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**Executive Editor**
John Mosley
Griffith Observatory
2800 E. Observatory Road
Los Angeles, California 90027 USA
(1) 323-664-1181 daytime phone  
(1) 323-663-4323 fax
jmosley@GriffithObs.org

**Advertising Coordinator**
Robert J. Bonadurer
Director, Minneapolis Planetarium
300 Nicollet Mall
Minneapolis, Minnesota 55401 USA
(1) 612-630-6151  
(1) 612-630-6180 fax
rjbonadurer@mpls.lib.mn.us

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Director, Theaters & Media Services
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Wichita, KS 67203 USA
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(1) 316-263-4545 fax
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Past President
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BGSU Planetarium, 104 Overman Hall
Physics & Astronomy Dept.
Bowling Green State University
Bowling Green, Ohio 43403 USA
(1) 419-372-8866
(1) 419-372-9938 fax
dsmith@newton.bgsu.edu

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Agnès Acker
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91, rue de l'université
67000 Strasbourg France
(39) 0 90 24 24 67
(39) 090 24 24 17 aox
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acker@astro.u-strasbg.fr

Association of Mexican Planetariums
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Museo Tecnológico C.F.E.
Apdo Postal 18-816
C.P. 11870, México City, México.
(52)55 16 13 57
(52)55 16 55 20 aox
eastrop@hotmail.com

Association of Spanish Planetariums
Antonio Camarasa
L'Hemisfèric
Avenida Institutio Obrero de Valencia
Esquina Autovia de El Saler
46013 Valencia Spain
34 96 33 55 331
34 96 33 55 331 aox
acamarasa@ac.es

Australianian Planetarium Society
Glen Moore
Planetarium, School Centre
University of Wollongong
Northfields Ave., Wollongong, NSW 2522 Australia
61 2 42865000
61 2 4286 3336 aox
kgm+AEAustralia.edu.au@apsweb

British Association of Planetaria
Teresa Grafton
London Planetarium
Marylebone Road
London NW1 5LR England United Kingdom
44 171 487 0310
44 171 487 0286
44 171 465 0862 aox
Teresa.Grafton@madame-tussauds.com

Canadian Council of Science Centres
John Dickenson, Managing Director
Pacific Space Centre
H.R. MacMillan Planetarium
1100 Chestnut Street
Vancouver, British Columbia V6J 3J9 Canada
(1) 604-738-7817 ext.234
(1) 604-736-5665 fax
jduckens@hrmacmilmanspacecentre.com

Council of German Planetariums
Dr. Wolfgang Wacker
Planetarium Mannheim gGmbH
Volkswagen-Holl-Allee 1
(Europlaza)
68165 Mannheim Germany
(30) 1 941 1181
(30) 1 941 7322 fax
dpastro@ukonline.de

European/Mediterranean Planetarium Association
Dennis Simopoulos
Eugenides Planetarium
Syntagma Avenue-Amfitea
Athens Greece

Great Lakes Planetarium Association
Susan Reynolds Button
Onondaga-Cortland-Madison B.O.C.S. Planetarium
P.O. Box 4754
Syracuse, New York 13221 USA
(1) 315-433-2671
(1) 315-433-1530 fax
sreynoldz@cnyc.org

Great Plains Planetarium Association
Jack Dun
Ralph Mueller Planetarium
University of Nebraska-Lincoln
210 Morrill Hall
Lincoln, Nebraska 68588-0375 USA
(1) 402-472-2641
(1) 402-472-8899 fax
jdun@spacelaser.com

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info@serafinizoni.it

Japan Planetarium Society
Soshi Ichikawa
Planetarium Ur
Suginami Science Education Center
3-3-13 Shimizu, Suginami-ku
Tokyo 167-0033 Japan
(81) 3 3396 4393
(81) 3 3396 4393 fax
KHF11056@nifty.ne.jp
shoho@ba2.so-net.ne.jp

Mid Atlantic Atlantic Planetarium Society
Prof. Connom
orion@li.net

Nordic Planetarium Association
Lars Broman
Broman Planetarium
Ostra Hamngatan 1
S-791 71 Falun Sweden
(46) 2310 177
(46) 2310 137 fax
lib@teknonland.org
http://www.rrm.se/ont/xtra/tc-wnpa.html

Pacific Planetarium Association
Jon Elvert
Lane ESD Planetarium
2300 Leo Harris Pkwy.
Eugene, Oregon 97401 USA
(1) 541-461-8227
(1) 541-467-6459 fax
elvert@lane.k12.or.us
http://www.pfn.org/~esd_plt

Planetary Society of India
Prof. G. Sopanen
Director, Astronomer
Innovative Learning Technologies and Open Skies
No. 3, 9th Lane, Indranagar
Adyar, Chennai 600 020 India
91 44 4184847
profgos@satyam.net.in

Rocky Mountain Planetarium Association
Christine Shupla
Arizona Science Center
600 East Washington Street
Phoenix, Arizona 85004 USA
(1) 602-716-2078
shuplac@AZSCIENCE.ORG

Russian Planetariums Association
Zinaida S. Pokhvalinskii
7-A, Yezd, 30 Nizhny Novgorod Planetarium
5-A, Yezd, 30 Nizhny Novgorod, 603 060 Russia
(7) 831 230 51 51
(7) 831 2 30 51 66 fax
plan@sandy.ru

Southeastern Planetarium Association
John Hare
Ash Enterprises
3602 23rd Avenue West
Bradenton, Florida 34205 USA
(1) 941-746-3322
(1) 941-750-9497 fax
jhare@aol.com

Southern Planetarium Association
Shawn Laatsch, Director
GHeens Science Hall & Rauch Planetarium
University of Louisville
108 West Brandeis Avenue
Louisville, KY 40292 USA
(1) 502-852-5855
(1) 502-852-0831 fax
10242 1032.compubserver.com

Southwestern Association of Planetariums
Mark S. Sonntag
Professor & Planetarium Director
Department of Physics
Angelo State University
San Angelo, Texas 76909 USA
(1) 915-942-2136
(1) 915-942-2188 fax
Mark.Sonntag@angelo.edu
msonntag@physics.angelo.edu

Ukrainian Planetariums Association
Ivan Knachkov
Kiev Republican Planetarium
57/3 Krasnoarmeiskaya Street
252005 Kiev, Ukraine
7 44 227 27 81
7 44 227 51 66
7 44 227 51 43 fax
kievpl@sovam.com

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(1) 419-372-8666
(1) 419-372-9938 fax
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(1) 315 432 4532 fax
sreynold@cnycrc.org

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Cosmic Spaceflight 101
Lessons I Learned Flying to the Edge of the Observable Universe

James S. Sweitzer, Ph.D.
Rose Center for Earth and Space
American Museum of Natural History
Central Park West at 79th Street
New York, New York 10024

Many late nights in November of 1999, I wished I still had the Zeiss Mark VI projector I knew so well from my years at the Adler Planetarium. With it I could easily imagine ahead of time what it could do and where it could take me. With the Mark VI, I would have avoided many headaches, only having to worry about controls for diurnal and latitude and annual motions. Life was less stressful with that older, earth-bound projector. But, that wasn’t the case now. During those long autumn nights of the last few months of the 20th Century, my production team was trying to find their way billions of light years into virtual space. And we were having major problems just driving a mere ninety light minutes to Saturn!

This was the month when we were finishing the digital camera choreography of the opening planetarium show being produced for the new Hayden Planetarium at the Rose Center for Earth and Space. Our new digital planetarium in the Rose Center’s Hayden is the most advanced in the world. We use a high-resolution Triimension digital projection system with seven 12” CRT projectors. It is fed by a multiple graphics-pipe, Silicon Graphics Onyx II supercomputer. Those nights in November we had loaded in data sets that described our Solar System. We were simply trying to travel from the Earth to Saturn, visiting Mars and Jupiter along the way, but we were repeatedly foiled by the enormity of the task of flying in three dimensional space with its full translational and rotational degrees of freedom, past effectively microscopic astronomical objects. Time after time we failed to make the trip to Saturn successfully. How would we ever make it to the edge of the Observable Universe?

We had not anticipated that simply racing to Saturn would be one of the most difficult segments of our show, but it was. And there were to be many other challenging legs of the trip before we finished the program for our gala opening event on the night of 12/31/99. To add to my anxiety, this was also the night the millennium bug was due! But the new planetarium show, Passport to the Universe, accomplished the goals we set for it, including astronomical attendances of over 1.5 million viewers in its first year alone. This article highlights some of the adventures experienced during the production of this show. It’s a recounting of what it was like for me to go through a crash course in what I call Cosmic Spaceflight 101.

Objectives and Resources

The goal of the opening space show for the new Hayden Planetarium was uncomplicated. We would use the full power of our digital systems to transport audiences along a single continuous flight path from the Earth, race under the outer planets, fly through the nearby stars, plunge into the Orion Nebula, spin out from our Galaxy, and finally cruise like a rocket deep into intergalactic space until we were many billions of light years from home. It was to be one nonstop flight spanning a size scale change of a factor of $10^{19}$! There would be no jump cuts, and we aimed to use real scientific data sets the entire way. We wanted our audience to experience the architecture of the Universe.

We would not have been able to even contemplate such a journey but for a couple of reasons. First of all, by the late 1990s, computing and video technology had finally matured that would enable us to display the necessary astro-
nomical data sets in three dimensions on a dome. Much of the visualized data sets could be projected in real time with our powerful SGI computers, but some visualizations like that of the Orion Nebula in the middle of our show, with its diffuse surface of ionized gas, could not. This was simply too huge a task for any computer to do in real time. Although the Orion Nebula appears for only two minutes, it required 10,000 processor-hours to render! This brings me to the second reason we dared to chart this voyage, and that is the help of our computing partners. We could not have performed the necessary computing for this and other scenes without the assistance of the San Diego Supercomputer Center (SDSC) at the University of California, San Diego, and the National Center for Supercomputing Applications (NCSA) at the University of Illinois. They were key players in a large, talented production team. (See the acknowledgements at the end for a more complete listing.)

But in this paper I'm going to focus on the unique lessons I felt were the most fascinating to a planetarium astronomer as we learned to navigate realistically the virtual worlds constructed from the astronomical data. Many other critical tools and processes were necessary to accomplish this challenging show, beyond the 3D navigational ones described here. For example, the stars as seen from Earth are projected in our theater by the unparalleled Zeiss Mark IX. Although it wasn't used for the majority of this particular show, our new Zeiss always takes the audience's breath away. The audio compositions and effects had a huge effect on the program too. But the story of the navigation may be the most interesting for those of us working to understand the sea change faced by planetariums going digital. Much of the success in creating a willful suspension of disbelief was due to how convincingly we could fly the audience into deep space. A clumsy flight would have destroyed the illusion of being there.

**Breaking Through The Crystalline Spheres**

Fundamentally, planetariums project images of the astronomical world onto hemispherical domes. It is easy to comprehend the Ptolemaic universe in a traditional planetarium because with its fixed constellations it duplicates the celestial sphere so well. But many of us never truly grasped 3D space in a planetarium dome until the first Evans and Sutherland Digistar projectors. Many domes are inclined to the horizontal, but the Hayden dome is traditional only in that it has flat horizon. Because of our dome's horizontal orientation, we needed to use as much of the screen as possible in creating our illusions. We could not rely on simply zooming straight into relatively tiny objects the way video or unidirectional theaters might. We relied heavily on the power of immersive motion cueing to achieve our 3D effect. During the early production stages, when we first tried out our system by simulating horizontal motion of the stars and the Galaxy through the theater, we were all surprised with how realistic motion cueing can be in creating the illusion we were actually in space.

**Scientific data sets were the vertebrae that formed the backbone of this show.** Except for the close-up scene of the Orion Nebula and most of the extragalactic scenes, the data sets we needed from the Earth out to a few hundred thousand light years were combined to make what we called the Digital Galaxy. The work to construct this galaxy and perform the other required visualizations was funded by NASA. From early 1997 on, we described the Digital Galaxy as the first true digital atlas of the Galaxy suitable for planetariums. It was organized into three realms: Solar System, stellar and galactic.

The Solar System realm was made up of planets with texture maps from NASA missions. For this first show at the new Hayden, the planets were placed to scale in their locations on 2/19/00, the first day we opened to the public. In retrospect, this attention to an specific day constrained our flight out of the Solar System to an extent that would give us serious headaches late in 1999. We could have just placed the planets anywhere we liked and then flown past them, but we were loath to tamper with the accuracy of our virtual universe.

At the interstellar scale, we filtered the European Space Agency's Hipparcos data set to represent some 25,000 nearby stars. For the rest of the stars in the Galaxy, we relied upon a theoretical distribution of 900 million stars spanning the entire Galaxy, as theorized by Hayden astrophysicists Ron Drimmel, Frank Summers and Neil Tyson. Within the Galaxy, the only gaseous nebula we flew near and into was the Orion Nebula. For it, we used the popular Kitt Peak National Observatory image from far away and then used a 3D model created through great effort led by the Rose Center's Carter Emmart, and modeled by Erik Wesselak also of the Rose Center, working with the San Diego Supercomputer Center's Dave Nadeau and Jon Genetti. Orion visualizations were based upon HST data and the astrophysical models of the scientists who made those Hubble observations: Robert O'Dell and Zheng Wen while they were at Rice University.

**Isaac Newton Versus the Flying Saucers**

One of the arguments scientists use against UFO sightings is that the lights seen in the sky are often reported moving in ways that violate Newton's laws of motion. In other words, if indeed a flying saucer could execute a nearly instantaneous right-angle turn you can be assured that the acceleration would emulsify or pulverize any alien pilot we could envision. But we know from playing video games that computer imagery need not conform to Newton's Laws. When we first started looking at real time simulations of planets and galaxies in our dome, I was struck by how sensitive people are to what I call **UFO moves** - those motions that violated the laws of inertia. Anyone who has donned a virtual reality helmet knows how nauseating motion in uncontrolled digital environments can be. We found two tricks to keep viewers feeling they were still under Newton's sway.

First, we made sure the flight paths were graceful and banked the way an inertial space craft or airplane might bank. If it felt right, it usually was right. But we also performed a second trick that made a big difference in fooling people into think they were
really moving. It was using our audio system. We installed a large array of speakers throughout our theater. In particular, we bolted small transducers under every seat to enable us to deliver low frequencies rumbles and other sound effects directly to each audience member. Overused, such audio devices can be annoying and fatiguing. We learned to use them judiciously, however. We rumbled the seats on two types of occasions, achieving the illusion of flying in an inertial world: whenever we accelerated, we rumbled the seats. If a large, massive object, such as a planet loomed overhead, we rumbled to make audiences feel the mass of the object. We didn’t need to do shake people up too often, because most of the time we were far from any planet or star.

**Motes in a Cosmic Ocean**

As astronomers we all know intellectually that the Universe is extremely large and empty. Astronomical objects in it are very small compared to the spacing between them. But close attention to the mathematical concept of cosmic scale and careful readings of Carl Sagan’s books could not prepare me for the reality of navigating a scale-model Universe. Typically, factors of four or five orders of magnitude separate each astronomical realm. I got my first glimpse of these chasms when testing the Solar System realm of the Digital Galaxy. Leaving the Earth, the Moon flashed by in the blink of the eye. Flooring the accelerator brought Mars into view relatively quickly, Jupiter then loomed bright and only a leisurely jaunt away. But, once beyond Jupiter, driving to Saturn seemed to take forever - the outer Solar System felt like a cross country trip between small towns in the Midwest.

With a traditional planetarium projector plus a few strategically located video projectors, all one needs to simulate a trip across the Solar System is to cross-dissolve zooms into the planets one after another and forget about the background stars. Yet with our scale digital model making such serial dissolves was impossible. We had to move quickly and also see the tiny planets - a daunting challenge. The Rose Center’s Carter Emmart described the planet encounters as if he was, “driving a Formula One racing car from full speed to braking so as to perform a hairpin turn around a blade of grass.” To complicate matters, dashing into deep space required motion that had to be inertial too. In effect now we had to slam on the breaks and skid to allow graceful looks at the planets. Then once we had viewed the planet, we had to regain our traction and slam the accelerator to the floor to make it quickly to the next planet. I now have an appreciation for the precision and variety of tempo required of deep space NASA missions that I wouldn’t have had otherwise. Shifting gears to head out into interstellar space also led to a curious and humbling moment.

The flight to Saturn was followed with an accelerating sprint out of the Solar System. At the beginning of the move we glided out in such a way that we could look back and see the entire Solar System shrink away slowly. I insisted that we needed to make sure and direct our path properly for our next destination, the Orion Nebula, some 1,600 light years away. Remember, we didn’t want to make any jump cuts. So, we went through a tremendous amount of effort to try and direct our motion carefully for this next step in our flight. But the fact is, we didn’t really need to. This is because it didn’t matter what direction we were moving in. When transitioning from interplanetary to interstellar flight, we had to increase our virtual speed of motion some million times simply to make it to Orion as quickly as we had traversed the Solar System! It didn’t matter how we had been moving in the past at all. When we jumped to the interstellar realm, our previous path was but a point compared to the grand interstellar swoop we would now take. Each lower scale realm was a mote in the next larger realm. I kick myself that we didn’t think of what this would be like once we shifted gears. Our effective flying speeds increased as quickly as the scale changes occurred. As the show production continued, I now knew I was either mad or going crazy at warp speed. I still cannot get over how insufficient my book-learned cosmological knowledge was when confronted with a real scale model cosmos.

**Gentle Spirals**

By this point of our show, the virtual spacecraft was in second gear and traveling nearly 50 light years per second through the Hipparcos data set of nearby stars. Stars streamed by rapidly as we hurtled towards the Orion Nebula. At this scale the motion was very simple and satisfying. From now on the show would be much easier to navigate, in part because the detailed objects we would zoom into or away from could now be composited into the scene. But I was yet to learn a surprising tactic from Carter Emmart, our lead science visualizer and art director, as he planned the subsequent flight path. This tactic enabled us to fly through complex regions like that of the Orion Nebula in a way that we could perceive the true spatial structure and scale of all its features. Carter and Erik Wesselak had worked hard with astrophysicist Robert O’Dell of Rice University and programmers from SDSC to insure that the nebula, including its stars, proplyds, ionization fronts, dust regions, and shock waves, was accurately modeled. But it was an alien landscape to be sure, even for astronomers like myself who have spent a half my life gazing at the Kitt Peak image of the Orion Nebula on my office wall. The real 3D nebula is far more complex than any 2D picture can depict, including structures at
many scales. We needed to take it all in, but then plunge through it on our way out of our Milky Way galaxy.

Carter’s solution was to not merely dive in head first, but to pay special attention to keeping our hydra-headed digital camera moving all the time. So, he outlined a careful path in which our virtual flight traced a spiral on the outside of a constricting cone with the center of the nebula at the apex. As we swooped in, we spun around as the spiral tightened and slowed. Besides simply helping audiences see things in 3D without special glasses, Carter used this path as a way to allow us to get closer to the small features of the nebula, such as the nascent solar system HST10. Slowing up all the while, Dave Nadeau of SDSC also suggested we continually change our direction of flight vector with respect to the radial chord from the point about which we were moving. At first, I feared Carter and Dave were proposing an unnecessarily complex flight path. But their instincts turned out to be perfect. Audiences could take in all the structure of the nebula in this graceful gyration, feeling more like a circling hawk than a dive-bombing falcon. The plunge ended in the nebula’s thin ionization front. Luckily, beyond the HII region we see from Earth looms the huge, dark Orion Molecular Cloud. We used the darkness it provided to further re-orient ourselves and shift into high gear. We would need to be moving much faster to whirl out of the Milky Way.

And spin again we did. By the time we left the Orion Molecular Cloud we began to accelerate until we reached a virtual speed that would exceed thousands of light years per second. Now, because we wanted to give people a bigger and bigger perspective, we would keep the theater’s zenith always oriented opposite our direction of motion. It was as if we were falling out of the Galaxy. But this time Carter specified a flight that was, in many ways, a reverse of our path into Orion. Now we spun outward on a trajectory that was ever widening as it accelerated. When we left the disk of the Milky Way and could view our entire galactic home, we did so in an orbit that widened and moved from one side of the galactic plane to the other.

The net result was that we could truly take in all the structure of the nebulae come to life.

Entrances, Exits and Fly Unders

Our continuing journey in the show still held a few surprises and lessons as we blasted deep into the Observable Universe. So far we had made a nearly impossible racing slalom to the outer Solar System, winged our way towards Orion, spiraled into the nebula, then lifted off out of our Galaxy. Now, we were effectively accelerating in reverse, looking back while our Milky Way shrank away at hundreds of thousands of light years per second. And we continued to do it in a way that Newton would approve of. (Einstein may not have, but I’ll deal with him later!) We were entering intergalactic space and learned quickly to keep this trajectory as simple as possible - ballistic, like that of manned Moon rockets.

Our three dimensional extragalactic data bases were beyond what the real-time Digital Galaxy model could handle when we were producing the show. We now have galaxy data bases we can manipulate in real time, but we couldn’t at the end of 1999. So then we turned to colleagues at NCSA and prepared to use the galaxy data of Brent Tully. We actually choreographed this part of the show a couple of months before the Saturn flight that gave me so many headaches. This one didn’t give us many problems because of the skill, experience and tools of the NCSA team led by Donna Cox. But, we had to travel to Urbana, Illinois, to choreograph the flight in their CAVE (a small virtual reality theater that holds four people comfortably) since our Hayden theater was not yet ready. We had chosen to use an SGI computer system in great part because it is the high performance simulation computer of choice for scientists working in science visualization. This meant that anything that could be visualized or run on an OpenGL system, like those at NCSA, could be run in our dome. OpenGL data can now be manipulated on laptops so these data will soon evolve to much more economical computer systems.

Initially, we intended to rocket out of our Galaxy and encounter other galaxies head-on as we shot far into extragalactic space. Our first flight path tests incorporated this type of trajectory and it was a wild experience. We hurtled past galaxy after galaxy on our way through the Virgo Supercluster. Just like the planets, galaxies are tiny compared to their separation, so it’s only when we got close to them that we could see them as actual disks or ellipsoids. But this move was making me sick in the CAVE and really didn’t help advance the theme of the show. So, I decided that we should keep the path as simple as possible - just fall away from the Milky Way as if we were on a ballistic trajectory at very high speed. Looking backwards, the Galaxy would then gradually join larger
and larger extragalactic structures.

To still keep the flight interesting, we decided to bring M31 and M33 onto the dome from below the horizon on separate sides of the theater. We cruised backwards right between these two nearest spiral galaxies. Not only does this entrance surprise the audience into paying attention to our neighbors, it also makes the galaxies appear big enough so people can’t miss them. If we’d taken a path that zoomed in on them, then we would have had to make sure and point them out when they were far away. In retrospect, we might have been able to achieve better depth cueing of the Tully atlas of galaxies if we had taken a sinuous path, but at least this way made matching this data set onto Ostriker’s much easier.

Horizon-level entrances work well in our dome. Falling backward past something big, like M31, is amazing. Flying under large objects is extremely exciting too. This worked well for Saturn with its large rings and it is also effective for the plane of the Galaxy. (We experimented with the latter many times, but decided not to save it for a future show.)

Once away from the horizon, the Local Group of galaxies shrank and converged near the Zenith. Picking up speed fast, we backed away from our corner of the Universe and could see the Virgo Super Cluster of galaxies to shrink down to a tiny knot of light. It then became just one intersection in the 3D network of superclusters that make up the joints in the grand design of our Universe.

Immersed in this complex, tangled structure, the problem we had to solve now was to help people see the geometry of the pattern. When simply static, this structure is confusing because we only see what looks like a chaotic Jackson Pollock drip painting. The solution again was to put the flight path into a sinuous curve. This caused the network structure to pop into three dimensions. It provided the perfect ending to the show as it revealed in the 3D web-like superstructure of the Cosmos.

Breaking Einstein’s Speed Limit

At the show’s climax far out in extragalactic space, we were effectively traveling far in excess of the speed of light. You’d think we’d have been pulled over by the cosmic speed cop, Professor Einstein. We were traveling at a rate of about 100 million light years per second. This comes out to a speed of around $3 \times 10^{15}$ times the speed of light! (It’s doubtful any cosmic cop could have caught us.) In fact, we started traveling faster than c within seconds of leaving the Earth. Should we have gotten away with this? I’ve had some interesting and sometimes heated discussions about this with several colleagues. Yet I believe we were justified in seemingly violating physical laws.

The goal of the show was a cosmographical one, not an attempt to teach the laws of physics. The script always clearly stated that we were exploring a virtual “map” of the Universe and not simulating actual space-flight. The argument can be made that because of the power of the visual scenes we nevertheless, inadvertently, cause audiences to think such travel is possible. That may be, but I feel that helping people construct a seamless model of the entire Universe in their minds is worth the risk. The so called “locale memory” this show formed in people’s imaginations is a rapid, powerful and lasting way to learn. Such memories are based upon a continuous experience of a location or map.

Another digital show which takes into account Einstein’s theories of relativity would be exciting. Digital planetarium systems are geometry machines and thus ideal for generating relativistic experiences. In principle, all one would have to do is to program in the transformations. We might then see stars as they would really appear to a relativistic traveler - abberated and Doppler shifted - an interesting sight, but difficult to explain. (A challenge we will want to confront in the future.) In a relativistic show, however, I’d miss the star streaming. When the stars sail by in a digital theater, it never fails to elicit gasps from the audience, just the way a stunning, static, starry sky does. I’m not sure I’d want to give up creating that reaction.

Returning Home

Sailing back to Earth at the very end of the show was a breeze because we were in a simulated Universe. We simply brought the...
How Tycho Brahe Really Died

Aase R. Jacobsen
Planetarium Curator
The Steno Museum
C. F. Møllers Allé bygn100
DK-8000 Århus C, Denmark

Lars Petersen
Planetarium Director
Orion Planetarium
Søvej 36 Jels
DK-6630 Rødding, Denmark

This famous Danish astronomer died in Prague on the 24th of October 1601, eleven days after he had attended a banquet at the Bohemian count of Rosenberg. Tycho was too courteous to obey the calls of nature during the hour-long dinner and finally his bladder burst, which led to his death. Or so the story goes. But is this the real cause of Tycho’s death? Is it at all possible to die from a burst bladder? Or are there more likely explanations of his death?

In 2001 we commemorate the 4th centenary of the death of Tycho Brahe, perhaps the first scientist in a modern sense.

Modern scientific investigations and analyses have given us new insight on the circumstances in those fateful days in Prague, October 1601. Three contemporary sources are available to diagnose Tycho’s last illness.

Johannes Kepler recounts in Tycho’s observation log that during the banquet with plenty of food and drink, Tycho Brahe didn’t want to empty his bladder and would wait until he got home; however he was unable to do so. After five sleepless nights he produced bloody urine, suffering great pain. Then followed more insomnia, fever and delirium. On the 24th October he passed away peacefully after hours of delirium exclaiming: “Have I not lived in vain!”.

Tycho’s friend, the doctor Johann Jessenius Jensen, states in his funeral sermon: “Then followed urine retention (lacking ability to pass urine) and great pain, by which the blood was attracted causing cystitis with accompanying continuous fever. Of this came a slight delirium.”

A note from the German doctor Johannes Wittich who visited Prague tells that Tycho died between 9 and 10 in the morning of the 24th October: “A stone made Tycho unable to urinate and he died from a burst bladder.”

All three sources point to the fact that Tycho suffered prostatic hypertrophy (enlargement of the prostate gland) or another disorder of the urinary system followed by uremia. However, at that time it was known how to insert a catheter and relieve the pain that way and Tycho was rather young (54 years) to suffer from prostatic hypertrophy. Why wasn’t that done? Could there be other explanations of his death?

After Tycho Brahe’s death, rumors arose that he had been victim of a poisoning case, and since the symptoms are in accordance
with heavy metal poisoning and poisoning by certain plants this possibility must be taken seriously into consideration. The motive for poisoning could be both political and religious since neither the catholic council nor the nobility were pleased with the influence this protestant had gained on the weak emperor Rudolf II in Prague.

To my knowledge this is the first time the story about Tycho Brahe's accidental suicide is printed in English.

The first medical-legal investigation was made possible in 1991 when a small box (at a Danish flag ceremony on Tycho Brahe's grave in the Teyn Church in Prague) was handed over to the newly appointed Danish ambassador in the Czech Republic by the director of the Czech National Museum as a gift to the Danish government. The box contained a piece of shroud and some beard remnants. A small note explained that these items originated from the opening of Tycho's grave in 1901 on the third centenary of his death, where the city authorities of Prague wanted to restore the sepulchral monument, and at the same time they investigated the rumour that Tycho's corpse had been removed in 1620 when the Catholics took power in Bohemia. The grave was somewhat damaged and it contained a male corpse, very likely that of Tycho Brahe since part of the nose was missing, but no bladder stone was found! In addition, a female corpse was discovered, possibly that of Tycho's wife Kristine Barbara, who outlived him by a few years.

When the beard remnants arrived in Denmark the director of the Ole Rømer Museum in Copenhagen, Claus Thykier, took the initiative for the item's transference to the Institute of Forensic Medicine at Copenhagen University for a possible clarification of the rumours of poisoning. The leader of the institute, Bent Kæmpe, consented to such an investigation, concentrating on arsenic, lead, and mercury by using an atomic absorption spectrometer.

Of the 4 cm long beard, 0.123 gram were used for the analysis. By using this method on a single strand of hair or beard, it is not only possible to determine the concentration of a certain element but also the time since exposure to the poison. Hair (and beard) will grow at a certain rate, and by locating a high concentration of, for example, arsenic at a specific place on the hair, it can be calculated when the person was exposed to arsenic.

In Tycho Brahe's beard a relatively high amount of lead compared to the present population was found, so it can not be excluded that Tycho died from lead-poisoning. But more likely, the lead content could be caused by the historical fact that lead frequently was used in kitchen ware, water pipes and as a wine-sweetener. Also environmental influences such as lead in the coffin may have given a high concentration of lead in the beard.

The concentration of arsenic was not found to be high enough to have caused the death of Tycho Brahe.

However, the beard contained a much higher concentration of mercury than normal. Taken in consideration with the description of his illness, uremia, shortly before his death, this corresponds with symptoms of poisoning by mercury.

It is well known that Tycho, apart from being an astronomer, also had a great interest in chemistry and medicine, and he composed different medicines. Mercury is a well known ingredient in medicine in those days, and it is possible he composed medicines containing mercury and had taken such medicines shortly before his death.

Unfortunately, in this first forensic investigation, the beard from Tycho did not leave any trace of root remnants. So it was not possible to determine how long a time before his death Tycho was exposed to mercury, nor if the mercury was taken over a short or longer period of time.

In 1996 it was possible to carry out another analysis using the PIXE-method (Particle Induced X-ray Emission) by J. Fallon at Fysiska Institutionen at Lund University, Sweden, this time on hair from Tycho with the root preserved. The result was that the mercury was not from an outside source but actually had been digested.

Using the growth rate of hair it was concluded that Tycho was poisoned by mercury one day before his death.

These forensic investigations show Tycho Brahe died of mercury poisoning. Even though it cannot be excluded, it is not likely that Tycho was murdered, but most likely he conducted his own death by using his own mercury-rich medicines the day before his death. This was done to help cure his disorder of the urinary system (prostatic hypertrophy or less likely bladder stones, since no stones were to be found in the coffin). It was not a burst bladder caused by his courteousness, but mercury in his own medicines that led to the uremia of which he died.

Adapted from:

Claus Thykier, Skalk 1994, vol. 1, p. 18
Bent Kæmpe & Claus Thykier, Naturens Verden 1993, vol. 11-12, p. 425
Jan Tapdrup in Tycho Brahe, Skoleljenesten Øresund (Marianne Bomgren & Lotte Suhr ed)
Special Effect Control Using PC Printer Port

Piyush Pandey & Avijit Biswas
M. P. Birla Planetarium
96 Jawaharlal Nehru Road
Kolkata 700071
India
91-33-2231516 phone
91-33-2827344 fax
netleech@vsnl.com

While reading the very informative article “Computer Control of Multiple Video Projectors” by Prof. Bert Thiel in the September 2001 issue of the Planetarian (Vol. 30, No. 3), we got the inspiration to share our experience about automation with the readers of the Planetarian. Under item, Special Effects, Prof. Thiel mentions a visual basic program with which he turns the special effect devices “on” or “off.” Last year we developed such a programme using QBASIC 4.7. This programme works like a GUI (Graphical User Interface) and addresses a parallel printer port. You can connect as many as eight special effect devices (or for that matter any electrical gadget) to the printer port as shown in Figure 4, through appropriate interface circuitry, of course.

Please take the following steps.

#1. Visit the first author’s website http://www.geocities.com/bokia and follow the link GUI for Control of Electrical Equipment Using Printer Port at http://www.geocities.com/bokia/gui.htm and download the GUI.ZIP file (43.2 kb) anywhere in your computer.

#2. Unplug your printer from the computer's parallel port. Unzip all the files. This operation will result in three files named:

- INSTALLBAT
  65 bytes
- GULEXE
  58.9 kb
- PP.QBF
  2.78 kb

Now you run the INSTALLBAT. This will automatically create a directory GUI in your root (C:\) and copy the required files there. Otherwise, you can create the directory GUI yourself and unzip GUILZIP there.

#3. You can now run GULEXE by double clicking its icon from Windows itself or you can go to MS DOS Prompt (or boot your computer in DOS mode) and run GULEXE from the GUI directory. For the DOS Boot option you will have to load your mouse driver software but you would not need to do it if you are running it from within windows. In any case you will get the following screen:

#4. Clicking the buttons on the GUI will only toggle their color from Green to Red and vice-versa. The color of the button (if you are using a color monitor) signifies the off/on state of the device. Green color means the device is off and Red color button indicates its “on” state, but nothing else will happen as you have not connected anything to your printer port. The EXIT button switches off all the devices and closes the GUI. The following screenshot (Figure 2) shows that out of the eight, three
Testing the GUI with LEDs connected to the printer port

Figure 3: Testing the GUI with LEDs

Circuit diagram for attaching devices to the printer port

Figure 4. How to connect your devices

Though technically with eight “data pins” of the printer port one can generate 2^8 (256 unique) addresses and control as many devices, but you require “decoders” - external electronic circuitry - to do this. To avoid this, our GUI internally generates 8 unique addresses and provides control of only 8 pieces of electrical equipment.

This GUI was developed by the authors for computer control of the planetarium projection system and several accessory projectors at M. P. Birla Planetarium, Kolkata. However, in our application the number of devices to be controlled is much more than 8 (actually 72). Therefore, instead of using the printer port, we address a PCL-225 PC add-on-card by Dynalog Microsystems (http://www.dynalogindia.com) that uses six 8255 ICs (Programmable Peripheral Interface) and can control up to 144 devices (for this, the appropriate port addresses have to be incorporated into the GUI). With this kind of arrangement we do not have to decode the 8255 outputs using ICs, rather, this job is done by the GUI itself. The article GUI for controlling devices using DYNALOG PCL-225 add-on-card http://www.geocities.com/bokia/gui225.htm describes the method and you can also download its demo version GUI225.ZIP designed to control 8 devices. On request, we can e-mail the full version (for 72 or 144 devices) to anyone in the planetarium community. Happy mouse clicking!

#5. Before you actually connect your devices, it may be a good idea to see if the GUI does anything. For this you should connect LEDs (Light Emitting Diodes) to the printer port as shown in Figure 3 and you should be able to switch them “on” and “off” using the GUI. Please use a spare printer cable for this purpose.

#6. Some precaution is necessary while connecting the Special Effect Projectors to the printer port. You need to protect your PC from external voltages and not draw power from PC through the printer cable. One need not always use relays to drive output loads. Figure 4 shows how the opto-coupler MCT 2E is employed to isolate the PC from external voltages. The transistor that is driven by the opto-coupler can be directly connected to drive other digital circuitry (take care about voltage, which is usually, +5 V for TTL and +3 V to 30 V for CMOS ICs).
The Search for Distant Planetary Systems
Michel Blanc, Director of the Toulouse Astrophysics Laboratory, former Director of the Midi-Pyrenees Observatory
Inventory of the objects in the solar system in order to understand its structure and composition, followed by the current state of research on planetary systems.

The Song of the Sun and Stars
Sylvie Vauclair, Astrophysicist at Midi-Pyrenees Observatory
From movements on the solar surface, it is possible to better know its interior activity. Such observations gave birth to helioseismology, a discipline in vigorous growth.

What Are All These Blind People Looking For in the Sky?
Peter von Ballmoos, Center for Space Radiation Studies
Today we live in a unique moment in astronomy. With the flight of space techniques and thanks to the instrumental developments during the second half of the 20th century, new windows on the Universe have been opened: the domain of radio waves, radar, infrared, ultraviolet, x-rays, and gamma rays are—for the first time—accessible to the curiosity of astrophysicists. This summary presents several recent facets to this new astronomy, along with instruments and discoveries in diverse wavelengths. The intention is to describe images in the invisible sky. Letter to Evgen Bavcar.

Museums and Cultural Sites: Searching for Lost Success
Marc Grodwohl, President of the Ecomuseum of Alsace
Notes by Agnes Acker: I had the chance to hear Marc Grodwohl during a lecture before the Economic and Social Council of Alsace. His talk charmed us all, and I asked him to publish his talk in our journal, which the author accepted but demanding the indulgence of the readers since the text was meant for a speech. This text speaks of “museums in Alsace”, but it keeps the same force if we enlarge the geographic coverage and if we change the term museum to “site of scientific teaching” or “planetarium.”

The Stakes and Limits of Scientific Animation
Stephane Colsenet, Director of the Palace of the Universe/Planetarium de Dunkirk
Is scientific animation at a crossroads? Reflections.

The Translation of the August 11, 1999 Eclipse In the Fabric of French Society
Fabien Nathan
Return to the social effects of the total eclipse of the Sun. Analysis of the interactions of science, bureaucracy, economics, and media, under the action of security and communication restraints, resulting in the social consequences seen in 1999.

The Space Observatory of CNES and APLF: An Exemplary Partnership
Gerard Azoulay, CNES (National Center for Space Studies)
For the first time this year, a program is installed at the same time in the largest French-speaking planetaria. This is an opportunity for a wide public to see a program that is very rich and supported by large-scale promotion. This program is the result of a collaboration between the Space Observatory of CNES and the Association of French-Speaking Planetaria (APLF), and ranks among the great events in public science teaching.

“My Secret Star”: A New Show for Children
Eric Frappa, Planetarium of Saint-Etienne
Presentation of a new show from our facility, integrating actors into virtual sequences. Description of different phases of production.

“The Spikes Codex” and Shipwrecked Aliens on Planet Earth
Guiseppe Canonaco, Europlanetarium, Genk, Belgium
A stunning new program, pleasing to children.

Planetaria and Shows: a list of shows in various facilities.

Show Statistics in Francophone planetaria
Jean-Michel Faidit, Planetarium de Montpellier
Although the majority of French-speaking planetaria only opened within the last two or three decades, they have produced more than 300 shows according to a non-exhaustive list published in the 2000 edition of this journal. At the dawn of the changing of the century, it might be interesting to examine the statistics of show themes, and distinguish pre-recorded programs from live ones.

Galileo, Planetarium at Montpellier
Thierry Camuzat, Coordinator, Director of Management Council, City of Montpellier
The planetarium project is advancing, and it will be called Galileo.

Ludiver: First Announcement of Operation

(Please see Abstracts on page 21)
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It's not your father's planetarium.
PIPS September 14-15, 2001:
The two-day meeting of Powerful Interactive Planetarium Systems (PIPS) that was held, on Friday, September 14, and Saturday, September 15, was a success despite the tragic events on September 11th. Several people cancelled, so we had a small but very lively group for the two days. Fifteen people attended. A PLATO grant from NASA provided funding for this meeting along with support from Learning Technologies, Inc. and O.C.M. B.O.C.E.S.

The following topics were presented:
"Finding Directions" (Gr. 2), "Multi-cultural Mythology", "Longitude, Latitude, Ocean Currents, and Weather" presented by Lindarae Bauer (Oneida-Madison-Herkimer BOCES);

"Sky Wonder ... Plus ... Lives of the stars" (popular basic sky show with unique ideas) ... Plus ... All about Light" (Gr. 5) presented by Paul Krupinski (Ancient Eyes Productions/Mobile Dome Planetarium Buffalo);

"Observations - Patterns and Cycles", "Why Mythology?", 'Iroquois Cosmological Stories", Susan Button (OCM BOCES).

We also discussed; "What's New at Learning Technologies, Inc." (Sunspotter, Lewis and Clark Cylinder); Commercial Programs Available for Starlab; the International Planetarium Society's Portable Planetarium Guide.

I include below the notes I took from Lindarae's workshop, "Multi-cultural Mythology."

"Mythology, Comparing Themes and Shapes" By Lindarae Bauer (Oneida-Madison-Herkimer BOCES)

Grade Level: Grades 5-12 (age 10-17 years)

Cylinders: basic northern hemisphere, Greek/Roman, Native American, Chinese, African/Egyptian

Note: All of these cultures could be found at basically the same latitude and could see the same stars. Use the winter sky for this lesson because it has the most similarities among cultures and in this season there are more bright stars and distinctive patterns. Before this lesson, students should already have a basic grounding in Greek/Roman mythology.

Procedure:
1. Have students look at the night sky and notice everything (motion, colors, shapes)
2. Explain that the ancients used information in the sky because they noticed a relationship between what they saw and what was happening on Earth:
   a. Direction-review how to find the north star and label the directions on the dome
   b. Time-note positions of basic patterns at different hours
   c. Shapes-some of the same shapes seem significant to most cultures
3. Point out that each culture used story-telling to define certain stars or patterns in the sky. These stories were used to pass along knowledge, signals of the changing seasons, the history of their civilization, and their belief system as well as to reinforce their political system.
4. Change the cylinder to the Greek/Roman. Briefly review the Greek/Roman stories of Ursa Major, Ursa Minor, Cepheus, Cassiopeia, Andromeda, Perseus, Pegasus, Gemini Twins, Orion, Canis Major, Lepus, Hydra
5. Note themes present in these characters and stories by stating some examples: direction/latitude indicator (North Star), family unit (king, queen, daughter, twins, bears), compromise (twins, Perseus), repeating cycles (circumpolar bears), opposites (twins), gods interfere with lives of humans (Orion - three stars, Cassiopeia), political unit (king, queen, princess), signs of the season (Aquarius, square of Pegasus)
6. Change the cylinder to Native American Indian. Note: The political system is different and community living units much smaller. As a result there are many tribes and each tribe may have a different story for the same group of stars. We have fewer records of the stories. Have students look for familiar themes (ideas) or shapes (people, objects, animals): family unit and repeating cycles (first woman, first man), direction/latitude indicator (Home Fire), contrast (Place of Decision), signs of seasons (rabbit tracks, butterflies and lizard), bears, male chief - 3 stars, rabbit, dog
7. Change cylinder to Chinese. Note: The political system is different from the Native American people and more like the Greek/Roman culture. As a result there are more universal stories across China. The sky is used more as an almanac by this culture. Have students look for familiar themes (ideas) or shapes (people, objects, animals): family unit/political unit (Emperor, Empress, Crown Prince, Prime Minister), Repeating cycles (Basket of wisdom), male warrior - 3 stars (Tsen), dog (wild jackal), square (four towers)
8. Change the cylinder to African/Egyptian. Note: The political system is different again and community living units much smaller again in the African culture. As a result there are many units and each unit may have a different story for the same group of stars. We have fewer records of the stories. The Egyptian culture, on the other hand, was based more on a city-state government. Have students look for familiar themes (ideas) or shapes (people, objects, animals): family unit/political unit (Osiris-male figure with three-star belt, Isis - his wife), opposites (male female beings), repeating cycle (wheat = north star, ternips and ancestors' eyes circle), dog (jackal)
9. Go back to the night sky cylinder. Wrap up by review of what we discovered. There are many similarities across cultures. Each star pattern, though, can represent many different things. The Big Dipper can be: sauce pan (French), plough (British), upside down elephant or giraffe (African), skunk or fire (Native American), bear (Greek). Cassiopeia can be: a queen (Greek), first woman (Native American), five canoes or a fish (Polyne­si­ans), reindeer horns (Northern Cana­di­ans), hands of Fatima (Saudi Arabia).
10. So, patterns in the sky are named because they mean something significant to the particular culture. The shepherd, farmer or sailor watched the sky each day and night and noticed everything (colors, brightness, times of rising and setting, relationships to the seasonal changes and tasks that needed to be performed) and stories were passed on from one generation to the next. This was a means of passing along information and instructions for seasonal activities as well as
their beliefs. Sometimes the stories included explanations of natural events and fostered respect for the political system and ancestors. And, there are many similarities across the cultures.

11. We could make our own constellations and write stories that show significant relationships between our constellations and what is happening on Earth, in nature and in our culture, today. Are we still concerned with some of the same things as the ancients?

PIPS 2002:

The next meeting will be held in June. Mark your calendar now! On June 14-15, 2002 we plan to meet at the Maryvale Planetarium in Buffalo, New York. Kathy Michaels will host this second two-day PIPS meeting. Workshops will be held under her 20’ stationary dome, with a Spitz Nova, and in Paul Krupinski’s Starlab. Look for more information in this column as details are finalized.

Think about planning a meeting at your location. Call or write if you would like help in planning a one- or two-day mini-conference for small and portable planetarians in your area. It is well worth the minimal effort.

Colleague Asked to Travel and Lecture in South Africa:

Marie Rådbo of Stockholm, Sweden wrote to share the good news. She wrote: “... you know that I have teachers working for me with my planetarium (Starlab). Just imagine, I have had it for 19 years. Now I have got an invitation from South Africa and in one month I will go there. I will travel all over the country giving public lectures and workshops and as you understand I feel very honored. I have also been asked to bring my Starlab and - I must admit - without really thinking about all the consequences yes.”

This is very exciting news, even if it will be difficult to transport the Starlab! She is there, in South Africa, as I write this! Marie had to purchase the Southern Hemisphere and the reverse motor and then had to really learn the Southern Sky (the right side up)! She continued to write, “I will also take the opportunity to ask you whatever experience you have from the southern sky. Do you have star charts which I can use/buy? Or any demonstrations ready for the southern hemisphere? Although my main task is not to work with the Starlab and the starry sky while visiting South Africa, I do appreciate whatever you can share with me or if you know somebody else to turn to. This morning, for breakfast, I talked to my husband about my problems, and then he wanted to find out for himself what it will look like in

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**Telling Time by the Southern Circumpolar Stars**

Cut out the two wheels below by cutting all around the edges. Place the black wheel on top of the other wheel and join at the center with a paper fastener. The paper fastener represents the position in the sky that is directly out in space from the South Pole of Earth. There is no star in that position that we can see in the sky without a telescope! Hold your outer wheel so that the current month is at the top. As you turn the inner wheel to different times, notice what happens to the positions of the star patterns.

**Activities:**

1. When you go outside you can observe where the star patterns are in the sky. Using your star wheel in the same way (holding it so that the current month is at the top), dial the stars to position them as they appear in the sky and you can tell the time without a watch - just like the ancients did!

2. While indoors, dial up the time for the sky tonight and notice the positions of the stars. Make a prediction about where you should look in the real sky to find the Southern Cross at your house tonight.

Go outside and see if it is there!
Cape Town and I have not managed to convince him about the directions yet. We really take it for granted that it should be like it is at home, don’t we. I tried to use one of my tennis balls but it does not seem that I managed. And I also find that I myself have to think twice not to think in a ‘northern’ way.

I searched the web and found two planetsphere makers for Marie. I have seen both of these dealers at conferences. Southern Sky Planisphere: http://www.walrecht.nl/ and http://www.astromax.com/chandler/nightsky.htm

I also found some Australian sites. Interesting info but not updated to the spring! http://minyos.its.rmit.edu.au/~e21092/ssky.htm and http://cidw.rmit.edu.au/e21092/ssky.htm

I sent her the simple southern star wheel below; it is not too pretty, but it is functional! See the box on the previous page.

To contact her and find out how she enjoyed her trip, write: Marie Rådbo (Astronomer and Assistant Professor, Experimental Physics, Chalmers University of Technology, SE-412 96 GÖTEBORG, Sweden Tel: +46 31 772 31 40; Fax: +46 31 81 20 89; Email: radbo@fy.chalmers.se) Homepage: http://fy.chalmers.se/ radbo/

American in Italy Contest:

Remember, don’t delay, this is your chance to travel. This is a golden opportunity; don’t let it pass you by! Applications for 2002 are due March 15th! If you are not American, think of a country you’d like to go to and see if you can partner with a planetarium there and with the manufacturer of your planetarium! Maybe you can expand this networking. See the announcement on the following page.

GLPA/SEPA Portable Planetarium Workshop 2001:

Sharon Mendonsa (Sudekum Planetarium, Cumberland Science Museum) and I decided to join forces this year to conduct a workshop at the SEPA/GLPA Conference. This workshop was designed to provide a forum for sharing ideas, programs, activities, tools, and resources that would be useful to others in the small dome/portable planetarium field. It was also the perfect opportunity for problem-solving with a group of professionals that have faced the same challenges.

Here are some notes from Sharon about what happened at that workshop:

Starlab and Small Dome Shar-A-Thon
Susan Button:
• Shared a quieting technique she uses. She says to students, “Hands on you head, hands on your shoulders, hands on your hips, hands on your lips. Now I am going to play some music and your job is to be an observer.” Also, praising children that are following directions helps others to start listening.
• Velcro horizon on Starlab: useful for teaching horizon astronomy. Lets children figure out directions through observation and discussion, then have them place cardinal direction signs on the dome once everyone agrees.
• Point to North (after finding it - using the Big Dipper pointer stars to the North Star) then turn right to each next direction saying “Never Eat Soggy Worms”: memory trick to remember order of directions.
• Paper plate astrolabe - designed by Chuck Beuter. It has flaps on the top edge to make it easier to site correctly.
• Use X signs to make guesses on the Velcro horizon. Students just place a marker on the dome to show predictions such as where the sun will set or rise.
• Put paper under side lamps to reflect the lamps’ light; this increases the overall dome lighting.
• Cut the bottom off of a popcorn can or an oatmeal box. On the other end cut a hole, leaving a half inch ledge. Slide can over the Starlab bulb and housing. This makes a platform for holding a plastic cup upside down over the light. On the inside of the cup students can draw a design which can then be projected on the dome. This is another idea from Chuck Beuter.

Sharon Mendonsa shared:
• How to make an inexpensive vinyl cover with holes to match the silver buttons on the cylinder. This is used to do activities about the sun and day and night. It blocks all the stars, except the sun, in the daytime. Make a template of the cylinder and cut out the holes. Add Velcro to the edges of the cover to attach it around the cylinder and make it removable for nighttime stars.
• A prototype lighting system that allows students to see the stars and see star charts or other materials at the same time.
• A moon phases book made from paper plates and also a constellation cup.

April Whitt:
• Lets children make noise when they first get in Starlab, just to get used to the environment. She sends the teacher in first and operates the door herself, letting 2 children in at a time.
• Pre and post visit activity “Personal Constellation” - students are given a grid with x and y axis to design their own personal constellation. They write letters of their name on one axis and alphabet on the other axis (handout)

Curtis Spivey:
• Recommended GEMS activity books to use for pre and post visit activities and other ideas.

Jack:
• Use the earth/sun distance of 93 million miles and shrink everything down to make the earth sun distance equal to 1 inch, one mile is one light year. In this scale, the nearest star is 4.5 miles away.
• If you use carpet squares, have the last group take them out with them.

Jane Hastings:
• Solar motion activity

Bob Hayward:
• Shared his sound system using a karaoke machine. It is inexpensive and works well in a Starlab dome. (hand out)
• Aim speakers up in dome and the sound will be better.

Don:
• Uses inexpensive clear spheres (like Christmas ornaments) and lets college students draw reference lines for the sky.
• Another scale suggestion was to shrink the sun down to the size of a ping pong ball (inch) and the earth sun distance is 8 feet. In that scale, one light year is one hundred miles. The nearest star would be 450 miles away.

MAPS 2001:

During the workshop this year we talked about and demonstrated some “Back to Basics Techniques” for the portable and small dome planetarium. Susan shared the results of a survey she conducted this year. This survey was part of ongoing research that Dan Francetic, a member of the Great Lakes Planetarium Association, is conducting. The survey asks teachers what they value most about the planetarium. Of 201 responses Susan received so far, an overwhelming response (120 out of 211) from teachers was that the planetarium teaches observation skills and secondly teachers placed having students see the night sky as extremely important.

Participants discussed how to keep our focus on “what planetariums do best” and listed activities and concepts that accomplish this. For instance, activities which involve marking the horizon as events occur and also using it as a way for students to mark predictions. Paul and Susan both have
a Velcro horizon on their Starlab wall and use various markers that can be “stuck” to it. Paul also has applied a Velcro celestial meridian to his dome and has students use it for measuring altitude. We also, however, looked at some of Paul’s special projectors and discussed their effectiveness when used sparingly.

The two cylinders highlighted this year were the “Galactic Cylinder” and the “Lewis and Clark Celestial Navigation Cylinder.” Susan described how she uses the Milky Way projection on the galactic cylinder to kick off a lesson on “Deep Space.” Steve Berr demonstrated the newest cylinder, “Lewis and Clark,” by showing how Lewis and Clark used dead reckoning and celestial navigation to find their location.

Paul demonstrated how he controls the fan speed from inside his dome. He uses a voltage regulator under his dome and after the last student finds his or her seat, he immediately dials a desired pressure - it takes about a second! His regulator is called “Powerstat” by the Superior Electric Company, Bristol Connecticut, USA.

So, all in all, we looked at the unique characteristics of a planetarium, teaching techniques, useful hardware and got recharged with new ideas for another year!

In Closing:

Peace and Justice go hand in hand. I am proud of the cooperation many nations of the world have shown thus far. I hope that justice can be served and we can have peace someday soon. All peoples will have a big job of maintaining that peace and guarding against those with an agenda that does not serve humanity and Earth.

I’d like to share a little piece of wisdom that was expressed by a local Iroquois Indian. The ultimate goal to strive for:

1) We are instructed to carry love for one another,
2) And to show great respect for all beings of the earth.
3) We must stand together, the four sacred colors of man,
   as the one family that we are,
4) in the interest of peace ...
5) Our energy is the combined will of all the people
6) With the spirit of the natural world,
7) To be of one body, one heart, and one mind.

- Chief Leon Shenandoah (Onondaga)

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2002 Day of Planetaria

Press Release

On March 17th, 2002, the next issue of the Day of Planetaria, that has been organized since 1995, will take place.

The aim of this initiative is that of promoting the knowledge and the diffusion of planetaria.

These are our suggestions for the planetaria accepting the proposal of collaboration for the Day of Planetaria of March 17th, 2002:

1) During this "Day" the planetaria offer their ordinary program or organize special events freely, such as lessons, shows, exhibitions, practical sky viewing and so on. Obviously in the monthly, weekly or daily program we suggest to indicate that "March 17th, 2002" is the annual "Day of Planetaria" that is celebrated in different countries. Join in the celebration of the "Day." it does not take big efforts;

2) In the leaflet that describes your planetarium program or in a special leaflet printed for the "Day" planetaria, you are invited to reproduce the logo of the "Day of Planetaria" selected after an international contest in 1997 (available on the Internet at: http://www.cityline.it/cult/Grup SCI/planeta.html, or simply opening the science pages on the Internet "http://www.cityline.it”).

3) If you decide to print a special leaflet for your public we suggest you mention briefly the total number of the planetaria operating in the whole world and in your country (see IPS Directory), the existence of the International Planetarium Society and the name and reference of your Regional or National planetarium Association. It could be also interesting to expose in your planetarium some copies of IPS publications, Planetarian magazine and journals edited by other planetarium associations.

4) The entrance is free in some planetaria during the "Day".

5) For such an occasion exchanges and twin­ships between planetaria of Eastern and Western, Northern and Southern countries, in particular with planetaria of not developed countries, are promoted.

6) We are inviting all planetaria, not only the European ones, to take part and to support the "Day", for example by celebrating a planetarium recurrence (anniversaries of planetarium buildings, or openings, or past directors and lecturers and so on).

7) The initiative provides a good chance of diffusing the knowledge of planetaria to the large public. The simultaneity in different cities draws mass media attention to this event. Obviously each planetarium is invited to indicate in the "press releases" that March 17th, 2002 is the "Day of Planetaria".

8) The programs of the "Day" sent to Italian Planetaria's Friends Association will be also available in the Internet site "www.cityline.it" (pages of "Science"). We suggest you create a permanent space in your Web site devoted to the "Day." For this reason we inform you that the proposed date for next "2003 Day" is March 16th.

In this way we can create a permanent link between your site and "www.cityline.it". Communicate to the webmaster of our Internet site your Web address.

Programs could be also collected in each country by "Day of Planetaria" collaborators. In Slovakia, for example, the programs are collected by Patricia Lipovska.

9) "Day of Planetaria" also offer the idea of an astronomical children’s drawing exhibition on-line in particular to planetaria that collect children drawings. We are collecting on the Internet (www.cityline.it/cult/ZANI/disegni.htm) the best drawings about two national astronomical contests and about the teaching activities with the students. We suggest that planetaria send us a copy of one of their best drawings collected in the last years or select the best drawings among the planetarium young visitors of these last months. The best way is to publish these drawings in your Web site and to communicate to us your Internet address. This exhibition on-line will become the "junior" section of "Day of Planetaria" increased each year by new contributions.

We hope that in the future also other countries join in this initiative. For further information or suggestions you can contact us at: Associazione Amici dei Planetari, c/o Centro Studi e Ricerche Serafino Zani, via Bosca 24, 25066 Lumezzane (Italy), fax 30/872545, e-mail: info@serafinozan.it.
(Abstracts, continued from page 13)

Bruno Daverin, Director of Ludiver
The passage to the third millennium also marks the end of the first year of operation of Ludiver. Report of activities.

Modernization of the Lucerne Planetarium
Daniel Schulp, Lucerne Planetarium
After more than three decades of activity, the planetarium in the Swiss Transport Museum is undergoing a facelift and an update to its equipment to enter into the 21st century. A visit to the work site.

The Functioning of a Small Planetarium
Michel Verdenet, Planetarium of Bourbon Lancy
Or, how to program a session.

Diverse Planetarium News
News from various facilities.

General Assembly of the APLF, Toulouse, Cité de l'Espace, May 2000
Gilles Roussel, Director of the Nantes Planetarium
Information on the general meeting of the Association of French-Speaking Planetaria (APLF).

The 2000 APLF Colloquium at the Cité de l'Espace, Toulouse, 6 and 7 May
Olivier Gadal and Marc Moutin, Cité de l'Espace
The 15th colloquium of the APLF ran from the 6th through the 8th of May at the planetarium at the Cité de l'Espace in Toulouse. With a program full of meetings, diverse events, and cultural and scientific outings, the 2000 colloquium was the occasion of meeting, discovery, and the exchange of ideas.

APLF 2000: Excursion to the Pic du Midi Observatory
Olivier Gadal, Cité de l'Espace
Discovery of new tourist installations.

IPS 2000 at Montreal: A Lively Success
Pierre Lacome, Director of the Montreal Planetarium
After London in 1998, the international meeting of the IPS was held in Montréal in 2000—the first time that such a meeting has been held in a French-speaking planetarium. The meeting was the site of many exchanges between 350 planetarians from six continents to highlight technological advances and to share experiences through communication and diverse thematic workshops. The participants decided to hold the IPS 2002 meeting in Morelia, Mexico.

Conference in Sri Lanka
Information on the Sri Lanka conference.

Louisiana News
News from the Lafayette Planetarium.

Planetaria across the world
Statistics on the number of planetaria worldwide.

A Planetarium in Algiers
Information about the planetarium in Algiers currently under construction.

Tinkering with the Stars
Loris Ramponi, President, Association of Italian Planetaria
Pedagogic laboratories in astronomy with common and recyclable materials. Proposed experiments before the lesson in the dome.

2001 Ephemerides
Astronomy events in 2001.

2001, A Space Odyssey
Jean-Yves Marchal, Strasbourg Planetarium
The title of Stanley Kubrick's celebrated film could be applied to space news this year, the first of the third millennium. Many of these events will be rich, so rich that it is sufficient to describe the principal ones. We shall not forget to say one last goodbye to the Mir space station, which, after fifteen years of good and loyal service, was deorbited in March 2001 to burn up in the atmosphere and leave some estimated 40 tons to sink into the ocean.

Library of the Stars
Philippe Dagneux, Science writer
Panorama of recent books.

The Sky on the Computer
Philippe Dagneux, Science writer
News on new software.

The Planetarium Gazette
News on planetaria, meetings, and shows.

The Planetarium Observatory
Statistical information about planetarium visitation.

The Planetarian's Directory
List of sources, organizations, equipment manufacturers and providers, etc., for the planetarian.

Planetarium Internet Directory
Directory of internet sites and e-mail addresses of planetaria.

2001 Planetarium Shows
Notes on shows running at various facilities.

(Spaceflight, continued from page 8)

Acknowledgements:
Flying deep into the Universe during the making of the space show Passport to the Universe required significant support and many talented people. For the specific work described in this paper I would like to thank NASA for its generous support of the Digital Galaxy Project, led by Neil Tyson and Dennis Davidson with significant scientific guidance from astrophysicists Frank Summers, Ron Drimmel, Charles Liu and Brian Abbot. The heavy-lift visuals of the show were a result of our partnerships with the San Diego Supercomputer Center (SDSC) at the University of California, San Diego, and the National Center for Supercomputing Applications (NCSA) at the University of Illinois. Since ours was a ground-breaking use of a large Onyx computer in a planetarium, we benefited from extraordinary support at all levels from Silicon Graphics. Visualizations of the Orion Nebula would have been impossible without the HST data and assistance of C.R. O'Dell of Rice University and Zheng Wen of Columbia University. Rendering and flight paths through Orion required the patient oversight and efforts of Jon Genetti and Dave Nadeau of SDSC. Extragalactic travel would have been in empty space without the data sets courtesy of R. Brent Tully of the University of Hawaii and J. Ostriker of Princeton University. Fleshing out the Digital Galaxy required a variety of images from Kitt Peak National Observatory and some from David Malin of the Anglo-Australian Observatory. Rendering, flight paths and choreography of the extragalactic scenes relied upon the tremendous talents and guidance of Donna Cox, Robert Patterson and Stuart Levi of NCSA. The AMNH "piloting and navigational crew" was led by Carter Emmart, Josh Mingus and Erik Wesselak. Thomas Kraupe and Julio Marrero consistently helped us get back on our feet during this process as they had done throughout the design of the new Hayden Planetarium. And the overall decision making on how best to achieve our story and production goals and keep from getting lost was ably under control by astrophysicist Steven Soter of the Hayden Planetarium, his co-writer Anne Druyan, along with our producer Robin Silvestri of Batwin+Robin Productions.

Vol. 30, No. 4, December 2001

Planetarian
President's Message

Martin Ratcliffe
Exploration Place
300 N. McLean Blvd.
Wichita, Kansas, U.S.A.
mratcliffe@exploration.org

Since my last message to you, much has changed. I am writing this in early October, and although you will not read this until January, the words are no less pertinent, to be sure. The changes began as I was working on details of the 2002 IPS conference. On August 20 I received the news that the Executive Council that governs the Morelia convention center where our IPS 2002 conference was to be held had cancelled the conference due in large part to political and financial reasons. No need to go into details, but it is fair to say that Gabriel Munoz, our colleague from Morelia, was stunned by those events as much as I was, and certainly actions far from his control led to the cancellation.

This is the first time in the history of IPS that such an event had occurred. A large amount of work, phone calls and decisions were made during the few days following August 20. I want to thank every officer and member of council for working so hard and so quickly to resolve the issue of a conference site. I would also like to thank Past Presidents Dale Smith, Thomas Kraupe, and James Manning for assisting with the process. Two of the current officers, Shawn Laatsch and myself, stepped up to offer host sites, and as such could not be involved in the selection process. The three Past Presidents were kind enough to work through the selection process and provided crucial service to IPS in order to bring a decision as fast as possible under the circumstances. As most of you already know by now, I am pleased to offer the services of Exploration Place in Wichita, Kansas to host the IPS 2002 conference. More of this later.

During the detailed planning and preparation for the vote on the conference site, the date of September 11, 2001, rolled around on the calendar. A perfectly normal day just like any other day. The sky was clear and blue. The air still. Fall was approaching. My biggest problem seemed to be resolving the location of the 2002 conference. I was driving to work listening to National Public Radio when I heard vague reports of an accident in New York where people thought a plane had struck one of the World Trade Center towers. Minutes later it was clear that something of tragic proportions was taking place. A second plane had struck the second building. This was no accident. Our world came to a screeching halt.

Since that awful, tragic day, each of us has shared the emotion and had to carry on with our lives with some sense of meaning. Certainly for a week or so planning for a conference seemed pretty insignificant. How do you deal with the epitome of evil? The answer came soon. Quickly a determined resolve grew out of the tragedy. People around the world emailed messages of support and friendship. International relations took on a new and more important significance.

Five weeks following the tragedy in New York the IPS Officers and Council were to meet at our annual planning meeting, at the Vatican Observatory in Italy. As I write this message I am traveling to chair the Council meeting, as are nearly two dozen of our colleagues. (In the last issue I said I would bring the results of the meeting, but the deadline for this issue falls on the date of the Council meeting, so that will have to wait until next time). It will be good to see our group together, an international group with like minds. The significance of our meeting at such a time of international crisis seemed all the more important. Traveling from all corners of the world, 22 colleagues joining together for the betterment of our society and representing planetarians from across the world. Our Society, bonded by a common love of the universe, people by individuals of every religion, color and race, takes on a deeper meaning at times like these. Each of us realized how important it is that we accept and embrace each other's culture and without fear but with understanding. How important it is to see our world as a tiny planet with one leading species reaching out for the stars. We planetarians see our planet from this different perspective. We have a vital role to teach this perspective to future generations, made ever so more important after the events of September 11, 2001.

The Planetarian

This journal has remained essentially unchanged in appearance for three decades. Following discussions with Editor John Mosley at last year's IPS Conference in Montreal, we are hoping to bring some changes to this journal. One of the reasons for change is financial. Methods of printing have changed over the past decade, and most journals have made the change to newer methods. As older ways of printing become more expensive, the time comes when change becomes economically necessary. This journal has reached the point where changing the process is necessary.

The potential for changing the printing methods also raises the opportunity for redesigning the journal to better reflect the professional status of IPS and the visual medium that we represent. I have been impressed with some of the changes other professional societies have made with their journals. One in particular that I read with more interest than in the past is the Royal Astronomical Society's Astronomy & Geophysics, a colorful and professional quarterly journal that engages the reader through good design and good writing. I have started a process that will lead to a new design for our journal and I am hopeful that a new design will appeal to everyone.

As a result, I'd like to ask for your input into these changes. The journal is your journal, and this is the time for you to send your suggestions and comments. What changes in format and layout would you consider important? Jot down suggestions and drop me an email with your ideas.

Conferences

There are many professional conferences where it would be beneficial to the society to have some visible representation. Strong links between the education offices of regional NASA centers are developing well through the work of a number of individuals, and the timing is just right for a higher visibility at the American Astronomical Society, the Division of Planetary Sciences of the AAS, and at ASTC. Christine Shupla from the Dorrance Planetarium in Phoenix, Arizona, U.S.A. is developing ideas to have an IPS booth at some of these conferences. The idea is that volunteers from various regional IPS groups could host such booths and help promote the work of planetarians across the world. If you think you can help in this important aspect of our communication to the outside world please contact Christine or myself. The goal is to highlight the goals of IPS and provide professional dialogue.
Many planetariums have already received their free logo slides. You can too! But you need to act now, before it's too late!

We invite you to send us your logo. We will create for you a FREE enhanced version of your logo and output it onto 35mm film with its matching DIGI-MATE™ mask.

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314.353.339
Focus on Education

Kathy Michaels
Maryvale Middle School Planetarium
1050 Maryvale Drive
Cheektowaga, New York 14225
Kmmichaels@adelphia.net

Francine Jackson
University of Rhode Island Planetarium
P.O. Box 353
Providence, Rhode Island 02901
Francine@IDS.net

All of us, whether in the classroom or museum setting, must be aware of changes in school curricula; however, it sometimes appears there are more organizations coming up with more interpretations of standards that it can be daunting to try to keep up with them all. Our best bet is to stay with the standards developed by organizations with a reputation for quality. And, quite possibly, when looking for Science, Math and Technology curricula, our best bet is that of the American Association for the Advancement of Science (AAAS).

Founded in 1848, the AAAS has continually worked to advance science by promoting communication and cooperation between scientists, fostering better science education, and enhancing the public understanding and appreciation of science in human progress. Considered one of the leading scientific societies in the world, the AAAS includes over 143,000 individual members and nearly 300 affiliated scientific, engineering and mathematical societies and academies of science.

Their Project 2061, founded in 1985, is helping to foster a society in America that is literate in science, mathematics and technology. The project is developing a coordinated set of reform tools and services - books, CD-ROMs, on-line resources and workshops - to help educators improve K-12 education for all students.

To help educators use its print and electronic tools to improve student learning in these areas, Project 2061 offers an array of professional development programs that can be customized to suit the specific needs of schools and school districts. For more information about these professional development programs call 1-888-PDP-2061, or visit their web site at www.project2061.org. Books discussed here can be purchased through the Oxford University Press.

Project 2061 has produced a series of books designed to guide educators in improving education in science for all students. Today we'd like to highlight its landmark publications, Science for All Americans, and Benchmarks for Science Literacy, which have sparked national and local discussions about what students should learn.

Science for All Americans (SFAA) identifies what everyone should know about the science endeavor: how it operates, what its strengths and limitations are, and what it has to do with our lives and our future. Its bold recommendations for education reform downplay traditional subject categories, highlighting instead the connections between them. It also emphasizes understanding important ideas and thinking skills over memorizing specialized vocabulary. In short, SFAA shows that science literacy has to do with the quality, coherence, and utility of our knowledge rather than the sheer quantity of isolated bits of information we have acquired.

Created in close consultation with a cross section of American teachers, education researchers and scientists, Benchmarks for Science Literacy (Benchmarks) provides guidelines for what all students should know and be able to do in science, mathematics and technology by the end of grades 2, 5, 8, and 12. It is not a proposed curriculum, or a plan for one, but a tool for educators to use as they design curricula that fit their students' needs and meet the goals previously outlined in SFAA.

However, there are advocates of science, mathematics and technology education reform who have claimed that the content of the curriculum is not appropriate for the modern world, that it has become over-stuffed with poorly coordinated topics, leaving students with too little time for learning any of them well. Next time we will address these criticisms.

Our regional education highlight comes from Dave DeRemer, Chair of the Great Lakes Planetarium Association (GLPA) Education Committee: GLPA Past President Dan Francetic has prepared an educational survey for planetarians. For over a year, the survey has been distributed to teachers and group leaders visiting a variety of planetaria in the Great Lakes region. Given out at the end of each show, the survey asks teachers to rate the educational value of the program by subject (e.g. math, science, technology). More than 600 surveys have been returned so far. When Dan has collected about 1,000, he plans to analyze the results and make his results available in a TIPS booklet format.

Dan is also working on revising the TIPS booklet on keeping your planetarium open when challenged with budget cuts. He would like anyone who has experienced severe, budget cuts or closing threats to submit a one-page summary of techniques used in saving their facilities. Email him at the address found at the GLPA web site.

For the past several years, Chuck Bueter has been gathering useful paper plate astronomy activities. His project led to completion of a wonderful videotape, which highlights several of the best projects. Chuck and long-time paper plate guru, Wayne James, presented a workshop at the GLPA/SEPA meeting this past June. This tape is available to all, by contacting Mitch Luman, again at the GLPA web site. Or see Paper Plate Education at http://analyzer.depaulu.edu/paperplate.

Gene Zajak is almost finished a TIPS booklet on music in the planetarium. It mentions astronomy-related songs and music that is useful in a variety of planetarium situations. Gene hopes to finish it and have it printed by the end of the year.

Bob Bonadurer and Dave DeRemer have received a NASA grant to write a program called "Stargazer." The show is inspired by the professional life of University of Illinois Professor James Kaler. Dr. Kaler's fascination with astronomy from boyhood to adult will provide the framework to create a planetarium program which teaches about stars.

GLPA's first program, "Zubenelgenubi's Magical Sky," was presented at the GLPA/SEPA meeting last summer. Show packages are available for $100 by contacting Mitch Luman.

Internationally, Marie Radbo (radbo@fy.chalmers.se) writes that she has received an invitation from South Africa to share her experiences of science communication. This will include her use of the Starlab. Marie's report will appear in the next Education Focus; in the meantime, see Mobile News Network earlier in this issue.

Sri Lankan Skies and Sir Arthur: 2001: A Space Odyssey

About three dozen educators were privileged to spend a week in Sri Lanka during March, 2001. The following summary of the experience is from a poster session given at the GLPA/SEPA Conference by April Whitt
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of Fernbank Science Center in Kentucky, June 2001 capril.whitt@fernbank.edu>
Thirty five delegates from around the world gathered in Colombo, Sri Lanka, in March 2001. From tourist sites to the incredible students and teachers, each of us came away richer in spirit. We met Sir Arthur writer of 2001: A Space Odyssey in person!

When Sinbad was voyaging through the distant past, one of his visits was to an island of gems, called Serendip. International Planetarium Society members visited that same treasure-trove in March of 2001 - the country of Sri Lanka.

Our host, Mr. T. C. Samaranayaka, director of the planetarium in the capital city of Colombo, and Dr. Dale Smith, designed a conference full of sight-seeing, opportunities to share information and ideas with fellow planetarians, and to work with teachers and students.

The conference opened with greetings from government ministers and a key-note address by Sir Arthur C. Clarke, who shared his ideas and good humor. He talked about the latest findings from Mars, encouraged us in our public education projects, and answered questions for a web cast sponsored by AVI. A good many of us used time before the festivities began to have our pictures taken with him.

One of the best parts of any conference is delegates sharing information.

Suggestions for engaging audiences through their own cultures were offered by Professor Anthony Fairall, Planetarium Director, Cape Town, South Africa. The planetarium there offers programs in several languages, and the program “Fires in the Sky” relates the fiery sunsets and blazing night stars to the fire that is part of cultures in the area. He offers the following comment: “From an educational point of view, I think the greatest impression conveyed to me was the emphasis and success concerning outreach to children. If Sri Lanka was a business, it would be staffed by adults and teachers, and the children would be the clients. Such was the care and respect shown by the adults towards the children. It was an atmosphere of encouragement and reward. For instance, I think of the presentation of certificates to the children that had completed the planetarium course on astronomy, and the ceremonial and congratulatory atmosphere that accompanied it. No wonder the children were so enthusiastic, and receptive to what we could offer them. It is a lesson all other countries should learn.”

Italy’s Dr. Ron Drimmel reported on building a digital galaxy, a project to aid how we see the sky. He offered the following comment: “I think I can honestly say that the conference in Sri Lanka was perhaps one of the best I’ve attended. In large part this was because of the opportunity we had to get to know each other and the people of Sri Lanka. The children were the most inspiring. Their enthusiasm, gratitude, respect, and above all their aubounding desire to learn, brought home to us all the immense potential of the Sri Lankan people.”

In the conference hotel meeting rooms, Dr. Iyamperumal of Chennai, India reminded us that, “Science without society is lame, and society without science is blind.” He urged astronomy education in planetariums to help dispel superstitions held by the general public.

Professor R. Subramanian of Calcutta, India, described International Cosmology Week, a cooperative effort by astronomical libraries and the science research institutions.

Planetarium programs are connected with the Slovak Republic’s Central Observatory to highlight practical astronomy, said delegate Marian Vidovenec. The observatory has produced calendars and textbooks for over a century.

SEPA historian John Hare discussed computer technology in the planetarium, and questioned whether it becomes outdated too quickly, while James Williams utilizes the Santa Barbara, California, amateur astronomers as volunteers to promote an astronomy education outreach program.

A visit to the planetarium on March 20 gave us an opportunity to meet teachers and students. A large facility with a Zeiss instrument, the Sri Lankan skies were incorporated into a lesson April Whitt offered. Locating the International Space Station in the night sky and modeling communication with it involved children and teachers in a paper-plate activity.

George Hastings presented an excellent PowerPoint demonstration, using that medium to teach 21st century astronomy. A model kit to explain the apparent motions of the sun, moon and planets to Japanese school children was described by Kyoji Saito. Jan Sifner detailed the STARVID technology used in the Prague Planetarium in the Czech Republic.

And the school children enchanted us with singing and cultural dances. Delegates were invited to present prizes to the winners of student astronomy project competitions after lunch.

The last of the paper sessions was held at the conference Hotel Lanka Oberoi. The Hong Kong Space Museum sent astronomy teaching packages that were described by Chee-kuen Yip and Karen Sit.

From Chennai, India, Professor P. Devadas offered ideas about igneous and volcanic origin of craters, while Dale Smith reminded delegates of IPS Educational Services and to keep our eyes on the sky.

A colorful cultural program of musicians and dancers, and a delicious banquet rounded out the evening.

The equinox brought the elephants. The Pinnewala Elephant Orphanage was the first stop. Orphan elephants can find a home here, before training to become the “heavy machinery” in road construction and logging work.

Delegates toured a school in Kurunegala, and were welcomed by students.

Australian delegate Clare Williams addressed the group, reminding students of the importance of astronomy education and how enjoyable it is as well.

The next three days were a whirlwind tour of a small part of this beautiful country. The rock fortress of Sigiriya, a spice garden en route to Kandy, cultural programs, the Peradeniya Botanic Gardens, tea factory, wood-carving and batik industries, and the gem mines of Ratnapura - all were simply magical.

Nightly observation sessions with teachers and students let us share the real sky. Their interest, questions, and eagerness to learn prompted several comparisons with our own students. And at eight degrees north of the equator, we saw the Southern Cross (some of us for the first time) on one horizon and the Big Dipper opposite. Opportunities to contribute materials and expertise will be available in the future, so watch for information from the IPS.

Perhaps our host summed up the experience best. At the final dinner, hosted by the Ministry of Science and Technology, Mr. Samaranayaka asked that we take away with us the “golden memories and silver tears of Sri Lanka.” Treasures indeed.

In the next column, Jim Williams, of Santa Barbara, California, will share his thoughts on this memorable experience.

Finally, those who went to Sri Lanka were privileged to meet Sir Arthur C. Clarke. After the destruction that occurred in September of 2001 in the United States, he released a statement, which was placed on the web by NASA Chief Historian Roger D. Launius. Clarke’s words, which addressed the disaster, are words of hope that all of us should remember, even during our darkest times. May they remain a part of our lives: “Like most of the world, I watched with horror and disbelief the unfolding events of Black Tuesday: local networks gave BBC and CNN coverage for hours.

(To see Education on page 39)
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**Reviews**

April S. Whitt  
Fernbank Science Center  
156 Heaton Park Drive NE  
Atlanta, Georgia 30307  
april.whitt@fernbank.edu

As the planet careens past the solstice, you might be looking for the perfect gift for yourself, your library, friends or family. Publishers have graciously sent us these to choose among, and this issue's reviewers are to be thanked as well: Richard Dreiser, Francine Jackson, Terry Johnson, and Dan Rosen.

![The Reader's Digest Children's Atlas of the Universe](image)


Reviewed by Francine Jackson, Bryant College, Smithfield, Rhode Island, URI Planetarium, Providence, Rhode Island.

Every so often a book comes along that is very well-written, beautifully illustrated, and quite coherent. Unfortunately, such a book is often overlooked by the average reader because it's found in the children's section. This book is a great example.

Over the years, I've found that the Reader's Digest usually produces a quality product. This has to be one of its best. Each two-page spread is a specific topic (e.g., Astronomy from the Ground, Earth and the Moon, Black Holes). The upper left is usually a several-line blurb on the subject; the right-hand page is a related illustration, with accompanying minitext that often spills onto the left page. All of the text is easy to read, as befits a kid's book, yet interesting and informative enough for the parent. In addition, each topic has either/or, and sometimes both (a) a little box called Amazing Facts - a little "Wow!" to go with the subject. For example, on the Milky Way page, "If you were here on Earth on a space shuttle, traveling at 5 mi./sec (8m/sec), it would you take (sic) 1.2 billion years to reach the center of the galaxy. That's about 1/10 the age of the universe." (b) a little box called Project. On the Mars page, there's a two-step process for "Making a Red Planet." Included are very simple instructions requiring easy-to-find objects - in this instance, steel wool, water, a dish, and rubber gloves.

If a topic might be a little more difficult, there's yet another box somewhere on the two-page spread called Look Again. There you will find three questions relevant to the topic, a good review for what could be harder for the young reader to understand.

Go to the back of the book and you will find a Universe Fact File. This consists of some of the most concise tables I've ever seen in any general reader book; each planet, each planet's moons (as of the writing), eclipses up to 2015, Moon missions, planetary missions, the Local Group, etc., etc. One page has Universal Records, such as the biggest meteorite, the biggest canyon, tallest mountain, closest comet to approach Earth. Turn the page for an Astronomy Timeline, from 30,000 B.C. to 1999, followed by a very extensive glossary.

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"Every so often a book comes along that is very well-written, beautifully illustrated, and quite coherent. Unfortunately, such a book is often overlooked by the average reader because it's found in the children's section."
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Although this atlas is found in the children's sections, an adult newcomer to astronomy will really find it useful without being condescending. In fact, I suggested it as an alternative textbook for one of my adult education courses, and several of my students agreed it was the most useful of the books in my list. In fact, it was deemed the best of my alternate selections for fact-finding, interest, and ease of use.

Gribbin uses the last half of the book to discuss the work involved in writing Hubble's Law and the measurements made to refine the Hubble Constant, thereby narrowing the error in our calculations of the universe's age. The Hubble Constant has dramatically changed in value since it was first published in 1929, and Gribbin struggles to give each revision. Unfortunately, there are so many revisions that Gribbin winds up just quoting numbers without much explanation in some places.

Then, in the 1970s, scientists squared off. For over 20 years, cosmologists were split into two distinct camps - one which maintained a universe older than fifteen billion years, and one which set the value at under fifteen billion years. After much debate, sometimes heated, the camps did not move any closer to one another. The fact that Gribbin was closely involved with one of the camps is not lost on the book, as much of
1995 has finally brought the two camps (lapius) and Princess story from China may be known to knowledge and a sure-fire way to hold stu-
ence. The weight of evidence gathered since about each story at the end of the book. My
and full of sly humor. And they come from
sprite"

Afghanistan. There is a bit of background tararium library for inspiration.

The Birth of Time is written for laymen
are beautifully written, lyrically illustrated,

I'm always looking for folk tales and sto-
and full of sly humor. And they come from
take an age of a little over thirteen bil-
lion years. This figure fits nicely with what
we know of the ages of the oldest stars and
our theories of galactic evolution.

The fifteen stories collected in Starry Tales are beautifully written, lyrically illustrated, and full of sly humor. And they come from
all over the Earth. The familiar Greek myths
of Orion and Taurus, of Ophiuchus (Aescu-
lapius) and Scorpius are here. The Weaving
Princess story from China may be known to
many. I had never heard "Starbright, Star-
sprite" from the Pawnee culture, "The Cocka-
too and the White Gum Tree" from Austra-
ia, the "Many Colored Llama" story from
Peru, or "The Giant Who Stole the Sun" from
Afghanistan. There is a bit of background about each story at the end of the book. My
only disappointment with this volume is that there are no sources listed.

This is a book you'll want in your planetar-
library for inspiration.

"The fifteen stories collected in Starry Tales are beautiful-
ly written, lyrically illustrat-
ed, and full of sly humor. And they come from all over the Earth."

The Storytelling Star: Tales of the Sun, Moon and Stars, by James Riordan, Pavilion Books Limited, London House, Great Eastern
Wharf, Parkgate Road, London SW1 4NQ, UK, ISBN 1862052026, hardcover, UK
pounds12.99.

Reviewed by April Whitt, Fernbank Science
Center, Atlanta, Georgia.

The cover of this delightful volume de-
picts stars falling into the upraised hands of
children all over the world. Each star brings a story for (as the first tale in the book, a
Senea story describes) "Stories are like the
stars in the sky; they are countless and last
for time out of mind."

Here are nine stories, mostly of the cre-
tation type: the Maori "Making of Heaven
and Earth," the Inca "Birth of the Stars," and
the Aztec "Girl Who Became the Sun." The
Perseus and Andromeda story is told with a
different twist, and the Norse "Little Master
Thief" is a Pleiades tale. The illustrations and
page borders are lovely, and this book has a
list of sources - important if you're tracing a
story for a program. I would add this book to
a list of resources for teachers and planetar-
ians anywhere.

"Stories are like the stars in
the sky; they are countless and last
for time out of mind."

Parallax: The Race to Measure the Cosmos, Alan W. Hirshfeld, W.H. Freeman and Company, 41 Madison Avenue E26th 35th

Reviewed by Richard Dreiser, Yerkes Observ-
atory, Williams Bay, Wisconsin, USA.

Visitors to an observatory or planetarium
are told that stars are spheres of gas undergo-
ing nuclear fusion. Stars are like the Sun, but
located much farther away from Earth than the
Sun. Occasionally, someone will ask how
we can possibly know. The answer of course is
parallax. Although by no means an easy
measurement, it is the most basic method
there is. All other methods, at least for the
closest stars, are based on parallax. Without
it, we would only have a vague concept of

the distance scale.

Hirshfeld tells the reader immediately that "there is no way to determine the distance to
a star by casual inspection of the night sky". Star brightness alone does not provide a
method for determining distances. "A visually
bright star might be a moderate light-
emitter sitting on our solar system's doorstep
- or it might be a luminous "supergiant" star
parked halfway across the Galaxy."

"Parallax is the glorious, very
readable story of what
might have turned out to be
an entirely hopeless quest."

"The pathway to the stars is rooted in the
everyday phenomena called parallax.
Parallax is the apparent shift in an object's
position, when viewed alternately from
different vantage points." While the ancients
had some success in measuring a rough dis-
tance to the Moon, when it came to the
more distant objects, "they were utterly
defeated."

Parallax is divided into three parts. The first
chronicles efforts to prove the stars
might exhibit a yearly "wobble." If the Earth
takes one year to circle the Sun, one ought to
be able to measure star positions every six-
months (when the Earth is on the opposite
side of the Sun). Once that was accomplished,
the hunt for stellar parallax - and the laying
out of the cosmic third dimension -
could begin in earnest.

Of course, given that the stars are much
distant than one might have guessed,
such parallax is very tiny indeed. No instru-
mements existed in antiquity that could begin
to measure such miniscule shifts. Early
attempts to make them (and introduce a
"heliocentric" solar system in which Earth
goes around the Sun) were entirely doomed.
Doomed also were most attempts to get
away from an Earth-centered universe.
The first part provides an excellent primer
of early thoughts about the universe, begin-
ning with that of the ancient Greeks, ending
with a fine explanation of parallax itself,
whether in surveying or in measuring mind-
numbing distances to stars.

The second part of Parallax chronicles the
efforts of astronomers to measure this
extremely tiny shift. Several generations of
astronomers rashly supposed parallax mea-
surements could be made accurately and
quickly. Astronomers knew what to look for,
in theory, but lacked good equipment, and
did not understand how difficult, time-con-
suming, and vast the undertaking would be.
Part two covers the development of lenses.
The first known depiction of spectacles dates from a fresco painting dated 1352. Obviously, lenses were understood and manufactured before then. Galileo fine-tuned a telescope and made it astronomical; by the late 1700s, astronomers had built at least one relatively crude but giant reflector.

The third part of Parallax explains how astronomers were finally able to begin making meaningful parallax measurements, following the introduction of fine telescopes and more-precise measuring devices, in the 1800s. Without the development of fine flint glass in the 1800s, the "modern" refractor could not exist.

Parallax is the glorious, very readable story of what might have turned out to be an entirely hopeless quest. One wonders what would have happened if stars were all one thousand times more distant than they are. Better yet: what great strides might we have made if the stars had been one thousand times closer. If humans had measured the first stellar parallax in, say, 1500, we would no doubt have progressed scientifically much more rapidly than we already have. That the riddle of stellar parallax was solved at all is a fantastic and enjoyable story related here.

"Once again, Kaler has put together a very readable, fascinating astronomy book."

Reviewed by Richard Dreiser, Yerkes Observatory, Williams Bay, Wisconsin, USA


Reviewed by Dan Rosen, Western Sky Planetarium, Fruita, Colorado, USA

Many of these poems cut to the core of the never-ending conflicts and contradictions inherent in thinking human beings. John Witte's poem "Robert Oppenheimer, 1945" is a fine example. But by far the most powerful and unforgivingly honest poem describing this conflict is "Giving In" by Roald Hoffmann, a Nobel Prize-winning scientist enthralled with his study of the natu-
eral world and ever so cognizant of the activities of man. It describes the extreme pressure necessary to produce artificial diamonds in the laboratory and compares that with a simple pressure device used for torture in a cellar in Buenos Aires. The "... scream in the cellar ..." leaps off the page - and I can still hear it. This shattering poem, in so few words, captures the struggle of living in a fascinating world of always wanting to know more, and a horrifying world of knowing too much.

In the chapter entitled Human are a number of excellent poems most notably Charles Harper Webb's remarkable diamond-shaped Descent (For My Son).

Beginning with "Let there be amino acids ..." the poem goes on to tell a very concise story of evolution from the sloppy primordial seas through many livings and dyings and chance occurrences eventually leading to his son. It should be read by every fresh-

man biology student.

Some of Kurt Brown's selections are down-

right sexy in their celebration of the uni-

verse. Gloria Vando's offering HE 2-104: A True Planetary Nebula in The Making stands out. Here she describes an observing session and is reminded of a hot night in Texas in the back seat of a red mustang convertible.

Whew!

Len Roberts' "Learning The Planets" vividly describes astronomy lessons while in religious school in 1958. I can almost see Sister Angelique, 

"... telling us about the Black Hole that sucked all light into it, spreading her black-winged arms and wrapping Margaret Blake to show her what it was like ..."

Alison Hawthorne Deming celebrates a night of observing in her poem Mt. Lemon, Steward Observatory, 1990. She ponders,

"... What is it to see? A mechanism wired in the brain that leads to wonder. What is it to wonder but to say what we've seen and, having said it, need to see farther ..."

" Why not think the brain's favorite food is seeing?"

And let's always keep in mind what Tim Seibles says in Something Silver White,

"... You know you can spend your whole life glancing at your watch while everything mysterious does everything mysterious ..."

What is poetry? It is a collection of words that sits by the side of your bed, on a bathroom shelf, upon the hearth. You pick it up and find comfort and inspiration and it helps you dream. Poetry speaks to the endless possibilities of a lifetime. Here is Albert Goldbarth in Farder To Reache of inviting Kepler out for a beer with Walt Whitman ... and then it happens:

"... Really: he's flinging his cloak on now. It's a foggy night as we sit around the veranda overlooking the lake.

"Albert is worried at first if they will have anything to talk about. But, ... maybe it's the beer. It turns out we can shoot the s--- all night, stein after stein, anecdote on anecdote, until the first light swarms over the water like thistledown on fire.

Then the fog disappears ..."

Surely, poetry and science have much to offer each other. Read this book and laugh, shudder, celebrate, dream, scream, get down on your hands and knees and give thanks that every once in a while ... the fog disappears.

Kurt Brown has done a great job putting this wonderful and important collection of poetry together. This book should have a place in any skygazer's library, and in any museum or planetarium gift shop.
NEW! Images of the Infinite
Since its deployment from the space shuttle Discovery on April 25, 1990, the Hubble Space Telescope (HST) has provided us with spectacular awe-inspiring images and has enriched our understanding of the Universe. This sky show highlights the history and top science findings of the telescope, as well as taking audiences on an unforgettable tour through the Solar System, Milky Way Galaxy, and to the limits of the visible Universe!
30 minutes / 200 slides / $895 for show kit with video on laser disc / $795 for show kit without laser disc

NEW! Spirits from the Sky: Thunder on the Land
Providing a never-before-seen journey into the culture of the Skidi Pawnee Native American Nation, this sky show produced in cooperation with the Tribal Elders, will explore the Skidi Band’s cultural philosophy of patterning their lives from the observations they made of the Earth and celestial phenomena. This show is funded in part by a grant from the National Science Foundation.
37 minutes / 386 slides / $475 for show kit

Clouds of Fire: The Origin of Stars
Exploring the interconnection of all matter in the Universe, this sky show presents an overview of star formation and the modern instruments which help us gain a clearer picture of stellar life cycles.
33 minutes / 266 slides / $795 with laser disc / $695 without laser disc

In Search of New Worlds
Posing the age-old question of “Are we alone in the Universe?” this show utilizes special effects, computer animations and interviews with planet hunter Geoff Marcy to offer a comprehensive look at the search for planets beyond our own solar system.
33 minutes / 217 slides / $595 with laser disc / $495 without laser disc

Seeing the Invisible Universe
Narrated by Bill Kurtis, host of the successful PBS series “The New Explorers,” this sky show explores the amazing discoveries in wavelengths beyond the range of human perception. Highlighting the Gamma Ray Observatory, the show features interviews and computer animations.
33 minutes / 232 slides / $295 with laser disc / $250 without laser disc

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What's New

Jim Manning
Taylor Planetarium
Museum of the Rockies
Montana State University
Bozeman, Montana USA

As I write these words in mid-October, Mars Odyssey is just days from being captured by the gravity well of the planet Mars to begin its reconnaissance of that currently dusty world, the remarkable Deep Space One pictures of the bowling-pin nucleus of Comet Borrelly are still fresh, and yet our thoughts are largely aimed at our own beautiful and troubled planet.

If our calling is to seek cosmic perspective and to share it with others, there seems no better time than now to engage in that noble endeavor. And my modest effort is to share with you what I've found in the last few months that's new or fresh to me - and perhaps to you as well - that may help us in our task. And the early-October Western Alliance Conference in Eugene, Oregon, USA provided many opportunities for discovery. Attend...

Out of Eugene

The Western Alliance Conference brings together the Pacific, Rocky Mountain, South-west, and Great Plains planetarium associations for a multi-region annual gathering that attracts a number of vendors and others with new things to report. Following are nutshell accounts, no particular order, of what many had to offer and to say, with contact information for those who wish more details.

Evans & Sutherland, 600 Komas Drive, Salt Lake City, Utah 84108 USA, telephone +1-801-588-7500, fax +1-801-588-4520, web site www.es.com; Jeri Panek, in addition to bringing copies of E&S's current and nifty lunar phases calendar, presented three video trailers of programs currently available or in development for the company's various configurations of its StarRider (including interactive - that is, real-time - and linear playback versions for display of full- or part-dome computer-generated video programs). “Wonders of the Universe” takes the audience on a journey through the larger universe (I’ve seen this program in its entirety on a dome, and it’s breathtaking). “New Horizons” does much the same but for the solar system. And “Microcosm: The Adventure Within” is a “Fantastic Voyage”-like journey through the human body with plot, and looks like great fun. Other programs are also currently available. Jeri can be reached at her e-mail address: jpanek@es.com.

Sky-Skan, Inc., 51 Lake Street, Nashua, New Hampshire 03060 USA, telephone +1-800-880-8500 or +1-603-880-8500, fax +1-603-882-6522, web site www.skyskan.com; Paul Tetu announced that DVD versions of Sky-Skan’s famous special effect laser discs were now available, with quality superior to that of the laser discs, and that DigiDome 4.0 was likewise available with some new digital slide processing features included for customizing slide images for the dome. Steve Savage presented the latest demo for Sky-Skan’s SkyVision in Jon Elvert’s Lane Planetarium theater using high-definition video projectors - and the effect was quite stunning. I’ve never seen video projection look so sharp on an entire dome, and the imagery was gorgeous, ranging from a heaving oceanscape to Stonehenge to assorted abstracts to the space shuttle over the Earth to the piece de resistance - a complete 3-D assembly sequence for the International Space Station. Amazing stuff! Sky-Skan has also recently beefed up its staff. Contact as given above for more information on these and other Sky-Skan products and services.

Minolta Camera Co., Ltd., Planetarium Operation, Esaka CTS Center, 2-30 Toyotsucho, Suita-shi, Osaka 564 Japan, telephone +81-06-386-2050, fax +81-06-386-2027, and US Office, 101 Williams Drive, Ramsey, New Jersey 07446 USA, telephone +1-201-913-5347, fax +1-201-818-0498; Phil Groce reported that Minolta’s GeminiStar system, which combines a Minolta Infinium II projector with an E&S DigiStar II system, will now come as a single physical unit incorporating both systems, with a small footprint and an integrated control system.

Megasystems, Inc.; Phil Groce also reported that the company, which supplies large-format film systems and digital sound systems for planetariums (among other clients), has merged with Pacific Title Art and Design Studio, one of the largest post-production studios in Hollywood, California. The company can also transfer film-based content to many other formats. My contact information for the company is not current; you may wish to contact Phil at Helping Planetariums Succeed, 619 Orange Street, Macon, Georgia 31201 USA, telephone +1-478-750-7870, fax +1-478-750-7862 for more details.

Loch Ness Productions, P.O. Box 1159, Groton, Massachusetts 01450 USA, telephone +1-978-448-3666 or +1-888-4-NESSIE, fax +1-978-448-3799, web site www.lochness.com; Mark and Carolyn Collins Petersen announced that a new Geodesium music album (the sixth), entitled “Stellar Collections, is now available containing the best of Mark’s soundtrack work over two decades; the cost is $15 U.S. for CD, $10 for cassette. The Nessies’ remastered “Music Back-Pack” library (mentioned in a previous column) is also for sale in CD format, and the latest issue of the Loch Ness Compendium (published last April) is available for $50 U.S.; the compendium is a directory of planetariums around the world. Western Alliance attendees were also treated to a performance at the Lane Planetarium of Loch Ness’ newest release, “MarsQuest,” a masterful reworking of its well-received “The Mars Show,” both narrated by Patrick Stewart. The program was favorably reviewed in the fall column just past; suffice it to say that it was great to see the program realized on the dome (and to see the high-def video projectors that ran the SkyVision demo used effectively as a video pan system for the program). Definitely a winner. Upcoming program releases include “Oceans in Space,” screened last year in Corsicana, Texas (the program features a search for places favorable for life with a focus on oceans, and is narrated by Avery Brooks - a good, solid astronomy program), and an updated “Hubble Vision,” program featuring the discoveries of the HST. “MarsQuest” and “Oceans in Space” sell for $1,995 U.S., “Hubble Vision” for $1,295. For more details on the show packages for these and other Nessie shows, contact as given above.

Laser Fantasy International, 300 East Evans Street, Suite P290, West Chester, Pennsylvania 19380, telephone +1-609-918-8292, fax +1-609-918-8293, web site www.laserfantasy.com; Scott Huggins announced that his company was making available for sale an extensive laser image library of “laser clip-art” for ILDA-compatible laser systems, gleaned from 25 years of show production. The library will available as a series of CDs containing a total of about 600,000 frames. The first is the “Space” disk, including 20,000 frames of constellations, astronomical objects, spacecraft, and the like. to follow will be CD’s categorized as “Animals,” “Nature,” and “Technology.” A single CD will cost $900 U.S., with a discounts for the purchase of two or more of the CD’s. Scott also announced that Laser Fantasy and Audio-Visual Imagineering (AVI), both of which sell compact full-dome laser graphics systems, had reached an agreement whereby AVI will offer its Omnispace system to domes 50 feet (15 meters) and larger, while Laser Fantasy will focus on marketing its Lumisphere system to domes smaller than 50 feet (15 m). It’s nice to see these two well-respected compa-
nies working together for the benefit of our small community! Several program trailers were demonstrated in the Lane Planetarium, including LEE's "Brief Mystery of Time," an educational program, and "Pink Floyd: The Wall" and "Dance of Light" featuring the famous Pink Floyd album and classical music respectively. The Lumisphere system sells for between $140,000-150,000 U.S.

Spitz, Inc., USA Route 1, Chadds Ford, Pennsylvania 19317, telephone +1-610-459-5200, fax +1-610-459-3830, e-mail spitz@spitzinc.com, web site www.spitzinc.com: Joyce Towne announced two new partnerships forged - one with CineMuse, Inc., (www.cinemuse.com) one of North America's leading high-definition video entertainment companies, according to a press release distributed at the conference, to distribute programs from CineMuse's extensive library through its dome-based visual immersion theaters. The second partnership involves Trimension Systems (www.trimension-inc.com), a leader in large-scale virtual reality systems; the partnership will create opportunities to combine Spitz's strengths in video play-back technology with Trimension's in real-time interaction technology, according to a second press release. In the Lane Planetarium, Spitz presented a trailer for its "Oasis in Space" available with its Electric Sky system, and character development pieces for its upcoming release called "Dark Star Adventure" featuring the adventures of an alien family (nicely done). CineMuse offered some high-definition video snippets as well. Contact Joyce for more information on Spitz's many products, including domes, its Nomad Remote Control Console Unit (for portable theater control), interactive audience response system, and PolyDome (a digital image processing system for dome visualizations, version LS now in release).

Goto Optical Manufacturing Co. 4-16 Yazaki-cho, Fuchu-shi, Tokyo 183 Japan, telephone +81-423-62-5312, fax +81-423-62-9571, and USA Liaison Office, 1525 Bernice Street, Honolulu, Hawaii 96817, telephone +1-808-847-5800 or +1-808-847-5800, fax +1-808-847-5850, e-mail gotousa@earthlink.net, web site www.goto.co.jp: Ken Miller announced the development of a new planetarium projector to fill the 26-40 foot (8-12 meter) gap in Goto's product line: the Model G812, whose first installation is scheduled for next year at Young Harris college in Young Harris, Georgia USA. The new model was developed with input from planetariums in focus group sessions conducted at planetarium conferences over the last year or so. Features of the optical-mechanical instrument include the projection of 8,500 stars down to magnitude 6.5, digital planet projections, 24 constellation figure projections, 3 rpm motors which allow the machine to run to any sky setting in ten seconds, the use of LED illumination and fiber optics bundles from a single light source. The projector is designed to fit neatly into the footprints of projectors it may be replacing in older facilities, and is priced at under $400,000 U.S. For more information on the new projector and Goto's superb and exhaustive panorama library, whose images are available for sale, contact Ken as given above.

Audio-Visual Imagingineering, Inc., 10801 Cosmonaut Blvd., Orlando, Florida 32824 USA, telephone +1 407 859 8166 or +1-800-952-7374, fax +1-407-859-8254, e-mail joanne_avimagineering.com, web site www.av-imagineering.com, web site www.av-imagineering.com: Joanne Young presented the first in a series of AVI's "Legends of the Night Sky" programs, featuring classic sky mythology realized in laser imagery with a full soundtrack. The first, "Perseus and Andromeda," tells the classic tale whose figures fill the autumn sky. I've seen it before, and it's simply delightful - as well as being faithful to the original myth. This is a wonderful alternative use of laser technology, essentially offering a clever cartoon treatment of sky tales. I can't wait to see the next one, which will involve Orion. For more information on this series, the Omniscan full-dome laser graphics system which ran the demo, and other products and services provided by AVI, contact Joanne as given above.

JHE, 4301 32nd Street West, C-1, P.O. Box 14278, Bradenton, Florida 34280 USA, telephone +1-941-794-3200 or +1-800-543-5960, fax +1-941-753-1482, e-mail jhe1value@gte.net, web site www.joehokinengineering.com: Joe Hopkins demonstrated the first of his Cosmic Tools DVD series of computer-generated video clips - DVD #1 called "The Planets" and featuring images of all nine planets of the solar system rotating, zooming, and slewing. There are 27 sequences in all, readily selectable via a menu screen, and nicely rendered. The DVD costs $295 U.S. Upcoming DVDs in the series include "The Solar System" which expands the menu selection to 40 entries, including the sun, moons, and asteroids, and "The Earth" which focuses on the Sun-Earth-moon system (priced at $395), and "Deep Space," which features nebulae, galaxies, quasars, and other deep-sky objects. Other JHE products include the Planetscan, a new system which provides slewing video capability, and all-sky system, a panorama system, show control modules, and more. Contact Joe as above for the full array of products and services.

Bowen Productions, 748 E. Bates Street, Suite 300W, Indianapolis, Indiana 46202 USA, telephone +1-317-226-9650, fax +1-317-226-9651, e-mail bowenprod@aol.com, web site www.bowenproductions.com: Mark Trotter and Dan Ritchie presented information on the AstroFX family of products, which uses hard-drive storage of video segments; contact as above to learn about them - it's cool stuff.

Ash Enterprises, 3602 23rd Avenue West, Bradenton, Florida 34205, telephone +1-941-746-3522, fax +1-941-750-9497, e-mail jllhare@aol.com: John Hare announced that partner Eric Melenbrink will be coming on with Ash full-time beginning next year. Ash has been chosen by Goto Optical Manufacturing Company to be its exclusive U.S. representative for parts and service, and Ash also provides parts and service on a variety of Spitz A-model projectors and others. The company also offers refurbished Goto and Spitz projectors for sale, as well as new and used domes, custom projectors, and its famous warp drive projector which uses an overhead projector as part of its design (the cost is $695 U.S. without the overhead included, $795 with). Ash is also an authorized East Coast Control Systems and Sky-Skan dealer, and provides project management and design consulting services. Contact John, as listed above, with your needs.

East Coast Control Systems, P.O. Box 486, Bigler, Pennsylvania 16825, telephone +1-814-857-5420: John Frantz informed me that East Coast has now converted the front ends of virtually all of the extant R. A. Gray MC-10 control systems, replacing the MC-10 computer with his PC-based Hercules central processor. Our facility made the change-over about eighteen months ago (we liked our tank-like MC-10, but it was admittedly slow in the compiling mode, had no real-time editing capability, and it was getting hard to find eight-inch disks ...); we're very pleased with the results and performance of the East Coast system. John's company offers a complete suite of theater control devices, as well as laser systems which I've found very impressive when I've had opportunities to see them demonstrated. For details, contact John in Pennsylvania.

Astro-Tec Manufacturing, Inc., P.O. Box 608, 550 Elm Ridge Avenue, Canal Fulton, Ohio 44614 USA, telephone +1-330-854-2209, fax +1-330-854-5376, e-mail shopper@astrotec.com web site www.astro-tec.com: Stephanie Hopper and crew regaled me with stories of their adventures around the world, for the company is one of the leading projection screen manufacturers in the world. Name a country, if it has planetariums or similar attractions, it probably has Astro-tec projection domes somewhere. Astro-tec has also been a wonderful supporter of planetarium
developed by a consortium of production entities under his project direction, with the cooperation of the Broderbund company which owns the rights to Carmen. While the first concentrated on the solar system, the second features the universe beyond. The Carmen premise remains: she steals something (or is about to), and the audience, led by an ace detective, solves puzzles and clues to track Carmen in an attempt to capture her and make right the universe once again. The programs are fast-paced and fun. We're having a great time running the first Carmen show, and the second looks even better; the video animation and all-sky sets are more elaborate, and VAL, the helpful ship-board computer, has been afflicted with multiple personalities which adds to the fun. If you want in, the purchase price is about $6,500. That's steep for many planetariums, but this is big-league stuff, and we, for example, financed the purchase with local business grants and donations with relative ease. So give Bill a call for details; these shows are great for kids, families, and school groups. And you get to "chew the scenery" as the ace detective - and what planetarian doesn't love to do that?

**Bishop Planetarium**, 1515 Bernice Street, Honolulu, Hawaii 96817 USA, telephone +1-808-847-8235, e-mail mikes@bishopmuseum.org: Mike Shanahan presented an excerpt of the second Explorers project program, "Explorers of Mauna Kea," which I saw in its entirety last year and liked. The news is that a third installment, called "Explorers of the International Space Station," is due out next spring. The show kits contain 250 slides, laser disc, CD soundtrack, script and production notes, and technical and educational web sites. Stay tuned for more news on the upcoming release.

**Minneapolis Planetarium**, Nicollet Mall, Minneapolis, MN 55401, telephone +1-612-630-6150, web site www.mplastruman.org: Rod Nerdahl presented a large chunk of the program "Time Bandits" at the Lane, which featured a group of kids taking a romp through time led by an alien. The planetarium offers a number of such programs for sale, and those I've seen feature good, solid information within charming story lines. And the prices, as I recall, run in the several-hundred-dollars-U.S. range. If you'd like to learn about the wide selection, contact as above.

**Learning Technologies, Inc.**, 40 Cameron Avenue, Somerville, Massachusetts 02144 USA, telephone +1-617-628-1459 or +1-800-537-8703, fax +1-617-628-8606, e-mail starlab@starlab.com, web site www.starlab.com: Eileen Starr reported on her collaboration with Learning Technologies to develop a new Lewis & Clark Starlab cylinder which highlights the navigational stars used by the duo on their western U.S. explorations, as well as sky reference points and coordinates and other details relating to celestial navigation. The cylinder sells for $525 US, and a set of 26 related activities developed by Eileen is available for an additional $10. For more information, contact Learning Technologies or Eileen at Valley City State University's Roads Science Center Planetarium, e-mail Eileen_Starr@mail.vcsu.nodak.edu.

**SOFIA Education and Public Outreach**, NASA Ames Research Center, MS 144-2, Moffett Field, California 94035 USA, web site sofia.arc.nasa.gov: Mike Bennett of the Astronomical Society of the Pacific (one of the partners in the education and outreach program for the Stratospheric Observatory For Infrared Astronomy) reported on the status of educational opportunities for planetarians. Once the 100-inch (2.5 meter) telescope, fitted into a short-bodied 747 jetliner, is flying beginning in 2004, planetarians and other educators will be able to apply for opportunities to fly aboard the aircraft or to work with SOFIA for a year as part of the visiting educators program. Other education and outreach programs are planned as well. Contact Mike, Edna DeVore at the SETI Institute, or access the SOFIA web site to find out more.

**Stasiuk Enterprises**, 4909 NE 47 Avenue, Vancouver, Washington 98661 USA, telephone +1-360-750-4524, e-mail garrys@pacifier.com, web site www.pacificer.com/ garrys: a brochure picked up from same at the Western Alliance conference listed Stasiuk's current show kit offerings including student programs and programs for general use on a variety of topics, with prices ranging between $300 and $1,250 U.S. Contact as given above for details.

**Space Telescope Science Institute**, Office of Public Outreach, 3700 San Martin Drive, Baltimore, Maryland 21218 USA, telephone +1-410-388-4394, fax +1-410-388-4579, e-mail stoke@stsci.edu: John Stoke, informal science manager, sent news of STScI happenings. Planetarian Ian Griffin formerly of Northern Ireland, Florida, and New Zealand has joined the staff as head of public outreach, and Frank Summers formerly of the Rose Center/Hayden Planetarium in New York has joined as a staff scientist. Current services to the planetarium community include participation in the IPS slide service; advanced access to Hubble news releases; ViewSpace multimedia programs which feature lovely conglomeration of Hubble imagery with interpretive copy intended for display on large screens, computer kiosks, and the like (beautifully done, by the way); two large traveling exhibits on the HST, large-format transparencies of Hubble images suitable for backlit display; and access to materials for conferences over the years, as have virtually all of the vendors listed in this column. That's not new - but its very good! Astro-tec not only erects, but also refurbishes, replaces, and paints old domes. For your dome needs and questions, contact Stephanie and the gang in Canal Fulton.

**Megastar**, 2-18-25 Minami-Ikuta Tama-ku, Kawasaki Kanagawa, Japan 214-0036, telephone/fax +81-0-44-976-1318, e-mail oohira@ja2s0-net.ne.jp: Takayuki Ohiro, the creator of a new planetarium projector called Megastar, demonstrated his prototype model in the Lane Planetarium during the Western Alliance conference to the oohs and ahhs of the assembled planetarians. (See the December 2000 issue of the *Planetarian* for an account of the system's development.) The sphere-shaped projector is small and compact (45 cm or about 18 inches in diameter, weighing less than 27 kg or 60 pounds), but projects a mighty 1.7 million stars down to magnitude 11.5, plus 300 deep sky objects brighter than magnitude 8. It features the standard diurnal, latitude, and azimuth motions plus free axis rotation and has twilight, sunset, and sunrise glows plus mood lighting and separate planets projectors individually computer-controlled. The effect on the 40-foot (12m) Lane dome was breathtaking; the projected sky was virtually gray with faint background stars in a vast multitude, and the Milky Way glowed in the most spectacular portrait I've ever seen in a planetarium - rich and delicate and detailed and star-cramped, with dark lanes and clouds standing out in marvelous contrast. It was just gorgeous. It will be interesting to see where this tiny, elegant, and eminently portable planetarium system goes now in its development and availability in the larger market - because it seems to me to be eminently marketable if it can be produced and maintained in quantity. If you have a chance to see it, don't miss it; the sky will delight you. Contact Mr. Ohiro in Asia as given above for more details, or talk to Bill Gutsch of Great Ideas, 11 The Crossway, Smoke Rise, Kinnelon, New Jersey 07405 USA, telephone +1-973-492-8165, fax +1-973-492-1836, who is the North American and European contact concerning the system.

**Great Ideas**, 11 The Crossway, Smoke Rise, Kinnelon, New Jersey 07405 USA telephone +1-973-492-8165, fax +1-973-492-1836: the irresistible, incorrigible, and irremediable Bill Gutsch not only assisted Takayuki Ohiro with his Megastar demo, but also demooed an excerpt of the second of the "Where in the Universe is Carmen Sandiego?" programs developed by a consortium of production entities under his project direction, with the cooperation of the Broderbund company.
special events and scientific expertise for special needs. In the future, STScI hopes to provide access to a video clip library, a library of astronomical visualizations, and science seminars for planetarians at the institute. All good and helpful stuff; see John for particulars.

Laser Captioning Jack Dunn of the Mueller Planetarium at the University of Nebraska state Museum, 213 Morrill Hall, Lincoln, Nebraska 68588 USA, e-mail j Dunn@unl.edu, reported on his work to use lasers to provide captioning on the planetarium dome for regular programming for the hearing impaired. It’s worthy effort indeed; if you’d like to learn how he does it, contact him as given above.

Our Fantastic Universe

Well, of course it is. But that’s also the title of a CD-ROM that Tom Hocking has written to tell me about. It comes from ACR International LLC, 2255 N. University Parkway, Suite 15-#277, Provo, Utah 84604 USA and features a sizable library of Hubble images. Concerning the product, Tom writes the following:

“Every once in a while a product comes along that is better and more useful than intended by its creators. While not bleeding edge in timeliness – it has a 1999 copyright date – “Our Fantastic Universe” is a CD-ROM with a wonderfully accessible and fast loading collection of some of the first 4000 or so Hubble Telescope images. Many of these images are not new to folks who have been following the odyssey of the HST. But for folks who would love fast, non-internet dependent access to some very good imagery (and captions!), as well as archival press releases and MPEG and QuickTime video clips, then this is one CD-ROM worth the $15 suggested retail price.

“The CD-ROM is browser based (its auto-launch feature starts your browser and opens the start page for you) and the index is easy to follow. If you have no browser, no worries there, since it comes complete with an install of Netscape 4.7. If your net connection is live though, then the collection of links interspersed throughout the collection will be live. Again, this is not bleeding edge – but if you want a fast loading archive of hi-resolution HST pictures, then you need to own this disk. You can even buy quantities for resale in your gift shops too.”

Tom gives minimum system requirements as 485/66 MHz CPU, CD-ROM drive, Netscape or Internet Explorer 3.x or greater, Media Player with ActiveMovie 1.0 or greater. For sales and free technical support, you can call +1-801-229-1230 or fax +1-801-229-1123. For more information, you can also contact a fellow names Brian Davis at brian@prodigita.com. Thanks to Tom for the review.

Looking Down With Binoculars

Dale Smith has alerted me to the web site of Trico Machine Products, 5081 Corbin Drive, Bedford Heights, Ohio 44128 USA, telephone +1-216-662-4194, fax +1-216-662-7513, web site www.tricomachine.com, which sells an interesting product: a special binocular holder which allows you to look down to see the sky.

The product is called the Sky Window, and employs a binocular mount suspended above an 8 X 10 inch (20 X 25 cm) mirror which can swivel on the altitude axis. You aim the binoculars down onto the mirror, adjust the mirror to bring into view a portion of the sky between horizon and zenith in the direction it aimed, and then you look through the binoculars at what’s on the mirror. No shaky hands, no neck stiffness – but you need a flat surface on which to set it, or a tripod to which you can attach the device via the tripod adapter.

This is an interesting concept for those desiring steady views – and would be especially useful, I think, for showing kids binocular objects in the sky. The Sky Window sells for $230 U.S. You can also purchase a pair of 8x60 binoculars to use with it, which provides a 5.5-degree field of view and costs $110. Buy them both, and the cost is $320.

Check out the pictures of the device at the company web site, where you’ll also find more information. (But pass by the “ICMO” link for the addition of the local times of sunrise and sunset, which can be customized for your Earth location.)

Another Walrecht Planisphere

Rob Walrecht in the Netherlands reports that his English-language planisphere for 20 degrees North is now out, and that he hopes to have his English-language equatorial-based planisphere out sometime next year. He will then have complete coverage, at regular latitude intervals, from 65 degrees North through 45 degrees South – which just about covers everybody but a few polar bears and penguins. To see his full line of products, check out his web site at www.walrecht.nl, or e-mail him at walrecht@globalx.nl

Catalogs

If you’re looking for astronomical stocking-stuffers for the holidays for your favorite astronomy nut, check out the latest catalogs from the following companies:

Astronomical Society of the Pacific, 390 Ashton Avenue, San Francisco, California 94112 USA: it’s like Christmas every time I open this one. You want celestial software? Videos? CD-ROMs? Books? Slides? Orreries? Posters? Slides? Planet models? It’s all here. New items include note cards featuring Hubble images ($18 U.S. a set), and accurate scale models of asteroids Kleopatra and Eros. Yes, these last two look like black and brown lumps, but that’s what they are, and they’re bound to be conversation starters. (As in “What on Earth is that?” “Well, they’re not on Earth.” Go from there.) They cost $25. You can order on line at www.astronomy.org, or by phone at +1-800-335-2624 (+1-415-337-2624 from outside the U.S.), or by fax at +1-415-841-9785.

MCM Corporation, P.O. Box 19907, Baltimore, Maryland 21211 USA: this company’s astronomy catalog is as chock-full as the ASP’s. You’ll find in its pages CosmoOdyssey II planetariums for sale (manufactured by R. S. Automation Industrie based in France), including domes for the projector, a scale model of the ISS ($359 U.S. assembled, $160 unassembled), desktop planetariums, a huge assortment of slide sets (just pick a topic), numerous CD-ROMs, laser discs, videos, and DVDs, and a large variety of globes and solar system models. You can contact the company by the usual means: telephone +1-410-366-1222, fax +1-410-366-6311, e-mail mmcmcorp@aol.com, web site www.mmcorporation.com.

Astronomical Data Tools

Roger Mansfield of Astronomical Data Service, 3922 Leisure Lane, Colorado Springs, Colorado 80917, has done it again: produced a fine set of data publications for 2002 that can be customized for your specific Earth location.

The Skywatcher’s Almanac 2002 provides listings of the times of sunrise and sunset, moonrise and moonset for every day of the year for one’s latitude and longitude, supplementing this information with sections on eclipses for 2002, planet phenomena and visibility, explanations of concepts, and other useful bits. It sells for $18 U.S., $20 for a laser-printed version.

The Photographer’s Almanac 2002 offers similar data with the addition of the times twilight begins and ends, the azimuths of these bodies at their rising and setting, and their altitudes at local noon. The cost is $20.

Buy the laser-printed addition of the first, or the second, and you get a complimentary copy of Roger’s Skywatcher software program, suitable for windows 95/98/NT, which allows you to plot the sun and moon’s attitudes as functions of local mean time for any

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day of the year for any location on the Earth.

Two other available publications are the *Local Planet Visibility Report 2002*, which lists the right ascensions and declinations of the five visible planets for two- or five-day intervals, plus an equatorial star map on which to plot them, plus a users guide, for $15, and the *Comparative Ephemeris 2002*, which offers a day-by-day set of positions for the planets and the sun and moon, for $12.

Purchase all four (the Forecaster’s Special 2002) and you can do so for $60, a $7 savings.

I like these publications – especially the first two – and use them regularly in both my work and play. They’re useful and convenient and I recommend them highly.

Finally, A Personal Note...

I have a magnet on the file cabinet in my office. It’s a simple thing; it shows an image of the full Earth bracketed by the words “All One People.” And it’s never seemed more poignant a message to me than right now, when, in the course of events this troubled year, and especially on September 11, we realized how far some of us are, on this small and fragile planet, from understanding or accepting this basic and powerful truth.

The year 2001, the first year of the new millennium, with all of its desperate hopes for our flawed and fallible world, hasn’t turned out as any of us would have desired. We’re not really spacefarers yet, as Clarke envisioned. We’re not living lives of technologically-wrought leisure as predicted by the visionaries of the 50s. We’re still fueling ancient grudges with modern weapons. And we’re still killing each other in the name of God.

So what are we to do?

Personally, I find the answer in my little magnet. What are we to do? What we’ve always done: to offer people perspective. To remind them that we live on tiny, delicate, incontrovertibly connected world in a vast and complex cosmos. That we are one species, defined far less by how we are different than how we are the same. That we owe it to ourselves, to our species, to the universe that nurtured us and of which we arguably may be the highest evolutionary expression – to survive. That we’re all in this together. And that we can still reach for the stars.

What are we to do? Our jobs.

Here at the end of 2001, I wish you the serenity and resolve to continue your good work – the work of us all – as we do our small but important part to make this good old world a better place in 2002 and beyond.

Have a calm solstice, the faith, and looking for all that’s new and worthwhile on our beautiful, spinning Earth...☆

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Running time - 30 minutes

# of slides - 172

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Running time - 29 minutes

# of slides - 101

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Running time - 35 minutes

# of slides - 302

**ONCE IN A BLUE MOON**

Running time - 35 minutes

# of slides - 270

**HERCULES SUPERSTARS**

Running time - 37 minutes

# of slides - 219

**THE X TRA TERRESTRIAL FILES**

Running time - 34 minutes

# of slides - 122

**HONEY, I SHRUNK THE SOLAR SYSTEM**

Running time - 36 minutes

# of slides 336

**3-2-1...BLAST OFF**

Running time - 32 minutes

# of slides - 152

**HONEY I SHRUNK THE UNIVERSE**

Running time - 37 minutes

# of slides - 172

**WINTER WONDERS**

Running time - 35 minutes

# of slides - 172
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Putting the I in IPS ...

I recently had a fantastic opportunity to travel to Shanghai, China to assist with the installation of some shows at the brand new Shanghai Sciencland. This new monument to science has to be one of the most exciting facilities in the world. Inside what they are calling the Imax Universe Theater you will find a Digistar 2 projector from Evans and Sutherland; Sky-Skan A/V and control; and an ImaxDome Projection System. This theater will open with China: The Panda Adventure and Buhl’s Through The Eyes Of Hubble in December, 2001. Nearby stands an Imax P3D Theater utilizing polarizing 3D glasses. To top it off they also have an Iwerks TurboRide Theater running Pirates in 4D that is housed inside a huge yellow sphere suspended inside a geometric glass enclosure at the center of the facility. Add in some impressive exhibits including a walk-through rainforest and an underground geological simulation and you can imagine what a wonderful resource the people of Shanghai will soon be enjoying. A great big thank you to science has to be one of the most exciting facilities in the world.

will be missed...

Gary Sampson (Gary E. Sampson Planetarium, Waukesha, Wisconsin) is now retired and you read correctly - the School Board in Wauwatosa (his former employer) renamed the former Wauwatosa West High School Planetarium in his honor!

Dr. Eileen Starr (Director of the Roades Science Center Planetarium at Valley City State University in Valley City, North Dakota) will be retiring at the end of this academic year. She says, “Valley City State University is a great place to work!”

Dick Knapp, a planetarian since 1965 and Manager of the Russell C. Davis Planetarium, Jackson, Mississippi, since before it opened in 1978, retired on August 15, 2001. Lenard Jenkins, Production Supervisor, preceded him in retirement on June 30, 2001. Some of you may know that Dick began his professional career at the Morehead Planetarium in Chapel Hill, North Carolina. His accomplishments there included training astronauts in celestial recognition, leading the planetarium through the transition from live to taped shows, drafting accreditation guidelines for stand-alone planetaria that the American Association of Museums later adopted, and developing the Morehead Graduate Internships in Planetarium Studies. Their expertise, supported by Cinema-360, the Foundation, and the City of Jackson, produced The Space Shuttle: An American Adventure, the first professional film shot in orbit using NASA’s first movie camera payloads. Since its premiere in 1985, the film has played in nearly twenty theaters worldwide to over one million people and earned a gold medal in the International Film and Television Festival of New York. Thanks in large measure to Dick and Lenard’s efforts, C-360 transformed into the thriving Large-Format Cinema Association. Most recently, Dick and Lenard persuaded the City of Jackson to fund the acquisition of new large-format film technology. A MEGA-HD Cinema opened last September to unprecedented crowds.

Congratulations

... to Audio Visual Imagineering, Inc. (Orlando, Florida) and SpaceMedia Entertainment who collaborated on a unique exhibition in Europe called Man and Space - Moments of Fascination from September 28 to October 7, 2001 at a fair in Offenburg, Germany. AVI debuted their OMNISTAR projector as a part of the exhibit which uses a laser projecting on the inside of a huge white balloon. The effect is like watching a laser show from behind your planetarium dome! Visit www.universedimensions.de for a closer look.

... to Peggy Motes of the Munice Community Schools Planetarium in Munice, Indiana, who was recognized for excellence in teaching and was featured in the October 11, 2001, Life section of USA Today. Peggy was nominated to be included in this special group of educators. She just returned home from the Western Alliance meeting where she presented a great paper about her extensive program surrounding the June solar eclipse. Way to go Peggy!

... to Stuart Ingram, Chairman of the Board and Robert Cline, Museum Director on the soon to be opened planetarium in Ocean Isle Beach, North Carolina - with a 12-meter (40-foot) dome and 1024/ATM4 system from Spitz, Inc.

People on the Move

John Schroer (formerly with the Schenectady Museum Planetarium) has accepted the position of Science Educator at the New Detroit Science Center! He will be joining Todd Slisher (formerly with the Sharpe Planetarium in Memphis, Tennessee) and staff as they prepare to open the Digital Dome Planetarium, a 15-meter (50-foot) tilted dome with 117 seats, featuring a E&S Digistar II, SkySkonSpice with the works, and more!

Aaron Guzman (formerly with the Business Department of the Don Harrington Discovery Center, Amarillo, Texas) is now Education Coordinator at the Buehler Planetarium at Brodhead Community College in Davie, Florida.

Mark Trotter (formerly curator at the Louisiana Nature Center Planetarium in New Orleans, Louisiana) has taken a on the role of Senior Projects Manager at Bowen Productions of Indianapolis, Indiana.
Bad News in Florida

An early morning fire is blamed for $2.5 million in damage to the South Florida Museum's Bishop Planetarium in Bradenton, Florida. The August 23, 2001 blaze created huge billows of smoke and closed the entire museum. No one was injured, and, flame, heat and smoke damage did not reach the museum's renovation projects.

The Bradenton Fire Department responded to smoke seeping from the domed theater around 5:30 am in the morning. After an intense, long search for the source of the fire, investigators have pinned it as electrical in nature. The damage amount soared because the area that fire and smoke affected contained 50 to 60 computer-controlled carousel projectors, three video projectors, and an expensive laser system.

Great Ideas

Need a little inspiration? Look no further than www.ipnet.com. It's the website of Shigemi Numa­zawa and his Japan Planetarium Lab Inc. This sight has lots of astronomical observations as well as fine art images that he sells through a photo bureau.

Forwarded from Claudio Veliz in New York City, "I found this powerful search engine, focused only on scientific information: http://www.scrirus.com/"

Jeff Adkins has started a new web site for astronomy teachers called www.Astronomy Teacher.com. He hopes to post lesson plans, links to online courses, and of course links to astronomy sites. At the moment, the Links and Resources page has a lot of links, but the other areas are just getting started. There is also a message board where you can set up conversations, ask questions, find out how other people teach moon phases and so on. Of course, all of it is free. Stop by, take a look, and let him know what you think.

Future of IPS

Two issues ago I mentioned some thoughts about how IPS can either stay as it is today or expand in the future. Critical to growth of an organization is a close look at its current structure. Over the next few months discussions will take place that will study the structure of IPS as an organization and see how it can best be developed to provide better service to its members and to increase its membership base. John Dicken­son of the H.R. McMillan Space Science Cen­tre in Vancouver, Canada, is leading the discussion and I again encourage you that if you have ideas on how IPS could be improved for your benefit, now is the time to tell us. Please send John or myself your thoughts as we work through this process.

(BT) Before Tuesday/(AT) After Tuesday

I was in Shanghai on September 11, 2001. We had to stay in China for an additional five days until air traffic got back to normal. Someone from the staff of Science­land said, "it is a new year in America". It took me a moment to realize what he really said was, "it is a new era in America". Watching the events unfold on television, I felt that the importance of the project that we were working on was now somehow diminished. That was the case until I started to think about all of you out there. I thought about how you strive to explain the wonders and beauty of the heavens. How your eye twinkles like a star every time someone stops to ask, "how does that machine in the middle of the room work?" I thought about how lucky I was to be a planetarian, and it pulled me through.

(=President's, continued from page 22)
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The editing is done at a time when there is a strong feeling of uncertainty among us, and many contributors have included a thought related to the terrible events of 11 September. In comparison with this, it seems like a small accident that an SAS plane crashed two weeks ago at the very same Milan Airport where these lines are written, when I am on my way to the IPS Council Meeting in Castel Gandolfo south of Rome. I can only say as so many others that I just hope that peace will be possible on our planet in the not-too-distant future.

The International News column depends entirely on contributions from IPS Affiliate Associations all over the world. Many thanks to Bart Benjamin, Ignacio Castro, John Dickenson, Jon Elvert, Jean-Michel Faidit, John Hare, Aaron McEuen, Loris Ramponi, and especially to Paul England, who now hands the BAP reporting duties to Teresa Grafton, for your contributions. You are welcome back with new reports, and I look forward to reports from other Associations as well. Upcoming deadlines are 1 January for Planetarian 1/2 and 1 April for 2/2.

Association of French-Speaking Planetariums

No important news from France by this report, so we take the opportunity to publish a map of French planetaria. And a message of sympathy to our American colleagues after the terrible events of 11 September.

Association of Mexican Planetariums

It was with deep surprise and disappointment to find out on August 23, through Christine Schuplas’ IPS news service, about the cancellation of the IPS 2002 Conference at Morelia, México due to economic problems in government institution supporting the Morelia Planetarium. Nevertheless the Director, Gabriel Muñoz has told that he will host the AMPAC 2002 meeting at his planetarium, perhaps at new date.

On the brighter side of things, Papalote Museo del Niño, a children’s science center in México City, is in the planning stage of installing a new planetarium in order to be able to produce the same kind of immersion type shows presented at the Hayden Planetarium in New York. Spitz will provide the large 23 meter diameter projection dome, and Papalote already owns the computer to run the required software. It will be seen how things develop in the next few months.

British Associations of Planetariums

BAP held its annual meeting at the At-Bristol Science Centre on 15 September. It was a great meeting since BAP is a family of supportive friends who are planetarians. Thirty members, most old friends, attended the largest meeting yet. It was a great social success including a river trip of Bristol Harbor and a convivial pub meal together. The meeting commenced with thoughts for those touched in whatever way by the disaster in New York and also the words of Carl Sagan on our place in space.

BAP membership has increased during last year and two large science centers opened, At-Bristol and National Space Science Centre. Glasgow Science Centre has opened but not...
yet its planetarium. A few more additional mobile domes are now operating in the UK doing business mainly with schools.

Generally, all are doing adequate business but none reports large growth and some are static. Large centers are meeting visitor targets but not their revenue projections. There is concern that we are reaching a plateau and the economic situation, but holidays spent at home, with the current world situation, may help. We hear of new domes being planned, and they can only compete with already increased number of Millennium/Lottery-funded science attractions which have mushroomed in the last few years. Will there be sufficient business for us all and who will fail? May be all of us!

New officers for 2001/2002: Eva Hans of South Tyneside College is now President, Teresa Grafton of London Planetarium is UK IPS Representative, David Thomas of Techniquest is remaining as Treasurer. Hollie Molyneaux of NSSC Leicester has become Secretary, much to her surprise! We are grateful to Alex Barnett for offering to host the BAP Secretariat at Leicester. These officers with the past presidents make up the Council with co-options for various projects during the year.

This year BAP's two awards were presented as follows. The Undine Concannon Award for Organisational Achievement goes to Alex Barnett for her tremendous determination, planning and achievement of the opening of the National Space Centre at Leicester supported by her team. The Terence Murtagh Award for Technical Innovation goes to Peter Bassett for taking mobiles to places they had never been before, and the technical challenges he overcame to do this.

BAP is looking to provide a Presenters course this year. It is also investigating closer working links with Association for Astronomy Education. The web site will be further developed and other sub-committees formed for projects suggested at the meeting. BAP remains strong and a source of support and help for all planetarians in the UK. For many it can be a lonely misunderstood calling, and an encouraging call from a fellow member can reach places and give strength not found elsewhere.

Canadian Council of Science Centres

Like many organizations, including IPS, the CCSC is planning for the future. CCSC needs to adapt to meet the needs of its members and provide leadership to the science center and planetarium community in Canada. A CCSC Planning Session was held in Sudbury on 8-9 June 2001, hosted by CCSC President Jim Marchbank. Key factors driving the review include the relatively low profile of science centers, with government, business and the general public; declining government funding to the sector; the need to develop new and more inclusive programs; and the need to enhance links to business and industry. Canada's geography, the lack of dedicated resources, and the absence of a plan or objectives complicate the desire to develop solutions to these issues.

One outcome of the Planning Session was that the following goals were developed for the Council.
1. To establish the relevance of the Council to our staff, government and the general public.
2. To develop a federal government funding program to increase the capacity of science centers, enhance science literacy and enhance innovation and creativity.
3. To develop a program that assists members to enhance the effectiveness of their programs and services.
4. To measure and communicate the efficacy of science centers in enhancing science literacy and economic development.
5. To develop an effective organization to achieve our goals.

The CCSC Board has also agreed to expand its membership and representation, to sever its affiliation with the Canadian Museums Association after the 2002 conference in Calgary, and recommend a change of name to the membership. The proposed new name of the society will be the Canadian Association of Science Centres. Next meeting of the CCSC Board will be at the Phoenix ASTC Conference, October 5th to 9th 2001.

The recent terrorist acts in New York and Washington DC have created a level of uncertainty rarely experienced in the last few decades. Many Canadians sent messages of condolence to their friends and colleagues in the USA. The concept of the fragile blue planet, our only home, was helpful to many in trying to get to grips with how they should react to these horrific events. Now many are also evaluating the possible impacts on travel and tourism, and on attendance at our facilities. We join our friends around the world in praying for the speedy return of peace.

Great Lakes Planetarium Association

At the SEPA/GLPA Conference in June, GLPA conducted an election of officers. Joseph DeRocher was elected President-elect, Robert Bonadurer was re-elected as Secretary/Treasurer, and Susan Reynolds Button was re-elected as IPS Representative.

Illinois. The Fall 2001 meeting was held at Strickler Planetarium of Olivet Nazarene University in Kankakee on 27 October. The Spring 2002 meeting (with Wisconsin/Minnesota) will be held on 3-4 May in Madison. The Adler Planetarium in Chicago has premiered Solar Storms as its latest interactive offering for visitors to explore. This sky show presents findings about powerful storms from the sun, its spectrum and magnetic fields, and it encourages the audience to test their knowledge about our parent star. On 22 September, Adler hosted a series of activities to usher in the astronomical start of autumn, including Phyllis Pitluga's lecture entitled Cultural Significance of Equinoxes and Solstices.

The William M. Staerkel Planetarium at Parkland College in Champaign premiered several new shows this fall, including Night Lights, a Sudekum Planetarium production written by their own Waylena McCully. In November they opened Santa's Secret Star. Also returning this fall will be a five-week workshop on practical backyard astronomy, a teacher's workshop in their Telescope Loaner Program, and a Telescope Buyer's Seminar. Lakeview Museum presented a limited selection of school shows in September while all of its laser disk players were in Chicago for preventive maintenance. Sheldon Schafer, Director of Science Programs, was fortunate to see a perfect eclipse from Mozambique, part of a 21-day camping safari through South Africa, Swaziland, Mozambique, Malawi, Zambia, and Zimbabwe. Sheldon said: "It was an unbelievable adventure."

This fall, the Cernan Earth and Space Center at Triton College in River Grove hosted From Observation to Exploration, a six-part Educator Workshop Series featuring basic astronomy and planetary science, as well as participating in the Museum Partners Science Program. The ISU Planetarium reopened in September with the program Daughter of the Stars, which showcases a variety of legends about the night sky as told by Native Americans from Alaska to Mexico.

Indiana. The Fall 2001 meeting was held at Goethe Link Observatory in Martinsville on 26-27 October. The Spring 2002 meeting will be held in Mishawaka on 20 April. The PHM Planetarium Air & Space Museum is adding a scale model Air Museum to its Manned Space Museum. The Air Museum includes 1/72 scale models of all the major aircraft of each decade, including both military and commercial aircraft. The planetarium has also put together a 38-minute video entitled History of Flight in the 20th Century. Director Art Klinger and Dr. Phil Wynn have completed a rough draft of a new astronomy textbook/workbook entitled Mysteries of the Night Sky. This full year introductory astron-
omy text is for high school or college introductory courses.

The Carmel Clay Community Schools Planetarium has made some recent renovations, including the addition of new seating and carpet and a new sound system. The Muncie Community Schools’ Planetarium presented the StarDate Ancient Horizons Egyptian program in both English and Spanish in September in celebration of Hispanic Heritage Month. In June, the planetarium was a downlink site for the summer solstice total solar eclipse 2001 from Zambia, South Africa. Holly Hudson is the new Planetarium Director for Terre Haute Schools, taking over after Jerry Mansfield, who retired in June.

Maryann Foster, an art teacher, and Gregg Williams, Planetarium Director, have produced a planetarium show titled Van Gogh Sees the Stars for the Merrillville Community Planetarium. The program traces the life of Vincent Van Gogh and his interest in the sky. The planetarium hopes to use the show with art classes and as a public program. Steve Sumichrast, a Student Assistant and high school student in Merrillville, has helped create a website for the planetarium as part of the school system’s website. In August, the University of St. Francis appointed Alan Pareis Director of the E.C. Schouweiler Planetarium. Luann Watson was hired as Educator to present and develop school programs. Michigan. The Fall 2001 meeting was held at Grand Rapids on 19-20 October. The Spring 2002 meeting will be held in Sault Saint Marie sometime in mid-June. The Cranbrook Institute of Science Planetarium in Bloomfield Hills recently debuted a new astronomy program entitled Awesome Autumn Skies. The show features an audience-interactive Digistar starmap, as well as an educational tour of the current night sky, Milky Way galaxy and zodiac. In addition, they hosted a four-week course entitled Astronomy for Inquiring Minds beginning in October, and they will host a telescope users workshop in January. The Shiras Planetarium in Marquette displayed a Lunar Disc during June and July. This year marks Director Scott Stobbelaar’s last school year of regular teaching, but he will stay on with the planetarium in retirement.

The Exhibit Museum of Natural History in Ann Arbor is in the final stages of their in-house production of Women In Astronomy: A History. The program, funded through a grant from the Michigan Council for Arts and Cultural Affairs and private donors, will open in Ann Arbor in January. This show focuses on twenty women spanning the time from A.D. 400 to the present.

The Longway Planetarium in Flint enjoyed the beginning of its new era as a Digistar planetarium when they re-opened on 29 September. In mid-September, as part of the Quilts at Crossroads countywide quilt show, they presented Star Quilts at Longway Planetarium, a show of locally made quilts with a star theme in their exhibit lobby.

The Grand Haven Area Public Schools Planetarium is working to increase the number of classes visiting this year after a successful reopening. Last year, 6th and 7th grade students were treated to visits. This year, 4th and 7th grade students were added. The Delta College Planetarium in Bay City shut down during the month of September for annual equipment maintenance and cleaning. The planetarium reopened for a new season of shows in October. Once again, in celebration of Halloween, they hosted a free day where they ran Night Walk free of charge to all visitors.

Ohio. The Fall 2001 meeting was held in Pittsburgh on October 12 & 13. The Spring 2002 meeting dates and location will be announced later. A veteran Ohio planetarium is retiring. Dick Speir has directed the Sidney Frohman Planetarium in Sandusky since its opening in 1967, serving schools in Sandusky and the surrounding area and running weekend programs for the general public. After a lapse of almost ten years, the Fostoria High School will be implementing its planetarium into their Earth Science curriculum once again. The NOVA III star projector has been refurbished by Ash Enterprises.

The planetarium in Shaker Heights recently ran a successful fourth space camp with twelve students, including exchange students from Israel, China, Switzerland, and Kosovo. Amateur rocket builders demonstrated the principles of rocketry and showed video of some amateur launches, including a large scale model of the Mercury capsule which carried Alan Shepard in 1961. Shepard’s daughter was at the amateur launch. Meanwhile, the Shaker Planetarium is being redone. A room for AV editing is being put in, the star machine console is being redone by Jon Frantz, and new cove lighting was installed. The facility now has six slide projectors and a new control system that features automation and editing capability.

This summer, the Ritter Planetarium and Brooks Observatory offered a very successful Parent/Child Space Academy in July and hope to add this new workshop to their set of Boy and Girl Scout and Telescope workshops. In August, Ritter bid farewell to long time student employees Meredith Gray and William Fischer. Both are now at the University of Massachusetts pursuing graduate degrees.

This fall, Dayton’s Caryl D. Philips Space Theater featured Explorers as their main public show in conjunction with the Navigation traveling exhibit. As part of a capital campaign, their ten-year theater seats have been reupholstered.

Wisconsin/Minnesota. There was no Fall 2001 meeting, but the Spring 2002 meeting (with Illinois) will be held on 3-4 May in Madison. The Minneapolis Planetarium recently premiered its new original production called Space Dreams and continues its plan to open a new facility in late 2005. The Barlow Planetarium in Menasha (GLPA’s 2002 conference site) has premiered its own children’s show, The Amazing Show, and started hosting sleepovers this fall.

Italian Planetaria’s Friends Association

During the last National Meeting of Italian Planetaria (Rovigo, October 2001) news was presented about the planetaria of Rome and Naples. The second has been opened on 23 November in the biggest Italian science center, the “City of Science” of Naples. Under a dome of 98 meters (75 seats), a ZKP 3 Zeiss projector with Sky-Skan All-Sky has been installed. The planetarium coordinator is Alessandra Zanazzi <zanazzi@cittadellascienza.it>. The previous star projector, a Goto Ex-5 model, will be used in the section of the museum devoted to children.

During the Meeting in Rovigo, another new project was described, an Italian planetarium of 1873 and a memory about the Italian astronomer Giovanni Latino Andriessi in the occasion of the centenary of birth (1901). Andriessi was director for twenty years of the old Rome Zeiss Planetarium, when the dome was installed inside the Roman Thermal Baths of Diocleziarn. From 1928 to 1948. He was lecturer of 9000 planetarium lessons and 17 astronomical courses that involved thousands of people. In 1929, he conducted special lessons for distinguished people like kings, queens, and princesses. The final part of the Meeting was devoted to a concert-conference inspired by Harmonies Mondial by Kepler.

Nordic Planetarium Association

The biennial NPA Conference was hosted by Framtidsmuseet in Borlänge, Sweden on 21-23 September with Hans Lundström as chair. It was a successful event with 30 participants from five countries. Tom Callen presented the complicated production process of Cosmonova’s (Stockholm, Sweden) new show UFO - The Truth is Here. Lundström presented Framtidsmuseet’s latest educational school show Stars and Plants and their family show in the making, Twins in
Space. Lars Broman presented the new one-semester course Communicating Science at Dalarnas University - contact him at <lb@aavo.se> for more information on that - as well as the financial problems of Teknoland (both in Falun, Sweden). Teknoland's Spitz star ball has been sold to Mariestad's Astronomical Club (Sweden) and their giant Starlab dome to Science Circus/Teknoteket in Oslo, Norway.

Eva Mezey reported that Lund's planetarium in southernmost Sweden is moving from the old observatory building in central Lund to a new location near the Department of Astronomy at the University of Lund. Johan Gijsenbergs presented Sky-Skan Europe, with offices in München, Germany and Amsterdarn, Netherlands (where Gijsenberg is). Aase Roland Jacobsen presented The Aarhus Meteorite and other events at the Steno Museum planetarium, Aarhus, Denmark. Aslaug Norden-Ott talked on her experiences when presenting Harry Martinson's epic Aniara in a Starlab planetarium at Lem university high school in Göteborg, Sweden - some readers may remember Aniara from Mariana Back's planetarium show at Framtidssmees Kosmorama Space Theater during the IPS'90 Conference or from John Hare's American Aniara show. (More about Aniara and Martinson in the Planetarian 2/98.)

Lars Petersen presented the activities of Orion Planetarium, Jels, Denmark, which runs as a sister planetarium of the planetarium in Aarhus. A few years ago, there was a great risk that Orion should be sold to astrologers, but was saved by intervention from the University of Aarhus. Jaak Jaaniste presented the first year's activities of the new Starlab at the Science Center AlHAAA, Tartu University, Estonia. Ilgonis Vilkis from the Institute of Astronomy in Riga talked about the situation in Latvia - not yet a planetarium, but the Estonian Starlab would be borrowed later this year.

Ann-Gerda Eriksson talked about Sweden's northernmost planetarium activities, the small planetarium at Teknikens Hus in Luleå and their nowadays two Starlabs, used in outreach programs in Norrbotten and Lapland. Ann-Marie Grönkvist from Chalmers University of Technology, Göteborg, told that Chalmers' Starlab program will close down - more on that below. Guest lecturer Prof. J. E. Mountain talked on An epoch-making invention in the field of portable mini-domes - Prof. Mountain is remembered from his lecture on black holes during IPS'90, which came to a sudden end when he suddenly was physically absorbed by his invention that time, a black hole generator.

A new board was elected for the two years 2002-3: Lars Broman, President; Hans Lundström, Secretary/Treasurer; Timo Rahunen Vice-President with Sakari Lehtinen, Deputy; Aase Roland Jacobsen, Director with Lars Peterson as Deputy; Helle Jaaniste, Director with Jaak Jaaniste as Deputy; and Ivar Reed Nakken, Director with Torbjörn Urke as Deputy. Finally, NPA received an invitation to hold its next conference in 2003 in Tartu, Estonia.

Nineteen years ago, Chalmers University of Technology bought a Starlab, actually the first in Scandinavia. Since then, first Marie Rådbo and later also Ann-Marie Grönkvist have given hundreds of thousands of children the opportunity to see the stars, and it is still going strong. But now Rådbo has decided that it is time for a change. She has been invited by FEST, the Foundation for Education, Science and Technology in South Africa, to share her experiences. During the trip she will visit science centers, observatories, universities, etc., and talk to learners, teachers, and the public about her ideas about science communication and about astronomy. She will also take Chalmers' Starlab and leave it there as a gift to FEST. Rådbo is sure this is an excellent future for the planetarium and she will also try supporting them as much as she can.

Per Broman, Broman Planetarium, has two new products for the Nordic market. One is the computer program Plot Formula, used to increase understanding of functions, equations, and graphs. A demo version of the program is available at <www.planetarium.se>. The other product is Learning Technologies' foolproof solar telescope Sunspotter, also presented at Broman Planetarium's site.

Pacific Planetarium Association

A two-alarm fire at the California Academy of Sciences in San Francisco occurred late on the evening of 30 August 30, consuming the museum's main gift shop and causing significant heat and smoke damage to the nearby exhibit area adjoining the Morrison Planetarium. The planetarium theater itself and the historic star projector were subjected only to a slight, cleanable accumulation of soot, thanks to the rapid response of the San Francisco Fire Department. A NASA lunar sample was undamaged. Most notable, though, was the melting of the Academy's famous large models of the planets, which were made of Plexiglas - these were so deformed by the heat that they ended up looking like pieces from a Salvador Dali exhibit. The hall's signature element, the Foucault pendulum, suffered heat-damage to its control electronics and was temporarily removed. The Academy was closed to the public for 2½ weeks in September as the stains and odors of smoke and soot were removed by a professional cleaning crew. Full operations - including planetarium shows - are now back to normal, though in the absence of an auditorium, main gift store, and astronomy exhibit area.

The Morrison Planetarium should be able to celebrate its 50th birthday on 8 November. It is hoped that the exhibit hall will be repaired and refurbished enough to allow public access in December. A new family show, What's Up?, premiered at the end of summer, featuring a cartoon character from the 1st-3rd grade school show who asks questions and offers wise cracks about the night sky. This and all other shows were written and produced in-house.

An all-dome video system was installed in the Lane Planetarium in Eugene, Oregon. The full-dome, hi-def SkyVision system was installed under its current 12.2-meter dome, but will be moved to the planetarium's new 15-meter theater upon completion. A Dolby digital, 5.1 surround sound system, two DVD players and a MPEG video player were also installed.

The Astronomical Society of the Pacific (ASP) has a new web address at <http://www.astrosoctiy.org>. All other addresses on the Society's educational web site have also changed. We apologize for causing more work, but would be most grateful if you could change references and links in your publications and on your web sites. For more information, please contact the Society's webmaster, Leslie Wolber at <webmaster@astrosoctiy.org>.

Rocky Mountain Planetarium Association

The recent Western Alliance Conference in Eugene, Oregon, was strong. Being scheduled in the wake of 11 September, it appeared to have only effected our attendance by about 10-15%. Business was pretty much as usual.

One of the major announcements for RMPA as a group is the new web site, <www.rmpadomes.org>. They are very excited to offer, to the members of RMPA, access to a library of useful slides, panoramas, all-skies and just about anything else folks want to share. In order to partake of this service, one needs to become a member of RMPA. In order for this service to become successful, we need members to submit material. So, you see, this is sort of a group effort. If more get involved, then more people get results. (Membership for RMPA is currently at $15/year) Here is where the NON RMPA's, come in. Our membership is not limited to just the Rocky Mountain Region. So, RMPA invites the world to partake in this by
becoming a member, making submissions and getting the benefits of the shared visual resources.

Submissions for this service have already begun. The Air Force Academy, Colorado Springs, Colorado, has submitted all of their panoramas for the library. Hansen Planetarium has also submitted a few all-skies from their recent productions. After the announcement at our conference, others began to talk about what they had to submit and that they will indeed become a member. Obviously, this will turn into something that we all can use.

For the moment, the website will host a catalog with thumbnails to show what is available. When members find what they are looking for, they will need to place their order to the librarian via e-mail. The librarian, for the time being, will burn the data onto a CD-ROM and send it off. You may be asking, who is this individual? For now, Hansen Planetarium will manage, scan, host, and mail the data. Hansen Planetarium continues their efforts to build a new facility by the end of the year 2002. Soon they will know much more about the financial aspect of the project. Feelings are good. They feel that they are supported and will get what they need in order to do what they are planning, All-Dome Video!

The Faulkner Planetarium is making progress with plans to build a research-grade observatory. This facility will be on the University Campus, most likely, in a separate building from the museum. It will be a Classical Cassegrain mount, boasting a 60-cm (24 inch) Torus Instrument, with a coudé focus and Springfield Mount. Plans are to have construction complete as early as January 2003. The USAF Academy Planetarium is getting a new sound system. Installation should be in late November. The contract was awarded on 30 September to Bowen Productions of Indianapolis. The sound system will replace components that range in age from 10 to 30 years old. They hope to have a sound system that will rival any other facility.

A new staff member is coming on board at USAF Academy Planetarium (Center for Educational Multimedia). He is Technical Sgt. Vito Loguidice, and he'll replace TSgt Charles (Chuck) Stringham, who will be moving to Georgia later this year. TSgt Stringham has been at the Academy Planetarium more than three years. With the stepped up security at Air Force Bases, including the Air Force Academy, they have temporarily discontinued public and school presentations. They are making changes to the lobby displays in an attempt to show visitors that the planetarium is part of a larger military training facility, and that the Air Force is involved in many aspects of space transportation, earth sensing, weather observations, and other activities that contribute to, or rely heavily upon, our national space capabilities. They are also looking at ways to deliver appropriate Air Force messages in each of their programs dealing with navigation, aviation, space, astronomy, and solar or terrestrial information to explain any connection between those topics and Air Force and Academy programs.

Southeastern Planetarium Association

Bradenton's Bishop Planetarium suffered a devastating fire early on the morning of 23 August. Over a month later officials are still uncertain as to the cause. The planetarium projector and most of the other equipment including the dome have been declared a total loss. All staff except director George Fleenor have been let go by the parent organization, the South Florida Museum. The future of the planetarium remains uncertain.

Plans are moving forward for the 2002 SEPA conference, which will be hosted by the new planetarium at the Louisiana Arts and Sciences Center in Baton Rouge. Conference dates are 25-29 June 2002. The site for the 2003 SEPA conference is still undecided. For up-to-date information on SEPA, visit their website at <www.sepadomes.org>.
NASA Space Science News

Anita Sohus
NASA/Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91109
USA
818-354-6613
818-354-7586 fax
anita.m.sohus@jpl.nasa.gov

In September and October, we received many applications for the 2002 Solar System Ambassador program, through which competitively selected volunteers from across the country bring the wonders of space science to the public in many non-traditional venues. As usual, we received a number of applications from other countries. Unfortunately, because our funding comes from U.S. taxpayer dollars, we can only select U.S. citizens. Kay Ferrari, the program coordinator, shared a particularly poignant application from a citizen of Bosnia Herzegovnia, however. His reason for wanting to be a Solar System Ambassador: "I live in a country where we have forgotten to look at the stars." Perhaps by understanding the sheer scale and wonders of the Universe, people might learn to put their differences aside and work together to protect our own beautiful and fragile planet. (Kay has put our new friend in touch with a group, which includes a former Ambassador, in England who are discussing setting up an Ambassadors-like program there.)

Mars Odyssey arrived at Mars and went into orbit on October 23, 2001. After several months of aerobraking to achieve the desired orbit, look for the first images around the first part of February 2002. Keep in touch through the Mars Exploration Program site http://mars.jpl.nasa.gov.

A number of conferences went on as scheduled this fall, despite the uncertainties and the hassles of increased security at airports. Cheri Morrow, broker from the Space Science Institute, conducted a workshop at the Western Planetarium Alliance in Eugene, Oregon, hosted by Jon Elvert. John Stoeke, Anita Sohus, and Mary Dussault presented at the Space Science Showcase at the Association for Science-Technology Centers conference in Phoenix, where we enjoyed exploring the Arizona Science Center and listening to Christine Shupla narrate Cosmic Joyride, a showcase of the capabilities of their planetarium.

We're also working with IPS members to represent IPS at the American Astronomical Society's Division for Planetary Sciences annual meeting, which will be in New Orleans, Louisiana, from November 27 - December 1, 2001. A highlight should be the special session on Deep Space 1's findings at Comet Borrelly. The abstracts are online at http://www.boulder.swri.edu/dps01 (the education posters are Session 13).

A new resource especially for planetariums, museums, and science centers went live on October 5, just in time for ASTC and WPA. The Space Science Access website at http://mo-www.harvard.edu/spacescience access has been created as a "watering hole" for planetariums, science centers and museums to access NASA resources, share ideas, and share best practices in informal science education. Kudos to Mary Dussault of the Structure and Evolution of the Universe Forum at Harvard-Smithsonian and to Kathryn Treml and Craig Anthony of the SouthEast Regional Clearinghouse broker/facilitators for putting this site together, with the help of the Informal education working group of NASA's Office of Space Science Education and public outreach support network. We solicit your feedback and participation in this site. Every page has a link to an evaluation form. We'll be making this site known to the space scientists around the country, too, as a meeting place for those wanting to find experts in specific science areas or in science education.

Another tool that we plan to expand is the NASA Solar System Exploration Mission Launches and Events calendar, at http://sse.jpl.nasa.gov/whatsnew/calendar.html. I put together this "decade at a glance" in direct response to complaints I heard at ASC several years ago, that folks don't know what NASA is doing and when they are doing it. This obviously had made it hard for you to plan programs and events around exciting NASA events. This calendar shows launch dates and the mission events such as flybys, orbit insertions, landings, and sample returns for U.S. missions exploring the solar system. It also includes foreign missions in which NASA is participating, such as Rosetta and Mars Express. Each item is hot-linked to more information. Since this clickable calendar includes only solar system exploration information, plans are underway to create similar calendars for NASA's other space science activities. The calendars will be linked from the Space Science Access site, so watch for them there.

One virtue of the "decade at a glance" calendar is that it quickly shows what an exciting decade this will be. The year 2004 is going to be especially exciting, when two rovers land on Mars; Stardust captures primordial dust from Comet Wild 2; Deep Impact and Messenger launch to Comet Tempel 1 and Mercury, respectively; Genesis returns solar wind samples; and Cassini arrives at Saturn and drops off the Huygens probe, which will parachute to Titan's surface in January 2005.

The 2001 version of the NASA Solar System lithograph set is now available through NASA Spacelink (http://spacelink.nasa.gov/InstructionalMaterials/NASA.EducationalProducts/SolarSystemLithographSe). The last set was published in 1997, and a lot has changed since then. Subscribe to NASA Spacelink Express (http://spacelink.nasa.gov/xh/express.html) to be advised when new educational material is available from NASA.

Three new Broker/Facilitators have been selected, with their contracts starting January 1, 2001. Contact info for all the brokers is given below.

The quickest way for us to get current information to you is through your listserves, so until next issue, keep an eye on Dome-L.

Regional Brokers as of January 2002

Lunar and Planetary Institute (LPI)
Point of Contact: Dr. Kathleen Johnson
Houston, TX
Phone Number: (281) 244-2014
Website: http://cass.jsc.nasa.gov/education/EPO/broker.html

SouthEast Regional Clearinghouse (SERCH)
Point of Contact: Dr. Cassandra Runyon
Charleston, SC
Phone Number: (843) 953-5437
Website: http://serch.cofc.edu/serch

Depaul University (DU) Space Science Center for Education and Outreach
Point of Contact: Dr. Lynn Narasimhan
Chicago, IL
Phone Number: (773) 325-1854
Website: http://analyzer.depaul.edu/nasa/broker

Space Science Institute (SSI)
Point of Contact: Dr. Cheri Morrow
Boulder, CO
Phone Number: (303) 492-7321
Email Address: camorrow@colorado.edu

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Space Science Network Northwest
Point of Contact: Dr. Julie H. Lutz
University of Washington, Seattle
Phone Number: (206) 543-0214
Email Address: nasaerc@uwashington.edu

The Center for Educational Technologies
Point of Contact: Dr. Nitin Naik
Wheeling Jesuit University, Wheeling, WV
Phone Number: (304) 243-2388
Email Address: nitin@cet.edu

New England Space Science Initiative in Education (NESSIE)
Point of Contact: Dr. Cary I. Sneider
Museum of Science, Boston, MA
Phone Number: (617) 589-0359
Email Address: csneider@mos.org
Charlie Smith was describing the negotiations with Evans and Sutherland before the installation of the very first Digistar projector in the Richmond Universe (or any universe, for that matter) in the early ’80s. He very much wanted a comet projector, and argued forcefully that with P-Halley returning soon, everyone needed a comet projector.

“When I arrived in their offices for the next meeting,” Charlie recalls, “they had a small gift-wrapped package waiting for me. And there in a box was a can of Comet Cleanser. I knew we had our comet!”

Director of the South African Museum Planetarium, Tony Fairall had the good fortune (?) of new seating installed during the winter months. Alas, the course of true seating never does run smooth:

“Date: Mon, 2 Jul 2001
To all those concerned with the planetarium seating:
On the positive side, the new seating looks very nice and is a great improvement over the old broken down tattered seats.
Unfortunately there is quite a bit of negative side.
After the very first adult show on Saturday, a number of the seat backs were found to be bent backwards, one in particular was bent almost flat. Presumably the brackets supporting the backs are not strong enough. The seats have been straightened but this obviously requires urgent attention.
Since young children cannot get the seat backs to recline, we had put in a specific request that the seat backs be set in an initial position 15 degrees off the vertical. This has not been done, so the seats are currently uncomfortable for children.
The seats are set too high. No allowance has been made for the tilt back mechanism in setting the height of the rail on to which the seat backs are bolted. It means that a person of average height, who leans back in one of the chairs, has his feet lifted off the floor.
I also note that the original plan in January, with 162 seats, was based on a seat width (arm included) of 500 mm. It happens this is too small. I arrived in their offices for the meeting, “I don’t think of it as further proof that I’m eligible for food stamps.”

With the coming of summer to our southern hemisphere members, here’s a bit of celebratory verse, courtesy Michael Harrison and Christopher Stuart-Clark in their Year Full of Poems, published by Oxford University Press, John Smith writes:

Have you ever heard the sun in the sky
Man have you heard it?
Have you heard it break the black of night
Man have you heard it?
Have you heard it shouting its song, have you heard it scorch up the air like a pho-nix bird, Have you heard the sun singing?

Byron Herbert Reece was a Georgia poet, referred to as a mountain singer. His “Winter Solstice” poem, published in 1955 as part of the book A Season of Flesh, is offered here for northern hemisphere readers, courtesy E. P. Dutton Publishers.

When the land is white with snow
Something chills the moonlit scene,
Cold so strange no mercury
Prepares it by degree,
As if feathered fear should go
Like a condor wing between
Heaven and earth and all of time
Lay defined in whitest rime.
And always the wild wind comes on to blow.

Let the Blackguard wind affright
Fox and owl that wake at night.
Should it rouse a sleeping man
Though it shrills the solstice air
Let him turn to sleep again,
Turn to peace, remembering
That the twice-divided year
Is quartered toward the spring.

A blessed and peaceful solstice to each of you.
Closer to the stars

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The life-size planetarium

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600 Komas Drive
Salt Lake City, UT 84108
801-589-7405
Jpanek@es.com

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Still image from an Evans & Sutherland’s Digital Theater all dome production “Wonders of the Universe”.