribution.

By the time you read this, Dennis will be living in Orleans, France. He plans to perfect his French, drink lots of wine, tour chateaux, and see as many French planetaria as possible. He is tentatively planning to attend the March planetarium meeting in Sri Lanka (the one that Dale Smith discussed at Winston Salem), because the airfare from Paris isn't very expensive.

Lafayette Natural History Museum Planetarium, Lafayette

Construction continues at the downtown department store which is being modified to become the Lafayette Natural History Museum & Planetarium's new home. As of this writing, the building's roof and much of its interior structure have been removed, and the walls are being supported by exterior scaffolding that

resembles a launch gantry. The museum and planetarium is expected to open at that site in early to mid 2002.

In early June we ended the last full school year of field trips at the original planetarium. School programs will resume during the fall but will end there forever around the end of this calendar year. Although we hope to continue workshops and programs for the public at least through the end of this year, our building project is requiring more and more time in planning for equipment and exhibits, initial planning for new planetarium and observatory programming, and gearing up for public observing programs to be done after the old planetarium closes.

In March we had solar viewing and a star party at the Wedell Williams State Aviation Museum in Patterson, Louisiana, and also made an overnight astronomy/archaeology trip to the Poverty Point mound site in the northeastern part of the state for viewing under very dark skies.

We had a successful Astronomy Day in April, featuring H  $\alpha$  and visual solar viewing during the day and a telescope fair in the evening.

This summer we're running The Cowboy Astronomer.

News from SEPA States  
continued

Michael Sandras  
Freeport-McMoran Planetarium  
Kenner, Louisiana

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Roper Mountain Science Center

Doug Gegan reports their emphasis will be on constructing and outfitting a new annex building for the Daniel Observatory. This will include a large workshop area, and a classroom in support of evening activities. A large south facing telescope deck is also included.

On the program front, we will be working on a History of Greenville program for presentation to 5th graders. This is the result of a major grant, and a demonstrated need by Greenville County teachers. It is scheduled to open after the first of the year.  
Settlemyre Planetarium

We here at the Settlemyre Planetarium are breathing a sigh of relief as summer camps are over. We recently received a major grant to upgrade our auditorium's audio and video capabilities, and most of the autumn months will be spent on this endeavor.

Not to ignore the planetarium, we are currently installing our new public show The Search for Life in the Universe. In addition we are performing a complete upgrade of our panorama images and hope to have all new pans masked and aligned before the start of the school year.

Glenn Dantzer  
Settlemyre Planetarium  
South Carolina

## Craigmont Planetarium, Memphis

Staff changes are the big news at our facility. Ten year planetarium veteran Lisa DuFur has taken a position with the distance learning program of the Shelby County school system. Taking her place as Craigmont Planetarium Instructor is Donna Thomas. (Hmm. Now both of the planetarium staff have the same initials.)

Donna has three children ages 10, 12, and 14, and her whole family is active in their church and in a variety of competitive sports. Donna enjoys golf, basketball and softball. The day before this writing, she made her first ever hole in one.

Her undergraduate degree is from Lambuth University in Jackson, Tennessee, where she earned a Bachelor of Science degree in elementary education. She is pursuing a Master of Arts degree in educational technology at Walden University.

Donna has been a teacher with the Memphis City Schools since 1983. She came to Craigmont in 1984, where she has taught Health, Physical Education, and Honors General Science; served as Middle School science department chair; and coached the volleyball and basketball teams.

She serves as the West Tennessee representative to the Tennessee Technology Panel and has pursued and received multiple grants to purchase technology for her classroom. Wal Mart named her their Teacher of the Year for 1999.

She regards the highlight of her education career to be the 1993 Mississippi River Project. Her 7<sup>th</sup> grade science class participated along with children from other cities that border the Mississippi River in simultaneously testing the river water for pollutants. Vice President Al Gore visited our site in Memphis and participated with her children. Then he took part in a live teleconference between her students and children from three other cities via satellite.

Donna says I'm thrilled to be here!

As a result of the staff change and some other attention Craigmont has garnered from the Board of Education, we'll be engaging in some new efforts. Donna has experience in creating WebQuest activities for students, so expect our Web site to become more dynamic than ever. We may even get some help from the central office to use CGI scripts to gather information from students who contact the planetarium at a (planned) new e-mail address.

Donna is also eager to expand our outreach program from its current sporadic state to a regular and ongoing part of our educational program. As part of our 2000-2001 strategic plan, we'll be creating a new brochure to advertise what we can do for students, teachers, school staff, and the community. She'll take these brochures to local schools and encourage teachers who haven't yet utilized the planetarium to consider availing themselves of our facility.

Our two Skylights and Twinkles newsletters which were aimed at different age level audiences will be combined into a single Skylights publication which serves all grade levels.

This fall we're going to be running JHE's Welcome to the Universe program. Our school gets lots of visitors because of its International Studies optional program. We're also expecting more visitors than usual because of our school's educational model, called Multiple Intelligences. This short program will suit our needs for a presentation to show visitors who don't have time to stay for a full length star show.

This fall we'll also be running SEPA's Saving the Night, Sudekum's Our Place in Space, Hansen's Secret of the Cardboard Rocket, GLPA's Solar System Adventure Tour, and Sudekum's Lunar Odyssey in addition to our own Star of Bethlehem.

Based on several comments I read in the last Southern Skies, several facilities have purchased SkyScan's Special Effects Laser Disc #8. They specifically mentioned the sections on Egyptian astronomy. How ironic that one of the new shows being distributed by our colleagues in Virginia is about Egypt. Stardate: Ancient Horizons appears to be an excellent program to run in a city named after the ancient capital of Egypt and which has a huge Pyramid on its Mississippi River bluffs. We'll make a gradual transition of producing and adapting new star shows after the newest staff member has a chance to get comfortable behind the console.

On a personal note, I have some very happy news to announce. My daughter Kathy and her husband Andy, who live in Cincinnati, are expecting the birth of their first child in February. My wife Judy and I are very excited in anticipation of being grandparents. So far the toughest decision we've had to face is what names we want to be called by the new baby. I have learned that this is a decision not to be taken lightly. I'm leaning toward, Your



# Web Review: Astromaterials Curation

<[www.curator.jsc.nasa.gov/curator/](http://www.curator.jsc.nasa.gov/curator/)>

Okay, so I'm not a terrific reviewer. My problem is that I tend to review Web sites that deal with subjects that I know well, like a lot, or both. This Web site falls into both categories. This site has lots of interesting information for planetarians, including online educational materials, information about lunar samples (drool), Antarctic meteorites (drool again), and future extraterrestrial samples such as the ones Stardust will return and eventual returned samples from Mars missions (still drooling... excuse me for just a moment while I compose myself).

Astromaterials Curation at Johnson Space Center in Houston is responsible for the curation of lunar samples, Antarctic meteorites, stratospheric samples that NASA has collected, and space exposed hardware (like the Long Duration Exposure Facility). Like many NASA Web sites, this one is easily laid out for surfers to use.

The educational products section is excellent. It includes fact sheets, teacher's guides, information on a slide set, and even a coloring book, all in convenient Adobe PDF format. I can vouch from personal experience that the teacher's guides and fact sheets are useful. I've used almost everything in the education products section of this site, and it is a terrific resource for teaching planetary science.

If you are interested borrowing a lunar rock for display in your facility, click on Lunar Rocks and Soils. This section also has information on the Lunar Sample Laboratory Facility and current news about the Moon and lunar research. (They even offer a newsletter in PDF format.)

One of my favorite sections of the site is the tour of the Lunar Sample Laboratory Facility. This section explains the precautions taken in each section, the types of samples housed within, and the work that the laboratory does in examining and preserving lunar samples.

On the whole, this is an excellent site. It includes material for professional planetary scientists and researchers, educators, and the interested public.

## The Positives

The site is well organized. For example, there are links to the educational products from the lunar and Antarctic meteorite sections. Cross links make navigation very easy. There are lots of materials in PDF format, which makes it easy to access these materials. PDF is one of the greatest creations ever—a set of standards that make Web publishing platform independent. There is a site map on the main page, which I always appreciate.

The links page is very good. It is subdivided into individual sections and includes a general links page. There is abundant information about the Antarctic meteorite program and even a search page to query the Antarctic meteorite database.

## The Negatives

I don't particularly care for frames on a Web site, and I will always opt for a non-frames version if given the choice. Unfortunately, there isn't one here. The main page is not framed, but most of the sections that are linked from the main page are framed pages. For the most part, frames seem to be more trouble than they are worth.

Since they have opted to use frames, then they should use them correctly. I would like to see cross links to the entire site from anywhere within it. They have a number of internal links, but they should have more of them if they're making me deal with frames.

## Astromaterials Curation

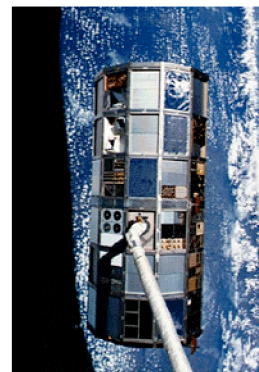
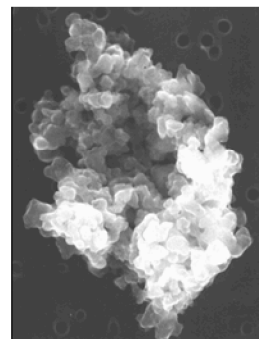
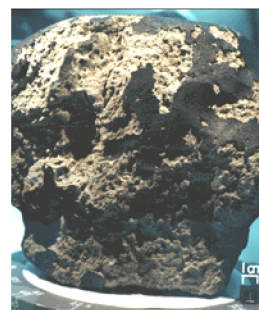
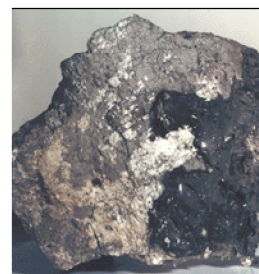
NASA - Johnson Space Center



The Astromaterials Curation home page

Dennis J. Cowles  
Web Review Editor  
Louisiana Nature  
Center Planetarium

Top to bottom: an Apollo  
16 Moon rock; a Martian  
meteorite from Antarctica;  
a cosmic dust grain; the  
Long Duration Exposure  
Facility (LDEF)



# HST's Greatest Hits of '96

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

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| <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 NGC 2366, 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> <p>36.c Cartwheel Galaxy illustration</p> |
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The entire set of 39 slides is \$48.75, including postage and handling. Send a check or purchase order to the address

01	Central supermassive black holes in galaxies NGC 3377, NGC 3379, and NGC 4486B:	17	stars surround their mother
03	SN1987A Fireball: One tenth light year long dumbbell structure expanding at six million miles per hour in supernova 1987A	18	A collision between two spiral galaxies in the heart of galaxy Arp 220
08	Changes in the nucleus of Comet Hale Bopp as it moves closer to the sun beginning in September 1995	19	Fireworks near a black hole in the core of Seyfert galaxy NGC 4151
09.a	Transition from spring and summer in Mars's northern hemisphere; photo taken shortly before opposition	20	STIS reveals an invisible high speed collision around a supernova
09.b	Three photos of Mars taken six hours apart with 90 degree difference between images; photos taken shortly before opposition	21	Hubble pinpoints the optical counterparts of a gamma ray burst in a distant galaxy
11	The Egg nebula in which stars are born and die violently; photo shows jets of gas being blasted into space	22	Hubble captures a volcanic eruption plume from Jupiter's moon Io
12	A supermassive black hole located in galaxy M84	23	A gamma ray burst blazes from a titanic explosion in deep space
13	NICMOS captures region of the Orion nebula filled with action as a center for the birth of new stars	24	Hubble's look at Mars shows a canyon dust storm, cloudy conditions for Pathfinder's landing in July 1997
14	Supernova 1987A: different colors represent different elements in the ring	24.a	Dissipation of a large dust storm on Mars
15.a	A view of Mars's cloud cover	24.b	Hubble shows dust and water ice clouds exhibit substantial daily variations
15.b	Seasonal changes in Mars's north polar ice cap	25	Powerful telescopes discover the largest galaxy in the universe
15.c	Four views of Mars rotated 90 degrees between images during summer in Mars's northern hemisphere	26	Hubble separates components in the Mira binary star system
16	The Cone Nebula: six baby sun like	27	Hubble reveals huge crater on the surface of the asteroid Vesta.
		28	Hubble finds a bare black hole pouring out light.
		29	Hubble shows blobs of gas formed by some nova outbursts.
		30	Hubble keeps track of a fading gamma ray burst.
		31	Mars at the beginning of autumn in the Martian northern hemisphere.
		32	Hubble sees a neutron star alone in space.
		33	Hubble identifies what might be the most luminous star known.
		34.a	Hubble reveals stellar fireworks accompanying galaxy collisions.
		34.b	Detailed images of colliding galaxies.
		35	Hubble shows images of a blue straggler star.
		36.a	Hubble tracks clouds on Uranus.
		36.b	Hubble spots northern hemispheric clouds on Uranus.
		37	Hubble shows infrared view of moon, ring, and clouds of Jupiter.
		38.a	Hubble sees supersonic exhaust

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- |   |  |
|---|--|
| <p>01 COBE's infrared view of the Universe: three maps of the full sky seen in infrared light</p> <p>02 Distant supernovae: light sources determine universe's expansion rate</p> <p>03 Beta Pictoris: disk indicates planets, possible brown dwarf companion</p> <p>04 Jupiter aurorae: a curtain of light extends several hundred miles beyond Jupiter's limb</p> <p>05 Saturn's aurorae: curtains of light extend 1,000 miles above cloud tops</p> <p>08 Supernova 1987A: a collision between the expanding blast wave and circumstellar ring</p> <p>10 Serendipitous asteroids: HST images show curved trails of asteroids</p> <p>11.a Planetary nebula NGC 7027: a brief stage in the evolution of a medium mass star</p> <p>11.b Cotton Candy Nebula and Silkworm Nebula: phases of stellar burnout</p> <p>12 Star birth in barred spiral galaxy NGC 1808 possibly due to interaction with NGC 1792</p> <p>14.a Centaurus A: nearest active galaxy to Earth shows turbulent firestorm of starbirth</p> <p>14.b Centaurus A: tilted disk of gas at galaxy's core surrounds suspected black hole</p> <p>15 Stingray Nebula: Henize 1357, the youngest known planetary nebula</p> <p>16 NGC 1818: globular cluster of over 20,000 stars in the Large Magellanic Cloud</p> <p>17.a GRB 971214: gamma ray burst is most energetic event in the universe</p> <p>17.b GRB 971214: gamma ray burst; comparison of Keck Telescope and HST views</p> <p>18 Saturn: details of the clouds and hazes in atmosphere of ringed planet</p> <p>19 Possible first extrasolar planet ever</p> | <p>to be imaged orbiting about a new born binary star</p> <p>20 Four of NASA's proposed designs for the Next Generation Space Telescope (NGST)</p> <p>21 Galaxy NGC 4314: bright ring of starbirth around the galaxy's core</p> <p>22 NGC7052: galaxy with 300 million solar mass black hole in its center</p> <p>25 N81 in the Small Magellanic Cloud: a celestial maternity ward</p> <p>26.a Galaxy Cluster MS1054-03321: thousands of galaxies 8 billion light years from Earth</p> <p>26.b Supernova 1996CL: a March 1996 exploding star in galaxy cluster MS1054-0321</p> <p>27 Distant galaxy clusters: left, in Virgo; upper right, in Andromeda; lower right, in Taurus</p> <p>28 NGC7742: a small Seyfert 2 active galaxy probably powered by a black hole in its core</p> <p>29 Saturn: pastel yellows, browns, and greys distinguish cloud differences</p> <p>30 Sagittarius Star Cloud: HST peers into the heart of the Milky Way</p> <p>31 NGC7635, the Bubble Nebula: an expanding shell of glowing gas surrounding a hot star</p> <p>32.a Infrared views: left: faintest galaxies ever seen; right: objects 12 billion light years away</p> <p>32.b Deep field galaxy: left: visible light areas of starbirth; right, infrared disk structure</p> <p>34 Neptune: a look at the eighth planet's stormy disposition</p> <p>35 Uranus, August 8, 1998: its four major rings and 10 of its 17 known satellites; false color</p> <p>36 NGC6210 planetary nebula described as looking like a turtle swallowing a sea shell</p> <p>37 Quasar PG1115+080 and gravitational lens effect:</p> <p>38 Nebula M1-67 around star WR124: gas ejected into space at 100,000 mph</p> <p>39 NGC3132: southern hemisphere's Eight Burst or Southern Ring Nebula</p> <p>41.a HST deep field south: thousands of</p> |
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# JPL '98 Slides

NASA JPL has sent us the following slides for the Galileo Mission and others. Slides are \$1.25 each.

P 35036B	Launch of Galileo on STS 34 Atlantis	P 47935	Io Glowing in the Dark
P 35213	Deployment of Galileo and IUS	P 47961	Ganymede s Nippur Sulcus
P 37218	Venus Colorized Clouds	P 47970	Ganymede Color Global
P 37327	Moon: Western Hemisphere	P 47971	Io in front of Jupiter
P 37539	Infrared Image of Low Clouds on Venus	P 47972	Changing Volcanoes on Io
P 37593	Earth: Ross Ice Shelf, Antarctica	P 48035	Stereo View of Ganymede s Galileo Region
P 37630	Global Images of Earth	P 48040	Natural and False Color Views of Europa
P 40449	Gaspra: Highest Resolution Mosaic	P 48063	Thunderheads on Jupiter
P 41383	Gaspra Approach Sequence	P 48112	Ganymede Uruk Sulcus High Resolution Mosaic Shown in Context
P 41432	Moon: North Pole	P 48113	Ganymede Galileo Regio High Resolution Mosaic Shown in Context
P 41474	Earth: Northeast Africa and the Arabian Peninsula	P 48114	Jupiter s Great Red Spot
P 41493	Earth: False Color Mosaic of the Andes	P 48122	Two views of Jupiter s Great Red Spot
P 41508	Earth: Moon Conjunction	P 48127	Ridges on Europa
P 42501A	South Polar Projection of Earth	P 48145	Io: Volcanically Active Regions
P 42964	Asteroid Ida: Five Frames Mosaic	P 48188	The Main of Ring of Jupiter
P 44130	Asteroid Ida: Limb at Closest Approach	P 48231	Callisto Crater Chain at High Resolution Shown in Context
P 44131	Ida and Dactyl: Enhanced Color	P 48236	Europa: Ice Floes
P 44297	High Resolution View of Dactyl	P 48293	Callisto: Scarp Mosaic
P 44520	Asteroid Ida Rotation Sequence	P 48294	False Color Mosaic of Jupiter s Belt Zone Boundary
P 44542	Comet Shoemaker Levy 9 Fragment W Impact on Jupiter	P 48299	Asgard Scarp Mosaic
P 47058	Ganymede: Comparison of Voyager and Galileo Resolution	P 48445	True Color Mosaic of Jupiter s Belt Zone Boundary
P 47065	Ganymede: Mixture of Terrains and Large Impact Crater in Unuk Sulcus Region	P 48496	Color Global Mosaic of Io
P 47162	Full Disk Views of Io (Natural and Enhanced Color)	P 48526	Europa Ice Rafts
P 47179	Three Views of Io	P 48527	Closeup of Europa s Surface
P 47182	Jupiter s Great Red Spot	P 48532	Mosaic of Europa s Ridges, Craters
P 47183	Dark Bands on Europa	P 48584	Io s Sodium Cloud
P 47194	Live volcano on Io	P 48698	E4 True and False Color Hot Spot Mosaic
P 47196	False Color Great Red Spot	P 48700	Jupiter Equatorial Region
P 47903	NIMS Ganymede Surface Map	P 48952	Jupiter s White Ovals, True and False Color
P 47905	Five Color Views of Io	P 48954	Ancient Impact Basin on Europa
P 47906	Europa In Color	P 48956	Active Volcanic Plumes On Io
		P 48439A	The Mars 98 Lander
		P 48440A	The Mars 98 Lander
		P 48494A	The Mars 98 Orbiter/Lander
		P 48495A	The Mars 98 Orbiter/Lander
		P 48567	Dr. Peter Tsou holds Aerogel
		P 48589	Stardust Spacecraft
		P 48691	Deep Space 1 Spacecraft

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- |      |   |      |  |
|------|---|------|--|
| 01   | M57 Ring Nebula: the sharpest view yet of this planetary nebula                       | 19   | Hubble's top ten gravitational lens effect images                              |
| 02   | Combined deep view of infrared and visible light galaxies                             | 20   | NGC4603: magnificent spiral galaxy associated with Centaurus cluster           |
| 03   | HD 141569: stellar dust rings of a star in the constellation Libra                    | 21   | NGC3603: various stages of the life cycle of stars in a giant galactic nebula  |
| 04   | SNH1987A: self destruction of a massive star in Large Magellanic Cloud                | 22   | AB Aurigae: a swirling disk of dust and gas surrounding a developing star      |
| 05.a | Six images of a young stellar disk found in the constellation Taurus                  | 23   | Mars: a colossal polar cyclone   |
| 05.b | Four images featuring disks around various young stars in Taurus                      | 25   | N159: a turbulent cauldron of starbirth in Large Magellanic Cloud              |
| 06   | NGC 1316: silhouette of dark clouds against a glowing nucleus of an elliptical galaxy | 26   | NGC4414: magnificent details in the dusty spiral galaxy                        |
| 07   | Mars: visible, infrared light images; evidence of water bearing minerals              | 27   | NGC6093: a stellar swarm in a dense globular cluster                           |
| 08   | Proxima Centauri: a detailed image of the Sun's nearest stellar neighbor              | 28   | Mars: the red planet at opposition during April - May, 1999                    |
| 09   | GRB990123: fading visible light fireball in a gamma ray burster                       | 29   | MS1054-03: galaxy collisions in distant clusters                               |
| 10   | Six images showcasing different views of spiral galaxies                              | 30   | Jupiter: an ancient storm in its atmosphere (The Great Red Spot)               |
| 12   | Tarantula Nebula: multiple generations of stars in the brilliant cluster of Hodge 301 | 31   | Giant star clusters near the galactic center                                   |
| 13   | Jupiter: images of the volatile moon Io sweeping across Jupiter's face                | 32   | HCG 87: a minuet of four galaxies  |
| 14   | Copernicus: the 58 mile wide (93 km) impact crater on the Moon                        | 33.a | HE2 104: small, bright nebula embedded in the center of a larger nebula        |
| 16   | NGC4650A: a polar ring galaxy   | 33.b | R136 in 30 Doradus: a grand view of the birth of stars                         |
| 18   | Rings, arcs, and crosses as seen in   | 34.a | R136 in 30 Doradus: two detailed views of a highly active region of star birth |
|      |   | 34.b | NGC1365: a barred spiral galaxy reveals a bulge in its center                  |
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NASA JPL has sent us the following slides for the Mars Pathfinder and Cassini/Huygens missions. Slides are \$1.25 each

# Making Waves: The 1999 Yerkes Summer Insti-

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A buzzer tied to a string  
provided a demonstration  
of the Doppler Effect.

Recipe for a great summer course: Collect two dozen students, place them in labs full of fun stuff like water and Slinkys™, and get them thinking about energy. Last summer (1999) the University of Chicago's Office of Special Programs provided the students; the Center for Astrophysical Research in Antarctica (CARA) gathered the instructors, motion sensors and Slinkys™.



Since 1991 groups of high school students have visited Yerkes Observatory in Lake Geneva, Wisconsin for a week in August, staying at the nearby George Williams College, and working with instructors in labs during the day and at telescopes each evening. The Office of Special Programs chooses the students, trains their leaders, and arranges all the logistics of getting kids and parents from the city to the observatory and back again.

Younger siblings and parents usually come up for an Open House on Friday evening at the end of the Institute. The students have prepared presentations or displays that demonstrate what they've learned over the week, and they act as tour guides around the observatory as well.

The summer of 1999 was the eighth year for the Institute, and largely through the efforts of Chicago science teacher Judith Whitcomb and CARA coordinator Randy Landsberg, it was the most successful program to date.

Students attended lab sessions in the

mornings, afternoons, and evenings, as before, but attended analysis groups between labs. During the group sessions, students quizzed each other about the lab just completed and worked with the instructor on new or unanswered questions. Later in the week, students broke into smaller jigsaw groups, with each student explaining the concepts from a different lab, while the other students asked questions or challenged ideas. This led to much more interaction among students and instructors.

The theme of waves allowed students to survey a variety of topics. Instructors sent their lesson plans to Judith Whitcomb, who wove them into a lab manual distributed to the students just before the institute began.

An ice breaker activity asked students to think of a verb that expressed the essence of different categories of human activity (Art, Education, Medicine, Athletics, etc.) The instructor used the activity to listen to student interactions and assess their ability to define concepts.

Using Slinkys™ and telephone cords, students discussed amplitude, wave length, and frequency. A buzzer tied to a string provided a demonstration of the Doppler Effect. As one student swung the buzzer around his head, other students stood several meters away, listening to the pitch change as the buzzer moved toward or away from them.

Several talented students choreographed a dance to the AstroCapella's Doppler Shift song and shared it with parents during the open house at the close of the Institute.

In another lab students set up antennae to collect television signals. One signal



Right: Using Slinkys™ and telephone cords, students discussed amplitude, wave-length, and frequency.

came straight from the station, while a second signal was reflected from the dome of the 40 inch refractor. The two signals appeared on a television monitor as an image and a ghost. Measuring those two signals and the distances to the dome and television station and working with the scan rate of picture tubes, students calculated the speed of light.

Students analyzed polarization filters to determine the plane of polarization. Sunglasses that cut the glare from lovely Lake Geneva were discussed as well.

Using the ten inch telescope in the South Building, students captured images of galaxies with a CCD and compared the recorded images to what they saw through the eyepiece. They then worked with Hands On Universe software to analyze their images and see how astronomers developed the density wave theory of the appearance of spiral arms.

Water waves were used to demonstrate characteristics of waves, such as reflection and interference. Students became so enthralled with the ideas that they built sand islands on the Lake Geneva beach (during their break time!) to observe the patterns of waves breaking on their island's shores.

A PASCO motion probe and a light sensor enabled students to gather data on distance and velocity. Analyzing their data to determine the similarities and differences in the behavior of mechanical and electromagnetic waves was painstaking.

Night labs included observing the sky with the 40 inch refractor and reviewing the celestial coordinate system with star maps. Partners used ten inch reflectors on loan from the Milwaukee Astronomy Society to star hop across the charts from Consolmagno and Davis's book *Turn Left at Orion*. These activities provided practice. Students used the telescopes to show celestial objects to their parents and siblings during the culminating Open



House.

If you're interested in adapting any of the activities for a camp, teacher workshop,



Space Camp, or summer school, please feel free to do so. The student lab manual is available at our Web site: <http://astro.uchicago.edu/cara/outreach/seysi/1999/>.

*Turn Left at Orion* by Guy Consolmagno and Dan M. Davis, was published in 1995 by Cambridge University Press. The ISBN number is 0 521 48211 9.

Making Waves  
continued

In another lab, students set up antennae to collect television signals. One signal came straight from the station, while a second signal was reflected from the dome of the 40 inch refractor.

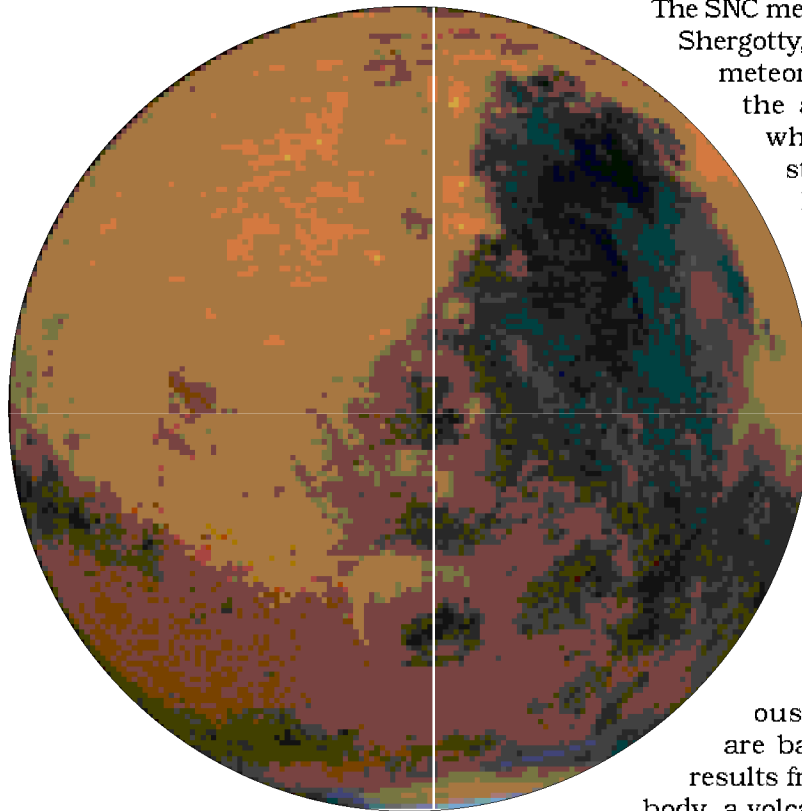
Students became so enthralled with the ideas that they built sand islands on the Lake Geneva beach (during their break time!) to observe the patterns of waves breaking on their island's "shores."

Left: Students attended lab sessions in the mornings, afternoons, and evenings, as before, but attended analysis groups between labs.



# The Martian Origin of the

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The SNC meteorites, named after the Shergotty, Nakhla, and Chassigny meteorites, are a subgroup of the achondrite meteorites, which are non primitive stony meteorites which have undergone some kind of geologic process on their parent body. The SNC meteorites share certain characteristics that indicate an origin on Mars. The following summary outlines the major lines of evidence for a Martian origin for the SNCs:

## Summary

1. The SNCs are igneous (i.e., volcanic); most are basalts. Since volcanism results from interior melting of a body, a volcanic meteorite implies a large parent body since a small asteroid

cannot retain enough internal heat to melt rock. Small asteroids lose their heat to space rather quickly, on time scales of a hundred million years or less. All volcanic meteorites come from bodies at least the size of a large asteroid.

**Key Point:** The SNC parent body is large.

2. SNCs are very young meteorites compared to other volcanic meteorites, such as the lunar achondrites or diogenites. Most SNCs have crystallization ages of about 1.3 billion years; some, like EETA 79001, are only 180 million years old. ALH 84001 is an exception to the youth of the SNCs, with a formation age of roughly 4.5 billion years. In contrast, the youngest dated volcanic rocks from the Moon are 3.3 billion years old. Diogenites, basaltic achondrites from the asteroid Vesta, are over 4 billion years old.



A crystallization age of 180 million years implies that the parent body was very large, at least as large as the larger moons in the solar system, and probably planet sized. A large parent body is required to guarantee that enough heat would be available to sustain volcanism for more than 4 billion years.

**Key Point:** The SNC parent body is a planet sized object.

3. The SNC meteorites contain hydrated minerals, meaning that they formed in the presence of water. No other type of volcanic meteorite contains hydrated minerals, nor do most chondrites. The presence of hydrated minerals indicates that the parent body had water when the basalts originally



formed.

Key Point: The parent body had water.

4. The SNCs were not in space for a long time. Exposure age refers to the amount of time that a meteorite spent in space as a small object. Exposure age is estimated by the number of cosmic rays tracks through the rock and by the amount of damage done to the surface of the rock by cosmic ray hits. The cosmic ray flux is believed to be generally constant, so the amount of cosmic ray damage is proportional to the amount of time that a rock is exposed. SNC meteorites have exposure ages that are shorter than 20 million years (the Dar al Gani meteorites have exposure ages of only one million years, and the Antarctic meteorite EETA 79001 has an exposure age that is only 600,000 years), indicating that they didn't spend a long time in space. These exposure ages are consistent with dynamical simulations of the delivery of meteorites from Mars to Earth.

Key Point: The SNC parent body is close to us in the solar system.

5. Lava traps gases as it solidifies, and the SNCs contain gases. The gases in the SNCs match the characteristics of the atmosphere of Mars, in both the relative abundances and isotope ratios, which were measured by the Viking landers in 1976.

Key Point: The atmosphere of a planet is essentially unique, and the fact that SNCs contain gases that match the atmosphere of Mars is considered definitive.

6. The bulk chemistry of the SNCs matches the bulk chemistry measured at the surface of Mars by the alpha proton x ray backscatter spectrometer on the Sojourner rover in 1997.

Key Point: This is also considered to be a definitive piece of evidence.

Determining the parent body of a meteorite is largely a question of determining what objects cannot be the parent body. When a meteorite is first recognized as such, the parent body could conceivably be any solid body in the solar system, or even from outside the solar system. (All known meteorites over 20,000 of them come from our solar system. The only possible exception to this is the Murchison carbonaceous chondrite which fell in Australia in 1969.) Analysis of the specific properties of the meteorite limits the possible parent bodies.

The fact that SNCs are igneous in origin eliminates most of the asteroids as parent bodies, because they are not large enough to sustain the internal heat for a long enough period of time to produce volcanic rock. This eliminates all parent bodies except for planets and moons, and a handful of large asteroids.

The crystallization ages of the SNCs eliminates the rest of the asteroids and most of the small moons in the solar system, because a large parent body is needed to sustain the internal heat to produce volcanic rock as recently as 180 million years ago some 4.3 billion years after the formation of the solar system. Probably all bodies that are the size of our Moon or smaller are eliminated as potential SNC parent bodies by the crystallization age alone.

The presence of hydrated minerals eliminates more possible parent bodies, because many places in the solar system don't have water. Mercury probably never had any, and Venus hasn't had water for at least 500 million years a longer period than the crystallization age of the shergottites. The moons in the outer solar system have lots of water (in the form of ice), however, but they are eliminated as parent bodies by the exposure ages of the SNCs.

A meteorite that reaches the Earth from the outer solar system will have a long exposure age. Meteorites from the asteroid belt have exposure ages on the order of 4 billion years, so presumably meteorites from the outer solar system have not had sufficient time since the beginning of the solar system (4.5 Ga) to evolve into Earth crossing orbits. The longest exposure age for an SNC meteorite is about 14.5 million years, which implies that the parent body must be close to Earth.

The chemistry of the SNCs is the evidence that is conclusive. In 1983, it was shown that the glasses in the Antarctic meteorite EETA 79001 have the same composition as the Martian atmosphere as measured by the Viking landers in 1976. The following year,

the nitrogen isotopes and the nitrogen/ argon ratios of the SNCs were also shown to be identical to those of Mars. Further evidence was obtained with the Mars Pathfinder mission in 1997, specifically with the data obtained by the Sojourner rover's alpha proton x ray backscatter spectrometer. The bulk composition of Martian rocks was measured by Sojourner, and is consistent with a Martian origin for the SNCs.

#### A Few Notes on the Meteorites

Chassigny fell on 3 October 1815, at about 8 AM. Chassigny stands out as a Martian meteorite because it contains noble gases that do not match the other Mars meteorites or the atmosphere of Mars. Some speculate that the noble gases in Chassigny are derived from the Martian mantle.

Shergotty fell on 25 August 1865 in India. Shergotty shows signs of extreme shock, a fact which makes it difficult to date the original crystallization of the rock.

Nakhla fell in Egypt on 28 June 1911 as a shower of meteorites. One of the Nakhla stones allegedly struck a dog, killing it. Nakhla contains salts, signs of aqueous alteration.

Lafayette was noticed in the geology collection of Purdue University in 1931. Lafayette contains the most water of any of the Mars meteorites, and the most material that has experienced aqueous alteration.

Governador Valadares was found in Brazil in 1958. The specimen appeared shiny and well preserved; some believe that the meteorite was collected soon after it fell.

Zagami fell on 3 October 1962, passing very close to a farmer as it landed. Zagami was the second Mars meteorite that was discovered to have trapped a significant amount of Martian atmosphere. Note that while Zagami and Chassigny both fell on 3 October, the exposure ages do not agree, so a single ejection event for both meteorites is ruled out.

ALHA 77005 is the first of the Antarctic SNCs to have been discovered. This meteorite, along with LEW 88516 (below), shows signs of heavier shock than most of the other SNCs. It is believed that these two meteorites were ejected from Mars at the same time. The orientation of the olivine crystals in the rock indicates that it solidified as it flowed and accumulated.

Yamato 793605 was collected by the Japanese Antarctic Meteorite Collection at the Yamato Hills in 1979. It, like ALH 84001, was originally misclassified as a diogenite and later identified as an SNC. Yamato 793605 seems to be very similar to ALHA 77005 and LEW 88516, but it has an exposure age that is some 0.7 Ma older.

EETA 79001 is one of the most important of the SNCs, because the glass inclusions in it were shown in 1984 to be identical in composition to the Martian atmosphere, thus confirming a Martian origin. EETA 79001 contains two mineralogically distinct regions within it, making a very rare meteorite indeed. One hypothesis holds that the two regions were created in different lava flows, while another holds that one of the regions is an impact melt sheet.

ALH 84001 is the most unusual of the Mars meteorites. It is believed to be the only Martian meteorite that represents a sample of the southern cratered highlands of Mars. Its extreme age, 4.5 Ga, makes it a possible candidate as a piece of the original Martian crust. It is the oldest sample of any planetary body. In contrast, the oldest known meteorite, the Allende carbonaceous chondrite, has an age of 4.56 Ga only 60 Ma older than ALHA 84001. This meteorite spent the longest time in space of any of the other Martian meteorites. Perhaps the most unusual feature of this particular meteorite is the presence of carbonate globules. The presence of the globules is one piece of evidence that McKay et al. used to argue for ancient life on Mars. (I will not attempt to summarize the arguments about ALHA 84001 here. I recommend Allan Treiman's pages at the website of the Lunar and Planetary Institute in Houston, where he summarizes the arguments both pro and con, at [http://cass.jsc.nasa.gov/lpi/meteorites/mars\\_meteorite.html](http://cass.jsc.nasa.gov/lpi/meteorites/mars_meteorite.html))

LEW 88516 is similar to ALHA 77005, but they are distinct due to different terrestrial exposure ages.

QUE 94201 is a basalt, and similar to the dark interior portions of Zagami and part of EETA 79001. There are indications that QUE 94201 cooled very rapidly from the parent melt. Due to its small size (12 grams), samples of this meteorite are not gener

ally available to researchers.

The four Dar al Gani meteorites are believed to be pieces of a larger meteorite that broke up as it entered Earth's atmosphere. The same is believed true of the Los Angeles meteorites and the Sayh al Uhaymir meteorites. In the table of Mars meteorites below I have grouped these meteorites together rather than considering them distinct.

The Los Angeles and the Sayh al Uhaymir meteorites have not, to my knowledge, had formation or exposure ages determined yet (or at least not published), so these values are not listed in the table. I predict that they will have formation ages of 180 million years, like the other shergottites.

Robert Verish, a meteorite collector, found the Los Angeles meteorites in his rock collection on 30 October 1999. He had collected these two meteorites some 20 years ago, and had put them in his rock collection. They were stored in boxes with most of the rest of his collection. When he examined them closely, on 30 October 1999, he suspected a meteoritic origin since they had fusion crusts. He sent samples of each to UCLA for confirmation of their status as meteorites, and UCLA confirmed them on 17 December 1999. Announcement of their membership in the exclusive SNC club came in early January 2000. Los Angeles is currently undergoing further analysis.

Sayh al Uhaymir 005 and 008 were found in Oman on 26 November 1999, just 1.8 kilometers apart. Together these two meteorites have a mass of 9.9 kilograms.

Dhofar 019 was found in Oman on 24 January 2000. The Vernadsky Institute and the University of Tennessee made the classification of Dhofar 019 as an SNC. Based on the bulk composition, it seems to be a shergottite.

Oman is rapidly emerging as the new meteorite hot spot. So far, there are three new SNCs from Oman, as well as a couple of lunar basalts (Dhofar 025 and 026; they probably fell at about the same time, but these two are completely different in composition and texture). As of this writing, there are approximately 150 Omani meteorites awaiting classification.

#### A Final Word

Mars wasn't considered a parent body for the SNC meteorites until 1979, even though it was known as far back as 1872 that the Shergotty meteorite was a basalt. By careful elimination of other parent bodies, Mars has emerged as the only viable candidate for the SNC parent body.

Most of the SNC crystallization ages cluster around two dates: 1.3 Ga and 180 Ma. These dates are consistent with the relative chronology of the surface as determined from relative crater counts of the Martian surface and the estimated impact flux in the inner solar system. Depending on the exposure age estimates, the dates of ejection from Mars cluster around three or four separate impact events.

The SNCs represent samples of Mars, so they are incredibly valuable scientifically. They allow us some insight into processes on Mars and to make predictions about what we will find there. The drawback to using the SNCs for predictive purposes is that we have no geologic context for them; they could have come from many different regions on Mars. We must have the geologic context to go along with samples of Mars to unravel its complicated history, a history that is seemingly rewritten with each new successful mission.

Our view of Mars has changed radically within the last five years. The view that we obtained from Viking told of a Mars that was volcanic and wet early in its history, but mostly quiescent in recent geological time. The view that we have from Mars Global Surveyor and the SNC meteorites is very different, a story of recent volcanism (180 million years is relatively recent to a geologist!), a possible ocean in the northern hemisphere, and maybe, just maybe, early Martian life.

Our view of Mars is still changing, and will continue to change in the coming two decades. More Mars missions are planned, even with the catastrophic loss of Mars Climate Orbiter, Mars Polar Lander, and the Mars Microprobe missions. NASA is currently exploring new mission concepts for Mars, and redefining the scientific goals for Mars exploration. This reexamination is due to be completed in August 2000. The SNC meteorites will play a major role in the definition of these goals.

The four Dar al Gani meteorites seem to be pieces of the same meteorite, as are the two Sayh al Uhaymir meteorites and the two Los Angeles meteorites.

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On a related topic, check out this Exobiology: Origin of Life interactive map at the URL: <[http://calspace.ucsd.edu/marsnow/library/science/exobiology/origin\\_of\\_life2.html](http://calspace.ucsd.edu/marsnow/library/science/exobiology/origin_of_life2.html)>.

It s part of the Mars Science: What we know about Mars section of the Mars Index

# Data for Martian Meteorites

The Martian Origin  
of the SNCs  
continued

Number	Name	Date of Fall / Find	Type	Mass (g)	Crystallization Age	Exposure Age
1	Chassigny, France	3 Oct 1815	C	4000	1.3 Ga	12 Ma
2	Shergotty, India	25 Aug 1865	S	5000	180 Ma	2.6 Ma
3	Hakhh, Egypt	28 Jun 1911	N	10000	1.3 Ga	12 Ma
4	Lafayette, Indiana	1931	N	800	1.3 Ga	~11 Ma
5	Governador Valadares, Brazil	1958	N	158	1.3 Ga	9 Ma
6	Zagami, Nigeria	3 Oct 1962	S	18000	180 Ma	2.6 Ma
7	ALHA 77005	29 Dec 1977	S	482	180 Ma	3.4 Ma
8	Yamato 793605	1979	S	16	180 Ma	4.1 Ma
9	EETA 79001	13 Jan 1980	S	7900	180 Ma	0.6 Ma
10	ALH 84001	27 Dec 1984		1939.9	4.5 Ga	14.4 Ma
11	LEW 88516	22 Dec 1988	S	13.2	180 Ma	3.4 Ma
12	QUE 94201	16 Dec 1994	S	12	180 Ma	2.6 Ma
13	Dar al Gani 476	1 May 1998	S	2015	180 Ma	1 Ma
	Dar al Gani 489	1997	S	2146	180 Ma	1 Ma
	Dar al Gani 735	1996 or 1997	S	588	180 Ma	1 Ma
	Dar al Gani 670	1998 or 1999	S	1619	180 Ma	1 Ma
14	Los Angeles 001	30 Oct 1999	S	452.6		
	Los Angeles 002	30 Oct 1999	S	245.2		
15	Sayhal Uhaymir 005	26 Nov 1999	S	1344		
	Sayhal Uhaymir 008	26 Nov 1999	S	857.9		
16	Phobos 019	24 Jan 2000	S	1056		

THE DEADLINE FOR THE NEXT ISSUE OF SOUTHERN SKIES IS OCTOBER 1. SEND SUBMISSIONS ON A 3.5 DISK OR VIA EMAIL ATTACHED FILE TO DTEAGUE2@MIDSOUTH.RR.COM OR TEAGUE1@TEN.NASH.TEN.K12.TN.US

tions Dave and Joe!

This year was also an election year. All SEPA Council offices were open for election or re election. We had two outstanding candidates for President Elect: Pat McQuillan and Michael Sandras. Both individuals would perform admirably as our leader. It is unfortunate that only one could be chosen. Your new President Elect is Michael Sandras. Congratulations Michael! Other offices will remain the same, since both ran unopposed. I think most people realize what an asset we have in Duncan Teague and John Hare. Both of their positions require lots of time and/or travel. We are fortunate to have two such talented individuals so willing to help our organization. Thank you John and Duncan!

The conference featured distribution of SEPA's infomercial Saving the Night. The debut was opening night at SciWorks after the reception. Everyone seemed to enjoy it. Every dome/member took home a personal copy. If you weren't there, don't worry. We plan on mailing out all members copies, and many of you should have received yours by the time this journal reaches your mailbox. If you receive two, please return the extra one. We're trying to distribute one copy per dome, and it's

possible two could arrive by accident.

The QuickTime™ movie version of the star show has been forwarded to International Dark Sky Association headquarters in Tucson, Arizona. They will make it available to anyone who requests it at a small duplication cost. I've proposed to Meade Instruments Corporation the idea of bundling the QuickTime™ CD with new telescope sales. Only time will tell how this part of the project will turn out. Perhaps by the autumn issue of Southern Skies I'll have a favorable update to report. I'd like to thank again all those who helped put this show together. Thanks for pulling together as a team! You can see their names listed in the script folder for the show.

Special thanks go to all the vendors and sponsors who supported this year's conference. We could not have done it without their help. Those who helped sponsor this year's conference are noted on the back cover of this journal. Please let them know, whether in conducting business or just socializing, how much you appreciate their support.

Clear DARK Skies, G.F.

## Paul Campbell Fellowship Award Nomination Form

Nominees must have been a member of SEPA for at least ten years, and they must display qualities in each of five areas, as represented by the five pointed, star shaped award: integrity, friendship, service, knowledge, and vision.

Please submit this form to any SEPA Council member.

Nominee's name:

Qualifications:

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# *Southern Skies*

VOLUME 20, NUMBER 3

JOURNAL OF THE SOUTHEASTERN PLANETARIUM ASSOCIATION

SUMMER 2000

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The Southeastern Planetarium Association wishes to acknowledge the organizations which so generously sponsored our conference in Winston Salem.

Thank you.

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