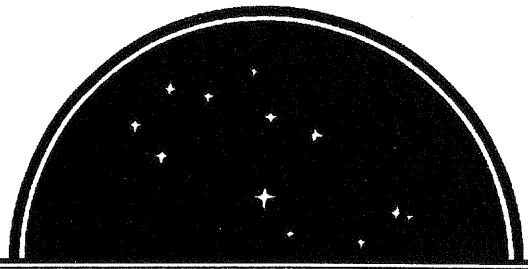

PLANETARIAN

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Vol. 29, No. 1, March 2000

Articles

Features

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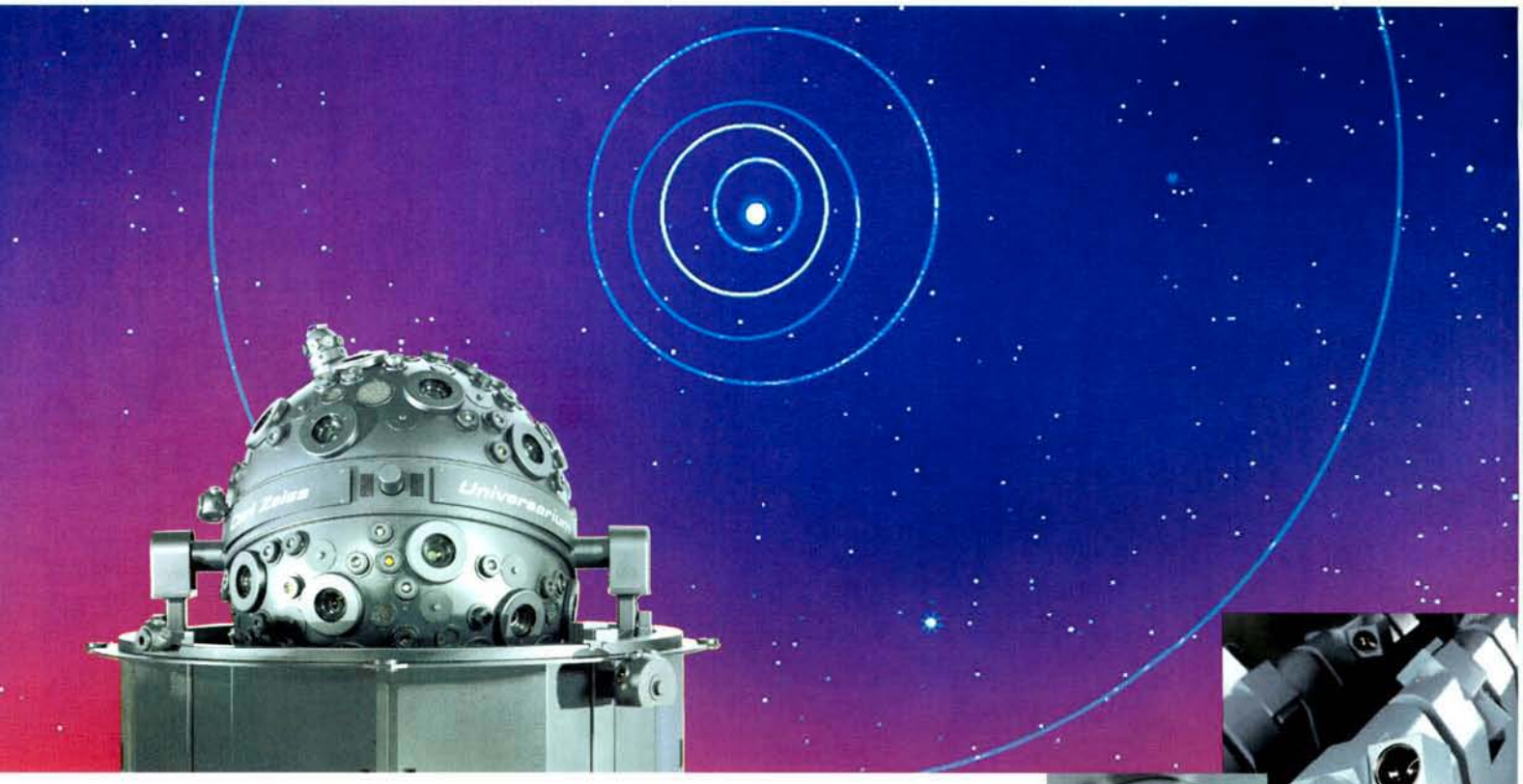

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Index

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Three Astronomies

1999 Armand N. Spitz Lecture

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Abstract: I present three aspects of astronomy, all different, but all interconnected and supportive of one another: amateur/beginning, research, education. Each is driven by three more interrelated aspects: pure science, wonder, and beauty. In the first astronomy we learn about the sky, the seasonal passages of the stars and constellations, and their meaning to humanity. In the second we explore the physical depths of the subject to see how things work, which only enhances our sense of awe. In the third, not only do we give the gift of astronomy back to others, but also use it to teach powerful lessons in history, philosophy, and humanity.

I am honored and deeply thankful for being asked to give this lecture. There are many to thank, and Dave Linton, who started me on my visits to GLPA, is a good place to start. Thanks too to Dave Leake, as an email exchange with him triggered my topic. Finally, a heartfelt thanks to all of GLPA and to everyone involved in this wonderful invitation.

Prologue

I would like to offer three aspects of an astronomical life experienced over the 52 years I have been an astronomer. All here have visited at least one, most two, some all, as I have been privileged to do. The practitioners of each stage have taught me to be an astronomer, have helped me savor my profession, and have given me the ability to present these aspects back to you, three astronomies in which you can recognize yourselves and the work you do in teaching others to experience and appreciate the sky and the Universe.

Woven around and through the three astronomies are three interconnected drivers that must first be recognized. They are not presented in any order of importance.

1. Science: a fascination with how things work. We do not have to *do* science to appreciate it and its results; we need only understand its workings. Being a scientist is not just a way of doing; it is a way of thinking. Any of us, at any age, can be scientists.

2. Wonder: the utter awe in which we can observe and hold nature in all her glory. Here we feel the spiritual and human values of our science and of the Universe, of what it means to us personally.

3. Beauty: the aesthetics of the sky. The sky is a canvas on which is drawn the loveliest art.

These drivers are not separate, but combined, science, wonder, and beauty. We can be drawn in by any of them, alone or in combination. The essence of the three astronomies is to present these drivers to others to draw them back into the astronomies. The culmination is education, of both children and adults, in which we use the astronomies not only to examine the sky and earth and our relation to them both, but to examine human relationships as well. At the nexus, where they all cross, stands another trio: the planetarium, the observatory, and above all, the sky itself.

Three Astronomies: Amateur/beginning, research, education, amateur included with the beginner with the recognition that amateur astronomers span all the astronomies. The astronomies are told of and described from my perspective, but with the hope that you will all recognize yourselves. The three astronomies are not necessarily sequential. They can run at different times and be present simultaneously. We can be beginners, researchers, educators, all at the same time. Nor must we partake in them all; to be an astronomer you need but one. There are those who feel that only professional research scientists can be called "astronomers." That is not true. I discovered astronomy when I was eight years old. When asked, I said I wanted to be an astronomer, not realizing that at that moment I had already become one. An underlying theme of this subject and of this talk is that there are few distinctions between areas of knowledge, that we can combine all manner of things, including science, art, and philosophy.

The three astronomies: amateur/beginner

Amateur (again, knowing that amateurs in fact cover all the astronomies): here is the beginning, where we learn the stars and the sky and what astronomy is about. Here is where the importance and magic of the stars and constellations are brought to the children, told here through me, through what these constellations mean to me as an adult even now and how I treasure them, how I live the seasons through them, told through the magic of the planets as I first saw them. The images are burned into my mind, all the drivers present at once. As I go, I want you to reflect on your own experiences, on what the constellations meant and mean to you. This is not about me, but about you.

A picture of Boötes vividly shows the bright orange star Arcturus. Articles in magazines talk about how such star colors are washed-out. Not to me. I saw this one when I was eight years old. I recall thinking "Look at that orange star up there." They really do have colors.

Somebody here asked me, "How did you get into this business?" And I said I would tell later. So here is my story. I was walking up from the grocery with my grandmother, who was not well educated, at least not formally. Eight years old, I had received some stars on my school papers, and I thought stars had points. I told her that. She said, "No they don't." I said, "Sure they do." She said, "No, look up." I looked up – my eyes were a lot better back then – and this bright one *didn't* have any points. And it was orange. I kept following this orange star. The next season it came back and I kept looking at it and it kept looking orange. I didn't find out for some time that it was Arcturus. When I grew a little bit older I was able to find the Dipper.

Once you find the Dipper, you can find anything up there. It was my signpost that led me back to finding Arcturus, and then I discovered who that orange star really was.

More reminiscences. The Dipper rises here over the lights of Tucson, Arizona. Watch it going around the pole. It tells me the time and the seasons. I saw this "giant arrow" that was pointing down to the West. I didn't know for a couple of years that it was the northern part of Auriga. To me, it was – and still is – "the Arrow." It's my personal constellation. I watched it go around the pole and every time I see it setting toward the northwestern sky, I have wonderful memories of my childhood. Take your kids outside. Let them make up their own constellations. I'll bet they do that already. It's no trick to realize why the ancients made them. Everybody sees different patterns. You can then talk about different cultures seeing things differently. Teach them in the planetariums. Teach them under the sky, teach them the beautiful constellations, because they will look to the sky forevermore, a sky that will someday bring back their own memories.

This is a picture of Jupiter, taken at the last GLPA meeting. I remember when I was twelve years old watching the Great Square of Pegasus rise in the east. Something rose beneath it. The diamond was pointing down at this brilliant yellow-white star. I can't even remember how I figured out that it was Jupiter. But I was twelve. It takes twelve years for Jupiter to go around the Sun. That's where it was when I was born. Then I was 24, 36, 48, and now 60, and it just passed through Pisces again. I am five years old. Some people will say that I still act that way once in a while, but that's all right. The idea reflects on childhood and the childish wonder in me. I think that the childish wonder in everybody who teaches this subject keeps it – and them – alive.

The magic of the stars and constellations is best told by a poem from *A Child's Garden of Verses*, written by Robert Louis Stevenson. Let me read this to you, and while I do, reflect on your own experiences. I'll bet you remember yourselves.

Escape at Bedtime

The lights from the parlor and kitchen shone out
Through the blinds and the windows and bars;
And high overhead and all moving about,
There were thousands of millions of stars.
There ne'er were such thousands of leaves on a tree,
Nor of people in church or the Park,
As the crowds of the stars that looked down upon me,
And that glittered and winked in the dark.
The Dog, and the Plough, and the Hunter, and all
And the Star of the Sailor, and Mars,
These shown in the sky, and the pail by the wall
Would be half full of water and stars.
They saw me at last, and they chased me with cries,
And they soon had me packed into bed;
But the glory kept shining and bright in my eyes,
And the stars going round in my head.

You follow the seasons. Wintertime. Orion rising in the east means cold weather coming on. Orion chasing the Pleiades across the sky means spring is coming. Find then spring blossoms, and everyone says, "Yes Leo is here, the harbinger of spring." Not to me. Not Leo. Coma Berenices. I remember looking with binoculars one spring night. What is that wonderful lacy thing up there beneath the Dipper? I've been following it ever since. What a glorious sight. Coma, to me, is spring. Summertime brings the wonders of the Summer Triangle: Vega, Altair, Deneb, the Northern Cross, Cygnus, the exquisite little constellations of Sagitta, Delphinus; I watch them go across the sky, Vega practically overhead.

And then back into autumn. Now fall trees and it's GLPA time! One of the most magical moments of the past was watching Andromeda rise in the east. I was at a party with my parents. It was dark back then. I wandered to a hillside and there was her graceful figure. I'd never seen it before. But now to me autumn is always Andromeda rising. Now winter approaches again. The Pleiades are rising up in late autumn, even as they are now, and it's cold out there. You all have such stories of your own to tell, our seasons all in the sky.

The three astronomies: research

Then you move to a growing realization of the science that is behind all this charm and beauty. It doesn't diminish the experience: it enhances it because you get to learn the telescopic sky. The photographed Milky Way in Scorpius and Ophiuchus is glorious here in this picture, with cascades and waterfalls of stars pouring down from the heavens. Here is the grandeur nature gave us, no longer just constellations, but what's behind them.

I had a three-inch telescope with an f/8 spherical mirror, and when the wind blew, it shook half a degree. But if I was really careful, I could see things. It helped teach me to deal with problems and to gain needed skills. I'll never forget my first look at the Double Cluster in Perseus. I – and you – can see colors, red stars, red supergiants, in these very young clusters. How lovely. Benjamin Boss and his father Lewis created a magnificent star catalog and found that the twin clusters really are related. I used to show up on Tuesday nights at the old Dudley Observatory in Albany, New York, to help Benjamin – who was getting quite old – with open houses. I was the dome puller – no motors, just pulleys and ropes. The Double Cluster brings these memories back to me.

Look at the Andromeda Nebula through the telescope. All you see is a fuzz-ball. But if you know what it's about, know some of the science, you can realize that you are encompassing two to four hundred billion stars all in one shot. Everything in our own Galaxy is up there. What wonder! It doesn't matter whether you can see the spiral arms or anything else, it doesn't matter at all. It's the knowledge with which you are looking that counts.

I didn't have very many books, kid's books yes, but science books were hard to get and expensive. But I found a few astronomy books in the village library. Among my first was *Introducing the Constellations* by R. H. Baker. He had placed all the pictures on a blue background. I was captivated by that: look at that hazy smoke ring, the Ring Nebula in Lyra, floating in the blue of the sky. So to keep a memory of the picture after the book was returned, I drew it. Then I drew more from this and from other books. By the time I was in junior high school, I had 120 drawings, using white crayon and ink, developing my own techniques along the way. They're all gone. They were mixed up with other things and my parents got rid of them without realizing. It doesn't really matter, as they are all in my head. From them I learned to recognize so much of what was in the sky. I know the Beehive Cluster in an instant! I encourage you to have your kids draw from astronomical photos. You may be doing that already. Take black paper, white ink, white crayon, and see what they can do. Have them take them home. They will never forget what they draw and it will never be lost to them.

Deeper examination followed, ultimately leading to research. I discovered the Ring Nebula by myself with my little three-inch and dragged my parents out in the middle of the night, "Look, look, look at this! Look at this!" And they looked at it and said, "Isn't that nice." They hadn't a clue as to what they were viewing. But you could see the little smoke ring even in that little 'scope with but 80 power. I was fascinated by planetary nebulae, and I finally wound up going into the field. But that did not take away their

charm. Knowing the details of the subject, of what astronomical objects are, how they are made, parallels knowledge of music. Knowing how to read music hardly takes away from its beauty. You may hear people say that if you can read the score of Beethoven's Seventh, then the symphony loses some of its power and meaning. That's nonsense. The more you know, the more you understand it. The more you learn about the astrophysics of your subject, the more you appreciate the glory that nature actually gave to us.

As a student and adult I got deeper into the subject and became more and more expert. I don't have to repeat the definition of an expert in here, do I? I will anyway. An expert is one who knows more and more about less and less until he knows all there is to know about nothing. I became a hard-core professional expert, a dedicated researcher. But fortunately I never lost my beginnings; once the roots are there, placed by mentors and teachers, you do not lose them, you grow from them. I always loved to go outside. I generally used smaller research telescopes, but did have one run at the four-meter on Kitt Peak. George Jacoby and I were studying planetary nebulae in the Andromeda galaxy using a (for then) sophisticated multiple-object spectrograph that George had programmed. (You could not "see" the nebulae – the telescope was set blind from previous imaging, and it was amazing to watch hosts of spectra pop up from seeming nothing.) Mostly I was there for the ride and to provide background for the project. We would set the exposure and then I would take the elevator 10 floors down to the parking lot and start snapping constellations with my 35mm camera. I went back upstairs, got M31 again, and then it was back down. It went on like this all night long and for the entire four-night run. George must have thought I was nuts. But isn't it wonderful to be able to combine things like these? The project was semi-successful, and we did get a paper out of it, but the real treasure was in the little photos, which I still use.

I had become, as you saw above, a spectroscopist. I specialized in chemical compositions of planetary nebulae, becoming narrower and narrower. But don't discount the beauty of the spectrum. We don't get into spectra very much in public education. But it's not that hard, as you can relate astronomical spectra to rainbows and other natural phenomena. This spectrogram of the Ring Nebula was taken by a Japanese astronomer at Okayama Observatory. It shows colorful emission lines; here in the red is one from hydrogen, H-alpha, and down here are the classic blue-green lines of oxygen and again hydrogen. It's from spectra that you begin to learn the souls of stars and nebulae. You can't begin to understand them without understanding their spectra. It's well worth trying to educate people about these lovely rainbows; they can only enhance the experience of astronomy.

What do you learn from all this? What you gain from hard-core professional research is an even deeper appreciation of the awesomeness of nature. This is a picture of waves in the North Sea. There are an immense number. On every wave there are little wavelets, and then yet more wavelets, practically down to the atomic level. The scene is awesomely complex. No one can replicate this in its real physical detail. These clouds show the same level of complexity. Look at their edges. The edges have edges, which themselves have edges. Your vision of the sea and sky spans but a few dozen miles, however. You don't immediately realize that this sort of awesome complexity exists all the way around the Earth. Now factor this complexity into the night-time sky, imagining that probably many of these stars have planets going around them. Each one of them is just as complex as our own. Go deeper into the other galaxies and deeper and deeper into the Universe. These galaxies have as many stars as our own. Each one of them has immeasurable numbers of planets, and each has the same level of complexity! Meditating on the subject becomes an extraordinary experience. Let me read you something else to try to summarize it.

Paths' End

Sit alone upon an island shore
And watch the mating of the sand and sea
Encapsulate within your vision's core
The Universe's vast complexity.
Churning at the coast, the ocean hurls
A million sunlit bubbles to the sky,
Each flashing drop its own minuscule world,
Each a cosmos caught within your eye.
Now multiply this view around the earth,
Then multiply afresh to space's end
Where heavens' stars began to give us birth,
Our Sun and Earth and selves a starry blend.
Only from such a great infinity
Could all our hopes and dreams have come to be.

I am convinced that without the complexity of the Universe as a whole none of what you see here, on this Earth, would be possible. The complexity of us, of life, depends on that of the entire Universe; it is there for us and for whatever other creatures there might be within its expanse

The three astronomies: education

Finally, the most important of the three astronomies involves education. We give back to those who gave to us by giving the gift of astronomy to others, which is what you are doing now. I want to emphasize and repeat as strongly as I can that none of this is about me and my experience. I'm serving here as an example. You all have this mission within you. You're using the classroom, the planetarium, and the sky to teach the beauty of both the nighttime and the daytime sky. Look at this wonderful picture of the entire hemisphere of the sky and the Milky Way. The Northern Cross lies at the upper left, the Southern Cross at lower right. Here is the Coal Sack and up here Sagittarius. Right across the Milky Way runs the zodiacal light, our own planetary system; here are a couple planets and here a meteor flashing through Earth's atmosphere. Everything is there for you to see, including Halley's Comet. Stars are here in all manner of different stages of evolution, including those beginning their lives in dark clouds, dying stars, everything in this one picture. And don't forget the glorious daytime sky. Anyone seeing a rainbow sees a spectrum. I saw a beautiful one coming into town as I hit a little patch of rain. Such sights are common, not just rainbows, but other phenomena of the daytime sky that teach and then lead back at sunset into twilight, and then into the deepness of night when you can appreciate the stars all over again.

We can use our astronomy to teach human values. Now we enter the interdisciplinary part of the subject. Get an old star map of constellations. These figures are truly ancient. To the ancient Greeks they were ancient. I'm not telling you anything you don't know. We don't really know the constellations' origins except that they come from the ancient lands of the Middle East. You can talk about them to students and bring out a whole history of the western world. The constellations were passed down to the classical Greeks, who put their own patina on them. You can discuss Homer, who first began to recognize and codify them, about other Greek poets who used them, all leading to classical literature, to Greek science, to Hipparchus, Aristotle, Ptolemy. Teach about how Greek culture passed to Rome, the constellations now having Latin names, into northern Egypt and Alexandria to Arabia, of how these cultures appreciated that of the Greeks. Show how the Arabians took so much of this knowledge and translated it into Arabic, the language used for so many of our star names. Most students aren't even aware that the Arabs had this kind of civilization in the

tenth and twelfth centuries. Then you can go back into Europe and the developments that led to the science of today. You can examine a history of western civilization with what's up there in the sky.

Look at cultures and time. Stonehenge had nothing to do with Druids in funny hats. Tell them what it really is and how ancient peoples were just as smart as you are sitting out there today. They could solve difficult civil engineering problems quite well, thank you very much. Just look at the pyramids! People haven't changed much if at all over the last many thousands of years.

Look at cultures in space, as opposed to time. You are all familiar with this wonderful polar star trail picture taken from about 31 degrees south. It's an 8-hour exposure with an Australian observatory in the background. Then move. This picture was taken from around 10 degrees south. Look at what happens to the south celestial pole! Such pictures give you the chance to wander the Earth, both in the planetarium and in the classroom. You can then talk about different cultures, how latitude makes cultures different in the far north and arctic than in the south and the tropics; you can discuss how cultures must adapt to latitude.

A few years ago while teaching a basic astronomy class I had a sudden impulse. I talked about how you have to be careful going down to the tropics because the Sun is more overhead. When you look overhead you're looking through "one atmosphere," and when you look at the horizon you look outward through almost 40 times as much. That's why the setting Sun can be so red. Then break sunlight into a spectrum again, from red to violet. But there is also radiation shortward of violet, in the ultraviolet. It's dangerous; it burns. When the Sun is on the horizon, you don't get sunburns because all that air removes the ultraviolet and it doesn't reach you. But when the Sun is close to overhead, the ultraviolet becomes very intense. When northerners go to the tropics, sudden sunburn can come as quite a painful surprise.

I said to the students (as best I recall), "You know people who live down there have to have protection. Tans are the body's natural defense. If you are a hunter-gatherer or an ancient farmer, you must have permanent defense. Those in equatorial regions had to develop permanent protection against the Sun, and their skins must be dark. Look at me though. I'm about as white as can be. My ancestors are from Sweden. We don't need dark skins, we need sunlight. Kids who ran the slums of Edinburgh died of rickets because they didn't get enough of it. We need whatever we can get. Haven't you [the students] ever noticed that skin color of human beings changes almost continuously from the equator to the pole? People are nearly black at the equator. They have to be to protect themselves. People are much lighter toward the pole. Sure, there are differences, as even ancient people migrated. But you find that latitude runs as a common thread, even when you look at people in southern Europe as opposed to northern Europe." And I said, "You know, that's all that race is about. That's it – latitude. Nothing else. Nothing else, whatsoever. Not intelligence, not ability, nor any other characteristic." The first time I did that, I got an ovation from the class.

I want to read you portions of a letter I received. This isn't to me, it's to everyone who has and will use astronomy to teach human values.

Hi Professor Kaler,

This is Chris from your Astro 100 class (the tall black guy that always comes into your office and hands in his work). I wanted to come in and talk to you personally but I'm kind of self conscious seeing that all summer I've come in only once and I don't want to come in and make you think that this is some sort of pre-exam buttering up. However, there are a few things that I had wanted to convey to you.

I'm a senior Sociology major. I'm also a black kid from the inner city. What this means is that I can think of a thousand better things to do than look up in the sky and imagine Vega, Ursa Minor, light years, photons, and all the rest of the astronomical jargon. However, I feel that if a person is going to spend his money he should at least be able to get something out of the class. It may be a phrase, quote, experience, or something else that a letter grade might not reflect. To me if a person goes an entire term and can't do this he has wasted his time.

But if I can leave with something, the class has indeed been profitable. Earlier this semester you said something that made me feel a little bit better about getting up at 8:30 in the morning to go to class. You stated that race differences only pertain to where a person lives relative to the equator. You know this made a lot of sense. So many times in our world people want to view things in terms of winners and losers, inferior and superior, rich and poor, and black and white. They want to cite one race as being dominant or inherently smarter. Therefore when you hear a respected professor, especially of the opposite race, say otherwise it lets you know there are still some humane people left. You seem to lecture as a person that really enjoys what he does and a person that honestly would like people to at least make an attempt to understand the field of astronomy.

I suppose this is why you get so offended when people get up and leave during your lecture. As you stated, you have over 40 years of experience in the field and all you ask is that people sit in and try to learn something for 50 minutes. They never know what they can take away from it. I just wanted you to know professor Kaler, courtesy of that statement, I often drive up to Chicago on the weekend looking out the moon roof of my car following Polaris. Or I look up at the sky at night and try to imagine some of the constellations we've talked about. I'm a young black man and the preliminary stage of college is over now. It's time to get out in the real world and make a difference. I have a 3-year-old daughter and she's depending on me. However, after making it through this university I think I'm about ready for any task. So on that note I'd like to say good luck and God bless you.

Astronomy goes powerfully to philosophy. In the nineteenth century determinism was in vogue. We had discovered Neptune through Newton's laws. If you knew where everything was, all the little mass points and their velocities, everything was predictable, perhaps even human thought and human fate. Determinism ruled. Then came quantum mechanics and the uncertainty principle, which of course is fundamental physics. But we all know that physics is simply a branch of astronomy! We all grew up that way. Astronomy, in a sense, is a guide for our lives. More perhaps than you know.

A couple of years ago, in a fit of madness, I said to my class, "You are supposed to give me at least three of four projects. But to help you I'll add another, a wild card, and you can substitute it for any of the others, a short term paper." Though I had perhaps 300 students, I thought only a few would take me up on the offer. I got a hundred! Including one from a student who took my textbook, selected various paragraphs, and stitched them together, figuring, "Aw, he'll never know."

Then I got this one, the like of which I have never seen. Yes, I'm going to read you a term paper! But it's not to me. It's an allegory and is really to and for everyone who ever teaches in a classroom and makes him or herself heard to the student. It's a remarkable piece of work. First I read it to my wife. Then I sent it to my editor in New York. I want to give this to you. I want to give it to you from my heart.

In class I asked her to see me about it, told her what I had done and praised her talent. She has since graduated and is now a grad student in art therapy for children. When I contacted her to read this officially and get it included in the Conference Proceedings so that you can have it for yourselves, she said my confidence in her helped changed her life and came at the perfect time for her. You've all done this, and you will keep doing

it, whether you are aware of it or not, all of your professional lives.

Stars
By Susan Jacobs
As taught by James B. Kaler

Wild card project for Astronomy 100
Things to Keep in Mind While Reading This Story:

1. This story is absolutely true (except for the parts I made up).

2. This story is for the little kid that still is in the college student.

3. While there may appear to be pathetic attempts at flattery in this story, none of it was intentional. Unless you like blatant attempts at flattery, then of course I meant it.

4. Please enjoy this. My grade depends on it.

There once was a confused student who, believing that she could find all of The Answers, packed her belongings and went to a place called College. There were large buildings there with the Important Books in which she hoped to find a certain type of Wisdom. This Wisdom, she thought, would lead her to a happy life. She searched and searched and searched until she was exhausted, but The Answers were nowhere to be found. In a haze, she wandered the campus, without a clue what to do next. Seeing the unhappy face of the student, an astronomy professor walking by stopped to ask her what was the matter. "I am lost," she claimed in a far off voice. "Well, that is easy," replied the professor with the wisdom that astronomers often possess. "Since it is a clear night, and we are at 40 degrees North latitude, look to the North and look 40 degrees up. There is the North Star. Anytime you are lost, find it, and you should catch your bearings."

"But I am not THAT kind of lost," answered the student, disappointed. "Hmmm .... I think I understand. Come with me," he said assuredly. Bewildered, the student quietly followed until she found herself at the campus observatory. "Professor, no offense, I mean, I understand that an astronomer would think that astronomy could fix almost anything, but realistically ...." "The stars are immensely older and wiser than you," he interrupted. "They are more than just atoms of hydrogen, helium and that other stuff. Look through this telescope and tell me what you see." "Well, stars and planets, I guess."

And that began a long night at the observatory. The astronomer showed her billions and trillions of stars, and to sum things up, these are some of the things she learned:

1. Stars may seem like they last forever, and they do last a long time, but everything must change. They are born, they change colors, and after a long time, they get really, really bright, and then they die. That is just the way Things Work. It is the same way with people.

2. Often times, when we look into the sky, we are really just looking at light that was cast from a star a long time ago. Even though people sometimes have to leave us, their memories can remain, and still offer light to show our way.

3. The stars that one person sees as a lion, another person may see as a can-opener. Neither person is wrong, we just often have different ways of looking at things.

4. When compared to a star, a problem is really very small.

Finally, the professor said, "The stars are always there, but many things will make you think they are not. When the sun is out, or when the clouds blanket the earth with bad weather, it will appear as if they have disappeared, but there they are. Just like the answers are always in your heart, it is just sometimes things get in the way." With this, the student thanked the professor and left into the night. She walked until she found a nice patch of soft grass, and laid herself down. Under the stars, she thought about what the professor said until sleep came and took her away. Finally, with starlight streaming down on her, she was at peace.

I hope someday you get a gift like this. In fact you have. She wrote it for you. She wrote it for what you have done. She wrote it for what you will continue to do in the future when you leave here. So go. Go work your magic. Go out there and do what you have done. Have them learn the heavens. Have them learn the sky. Have them learn life. Have them learn the quiet earth. Have them learn the wonder of everything that's out there.

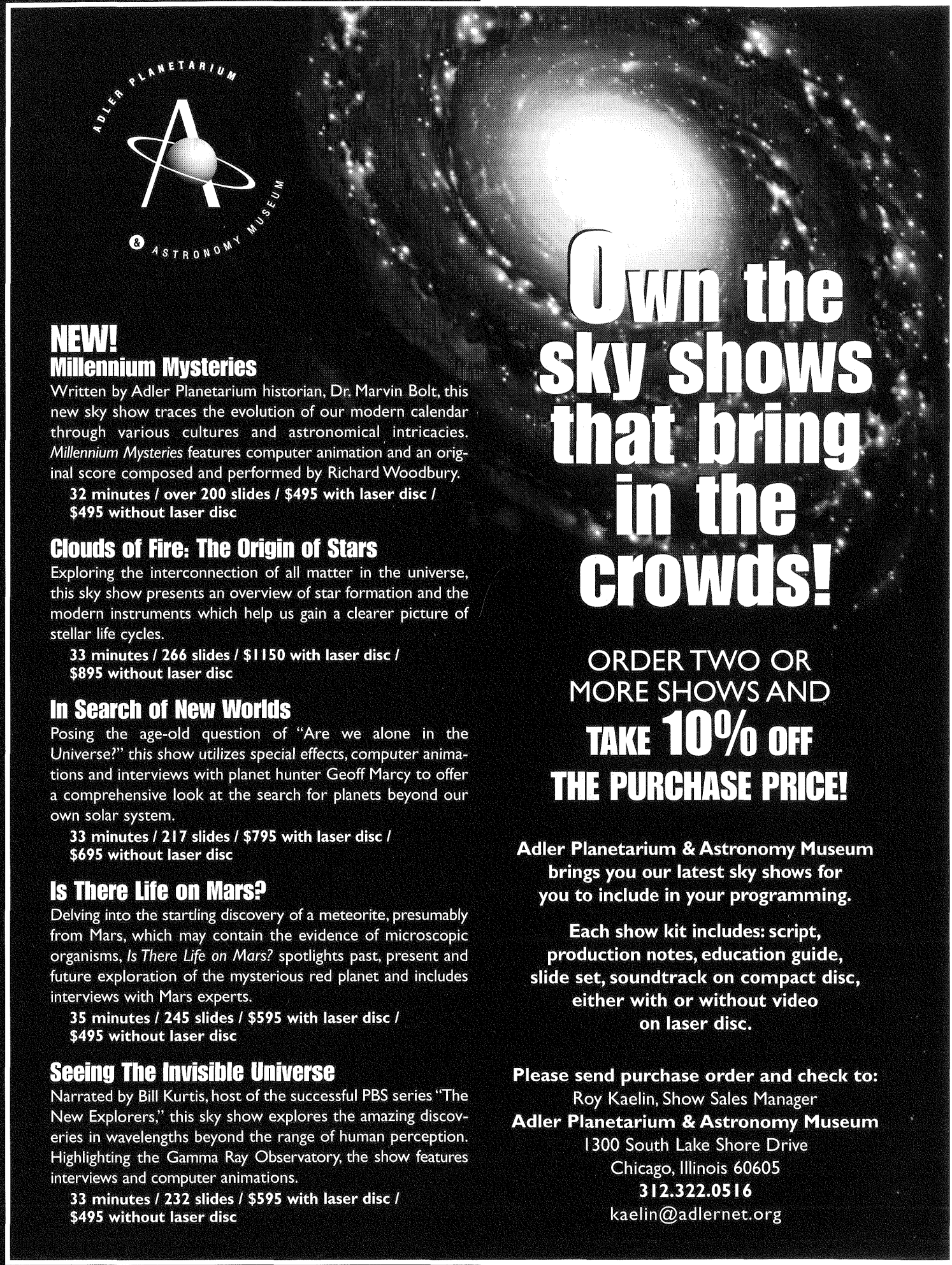
Go with the words of Walt Whitman:

When I heard the learn'd astronomer,
When the proofs, the figures, were ranged in columns before me,
When I was shown the charts and diagrams, to add, divide, and measure them,
When I sitting heard the astronomer where he lectured with much applause in the lecture-room,
How soon unaccountable I became tired and sick,
Till rising and gliding out I wander'd off by myself,
In the mystical moist night air, and from time to time,
Look'd up in perfect silence at the stars.

Thank you and good night. ☆

This paper was originally presented as the Armand Spitz Memorial Lecture at the 1999 Great Lakes Planetarium Association Conference, held in Kalamazoo, Michigan. Reprinted with permission from the 1999 GLPA Conference Proceedings.

Title:	2001 Queensland Astronomy Education Conference
Date:	March 31st, 2001
Venue:	T.B.A.
State:	Queensland, Australia
Description:	The Queensland Astronomy Education Conference is Australia's only bi-annual educator's conference targeting the teaching of astronomy and astronautics in primary and secondary schools. The programme varies but usually includes portable planetarium sessions, lectures, workshops and a night observing session.
Contact name:	Paul Floyd
Contact Email:	ssemps@ozemail.com.au
URL:	http://www.ozemail.com.au/~ssemps/confer/index.html



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Written by Adler Planetarium historian, Dr. Marvin Bolt, this new sky show traces the evolution of our modern calendar through various cultures and astronomical intricacies. *Millennium Mysteries* features computer animation and an original score composed and performed by Richard Woodbury.

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Reviews

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Greetings for the second-last equinox of the millennium, planetarians. Reviews of these fine books are brought to you courtesy these kind reviewers: Reg Fox, Lee Hines, Deborah Huffman, and John Mosley. Ken Wilson and I are always looking for people who want to read new books, examine new software, and write new reviews. How about filling another of those resolutions with a contribution from which all your colleagues will benefit?

Quest For Unity; The Adventure Of Physics, by Etienne Klein and Marc Lachièze-Rey, Translator: Axel Reisinger, Oxford University Press, 198 Madison Avenue, New York, New York, 1999, ISBN 0-19-512085-X, $24.00.

Reviewed by Lee Hines, Astronaut Memorial Planetarium and Observatory, Brevard Community College, Cocoa, Florida, USA.

Quantum physicist Etienne Klein and astrophysicist Marc Lachieze-Rey are both scientists with the Atomic Energy Commission in Sacey, France. Axel Reisinger, translator, is a scientist at Sanders, a Lockheed Martin Company, in Nashua, New Hampshire.

The Quest for Unity examines the history of physics over the last 400 years.

The Quest for Unity examines the history of physics over the last 400 years through an ongoing search for the One, the Grand Unifying Theory, which explains and makes sense of the universe where we find ourselves. The authors reveal how the quest for unity, for the One, has been the source of or momentum for virtually all the great breakthroughs in science. From the ancient Greeks search for the one fundamental element in all things to Galileo's reconciliation of the earth with the heavens, to Newton's Theory of the motion of celestial bodies, to Einstein's space-time concept and beyond, the Grand Unifying Theory still eludes us. As Klein and Lachieze-Rey illustrate, the quest itself has driven many of the great breakthroughs in science and yielded boundless discoveries. The search is often more fascinating and surprising than the end result turns out to be.

Klein and Lachieze-Rey present and comment on the successive unifications that have marked the fundamental advances in physics. From Galileo, Descartes, and Newton, physics is traced as it developed in a world undergoing transition from a theological base to one of knowledge based on observation and experiment. The course of physics is then followed through a series of unifying steps. Electricity and magnetism became electromagnetism of which light was just a part. The twentieth century brought special and general relativity and prompted an "array of new unifications: electromagnetism with kinematics and, ultimately, dynamics; space with time; and matter with radiation (themselves related to space-time through the bias of gravitation)."

Modern unifications are then traced through the many twists and turns of the "quantum revolution". Particles and their interactions are viewed through gravitation, electromagnetics, and the strong and weak nuclear forces.

A search for harmony through symmetry and then reductionism leads us to the close of the twentieth century. "The history of human thought has been more akin to a series of stomach rumblings, interspersed with a few strident shrills, than a graceful and harmonious process of synthesis."

The book closes with a look at grand unification, superstring theory, and an interesting summary of quantum cosmology. There is also a conclusion that is quite insightful concerning scientific process: "unification does not necessarily lead to unity. It weaves a fabric that is never quite finished. Rarely does it offer more than a fleeting glimpse of unity." We must constantly press on for better understanding, new theories, and more creative insights.

Johannes Kepler and the New Astronomy, James R. Voelkel, Oxford University Press, 198 Madison Ave., New York, NY, 10016, ISBN: 0-19-511680-1, 141 pages, hardbound, $21.

Review by John Mosley, Griffith Observatory, Los Angeles, California, USA.

This is the second in a series of profiles of scientists written for young adults (or adults who enjoy an easy read), and it follows *Galileo* (reviewed in this column in June, 1999). I was quickly drawn into the story and thoroughly enjoyed reading it for relaxation. It puts the life of Kepler into the context of the religious strife of Germany in the early 1600s and is a review of the history of his age as well as a biography. It also shows how Kepler did not escape the mind-set of his time, where everything existed for a purpose, and that Kepler felt that his purpose in life was to reveal the glory of God by better understanding His solar system through mathematics. Although expensive if priced by the page, this short book is a well-written summary of Kepler's life and times, full of insight, and a delight to read.

I was quickly drawn into the story and thoroughly enjoyed reading it for relaxation.

Adventures In Celestial Mechanics, by Victor G. Szebehely and Hans Marc, 2nd Edition, Published by John Wiley & Sons, Inc., 605 Third Avenue, New York, New York, 1998, ISBN 0-471-13317-5.

Reviewed by Reginald Fox, Astronaut Memorial Planetarium and Observatory, Brevard Community College, Cocoa, Florida, USA.

With the passing of Victor Szebehely in 1997, the Astronomical and Astrodynamics communities lost a well-known and highly respected expert in the field of Celestial Mechanics. He and Hans Marc collaborated on the second edition of *Adventures in Celestial Mechanics* at the University of Texas. I did not know Dr. Szebehely personally, but his contributions to the field of Celestial Mechanics stand on their own merits and Hans Marc pays a nice tribute to Professor Szebehely in the opening pages.

Adventures in Celestial Mechanics is designed as a text for a first course in orbital mechanics and spacecraft dynamics. It treats many of the classical topics in celestial mechanics (the Two-Body Problem, Kepler's Equation, Lambert's Theorem) but also delves into subjects of practical use in the 'Space Age'. Such topics include rocket propulsion, orbital maneuvering of spacecraft and spacecraft dynamics (including a

discussion of how spacecraft orientation is controlled by spin-stabilization or three-axis stabilization). The level of mathematics is limited to basic calculus, vector analysis with a few tensor equations in the chapter on Elements of Spacecraft Dynamics.

The authors take the trouble to show in some mathematical detail how various significant equations in the field are derived. Unfortunately, during the review, I found more than a few errors in specific equations, equation references and references to figures, some of which obviously resulted from the translation of manuscript to final copy. The serious student will wish to carefully work through the derivations, using the text as a guide.

For example, the text at the top of page 38 refers to Figure 2.1 instead of Figure 2.4; Equations 4.22 and 4.23 have corrupted terms in derivatives; Equation 7.1 in the derivation of Kepler's Equation should read a/b = CD/QD, where the Q has been mistranslated as an O. These and other minor errors are blemishes on an otherwise, quite illuminating work for those who wish to get a flavor for the computational tasks involved in guiding spacecraft through our solar system and beyond. I expect the remaining author (H.M.) will address these should there be a third edition and I certainly do not mean to cast dispersions on the capabilities of the authors.

> Adventures in Celestial Mechanics is designed as a text for a first course in orbital mechanics and spacecraft dynamics.

As an example of the readability of the book, I was able to proceed from cover to cover in only three and one-half weeks of spare-time reading (and it has been several years since I looked at many of the topics treated). I found the book to be a worthwhile refresher for basic concepts and results.

While *Adventures in Celestial Mechanics* may not be appropriate for the mathematically un-inclined, it does contain prose discussions of interesting applications in celestial mechanics. Examples include: a comparison of the efficiency of chemical, ionic and nuclear propulsion in Chapter 5 on rockets; a discussion of zero-energy (parabolic) orbits as it relates to orbit unpredictability in Chapter 7; a lucid treatment of basic orbital maneuvers (circularization and transfer orbits) in Chapter 8; a useful history of planetary exploration and the navigation of spacecraft in the solar system is found in Chapter 10. The last chapter (13) treats the long-term dynamic stability of the solar system and explains how the new and exciting field of chaos theory relates to multi-body problems in celestial mechanics. I plan to re-read the book soon, following the preparation of this review, since I feel sure I have missed some jewels of value to me as a student of celestial mechanics.

Magnificent Universe, Ken Croswell, Simon & Schuster, 1230 Avenue of the Americas, New York NY 10020, 1999, ISBN 0-684-84594-6, 210 pages, $60.

Review by John Mosley, Griffith Observatory, Los Angeles, California, USA.

Owen Gingerich sums it up nicely in his back-cover testimonial when he writes, "This is clearly the best cosmic photo album in recent history." It is a magnificent collection of large astronomical photographs with long captions.

Each page is a generous 35 x 25 cm (13¾ x 10 inches), so the photographs are truly huge when held in your lap. The book is printed in Great Britain, where they have a long tradition of producing high-quality books, and the quality of this one is indeed very high. All pages are black (text is reversed in white) and bleed to the edge, and generally the images fill each page. (One of my few quibbles are the few two-page photographs that run across a seam.) Photographs come from the Hubble Space Telescope, many NASA spacecraft, the Anglo-Australian Observatory (David Malin), the European Southern Observatory, plus many other sources, and were carefully chosen. It's striking how many excellent color photographs exist nowadays.

> "This is clearly the best cosmic photo album in recent history."

The text is written for the knowledgeable amateur or armchair astronomer, and is far more than a set of captions. Text runs to a full page per picture, and it provides a mini-course in astronomy. It is astronomy as learned through appreciation of astronomy's most spectacular photographs. It reads well and would have good value even without the photographs.

I don't have a coffee table, but I should get one just to put this beautiful book on it. My guests would enjoy it.

Earthdance, by Lynn Reiser, Greenwillow Books, William Morrow and Company, 1350 Avenue of the Americas, New York, New York, 10019, 1999, ISBN 688-16326-2 $16.00.

Reviewed by Deborah Huffman, Fernbank Science Center, 156 Heaton Park Drive NE, Atlanta, Georgia, USA.

I opened this book with great expectations. It's a beautiful volume, small amounts of text on each page, aimed for the younger students for whom it's difficult to find good books about space. This one is about the planets.

Hubble Space Telescope images are the backdrops for the artwork, and they're great. Some of the drawings of the "stage sets" had cute ideas for the concepts of day and night, but there was little substantial content overall.

The book doesn't teach anything scientific and it sows seeds of misconception. Starting young children off with unrealistic ideas is not a great start. The drawn spacecraft is outdated, while the ideas of taking off or landing in the backyard and traveling alone "to the edge of the universe" in one morning, are simply wrong.

> Hubble Space Telescope images are the backdrops for the artwork, and they're great.

I could not discern the author's main idea or central theme. What is the point of this book? While it is visually appealing, I would not buy this book for a young child, nor would I recommend it for teachers or librarians. ☆

The **final** deadline for the **June** issue is **April 21.**

Most Frequently Asked Questions:

QUESTION: What is the most frequently asked question about 'STAR GAZER'?

ANSWER: That's easy. Everybody asks about our theme song which is the classic 'Arabesque #1' by Claude Debussy performed by Tomita on the still available "Snowflakes Are Dancing" album (RCA)

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ANSWER: Most TV stations air 'STAR GAZER' just before nightly sign-off. However, due to 'STAR GAZER's' enormous popularity a number of stations find the show's 5-minute format can fit anywhere during the broadcast day and air the show more frequently. Local TV listings seldom include 5-minute shows, so it's best to call the station for the broadcast schedule.

QUESTION: If I can't find 'STAR GAZER' on my hometown PBS station, how can I see it where I live?

ANSWER: 'STAR GAZER' is provided free of charge by WPBT, Miami to all PBS stations. If you can't find it, write or call your local PBS station and ask if they will air it and remind them that it is available free of charge.

QUESTION: Is it necessary to get special permission to use 'STAR GAZER' for astronomy club meetings, teaching in the classroom, science museum or planetarium use?

ANSWER: No. In fact, many astronomy clubs, teachers, science museums and planetariums have been taping 'STAR GAZER' off the air and using it regularly as a way to reach their public.

QUESTION: Is there any way I can get 'STAR GAZER' other than my local PBS station?

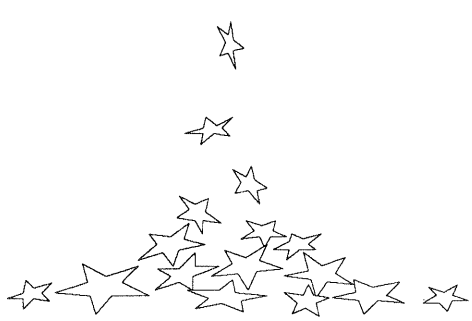
ANSWER: Yes. A month's worth of 'STAR GAZER' episodes are fed monthly to a satellite from which all PBS stations take it for their local programming. Anyone with a satellite dish is welcome to the satellite feed. Again, no permission is required. For satellite feed dates and times call Monday through Friday (Eastern time) 305-854-4244. Ask for Ms. Harper or Mr. Dishong.

QUESTION: I am a teacher planning my curriculum and would like several 'STAR GAZER' episodes in advance, but I do not have access to a satellite dish. Is there any other way I can obtain 'STAR GAZER'?

ANSWER: Any teacher anywhere around the world can obtain 'STAR GAZER' episodes in advance through their NASA C.O.R.E. Teachers' Resource Center. For details write:NASA C.O.R.E.; Lorain County Joint Vocational School; 15181 Route 58 South; Oberlin, OH. 44074. Or visit our website: www.jackstargazer.com

QUESTION: Why does 'STAR GAZER' always say "Keep Looking Up!" at the end of each show?

ANSWER: Have you ever tried star gazing looking down?



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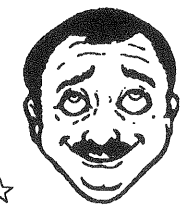

JACK HORKHEIMER: STAR GAZER

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"... knows how to come down from the ivory tower and make astronomy accessible."
George Lovi, Astronomer
American Museum/Hayden Planetarium

"...I never miss it. As someone totally involved in science fiction, I'm enthralled with Jack Horkheimer's science fact."
John Nathan Turner,
Executive Producer, 'Dr. Who'

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Gibbous Gazette

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I am proud to be a part of the Editorial Staff of this publication. I have always loved the planetarium. I have been an employee of the Buhl Planetarium since 1982. Before that, I was a part of the Buhl Family as my father was the Chief Technician at the original Buhl from 1959 to 1990. My mother held a brief position in the Administrative Offices and my Aunt has sold items in the Gift Shop for over 40 years. I met my wife at the original planetarium in 1983 and we were married in the Star Theater in 1988. 1988 also saw the merger between Buhl Planetarium and the Carnegie Museums of Pittsburgh and in 1991, the new Buhl Planetarium opened as a part of the Carnegie Science Center. To date, programs that I have helped to produce have been adapted over 300 times by planetariums in 17 foreign countries and have been translated into 13 different languages. With your help, I hope I can chronicle the joys and sorrows of this Society so that we may become a closer community, dedicated to the love of our profession.

Congratulations

to **Christine Shupla** (Dorrance Planetarium, Arizona Science Center in Phoenix, Arizona) on her new role as Planetarium Manager and new Mother. Christine asked me to take over this column after the 1999 Desert Skies Conference. Thank you Christine for your years of dedicated service to IPS.

to **Amie Gallagher** (Astronomy Educator, Hayden Planetarium in New York, New York) and her husband **Mike** on the arrival of their son **Ryan Angus Michael Gallagher** on January 16, 2000 at 5:09 PM. Baby Ryan weighed in at 6 pounds 9 ounces and mother and baby are home after a smooth delivery.

to **Eric Schreur** (Director, Kalamazoo Public Museum Planetarium in Kalamazoo, Michigan) on a well organized and smooth running GLPA Conference, October 20-23, 1999. His show *Sky Legends of the Three Fires* showed off some impressive combinations of Digistar, video and special effects. Eric could win a prize for the best theater documentation and training program for his part-time presenters.

to **Linda Hare** (Executive Director, International Laser Display Association in Bradenton, Florida) on ILDA's 1999 Conference at the Contemporary Resort at Walt Disney World, November 20 - 23, 1999. Since Laser Shows and Laser Projectors play such a strong part in many planetariums, I would recommend this conference to anyone who programs lasers or would like to learn more about how their systems work. The ILDA Conference was held in conjunction with Lighting Dimensions International (LDI), The Entertainment Technology Show. LDI is massive with 10,000 attendees and over 400 vendors featuring everything from 30 foot high columns of fire to wireless microphones to specialty lighting instruments. Two stand outs at this year's LDI show were **Audio Visual-Imagineering With Lasers** (a.k.a. AVI of Orlando, Florida) with their Omnistar TM Laser Balloon (think planetarium turned inside out!) and **Color Kinetics** (Boston, Massachusetts) for their Chromacore TM line of LED-based color-changing light fixtures (great possibilities for exhibits and auxiliary lighting applications). Visit them on the WWW at av-imagineering.com and colorkinetics.com.

to **Mark Howard** (Producer, Brevard Community College Planetarium in Cocoa, Florida) for his First Prize winning entry (Flying Purple People Eater) in the Pangolin Users Group Competition at ILDA 99. Mark was heard to say that he'll return the prize money to the planetarium since he made the show on company time!

to **Bob Wollman** (Director at the Richard King High School in Corpus Christi, Texas) and Bill Hughen (Webmaster) on their recent Academic Excellence Award from StudyWeb.Com for their planetarium home page. Be sure to check out the Planetarium Etiquette section at http://members.aol.com/aggiebill/king. to **John Sohl** (Director of the Ott Planetarium at Weber State University in Ogden, Utah) on the opening of their new Observatory! With a 16" Meade StarFinder This is being called one of the largest public observatories in Utah. You can take a virtual tour of the observatory at their website, http://physics.weber.edu/planet/observatory.html.

to the **Members of the Australasian Planetarium Society** for their recent affiliation with IPS. Visit our southern neighbors online at www.cfmeu.asn.au/aps/.

to **Robert C. Victor** (Longtime Staff Astronomer of the Abrams Planetarium in East Lansing, Michigan) who officially retired last fall after 32 years of service. Bob is best known as the creator and author of the monthly *Abrams Planetarium Sky Calendar*, a well established, respected, and valuable resource among science educators and sky watchers of all ages. Bob started the *Sky Calendar* in the late '60's as mimeographed sheets, listing a few noteworthy events with some observing projects teachers could do with students. Over the years the look and presentation of the *Sky Calendar* has evolved. Diagrams first appeared on the December 1972 issue. The famous "Bob Victor wolf" debuted in August 1974 baying at the full moon. The *Sky Calendar* has received several awards, including an excellence in educational journalism from the Educational Press Association of America. Though Bob may be retired, he will continue to play a major role in producing the *Sky Calendar* for some time to come.

People on the Move

Bill Carr (formerly with Fels Planetarium in Philadelphia, Pennsylvania) is now a member of the Graphics Division of Spitz Inc. of Chadds Ford, Pennsylvania. **Davin Flateau** (formerly with Laser Fantasy at the Charles Hayden Planetarium in Boston, Massachusetts) has taken up the role of Producer - Digistar Systems at Exploration Place in Wichita, Kansas. **Adam Stachura** (former Assistant Producer/Education Coordinator) has left the Davis Planetarium at the Maryland Science Center in Baltimore, Maryland to join the Pinch Valve Industry. **Kerry Handron** (formerly with the Burke Baker Planetarium at the Houston Museum of Natural Science) has moved to Pittsburgh, Pennsylvania, to head up the R.K. Mellon Earth Theater project at the Carnegie Museum of Natural History. Touted as the first theater in the world specifically designed for a Sky Skan SkyVision System, the 65 seat, 40 x 10 foot curved screened theater houses five LCD projectors and a SPICE Automation System. Stop by and see their *Millennium* show the next time you're in town.

Did You Know

After spending 5 months working and living in Moscow, Russia, **Rob Landis** popped in to an unannounced homecoming of sorts to this year's GLPA meeting Kalamazoo, Michigan. In his presentation, he shared photographs and experiences of working STS-96 (the second space shuttle flight to the International Space Station) from Mission

*(Please see **Gibbous** on page 20)*

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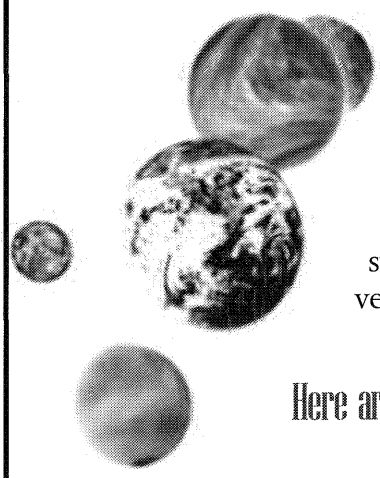

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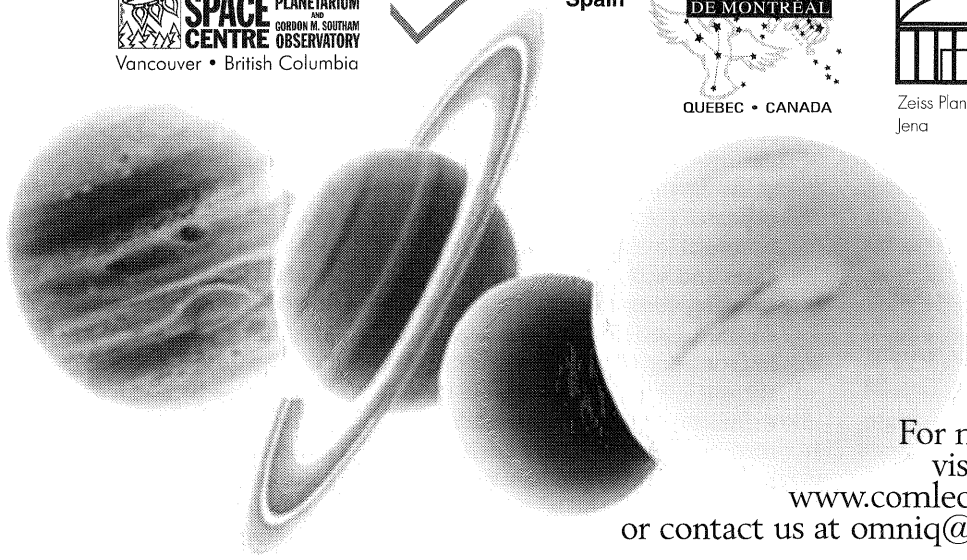

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MINUTES OF THE IPS COUNCIL MEETING

Flagstaff, Arizona October 17, 1999
* indicates action items

In attendance:
President Dale Smith
President Elect Martin Ratcliffe
Past President Thomas W. Kraupe
Treasurer Shawn Laatsch
Secretary Lee Ann Hennig

Affiliate Representatives:
Association of Mexican Planetariums (AMPAC)
- Gabriel R. Muñoz for Ignacio Castro
British Association of Planetariums (BAP)
- John Dickenson for Paul England
Canadian Council of Science Centres (CCSC)
- John Dickenson
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- Jack Dunn
Italian Planetaria's Friends Association (IPFA)
- Susan Reynolds Button for Loris Ramponi
Japan Planetarium Society (JPS)
- Shoichi Itoh
Middle Atlantic Planetarium Society (MAPS)
- Don Knapp
Nordic Planetarium Association (NPA)
- Lars Broman
Pacific Planetarium Association (PPA)
- Jon Elvert
Rocky Mountain Planetarium Association (RMPA)
- Jim Manning for Mike Murray
Russian Planetarium Association (RPA)
- Marina Latysheva for Zinaida Sitkova
Southeastern Planetarium Association (SEPA)
- John Hare
Southwestern Association of Planetariums (SWAP)
- Mark Sonntag

Affiliates not in attendance:
Association of French-Speaking Planetariums (APLF)
Council of German Planetariums (RDP)
Ukrainian Planetarium Association (UPA)

Guests:
Pierre Lacombe - IPS 2000 Conference Host
Gabriel Muñoz - IPS 2002 Conference Host
Dr. Robert Millis - Lowell Observatory Host

The meeting was called to order at 9:15 a.m. by President Dale Smith. Dale welcomed Council to Mars Hill, home of the historic Lowell Observatory. Dale introduced Dr. Robert Millis, Director of Lowell Observatory, our host at the Lowell complex, who gave a brief presentation on the history and operation of the Lowell Observatory.

The **Secretary's Report** on the Minutes of the London Meeting had been previously published in the December 1998 ***Planetarian***. Jim Manning moved to approve the minutes, seconded by Jack Dunn, and approved.

Shawn Laatsch presented the **Treasurer's Report**. Council reviewed and discussed specifics of the 99/00 Budget. Based on discussion, Council made suggestions concerning the following items:

1. Treasurer will expand the analysis of long term trends and comparisons of services and expenses as they relate to the dues structure. This will be included as a standard feature of the Treasurer's Report.
2. Armand Spitz Fund:
   a. Susan Reynolds Button suggested that an explanation of what the Armand Spitz Fund is would be beneficial to the membership, some of whom may not be aware of its purpose.
   b. A portion of the Armand Spitz Fund will be used to provide seed money for development of the IPS Laser Disc Project and the remainder will be placed in a short term CD Fund.
   c. * **Motion** by John Dickenson to **rename the Armand Spitz Fund** the "**Armand Spitz Planetarium Education Fund**". Seconded by Dennis Simopoulos and approved by Council.
3. Year 2000 Budget:

Treasurer Shawn Laatsch reported that printing costs account for our largest expense. The electronic media will be a viable alternative to IPS in selected cases and will result in a reduction of printing costs eventually. John Dickenson suggested that there is potential in generating sales and/or new memberships if IPS were more visible to non-members. Thomas Kraupe underscored the Laser Disc Project as a perfect example as a potential product for the non-IPS market and the large group of science museums (via ASTC and ECSITE). Jim Manning pointed out that our mechanism for communication is directed toward members. Some suggestions for addressing this issue were:

a. invest in a mailing using our own Directory
b. place ads in publications of other organizations publicizing IPS and its resources
c. publicize in the planetarium regional publications

Jim Manning moved to approve the report, seconded by Martin Ratcliffe, and approved by Council.

Dale Smith presented the **President's Report**. President Dale Smith expressed his gratitude to past presidents, in particular Bill Gutsch, Jim Manning and Thomas Kraupe for laying the foundations for a truly international and active IPS. Dale's main goals during his tenure will focus on:

1. Making IPS seem less distant to its members. The President has attended all U.S. affiliate conferences and two international affiliate conference and will try to continue in this effort.
2. Recognizing that mid-size and small planetariums are the largest segment of our organization.
   Large and small planetariums share the same goals despite the economic, structural, and institutional differences.
3. Working on the structure of our organization and keeping member services on task.

The President feels that the challenge is to make IPS a vibrant organization doing many things and that requires many hands at work. Those hands include the President, the Officers, the Council and the Committee Chairs working as a team.

Affiliate Reports

Written **Affiliate Reports** were reviewed. In Affiliate News from the floor:

Marina Latysheva presented the Russian Planetarium Association Report. Marina reported on the state of the Russian Planetariums and invited planetarians to the February 2001 Conference in Russia. Details will be available next spring.

Gabriel Muñoz reported that AMPAC will hold a conference in Tijuana, Mexico, March 18-20, 2000. Gabriel was recently elected President Elect of AMPAC and will be President during the IPS Conference being held in Morelia, Mexico in 2002.

Jack Dunn of GPPA reported that they have initiated informal one-day meetings between the GPPA Conferences.

John Hare of SEPA reported that they are involved with a mini-show production "Dark Skies," narrated by David Levy and musical score by John Serrie. The eight-minute program will be available to SEPA members free and to non-members at a nominal charge.

John Dickenson of CCSC reported on the results of a Canadian planetarium survey.

Among the more interesting responses and comments on the surveys were:

a. A lack of awareness on respondents' parts of the mission of IPS and some of the services.
b. Requests for more information about trends in the planetarium field.
c. Who and what is the planetarium market field?

The survey prompted John Dickenson to suggest that we "need to develop an eloquent rationale for the importance of planetaria" and to look at the issues which help us to market our facilities and services.

Jim Manning reported that four of the US western affiliates (GPPA, PPA, RMPA, SWAP) will be meeting October 4-8, 2000, in Dallas, Texas - a pre-conference tour of the Johnson Space Center in Houston is also on the agenda. Mike Murray, President of RMPA has edited a 320 page *Planetarium Operations Guide* (planetarium primer) available free to RMPA members. Contact Mike Murray for more information.

Sue Reynolds Button reported on behalf of Loris Ramponi that he is developing a contest for students to create their own constellations. The contest promotes art, literature and international cooperation. Loris is looking for collaborators within the planetarium field to carry out the project

Thomas Kraupe reminded Council that Affiliates are partners with IPS and those Affiliates who are not represented at Council or who file no reports are not able to fully participate in discussions on issues and projects. Council needs and values the input from all Affiliates in order to be aware of their concerns and to benefit from their counsel. Discussion followed on how to encourage Affiliates to be more communicative with IPS on their news, reports, and concerns. Suggestions were offered on how to address this issue from Council's point of view. Lars Broman encourages Affiliates to continue to pass information on to him for inclusion in the International News Section of the ***Planetarian.*** Council also discussed how to encourage planetariums to communicate regionally.

Jim Manning moved to accept all Affiliate Reports, seconded by Thomas Kraupe and approved by Council.

President Dale Smith reported that an **Application for Affiliation** had been received from the Australasian Planetarium Society. Council reviewed and discussed the documents submitted in support of affiliation. The Society includes the regions of Australia, New Zealand and the adjacent islands in the South Pacific. *** Motion** by Jim Manning to **accept the application for affiliation of the Australasian Planetarium Society**, seconded by Lars Broman and approved by Council. IPS welcomes our 19th Regional Affiliate and the first Affiliate in the Southern Hemisphere.

Standing Committee Reports

Standing Committee Reports were presented, reviewed and discussed. The Awards Committee and Program Committee Reports were tabled until the Council meeting on Monday, October 18.

Treasurer/**Membership Committee** Chair Shawn Laatsch presented the **Membership Report.** By the end of 1999, our membership will be approximately 630. Council discussed the Survey of Membership with emphasis on the individual categories and associated data. Considerable discussion ensued regarding planetarians/facilities which are unable to afford the fee for membership in IPS.

*** Motion** by Dennis Simopoulos **to charge the President by December 31, 1999, to develop a mechanism for increasing accessibility to IPS services to planetariums in countries of non-convertible currencies and to be implemented as soon as possible**, seconded by Jim Manning and approved by Council.

The **Elections Committee Report** was presented on behalf of Chair Steve Mitch. The Elections Committee proposed guidelines that would be made available to prospective candidates for offices of IPS. Discussion followed as to the wording and format for the document. Council agreed that more detail relating to officer positions was needed as well as the necessity of being able to give prospective candidates a sense of what the job entails. Council approved Dennis Simopoulos' suggestion that John Dickenson be tasked to rewrite the proposed information document for potential candidates.

*** President Dale Smith directed John to complete the document, pass it on to the Officers for review and then present the document to Council in Montreal for action.**

The **Publications Committee Report** was presented on behalf of Chair April Whitt. Membership brochures have been translated to French, German, Spanish, Japanese, Chinese, and Russian. The Committee is working on Italian and Portuguese, and the brochure will be updated to reflect the dues change effective in January 2000.

The 1999-2000 ***IPS Directory of the World's Planetariums*** will go to press in December. The second edition of the ***IPS Resource Directory*** is due to be produced in 2000. President Dale Smith explained that our procedures for data base information and formatting will allow us to create a single *Directory* by 2001. This single combined *Directory* will result in reduced set-up costs, publishing costs, and benefits for advertisers. The new *Directory* would be a unique publication including vendors and planetariums and should eliminate double entries. Discussion followed concerning the process of offering electronic versions of the *Directory*: CD/disk format/hard copy. After much discussion, Council agreed to go through one more print cycle of both *Directories*, but to develop an electronic version prototype based on a suggestion by Dennis Simopoulos.

The proposal will include:

a. detailed budget for production
b. milestones for production
c. deliverables
d. deadlines

*** Motion** by Martin Ratcliffe to **publish the primary version of the Directory as a print version, but finance an electronic version as a test (prototype) of the *World Wide Directory***, seconded by John Dickenson, approved by Council with one objection.

Chair Susan Reynolds Button reported that work on ***The Portable Planetarium User's Handbook*** is progressing. This document will be made available on line with segments available on audio tape. Susan is still seeking suggestions and lesson plans for the handbook.

Johan Gijsenbergs is maintaining the European Repository for IPS Publications including the Directories and the ***Planetarian.*** *** Publications will be sent to Shoichi Itoh so that an Asian Repository can be established at the Osaka Science Center.**

The IPS Web Site is developing nicely. Webmaster Tom Callen reports ongoing enhancements include a History Page developed by John Hare, a Vendor Page by Don Knapp, and an Education Resource Page by Jon Elvert. Future additions will include an Astronomer Resource List, Chat Room and Auto Responding Mailboxes. Discussion included suggestions for a "Members Only" page which would require passwords. The Web Subcommittee will investigate the requirements and implementation for secure areas. Thomas Kraupe suggested a "What's New" on the Web Site segment which would highlight the latest additions or timely changes to entries.

Many thanks for the hard work and dedication of ***Planetarian*** Editor John Mosley, and Webmaster Tom Callen.

Ethics Committee: vacant

The **Finance Committee Report** was presented in conjunction with the Treasurer's Report.

Ad Hoc Committee Reports

Ad Hoc Committee Reports were presented, reviewed and discussed. The IPS Script Contest Committee Report was tabled until the Council Meeting on Monday, October 18.

The **Language Committee Report** was presented by Chair Lars Broman. The Committee recommends:

a. placing Membership Brochures, in as many languages as possible, on the IPS Web Site.
b. evaluating a translation software program: if the evaluations are favorable, IPS should consider purchasing the program.
c. expanding the exchange of abstracts between the ***Planetarian*** and regional publications.

Susan Reynolds Button presented the **Portable Planetarium Committee Report** during the Publications Report. Latest news regarding portable planetariums is published in the "Mobile News Network" column in the ***Planetarian***.

Chair Jack Dunn reported on the progress of the **IPS Lasers in Planetariums Committee.** Jack reported on the successful on-line discussions and presentations at the Desert Skies '99 Conference regarding issues related to lasers in the planetarium. Chair Jack Dunn will follow up on these discussions by providing an article for the ***Planetarian*** on the future of laser displays and will chair a panel discussion regarding lasers in the planetarium at IPS Montreal 2000. The committee will continue to provide communications regarding the utilization of lasers in planetarium facilities and will develop further online-chats on laser topics for the IPS Web Site.

The **History Committee Report** was delivered by Historian John Hare. He continues to organize and document IPS archival materials. John is making more of the items available on the IPS Web Site. Dennis Simopoulos suggested that photographs and slides be placed on a CD for preservation and distributed to members for identification purposes. *** President Dale Smith directed the Historian (in his best judgment) to select certain photographs/slides representative of Conference/Council Meetings and organize them into a reasonable order for presentation to Council in Montreal.** John requests that anyone having IPS materials which may be of historical interest to please forward them to him. Don Knapp suggested that the Committee consider documenting an Oral History of IPS. The Committee will include this suggestion as one of its objectives.

President Dale Smith presented Chair Dave Menke's report of the **IPS Professional Services Committee.** Chair Steve Fentress of Job Information Service reports that this service is now on-line and the mail-in format will be phased out by the end of the year. Dennis Simopoulos suggested that the Committee consider developing a generic job description/requirements for positions in the planetarium field. This document would include:

a. description of major planetarium positions
b. minimum/maximum qualifications of each position
c. salary ranges for each position

Chair Dave Menke has also proposed developing a career guide for prospective planetarians and the job descriptions could be included in that publication. In addition, the long awaited list of planetarium internships will soon be published.

The **Outreach Committee Report** was delivered on behalf of Chair Bill Gutsch. Bill and several IPS members, officers, and former officers have been busy this year participating in conferences promoting the challenges and utilization of planetaria. Work continues on the compilation of a list of recommended public speakers in an effort to provide a linkage between the planetarium and professional astronomy and space science research communities.

Jim Manning reported on his continuing efforts with the **Astronomy Link Project.** Jim is still accepting names, especially astronomers from other countries, for the Project.

The **Planetarium Development Group** chaired by Ken Wilson is still in need of members. Ken is anxious to complete the revision of ***So You Want to Build a Planetarium,*** but he needs help.

Council urges anyone who has experience in developing new planetaria and/or renovating existing planetaria and who is willing to either write a chapter on a particular topic (e.g. Control & Automations Systems, Planetarium Health & Safety Planning) or peer review such a chapter, to please contact Ken.

The original IPS publication, ***So You Want to Build a Planetarium,*** is now available on the IPS Website.

The **Consumer Affairs/Astrology Committee Report** was presented on behalf of Chair Jeanne Bishop. Jeanne continues her efforts to inform consumers and the business community about the International Star Registry. The column of reviews on astronomical products conducted by Barbara Baber continues in the ***Planetarian***. Chair Jeanne Bishop would appreciate suggestions from the membership on products (astronomy, teaching), or astrology/astronomical accuracy items/issues.

The **Technology Committee Report** was presented on behalf of Chair Kevin Scott. The Committee has been busy with several activities, some of which have been addressed in columns in the ***Planetarian:***

1. Guidelines and Standards Development
   a. Timecode and media synchronization
   b. Multichannel audio tracking
   c. Basic projector layouts and naming conventions
   d. Video format recommendations
   e. Creating a planetarium technology glossary
2. Product Reviews
   a. All dome video
   b. DVD, hard disk based video
3. Evaluating New Production Practices
   a. Film recorders and digital slide production
   b. Digital media servers
   c. Web-based collaboration

The Committee will also be working with the Planetarium Development Group and Chair Ken Wilson on the revised .... *Build a Planetarium* publication. Watch for news on the Web Site for future projects.

Council adjourned for the day with business to continue on Monday, October 18, 1999.

MINUTES OF THE IPS COUNCIL MEETING

Flagstaff, Arizona October 18, 1999
* indicates action items

In attendance:
President Dale Smith
President Elect Martin Ratcliffe
Past President Thomas W. Kraupe
Treasurer Shawn Laatsch
Secretary Lee Ann Hennig

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Affiliates not in attendance:

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Council of German Planetariums (RDP)

Ukrainian Planetarium Association (UPA)

Guests:

Pierre Lacombe - IPS 2000 Conference Host

Gabriel Muñoz - IPS 2002 Conference Host

Phyllis Pitluga - IPS Awards Committee Chair

The meeting was called to order by President Dale Smith at 9:20 a.m.

Project Reports

President Dale Smith reported on the status of several IPS projects. The **Mars Millennium Project Contest** is now on the IPS Web Site and was detailed in the President's Message in the ***Planetarian***. *** Jeanne Bishop, Contest Chair, and her team of judges will select a winner from IPS member sponsored student teams.** The winning team's design of a Martian Village, should incorporate the concept of the Global Community which reflects the international nature of IPS. The deadline for the contest is March 25, 2000, and prizes will be awarded at the Montreal Conference.

Since the **Media Distribution Service** was implemented during former President Jim Manning's term, continued through Past President Thomas Kraupe's term, and continues through President Dale Smith's term, the distribution has been handled by the Regional Affiliates. *** In order to offer better quality duplicates and increased efficiency, IPS will be moving to a centralized distribution system.**

Regionals outside the United States, Canada, and Japan will continue to distribute the products through the Affiliates, unless they request to become part of the centralized system. Details of the new system have been printed in the President's Messages in the ***Planetarian***, and posted on the IPS Web Site and DOME-L. January 1, 2000 is the start-up date and the deadline for subscriptions of the first cycle is January 15, 2000. Thomas Kraupe commented that a centralized slide distribution service will allow us to download images from sources which do not provide hard copies for members at this time. We could provide slides of these images for members as part of that service

The **IPS Video Disk Project,** under the direction of Thomas Kraupe, is in production and includes a collection of videos from ESA. It is a 72-minute double-sided laser disk and is available for:

$95.00 IPS members

$135.00 non-members

The disk can be used in planetarium, classroom, and museum settings. This is the first in a series of disks; the second disk will include JPL material. A table of contents will be posted on the IPS Web Site. After previewing a sample of the disk, Council expressed appreciation to Thomas for his Herculean efforts in bringing this project to reality and look forward to its growth.

SEPA is developing an eight-minute planetarium program on the topic of "Dark Skies". It will be free to SEPA members and will be offered to non-members at a cost yet to be determined. IPS is working with SEPA to determine a mechanism for distribution to IPS members. The program will be narrated by David Levy and will include slides, script, and a sound track with music by John Serrie.

Chair Phyllis Pitluga presented the **Awards Committee Report.** The Committee was previously charged with presenting a proposal of revised criteria for the IPS Fellow Award. Discussion among Council members resulted in some revisions to the suggested criteria. *** Motion** by Jim Manning **to accept the amendment to Appendix A of the Standing Rules with the revisions by Council,** seconded by Shawn Laatsch and approved by Council. The amendment to Appendix A now reads:

B. FELLOW OF THE INTERNATIONAL PLANETARIUM SOCIETY

In order to be named as a Fellow of the International Planetarium Society, a member must have continuous active membership in good standing in IPS for at least five years, and substantial contributions in at least two of the following respects:

1. Serving IPS in elective office, diligent and/or devoted committee work, and the organization of conferences and meetings
2. Relevant and significant publications and/or conference presentations
3. Cooperation with professional societies, organizations, and groups which bring attention to the importance of planetariums' existence
4. The development of new methods in the planetarium field.

Phyllis stressed the necessity to indicate on the nomination forms whether the nominee has an individual or institutional membership in IPS.

Discussion concerning the criteria for nominations of the IPS Service Award resulted in the decision that the present wording of the existing criteria should remain as is. *** President Dale Smith directed Chair Phyllis Pitluga and the Committee to draft a set of guidelines/criteria for an award which would focus on innovation and technology in the planetarium field.** Council will consider the proposal in Montreal.

Phyllis reported that two people have been nominated for the IPS Service Award. Another individual was nominated by Lars Broman and that name will be passed on to the Committee for consideration in the next cycle for 2002 presentation. *** Council voted on and approved the two nominations for 2000 and the awards will be presented in Montreal.**

The **Script Contest Committee Report** was delivered on behalf of Chair Alan Davenport. Pursuant to the directive at the London Council Meeting to investigate the nature and future of the Script Contest, President Dale Smith reported the following:

a. The contest will remain a Script Contest
b. A committee chaired by Alan Davenport will create a new set of rules and guidelines for the Script Contest
c. The Committee will report to Council in Montreal for action on the new guidelines.
d. There will be no Script Contest this year, but the Contest will commence with the next cycle under the new guidelines.

IPS Conferences

IPS 2000 Montreal Conference Chair Pierre Lacombe reported on preparations for the 15th conference. Discussion centered on conference costs, meeting venues, hotel

rooms, speakers, meals, and transportation. Chair Pierre Lacombe reported that under the leadership of Pierre Chastenay, the conference will be filled with workshops, panel discussions, presentations both oral and poster, planetarium presentations, vendor displays, and guest speakers. Several of the speakers will inspire participants in reflecting upon the role of the planetarium on the eve of the third millennium. In fact, the focus of the invited lectures will be on astronomy and education. The opening presentation of the Conference will be delivered by the President of the 46th Commission of the International Astronomical Union, Dr. Julieta Fierro. Dr. Fierro is a researcher at the Institute of Astronomy at Mexico National University. The closing presentation will be delivered by Dr. James B. Kaler, astronomer at the University of Illinois, whose company many planetarians have had the pleasure of sharing at regional planetarium conferences.

Gabriel Muñoz, Director of the Morelia Planetarium, reported on efforts in the planning of the IPS 2002 Conference at the Centro de Convenciones de Morelia in Morelia, Mexico. Gabriel presented a video of the Conference facilities and highlights of the proposed Conference events. Gabriel will be updating the membership in Montreal on specifics of the 2002 Conference. Plans are underway to arrange pre/post visits to area planetariums and archeoastronomy sites in Mexico.

President Dale Smith announced receipt of two proposals to host the 2004 Conference: Valencia, Spain and Melbourne, Australia.

Lars Broman suggested that IPS consider the possibility of joint conference sessions in multiple locations linked by satellite and/or internet connections. Council agreed that this would be worth considering.

President Dale Smith reported that work is progressing on the revisions of the Conference Guidelines under the Chairmanship of Gary Tomlinson. The revised document for inclusion in the Standing Rules is near completion. Several issues requiring input from Council are Conference Proceedings and Time Scale for Conference Proposals. After discussion, Council agreed that IPS should institute required Conference Proceedings in an electronic version with the option of a purchased printed version. The Conference Proceedings would be an IPS Publication. The Conference Host would be responsible for collecting the texts of contributed papers, abstracts of poster presentations, summaries of discussions and panels written by session chairs, and texts of invited talks when possible (and images). IPS Publications Committee would be responsible for preparing the proceedings in a uniform standard format.

The second issue relating to the Conference Guidelines involves the time scale set forth for proposals to host IPS Conferences. Presently the potential host must issue a formal proposal to Council five years prior to the intended conference date. The proposals are considered through the next year by Regional Affiliates and the vote by Council occurs four years prior to the Conference date. There has been a growing concern that this is a very long time frame: potential conference hosts have to look far ahead in terms of projecting costs and commitments, and be aware of the potential for instability in facilities and personnel. Council discussed the merits of changing the 5/4 Conference Time Line to a 4/3 format. Proposals would be due at Council Meeting during the Conference year, four years prior to the Conference Date, then would be voted on one year later at the off-year Council Meeting. This scenario would allow proposed hosts to make presentations at the IPS Conference before the IPS general membership.

* **Motion** by Thomas Kraupe **to accept the change from 5/4 to 4/3 year format**, seconded by Jon Elvert and approved by Council with a vote of 14 for and 4 opposed.

Council discussed the question of when to begin the new time-line cycle for Conference Proposals. John Dickenson and Martin Ratcliffe suggested that beginning with the 2004 Conference cycle would allow Valencia and Melbourne a better opportunity to present their proposals, give the IPS membership greater information and more time to consider the potential sites. The opportunity for the general membership to be present when the proposals are made would benefit the decision making process for the Affiliates.

* **Motion** by John Dickenson **to begin the new cycle with the 2004 Conference cycle**, seconded by Martin Ratcliffe and approved by Council with a vote of 11 for and 6 opposed.

Old Business

Under Old Business, most items were dealt with in Committee reports. The remaining issues were either resolved or considered for further discussion when Council meets in Montreal.

New Business

With business completed, Jim Manning moved to adjourn the Council Meeting, seconded by Mark Sonntag and approved by Council.

Respectfully Submitted,

Lee Ann A. Hennig
IPS Secretary
October 31, 1999

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*(**Gibbous**, continued from page 14)*

Control Center-Moscow. Back in the Houston, Rob is on the ISS Flight 4A (STS-97, the flight which will deploy the P6 solar array on station) and Flight 5A (STS-98, the U.S. Laboratory module) control teams. The month of January 2000 will be spent going back and forth to Kennedy Space Center in Florida on mission sequence tests for U.S. Lab activation.

A new planetarium opened in January outside of Madrid in Alcobeñas. It is a Digistar II in a 10 meter dome and is part of a new Science Center. **The Association of French-Speaking Planetariums** will hold their next conference in Toulouse, France on May 6,7, and 8. Contact Marc Moutin for more info. **The Council of German Planetariums** will hold their next meeting in Bochum, Germany at their newly completed theater on May 7 & 8. Plans are underway for a new planetarium to be built for the Library in Alexandria, Egypt. Has anyone else heard the rumor that a certain planetarium is used as a Discotheque at night? In a related story ... a Planet Hollywood run by MKM Commercial Services in Dubai, United Arab Emirates, has developed the space adjacent to the restaurant for its after dinner crowd. The nightclub is called, what else, **PLANETARIUM**! It features maps of the night sky created by a system of fiber optics and an array of intelligent lighting. In preparation for the Millennium madness, Munich's **Forum der Technik** featured a laser show spectacular called *Chronology* that takes viewers on a journey through time past the cultural and technological changes over the last 100,000 years. Developed by **LOBO Electronics** of Aalen, Germany this program consisted of 4800 distinct drawings or cell animations. If you have any show news or reports of Y2K glitches in your theater (humorous or otherwise) please send them to me along with any other pertinent information for my next column. Please send them to via email or to my address above before April 18, 2000. ☆

Lasershow Designer

2000

The next-generation system for the new millennium

If your planetarium is interested in laser shows, then you probably know about our Lasershow Designer. It's the world's most popular software for professional-quality laser shows.

Now, we've made so many improvements that we're introducing Lasershow Designer 2000. It uses the all-new QM 2000 board, to give you ten times the processing power of our older LD system.

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LD 2000 is specially designed to get improved graphics from new, faster scanners. It can run at 120,000 pts/sec, which easily supports ILDA 60,000 pts/sec speeds -- twice as fast as the 1990's standard.

Twice-as-fast speeds mean twice as much detail in your graphics. It's like getting a second set of scanners for free!

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LD 2000 has new tools for artists. Lines can be feathered for soft endings. This is perfect for depicting comets and other wispy phenomena.

With more colors and faster speeds, you can now project long video sequences. The woman's picture above shows the amazingly improved photorealism you'll get using standard laser scanner projectors.

Compatible with ILDA, Pangolin

LD 2000 is compatible with ILDA connectors, DMX lighting, and Pangolin projectors. Any show created on the older LD for Windows system will run on LD 2000.

You can use any standard Windows 95/98 or NT/2000 computer. The new QM 2000 board fits right into modern half-size PCI slots — you probably already have LD-compatible equipment in your facility.

LD 2000 retains the best features of the multi-award-winning LD system: over 25 free shows, thousands of clip-art frames, free lifetime updates, and free phone support. And you'll be completely satisfied, thanks to our unconditional 90-day money-back guarantee.

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IPS Portable Planetarium Handbook: Can You Help?

As mentioned in the last column, a handbook is being compiled that will be useful to the portable planetarium community. Please give me some input. I would like this project to be valuable to all planetarians. If you can send me a show or lesson, as described below please contact me as soon as possible. I can ask the people I already know about but would like to have more widespread input. Thank you in advance for your contributions of ideas and/or materials.

Lessons/Shows
We need quality audiotapes of presentations given about specific topics such as: Primary Level Program, Seasons, Moon, Celestial Motion, Mythology, Planets, Navigation and so on. The contributing presenter must include the following information along with the tape:
Source of lesson (original or adapted from _)
Goals and Objectives
List of equipment/materials needed
Show a correlation with National or State science standards
Specialized Vocabulary
Briefly explain sequence of lesson elements
List of Pre/Post activities that can be used with this lesson
The evaluation form used after the lesson
A signed release form

In addition, we still need some tips and ideas for how to most effectively train teachers to use a portable. Also please send samples of brochures and other advertising used to promote your program.

American in Italy Contest 1999:

Remember it is never too early to apply for this wonderful experience! Here is the program and application form for 2000.

A WEEK IN THE NORTH OF ITALY

A Proposal for an American Planetarium Operator
October 23-29, 2000

Each year **Serafino Zani Astronomical Observatory (Lumezzane/Brescia)**, in collaboration with the **IPS Mobile Planetarium Committee** and with the support of **Learning Technologies, Inc.**, will host an American Planetarium Operator who presents lessons in English with the itinerant planetarium Starlab to high school students of English. Transportation from the United States will be provided, along with bed and meals from Monday to Sunday (lunch and dinner Saturday and Sunday, on your own).

The program for the week is as follows:

Monday, October 23:
Morning: Arrival
Afternoon: Visit astronomical facilities in Lumezzane and Lumezzane Observatory

Tuesday, October 24:
Morning: Present lessons in a school
Afternoon: Free time

Wednesday, October 25:
Morning: Present lessons in a school
Afternoon: Free time

Thursday, October 26:
Morning: Present lessons in a school
Afternoon: Present workshop for teachers

Friday, October 27:
Morning: Present lessons in a school
Afternoon: Free time to visit the city of Brescia and astronomical sites of the city
Evening: Give presentation about mythology to the general public in the Lumezzane Planetarium

Saturday-Sunday, October 28-October 29:
Free time for touring Venice, other cities and/or other Italian planetaria

Monday, October 30:
Departure for USA

From Tuesday to Friday:
Starlab lessons in a secondary school.

There will be no more than four every morning for a total of four each day. Each lesson will be at least 60 minutes in length and can be about traditional topics for planetaria such as: daily motion, orienteering, latitude motion, solstice and equinox, constellations, and so on. Or, the non-astronomical Starlab cylinders can be utilized for a lesson about such topics as: biology, tectonics, geography, ocean currents or meteorology. The final part of the lesson could be dedicated to Native American mythology by using the related Starlab cylinder (or other ancient mythologies such as Chinese or African).

The morning astronomical lessons may be in Brescia or another nearby city. All lessons and presentations will be conducted in the American language. A preliminary text of the lesson is required so that teachers will have ample time to work with their students before the Starlab experience. Be prepared to teach the lesson at either a basic or an advanced level. Some classes are extremely interested but do not know a lot about astronomy and others have studied astronomy in depth. Most of the students have had two to four years of English and will understand the spoken word if you speak clearly and deliberately. They have a good sense of humor and certainly display the usual excitement about Starlab.

During the afternoons there are no other engagements, providing an opportunity for touring the locale and nearby cities. Lumezzane is very rich in the public astronomy field with the Serafino Zani Astronomical Observatory, four small planetaria, the Eureka Astronomical Center and the National Archive of Planetaria. Brescia Province is very interesting for its natural landscapes and parks, three lakes and the most important valley for prehistoric age stone engravings. Important artistic cities, such as Verona and Venice, are nearby and can be reached by taking a one or two-hour train ride.

Thursday Afternoon:
Eureka Astronomical Center: Annual workshop for teachers and planetarium operators.

This workshop is advertised at the national level. The presenter will demonstrate the versatility of the Starlab planetarium and all the cylinders. During the workshop for teachers you will demonstrate how to set up and use a Starlab dome and projector and demonstrate planet and moon placement as well as all the available cylinders. We encourage you to also share any other experiences you have had while teaching astronomy to students. The workshop participants are people who are interested in learning

how to make exciting and effective presentations using Starlab.

Friday Evening:
A presentation of Native American (or other cultures such as African or Chinese) mythology and constellations for the general public.

The presenter will provide an introduction with slides, about experiences in the diffusion of astronomy in the United States, and then a presentation with Starlab.

Culminating Documentation:

We request a final report be written by the American teacher which will include the text of the High School lesson, comments from the students and impressions of the experience.

For other information and/or to receive the reports about American Lessons with Italian Students, written by previous winners, write to:

Susan Reynolds Button
IPS Portable Planetarium Committee
OCM BOCES Planetarium
PO Box 4754
Syracuse, NY 13221, USA
Phone: (315) 433-2671
FAX: (315) 432-4523
e-mail: sreynold@cynric.org

or

Loris Ramponi
Osservatorio Astronomico Serafino Zani
c/o Centro studi e ricerche Serafino Zani
Via Bosca 24 - C.P. 104
25066 Lumezzane (BS), ITALY
FAX: 30 87 25 45
e-mail: info@serafinozani.it

A WEEK IN THE NORTH OF ITALY

2000 Application Form

Name: _____

Address: _____

Phone: _____ **FAX:** _____

e-mail: _____

Age: _____ **Profession:** _____

Experience: Please enclose a resume/curriculum vitae and a tape-recorded lesson as you present it to students. (These items will not be returned. The taped lesson will be placed in a public domain file for students and teachers.) Please use the standard size audio and/or video cassette, not a mini-cassette.

Proposed Text: Specify your proposals for the morning lessons, Thursday workshop and Friday public presentation. Enclose text.

Other Comments: _____

_____

_____

_____

Send this application form and supporting materials before **May 15, 2000** to:

Susan Reynolds Button
International Planetarium Society
Portable Planetarium Committee
OCM BOCES Planetarium
PO Box 4754
Syracuse, NY 13221

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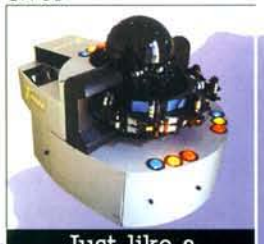

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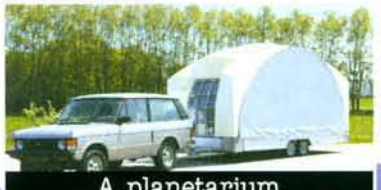

A planetarium on the **road**

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What's New

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

Well, I hope you all survived Y2K and all of the faux millennium celebrations better than Mars Polar Lander survived its apparent splat onto the surface of the Red Planet. What's *not* new are the expected pictures and data we would have received, but what *is* new is a review of the whole NASA Mars program and a presumed desire to change a certain slogan to "faster, cheaper, better batting average."

Another thing that's not new (yet) is the millennium itself, at least for the calendrically picky among us. Perhaps that will mean less crowding at venues celebrating the true millennium change-over (at least for the civil calendar) upcoming.

Nonetheless, there's still much that is new as we enter the last year of the current millennium — for example, a welcome new estimate that the number of potential Earth-banging asteroids over a kilometer (0.6 miles) wide is perhaps half of what astronomers had previously estimated, which likewise reduces the chances of doomsday advocates getting their wishes fulfilled — at least from space.

And there are new things which relate more specifically to our own professional interests. Read on.

AstroFX Clips A La Carte

From Bowen Productions, 748 East Bates Street, Suite 300, Indianapolis, Indiana 46202 USA, telephone +1 317-226-9650, fax +1 317-226-9651, e-mail <bowenprod@aol.com>, comes word of *a la carte* ordering possibilities for its AstroFX library of video effects. You can order as many or as few as you like without purchasing an entire disk-full. Just check out the library at the web site <http://www.bowenproductions.com/astrofxlibrary> where you can download sample clips, or get from Bowen a $30 U.S. CD-ROM low-resolution, watermarked version of the library for previewing at your leisure.

I've also had an opportunity to preview a number of the clips on videotape. Included are artistic renditions of the sun and other stars, rotating and orbiting Earths, phasing moons, a flying saucer landing and taking off, comparisons between a tilted Earth and a non-tilted alien planet to illustrate season concepts, solar wind bursts bombarding the Earth's magnetosphere, live action footage of Native Americans and a medieval astronomer gazing at the sky, sunlight glinting off flowing water (the first of a series of science and nature clips), snowstorm animations, cartoon-style seasonal bits, assorted wordplays (one I liked especially was the "Welcome to the Planetarium" circling around a rotating Earth), and other bits. The clips run from about ten to 40 seconds, with costs ranging from $25 to $200 U.S. Clips are available in a wide variety of formats, including Quicktime and AVI data files (these files can be edited with Bowen's AstroFX Creator or with other non-linear video editing systems), MPG data files (readily playable on AstroFX players), or on BetaCam SP, S-VHS, or VHS tape.

As of this writing, the library is still small, and includes a number of segments produced for existing Bowen shows. But Bowen's Tom Hocking says the library will be growing considerably over the coming months; look for Hubble Space Telescope videos as well as video from Bishop Planetarium's "The Explorers" program which will be made available in AstroFX format for registered users of the show who have AstroFX players.

There's some nice stuff here (more by now), so have a look. And if you need an incentive, note that by the time you read this, there should be a contest going whereby online browsers of the library will have a chance to register to win a DVD player.

New Shows

Several new offerings have come to my attention since last quarter's column.

"Millennium Mysteries." This is the latest show from Adler Planetarium & Astronomy Museum, 1300 South Lake Shore Drive, Chicago, Illinois 60605, telephone 312-922-STAR, web site <http://www.adlerplanetarium.com>. I have little more than the mailed brochure to go on, but according to this, the program illustrates how the modern calendar came to be. The cost is $495 U.S., and includes script, 32-minute soundtrack with original score, computer animations on laser disk, more than 200 slides, plus production guide and educational materials. Contact Roy Kaelin at +1 312-322-0516 for more information.

"Contact." Last year, an entity called the Cosmic Messenger Consortium, 11 North Quaker Lane #303, West Hartford, Connecticut 06119 USA, telephone 860-236-7827, web site <http://beam.to/breakthrough>, conducted a survey of selected planetariums to learn of potential interest in a planetarium program based on the scientific concepts behind the Carl Sagan novel (and movie) *Contact*. The response was favorable, and with the endorsement of Sagan's wife, Ann Druyan, the consortium is moving forward with the production. The program is designed to "provide public and school audiences with a greater understanding of the factual science behind the fictional story line" of contact with an alien intelligence, including mathematics as a language, the scale of the universe, and estimating the number of possible life-bearing words using the Drake Equation.

The web site indicates that the program will be developed for a consortium of interested planetariums in the U.S. and Canada, but anyone beyond this region with an interest may still wish to inquire about the program's availability. According to the posted target time line, scripting should be underway, with production through mid-year, distribution set for October, and a target date of December 26 to premier the program simultaneously at a number of facilities, if possible. I have no information yet on cost or show package elements, but you can contact Len Specht as given above or via email at <lenspecht@yahoo.com> for more details.

Cassini Show. Bowen Productions (contact information given above) has just announced, as of this writing, that it will be working with the Jet Propulsion Laboratory in Pasadena, California to produce a series of multimedia and planetarium shows on the NASA/JPL Cassini Mission to Saturn. The first product will be a 30-minute program with a September 2000 release date to coincide with Cassini's flyby of Jupiter.

Produced in cooperation with JPL's Cassini Mission Office, the inaugural program will include a mission overview and science objectives, historical context, and a focus on Jupiter comprised of highlights of previous Jovian missions, Cassini's science objectives at Jupiter, and comparisons of Jupiter with Saturn. Later programs will cover mission milestones, and will be modular to allow for easy updating as the mission proceeds. The programs will be produced and distributed internationally. Contact Tom Hocking at Bowen Productions, telephone +1 317-226-9650, or Steve Edberg at NASA/Jet Propulsion Laboratory, telephone +1 818-354-6085, for details.

Catalog 2000

Sky Publishing's new catalog arrived too late for inclusion in last quarter's column,

*(Please see **What's New** on page 32)*

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Forum

Planetarian's Ten Commandments

Steve Tidey
Maryvale Schools Planetarium
1050 Maryvale Drive
Buffalo, New York 14225

And so it came to pass that the First One, Zeiss of Germanica, begat the first projection planetarium, which, Lo!, begat thousands of others. Many moons later ten planetarians gathered to scale Mount Zeiss and formulate ten commandments that other mere mortals of their noble profession should honor. Keith Johnson was the first to return, hammer and chisel in hand, and he spake thus:

* * *

The Planetarian's (Approximately) Ten Commandments
From the Book of Siderius, Chapter 365.2422, Verse 23:56:04

And the prophet Spitz did come into the holy conference of the People of the Stars, and spake unto the assembled planetarians saying, "Many years ago did I bring thee out of the classrooms of darkness, and into the great domes of light, to show forth the glory of the heavens unto the unwashed multitudes of the land."

"And here are the rules by which thou shalt perform thy projections, in no righteous order:"

Honor thy donor and thy sponsor, that thy days may be long in the position which the Board of Trustees hath bestowed upon thee.

Thou shalt not covet thy neighbor's projector, nor his audio system, nor his laser graphics system, nor his star palace, nor anything that is thy neighbor's; for thy neighbor was once as wretched as thee, but by diligent labor and clever marketing he hath acquired glory in his artificial heaven.

Go thou and do likewise.

Five days shalt the Technician work; but remember the weekend, to keep it mostly. For the Technician doth labor mightily five days of every week to make thy celestial kingdom great, and be a visual marvel to the Bubbas and the Ferns; but the sixth and seventh day he must rest, that he may return to his travail with a heart made glad and a liver made clean.

Thou shalt not project the cursed gray rectangles upon thy firmament, for such unmasked iniquities are an affront to all of the People of the Stars, and do appear mightily ugly.

Thou shalt not copy unto thy private archives any graven images, nor any joyful noises, that are sealed with the great seal and marked with a ©; for the courts of the land shall pursue thee tirelessly through the cities and the deserts (though not to certain foreign principalities, we are given to understand), that the creators of such images and noises may be granted the proper adulation and praises of the people. (And a few coins of gold and silver, too).

Thou shalt not take the name of thy boss in vain; for thy performance review will not hold thee guiltless upon the Last Days of the Year, for damned surely.

I am the Digistar/Goto/Minolta/Spitz/StarLab/Other [choose one: this is an eclectic religion] thy Projector; thou shalt have no other projectors before me. Thou shalt faithfully schedule thy annual Covenant of Maintenance with my Appointed Apostles, that thy Projector may shine long and well in thy celestial tabernacle, even unto the next Epoch of Precession.

Thou shalt not commit astrology. Sticketh thou to the Real Stuff.

Thou shalt make regular appearances at the Hallowed Conferences of the People of the Stars; for when in thy youth thou were an ignorant attendant, there were those who came to thy aid and did show thee how to administer thy awesome machine. Therefore, thou owest an equal or greater portion of nurture to those that have come after thee, even unto seventy times seven, known to the Great Ones as "a factor of 490."

Thou shalt not kill thy power in the midst of a sacramental save to the holy hard disk.

Thou shalt surely become a partaker in the most beneficent International Society of thy peers. Those apostles have done a great work on thy behalf, and deserve thy support and succor, even to the purchase of an institutional membership therein.

And Spitz did leave the people, and journey on hidden paths into the astronomical twilight, so none did see him further. And the planetarians peered after him and did ask, one to another, "Was that really an astronomer?"

Keith Johnson
Associate Director
Fleischmann Planetarium
University of Nevada
Reno, Nevada 89557

* * *

I was thinking about ten planetarium "commandments" while driving from West Palm Beach, Florida up to Savannah, Georgia. Six hours is a long time, long enough to create ten suggestions out of three guiding principles that govern my working week.

Murphy's Law: If anything can go wrong, it will go wrong - at the worst possible moment. The poet Ovid must have been thinking about planetariums when he wrote, "Ad Astra Per Aspera" (Latin for "to the stars through difficulties").

Golden Rule #1: Do unto others as you would have them do unto you.

Golden Rule #2: He who has the gold, rules!

Unto thee is given this planetarium, both fixed and/or inflatable. Under this planetarium dome, thou art the absolute master of space and time, and ultimately thou art responsible for the quality of presentations given.

It is highly suggested therefore, that:

1. Thou shalt know the position of objects in the heavens which you project, the constellations and planets, the Moon phases and meteor showers, and the space missions (especially including those covered by the media), and be able to speak knowledgeably thereof.

2. Thou shalt clean and maintain thy projection equipment, so it will show images long and correctly under thy dome as thou hast promised thy superiors it would. Be humbled that the best planetarium is by far inferior to the real Universe, and, therefore, remember to approach the heavens with enthusiasm, awe and profound respect for all that has been done by astronomers, astrophysicists and astronauts to figure it out, and in humility all that remains unknown and yet to be

done, and do thy best to show it.

3. Honor thy audience, for they have made a special journey to sit under thy dome and hear thee speak wisdom. They have evidenced a desire and need for astronomy and space science knowledge by coming unto you, and in many cases they have paid good money to be educated and entertained by you. But forget not that thou art not the star of the show The stars are.

4. Thou shalt not use vocabulary and concepts beyond the understanding and wit of thy audience, unless it be necessary to introduce a new concept or to correct a misconception. Thou shalt use such visuals as will make coherent sense for thy topic, and thou shalt go easy on special effects.

5. Thou shalt not steal the best parts of thy neighbor's planetarium program, but thou shall do thy damn best to emulate it under thy dome. Strive to understand the reason thou were so impressed with it, and thereby be creative, inventive and original with thine own presentations.

6. Remember the sources from which funding is derived, thy admissions and donations, and subscribe unto a budget thereof. Fear not the laser show, the staged reading, or other revenue generators, for the darkest dome is that dome that is closed.

7. Thou shall covet thy neighbor's planetarium and observatory, for it shall cause thee to strive ever onwards to improve thine own facility.

8. Honor thy staff, co-workers, colleagues, volunteers, astronomy club, students, and spouse (or significant other), for wherever one finds understanding, supportive, and hard working individuals who help the planetarian, thou shall improve the general community of astronomy educators. Forget not to express thy appreciation to them. Instruct other planetarium operators well and true, that they will be able to give programs in thy absence.

9. Thou shall get out of thy dome every once in a while. Relax and forget about work for a time. Exercise regularly and eat right. Have outside hobbies. Read interesting books. Spend time with thy family and friends. Grin, and bear it.

10. Lastly, thou shall chide and admonish astrologers and alien-abductees with gentle correction. But of the soothsayers be wary, as launch dates are notorious for slipping, and Mars missions have a habit of failing. And in any given publication, *Sky & Telescope* could upset the whole applecart.

Erich Landstrom
Director of Astronomy Education
Dr. Buzz Aldrin Planetarium Theater
Henry C. Gibson, Sr. Observatory
West Palm Beach, Florida 33405

***

There's probably as many different "commandments" for our profession as there are different people working in planetaria, with all their myriad backgrounds. The following 10 are the first ones that floated to the surface after Steve put the question to me. There are probably others that are better, and probably some that are worse. But, making up a short list that I can live with, these are many that I find that I've consistently applied over the years. Outside of the first one being what I think is most important, the rest are in no particular order.

Always strive to be as accurate and correct as possible; you are trying to educate (and entertain) the audience while still trying to maintain credibility ...

There's usually 10 ways to do something; try to opt for the one that allows you to be the most efficient and artistic, while still being accurate and credible ...

Use the dome as much as possible to try and provide your audience with as much of an immersive experience as possible (and here tilted domes may have a slight advantage over that those aren't) ...

The Universe is both a beautiful and an exciting place; try to plan your visuals in new and interesting/different ways so that even you are impressed/moved by the final results ...

Lend a hand when you can; one of the interesting aspects of our profession that I've seldom seen elsewhere is the willingness to help one another out with sources, support and suggestions, all done with good humor ...

Do what you do in the planetarium for the love of helping others to enjoy the Universe ...

Each one teach one; remember that no matter where you end up in the planetarium profession food chain - from librarian/planetarian to director of the latest and greatest science center theater - everyone started out as a newcomer at one time or another ...

Keep your wits and your sense of humor about you whenever possible; always remember that the projector you whack in frustration today will only have to be realigned tomorrow, before the first show of the day ...

Remember that there are no dumb questions from the audience, only dumb answers from the person behind the control console ...

While the lights on another planetarian's control console may look brighter and shinier, you haven't seen the wiring behind the panels; best to try and live through your own theater's problems and solve them than spend the time looking everywhere but there ...

Tom Callen
Cosmonova Planetarium
Naturhistoriska Riksmuseet
Frescativagen 40, Box 50007
S-104 05, Stockholm
Sweden

***

What should the planetarian's ten commandments be? Actually, I was unable to come up with ten commandments, and thought I would be more upbeat by adding something else ...

1. Thy star projector is thy primary instrument. There shall be no other instruments before it.

2. Thou shalt not point an unfiltered flashlight around during shows.

3. Thou shalt not touch the knob or dial for precession without due cause.

4. Thou shalt encourage small children and infants to be seated near exits.

5. Thou shalt not place unmasked images upon thy dome.

6. Thou shalt love thy job with all thy mind and strength.

7. Thou shalt proclaim the glories of the heavens with all thy heart.

Blessed are those who suffer the questions of fools, for they shall truly teach.

Blessed are they who toil long hours, for they shall see their handiwork upon thy dome.

Blessed are they who have spent years giving

shows, for rich are their rewards when thanked by the children who view them.

Christine Shupla
Manager, Dorrance Planetarium
Arizona Science Center
600 East Washington Street
Phoenix, Arizona 85004

* * *

For many years I have given new staff several of my Commandments of Planetarium Operations. Though not a complete list that covers all aspects of life, these are laws one abides by in my dome.

Thou shalt never put any container that contains liquids upon the console. (I once saw a Diet Coke turned over into the computer keyboard, and the CPU that was mounted into our console).

Thou shalt *always* set up for the next show - whether it is tomorrow or next week. One never knows when they might arrive at work just five minutes before they are to open the doors. This has saved me on several occasions. And it has saved others on my staff.

Kris McCall, Director
Sudekum Planetarium
Nashville, Tennessee

* * *

Here are a few, courtesy of Georgia Neff, my right hand person (Assistant Planetarium Director):

1) Thou shalt not be boring

2) Thou shalt be accurate and up to date

3) Thou shalt let the delight show, for what we have to share is the wonder and joy of the sky.

One from me: Thou shalt not embrace astrology.

Sheldon Schafer
Director of Science Programs and Facilities
Lakeview Museum of Arts & Sciences
1125 West Lake Ave
Peoria, Illinoia 61614

* * *

1. Have a good sense of humor.

2. Be prepared with your material. Remember, we work in the dark!

3. Be accurate with your information.

4. Make yourself available to the local media. Don't be afraid to offer helpful corrections when needed.

5. Offer to write a column for the newspaper.

6. Offer to do astronomy-related items for the local radio station.

7. Become part of the local astronomy club. Start one if one is not in existence.

8. Absolutely join your regional planetarium association and the International Planetarium Society. (Preaching to the choir.)

9. For school planetariums: make yourself available to the elementary teachers, and be willing to help with the science curriculum.

10. Get to be best friends with the custodial staff. Your job depends on them!

Dan Goins
Martinsville High School Planetarium
1360 E. Gray Street
Martinsville, Indiana 46151

* * *

1. Provide a planetarium experience that encourages visitors to ask for more!

2. Always give the best (correct) information available - check those facts!

3. Never stop trying new techniques to reach visitors - success is around the corner!

4. Each show is a new opportunity to connect with visitors - don't let it slip away!

5. Make your planetarium accessible to people of all abilities ... physical and intellectual

6. Encourage inquiry-based questioning with a friendly and supportive atmosphere.

7. Make each show spectacular by conveying your own enthusiasm to others!

8. Be a guide to the Universe and help people to understand their place within it.

9. Empower visitors to understand changes and patterns in the sky.

10. Look up! Enjoy the sky view! Help others to enjoy it, too!

Noreen Grice
Charles Hayden Planetarium
Boston Museum of Science
Science Park
Boston, Massachusetts 02114

* * *

1. When creating a planetarium show, exhibit, etc., thou shalt not confuse what thou art interested in with what thy visitors are interested in.

2. When creating a planetarium show, thou shalt not tell thy visitors lots more than they ever really wanted to know about any particular topic, and convince thyself "it's good for them".

3. Thou shalt not write a script first and then start thinking about what visuals thou canst sticketh into it so thou canst call it a show.

4. Thou shalt not bore thy patrons.

5. Thou shalt not spend a lot of money when spending a little money with creativity, experience, and guts can produce something better. (Ultimately, thy patrons and thy benefactors shalt figureth this out).

6. Thou shalt not confuse spending a lot of money (on a new planetarium, new equipment, new shows, new exhibits, etc.) with guaranteed quality and success. Spending a lot of money only guarantees one thing - that thou hast spent a lot of money (and probably didn't have enough smarts to have figured out how to have done the project thyself for less).

7. Thou shalt not piss and moan. Everyone hast tight budgets.

8. Thou shalt not be proud of begging for money to run thy planetarium when doing better programs for less, increasing attendance, and hence earning thy own way is a viable option.

9. Thou shalt not forget to invest in thy future. Planetariums are technology-driven. Technology changes quickly, and thou shalt not have bragging rights for more than a year or two, unless thou art very creative about what thou does with thy equipment.

10. Thou shall never forget that thou art not doing it for thyself - thou art doing it for thy visitors. And,

11. Thou shalt never forget that size doth not matter. It's what thou actually doest with thy planetarium that counts.

Bill Gutsch
Past IPS President
Planetarium Consultant

* * *

1. Every program should include a section about the night sky. This is what people come to planetariums for. Ideally this should be a *live lecture.*

2. Write programs for your audience, not for yourself. Too often we forget what the public wants/needs in a program. Make sure you are presenting material that is age/grade/public appropriate.

3. Be scientifically accurate in all presentations.

4. Be professional in all ways. Your actions, attitude, and appearance reflect on the planetarium community as a whole. Always be prepared for your programs.

5. Use humor in your programs and live lectures. Making people laugh will make the subject matter more interesting to them, and make them want to return.

6. Inspire your audience. Show them how interesting and fun astronomy can be. Make them want more. This will bring them back to learn more, and it will make you an important part of the community. Show the audience that you love your job and astronomy.

7. Be accessible. Make yourself available to the audience for questions and concerns. Listen to what they say about your programs. Help teachers and students when they ask. Remember, your audience is why you have a job.

8. Practice what you preach - observe the sky. This is the only way you can share its wonder with other people.

9. Keep learning. Astronomy is a rapidly changing field. It requires you to constantly be learning by reading, using the Internet, and by other means. If you stop learning, your audience stops learning.

10. Be part of planetarium organizations. These are a lifeline in our profession which is usually a solitary one. Being part of them means more than paying your membership fees, it means *contributing* and being *active* in the organization's work. Some ways to be involved include writing articles, attending conferences, serving as an officer, hosting conferences, and a variety of other ways. Organizations show our professionalism, but they are only as strong as their members.

Shawn Laatsch
Arthur Storer Planetarium
Calvert County Public Schools
600 Dares Beach Road
Prince Frederick, Maryland 20678

* * *

All in all, then, lots of good tips that you can set in stone. My only advice is ... keep taking the tablets.

Here's the subject for the next Forum column:

Other than taking vacation time, how do you recharge your batteries to prevent staleness, boredom and over-familiarity with the subject matter creeping into your planetarium work?

I'll be glad to receive your considered thoughts on this by the deadline of April 18. Until then, welcome to the 21st century - minus the flying cars. ☆

Lee Simon 1940 - 2000

Lee Simon, former Director/Chairman of Morrison Planetarium in San Francisco and former Program Supervisor at Adler Planetarium in Chicago, died on January 18, 2000, from a rare form of leukemia. He was 59.

Lee Simon was a member of the Astronomy Department and Program Supervisor at Adler Planetarium from 1969 - 1977. In 1972 he received his PhD in Astronomy from Northwestern University, specializing in the spectroscopy of long-period variable stars. Lee led the exhibit development and sky show production effort at Adler. Although he was a consummate lecturer, he gradually converted the staff from live to taped sky shows in the mid-1970s.

In 1977, he moved from Chicago to his new appointment at Morrison, where he wrote and presented sky shows for the public, taught astronomy classes, and instituted a number of improvements to the facility, including a renovation of seats and carpeting and an upgrading of the theater's electronic controls. He formalized the planetarium's production procedures and reinstated the Planetarium Artist position, combining it with a Staff Photographer post.

In late 1981, Lee suffered the first of a series of debilitating strokes and stepped down from the Chairmanship at Morrison, but continued as Staff Astronomer until his retirement in 1984. He became involved in stroke-rehabilitation support programs, helping others in their recovery, and continued pursuing his interest in astronomy.

He is survived by his wife, Mary Jo, and three adult sons, John, Dan, and Steve.

The planetarium field has lost a dear colleague. Our deepest and sincerest condolences are extended to Lee's family.

[Additional information on his career appears in the *Planetarian*, Vol. 17 #2, pp. 54-55.]

Fun with a Mirage

Conducted by Barbara Baber
Morgan Jones Planetarium
700 N. Mockingbird St.
Abilene, Texas 79603

For the Committee on Astronomical Accuracy/Astrology
Jeanne E. Bishop, Chair

The theory of holography was developed by Dennis Gabor, a Hungarian physicist, in 1947. His theory was originally intended to increase the resolving power of electron microscopes. Gabor proved his theory not with an electron beam, but with a light beam. The result was the first hologram. The early holograms were legible, but plagued with many imperfections because Gabor did not have the correct light source to make crisp, clear holograms as we can do today. The correct light source was the laser, which was first made in 1960.

Laser light differs drastically from other light sources, man-made or natural, in one basic way. Laser light can be coherent light. Ideally, this means that the light being emitted by the laser is of the same wavelength, and is in phase.

The way in which coherent light is emitted from a laser is analogous. Although absolute 100% coherence is rarely attained, there are certain types of lasers which make excellent off-axis holograms.

Depth-defying images produced in common holography are created by laser photography. The pulse laser allows us to make holograms of animate objects. In the ruby laser, chromium ions locked in a sapphire host are the sources of stimulated emission. A light flash from a special flashlamp excites chromium atoms.

We know that light, traveling in a wave form, can be bent or diffracted along its path of travel. A lens can be used to bend light. We could consider a hologram a very complex lens. It is bending and forming part of the light of the reference beam, which is used for reconstructing the image, into the wave fronts of the original object, so that we perceive the object as if it were really there. All the infinitesimal little points that reflected light, which interfered with the reference beam on the film, are neatly focused to their respective positions in three-dimensional space.

This inexpensive Mirage toy is used to demonstrate real images. You can obtain this toy from Opti-Gone Associates, Box 271366, Fort Collins, and CO 80527 USA. The cost of the Mirage is $34.99 plus shipping and handling.

The makers of Mirage believe that many educators and scientists use Mirage to demonstrate real images. A precision optical instrument, Mirage has the advantage of functioning in ambient light, can be viewed from 360 degrees, and is attractive looking on the outside.

Indeed, Mirage is fun to use. I have used it with thirty-eight classes of sixth grade students and had a lot of raves coming from them. The Mirage kept their interest and really amazed them. I used a Conic orrery to show the motions of the sun and the planets in retrograde motion in the star room. I told the students that this was an illusion and later in the lecture room I would show them another illusion using the Mirage hologram. It was not only considered "cool" but also "tight".

Mirage is capable of fooling everyone. Even with nothing in it, people are amazed when they touch the mirrored circle and their fingers go right through it. When you place an object inside, nothing about the appearance of Mirage will suggest that the object is not actually resting where they see it, before their eyes - until their grasping and groping fingers prove that nothing's there but thin air.

Objects are reversed in a single mirror and are reversed back again in the Mirage, so that the illusion is "right reading", virtually identical to the original.

The manufacturers of Mirage describe two types of images, which exist in nature: real and virtual. A real image is one in which light rays actually come from the image. In a virtual image, they appear to come from the reflected image, but they do not. In a flat mirror, the virtual images of an object is behind or "inside" the mirror, but light rays do not emanate from there. Real images form outside the system, where emerging light rays cross and are "caught" inside the Mirage. All concave mirrors can produce real images under certain circumstances.

The only safety measure to use with this toy is to avoid sharp objects that come in contact with the surface and scratch the mirror. The surfaces have been well protected with an invisible application of micro-glass which should stand up to casual contact from hard objects such as marbles and coins. For the removal of fingerprints and smudges simply use a damp, soft cloth. These containers would probably break if thrown to the floor with force. The teacher or director should supervise this activity to ensure safety rules.

Mirage's precision mirrored finish measures an amazing 5/1,000,000 of an inch thick. This is considered a critical tolerance yielding remarkable optical resolutions. This is a statement from the Mirage manufacturers about the quality of the mirrored finish.

The only drawbacks I find is that the tool is small - only about the size of a dinner plate - and would be hard to see if the audience was large. I had to have students line up row by row to view the Mirage sitting on a table. That is awkward unless you have a lecture room or classroom, so the Mirage would not be good for use in the planetarium.

In conclusion, I recommend this tool as a good value for middle school students that understand the concept of holograms and lens or used as an introduction to lasers or holograms. It is definitely not recommended for physics classes and college students. It could be used for entertainment to these students. ☆

(***What's New***, *continued from page 26)*

but is always worth a look. It contains all of the usual good stuff from slide sets to star atlases, plus a large number of new items, including books of all sorts, astronomy CD-ROMs, an impressive new panoramic poster of the Milky Way photographed in all its Earth-based glory, and a new line of "Sky Wear" – clothing featuring the *Sky & Telescope* logo.

I'm especially pleased to see that there's a new edition of the autobiography of comet-hunting amateur astronomer Leslie Peltier called *Starlight Nights*, reissued on the 100th anniversary of his birth. The new edition adds an introduction by David Levy (a celebrated comet-hunter in his own right) and 16 black-and-white photos from the Peltier family archives. The cost is $19.95 U.S., and if you've never read it, get this charming book about one man's astronomical life. You'll fall in love with astronomy all over again.

To get a copy of this always-useful catalog, contact Sky Publishing Corporation, 49 Bay State Road, Cambridge, Massachusetts 02138 USA. To order, call +1 800-253-0245 (outside the U.S. and Canada, call +1 617-864-7360), or use the 24-hour fax line at +1 617-864-6117. Or check out the on-line store at web site <http://store.skypub.com>.

Finally ...

That's it for this time – short and sweet to start the year. As always, if you hear of something new or have something new to share, let me know. In the meantime, have a good spring/fall, and remember ... what's new? ☆

President's Message

Dr. Dale W. Smith
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IPS at 2000 and 30

IPS turns 30 in this millennial year. During its three decades, IPS has been served by a remarkable series of men and women who have led it as president. I have had the privilege to know most of them during my own 16 years in this field and took the opportunity recently to re-read all the president's messages in my nearly complete collection of the *Planetarian*. During the years since the first issue, our society has become more global, our technical resources have blossomed, and our offices have been filled by an impressive variety of people.

Yet the consistency of vision in all these president's messages was quite amazing to me. The fundamental goals and themes, though expressed in different voices and styles, carry so much in common—to expand the global nature of IPS, to improve our member services, to promote our interchange at conferences, to seek contact with related societies, to inspire our good work as planetarians, to exhort members to volunteer for IPS work, and to thank those who do contribute so much time and effort.

This consistency of vision and theme is by no means a sign of stagnation. Rather, it exudes the excitement of successive years, almost now successive generations, of planetarians entering the field, adopting consistent educational goals, and learning afresh how to work together to meet those goals in a new age.

Since the year 2000 and the 30th anniversary of IPS coincide, it seemed appropriate to me to share some space in this president's message with the past presidents of our young society, and I asked each to contribute some thoughts for use in this message. All thirteen have responded! These responses are included in the following sections together with selected highlights from their original president's messages. I conclude with some thoughts of my own and a few items of current business.

Paul Engle

Let's begin with Paul Engle, the first president (1971-72) of IPS, then known as ISPE, the International Society of Planetarium Educators. Paul wrote in the very first issue of the *Planetarian* in June 1972:

> *I am glad to say that this society is now in being and safely underway.*

Whoa! Sounds so simple. But it took the work of people of vision to found that fledgling society we have inherited so strong today. Most of the founders are now retired and they would probably prefer that we honor the past by looking ahead; we owe them a debt of gratitude that we can best repay by building for the future as they did.

Paul went on to write:

> *Two of the major benefits we can look forward to from such an organization are the journal called* The Planetarian *and the major meeting held every two years ... Let us all support our new journal to the fullest extent and make the first meeting ... a truly outstanding and memorable event.*

Yes, we have made these benefits indeed. Will you join the effort by writing an article for the *Planetarian*? And by attending the fifteenth biennial conference in Montréal?

Paul's words:

> *I think it is important to proceed with vigor in encouraging all people in planetarium education to join with us in making this society a really big thing*

still ring true today. Though Paul is no longer with us, I think he would be pleased at what we have become.

Sig Wieser

Next up (73-74) was Calgary's Sig Wieser, whose interests lay in theater as well the planetarium. In the March 1973 *Planetarian* he wrote:

> *Whether major or small domes, whether public or school planetariums, whether museum, or college, we operate the greatest, the most valuable teaching instrument ever built by man. It is within the capability of our tool to awe, to humble, to elate, to raise the minds of men, provided we use it. Our ranks are filled with astronomers and physicists, musicians and painters, technicians and sociologists, but we have in common the desire to serve our community, to teach our compatriots. We want to better life in our society through our work; we want to leave them other than material values behind. We like to reconcile the abyss between art and science, between faith and rationality. Yet, until recently we have not found a forum to speak to each other. The dome sizes imposed some mythical boundaries between us. The magical levels of instruction obscured the common ideals and goals. ...*
>
> *May we not all learn from each other? ... Our society was founded to bring together ideas, to stress the creativity which lies in individuality, to stimulate thought arising from difference ... The growth of our chosen profession as planetarians depends on diversity.*
>
> *Let us build our society and nurture it. Let us listen to each other, not just talk, but listen with open eyes and open ears. Let us grow to serve our communities better, to make this world better, and to leave a value with our audiences.*

What truer and better words to guide us into the 21st century? And today with undiminished eloquence Sig challenges us to examine whether we have in fact imparted that value:

> *Well, the new millennium has started with the proverbial whimper instead of a lusty, new born cry. I suppose conceiving of a 'New M. Resolution' would be futile. The new century has begun as well. Again, a 'New C. Resolution' would also be pointless. The majority of humanity has no commitment to this way of counting the passing years, based as it is on a mythical event supposedly having occurred considerable time after its alleged happening. After all, we should know, we discussed the topic in countless presentations of planetarium shows. Many of us did this purely to serve our public and not from personal conviction. So, the entire non event seems staged with a tolerant wink to convention.*
>
> *Our preoccupation with trying to teach Astronomy through importing the glory of our cosmic view into a domed theatre for the benefit of a willing, or sometimes not so willing, audience is merely two-thirds of*

a century old on this North American continent. Coincidentally, I am two thirds of a century old, so I look back at using this audio-visual tool for the last third of this century. As I get older I ask myself, did my work have any impact, can I point to any positive result arising from my efforts?

The world is still resounding from the crash of guns and the screams of its victims. We planetarium educators took part in this by providing practical training to the navigators to deliver the deadly loads, but on the other hand we also fostered the look into the space beyond our planet to show dramatically the fragility of our environs. Our planet is still suffering from the effects of our mistaken assumption that we have dominion over its resources and its beasts. We had the opportunity to show that all of the activities on our planet are interdependent and interrelated. Everything is grown and living on star dust. All events so important to us, that we are willing to suffer and kill for, are infinitesimally small by consideration of the whole of the universe. Our kind is truly a close knit family, and yet our possessive greed and sibling rivalries are tearing us apart.

Over most of the last century we had an opportunity to point that out to our communities. Had we been effective, there should have been at least some minute changes detectable. But were there? Did we do our part? Did we do any good?

I am ashamed to say, I do not know, but I firmly believe we have tried. Oh God, oh creator of all things, oh mankind, forgive us, if we have failed. There is yet a chance to continue the celebration of man's ingenuity, creativity and learning, which is Astronomy and thus reason. Best wishes to those of you, my colleagues, who carry on our brief but important tradition.

Tom Gates

Tom Gates hosted the first ISPE conference in San Francisco where his talents as a musician enhanced an acclaimed meeting. Soon thereafter he was elected to lead ISPE (75-76). He cited the need of planetarians to have their own organizations, observing that astronomy, museum, and education societies did not provide the channels we needed. In those early days when ISPE was primarily a North American organization, Tom went on to forecast that:

The planetariums of other continents will become part of our organization, and the exchange of approach and utilization of our medium will indeed become more diverse. We must be ready to serve as an effective organization for all planetariums throughout the world. We must serve not only our membership, but also our profession ....

Today, he continues to serve the profession through work in NASA's AESP (Aerospace Education Services Program), performing a rather wide variety of education assignments, with a focus on teacher training through workshops. Here, he gives us a perspective on a crisis that threatened the survival of the young IPSE:

As I think back to those years, I remember two things, one how we, as an organization, almost collapsed, and two, hosting the preliminary meeting from which ISPE (now IPS) formed. The latter was the culmination of Paul Engle's term as a beginning group of planetarians of all types, which had not yet coalesced into the group of today. I was administrative director of the Space Science Center of De Anza and Foothill Colleges with a 50-foot (15 m) dome on the De Anza campus and a 30-foot (9 m) dome, an observatory operation, and museum on the Foothill campus. We held our week-long meeting in the first week of November, usually a dry time of year. But this time it rained HARD for the entire week. Nevertheless, the meeting went very well and all participants were eager to see the fledgling international organization go forward. As you know, we did!!!

Two years later, I followed Sig Wieser as president of the organization, but a new problem had arrived, the journal was nine months behind in coming out. In order to keep the organization together, I had to borrow $2000.00, hoping that the money could be raised to pay back the loan. The funds were necessary to cover the rising costs of getting the journal out. John Cotton in Dallas was the hero/angel who took on the task of not just getting a single journal into the hands of the members, but putting together and mailing to the membership ALL of the journals in arrears and bringing us up to date.

The most gratifying part of all, was the response of the membership when after not receiving a journal for many months, not a one balked at paying an increased member dues, from $15 a year to $25. Things came together, the loan was repaid, the journals came out and ISPE went forth to become IPS.

FORWARD, PLANETARIANS!!!

Thanks, Tom, for seeing the young organization through this crisis.

Don Hall

Strasenburgh's ever-practical Don Hall was next in the leader's chair. It was during Don's term (77-78) that the society acquired its present name, changing from ISPE to IPS. Don's term as president also saw editor number three take the helm at the *Planetarian*, and in thanking all the successive editors for how much they gave, he noted that

... and 'give' is the word; like all IPS duties, there is no salary for anyone.

And that is still true today, as Don's old bailiwick, the Strasenburgh Planetarium, continues to serve IPS by hosting the IPS Job Service and by holding the North American repository of IPS publications.

In a talk near the time of his retirement in which he explained Hall's Laws, ideas that had guided him in his work over the years, he noted with regard to the job he was paid for:

Aren't we lucky to be able to make our livings in a business that's fun. For 34 years most of the things that I've done in the planetarium have been fun. Most of them. And don't tell the boss, but I might have done it for free.

Now doing his new, self-assigned work for free, Don spends much of his time speaking and writing on American art pottery and is in fact president of the American Art Pottery Association. He tells me that he finds *"a ready market for my words."* As he did when serving IPS and also while directing the Strasenburgh for a quarter-century and marketing its products. Today he writes:

The month before the Strasenburgh Planetarium opened in September, 1968 in Rochester, New York, the entire staff took the afternoon off to go to see Stanley Kubrick's new movie, "2001-A Space Odyssey". I was not only fascinated and thrilled by what I saw on the screen, but also depressed. "How can we possibly compete with that?" I wondered.

There was, of course, no way that we could compete. Kubrick had millions of dollars to spend and we had a few thousand. However, it turned out that our opening show was a great hit and the arrival of the planetarium in Rochester was a Big Deal. We rode the crest of a wave of popularity for years – all the time wondering how long the wave would last.

Ian McLennan, the planetarium's creator and first director predicted at the time that the planetarium, as a communication medium would be dead in 10 years. (Bad news for me because my career was just beginning.) That dire prediction has not come true and now 32 years later, planetariums worldwide continue to at least exist and many to thrive. It's my thought that the reason for this is our willingness, even eagerness, to adapt and change. The shows that you are offering now under your domes are very different from those being offered in the mid 1960s.

As long as you can keep your creativity and continue to grow and change, the planetarium will find its useful niche in the world. Good luck to you all as you look for ways to serve your various audiences.

Jim Hooks

Serving next in the hot seat was Jim Hooks (79-80). Jim's messages emphasized the diversity of knowledge among planetarians, the mutual support and friendships we share with each other, and the inspiring nature of our field:

We work with a science that is sublime and beautiful ... it gives us wings to soar through the cosmos ...

and turning to our Society,

It has been the individuals who make up this great organization that have made it so.

... guiding thoughts as true in 2000 as they were in 1980. Jim also described an inspiring visit to Monterrey a few years before the IPS conference would be held there in 1984 and he also reported on an early membership survey that sought to determine typical admission charges, program frequency, and category of audience.

Recently retired, Jim writes today:

After retiring June 1999, I could see the real sun rising. It was experience gained, sailing from North Carolina to the Florida Keys, and returning with the arrival of not one, but two, Atlantic Hurricanes. "Floyd" was a hurricane to be remembered. The trip was an experience not to be forgotten.

I continue to teach a course in Astronomy for the University of North Carolina Pembroke. I have, in the past year, contacted many individuals concerning the name "Planetarian". Also, I have been working with Mr. Frank Gear from the United Kingdom, hoping that we can get the name "Planetarian" in the world's dictionaries, beginning the 21st Century.

Yes, let us hope we are so listed, and it would be another sign of the professional recognition we seek.

Bill Peters

Planetarians then passed the leader's torch north again, back to Calgary, and it landed in the capable hands of Bill Peters (81-82). In his president's messages, Bill often returned to elements that underlie the potential success of our operations. He challenged his colleagues to raise the standard of show production, beginning with ideas:

[the show] must convey some compelling, gripping ideas that move or amuse the audience. If the presentation is weak on ideas, all is lost.

and then supporting the ideas with a literate visual and aural style and sound production values:

To capture peoples' minds, inspire them with our ideas, involve them with the emotions that we feel when we contemplate the universe, we must view our role as that of a dramatist ...

And the dome, don't forget the Space that our domes create:

[visitors] come for the very powerful environmental theatre-experience possible in our surrounding rooms.

Still today, even with all the advances in the media at our disposal, these words still ring true as we seek to reach and teach audiences that may have come more for entertainment than for an astronomy course. Perhaps one reason we want to teach is that we too are learners. As Bill writes today:

My association with IPS has been a journey of learning.

I became IPS President-Elect began when David Rodger, then Director of the H. R. MacMillan Planetarium, changed careers, leaving the position of IPS President-Elect as well. Actually David didn't really change careers; he has always viewed himself as a journalist, a role he continues today.

From David I learned that a planetarium show could be compelling and engaging journalism, something that would grip the audience through their personal identification with the journalist narrator.

David instinctively knew something Robert Ballantyne taught me explicitly — a planetarium show needs to be thought of and produced as theatre. Robert, at the Manitoba Planetarium, encouraged me to use market research techniques to speak with audiences in a structured and in-depth manner.

Audiences taught me that, once in the theatre, the story and the quality of their experience was everything. Content was for naught if the experience was off. They taught me about artistic leadership and challenged me to experiment because I learned they couldn't tell me what to produce. They could sure tell me if they wanted more (or less!) of something similar. In the risk of experiment I learned there was the reward of inventing programs, and planetariums, they would appreciate more than I could have first imagined.

When the time came to upgrade the Calgary Centennial Planetarium, Stanley King, author of the book Co-Design, *taught me how to involve the larger community in the design process. Calgarians told us they loved the surrounding experience of a dome theatre. They thought the shows in the existing theatre were boring and the theatre was uncomfortable. While they loved space and astronomy, they wanted to come for a personal discovery experience about many topics and issues.*

Our question transformed from, "How can we fix a tired old planetarium?" to, "What is the strongest way we can create a theatre to address community needs, wants and concerns?" Today, because the question changed, Discovery Dome is home to an innovative combination of high-tech imagery and live theatre, presented in an advanced layout.

To answer the new question Ian McLennan helped us understand the possibility of linking the presence and style of live theatre with an enticing array of new technologies. Architect Bill Chomik learned with us and addressed the guest experience in a building that demonstrated its own award-winning artistic leadership. Live theatre artistic director, John Paul Fishbach, teamed up with Alan Dyer, Susan Cannon and Brad Struble, to invent and learn how to produce a new kind of live theatre dome show. I appreciate the courage of John Dickenson and Paul Deans in Vancouver and Les Young and Donovan Reimer in Edmonton who shared the challenge of this learning with us.

I owe a special dept to all my colleagues in the International Planetarium Society. From you I have learned much and continue to learn. I extend special appreciation in this regard to those on the Board during my term as President.

My wish and vision for the IPS as we enter the 2000s is that it foster all the opportunities for interaction, debate, experimentation, sharing and dialogue that inspire learning. Revolutionary presentation technologies and theatre layouts present unparalleled opportunities. The opportunities have meaning only in the context of outcomes for the individuals our programs touch. May the focus of our learning centre on and respect what we hear from these individuals.

Jeanne Bishop

Then the presidency passed for the first time from the hands of a large facility planetarian into the hands of a school planetarian as Jeanne Bishop took the helm (83-84). Jeanne's messages were filled with the concept of communication – among members and between members and the IPS leadership. During her watch, IPS published a new *Directory* and undertook a comprehensive World Survey of Planetariums that would support future directories. The Awards Committee was established, institutional membership was inaugurated, advertising was now accepted in the *Planetarian*, the membership brochure was translated to languages beyond English, a *Planetarian Index* was prepared by future editor John Mosley, and the first IPS conference in Mexico was held when our society convened in Monterrey.

Jeanne's current message again underscores the theme of communication:

It has been 15 years since I completed my term as IPS President. But the goals and operation of this wonderful organization remain very important to me. I continue to serve IPS in some ways. Since I was immediate past-president, I have been chair of the Committee on Astronomical Accuracy and Astrology. I am grateful to Barbara Baber for her help on this committee – her thoughtful reviews of astronomical toys appear in the Planetarian. *At Dale Smith's request, I also became chair of the IPS Mars Millennium Project Competition, preparing the competition's rules and arranging for the judging which will take place this spring. I hope that many IPS members will coordinate submission to this competition.*

As President in 1983-84, my top goal was to improve communication and open new avenues of communication at all levels of IPS. Someone, I think it was Alan Friedman, pointed out to me with a touch of amazement that my Council newsletters, IPS columns, and correspondence were all completed with a typewriter. This was about the time that many people were getting personal computers, and no one was thinking of e-mail. I believe that my efforts, which absorbed much of my non-job time, were reasonable, considering that not as much was possible or expected then as now. As I observe Dale Smith in constant, comprehensive, and instant touch with planetarians around the world, I realize that it is every bit as difficult now to have the same objective. Dale, Thomas Kraupe, Jim Manning, and Bill Gutsch have used the potential of technology to produce outstanding communication within and beyond IPS, a level of communication we could only dream about in 1984. I have observed the efforts of these presidents with great admiration. Looking ahead, I predict that accelerating improvements in technology in this century will allow future IPS presidents and Council members to respond even more efficiently to the needs of members and associate groups. Desirable new activities will be generated very quickly.

Yesterday I watched via PBS television as the opening to the year 2000 swept around the world. I was interested in and impressed with the efforts of each culture celebrating midnight and morning. I felt close to the people of these locations on the opposite side of the world from me as fireworks exploded in skies over Beijing and Tokyo at their midnights. This is because I visited Japan last summer on a Fulbright Teacher Award scholarship and had been to China for an astronomy conference two years earlier. But I felt a deeper kinship with people of every country as I watched successive groups welcome the New Year sunrise.

As planetarium educators, we need to be in touch with this basic human response to the rising of the sun, as well as to other astronomical cycles. I believe that it is part of our mission to sensitively teach the astronomy of astronomical cycles to everyone. Myths are interesting and beautiful, but all people deserve to know how our planet moves within the universe and the wonders of the universe found all about us.

As the new century unfolds, I hope that planetariums worldwide, large and small, continue to expand their positive influence in educating people about astronomy and related subjects. To this end I hope that IPS Council and individual IPS members will keep reaching out to introduce new individuals and country organizations, large and small, to the IPS family.

Alan Friedman

As Comet Halley made its first appearance since the invention of the planetarium, Alan Friedman assumed the reins of the IPS family (85-86). Fresh from the Monterrey conference, Alan wrote:

This was our second meeting outside the United States, and it has helped to confirm the international flavor that increasingly characterizes our organization. At the same time, our regional affiliates remain vital and enormously active. It is a good time to be a member of the planetarium profession and IPS.

Still true today, I would wager. We have since held six meetings, three in the US, two in Europe, one in Asia; have added several new regional affiliates; and seen most of the regionals strong and active in serving their membership.

As the Tucson conference of his own term approached, Alan went on to evoke the real value of our conferences:

... a larger reason for meetings is to spend time with other planetarium people ... We need this community spirit for the days which follow when we will return to being isolated members of a numerically tiny, widely dispersed profession ... But for a few days, we are a real community.

Today, email and dome-l help bind us together, but there is no substitute for our gathering at IPS and affiliate conferences.

And perhaps, Alan writes today, it is this sense of community, this social sense, this shared experience, that still draws people to our domes as we bring the starry night inside:

Thirty years after the founding of IPS, and fifteen years after my term as President, planetariums are still with us. There didn't seem to me much question that planetariums would survive into the next millennium, at least in the early years of IPS. We were bristling with excitement over new instruments, dozens of new planetariums being built every year, and new educational strategies like participatory planetariums, interdisciplinary storytelling, and visitor response systems.

But the last few tenths of the 20th century brought an astonishing array of challenges to the planetarium as we knew it: personal computer-based home "planetariums," IMAX theaters, decreasing school budgets for "enrichment programs," and slackening support for new capital projects in most schools and museums.

Yet planetariums are still with us, and in most cases, are thriving. Here in New York City, we are eagerly awaiting our first visits to the new Hayden Planetarium, a $100 million plus project (that is not a misprint!). Starlabs continue to inflate on a daily basis throughout the region. The education department at the New York Hall of Science just finished our umpteenth Starlab teacher workshop, infecting another dozen teachers with the itch to get their students looking up at the stars. Over 2,000 teachers in the past fifteen years have learned to use Starlabs here.

Educational trends have come and gone at a steady rate. I've been through several cycles of "back to basics," "make more scientists," "scientists can't find jobs," "the computer/the Internet/self-directed learning/cooperative learning—is the answer," ad infinitum.

Fortunately for those of us who love planetariums, there are also constants, for schools and the general public alike: science continues to pose fascinating new questions, and continues to find even more fascinating new answers. It is still a thrill to look up at an all-encompassing sky, and take a measure of our relative standing in the universe. And people remain social animals: television and the Internet have yet to replace the movie theater or the stage, and PC-based planetarium programs, handy though they are, have not replaced the delight of that moment when the sun slowly sets in the western sky, Orion appears overhead, and we collectively gasp with delight.

Long live the planetarium and the planetarians.

53 and counting

And also this journal called *Planetarian*!

In his next-to-last message as president, Alan wrote a little line that may not have attracted much attention at the time:

John Mosley has accepted the position of Editor [of the Planetarian*].*

... which leads to the question, what is 52? The number of weeks in the year? Yes. The number of cards in a deck? Yes. The number of *Planetarian* issues John has edited? Yes! This one is now number 53, and counting. Some time ago, John passed the mark for editing over half the pages of this journal since Day One.

Thank you for your heroic and continuing efforts. We are all profoundly grateful.

An appeal from every president!

And besides this journal, and our other publications, and our conferences, and our member services, what is the value and purpose of IPS? Perhaps again Alan Friedman said it for us all:

The International Planetarium Society is a medium of communication ... this works only if our members have something they want to communicate and use IPS as their means to do so. IPS does not generate original ideas, questions, research, scripts, ... You, our individual and institutional members, do create these things. ... our society is exactly as worthwhile as its individual members make it. ... People join the society, travel around the world to attend its meetings, and read its publications because individual members are continuously volunteering their time to make and to keep the society worthwhile. The opportunity is open to each one of us to make IPS valuable.

Officers, committee members, the *Planetarian* team, and YOU, the individual member — it is each of us who can make IPS valuable or render it useless. It is the contributions of each of us taken together that can make IPS a vibrant organization that serves us all into the 21st century. But it depends on all of us working together. Don't ask, what can IPS do for me? Rather ask, what can I do for my fellow planetarians through IPS? Every bit of IPS work is done by a volunteer who somehow, despite a full-time job, makes the time to help. That was true in 1970, in 1980, in 1990, and now also in 2000.

You can help too, and now is the time! Write an article for the *Planetarian*. Suggest a project and then volunteer to help do it. Contact an officer or committee chair and offer to help. Lend your energy. Share your insight. Help us all work and grow together.

Von Del Chamberlain

Nearly a saros of years after the CAPE conference led to the founding of IPS, an insightful founding father took his turn at leading as Von Del Chamberlain entered a well-earned term as president (87-88). Toward the end of his term, Von Del could write, citing a succession of conference highlights and surely also thinking of a mature publication program:

IPS has certainly come of age as a professional organization. It has been fun to watch it do so.

The goals set forth in Paul Engle's inaugural message were being fulfilled. The organization had also become more international and had already selected a forthcoming conference site in Europe, the first outside North America.

Von Del was already suggesting further ways to expand the scope of IPS: to build on the internationalization efforts of his predecessors, to give more support to classroom planetarians, and to work more closely with research astronomers. The latter goal was soon realized with IPS support of *The Universe in the Classroom* newsletter produced by ASP and now distributed to all IPS members as a benefit of membership.

With eloquence, Von Del set forth our mission as planetarians in a voice at once prosaic:

In our theaters we translate the technical scientific information into the languages the crowds understand ... we bring the stars down to earth and into the minds of people to blend what has been learned about stars into the framework of human ideals.

and poetic:

Planetarians bring the voices of stars down to Earth to be heard and understood so that the elegant song of the stars may be known.

Can you hear the voice of the archaeoastronomer here? — the voice that's modern yet also attuned to the world of the ancient skywatcher who knew that:

... every time we look at [a star], a little bit of star enters us.

When we bring the sky to Earth and teach our science well, Von Del went on to argue, we help justify the existence of our planetariums: we educate our populace, we enrich their quality of life, and we may even attract visitors to our towns.

In his message today, he reminds us of our own role in the mission of our planetariums:

It is a pleasure to greet those involved in the work that I also spent most of my professional years doing. Actually, I have not yet left it. At present I am enjoying being a user of a planetarium, not needing to be concerned about administering it. Teaching part time at Utah Valley State College, located in Orem, Utah, I greet my students for every class under a 30-foot dome housing a Spitz projector.

Many years ago Armand Spitz told me something that has guided me since that

*time, **"The most important element of any planetarium," he said, "is the teacher."** I have thought about these words often over the years and I am more convinced of their truth now than ever before. What really counts, what has lasting value, what matters most of all is the changes that take place within the minds of those who visit planetariums.*

I recall the various issues that have been discussed at planetarium meetings—ISPE/IPS, GLPA, MAPS, GPPA, SWAP, PPA, PAC and others—issues such as: "how long will planetariums continue?" – "recorded vs. live presentations" – "education vs. entertainment." Now I do not think that these are really very important issues at all. They are important questions and concerns, but they are not the issues. I think that the grandeur of the cosmos assures that there will continue to be theaters of the sky. I think it is important that we continue to do the best professional work we can, using all the methods and technologies that will bring this about. I think that we should do highest quality audio-visual presentations to help make the beauty and significance of astronomy come alive for as many people as we can. I think planetariums can be and should be both theaters and classrooms. I think education should be entertaining as well as informative. I agree with Armand Spitz that the teacher is the most important tool in any planetarium facility. Teaching and learning are what the planetarium field is all about!

I admire what all of you continue to do and I value the fact that I have been one of your colleagues. There is nothing in nature that is more magnificent, more inspiring, more intellectually engaging than the night punctuated with stars. It has always been so and always will be. What an opportunity we have to inspire exploration of the beauty of the cosmos! What a privilege to be the most important tools in classrooms/theaters of the heavens!

Indeed!

Terence Murtagh

As IPS's second decade culminated, the Society prepared for its first conference in Europe and welcomed its first European president, Terence Murtagh (89-90). Described by his successor as a "roving ambassador for IPS," Terence traveled widely and his president's messages shared these visits with his readers: scenes from Amsterdam, Athens, and Tampere, among other sites, were a vivid part of his column. Terence energetically promoted more European involvement in IPS and was part of two Council meetings in Europe, at Armagh and Athens. A continuing pioneer in the use of video in our domes, Terence like Bill Peters before him used his president's column to critique planetarium work and practice with the hope of exhorting us all to examine what we do and do it better. After all, he wrote:

... we planetarians are very good at doing something about it.

Active we are and active we have to be. Terence has been active in developing video for use in planetariums and it's to video and the stars that his thoughts turn today:

Most visionaries don't get the future right and I'm sure my planetarium visions won't last beyond the first decade of the new century and millennium. But those ten years will be exciting enough for me.

I think the next ten years will see the most dramatic advances in all-dome presentations since the invention of the projection planetarium in the 1920s and the arrival of the electronic Digistar in the 1980s.

Many Planetaria will be able to benefit from new media to become all-dome theaters not restricted to astronomical presentations. This will provide new experiences for existing audiences and bring new audiences into the Planetarium environment.

The challenge for the domed theatre will be to provide audiences with the production values they expect from such high tech venues. Information provision can now be supplied in ways and at speed in formats so as to make many old planetarium show formats obsolete.

However the ability to experience, learn, and enjoy a domed theatre presentation as part of a group will be something no other medium can match.

No matter what other productions a planetarium or domed theater will present, they always will be able to make the heart skip a beat with that first spectacular view of the starry sky. A view of the heavens which in the real world which is quickly disappearing.

No matter how much I play with virtual reality skies, with laser projectors, and all dome LCD screens, my eyes will always be drawn upwards to the heavens and my heart will always belong to the stars.

I hope it will be the same for you and your future audiences for as long as the stars shine.

John Pogue

Those stars shone in Texan eyes as the gavel came Stateside again. It re-entered the hands of a school planetarian when John Pogue took office (91-92) after a decade of service on Council and nearly two decades as a planetarian. The election of an experienced school planetarian may have reflected that more of the world's planetariums are associated with schools than with any other type of parent institution.

The Texas teacher's voice sounded an alarm about declines in US science education and asked:

Do planetarians have a role in meeting these challenges? You bet! ... The responsibility falls on planetarians not only to educate but to stimulate the interest of planetarium visitors.

Education and inspiration – our dual challenge and responsibility whatever type of planetarium we're in, and whether in 1991 or 2001, when, as John noted for us all, the new millennium really begins. John also reminded us in a later message of the importance of our keeping good contacts with our local press to support accurate science reporting – of initiating news releases, of explaining points carefully to reporters, of being available as a source of accurate information.

John's term of office also showed us how vulnerable many school planetariums are to loss of support, whether due to administrative politics, to changes in district finances, to change of principals or superintendents, or to misunderstandings. In John's case, an unfortunate and cascading series of administrative decisions led to his re-assignment away from the planetarium in mid-term.

We in the professional societies, both IPS and the affiliates, must be ready to support our colleagues in distress. In some cases our appeals may be of no help. But in other cases, letters of support, when combined with effective local support from fellow teachers and the community, can help, as I've seen both in this office and earlier as GLPA president, and as my predecessors will surely cite as well.

Here, John reflects on the threats to his planetarium, the eventual outcome, and the positive lessons that can be drawn from those difficult circumstances:

It is a privilege to extend my congratulations to the International Planetarium Society upon the celebration of its thirtieth year. I am extremely honored to have been elected as a president of the society although, unfortunately, I probably served

one of the shortest-lived terms.

During my first year as IPS president and after 20 years as director of the Grand Prairie Schools Planetarium, the new superintendent determined that the facility, and position, were low priorities — an all too familiar scenario for many other school and college system planetariums over the years. I was reassigned to teach middle school math, the planetarium's operations were cut to one-half day, and a library aide (who was the wife of an assistant superintendent) was assigned to operate the planetarium. That same year I finished my thirtieth year of teaching and retired, but I was not able to preside over the biennial conference of the IPS. I am forever grateful to Bill Gutsch, then president-elect, who stepped in and chaired the conference.

A year later and after a state agency's month-long financial audit of the school district, citizens became aware of many questionable financial and operational activities of that administration (including two trips to New York City by the superintendent and board members and their spouses costing the district around $20,000 each). I and two other candidates aware of the district's administrative problems were elected to the school board. Within a year that superintendent sought employment elsewhere, the district made many operational changes during the next several years, and I am pleased to report that the planetarium is now back to full operation with a certified educator in charge.

I relate the above not to take personal credit, because one vote on a governmental board has no power alone, but to relish the fact that voting citizens, when aware of misuse of their tax money and the sacrifice of their children's educational opportunities to wasteful purposes, can make a difference. Happily, there have been other such resurrections of dormant planetariums.

Planetariums will continue to be enjoyable facilitators of public information because of the dedication and efforts of people like you, the members of the International Planetarium Society. I wish all of you success in your endeavors to promote your planetarium facilities and in educating your public about the wonders of the world and universe around them.

Bill Gutsch

Our twelfth president was once asked how he was able to put so many ideas into practice, and replied "by getting off my butt and doing something about it." Bill Gutsch (93-94) brought that energy to his service in IPS high office and especially promoted cooperation with related societies and the internationalization of our own. IPS gained four new affiliates during his term (Japan, Germany, Russia, and Ukraine) in addition to one (Italy) the prior year when he was Acting President. Bill also played an active part in planning the 1996 Osaka conference that would follow his term of office. His messages also report new cooperation with STScI to establish the IPS slide service, with AAS in taking steps to establish a speakers bureau, and with ASP in co-sponsoring a symposium on Astronomy Education (at ASP's 1995 Maryland meeting).

Like other presidents before and since, Bill called on members to take an active role in their Society:

> *... the strength of value of IPS rests in us. ... I believe Tom Clarke put it best when he said that, above all, IPS is a "marketplace of ideas."*

... a marketplace filled with ideas shared by each of us as we present at conferences, contribute to publications, and serve this society of our peers.

In his final message as president, Bill wrote that:

> *It has been the greatest honor of my career to have served as your President and worked for such a wonderful group of caring people.*

So would we all say, all who have had the privilege of service in this office and of writing in this column over the years and again today.

If you've persevered this far, you'll appreciate that Bill now begins:

> *Since you have to plow through all these other messages from IPS Past Presidents, I thought I would make my remarks mercifully brief.*
>
> *IPS indeed has come a long way in its 30 years. I congratulate the organization and all of you who have helped it survive, grow and flourish. As someone who has served somewhat more than a single term as President, continues as a Committee Chair, has been to lots of conferences and given lots of papers, I'm proud and happy to have done my part. Hopefully, we're a little stronger and a little more international as a result. It's a sincere honor and privilege to have served and still be serving. With technological changes coming almost daily to our medium, this next decade is certainly slated to be the most exciting and rewarding yet and, through consulting, writing and producing around the world, I'm excited to continue to be part of it. The journeys we and our audiences will soon be taking "under the dome" truly will be mind boggling.*
>
> *Some final advice, (in addition to my 10 Commandments listed elsewhere in this issue) — work hard, moonlight, max out those deductions, 403(B)s, IRAs, and SEP IRA's (or equivalent), buy low, sell high, invest for the long term, always listen to Uncle Lou and Abby Joseph Cohen, and send me a post card from as far away as you can get.*

Jim Manning

And the next president's post cards came from remote Montana as Jim Manning assumed the leader's mantle (95-96). While minding the issues with consummate care, Jim's messages were a testimony to the impact and the magic of what we do. They took us to the many places of our profession, to the domes that open:

> *... there it was: the 200-inch telescope — all girders and glass and history ...*

and to those that don't:

> *Planetariums have never been more numerous, more accessible, or better able to serve the function that Palomar ... did for some of us: to inspire, to spark an interest, to engage the imagination.*

to eclipses in Bolivia:

> *... the most vivid [images] of all ... the streaming corona of the eclipsed sun, and a simple cairn of stones in the middle of a desolate plain.*

and Thailand:

> *... those Thai kids had an enlightened opportunity to witness the workings of the universe first-hand, for their teachers knew that sometimes the best education is experienced rather than taught.*

to lecture halls with Dan Goldin:

> *... there are lots of rewarding moments ... whether it's the head of NASA offering a compliment or the sudden bright look on a little girl's face that tells you she understands.*

and Stephen Hawking:

this man did something I've never seen done before: hold 9,000 people in quiet attention while he explained the finer points of cosmological theory that had nothing to do with their daily lives. ... Professor Hawking reminds us that if we're going to reach an age of general scientific enlightenment, we're all going to have to get there together: the scientist, the planetarian, and the ordinary person who wonders if we are talking science or magic.

And thus the "why" of our mission as planetarians:

So why do we do what we do? I think it's for love. For the intangible rewards that come from enlightening others. For the satisfaction we get from puttering about in the universe in a way we enjoy. Because we really can make a difference ... We keep the cosmic link; we temper the absolute truths of the universe with the warmth of human perspective ... and it matters.

As do the matters of our business, and there too, much was done during Jim's term at the helm: the first IPS conference in Asia, reported in his messages before and after the meeting, the first distribution of Hubble and JPL slides, the creation of the IPS web site, the first steps toward Astronomy Link, an active publication effort, fine-tuning of our governing documents, and eight more manningesque columns of "What's New."

Then as the year called 2000 dawned, *'Tis the Season*'s author wrote anew, with wonder:

As I write these words, the calendar reads January 6, the Feast of the Epiphany – the commemoration in the Western Christian Church of the visit of the Magi as the first manifestation of Christ to the Gentiles. But today, with the year as fresh and new upon us as the morning sun shining on new mountain snow above my valley home, I'm thinking of the broader meaning of the term.

We all have epiphanies in our lives, times when the essential nature or meaning of something is suddenly made manifest to us, and our lives are changed. My own astronomical epiphany came early, as a child, with my earliest recollections of looking up into the night sky and realizing that here was Something Wonderful. Since I lived in a region with few astronomical resources and no planetariums within reach, my planetarium epiphany came somewhat later; it wasn't until college that I sat in the darkness of the Buckstaff Planetarium at the University of Wisconsin in Oshkosh watching a Spitz A3P create the universe on a dome and realized that here was Something Wonderful, too. It seems a marvelous coincidence to me now that at almost the very same time, the International Planetarium Society (then the International Society of Planetarium Educators) was being born.

We could all tell similar tales of our planetarium beginnings, and today, 30 years removed from these experiences, I realize – in another sort of epiphany – that I have become what others were for me in those long-ago years. I have become a catalyst with the potential to reveal the essential nature and meaning of the universe to the fresh, young minds of future scientists and teachers, to future stargazers, who, whatever they do, will do it with lives enriched by knowledge and appreciation of the universe in which they abide. And so, my friends, have you.

In this 30th year of IPS, it is important to remember the words of Henry Brooks Adams: "A teacher's effect is eternal; he can never tell where his influence stops." We are all teachers, we are all potential catalysts for epiphanies in others. May we use these important gifts wisely and well. And, with the year still fresh and new and all things possible, may they lead to Something Wonderful in our lives!

For, as Jim wrote in closing his final president's message:

... you belong to that strange and wonderful race called Planetarians ... it means "People of the Stars."

Thomas Kraupe

One of Europe's stars rose to the stage as Thomas Kraupe became "1st officer" of IPS (97-98). Thomas led with style and energy and a *joie-de-vivre*. While he drew on his great experience with cutting-edge technology, Thomas always saw our work in very human terms both past:

The ceremonial sites of ancient Mexico really get your mind set for the magical side of astronomy and our civilization ... I think ethnoastronomy is a great subject for us planetarians ... it allows us to relate the real sky to real people and show that astronomy is a relevant part of our culture ... I think that we as planetarians should have a special interest to connect current events to historical and cultural backgrounds.

and present:

The key to our success will indeed be our ability to incorporate and transport along with the content the emotional, the human touch of science and discovery: making people feel joy, excitement, and fun.

and not only for our audiences, but also for ourselves, even as so much of our communication is shifting to electronic media:

Even our new tools of telecommunications cannot replace the valuable personal contacts and friendships you make at [meetings] ... Let us celebrate with joy, share, and learn from each other.

And he expressed what every IPS officer and president has felt:

We want to make IPS better – but can do so only with your help and support.

Plain, basic words perhaps, but they go to the heart of the matter – we can only do better by working together – and they describe the results of Thomas' term: the website redesigned as a creative tool for our future communication, the second IPS conference held in Europe (with delegates from a record 29 countries), a new edition of the *Directory* and a first edition of the *Resource Directory* published, a worldwide planetarium survey conducted, the script contest reactivated, the membership brochure translated, the laser and technology committees activated, and work begun on the first IPS video.

Today, exuding that same verve and excitement, Thomas looks toward the planetarium of the future:

Greetings from Europe on the occasion of the 30th anniversary of IPS! It is with great pleasure and joy that I join this "birthday chorus" of former presidents of IPS. Our "dynasty" – and the history of IPS now spans one orbital period of Saturn, the "Bringer of Old Age" (a footnote: folks, have fun and figure out approximately how many "planetarium-projector years" we could celebrate by now – I mean the total number of rotations of the sun-projectors in all planetariums around the globe...adding up all motions in all starshows in 30 or even in 75 years–and you could also add to that quite some Digistar years I guess ...).

As I write these few lines, I am on a business trip in Madrid, Spain. Although being busy with leisure industry meetings, I will certainly also visit the Planetario de Madrid – maybe my most favourite planetarium, since it offers unique shows and a great example of what can be achieved

when you bring together technology and talent. That inspires me even more to throw some "brain snacks" at you as we IPS members get "old" and "wise" – and move forward towards a new millennium. We are in the middle of a revolution in the field of immersive theaters, which include planetariums – and I think it will happen much faster than we currently think – immersive theaters are going digital, and in the near future, we no longer will have the typical mix of media in our planetariums. This already has some major consequences for our profession. The privilege for astronomers in immersive theaters is gone – astronomers are no longer the only scientists who have their own theater: more and more locations will see digital all-dome systems, immersive shows focusing on geology, chemistry, biology, physics – or any other science may be produced. Especially planetariums in science museums will experience this as a challenge for their future – they may be replaced by such immersive science theaters, which might be run by a biologist or any other scientist along with a team of multimedia specialists. Astronomy certainly might be a vital part of the content presented, but the word "planetarium" for such theaters might not be correct.

I would be worried if we feel offended by these developments and reject using these technologies – it would remind me of the priests who refused to look through Galileo's telescope to see the satellites of Jupiter. Certainly the stars are beautiful, but just look at Hubble images .... using current and future immersive technologies we can relate the story of the whole universe to the story of us and for the first time show the real splendor of this amazing and active cosmos we are part of.

Let us not just concentrate on making our shows successful in the eyes of our colleagues, but rather let us think about our audiences and their senses. Certainly we have to discuss also what our measures of success are – just visitor numbers and economy or just the other extreme of shows that will not find their audiences, but which we regard as excellent .... Let us reinvent the planetarium as theaters which enable whole groups of people to share the same sensations and compare their experiences. Let us discuss how we can learn and teach narrative style to ensure a feeling of continuity of space and time for our visitors. The aesthetics and artistic flow of visuals in an immersive environment is not as simple as some folks think. We face here challenges similar to those encountered by the creators of IMAX-movies and High-Def TV productions, but we rarely have a dialog going between us.

Let us go beyond the fences of pure education or entertainment! I do hope we will benefit a lot from joining discussions with the Leisure Industry – as a complement to joint meetings with museums and teachers (remember, most of us are dealing with visitors whom we want to spend an hour of their leisure time at our planetariums ....). Let us continue to create various means of communication and exchange between IPS and other organisations and the industry. Let us work together for a renewed sense and sensibility of our immersive planetarium environment – Let us open our eyes, ears and hearts – let us talk, listen, share, and learn – for the benefit of future explorers.

IPS has evolved into a global network, a forum well suited to host and even orchestrate these debates by offering you the appropriate venues to speak up and exchange your experiences. My hopes are high – as are my expectations for the next few years, because IPS is in very good hands. Current President Dale Smith is doing a great job in all areas.

Join me in supporting his mission. Fellow planetarians, let me raise a glass of Weissbier towards IPS and its members. Happy Birthday, IPS – towards a re-birth of the planetarium idea for the upcoming new millennium. May IPS continue to be the family of those who boldly go where no one has gone before ....

And from the current president

In 1970, another starry-eyed graduate went boldly forth from Colgate University. Quite unaware that a society soon to be called IPS had been founded in that very same year, this aspiring astronomer moved into graduate school, unaware as well that he would have the privilege of serving that society at the cusp of a millennium change 30 years later.

When my college class convened for its 25th reunion in 1995, some of us were asked to write a perspective on changes in our field in the quarter-century since our graduation. That silver reunion essay, now revised and extended, forms the basis for this section which reflects on where we've come in these past 30 years – gains and losses, dangers and hopes, challenges and opportunities.

Advances in astronomy since 1970

We have discovered the solar system in the last thirty years. We are in danger of losing the whole Universe.

In 1970, we knew the planets as distant worlds only grudgingly revealing themselves to telescopes. We knew that Venus was veiled with clouds, but didn't know what the clouds were made of or even whether the surface was hot or cool. We had a few pictures of craters on Mars sent back by early spacecraft. We had only fuzzy pictures of cloud bands on Jupiter and Saturn. Uranus, Neptune, and Mercury were dots of light in a telescope. Of Pluto, we knew next to nothing, its size and mass mere guesses.

Then the veil was lifted. We sent forth an armada of robots to see the planets aright. Magellan, Mariner, Pioneer, Venera, Viking, and Voyager – brave names and bold missions. Streams of data and scores of photos flew home. Radar from the circumnavigating Magellan pierced the battery acid clouds of Venus to reveal a world of exotic volcanoes and cliff-scarred continents too hot for oceans to wash. Venera's cameras returned still-incredible images of the rocky surface. Vikings sped away to Mars. They coursed over colossal volcanoes, craters, canyons, and ice caps, and they landed to eat the dusty soil in search of life, but found they were alone. Surveyor and Pathfinder rolled in later to whet our appetites with images of a once-wet Mars. Pioneers and Voyagers and Galileo rode the gravity lines to Jupiter and beyond. Roiling bands of clouds and storms the size of Earth posed for the distant cameras and a score of moons become worlds in their own right. The scorching craters punched into little Mercury were seen close-up and named. And Pluto, now revealed as captain of the Kuiper belt, yielded up a moon that gave away its mass. All since 1970.

In 1970, we were in the midst of landing men on the Moon. Out of the cradle for the first time. And in our lives, perhaps the only time. Neil Armstrong took the first step the year before IPS was founded. Two years later, Harrison Schmitt, the only geologist among eleven test pilots, took a next-to-last step. Today, the six Apollo landers gather lunar dust, awaiting, perhaps, a rebirth some day as a remote world park. From the lunar rocks brought back, we gleaned the likely origin of the Moon – reassembled from a spray of rock wrenched away from the primeval Earth by the suicidal interloper Orpheus. Today, the last of the great Saturn V rockets lies prone on the ground at Cape Canaveral, its engines silent, consigned to life as a museum piece. Today, we can no longer launch men to the Moon or even a Voyager direct to Jupiter. The Galileo mission had, for the lack of an adequate rocket, to be launched inward toward Venus to pick up the requisite speed to climb out to Jupiter.

Around 1420, Prince Henry the Navigator

of Portugal set his sights to the south. He set his seamen feeling their way down the west coast of Africa, launching an effort that would cost as much as the Apollo program in terms of percent of GNP. By his death in 1460, his men had barely rounded Cape Verde. Only in 1487 did Bartholomeu Dias reach around the Cape of Good Hope, and open the door to India. You can see monuments to him today near the Cape. It had taken seventy years of perseverance. In 1497, a decade later, Vasco Da Gama completed the journey to India, and tiny Portugal became a world power. We went to the Moon in a decade, landed as a billion people watched, opened the door, and stopped.

In the early 1970s, I was fortunate enough to use the great 200-inch (5.2 m) telescope atop Mt. Palomar for my dissertation research. Opened in 1948, it was still the world's largest working telescope nearly three decades later. Then a classmate went into optical design and later described to me a telescope project he was involved with. The Multiple Mirror Telescope would bring the light from six separate mirrors, each two yards (2 m) across, to a single focus. I never believed it would work. In the mid-80s, I was using it, and yes, it worked. Today the Keck bares light-collecting surfaces ten meters across: they are a honeycomb of thirty-six separate mirrors, each polished to a millionth of an inch and orchestrated to act as one. Even bigger telescopes are in the offing. The OWL, if built, will have a 100-meter eye!

The computer technology to control these multiple mirrors did not exist thirty years ago. Today it seems routine. The mainframe computer on which I did the number-crunching for my dissertation? The word-processor on which I'm typing this essay uses more memory than that mainframe had, and it occupies only a small fraction of my desk-top computer. The laptop you carry on a plane has more memory than that big mainframe had in the late 70s.

By the end of the Hubble Space Telescope's projected lifetime a decade from now, we can expect to have telescopes *on the ground*, which can match or surpass the resolution which the Hubble alone still enjoys today. With adaptive optics reshaping a correcting mirror a hundred times a second, these telescopes still the Earth's atmosphere, and they can be built much bigger than Hubble at a fraction of the cost.

With the Hubble and soon with its successors, wherever they are, we are unveiling the universe in richer detail than we could have imagined a generation ago. We have seen the incredible turbulence of star formation, we have unmasked the chaos of mass loss as stars evolve, we have seen fragments of galaxies in birth at the edge of time. We've found the exotic corpses of stars — pulsars and black holes. We have opened our eyes across the spectrum; COBE has decoded creation's fingerprint, the cosmic background. We have honed in on the other Hubble, the Constant, and we think we may know the age of the Universe, give or take an aeon or two. We see these images on the TV news and we retrieve them from the Internet and world wide web. The computer center in which I did my senior project was barely built when IPS was born.

Since 1970, we have discovered planets around other stars — lots of them — and we

have discovered that we cannot see most of the universe. Thirty years ago we thought that stars made up most of the universe – stars spaced with some interstellar gas between them and assembled into those great collections we call the galaxies. Whatever the details, the universe was made up mostly of stars whose arrangement and inner workings we were figuring out. Then came the shock – there is the dark matter – and the stars we can see make up only a tenth of the Universe. When we watch how these stars move, we can feel the gravity of all that mass we cannot see. Nine-tenths of the universe is dark, we learned, and despite all the work since, we are still at a loss to know what this dark matter is. We are in a room with a hundred people, but we can see only ten of them: ninety are still invisible though surely there and made of we know not what. For all we know, it could be oobleck. But in 1970, we didn't even know the other ninety were there at all.

The risk of losing the sky

We are in danger of making the universe invisible in another way as well, as we pollute our skies with light. Astronomers flee to remote, dark mountaintops to escape the urban sprawl and build their telescopes. But even here the light pollution creeps. The great telescope atop Mt. Palomar has lost half its ability to see in just one generation as the bright skies of southern California creep up the mountain slopes like a plague. The electromagnetic chatter of human commerce threatens to drown out the faint signals that radio astronomers strive to glean from distant stars and galaxies.

But it is not only the research astronomers who lose. It is all of us – how well we know. If you live in a city, perhaps you cannot see the night sky at all. Or if you can, it is only vestige of what my grandfather, a farmer, saw. I live in a small city of barely 25,000 set among the farm fields of northwest Ohio, and we can see at best a third of the stars my classmates and I could see in 1970 from the Colgate Observatory grounds near the president's house. We planetarians are alarmed at the prospect of our theatres becoming zoos – the only places where you can see a truly dark sky. When we can no longer see the sky for ourselves, we will have lost our roots.

It would be a sad irony if we were to lose the sky in the same generation in which we are discovering the role the sky played in the world-views of our forebears – discoveries spearheaded in so many ways since 1970 by the pioneering work of my undergraduate mentor, astronomer-anthropologist Anthony Aveni. To the first peoples of the Americas, to the Maya and Inca, to the ancient cultures of Africa, to the Neolithic builders of Stonehenge, to the tropical navigators of the Pacific, the sky was a dark tapestry alive with those lights you and I call the stars, planets, Moon, and Sun. The ancients knew the splendor of the sky and the dance of its intricate cycles. The sky was a calendar to them, the sky filled their rich mythology, and the sky inspired their architects to align buildings and streets with key celestial directions. Have we not all taught this? The Maya turned building after building to face the setting of Venus. Today not one person in a hundred will even notice Venus, the brightest planet, when it domi-

nates the evening sky. Recently, after Venus had dominated the evening sky for three months, when I asked a college class and a school class who among them had seen it, of over 120 people, not a single hand went up. We not only ignore it, we have even tried to shoot it down: the Luxor Hotel in Las Vegas once aimed a 40-billion-candlepower shaft of light to illuminate the sky; with it, you could read a newspaper while floating at fifty thousand feet (15 km). Sacrilege, a Maya priest would weep.

Challenges and opportunities in astronomy education

But we are losing the universe in an even more insidious way. From the heady heydays of 1970 when we were sending men to the Moon, we have, at least in my home nation, begun a seeming estrangement from science. The Apollo program was one requiring an expensive initial investment followed by comparatively inexpensive subsequent flights. Yet once the initial investment had been made, the program was cancelled before the full scientific rewards could be reaped at a cost of only a few percent of the initial outlay. If we believed that we went to the Moon for science, we were living with an illusion. The science was a hitchhiker.

Physics was also a hitchhiker during the cold war. It had practical value because it had obvious applications to national defense of the superpowers. Now with the end of the cold war, funding for physics has diminished, and the physics community is facing a time of readjustment. It is an adjustment that astronomers can well understand. We have always been in a science in which the knowledge is acquired for its own sake, for the pleasure it brings to the discoverer, and for the insight and understanding it brings to the interested public and other scholars who learn from it.

We know that understanding the content of science can be a challenge to the lay person. The science of professional journals is cloaked in a complex web of precise technical jargon and the language of mathematics. To most people, including most college graduates, these are foreign languages they do not speak. We and other science educators can translate the jargon and communicate the content in more colloquial, friendly terms. We can convey information, and thereby provide the opportunity for our audiences and students to obtain knowledge and even some understanding as well. But to gather either information or understanding, the recipient must bring proper learning skills. Today, these skills are often absent.

Despite the explosive growth of modern communication, many listeners do not absorb even basic scientific information. In that recent informal poll of graduates and faculty taken at a Harvard commencement that we've seen in *A Private Universe*, only two of twenty-three could explain why we have seasons, and in polls of other populations, many of those asked could not correctly identify that the Earth goes around the Sun. It is the tip of an iceberg of ignorance that descends far deeper. If I think the Sun orbits the Earth, why should I support the extravagance of a mission to another planet? Or could I understand seemingly unrelated appeals to retain even limited national support for cultural broadcasting and for the arts?

Only if basic information is in hand does one have any chance of moving on to knowledge and understanding in the sciences. To make that move, one must also possess a basic level of numeracy and analytic reasoning and have the patience to internalize ideas. These skills are absent from the repertoire of an alarming number of students today, if the populations I see in large classes at a midstream state university are any guide and if they bear out the results of surveys taken over larger samples of students. My colleagues and I see many students today who are unable to read graphs or do even simple math and who seem unable to follow a chain of analytical reasoning. My older colleagues tell me it's worse now than in the past. If you live in another country than I do, you may be saying the same applies in your homeland too, though I hope not.

If these basic skills are absent, then access to the world of understanding beyond mere information is closed. Grasping the elegance and beauty of science and the conceptual splendor of the natural world is made impossible, or at least much more difficult. Science becomes an alien world disguised as a morass of facts, largely incomprehensible facts whose primary value may be seen to lie only in whatever technical application they might have. To a scientist whose primary work is now in science education, these are tragic shortcomings.

Our last US President quipped in the early 1990s that he did not understand his science courses at Yale, then proclaimed a program to make American students number one in the world in math and science by the year 2000. I didn't know whether to laugh or cry. The challenge is much greater than he could have imagined. Surveys show that US students' science competence is alarmingly low. General science literacy seems to shrink from our grasp despite the wealth of discovery and the abundance of means for sharing that wealth. I fear that many scientists do not realize how far removed their world is from the world of the general population. Certainly I did not, either as an undergraduate or graduate student. Now with almost daily contact with general public audiences and with mass market college classes, it has become very clear to me, though many of my students would claim I still don't understand it.

The promise of planetaria

So what does all this have to do with planetariums and with IPS? Well, planetariums serve perhaps 40 million people a year in shows and classes. Over the past 30 years, that's about a *billion* "fannies in the seats," to borrow Bill Gutsch's phrase. That's about 30% of the 1970 global population. So we are no small part of the world's science education team.

We've brought a great army of creative minds to the battle for astronomy education: look around this issue of *Planetarian* or any other issue since Volume 1-Number 1 for the insights and debates.

Our arsenal of tools is much changed since issue 1-1. Since 1970 we've seen mechanical starfields improve until they almost rival the real one, we've seen the dawn of Digistar and the proliferation of the portables. We've seen the advent of automation systems and their growing sophistication, we've seen the invention of video, immersive video, and real-time immersive video, of lasers, of laser disks, of digital video disks, of digital sound, and of software to create, manipulate, animate, and run it all. We have this army of tools at our disposal for science education that we could only have dreamed of, if that, in 1970. We bring these tools to bear in our multimedia shows, in our startalks, in our participatory lessons, and in all the ways we work.

Our Society has changed too. IPS has grown from a primarily US to a North American to a trans-Atlantic to a global organization. The original 7 affiliates have grown to 19; primary affiliate languages have grown to include at least 7 besides English. But as we've become more global, our means of communicating have helped us, I hope, draw closer together. Phone and postal mail have been joined by fax, email, and the web.

At the same time, other strengths have held remarkably constant. We have convened 14 biennial conferences, each cited by those attending as outstanding. We have regularly published our journal with a talented succession of editors and contributors. We have assembled directories and produced special publications. We have been guided by a remarkable series of presidents whose words old and new appear in this message. We have been served by an army of officers and committees. Somehow, we have kept to our credo as a volunteer organization and have remained a home for all sizes of plane-

tariums. We have kept our focus as astronomy educators even while we've kept up a lively and creative debate over all the diverse ways to try to be good planetarians.

And therein lies the key to our future. If we can frame our debates in our context as astronomy and science educators, then we can hold faithful to our role as players in the battle for science literacy on our planet in the 21st century. I do not know if this battle will be won. But the efforts being mounted in my homeland and in much of the world are substantial. New national science education standards have just been developed in the US and UK. Many US federally funded research grants now require an education component. Societies of research scientists are paying more attention to education in their fields.

We in planetariums see the excitement in the faces of our elementary school visitors and hope the excitement can be maintained as these children grow. We hear good questions from our public audiences; the question times in my own public shows routinely elicit thoughtful questions. I am awed by the talent and dedication of so many of my colleagues at all windows of the educational spectrum. New, more interactive teaching strategies abound. We have incredible technology to help us in our work.

Yet the challenges to general science education are formidable and perhaps growing: the literate and numerate skills required, the patience required, the confusion of video information with internalized understanding, the compartmentalization that besets many academic institutions, the fear that science tramples on matters of faith.

After one recent class in which I'd described us chemically as stardust — our atoms were made in the stars, I'd explained — one student inquired if I were atheist or agnostic. I am neither, but the question was intriguing to me because 30 years ago, the younger me would probably have posed the same question. We have all learned, some slowly, what science is.

In mid-century, the English novelist-scientist C. P. Snow penned a little book called *The Two Cultures* in which he decried the gulf between the sciences and the humanities. Members of my class were in fifth grade the year he wrote it, but the words still ring true and much work yet remains to bridge that gulf. But the tradition of the liberal arts sees all the world in an interdisciplinary context. The physical sciences, the social sciences, the humanities, the arts, and the everyday world should be inextricably linked. The sciences and the other elements of our culture shape each other. As the tools of science to investigate the physical world grow sharper, we are challenged to maintain the scientific literacy to use those tools wisely and to integrate the understanding of the physical world in the broad context of human knowledge and endeavor. The risks if we fail and rewards if we succeed are great, perhaps even more than they were when IPS was founded thirty years ago, and the outcome is as uncertain now as it was then.

Yet our field exudes an elegance and excitement that we strive to share. If we can bring the stars to Earth in a human way, we will have done our work well, and the promise of the planetarium will indeed be a vital part of the 21st century.

Business bits

Whew! Enough with ephemeral efforts to effect ethereal and elegant expression. Enter the elevator to Earth, and ask: just what are we doing this quarter, millennial cusp or not, to help fulfill that promise of the planetarium? Here is a brief account of the business at hand.

New dues structure. Effective January 1, IPS dues were raised for the first time since 1992. During the past eight years, IPS has absorbed steadily rising costs of operating and providing member services such as the *Planetarian* and directories. At its London meeting in 1998, Council reluctantly voted to increase dues effective with the year 2000. For individual members, the new dues are $50 for one year or $90 for two years; for institutional members, the new dues are $200 for the first year and $100 for subsequent years. Relative to the US consumer price index, IPS dues are one-third cheaper now than they were in 1975. We appreciate the understanding and loyalty of the membership. As always, the services of the Officers, Committees, *Planetarian* Executive and Associate Editors, and all other volunteers are provided without salary.

For your IPS dues, you receive many benefits:

- 4 issues a year of the journal *Planetarian*
- the *IPS Directory of the World's Planetariums*
- the *IPS Resource Directory*
- occasional special publications
- low subscription rates to the new IPS slide service
- low prices on IPS videodisks
- access to Astronomy Link
- notices of the biennial IPS conference
- access to all resources on the IPS web site, including members-only pages soon to be created
- best of all, being part of a global community of dedicated planetarians like yourself!

Election of Officers. Later this year, we will be electing IPS officers for the term 2001-2002. The officers who are elected will play a critical role in leading IPS in the coming years. During 2001-2002, Martin Ratcliffe (who is currently serving as president-elect) will move up to become President, and I will move on to Past-President.

The officers to be elected include President-Elect, Executive Secretary, and Treasurer/Membership Chair. The winner for President-Elect will then serve as President during 2003-2004 and as Past-President during 2005-2006, and thus serve as an officer for six years.

A call for nominations from Elections Committee appears elsewhere in this issue. This is your chance to help shape the future of IPS, so please consider it with care. If you wish to nominate someone as a possible candidate for an office, you can submit the name to any member of the Elections Committee. The Elections Committee is seeking the best possible candidates for IPS office, and you can help them with a thoughtful nomination.

IPS slide service. The first period of the centralized, direct IPS slide service began in January and will run until the value of the subscription price has been delivered. Then we will send out renewal notices in preparation for the beginning of the second service period. If you're a current subscriber, you'll be able to renew. Or even if you're not a current subscriber, you'll still be able to sign up for the second service period.

IPS video service. The first IPS laserdisk is now available. This 72-minute, 2-sided NTSC disk is filled with more than 30 superb video sequences released by ESA. Further information and a subscription form are available on the IPS web site at <www.ips-planetarium.org/ips-videos.html> or by contacting the IPS Treasurer. The subscription form was also printed in the December issue of the *Planetarian*.

Mars Millennium Project. If you are participating in the Mars Millennium Project contest sponsored by IPS, remember that the due date for submitting entries is March 25, 2000 (the date that Mars crosses its ascending node). Mail completed entries to the contest chair, Dr. Jeanne Bishop, at Westlake Schools Planetarium, 24525 Hilliard Rd., Westlake, Ohio 44145 USA. Prizes will be awarded at the Montréal conference.

Council Meeting. The IPS Council held its 1999 meeting at the historic Lowell Observatory in Flagstaff, Arizona, USA on

October 17 & 18. The complete Minutes appear elsewhere in this issue of the *Planetarian*. Council made several important decisions, and in the paragraphs below I will note some of the highlights.

New regional affiliate. Council voted to accept the application of the Australasian Planetarium Society to affiliate with IPS. We welcome the 19th regional affiliate and the first in the Southern Hemisphere. This affiliate covers Australia, New Zealand, and the island nations of the South Pacific.

Modified time line for conference proposals. After careful consideration, Council voted to shorten the time scale to receive and vote on proposals to host an IPS conference. Effective with planning for the 2004 conference, proposals will now be due at the time of the Council meeting *four* years before the intended conference and will be voted on at the Council meeting *three* years before the intended conference. This time scale (4/3) is a reduction of one year from the previous time scale (5/4) in which proposals were due five years ahead and were voted on four years ahead.

One benefit of the new plan is that proposals are now due at a Conference-year Council meeting, and thus the prospective hosts can make presentations about their conference proposal to the IPS membership at the general business meeting, and members can give more informed feedback to their affiliate representatives regarding the choice among the possible conference sites. The vote to select the conference site will take place one year later at the off-year Council meeting.

2004 conference proposals. The modified time line for proposals has the effect of extending the deadline for accepting proposals to host the 2004 IPS conference by one year, and thus such proposals will be accepted until the time of the 2000 Council meeting in Montreal. If you interested in submitting a proposal to host in 2004 and have not already done so, please contact me at once to receive a copy of guidelines for preparing a proposal to host.

Conference proceedings. Upon recommendation of the officers, Council voted to institute Proceedings available to all IPS members as a standard feature of our conferences, effective with the 2000 conference in Montréal. Prior to now, proceedings have been produced by some conferences but not by others. The Proceedings will contain texts of all contributed papers and summaries of panel discussions and workshops. Proceedings provide a valuable record of a conference, especially for those members who were unable to attend.

Current directories. Preparation of the 1999/2000 *Directory of the World's Planetariums* is moving along well as I write this in mid-January. By the time you read this in March, the Directory will definitely have gone to press and you may already have received it. The 2000 edition of the *IPS Resource Directory* will be produced later this year as well.

Future directories. Following completion of the current directory cycle, we plan to make two major advances with the directories. One, we expect to combine them into a single publication with two sections corresponding to the existing two directories; this is analogous to a telephone directory that contains white pages and yellow pages sections. Second, we expect to switch from print to electronic as the primary medium of issue, though printed copies will definitely be available for those members who prefer or require them.

Asian repository authorized. An Asian repository of IPS publications will be set up at the Osaka Science Center. Contact information will be provided at a later date once the repository has been established. This will be the third IPS repository from which back publications may be ordered. The other two are at Strasenburgh Planetarium in the US and at the Artis Planetarium in the Netherlands.

Fellow criteria revised. The criteria for nomination to be a Fellow of IPS were revised with an increased emphasis on contributions to IPS and the planetarium profession. The revised criteria are detailed in the Minutes.

Publications and guidelines in preparation. Work is moving along on a variety of publications and documents. Some are publications that will be available for distribution to members; others are essential guidelines for IPS operations.

1. *revised guidelines for hosting an IPS conference and for submitting a proposal to host an IPS conference.* Thanks to Gary Tomlinson for undertaking this major task in consultation with the officers and recent conference hosts.
2. *creation of job descriptions for IPS officers.* Steve Mitch, John Dickenson, and I have worked on this document which will give prospective candidates for an IPS office information about the duties and responsibilities associated with the office.
3. *career guide for planetarians.* David Menke <FamAstro@aol.com>has begun work on this guide on preparing for a career in the planetarium profession.
4. *portable planetarium user's handbook.* Susan Reynolds Button <sreynold@cnyric.org> is collecting and editing material for this handbook, which will be an enhanced, and internationalized version of one she originally produced for GLPA. Please contact Susan if you can contribute.
5. *revision of "So You Want to Build a Planetarium" booklet* to include text as well as guiding questions. Ken Wilson <kwilson@smv.org> is leading the effort on this valuable booklet. The success of this endeavor depends on having enough volunteers to do the work. If you have recent experience in building or renovating a planetarium and/or can contribute material, please contact Ken.

Web site enhancements. Several efforts are in progress or planning for enhancing the IPS web site. I've listed some here and will include more in my June message when they are a bit farther along.

1. *list of educational web sites.* Thanks to Jon Elvert <jelvert@lane.k12.or.us> for assembling this list and to those who have sent him additional sites. Please keep sending him sites so we make this a robust and really useful resource.
2. *IPS job roster.* Thanks to Steve Fentress for managing this page. If you have a job opening to announce, please send it to Steve at <IPSjobs@rmsc.org>.
3. *"News and Views": abstracts of and links to newspaper articles and press releases written by planetarians.* Sharon Shanks <slshanks@cc.ysu.edu> is leading this new project whose page on the IPS web site will feature links to and abstracts of newspaper materials (columns, articles, press releases) written by planetarians. This page is under design by Tom Callen as I write, and should be up by March. Check it out, especially if you write a regular column and want to see how someone else has explained a topic. Then contact Sharon to add your own on-line material to the page's resources. As with many other nifty ideas, this one will work and thrive only if people contribute to it.
4. *a chatroom, auto-responding mailboxes, and the Astronomy Link roster* are among other projects on the work list.
5. *an IPS-members-only page* will be created

soon and contain items that are benefits of membership.

IPS 2000 conference in Montréal. By now you should have received the mailing for the IPS 2000 Conference to be held in Montréal, Quebec, Canada on July 9-13. The conference promises to be an exciting one filled with valuable papers, workshops, panel discussions, invited talks, exhibits, demonstrations, and plenty of time for informal conversation as well. Please plan to attend, give an oral or poster paper, hear other papers, see the latest products from the vendors and exhibitors, and spend time meeting and sharing with your colleagues from around the world. Extend your time and learning by taking a pre- or post-conference tour.

Information is also available on the conference web site at www.planetarium.montreal.qc.ca/IPS2000. If you have further questions or need additional copies of the mailing, contact the conference secretariat at:

IPS 2000 Secretariat
Planétarium de Montréal
1000 St-Jacques
Montréal (Québec)
Canada H3G 1G7
Tel: +1 514 872-3611
Fax: +1 514 872-8102
Email: npatenaude@ville.montreal.qc.ca

Postscript and PDF versions of the registration form can be downloaded from the conference website.

Important conference deadlines are:
April 1 for early (discounted) registration
April 1 for titles and abstracts of papers
May 15 for full texts of papers
June 5 for hotel registration
June 16 for regular registration.

Basic costs (*quoted in and must be paid in Canadian dollars*) are:

Early registration	CDN$445	(~ US$307)
(includes all meals except banquet)		
Banquet	CDN$ 60	(~ US$ 41)
Conf. Hotel	CDN$142	(~ US$ 98)
(single or double, per night, plus tax)		

For reference, I've listed the approximate US dollar equivalents using an exchange rate of (CDN$1 = US$0.69). Please note however that exchange rates fluctuate and that *all funds must be paid in Canadian dollars.*

Planetarium panel at the American Astronomical Society. In early January I had the privilege of chairing a planetarium panel at the meeting of the American Astronomical Society in Atlanta, Georgia. This panel was part of a session on teaching introductory astronomy to college/university classes. Three other astronomers and I made brief presentations and fielded questions on how we use "the planetarium and the real sky" in teaching our "Astronomy 101" courses. This panel certainly enhanced the visibility of planetariums to AAS members who are deeply committed to astronomy education, just as we are.

Starry days and starry nights

Since this message has already run just a bit long, I'll defer a fuller report on that AAS panel until my June column, where I'll also describe the joys of a starry January day in the dark near the top of the world. Till next time ... ☆

UNIVERSE IN THE CLASSROOM 2000
A National Workshop on Teaching Astronomy in Grades 3-12

Universe in the Classroom 2000, a national workshop on teaching astronomy in grades 3-12, will be offered at the Pasadena Convention Center, Pasadena, California, on July 13-16, 2000, as part of the 112th Annual Meeting of the Astronomical Society of the Pacific. The workshop will include a series of sessions for teachers who are just starting to teach a unit on astronomy, as well as a strand of innovative ideas and updates for veteran science teachers. Teachers who may be a bit nervous about teaching any astronomy at all are especially encouraged to attend.

Half of the four-day program will be devoted to hands-on classroom-tested activities that convey basic astronomy and physical science concepts. Topics covered include how to teach the phases of the moon, have students discover the reasons for the seasons, deal with questions on UFOs and astrology, measure out the scale of the solar system, and explain black holes without math. The other half of the workshop will feature talks on recent developments in astronomy in everyday language, a "Kid's Space" where children of all ages learn and experience astronomy concepts while having fun, together with an astronomy expo and fair offering the latest astronomy tools. Participants will receive a thick package of activities and resources to take with them. Credit will be available through a local university.

For more information and a registration packet, teachers, librarians, curriculum supervisors, or youth group leaders should contact the non-profit society by:
* Phone: 415-337-1100 x 100
* Email: meeting@aspsky.org
* Mail: Universe in the Classroom 2000, A.S.P., 390 Ashton Ave., San Francisco, CA 94112.

(The Astronomical Society of the Pacific, founded in 1889, is the largest general astronomy organization in the U.S., with members in all 50 states and over 60 other countries. Its activities include publishing books and journals, organizing meetings and lectures, offering a mail-order catalog of educational materials, and presenting six of the most coveted awards in the field of astronomy. For more information, see their web site at: www.aspsky.org)

International News

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Early this morning on 21 January, I enjoyed a nice lunar eclipse in a cloudless sky. I took some pictures of the half-eclipsed moon with a 250 mm objective (in case there ever will become a new edition of *27 Steps to the Universe*). Lunar eclipses are nice - you can share the experience with people over a large part of the earth.

The International News column depends entirely on contributions that I receive from IPS Affiliate Associations all over the world. Many thanks to Vadim Belov, Bart Benjamin, John Dickenson, Jon Elvert, Jean-Michel Faidit, Donna Pierce, and Loris Ramponi 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 April for *Planetarian* 2/00 and 1 July for 3/00.

Association of French-Speaking Planetariums

Among the latest news from France is a new show from Planetarium de Vaulx-en-Velin. Managed by Patrick Millat, this Planetarium celebrates year 2000 with a show named *Histoires d'Univers*, a travel through sky legends and civilizations written by astrophysicist Daniel Kunth, and narrated by Michel Galabru, one the greatest French actors <www.planetariumvv.com>.

In the same region, the Planetarium de Saint-Etienne, managed by Philippe Huyard, is now preparing a new show for 2000, *Mon secret étoilé*. The show shown by the planetarium in 1999, *Rêves martiens*, attracted a large public of that city with an original advertising campaign - original for a planetarium in France! - representing a Martian with a shock slogan: "Come to the Planetarium if you are a man!". The success was great and many new people came to the planetarium <www.sideral.com>.

The next meeting of Association of French -Speaking Planetariums APLF will be hosted by the Planetarium of Cité de l'Espace in Toulouse in May 2000 <www.cité-espace .com>. Finally, at the end of this year 2000, a new Planetarium will open in Montpellier. It will be equipped with a 15 meter dome and a Digistar II with a StarRider.

Canadian Council of Science Centers - Planetarium Group

Canadian Planetarians have been surveyed on IPS and its services. Prior to the IPS Council meeting in Flagstaff a questionnaire was distributed to all Canadian planetariums listed in the latest IPS Directory. Input was requested on IPS activities and services, and on new initiatives that IPS might consider undertaking.

A number of responses were received, and the following are some of the comments made: Need more information on IPS and what it does. Develop generic marketing and fundraising materials on rationale and importance of planetaria. More work on IPS Job Bank, as hiring qualified planetarium people is a challenge. More news on trends in technology, programs etc. Reliable attendance statistics and trends. Insights into planetarium marketing, demographics, psychographics, etc. Who are our clients? More encouragement, models, news, etc on show collaboration and co-production.

These and other comments were brought to IPS Councils attention at the Flagstaff meeting held 17-18 October. A detailed report of that meeting was distributed to all facilities listed in the *IPS Directory*, along with information on IPS services and a membership application form for facilities which are presently non-members.

A CCSC Meeting is planned for Charlottetown PEI 9-13 May 2000. CCSC will be holding its annual meeting in conjunction with the Canadian Museums Association Annual Conference. In addition to the AGM several other sessions are planned which will be of particular interest to science centers and planetariums. Full details will be available soon. This will be a particularly rich year for our community as the IPS 2000 Conference follows in Montreal 9-13 July.

Planetarium Show collaboration continues to grow. A successful meeting of Canada's western science centers, including four major planetariums, was held in Calgary, Alberta 29-30 October. A number of issues of common interest were discussed, including government funding and exhibit and program collaboration. *Dr Fantastic's Marvelous Millennium Show*, a production of the Calgary Science Centre is now running in Vancouver and Winnipeg planetariums in addition to Calgary.

A unique new "modular" show called *The Universe Tonight* recently opened at Vancouver's H. R. MacMillan Planetarium. Hosted on video by Ken Hewitt-White of TV's *Cosmic Highway* series, the show is designed to run for several years but with changing "modules" for each season, and additional changeable modules to highlight current events such as the 30th Apollo anniversary, eclipses, meteor showers etc. A neat and relatively inexpensive way to keep an expensive show "fresh" for a much longer run than normal.

Plans for a major new planetarium in the Toronto suburb of North York are proceeding. Planetarium consultant Ian McLennan has recently completed a planning report for York University, on whose campus the facility would be located. The organizing group has completed the purchase of the old Zeiss star projector from Toronto's now defunct McLaughlin planetarium, for use as an exhibit in the new facility.

The Canadian Space Agency is developing a new strategy from which to build a stronger relationship with Canada's science centers and planetariums. A study by KPMG Consulting is underway, and new plans will be announced by mid-2000.

The IPS 2000 plans are moving ahead in Montreal. Pierre Lacombe and his staff are getting very busy implementing their plans for what promises to be a very well attended and interesting conference. A large contingent of Canadians is anticipated at the conference, and the planners are working on finding a time block for one of those all too rare pan-Canadian meetings.

Great Lakes Planetarium Association

Illinois: The Spring 2000 Illinois State Planetarium Meeting will be held at The Lakeview Museum Planetarium on 29 April. The Cernan Earth and Space Center on the campus of Triton College in River Grove was the recipient of a $33,947 general operating support grant from the federal Institute of Museum and Library Services. The Triton College Library and the Cernan Center also received a partnership grant for $99,835 from the IMLS to conduct a variety of hands-on programs and services related to the Mars Millennium Project. In December, the Cernan Center welcomed Captain Eugene Cernan for an extended book signing visit. This winter, the Cernan Center presented four different earth and sky shows", two different children's shows, and six different laser light shows. The Cernan Center hosted

the Near and Far Sciences workshop on 21 January.

The Lakeview Museum Planetarium reports that in addition to their regular shows, a different school show will be presented each Saturday morning for the general public during January through April. A make-it take-it activity precedes each show. The Peoria Astronomical Society meets in the planetarium dome the first Wednesday of each month. With the installation of *The Explorers*, the Strickler Planetarium in Bourbonnais debuted this outstanding program in early October. Tropical fruit was served and the geology of Hawaii was presented as guests made their way into the planetarium to see the show. New special effect projectors have been added as well.

The William M. Staerkel Planetarium at Parkland College began the new year with several shows including a new light show based on Pete Townsend's Lifehouse Project. On 4 February, Donald Luman of the Illinois State Geological Survey gave a talk on the view of Illinois from satellite imagery. This is part of their annual *World of Science* Lecture Series. The planetarium hosted the Near and Far Sciences Initiative on 25-26 February.

Indiana: Indiana's spring 2000 meeting takes place on 6 May in Marion. Keith Turner will serve as meeting host. In Muncie, an Educators Workshop was held in October during the Teacher Professional Days for area educators using the planetarium. The students from Central High School enrolled in astronomy are participating in the Mt. Wilson Telescopes in Education Project. In Martinsville, Dan Goins has recently been observing Venus in the daytime. Goins has also been participating in an Internet workshop entitled *Water in the Solar System.* It is online and runs 4 to 5 weeks. It is a joint NASA/JPL project. The Ball State University Planetarium reports that Ron Kaitchuck has begun the process of converting the planetarium's video clips over to the new AstroFX system.

Bowen Productions of Indianapolis has been chosen by the IPS to provide distribution services for Hubble and JPL Materials to subscribers of the IPS Slide Service. Bowen has also announced their new show *Mystery of the Missing Seasons* is now shipping. It is a 25-minute show designed for 3rd grade and general audiences. The script was written by IPS Fellow Jim Manning. Dayle Brown is doing Starlab (NIESC loaner) with K-6 in her school. She is working with the NIESC about doing an in-service for teachers. The Koch Science Center and Planetarium in Evansville conducted a Mercury Transit Event in the Museum parking lot on November 15.

Michigan: Michigan has a new state chair. He is Michael Narlock from the Cranbrook Institute of Science. Michigan planetarians could not be busier! The Chaffee Planetarium, the Kalamazoo Valley Museum's Universe Theater and Planetarium, the Shiras Planetarium, and the Peter F. Hurst Planetarium in Jackson presented several shows during the winter. Marquette celebrated its sesquicentennial anniversary by having families build history totem poles. Scott Stobbelaar, the director of Shiras Planetarium, made a rocket out of his totem pole which featured the history of the Shiras Planetarium. It was recently taken out of a city park and now resides in front of the planetarium. The McMath Planetarium at the Cranbrook Institute of Science in Bloomfield Hills debuted an in-house production entitled *Planet Alignment 2000* in February.

Ohio: The Ohio state meeting will take place on 29 April at Shaker Heights. Good news: Joe DeRocher is recovering well after a serious illness this summer and is now back at work at the Cleveland museum of Natural History.

At the Westlake Schools Planetarium, Jeanne Bishop has given several special class presentations in addition to her astronomy classes. Topics have included Multi-cultural astronomy, Celtic astronomy, Egyptian astronomy, lunar motions and phases, Star magnitudes, Classification and Life Stage, and Creative Writing. All these programs are presented live and many are interactive. Per a superintendent's dictum, each program is individually scheduled for a time that tries to co-ordinate with the individual classroom teacher's needs. In mid-November, Bishop gave a double-feature evening presentation based on the three weeks she spent in Japan last summer with the Fulbright teachers program. CRAP members and friends gathered for their 13th annual HPP (Holiday Party for Planetarians) on 11 December at the home of Jeanne and Allan Bishop. This annual gathering is a reminder that our ties are those of friendship as well as of the planetarium work we share.

Within Greater Ohio, the Edinboro University Planetarium in Edinboro, Pennsylvania keeps busy running shows for area schools and the general public. In November they hosted a group of students visiting from Zibo, China, where a new planetarium is under construction and should be opening soon. Through an interpreter, they highlighted the night sky for Zibo. Since Zibo is 13 hours later than EST, that means they had the fun of doing a show for the "current" night sky at 9:30 a.m.! The planetarium crew is also gearing up to produce more tactile maps related to astronomy, as another student with visual impairments may be taking their course on atmosphere and space science.

Youngstown audiences are learning about extra-solar planets and Dale Smith's students at Bowling Green are getting used to running shows in the boss's absence, as fall jaunts took the IPS president to Finland in September for the Nordic regional meeting, to Flagstaff in October for IPS Council, to Ft. Lauderdale in November for the IPDC meeting, and to Vienna over Thanksgiving for talks with a colleague at the UN Outer Space office.

Wisconsin/Minnesota: Minneapolis Planetarium, the planetariums in Hibbing and La Crosse, the Barlow Planetarium in Menasha, the newly named Allen F. Blocher Planetarium in Stevens Point have all reported that they a busy giving shows. At the Horwitz Planetarium in Waukeska, Dave DeRemer's classic show *Journey to the Stars* was recorded and produced in January and will be available in March for purchase through Minneapolis Planetarium show productions.

The Fernbank Science Center began their SEMAA (NASA's Science, Engineering, Mathematics and Aerospace Academy) workshops for students on Saturday mornings. Science Center staff is working with curriculum for the national headquarters in Ohio. Two new planetarium programs, opening in March 2000, highlight the International Space Station. The public show *City in the Sky* is being written and produced by David Dundee. April Whitt is working on a children's program, *Have Space Suit, Will Travel,* with two former planetarium interns, now students at Georgia Tech.

At the GLPA Conference in Kalamazoo, the following GLPA members were awarded the distinction of GLPA Fellow: Wade Allen, Elisabeth Daly, Ronald Kaitchuck, Alexander Mak, Kristine McCall, and Mark Reed. Congratulations and thank you for your fine service to GLPA!

Italian Planetaria's Friends Association

The annual Day of planetaria always takes place on the Sunday before or after the spring equinox. The *2000 Day of Planetaria* was held on 19 March. For the occasion exchanges between planetaria of different countries were promoted and this year also an exhibition on line of *Astronomical children drawings* at <www.cityline.it>.

The main Italian planetarium, in Milan, celebrates in May 70 years from the foundation. Conferences, exhibitions, and meetings, also with the participation of foreign colleagues, will be organized. The Ulrico Hoepli Planetarium of Milan is situated near the Natural Science Museum and managed by the municipality. The scientific chairman is

Dr. Fabio Peri. A new star projector is in the planning as well as a study visit among different foreign planetaria by Dr. Gianluca Ranzini with the financial support of the municipality. Dr. Ranzini prepared also the proceedings of the 1998 National Meeting of Planetaria that was held in Milan. Among the participants was Thomas Kraupe, the first IPS president attending a National Meeting of Italian Planetaria.

Each year since 1995, Serafino Zani Astronomical Observatory in collaboration with Learning Technologies, Inc. organizes the initiative *A week in Italy for an American planetarium operator.* During the week, secondary students follow lessons in the American language, under a Starlab dome, held by U.S. teacher selected among the candidates. Last October April Whitt from Fernbank Science Center of Atlanta, Georgia came to Italy. Earlier participants are, in 1995, Susan Reynolds, OCM Boces Planetarium, Syracuse, New York; in 1996, Jeanne E. Bishop, Westlake Schools Planetarium, Ohio; in 1997, Jerry Vinsky, Raritan Valley Community College Planetarium, Somerville, New Jersey; and in 1998, Dee Wanger, Discovery Center Science Museum, Fort Collins, Colorado. Colleagues interested to participate in the *2000 Week* can send their entries to Susan Reynolds or read the Internet pages about science of Serafino Zani Astronomical Observatory <www.cityline.it>.

Nordic Planetarium Association

Per Broman reports that Broman Planetarium lately has sold several Starlab planetariums in the Nordic countries. One Starlab went to the Science Center in Bergen, Norway and one to Technichus Science Center in Härnösand, Sweden. The National Museum of Natural History, Stockholm, Sweden - home of Cosmonova Space Theater - has purchased a Starlab projector to be used in a space exhibition in the making - Mariana Back on loan from the Museum of Technology in the same city is in charge of the project. Finally, Teknoland in Falun, Sweden has just got their 6 m dia. giant Starlab dome delivered.

Lars Broman and colleagues are presently very busy with the construction of the new Swedish science park Teknoland. Situated on six acres (30,000 sqm) of the Swedish National Ski Stadium, the park will open up on 13 May with a planetarium and over 100 interactive exhibits, some so large that they instead of being *hands-on* exhibits ought to be described as *the-whole-body-on.* Several astronomical exhibits will be included, among them *The astronaut scales, Galileo's observatory, Kepler's dance,* and five large 3D stellar constellations. The planetarium will have a star projector built by ASH Enterprises (U. S. A.) under the Starlab dome inside a giant Lap-type tee-pee. More information on Teknoland is available in English, French, German and Swedish on <www.teknoland.se>.

Pacific Planetarium Association

The Minolta Planetarium at the De Anza College is moving into the 21st Century with a new automation/control system from East Coast Control System. This is the first stage in what Karl von Ahnen, Director, hopes to be a series of major improvements to the planetarium.

A National Symposium on Teaching Astronomy to College Non-science Majors will be held at the Pasadena, California Convention Center on 17-19 July 2000. This is part of the 112th Annual Meeting of the Astronomical Society of the Pacific. This 2.5-day program involves panels of mentor projects, teacher resources, hands-on workshops, and trying new techniques and approaches to teaching astronomy. Contact Andy Fraknoi at <fraknoi@admin.fhda.edu> for further details.

The Coca Cola Space Science Center in Columbus, Georgia has hired Bill Gutsch to write a new show on the greatest wonders of the universe. Also from Gutsch: production is underway for *Where In The Universe Is Carmen Sandiego - II.* In this sequel, Carmen will escape from prison, develop warp drive and go after the giant black hole at the center of the Milky Way Galaxy. Audiences will have fun learning about nebulae, stars, supernovas, pulsars, black holes, and the structure of the Milky Way Galaxy. In addition, *Carmen - I* will be re-rendered for SkyVison (all-dome video) at the Burke Baker Planetarium in Houston.

The Bishop Museum (Honolulu) has to date distributed 170 copies of the NASA-funded *The Explorers* planetarium program. The Bishop Planetarium is also preparing a second NASA partnership program involving modern ground based astronomy done on Mauna Kea. Distribution for this program is set for this spring. Contact Ken Miller at <kmiller@bishopmuseum.org> for more information.

Russian Planetarium Association

Vadim Belov reports that the story of the planetarium in Nizhny Novgorod has continued after the Tampere NPA Conference in early September. Later in September, the Russian car company GAZ agreed to pay for the building of a new planetarium within the year 2000 providing it was built near the factory.

On 22 September Belov reported his journey to Tampere to the county's Astronomical Professors Conference and in October the government agreed to give half of the money for our building. Belov went on two missions for Moscow for visits to ministries and committees of education, the university, and the Cosmonaut Museum Association, meeting among others cosmonauts Grechko and Titov.

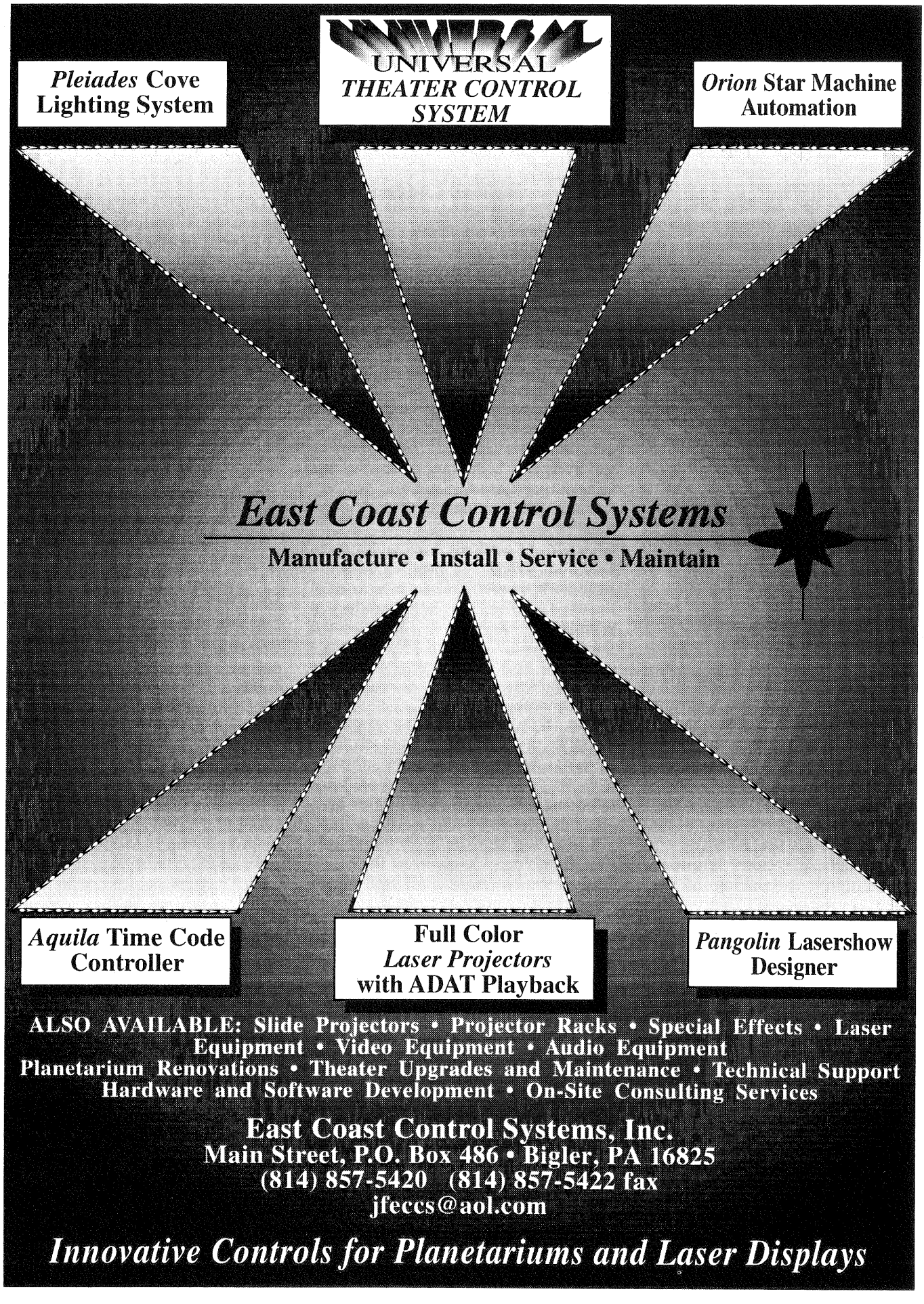
The Russian Planetarium Association took place at the planetarium in St. Petersburg on 5-7 November; Zina Sitkova participated in the event. Belov visited Briansk on 23 November and learned that Briansk's planetarium has finally left an orthodox church for another building.

On 14 December the Nizhny Novgorod Mayor gave the second half of the money for the new planetarium building. At the present time, RPA and the astronomical society (Astro is based at Moscow's University) are on the commission staff that negotiates the Russian planetarium. There is still a lot to do - plenty of small affairs and few big. For instance, new equipment had to be bought before the new year's day. Nizhny Novgorod Planetarium has got a new computer and a new president.

Southwestern Planetarium Association

J. Mark Wallace was honored with a reception on his retirement 16 January by the Andrews I.S.D. As past planetarium director, principal, and assistant superintendent for the District numerous friends, former students and collages were present. SWAP President Barbara Baber was in attendance as well others from the planetarium field.

Dallas will host the 2000 Conference for SWAP, RMPA, PPA and GPPA and hopefully the Association of Mexican Planetariums will join in Dallas to make this one of the Great Conferences of the millennium. The Harvey Hotel will be the conference site. Conference attendees will have the privilege of touring not only a Digistar I and II but several Spitz Star Projectors, and Minolta in the greater metroplex. Line dancing, Texas-size steaks, and for those of you at Desert Skies - the other half of your chocolate chip cookie. Tours of NASA Space Station and digs at Fossil Rim will be offered as pre and post Conference tours. Contact SWAP President Barbara Baber at <bbaberstar@aol.com> or Conference Chairman Donna Pierce at <dc_pierce@msn.com> for more information. Other sources of information are web master Jan Wallace at <jwallace@esc18.net> or SWAP's web site at <http://andrews.esc18net/Planet/Texas2000.html>. ☆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IPS Elections Committee Announces Call For Nominations

IPS Colleagues:

It is time to begin the process of selecting qualified candidates to run for the offices of the International Planetarium Society. These offices are President-Elect, Executive Secretary and Treasurer/Membership Chair. The term of office for President-Elect will be 2001-2002, after which, that person will serve as President (2003-2004) and then as Past President (2005-2006). The term of office for Executive Secretary and Treasurer/Membership Chair will be 2001-2002.

The IPS Elections Committee has been activated and is ready to accept your nominations for the three offices. All nominees must be a current member of the International Planetarium Society. We would like to have more than one person nominated for each office. Lee Ann Hennig has agreed to run again as the incumbent for Executive Secretary and Shawn Laatsch has agreed to run again as the incumbent for Treasurer/Membership Chair. The office of IPS President-Elect is wide open at this time.

The deadline for accepting nominations from the IPS membership is Monday, **May 1, 2000**.

The Elections Committee will review the list of nominees and verify that they are eligible to run as a candidate for office and then send the list of nominees to the IPS Executive Council. The Executive Council will formally submit them to the IPS membership during the Business Meeting of the IPS conference in Montreal, Quebec, Canada in July. At that time, additional nominations will be accepted from the floor.

Ballots and candidate biographies and statements will be mailed in mid-September. The returned ballots will be counted, audited and the results will be announced in December.

Please think about this important process as it directly shapes the future of your organization. Please submit the name of your nominee (and office) to any of the following individuals who have agreed to serve on the IPS Elections Committee.

Steven Mitch, Chair
Benedum Planetarium
Oglebay Park
Wheeling, WV 26003
U.S.A.
Fax 304-243-4110
e-mail - stargate@hgo.net

Johan Gijsenbergs
Artis Planetarium
Plantage Kerklaan 38-40
1018 CZ Amsterdam
Netherlands
fax 31-020-5233-518
e-mail - planetarium@artis.nl

Hallstrom Planetarium
Indian River Community College
3209 Virginia Avenue
Fort Pierce, FL 34981
U.S.A.
Fax 561-462-4796
e-mail - jbell@ircc.cc.fl.us

Tatsuyuki Arai
Planetarium
Katsushika City Museum
3-25-1, Shiratori
Katsushika-ku, Tokyo 125-0063
Japan
e-mail - arai@plum.ifnet.or.jp

Wayne Wyrick
Kirkpatrick Planetarium
Kirkpatrick Science & Air Space Museum
2100 N.E. 52nd Street
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e-mail - wizardwayne@juno.com
Jon Bell

Professor Tony Fairall
Dept. of Astronomy
University of Cape Town
Rondebosch 7700
South Africa
Fax +27-21-650-3342
e-mail - fairall@physci.uct.ac.za

**** NOTE CHANGE IN GRANT AMOUNT ****

The V. M. Slipher Committee
of the
National Academy of Sciences
Announces Funds Available in 2000 for the
Improvement of Public Education in Astronomy

During 2000/2001 the V. M. Slipher Committee will make two awards of $5,000 each for projects that enhance the public's understanding of astronomy.

We will fund projects which:

1. request seed money for programs that continue beyond the funding period
2. provide programs/services to more than a single group. *No request for equipment to serve a single classroom or school building will be accepted.*

Past grants have included support for radio programs about astronomy, refurbishment of an historical telescope for use in a public observatory, partial support of teacher workshops and park interpretive workshops.

If you wish to submit a proposal to the V.M. Slipher Committee, please note the following criteria:

1. The objective and procedures to be followed in the project should be outlined in concise terms.
2. The budget page should identify how funds will be spent (please note any other funds allocated to this project both direct and in-kind).
3. Proposals should be short—no longer than three typewritten pages. An original and *four copies* of the proposal must be submitted to be considered for funding.
4. Applications must be postmarked by **May 22, 2000.** Notification of grants will be made around the end of July 2000.

Please send applications to:

Dennis Schatz, Chairman
V. M. Slipher Committee
Pacific Science Center
200 Second Ave. North
Seattle, WA 98109

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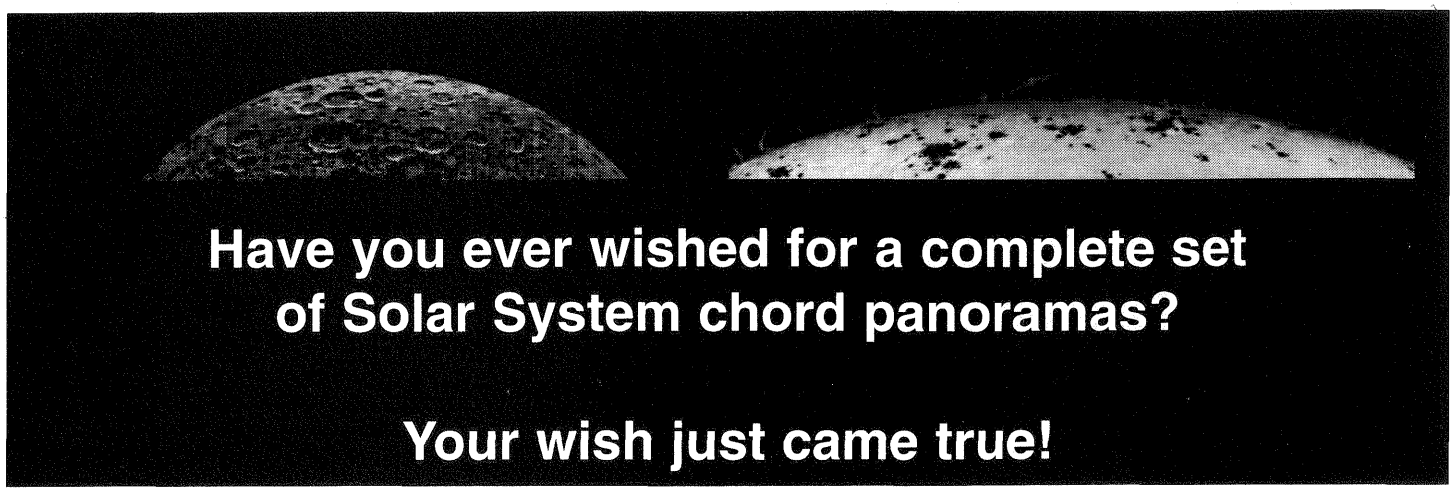

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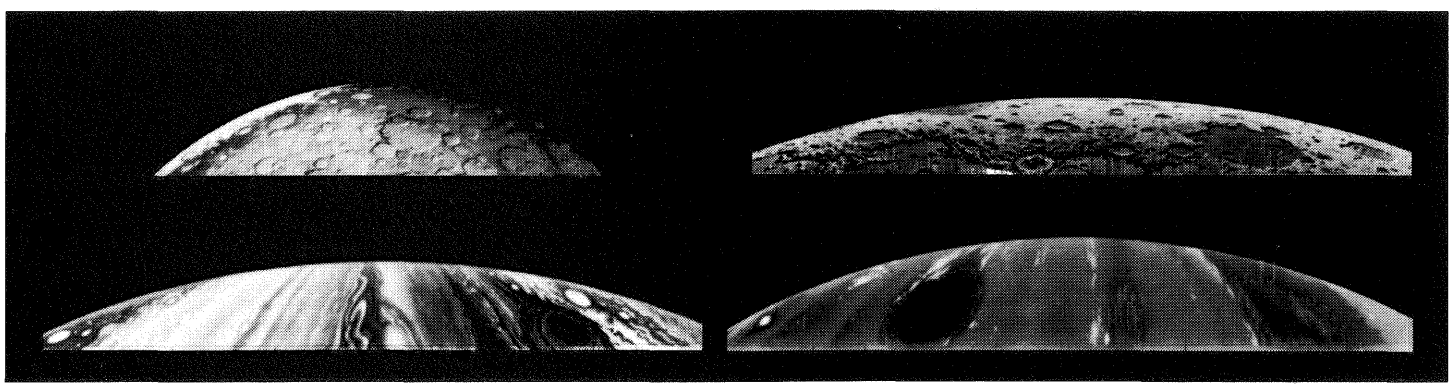

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Create Panoramas With Your Computer

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Good panoramas are hard to find. Sure, you've probably got a few scattered around in your slide file. But more often than not they're either incompatible with your theater's projection layout, not quite the subject you need, or are taken from some really hideous artwork. Finding or making single-slide images for your planetarium show is tough enough, but getting your hands on the right panorama can be a like trying to nail Jello to the wall! What to do?

I've recently found at least a partial solution to this problem by using my computer and a software application called VistaPro 4.0. Some of you may already be familiar with VistaPro, as it's been around for some time. It is billed as a three-dimensional fractal landscape simulation program which can recreate real-world or fantasy landscapes, using a combination of artificial intelligence, chaotic math and a user-definable set of values. Using VistaPro, you can create entire landscape panoramas customized for your planetarium of Earth scenes, or landscapes of other planets and moons. The resulting computer images can either be output directly to a film recorder, or to a color ink-jet printer and photographed at the copy stand. Although the program wasn't written for planetarium production use per se, some of its features, *seem* custom-designed for making planetarium panoramas, including the ability to appropriately section-up the scene for overlapped pan projectors.

Using VistaPro, you can create entire landscape panoramas customized for your planetarium of Earth scenes, or landscapes of other planets and moons.

Watching VistaPro at work is a truly fascinating experience! After the opening of an existing landscape map file and just a few simple mouse clicks and keystrokes, the computer sets about generating - seemingly as if by magic - an astonishing landscape

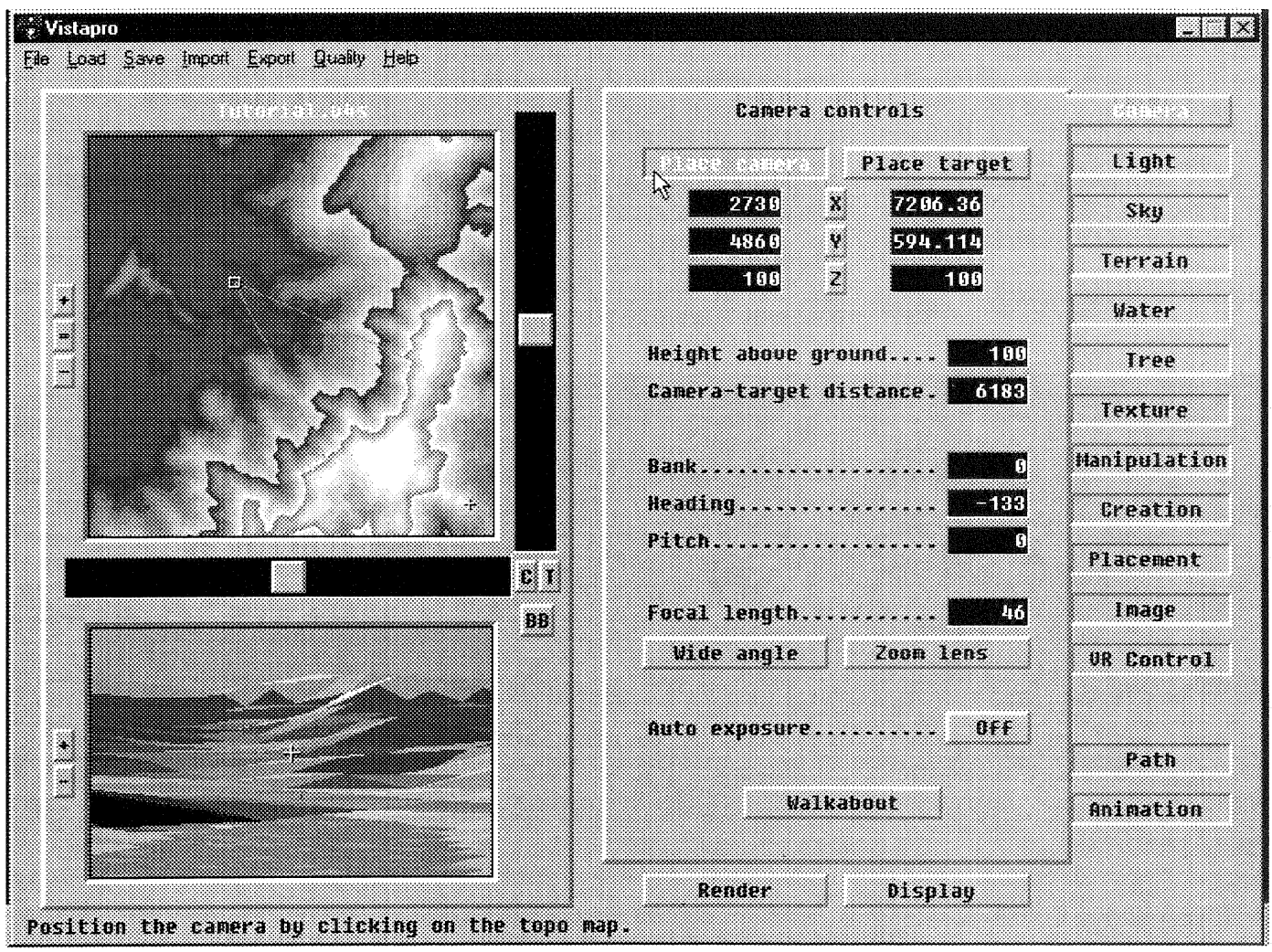

Figure 1

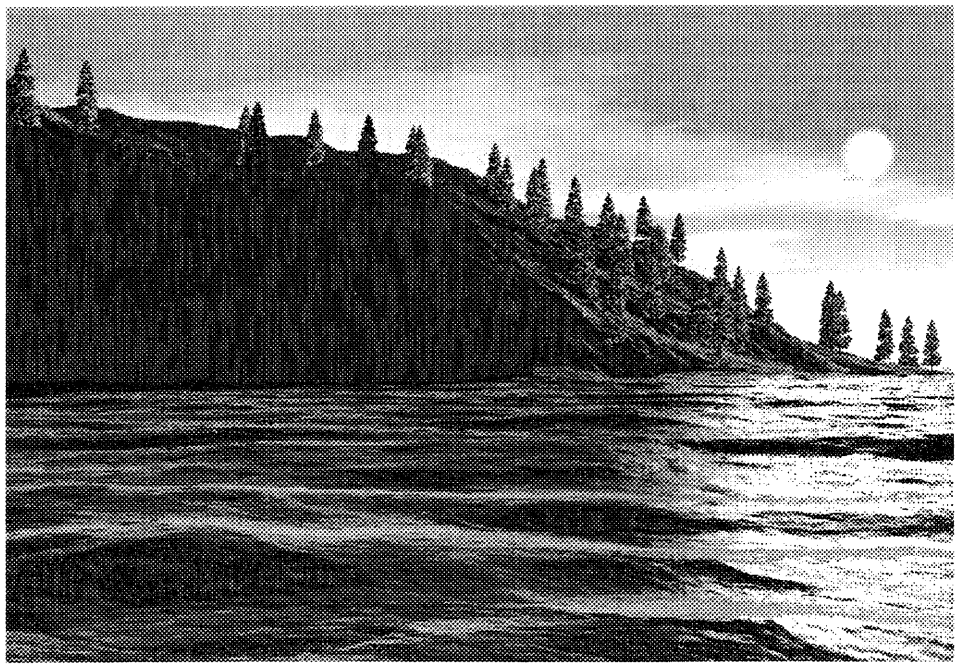

Figure 2

before your eyes. The experience of watching the software at work can be quite intoxicating, especially the first few times you work with it. In fact, in a communication to the late Stanley Kubrick a few years ago, Arthur C. Clarke wrote, "If you get VistaPro into your computer, you'll never do any more work! It produces images of almost photographic quality ...". What's even more amazing is that VistaPro 4.0 can be had for a mere $69 U.S. for the PC version, or $59 for the Macintosh, and is available - among other sources - from Andromeda Software (http://andromedasoftware.com).

Actually, VistaPro is only one of a series of currently-available landscape-rendering-capable applications. Some others include Bryce and Truespace - programs that are used by many computer artists. Besides rendering landscape elements, these programs also can create all sorts of geometric objects within beautifully surreal scenes - images like huge glowing crystalline spheres levitating in ghostly mists above an alien vista. While entrancing to look at, such imagery may not always be applicable in the planetarium. Such programs are also more expensive, more difficult to master, and use raytracing technology which takes lots of time to render each image on the computer. (A couple of other low/no-cost programs are available that are of potential use in creating panoramas, and I'll discuss these later.)

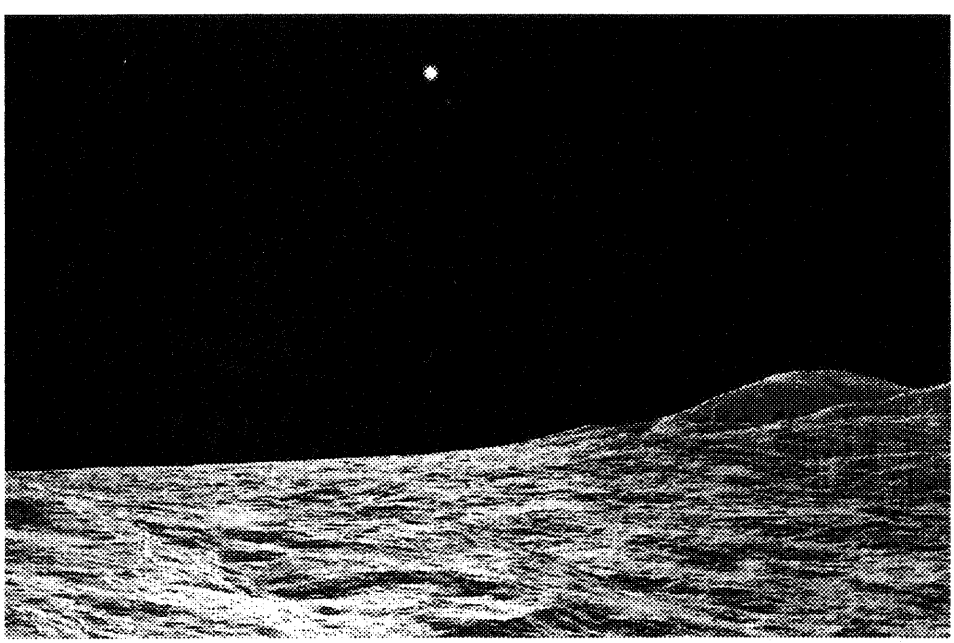

Figure 3

On the other hand, VistaPro is a *lean-and-mean* program, designed to create maximum output with a minimum of computer resources. In fact, the PC version, while written to run under Windows 95/NT, has a slightly *bare bones* appearance to the graphical user interface - almost a quasi-DOS feel (Figure 1). This lack of a pretty user-interface probably helps save computer resources for all the mathematical computations needed to turn out the landscape images as efficiently as possible. VistaPro is also different from the commercial raytracing packages in that it doesn't demand much learning or expertise from the user. You don't have to be a *computer artist* to turn out really nice landscape images with the program. One of the first images I created with VistaPro is shown in Figure 2. (Sorry, but I'm at a bit of a disadvantage reproducing these images here in course-screen lithographed black-and-white. To get a better idea of VistaPro's actual image quality, I strongly encourage you to do a little internet surfing. Simply search for *vistapro* or *vistapro landscape* on your preferred web browser to find some of the stunning examples of user-created VistaPro images in higher-resolution color.) Keep in mind that all of the elements seen in this image - landform, trees, water, sky, Sun, and clouds - are all generated automatically by the program. When creating landscape images, the user merely opens a *map file* and selects or adjusts a handful of parameters to get things going. The program does the rest.

Getting Started

To begin generating a landscape image, you first must have a topographic map, which displays within the square window in the upper-left area of the VistaPro workspace. There are several different sources for topo maps. The first is a *digital elevation map* (DEM). These maps are of actual places and contain elevation information necessary for the program to render the landscape image(s). VistaPro comes with two CD-ROMs. The first is a *program disk*, while the second *landscape disk* contains over 14,500 DEMs from different areas on Earth or elsewhere. You simply open one of these pre-existing DEMs. If it doesn't give you the sort of landform you want, simply open another DEM.

The second type of map-source can be generated by the program itself. At this point, I should mention the *control panels* section on the right-hand side of the workspace. It contains a series of different panels which can be accessed from mouse-

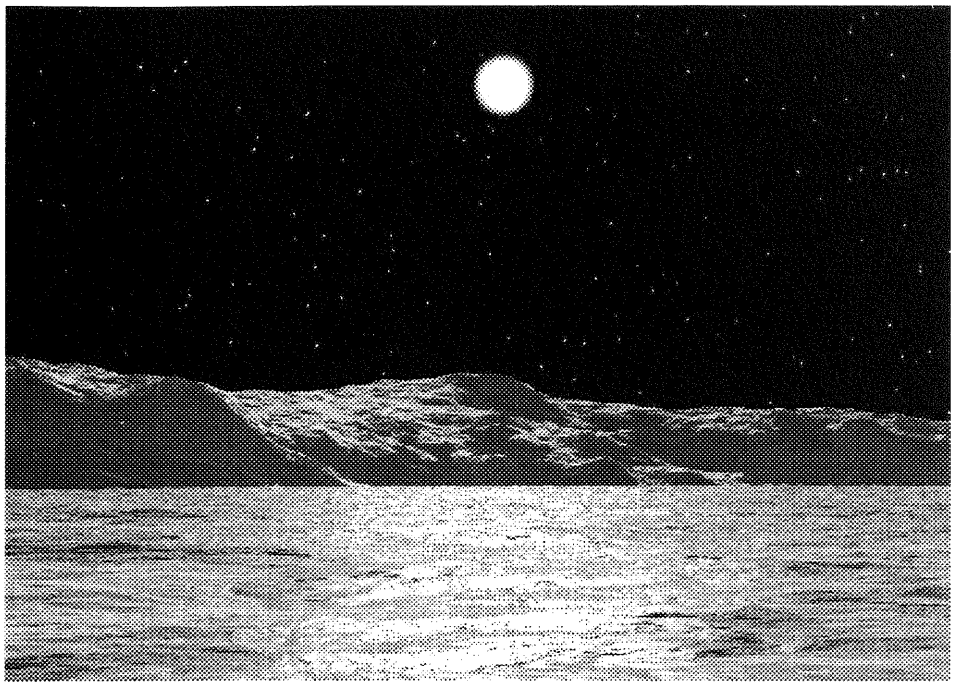

Figure 4

clickable tabs. Each of these panels allows you to control various aspects of the final rendered image (more on this later). Anyway, one control panel - called *Creation* - allows you to tell the program to create your own topographic map from over four billion possible fractal landscapes.

A third map source is from VistaPro landscape files which the user would have already customized and saved to disk. This would have been done by starting with either of the two previous sources and having changed or added various attributes such as feature elevation, erosion characteristics, colors, textures, lighting, snow line, tree line, camera position, etc. Having done all of this, you can save the landscape itself, for later retrieval and manipulation.

Once you have your topo map, a crude representation from a virtual viewer's position or *camera* is displayed in the lower-left window in the workspace. This is designed to give you a very rough idea of the landform shape. If you then click on the *Render* button at the bottom of the workspace, VistaPro begins to create the actual landscape image, complete with mountains, valleys, ground colors, trees, sky, clouds, etc. The amount of time needed to render the image depends upon a number of factors - the image size, the quality settings, and the number of elements placed on the landscape, such as trees or houses.

The rule of thumb is to start out with a small image and lower quality setting first. This will allow the program to render the image quickly, so you don't have to wait long periods to see the effects of any landscape alterations you attempt. Once you get closer to the landscape appearance you want, you can then increase the image quality settings and size for the final rendered image.

As I mentioned earlier, there are all sorts of program adjustments you can perform to modify your rendered scene. Again, the types of changes are grouped together on the control panels in the right-hand workspace area. Simply click on the label-tab for the panel group you wish to access. What follows is a brief listing of the various control panels and their major functions:

Camera - position and aiming of the virtual camera, lens focal length, and *Auto Exposure* (automatically adjusts the brightness of the scene based upon the angle and intensity of the virtual sunlight striking it)

Lighting - image brightness and contrast, light source (Sun) position in the virtual sky, and shadow characteristics on the terrain

Sky - Sun position (a parallel to the controls in *Lighting*), Moon position, activation/deactivation of Sun, Moon, stars, and sky visibility; cloud and haze characteristics

Terrain - characteristics of the rendered landform, including roughness, stratification, valleys, and tree and snow lines

Water - creation of seas, rivers, and lakes, wave-characteristic control (opens up the possibility for demonstrating terraforming in panoramas)

Tree - controls automatic tree placement and density, tree size, tree type (palm, oak, pine, and/or cactus), 2-D or 3-D tree rendering, and foliation

Texture - controls surface detail and application of texture mapping to ground, sky, water, tree and house elements

Manipulation - smooth or roughen, erode, stretch, enlarge or shrink features on the topo map

Creation - generates a new landscape from scratch

Placement - creates and places individual objects such as trees, houses, and roads

Image - controls rendered image size and other options

VR Control - sets camera positions in multiple-monitor virtual-reality display

Path & Animation - creates a scene animation using multiple VistaPro renderings of

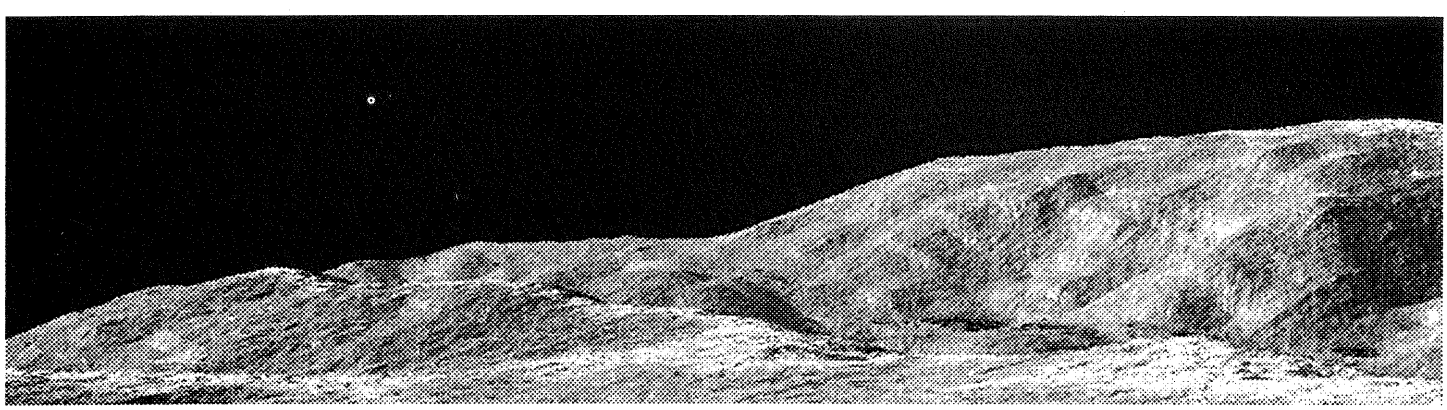

Figure 5

Figure 6

the same scene.

In addition to the controls already listed, the *Lighting, Sky, Terrain, Water,* and *Placement* panels provide access to control the colors of the ground, cliffs, sky, trees, water, sky elements, and houses.

As you can see, there is a lot of flexibility available to the user for controlling the scene. However, beginners can opt to specify as many or as few parameters as they choose. VistaPro will simply use the default settings of the program or map file if no changes are entered by the user. This makes *getting your feet wet* in VistaPro very easy, and makes the program non-intimidating and relatively easy to learn.

Obviously, since we work in planetariums, we don't only want to display Earth scenes. What about other planets or moons?

Actually this is pretty easy. By coloring the landscape blue, turning off the day-sky colors and trees, activating the stars and placing the Sun within the field of the virtual camera, a rather effective view from the surface of Pluto is created (Figure 3). A fantasy alien world - this time with a red ocean - is shown (in black-and-white here, of course) in Figure 4.

But all of the scenes mentioned so far are really intended as standalone images complete with sky elements and an identifiable rectangular format. While these make for pretty pictures, they aren't all that applicable for making planetarium panoramas. For these situations, the sky should be eliminated, since the planetarium dome above the simulated surface will become the sky - either with your instrument's stars, a cloud special effect, and/or colored dome lighting. For instance, turning off the sky colors, clouds, and stars in VistaPro, eliminating trees, and setting all the terrain surface colors to gray, yields a rather effective lunar landscape (Figure 5).

Not all extraterrestrial landscapes must be concocted from scratch or adapted for Earth terrains. The VistaPro landscape CD-ROM contains a pretty large series of Martian DEMs, including Olympus Mons and Vallis Marineris. There are also a number of Venusian-terrain DEMs as well (Figure 6). In both cases, the files have appropriate terrain colorations already incorporated into any landscape files that you may render from them.

Since you can change the aim of the camera, it's easy to pan it around and generate a series of individual slides that - when installing into your pan system - will display a landscape panorama. The visual results are quite impressive. What's just as impressive is the relatively small amount of time required to create a panorama. And you don't even need a staff artist to create these images. Of course, doing this properly does require establishing some specific, though straightforward, procedures. We'll touch on these aspects a bit later.

Panoramic Possibilities

In the meantime, let me show you a few examples of actual panoramas we've created. Because of the inherent difficulties of reproducing full panoramas here, we'll just show parts of the full landscape scenes - equivalent to about two-slide sections. The first is shown in Figure 7, and represents a country vista, with rolling grass-covered hills and pine trees scattered around. In this case, I didn't use VistaPro's automatic tree placement function, but placed all of the trees in the scene manually. A similar approach was used with the desert panorama shown in Figure 8. In this case, I opted for cacti rather than pines, and altered the terrain colors to look like a desert. Distant mountains appear in the background.

Sometimes manual tree placement is necessary to prevent trees from existing too close to the camera. In such instances, the foreground trees might appear so large that they would get clipped-off at the top of the image frame. Of course, you do have the option to reduce the sizes of the rendered trees, but this would make the background trees tiny. Another important point when creating trees is to minimize trees of any significant size that appear in the slide-overlap

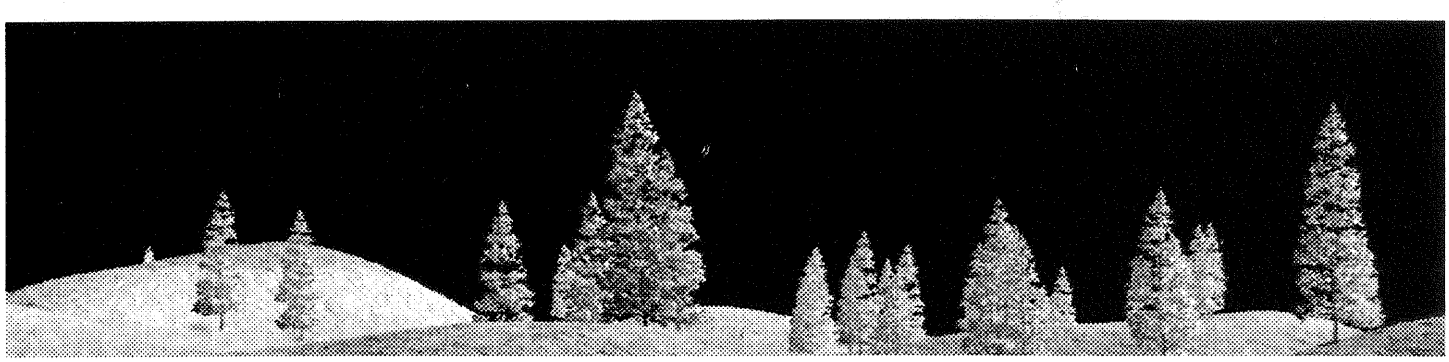

Figure 7

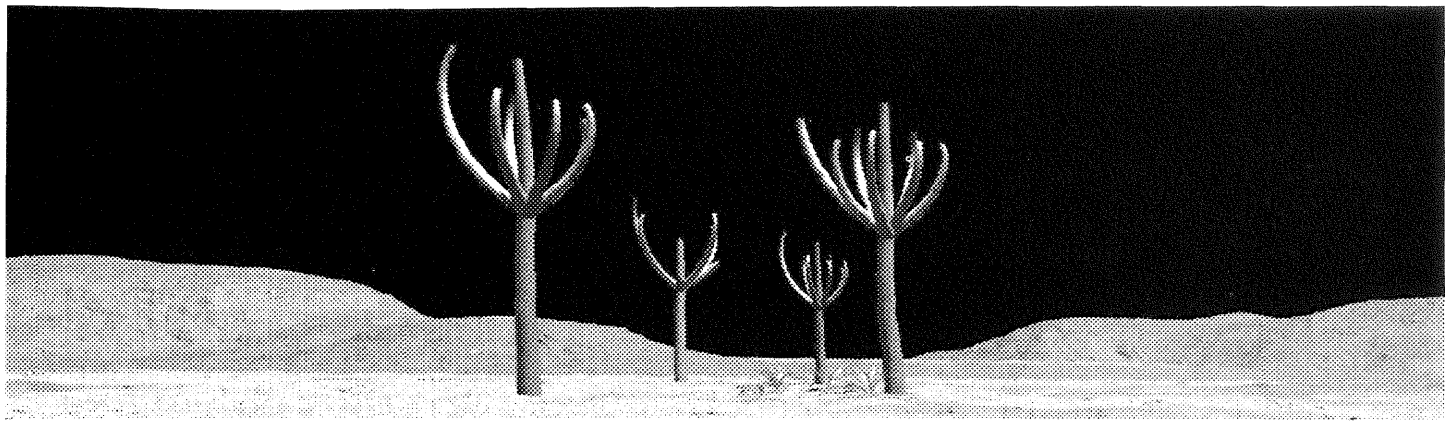

Figure 8

areas of your panoramas. Any slight misalignments between the pan sections can be more noticeable with well-defined objects like trees.

One thing that VistaPro won't do for you is render artificial objects (aside from little houses and roads). Though this might appear to be rather limiting, it is also easily overcome by inserting bitmap objects into VistaPro-rendered images using a capable painting or photo-editing program (PhotoShop or Paint Shop Pro). In Figure 9, I pasted an appropriate dome into a landscape scene to illustrate a mountaintop observatory. In Figure 10, an image of the Penzias/Wilson microwave horn that we acquired from Bell Laboratories was inserted to illustrate the discovery site of the Big Bang microwave noise. And in Figure 11, a radio-telescope was pasted into a VistaPro scene at three different sizes. (The radio telescope image was downloaded from the European Southern Observatory web site and used with permission and appropriate show credit.) This technique opens up all sorts of imaging possibilities for planetarium programs. Instead of throwing yet another rectangular-format slide onto the dome of some space or astronomy facility, a much more impressive panoramic scene can be created to visually impress audiences. Just remember that when pasting objects into your landscapes, try to match the lighting and shadow patterns (Sun direction).

All right, now that you've got a sense of some of VistaPro's visual possibilities, just how do you go about creating a series of individual slide images that - when installed in your projection system - will mesh into a coherent, convincing, and properly-overlapped panorama? For those interested in using VistaPro, I'll give you a few setup pointers.

Working the Geometry

Let's take Morehead Planetarium's panorama setup as an example. (Warning - there's a little geometry involved here, but bear with me - it shouldn't be too difficult to follow, I think.) We have a full 360-degree panorama system at Morehead, incorporating twelve projectors. The virtual-camera positioning and aiming in VistaPro is relatively straightforward in this situation - simply divide the full 360-degree sweep by 12, and you end up with a 30-degree horizontal offset between the virtual camera images. Keep in mind that - although you can aim the camera by clicking the *place target* button on the *camera* control panel - VistaPro is designed to adjust the virtual camera's *pitch* to follow the target position as well as the *heading* when doing so. This would have the effect of making the camera tilt slightly up or down each time the heading is changed, meaning that there will be a vertical displacement of each image, and the panorama sections won't line up in an up-down aspect. Therefore, once you get the camera positioned, aim the camera instead by entering a new numerical heading value. This numerical adjustment won't change the pitch value. (The *bank* setting should always stay at zero, by the way.)

Speaking of pitch, it's best to minimize any angular distortions between pan sections by keeping the camera pitch with about plus-or-minus 10 degrees, or less. Otherwise, the overlapping terrain areas will have a significant rotational displacement between one pan section and the adjacent one. Ideally, the pitch should always remain at zero to eliminate this, but a slight tilt up or down of the virtual camera is usually tolerable. Having said that, it's also important to remember that you need to find a camera position which will prevent any of the terrain as well as trees - from getting clipped-off at the top of the frame, and it's best to keep the terrain-line from dropping below the bottom of the frame as well (except at the extreme left and right ends of a partial pan

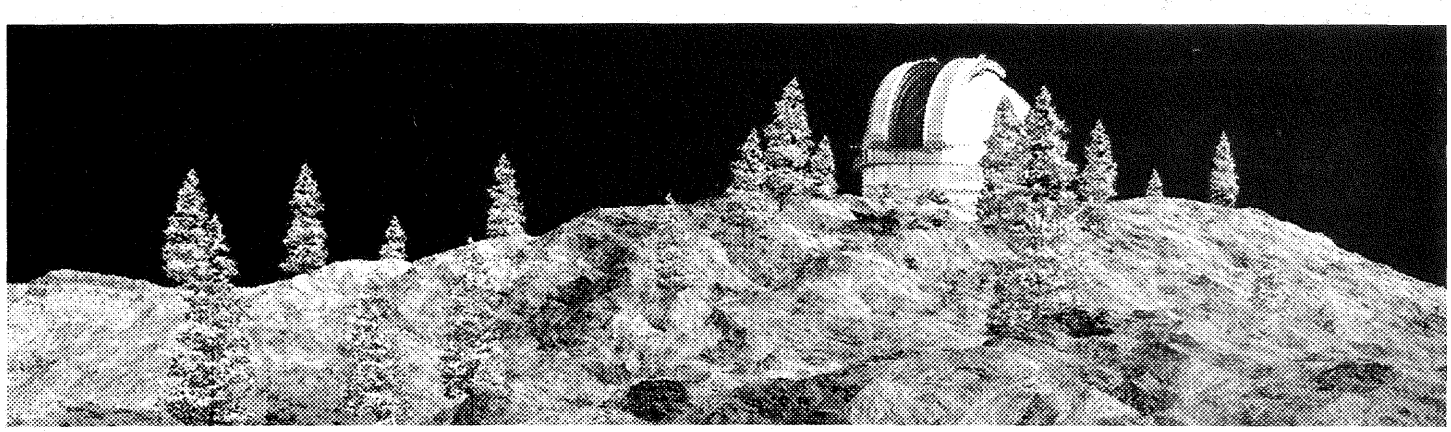

Figure 9

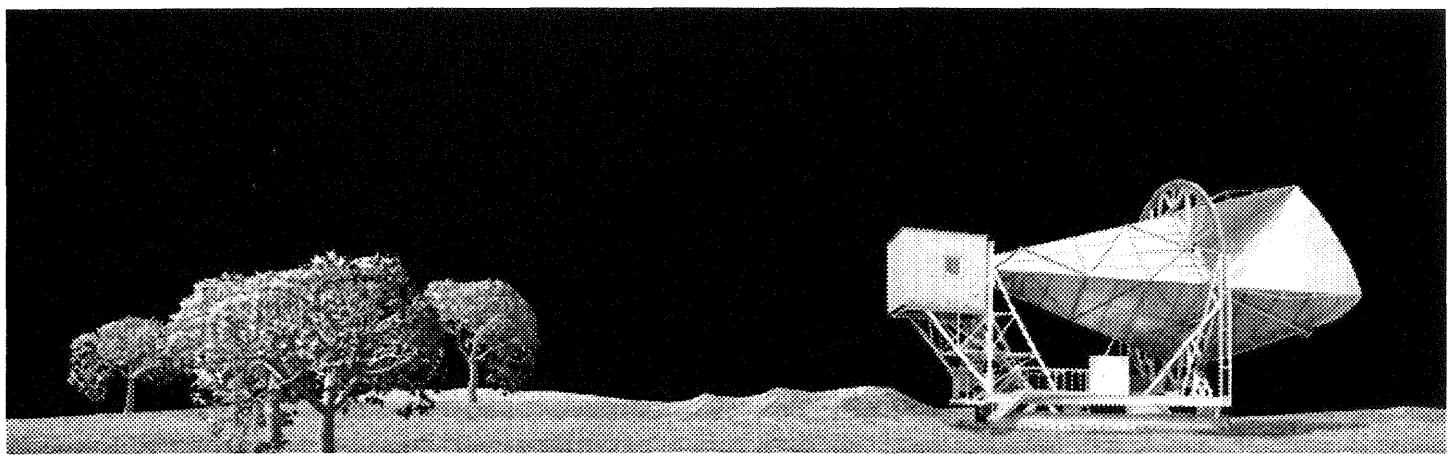

Figure 10

where a *drop-away* is actually desirable and needed). If the terrain-line is consistently too high or two low when the camera pitch is set at or near zero, try lowering or raising the camera position in altitude (the Z-coordinate, or *height above ground* setting) while keeping the pitch angle the same. This will have the effect of raising or lowering the terrain-line in the camera views. Obviously, all this may take a little experimentation. Sometimes it may be necessary to actually find or generate another topo map altogether to get a good terrain-line which sweeps uncut through your entire panorama.

Okay, so we've already decided that for a full 360-degree panorama, we need a 30-degree horizontal offset. But how do we control the image overlap? The key lies in the lens focal-length. At Morehead, each horizontal panorama slide overlaps the adjacent one by 25 percent. This means that a terrain feature at the right edge on one slide (a tree, for example) must show up exactly halfway between the center and the left edge of the right-adjacent slide (or, put another way, 25 percent right of the left edge of that slide). Through experimentation, I found that a focal-length setting of *46* in VistaPro will give us the required 25 percent image overlap in a 12-section panorama system. This figure was arrived at rather easily by rendering pairs of experimental images with the same focal-length setting, which were offset from each other in heading by 30 degrees, saving each image, and then opening each pair in my painting program. Placing the cursor on the matching terrain feature in question provided pixel-position values which were easily used to determine any inaccuracy in the overlap. Several trial-and-error attempts of doing this at different focal-length settings provided the final result. Keep in mind that this is a *one time only* test. Once you've arrived at your focal-length setting, you can use that from then on in your planetarium.

I did have another slight problem to overcome in getting our panorama sections to line up. Since we have a Zeiss Mk-VI star machine which protrudes above the dome's springline, our pan projectors are left-offset to shoot around the instrument. This keystones the individual pan images and makes them visibly taller on the right side than on the left (Figure 12). Unfortunately, VistaPro isn't designed to deal with this problem. However, I easily fixed this keystoning by counter-distorting the rendered VistaPro images using the *deform* function in Paint Shop Pro. By checking projected Oxberry grid slides, I determined that the keystone-distortion in our planetarium theater is almost exactly 10 percent. Performing a *select all* on each image and applying a minus-10-percent vertical deformation down from the upper right corner in Paint Shop Pro corrects for the keystoning (Figure 13). In fact, by using this method, all of our soft-edge-masked VistaPro-generated panoramas line up so well in the theater that not a single

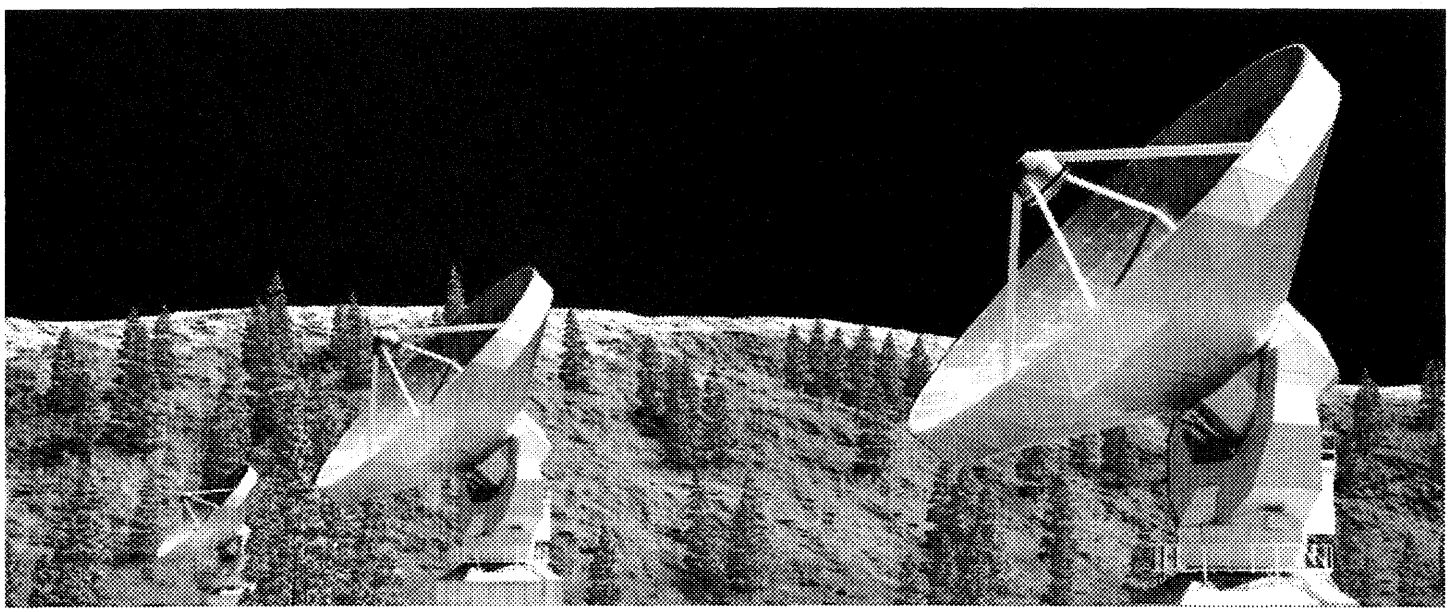

Figure 11

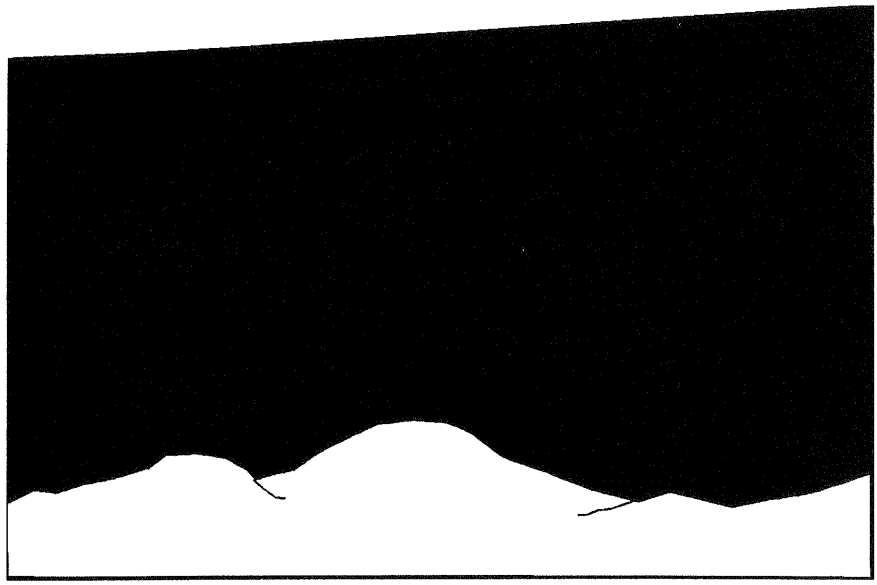

Figure 12

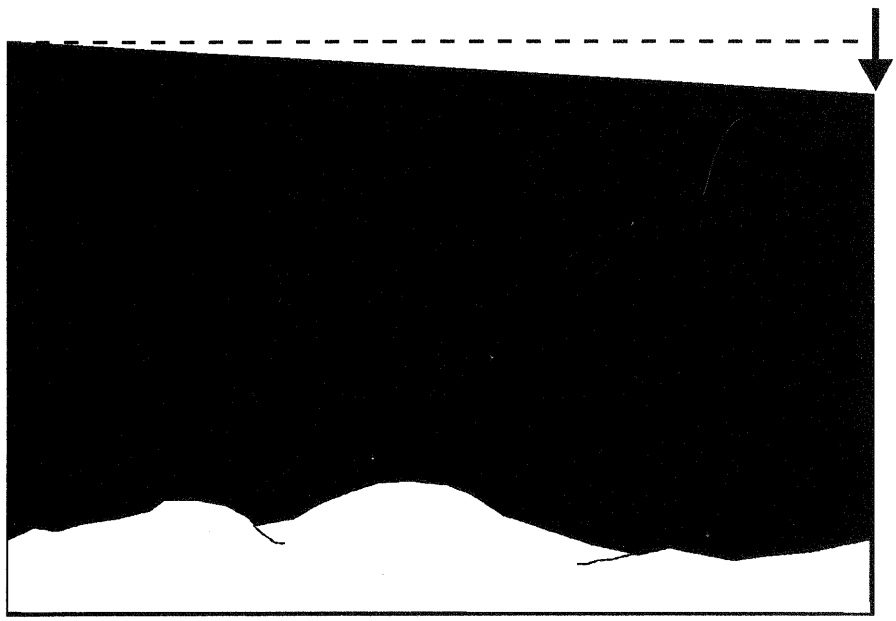

Figure 13

image has required any manual re-alignments!

So let's say you've got VistaPro installed on your computer, and you want to create landscape panoramas. How do you get these to slide? The simplest way is to take the image files to a commercial outfit with a film recorder. (If you choose this option, make sure to tell the technicians not to crop or resize the images in any way, but to print them *full-frame.*) However the film-recorder option can cost $5 or more per slide! That will really add up fast when doing panoramas. The alternative is to print your images to a good color ink-jet printer using high-quality paper and then shoot them at the copystand. Although this method requires some precision positioning of the prints under the camera, it may be worth working up such a special copystand technique to avoid the high commercial reproduction costs.

Additional Observations

I'll take a moment to make a few comments and tips that may be of use to potential VistaPro users:

- When setting up the image size, make sure to remember that the correct aspect ratio for slides is 3:2. For preliminary work in VistaPro, the exact size won't be critical, but once you start moving closer to setting up your final high-quality renderings, make sure to enter appropriate proportions. Note that none of the VistaPro preset image size options match the 3:2 slide aspect ratio. However, you can enter numerical values for your rendered images from the keyboard. To get an exact ratio on small scale, 300 x 200 pixels usually will do. For the final high-resolution renderings, I use 1500 x 1000 pixels.

- As you make changes to your topo maps, make sure to periodically do a *Save Landscape* (found under *File* on the menu bar). This will prevent you from losing your landscape changes (colors, textures, tree placements, etc.) in the event of a program crash or unexpected power blackout. Bear in mind that saving a landscape is different from saving a rendered image. (The latter is done under *Save* on the menu bar, which lists several different image-format options including PCX, BMP, JPG, and TGA (Truevision Targa). (If you want another file format, you will need to convert and re-save your images in a PhotoShop, Paint Shop Pro, or equivalent.) Even if you make changes to your topo maps and save the resulting rendered images, the changes won't be retained in the topo map without performing the *save landscape* function.

- If you will be sending your files for output through a film recorder, remember that the slide images will look darker than on your computer monitor. Set up *brightness* and *contrast* to make the images lighter than normal on the computer. You can also do this in your painting program after the images are rendered in VistaPro.

- In my computer panorama work so far, I have intentionally deactivated VistaPro's *Auto Exposure* function for fear that it might lead to perceptible brightness *steps* between the final panorama sections (though I plan to play around with it to test this assumption). Be careful if you decide to use this function. Otherwise, I suggest keeping it deactivated and manually setting *brightness* and *contrast.*

- Be careful when selecting your light source (Sun) position. Although a lower Sun will create more dramatic-looking shadows and make for more dramatic-looking terrain features, it can also make part of your panorama very dark, while the other part is very bright. I've found that keeping the Sun between 55 and 70 degrees declination (altitude) reduces excessive terrain-brightness differences without eliminating too much of the perceptible relief detail in the landscape.

- Remember that in most cases when rendering panorama images, you will want to

turn off your sky, clouds, stars and Moon, and often your distant *horizon* as well (I think VistaPro horizons look a bit artificial, especially against a black sky). Also, be careful when using *Haze*. It works well for Earth scenes, but probably isn't appropriate for some other planet/moon landscapes - particularly those with little or no atmospheres.

- Consider using textures for your terrain features rather than simple colors. Good textures will help give your landscapes a more natural appearance. There are lots of free texture files available for download on the internet. However, you'll probably find that only a small number will work well in your landscapes. The best ones have very tiny, granular-appearing detail. Be aware that VistaPro will only use TGA bitmaps for its textures, so any JPG and GIF files that you download will need to be converted to TGA. But don't worry about a bunch of TGA texture files taking up space on your hard drive. The typical texture file that works with VistaPro is only a few dozen pixels square, so even a larger number of small-dimension TGA files won't take up much disk space.

- Whenever possible always have your trees rendered as 3-D, rather than 2-D. Although 2-D trees will render faster, they look very artificial (sort of like the Crystalline Entity from the *Star Trek: The Next Generation* series).

- Try playing around with the *large scale roughness* and *small scale roughness* functions on the VistaPro *Texture* control panel. Along with the use of texture bitmaps, these functions can change the characteristics of the surface - especially in the image foreground. Foreground terrain which might initially appear like jagged, bare rock can be made to look smoother or less rock-like by setting *large scale roughness* to zero. *Small scale roughness* changes can create some useful terrain effects as well.

- One drawback to VistaPro is that there isn't any real way to create or modify individual features within an existing topo map (add or delete a mountain, or add craters) from within the program. This issue is a fairly significant one when trying to create lunar or other planet/moon panoramas. It is possible, however, to import a gray-scale 258 x 258-pixel PCX image as a topo map. This allows the user to take an existing VistaPro topo map, and perform an *Export Elevations as PCX-Grayscale* function, open the resulting PCX file in a paint program, modify and re-save the image, then *Import PCX as Elevations-Grayscale* back in VistaPro. One difficulty is that, for most exported topo maps, most of the information displays very darkly on the image in a paint program. The best strategy is to brighten the PCX image in the paint program using gamma correction (don't use brightness/contrast), perform the manipulations, re-darken the image with gamma correction to the same overall brightness as in the original image, save the image, and then import it back into VistaPro. This procedure seems to work fairly well.

- There is no *undo* function in VistaPro. This can be of some concern, particularly when you would like to reverse a manipulation to a topo map. However, I must say that I haven't found this to be a huge hindrance, only a moderate aggravation.

Other Software Options

As I mentioned either, VistaPro isn't the only landscape rendering program available (although from what I've seen so far, I has the best balance of rendering speed, flexibility, ease of use, and cost). Besides the higher-end commercial packages like Bryce, Truespace, and 3-D Studio Max, there are a couple of other programs worth mentioning.

The first is a program called Genesis II. It is available from an outfit called Geomantics (www.geomantics.com) in three versions - a *Freeware* edition, a *Light* version for $50, and the *Professional* version for $300. The Freeware and Light versions have most of the basic features of the full version. A few web sites claim Genesis to be superior to VistaPro. However, based upon the Genesis II-rendered images I've seen posted on the internet, I think its output quality is similar, though perhaps the sky quality is a little better. In my first attempt to work with the program after downloading, it didn't seem readily intuitive, but perhaps future attempts will yield greater success. The Genesis II Freeware version is available for download from the Geomantics web site.

The other application of note is Terragen. This is actually an amazing program that can be downloaded and used free for personal, non-commercial purposes, and is $79 for *commercial* use. This program excels at creating beautiful sky and water effects and many of its images truly look as though they are actual photographs of real-world scenery. The downside to Terragen is that it doesn't appear to render discipherable vegetation (individual trees and shrubs) - only green ground colors which suggest vegetation (like grass). It also takes a comparatively long time to render even medium-sized images compared with VistaPro, though turning off the sky-rendering speeds things up quite a bit. Terragen can be downloaded from the web site http://www.planetside.co.uk, where you can also see some examples of the amazingly beautiful landscape renderings the program can produce. The user interface for the program is pretty easy to understand and learn, and unlike VistaPro, it does allow the user to create and manipulate individual features on the topo map. I don't yet have a feel for how good the program would be at rendering extraterrestrial landscapes as yet, though the Terragen web site does have an impressive-looking Martian landscape image. I intend to explore Terragen's capabilities more in the future.

If you're interested in creating your own striking panoramas, I strongly suggest checking out one of these landscape rendering programs. Even with no artistic training, you'll soon be cranking out attractive horizon images for your planetarium programs. ☆

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Science teachers can register now for summer workshops on the Penn State University Park campus during the summer of 2000. The Science Teacher Workshops offer middle-school and high-school teachers the opportunity to experience some of the most exciting fields of science with senior faculty known for their excellence in both teaching and research. Teachers will participate in hands-on activities, meet with scientists and researchers, and tour various labs and research sites. Participants will receive two graduate credits from Penn State for each workshop. Room, board, and a travel allowance are provided. Scholarships will be available for the Astronomy workshops.

The workshops include:
- Astrobiology: the Origins and Early Evolution of Life (June 26 - 30)
- Stars and Planets for Science Teachers (July 10 - 14)
- Galaxies and Cosmology for Science Teachers (July 17 - 21)

Information regarding the workshops is available at www.outreach.psu.edu/C&I/Science4Teachers or www.psu.edu/spacegrant.
For more information, contact Geraldine Russell, 814-863-5957

SPACE CREATORS

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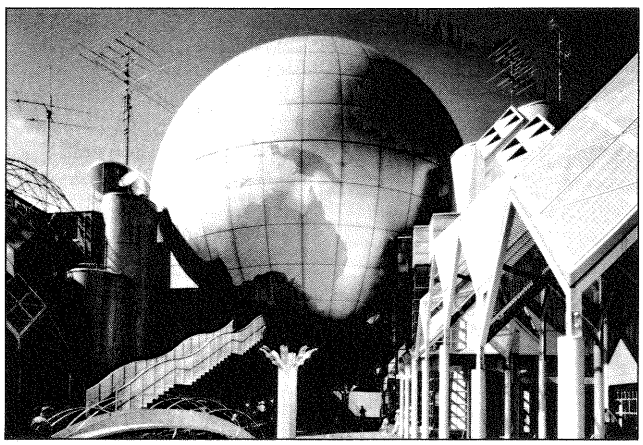

Shonandai Culture Center

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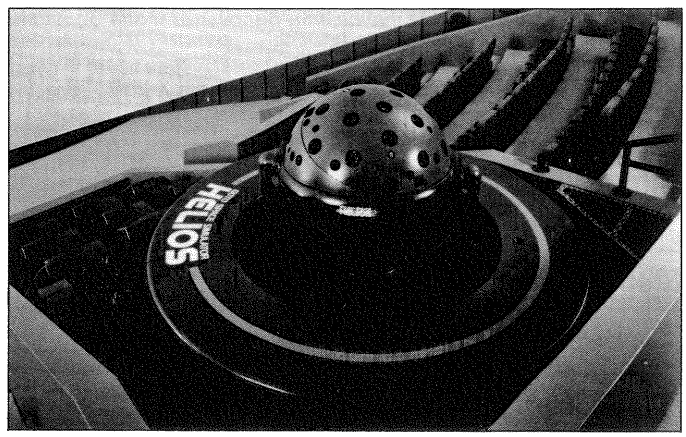
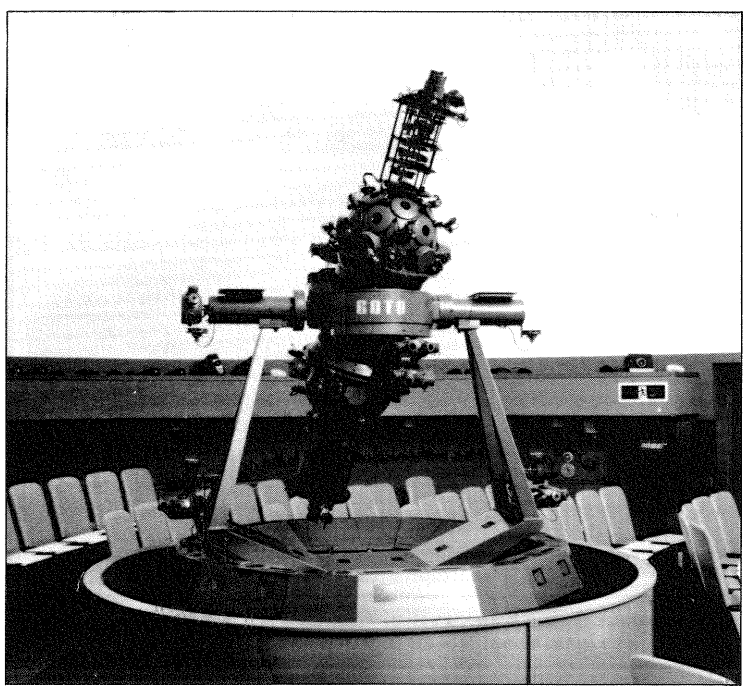


GSS-Helios

The GSS-Helios (GSX) features 25,000 stars reproducing a sky seen only from space. Digital shutters mean panoramas without stray stars twinkling through the image. Computer-assisted functions give manual mode the ease of auto mode without replacing the lecturer. The list of special GOTO features goes on and on. Contact your nearest representative and find out what your planetarium could be like.



G1014si

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Jane's Corner

The Best Planetarium in the Whole World

Jane Hastings
Thomas Jefferson Planetarium
4100 West Grace Street
Richmond, Virginia 23230

I have visited many planetariums in the last 30 years; I would like to reveal my selection for "The Best Planetarium in the Whole World." I know what you're thinking; I haven't seen them all. Please hear me out; I think you'll agree.

I'll tell you right away so you won't have to guess. It's the Holt Planetarium at the Lawrence Hall of Science (LHS), in Berkeley, California, built in 1973 under its first director, Alan Friedman. Planetarian Alan Gould is its current director. Let's go inside and see what qualifies Holt as "the best". As you enter the planetarium, you are struck with the smallness of it. It has a 6.8-meter dome, a Goto Mercury planetarium projector, and one circular set of benches. The benches seat approximately 25 (a few more children). The benches are so close to the inside circular wall that when you are seated, your head is slightly outside the dome circumference. Above and behind your head, on the wall, hang clipboards on nails and orange-colored dimmable lights which shine down on you.

The console is in the center of the room. The operator walks around the room in a narrow circular path found between himself and the feet of the seated patrons. No automation is evident; lots of toggle switches show on one side of the console. Two switches operate a cassette tape player and a CD player hooked up to two modest speakers. Other switches toggle a video projector, four slide projectors, and a couple of special effects projectors, all mounted in the center of the room somehow.

Where's the laser, all-sky, panorama projectors, surround sound, exploding supernova? How could this be the "Best Planetarium in the Whole World?"

This planetarium is a laboratory; a place in which to try out things which benefit all planetariums worldwide. It's inhabited by energetic go-getters who are anxious to be involved in projects to improve learning and science/math literacy. To that end, the LHS Holt Planetarium has been partners with several NASA and other federal programs including:

- NASA's Science Education Gateway (SEGway) project which produced middle and high school internet lessons; [http://cse.ssl.berkeley.edu/SEGway]
- NASA's Sun-Earth Connection Forum which is producing a lesson on seasons and a planetarium show about the Northern Lights;
- Center for Particle Astrophysics project which sponsored the creation of a planetarium program "Mysteries of the Missing Matter" (about dark matter);
- Hands-On Universe project which allows student access to an automated telescope, and enables students to use image processing software on downloaded images;
- An Integral relationship with the Great Explorations in Math and Science (GEMS) curriculum development project which has produced these teacher guides: *Earth, Moon and Stars, Moons of Jupiter, More than Magnifiers, Color Analyzers, Experimenting with Model Rockets, Height-o-Meters;* and *Sky Challenger Star Wheels* with six interchangeable discs, each disc focusing on a specific observing activity.

These are very busy folks, as you can see. The real clincher for Holt's title of "The Best ..." evolved while I was on vacation. I visited the Holt Planetarium to see a planetarium show. This is where Holt really shines! There were two shows offered during the day. One of them, "Constellations Tonight," is designed to teach people how to use a star map for the current night sky. The one I went to see was called "Moons of the Solar System". It was offered twice during the center's hours of 10:00-5:00. The planetarium show was $2.00, an extra cost not included with the admission price to the Hall.

Here a small group of adults/children was invited to join a guide on an adventure in science in which individuals from the group were allowed to express their ideas (and most likely their misconceptions) while we all pursued new knowledge and ideas. Moons of the Solar System: we began with the dimming of orange lights to a late afternoon sky. The sun set, the room darkened to show the moon in a southwestern sky with a sky full of stars. Holt's planetarian showed us how to find the North Star, using the Big Dipper. Then he asked a question: "Three days from now," he said, "where will the moon be in the sky at the same time of night, just after sunset?" Each person who wanted to guess was given a red arrow pointer to show where. The guide was in no hurry: all during the show he asked a few pertinent questions at each juncture and accepted all explanations without correction, just gently leading to a "better" explanation. He showed us where the moon would be three days from now.

Surprise! Not only is it in a different place, it's a different shape! "Where would it be three days from there?" he asked. Again, we saw the moon in a different place, with a different shape. We were asked to name the shapes we have seen. He then told us the names of the shapes, and asked, "Why does the moon change?" After a leisurely pause for audience ideas, he told us, "The moon moves around the earth. As the sun shines on the moon, the moon looks different". He then turned on a fairly bright light in the middle of the room and gave each person in the room a 2-inch Styrofoam ball stuck on a 6-inch piece of dowel rod, and we modeled moon phases, using our head as earth. We discovered how the moon changed phases.

After completing this demonstration, we were next shown a copy from a page of Galileo's journal on which he recorded data about the moons of Jupiter. The drawings were confusing. Next we saw a slide of what Galileo probably saw: Jupiter and its four largest moons. It was the first in a series of 11 slides specially produced for this show: they were shown in a sequence that revealed the position of the four moons over a period of time. Each moon was a different color (for purposes of this demonstration). People in the room were divided into four groups; each group was told to watch one moon as the slide sequence was shown, and report when "their" moon came back to where it started. And so we were *not* told that moons orbit planets and the closer the moon, the faster it moves; we *discovered* it!

For the second half of this show, we took a tour of the moons in the solar system. So, in "Moons of the Solar System," we saw lots of pictures of moons, we learned what a moon is, and how it moves. Wow: now that's a planetarium show!

But there's more ... In 1979, LHS conducted summer institutes for Planetarium Directors in the area of how to implement such lessons. A decade later, 300 teacher-leaders were trained in these summer institutes to bring the experience of "Participatory Oriented Planetariums for Schools" (POPS) to planetariums all over the world.

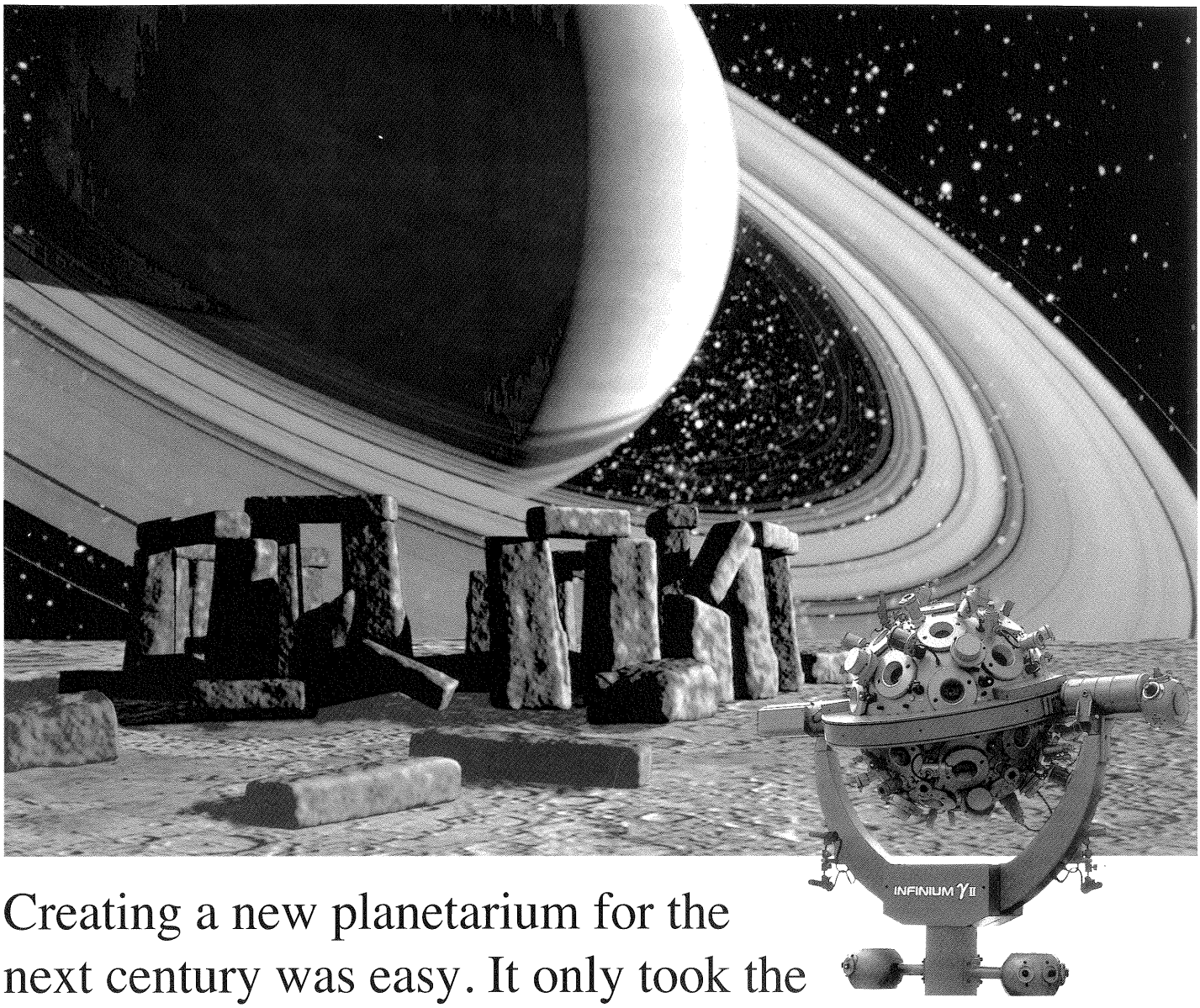
The POPS people also came up with a 12-volume set of books designed to help teacher and planetarium educators implement effec-

tive participatory programs and classroom activities. The Volume Titles are: *Planetarium Educator's Workshop Guide, Planetarium Activities for Schools, Resources for Teaching Astronomy and Earth Science, A Manual for Using Portable Planetariums, Constellations Tonight, Red Planet Mars, Moons of the Solar System* [that's the one I have described above; the 11-slide sequence comes with it], *Colors from Space, Who "Discovered" America, Astronomy of the Americas, How Big is the Universe?* and *Stonehenge.* If you have a planetarium, and don't have these books, *Get them!* [Planetarium web site: lhs.berkeley.edu/Planetarium; volume site: lhs.berkeley.edu/pass.]

These unique audience-participatory shows are authored and edited by Cary Sneider, Alan Friedman, and Alan Gould. In my opinion, without these three "hawkers" of "participatory-ness", we converts (yes, I'm one!) wouldn't have polystyrene balls on sticks, sky maps for use in the planetarium for star ID, or any other of the wonderful ideas spawned by 27 years of educational experimentation at the Holt Planetarium. The Lawrence Hall of Science has been a pioneer in what professional educators call the "discovery," "hands-on or "participatory" technique for learning, specializing in astronomy/space science/mathematics concepts. In 1998, nearly 19,000 people visited LHS's planetariums (including 8500 participants in their Starlab outreach program). However, there is no way to estimate how many people have been influenced by the commitment of Holt's staff to helping people understand the Universe.

In my opinion, the POPS philosophy is not only past history, it is the model for the direction that planetariums should go in the new millennium. That's another basis for the title I've laid on the Holt Planetarium. In the September, 1999 issue of the *Planetarian*, it seems that others agree. The lead article of that issue, entitled "Reflections on Planetarium Design and Operation", was written by Ian McLennan, a prominent former planetarian and avid planetarium-lover. In ending his 'reflections', Ian writes: " I have come full circle, and am convinced it is overdue for ... planetariums to abandon the recorded show, and go back to the basics. This means having highly motivated, knowledgeable, talented, enthusiastic presenters and communicators connect with live audiences in the planetarium theatres of the future. [We need to re-introduce styles] that can assist us in reaching the public at a very high level of engagement-including fundamental and excellent storytelling."

If I take another vacation out LHS way, you better bet I will go and see what the masters have come up with at "The Best Planetarium in the Whole World!" ☆



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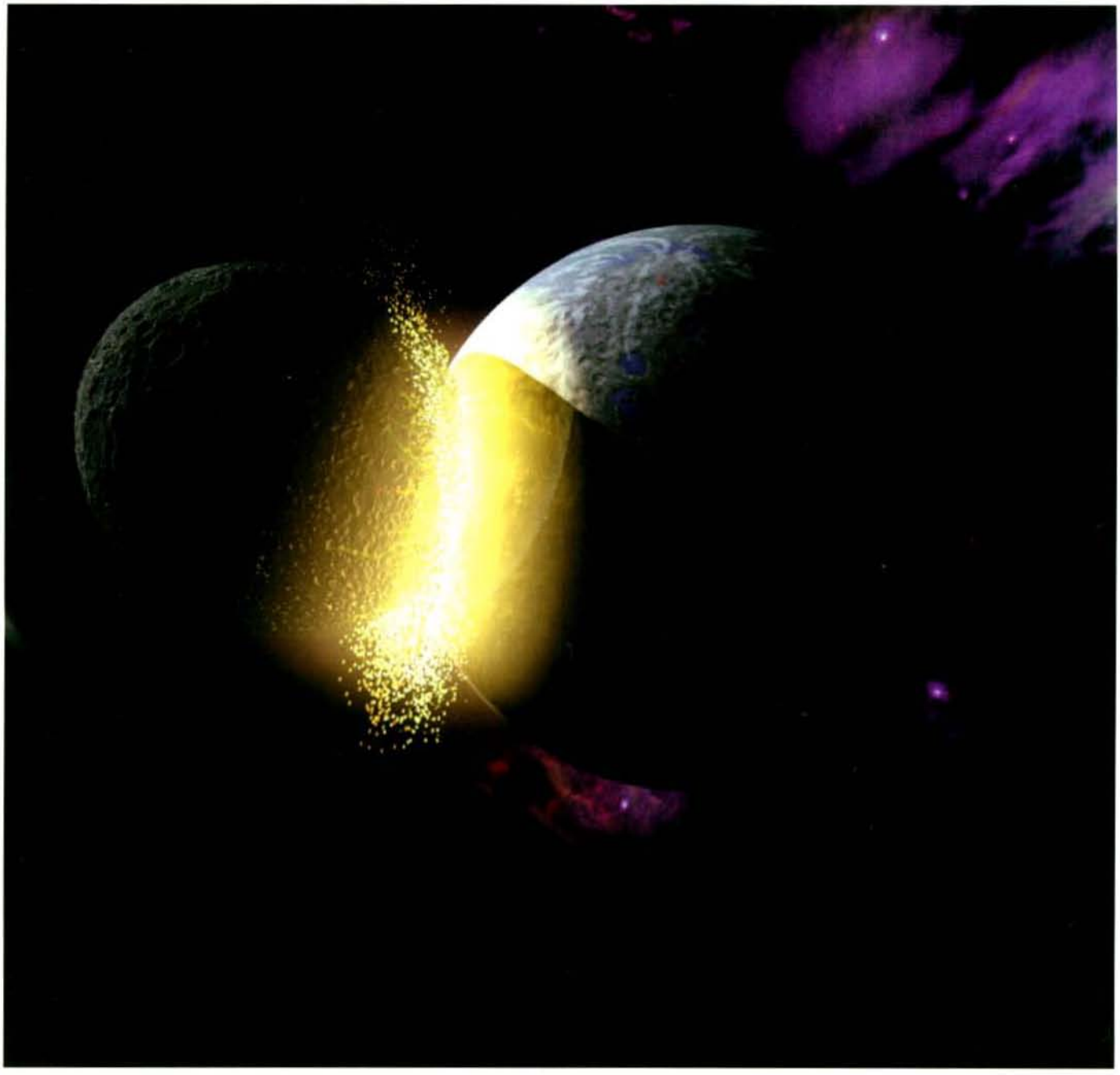

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