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Cover: Flamsteed’s magnificent Atlas Coelestis, published posthumously in 1729, used Bayer’s Greek-letter star-naming system from more than a century earlier, but not Flamsteed’s star numbers. Both Bayer’s letters and Flamsteed’s numbered stars appear on modern charts as two of many astronomical naming systems in use today, as explained by Jeanne Bishop beginning on page 6. Map image courtesy John Mosley.
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The IPS Conference in Valencia, Spain, was a great success, and as these words appear on page 2, I can be the first to congratulate the conference hosts and the many, many people who made the conference a wonderful experience. It was a job extremely well-done. There were vendors aplenty (one could have spent a full day visiting just them), more papers than a person could possibly attend, and many important and useful workshops and talks. Not to mention the demonstrations and previews in the planetarium that ran until (I’m told) 2 a.m.

There was much to like about the conference. It ran smoothly (except for probably unavoidable technical glitches in the dome); it was well-organized; the conference handbook was complete and professional; there was plenty of space; there were dozens of staff on hand to assist and direct; the meals were wonderful; and on and on.

I have one complaint/suggestion and one pet peeve. The complaint is that there was too much to do in the four days we had to do it, and cruel choices had to be made. I saw about half of what I would have liked to have seen, and I reluctantly left the demos under the dome at about midnight - thus missing the last few hours of material. This is a consequence of the organizers’ success in attracting good people and good material. Someone who once complained that “the Planetarian has too much advertising” doesn’t appreciate how hard we’ve worked to enlist so many advertisers (whose support pays for this glossy color journal), so I am very appreciative of the enormous amount of work that so many people put into the conference. But we needed another day! And we needed to schedule the planetarium theater so events could be concluded before, say, 11 p.m. Perhaps showing excerpts rather than full productions would have made this possible. Are the Australians listening?

My peeve is that, once again, as almost always, the name badges were too small to read unless you bent down and squinted. Come on, people! The technology exists to use large type and plastic holders that don’t swivel so they face inward half the time.

You’ll see in the columns that follow that I was not the only one to enjoy and benefit from the IPS conference in Valencia.

The Autumn 1979 issue was 36 pages long, which was exceptionally lengthy for that era. There’s space here to describe the articles and columns only briefly.

Alan Friedman, Laurie Eason, and Cary Sneider described in five pages the steps in developing “Star Games: A Participatory Astronomy Exhibit” at the Lawrence Hall of Science in Berkeley, California. The exhibit explains how telescopes work. Formulative evaluation allowed them to correct their initial designs and end up with an exhibit that was more user-friendly. Good idea! Their technique and the lesson of the value of testing is equally valid today (and note to self - the article is worth reprinting). The illustration below (figure 3 of eight total) shows one step of the review process.

Donald Hall described the first “Planetarium Production Techniques Seminar” held at the Strasenburgh Planetarium in Rochester, New York, in 1978, with 10 photographs.

Hubert Harber of West Chester State College in Pennsylvania wrote on “The Astronomical Techniques of the Polynesian Seafarers.” These include noting the azimuth of rising and setting stars and the passage overhead of zenith stars.

T. Smith of Nova University, Ft. Lauderdale, Florida, outlined the “Criterion for a Research Article.”

William Rush and Adolf Witt of the University of Toledo, Ohio, brought readers up to date on “Interstellar Matter - Some Misconceptions.” It contains useful information for people presenting planetarium shows on the Milky Way, but pure astronomy articles seldom appear in the Planetarian (they are available many places elsewhere).

“Sky Notes” by Jack Dunn listed records that contain music that is suitable for “borrowing” for planetarium shows (including some that include performance rights). Those were the days!

In another astronomy (as opposed to planetarium-related) article, John O’Keefe summarized his thoughts on “Asian Tektites.” He argued for the lunar origin of tektites in an era when it was still thought that the moon had once been part of the earth that somehow was flung off.

Dale Ferguson of the Arecibo Observatory in Puerto Rico wondered which is “Messier’s Most Fascinating Object?” He argued why it should be M87, the giant active galaxy at the heart of the Virgo Cluster.

George Reed of West Chester State College in Pennsylvania introduced “the Volkswagen of the planetariums” in his article “Starlab Offers a New Mode of Planetarium Activity.” So far 50 Starlabs had been sold, and George’s article promoted them to the wider planetarium field.

I thoroughly enjoy Jim Manning’s “What’s New” column each issue, and comparing it with James Brown’s column from 25 years ago always illustrates how very far we’ve come in a quarter-century. Brown’s Autumn 1979 column was a short catalog of sources for planetarium panoramas that he prepared to facilitate the non-commercial exchange of visuals between institutions. The total list of sources consisted of Don Davis and the Fiske, Manitoba, McLaughlin, Morrison, and Queen Elizabeth planetariums.

The “International News” column was far in the future, but individual reports appeared from the British Association of Planetariums (Terence Murtagh) and the Planetarium Association of Canada (Paul Deans).

Herb Schwartz’s “Creative Corner” offered hints on where to find products that are often useful in planetariums from Spiratone, Rosco Laboratories, C & H Sales, Blackhawk Films, etc.

“Jane’s Corner” on the inside back cover wrapped up a long and packed issue.
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How Astronomical Objects Are Named

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Introduction
At the 1988 meeting in Richmond, Virginia, the International Planetarium Society (IPS) released a statement explaining and opposing the selling of star names by private business groups. In this statement I reviewed the official methods by which stars are named. Later, at the IPS Executive Council Meeting in 2000, there was a positive response to the suggestion that as continuing Chair of the Committee for Astronomical Accuracy, I prepare a reference article that describes not only how stars are named, but how a wide variety of sky objects get their names. “How Astronomical Objects Are Named” is the result. I hope that this very long article may serve as a helpful “one-stop” source of answers for most of your astronomy nomenclature questions.

The professional astronomy group that makes official decisions about names of all astronomical objects is the International Astronomical Union (IAU). Sky objects with names established by long usage usually are recognized by this group. Major committees of the IAU are responsible for approving systems that name sky objects as well as for approving new proper names for some individual objects. There are specific IAU directions for naming different categories of objects.

Like the IPS, the IAU has declared its complete dissociation with the commercial practice of “selling” fictitious star names, wishing to make it unequivocally clear that any hint of association with these companies, which take in millions of dollars annually and have offices in many countries, is “patently false and unfounded.” Similarly, governments have noted that one cannot sell land on other planets or their satellites.

Strongly making this point, Brian Marsden, Director of the Minor Planet Center and a former Associate Director of the Planetary Sciences division at the Harvard-Smithsonian Center for Astrophysics, declares that the business of having a star named for you with the name registered in an ‘important’ book “… is a scam. Astronomers don’t recognize those names. The Library of Congress doesn’t recognize those names. They’re misleading the public. I’ve seen a few certificates giving the positions of the star — I’ve checked and there wasn’t a star there. Either they’re making up star positions, or they’re not interpreting the charts correctly.” (Dis - cover, February, 2000, p.72)

Planetarian Richard Pirko remarked on Dome-L, “I never attempt to make the buyer look like a fool. My boss, however, likes to tell his classes that they can achieve the same effect [as purchasing a star] by walking into the back yard, pointing to a star, and saying, ‘I hereby name you Aunt Betty.’ You then complete the ceremony by removing from your wallet $45 and setting it on fire.”

This article will focus on the systems used by astronomers to give accepted names to celestial objects and object features as well as the historical development of names for categories of objects, individual objects, and object features that now are in use. I have added anecdotal information to provide additional background about the naming processes and to make the topic more interesting. Celestial nomenclature is a broad subject with lots of opportunities to travel on interesting side roads of information, so it will take some time and distance (pages) to explore.

The Constellations
Throughout the world we find different names for constellations, begun long ago, all interesting and helpful to understanding the use of the sky by the societies of the people that developed them. However, these different systems are beyond the scope of this article; the discussion will be limited to the system of constellations used currently by astronomers in all countries. As we shall see, the history of the official constellations includes contributions and innovations of people from many cultures and countries.

The IAU recognizes 88 constellations, all originating in ancient times or during the European age of exploration and mapping. Possibly, notes Owen Gingerich, the oldest constellation is Ursa Major, its use (in the Northern Hemisphere) circling the world from an origin somewhere in Eurasia. The idea of a Bear for the Big Dipper, sometimes with surrounding stars, was used by natives of North America, who in turn migrated from Asia. When Europeans met the Native Americans, members of both cultures were surprised to find that the other group used the name of “bear” for these stars. Owen Gingerich suggests that the Bear constellation dates back to the Ice Ages.

Archeoastronomer E. C. Krupp recently reviewed and analyzed a large body of literature on the early development of the constellations in use today. I highly recommend Krupp’s article for a balanced look at different origin ideas including the “zone of avoidance” theory (pinpointing latitude where unseen stars would have centered on the south celestial pole at certain times in the precessional cycle) and Alexander Gurshtein’s ideas on the development of Zodiac constellations in sequential “quartet” groups beginning in about 5600 BC.

There are convincing records and arguments that Mesopotamia (areas of present-day Iran, Iraq, Northeastern Turkey, and Syria) was the site of origin for many of our constellations. Possibly the Lion (Leo), the Bull (Taurus with the Pleiades), and the Scorpion (Scorpius), all Zodiac figures, were among the earliest, appearing in the fourth millennium BC.

In ancient Greece, about 700 BC, the epic
poems of *Iliad* and *Odyssey*, attributed to Homer, and *Works and Days*, attributed to Hesiod, independently mention the Great Bear, Orion and the Pleiades. The asterism of the Pleiades was put forth as a separate constellation.

The astronomer Eudoxus (c. 390 BC-340 BC) was the first Western writer to discuss many of the now-recognized constellations of the Northern Hemisphere. We understand that his presentation was given in two separate books, now lost, handbooks for use with a celestial globe showing these constellations. *Phaenomena*, a poem that Aratus of Soli wrote in about 275 BC, shows us what Eudoxus must have described. Eudoxus and Aratus identified 47 of our constellations, including "the Water" (now part of Aquarius). Other Greek works listing *Phaenomena* constellations were summarized by Eratosthenes (276 BC-194 BC) of Cyrene, famous for finding the size of the Earth, in the third century BC.

Noting the times of these Greek writings, Krupp observes, "We encounter only sparse evidence for the constellations in the eighth century BC, but roughly 600 years later they parade in full regalia and present themselves as a complete set." (*Archeaeostronomy*, Vol. XV, p. 45.)

Many researchers have tried to determine the origin of the other *Phaenomena* constellations, with wide agreement that most came from Mesopotamia. Studies which incorporate the "zone of avoidance" theory assume that the constellations were created in one place at one time. Since each study concludes that *Phaenomena* constellations originated at a latitude/epoch (or place/time) combination that is somewhat different from the others, these studies do not identify our constellations' roots.

Krupp says that we should not assume that all the new constellations in *Phaenomena* were created abruptly at the same location. Based on all available evidence, and the lack of data showing otherwise, he believes it likely that an elaborate constellation system which led to *Phaenomena* constellations developed when three things existed: a motive (reference for motions of the Moon and planets), the lack of data showing otherwise, he believes it likely that an elaborate constellation system which led to *Phaenomena* constellations developed when three things existed: a motive (reference for motions of the Moon and planets), the lack of data showing otherwise, he believes it likely that an elaborate constellation system which led to *Phaenomena* constellations developed when three things existed: a motive (reference for motions of the Moon and planets), a means (instruments and literacy), and an opportunity (social organization comparable to a kingship that supports time, training, and resources for specialists). In a central situation with these features, newly-created constellations were fused to imported ones, sky figures that had been devised in other places at other times. A likely candidate for the first major creator-synthesizer of our constellations was the Mesopotamian Sumerian culture. Subsequent Mesopotamian kingship cultures may have added constellations with different origins to the Sumerian constellation core.

How the majority of *Phaenomena* constellations made their way to Greece also is uncertain. The Minoans, a maritime group who moved between the Middle East and the Mediterranean, may have learned the constellations directly from Mesopotamians, used them for their navigation, and passed them along to Egypt and Greece. Alternatively, Krupp thinks that it is just as plausible for Anatolia, especially Ionia on the western shore of the Mediterranean and a place near Eudoxus' home city of Cyzicus, to have served as main movers. Ionia was a wealthy, intellectual region, possessing excellent trade connections. The Minoans still may have had a part in constellation distribution, adopting, adapting and transmitting them after they finally reached Crete.

Ptolemy's book was the most crucial instrument for transmitting the Mesopotamian constellations to later generations. The set of figures described by Ptolemy in *Syntaxis* in the second century AD is the foundation of our constellation system. We know Ptolemy's work by the title *Almagest* ("the great book"). *Syntaxis* was translated into Arabic by Thabit ibn Qurra in the ninth century. The Ptolemaic constellations were kept vibrant in the Middle East while Europe was climbing out of a Dark Age. The Islamic scholar Al-Rahman Al-Sufi (903-986 AD.) identified 48 constellations in *Treatise on the Stars*, his version of the *Almagest*. Al-Sufi combined Babylonian, Indian, and Bedouin traditions, drawing beautiful figures around the stars identified by Ptolemy. For example, we see a camel by a woman in Al-Sufi's representation of Cassiopeia. Al-Sufi's book was very influential in both the Islamic area and in Christian Europe. A Latin version appeared in 1270, and an Italian translation was made in 1341.

New constellations were added by Europeans as their ships ranged to southern latitudes. And empty spaces in the northern celestial sphere that had not yet received names, called by the Greek name of *amor-photoi* the "unformed" or "unshaped," were filled in. All constellations that were added during this post-Renaissance period are considered "modern." Many fell into disuse, but many others were fused permanently with those in Ptolemy's list.

With the posthumous publication of his 1602 star catalogue, Danish astronomer Tycho Brahe (1546-1601) was influential in popularizing two constellations engraved by Dutchman Gerardus Mercator (1512-1594) on his 1551 celestial globe. They were Coma Berenices (which Mercator called Circinium), once part of Leo, and Antinous, which was a section of Aquila. It is likely that Mercator borrowed these figures from a globe printed in Cologne by Caspar Vopel (1511-1561) fifteen years before, developed in turn from much older ideas. Tycho promoted both constellations, Antinous and Coma Berenices, but Antinous did not last.

Between 1596 and 1603, twelve more constellations were added by two Dutch navigators who observed in the Southern Hemisphere. Pieter Dirkszoon Keyser (?-1595) and Frederick de Houtman (c. 1571-1627) were instructed by Dutch cartographer Petrus Plancius (1552-1622) to make and record observations while they were on southern voyages. In an unexpected venue, a dictionary of Malay terms he published in 1603, Keyser added an appendix of 303 stars and 12 new constellations visible from the Southern Hemisphere: Chamaeleon, Dorado, Grus, Hydrus, Indus, Musca, Pavlo, Phoenix, Triangulum, Tucana, and Volans. Plancius invented three constellations of his own which are used today: Colombia (from stars Ptolemy had listed as surrounding Canis Major), Monoceros, and Camelopardalis.

Johannes Hevelius (1611-1687) of Poland, who modeled his astronomy work on that of Tycho Brahe, slipped seven more constellations among the growing number, closing the *amorphotoi* regions. In Hevelius' 1690 posthumously-published star atlas we discover Canes Venatici, Lacerta, Leo Minor, Lynx, Scutum, and Vulpecula. Scutum was introduced as Scutum Sobieski, "shield of Sobieski." Sobieski was King John III of Poland (1624-1696) who fought hordes of Turks that invaded Europe. Four constellations introduced by Hevelius which did not survive were Cerberus, Mons Marinalis, Musca, and Triangulum Minor. (Note that Musca already was a name for a Southern constellation.) In his *Firmamentum Sobiescianum*, Hevelius drew his constellation figures with backs turned, as if they are looking toward the center of a celestial globe. Many celestial cartographers had used this technique in the golden age of the celestial atlas, beginning with Johann Bayer's *Uranometria* of 1603, but Hevelius was the last to employ it in a major star atlas.

Nicolas Louis de Lacaille (1713-1762) sailed to South Africa and established an observatory beneath Table Mountain at Cape Town. When Lacaille returned to France in 1754, after three years of observations, he proposed fourteen new constellations to the French Royal Academy of Science. Published in 1756, all of them were accepted and continue to be used today: Antlia, Caelum Sculptoris (Caelum), Circinus, Fornax Chimaiae (Fornax), Horologium, Mensa, Microscopium, Norma, Equuleus Pictoris (Pictor), Pyxis, Reticulum, Octans, Apatani Sculptoris (Sculptor), and Telescopium. Lacaille named Mensa, meaning "table," in
By the beginning of the twentieth century, our constellations were fairly well established in the minds of observers. In 1922 the first General Assembly of the IAU officially adopted the list of 88 constellations. Belgian astronomer Eugene Delporte (1882-1955) drew up a definitive list of constellation boundaries on behalf of the IAU. Since there had been no consensus for boundaries before this time, Delporte’s book *Delimitation Scientifique des Constellations*, published in 1930, formulated a rigid professional system, a system in which no further substitutions or additions could be made. Every position on the celestial sphere is within one of the 88 constellations as presented by Delporte. Actually, in Delporte’s work, there are 89 defined areas, since the constellation Serpens appears in two separate parts of the sky. The two parts of the constellation Serpens, now accepted as a single figure, were Serpens Cauda (the serpent’s head) and Serpens Caput (the serpent’s tail). Considering this detail, people spoke of 89 official constellations during much of the twentieth century.

In 1930, when the constellations were caged in this definitive manner, Ophiuchus (between Scorpius and Sagittarius) became a de facto thirteenth Zodiac constellation, or perhaps better described, a thirteenth ecliptic constellation. Ophiuchus was never part of the classical Zodiac. In 1959, authors of the *Larousse Encyclopedia of Astronomy*, declared there were 89 constellations divided into three zones: 13 ecliptic constellations, 29 constellations (along with the rest of Ophiuchus) between the ecliptic zone and the north celestial pole, and 47 constellations between the ecliptic zone and the south celestial pole.

To point out a constellation in the planetarium, many of us slide the arrow or laser pointer over stars to make a figure, or we indicate that lines of stars represent edges of a constellation. However, in the interest of accuracy it is advisable to let adult audiences know that most constellations have official boundaries where there is only empty space to the unaided eye.

Some object names are derived from constellation names, such as stars (discussed below) and clouds found within constellation boundaries. “SCO-Cen,” for example, is an OB association of stars known for having many supernovae, with boundaries within both constellations Scorpius and Centaurus.

The Stars

The *First Dictionary of Nomenclature of Celestial Objects*, published in 1983, describes over one thousand different star naming systems currently in use, mostly for faint objects studied by professional astronomers. Some of these were sanctioned specifically by the IAU, while others derive approval for their professional use from astronomical tradition. (“Sold stars” are not one of these professionally-recognized systems)

Proper Names

The historical development of individual star names used today goes back to Greek times. The works of Hesiod include Arcturus and Spica in the eighth century BC. In 275 BC Aratus included six individual stars in *Phaenomena*: Arcturus, Capella (which he called Aix), Sirius, Procyon (which was an entire constellation), Spica (which he called Stachus), and Vindemiatrix (which he called Protyrget). Archaeoastronomer Ian Ridpath points out that although Aratus’ inclusion of Vindemiatrix may surprise us due to its relative faintness, apparently the ancient Greeks used it as a calendar star which marked the start of the grape harvest.

In his *Syntaxis* (later, *Almagest*) of about 150 AD, Ptolemy summarized knowledge of 1028 stars, including estimates of their brightness based on observations by Hipparchus three centuries earlier. Ptolemy did not identify most of these stars by Greek letters as we do today. Instead he used long Greek phrases, most describing the position of the stars within constellations. Ptolemy added only four new names to the ones given by Aratus: Altair (which he called Aetus, meaning “eagle”) Antares, Regulus (which he called Basiliscus), and Vega (which he called Lyra, the same name as the constellation).

Al-Sufi, as he copied and modified the *Almagest* constellations, sometimes made direct translations from Greek to Arabic names, such as Fomalhaut, which means “the mouth of the southern fish.” However, Al-Sufi also applied old Arabic names to many stars in his reissued Arabic star charts, names which frequently depicted animals or people.

Most proper star names are a legacy from Islamic astronomers of the Middle Ages, the oldest system of naming stars still in use today. When the books prepared by Arab scholars were introduced into Christian European countries, they were translated into Latin. The stars kept their Arabic names. The Arabic astrolabe, an instrument whose name means “star taker” and which has crafted points representing specific stars, further helped to spread the use of the Arabic star names to Western culture.

See Richard Hinckley Allen’s book *Star
Names, first published in 1899 and later by Dover Publications in 1963, for a wealth of information about the proper names of stars that can be of interest to planetarium audiences. Although Star Names is a very useful book, E. C. Krupp cautions us that research since 1899 shows that some of the information in Star Names is false, including the description of the origin of Hercules’ 12 Labors.

Also see the widely-referenced translation by Paul Kunitzsch and Tim Smart, Short Guide to Modern Star Names and Their Derivations (1986). The star name Betelgeuse (in Orion) offers an interesting example of a translation problem. Kunitzsch and Smart translate Betelgeuse as “hand of the central one.” But in some other books and articles we find “the star of the right shoulder,” “the bright red star in the right shoulder,” and “the right armpit of the giant,” all incorrectly including “right” as part of the meaning of Betelgeuse. It is helpful to be aware of incorrect translations in sources we use for planetarium programs and teaching.

Some Proper Names Used by NASA

Three stars received unofficial alternative names that were used in prestigious places. The names started as a conspiratorial joke involving people in two planetariums. E.C. Krupp, who wears the hat of Director of the Griffith Observatory as well as Archaeoastronomer, explains what happened: Astronaut Virgil Grissom made arrangements with Tony Jenzano (?-1997), Planetarium Manager at the Morehead Planetarium, to quietly rename three stars within a list that would be used in navigating Apollo spacecraft to and from the moon. Grissom submitted a list of 37 stars they were to learn to instructors at Morehead. The created names embedded in the list are backwards-spelled parts of astronaut names. Regor came from Roger Chaffee (1935-1967), renaming Gamma Velorum; Dnoes came from Edward White II (1930-1967) for Talitha or Iota Ursae Majoris (the northern star of the “third leap of the gazelle”); and Navi came from Virgil Ivan Grissom (1926-1967) for Segin, the center star of the “W” asterism in Cassiopeia.

Grissom, Chaffee, and White all died in the Apollo 1 fire during a simulated countdown on January 27, 1967.

The list containing the bogus names was passed along from the astronauts to Clarence Clemishaw at the Griffith Observatory planetarium, where training in celestial navigation and star identification continued. Clemishaw accepted the list; he did not question the authority of astronauts. When a second Apollo crew trained at the Griffith Observatory planetarium, the three star names remained in use. Subsequently George Lovi used the names in his monthly Sky and Telescope star maps and articles. By 1977, Clemishaw knew how the names originated, and he explained their origin in his book The Beginner’s Guide to the Constellations. See Krupp’s October, 1994, “Rambling Through the Skies” and Fred Schaff’s April, 2003, “Star Names New and Old,” both in Sky & Telescope, for more details. Also note the section below “Marx: A Few Details” for the way the Apollo 1 astronauts have been honored with official celestial names.

Bayer Designations

A second star-naming system was introduced by German astronomer Johann Bayer (1572-1625) in his 1603 atlas Uranometria. “Bayer designation” is a name applied to this system. Bayer used 60 beautifully-drawn constellations to identify stars, and he designated each star with a Greek letter. Often Bayer designated stars in their order of their apparent brightness within a constellation together with the genitive case of the Latin constellation name.

However, frequently Bayer used a combination of brightness and positional order within a constellation. For example, in Leo, the brightest star (Regulus) was Alpha Leonis, the next brightest, Beta Leonis, etc. But in Gemini the brightest star (Pollux) was Beta Geminorum, and the next brightest star (Castor) was Alpha Geminorum. In Ursa Major, Bayer used Greek letters for the Big Dipper stars in the order of the Dipper pattern. Amateur astronomers and some planetarians now beginning their study of star names think of the Bayer “brightness rule” as fixed, but as James Kaler notes, “It is massively violated.”

When Bayer ran out of the 24 letters of the Greek alphabet, he used Roman lower- case letters and then upper case letters, A to Q. Although the Roman letters no longer are used for the Northern Hemisphere, the Greek letter system has been applied to the entire sky. Alan MacRobert notes that years ago names like Alpha Centauri, meaning “Alpha of Centaurus,” seemed very natural to people who were familiar with Greek and Latin required courses in high schools and universities in the United States. Today many people in the US who hear Bayer designations are encountering Greek and Latin for the first time. The system may seem difficult or strange. Depending on general knowledge of Greek and Latin in a particular country, as you present star names in the planetarium it may be helpful to discuss some details of the Greek alphabet and Latin genitive case.

Bayer modified a system that had been introduced in 1540, over sixty years earlier, by Italian Alessandro Piccolomini (1508-1579). Piccolomini’s catalogue designated the brightest stars in each of 47 constellations with sequential low-case Roman letters, for the first time showing fairly accurate star positions on star charts.

Since so many planetariums use picture projections of the constellations, it may be interesting to know that the Western-style pictorial star chart began with Bayer, coinciding with the Renaissance art revival throughout Europe. Bayer’s constellation pictures of scantly-clad human figures and plump women probably reflect the art values of his time. The backward-facing figures found in Bayer’s Uranometria, and in later atlases until the time of Hevelius, must be an attempt to match mirror-reversed stars found on the outsiders of opaque celestial globes.

The first scientific use of Bayer’s atlas was by Johannes Kepler of Germany for his 1604-1605 notation of a supernova, “Kepler’s new star,” in the constellation Ophiuchus (recorded in De Stellae Nova, 1606). When Kepler (1571-1630) redrew Bayer’s Ophiuchus chart, he added his new “star” (labeled “N”) as well as positions of Mars and Jupiter at two different times. Kepler reversed Ophiuchus from Bayer’s direction, facing the figure toward the reader instead of away.

Flamsteed Numbers

A third important star naming system is Flamsteed Numbers, authored by John Flamsteed (1646-1719). Flamsteed became England’s first Astronomer Royal in 1675, the year the Greenwich Observatory was founded. Like Hevelius, John Flamsteed seems to have idolized and likened himself to Tycho Brahe. Flamsteed was so meticulous that he never got around to publishing his work himself. An unauthorized and uncorrected version of Flamsteed’s observations between 1676 and 1708, without star charts, was published in 1712 by Edmund Halley in collusion with Isaac Newton. Flamsteed gathered and burned all unsold copies of the Halley publication, but errors in the Halley publication were perpetuated. A correct illustrated atlas of Flamsteed’s work, Stellorum Inserarum Catalogus Britannicus, often called the British Catalogue, was published in 1725, four years after Flamsteed’s death. In this so-called “equinox 1725” system, each constellation’s stars are numbered in order of their right ascension, along with the genitive case of the Latin constellation name. Therefore 80 Virginis is east of 79 Virginis and west of 81 Virginis. All stars were numbered, whether or not they had a Bayer designation. So Vega is 3 Lyrae as well as Alpha Lyrae. The highest Flamsteed number within a constellation is 140 Tauri. Flamsteed’s simple system of Arabic numbers was similar to the system that had been used by Islamic astronomers.

Flamsteed’s book of constellation charts,
Atlas Coelestis based on the British Catalogue, was published with modifications by Abraham Sharp in 1729. On the chart of Andromeda, for example (see front cover), one sees the Bayer system of Greek letters. An unlabeled object can be identified at the location of M 31, the Andromeda Galaxy.

In 1930, with the publication of the IAU-supported work of Delporte, many Flamsteed catalogue star names became truly puzzling. Some stars which previously were in certain constellations now were in different constellations. For example, 49 Serpentis is in Hercules and 30 Monocerotis is in Hydra.

Flamsteed numbers usually were applied only by those in England, although Johann Bode gave Flamsteed-type numbers to stars of the Southern Hemisphere. Flamsteed numbers still are used frequently, although the only Southern Flamsteed numbers applied by Bode that have survived are 30 Dor and 47 Tuc.

Other Star-Naming Systems

As telescopes revealed fainter and fainter stars, new systems for identity were needed. The BD system, for Bonner Durchmusterung (Bonn Survey), was begun in 1859 by German astronomer Friedrich W. Argelander (1799-1875) at Bonn Observatory. Stars including tenth magnitude are included in this list. For the BD, Argelander and subsequent mapmakers divided the sky into narrow declination bands (1°) each beginning at 0 hours right ascension. Vega's designation in this system is BD+38° 3238, the 3,238th star between declination +38 and +39. The first BD covered the north celestial pole to -2° declination, the next, called the SBDS, covered the sky to -23° declination, and the last, the CD or CoD for the Cordoba Durchmusterung, extended to the south celestial pole. A total of 1,071,800 Durchmusterung star designations were made. BD names still are in use, but the magnitudes given in the BD catalogs are unreliable.

A rival to the Cordoba Durchmusterung was the nineteenth-century Cape Photographic Durchmusterung (CPD), the first major astronomical work to be carried out photographically. The CPD gives the approximate positions and magnitudes of nearly half a million Southern Hemisphere stars.

The Henry Draper Catalog (HD), of stellar spectra is a widely used catalog. In the early years of the twentieth century U.S. astronomer Annie Jump Cannon (1863-1941) at Harvard College Observatory listed the spectra of 225,300 stars in order of right ascension. More were added in the Henry Draper Extension (HDE). All stars with HD or HDE designations have had their spectra analyzed.

In 1908 another catalog was issued at Harvard: the Revised Harvard Photometry (HR), which tried to give accurate magnitudes for the brightest 9,110 stars (stars to a faintness of about magnitude 6.5). This list remains the basis of the now widely-used Yale Bright Star Catalogue.

The Smithsonian Astrophysical Observatory (SAO) Star Catalog, a compilation published in 1966, lists very accurate positions for 258,997 stars, to a faintness of about 9th magnitude. SAO stars are numbered by right ascension within 10 degree-wide declination strips. The SAO Star Catalog expanded on the single General Catalogue of 33,342 Stars (GC) by Benjamin Boss, published in 1937.

The United States Naval Observatory has the current most dominant catalog, which contains over half a billion stars. The USNO Catalog (AL0 on 10 CDs and A2.0 on 11 CDs) is the current record holder for the world's largest star catalog. It covers the entire sky, and it was created by scanning red and blue plates from different surveys. In its preparation, objects that appeared on only one colored plate were eliminated, which helped to evade the problem of spurious objects.

The Hubble Space Telescope Guide Star Catalog (GSC) contains 18,819,291 objects, available on two CD-ROMs. The GSC's brightest objects are 6th magnitude, since brighter stars cannot be used by Hubble's guide cameras. Most of the objects are 13th, 14th magnitude stars, although some 15th magnitude objects are included and 3.6 million of the objects are faint galaxies.

A set of catalogues based on the Hipparos Space Astrometry Mission are the Hipparcos Catalog (HIP), the Hipparcos Input Catalog (HIC), and the Tycho Catalog (T). The Hipparcos spacecraft name is derived from High Precision PARAllax COLlecting Satellite, a name honoring the early Greek astronomer Hipparcus. Large scientific teams collaborated with the European Space Agency (ESA) to release these catalogs in 1997. HIP includes position measurements, magnitudes, proper motions, and uncertainties. Objects are ordered by right ascension. HIC gives the data input to Hipparcos. The Tycho Catalog (known, called Tycho-1) is a specialized set of Hipparcos data. A user-friendly website contains parts of the catalogs, and it supports those who have and use the catalogs: http://astro.estec.esa.nl/Hipparcos/hipparcos.html. Because, unlike earlier database studies, Hipparcos did not operate for several decades, Tycho-1 proper motion data is relatively poor. Positions based on Tycho-1 data are excellent for times near 1991 (the midpoint of the satellite observations) and are slowly getting worse as time passes.

The Astromatic Catalog (AC) contains data for about 4 million stars, prepared from plates imaged about a century ago. The AC contains four times as many stars as Tycho-1. The United States Naval Observatory (USNO) derived improved positions by combining AC data with Tycho-1 positions in a hybrid ACT Catalog. The ACT Catalog lists star positions that are almost as precise in 2004 as they were in 1991. However, the Tycho-2 Cataloge, prepared in 2000 by synthesizing data from the AC, Tycho-1, and several other catalogs, plus employing better computer processing techniques not available earlier, essentially has made Tycho-1 and the ACT catalogues obsolete.

The Two-Micron All Sky Survey (2MASS) part of NASA's Origins program recorded data for over 470 million point sources and over 1.5 million extended sources from 1997 to 2001. Although the 2MASS catalog sources are much less utilized than the United States Naval Observatory sources, Principal Investigator Michael Skrutskie enthuses that this data volume is “several hundred times larger than that contained in the human genome. Astronomers will become cosmic geneticists, searching out patterns in these sky maps to decode the structure and origin of the Milky Way and the surrounding nearby Universe.”

There are eight types of 2MASS catalogs, including the All-Sky Point Source Catalog (“2MASS”) and the All-Sky Extended Source Catalog (“2MASSX”). Object nomenclature uses these catalog acronyms with numbers representing very precise right ascension and declination.

Some other important professional naming systems are found in the following catalogs: the Positions and Proper Motions Catalog (PPM), and the Zodiacal Catalog (ZC) by Robertson.

Astronomers maintain web-based data bases of sky objects. The largest and most used astronomical data base, containing stars as well as other Galactic objects outside of the solar system (and extragalactic objects since 1983), is SIMBAD, or “Set of Identifications, Measurements, and Bibliography for Astronomical Data.” SIMBAD contains 1.54 million objects with 4.4 million identifying names, cross-indexed to over 2200 catalogues, based on 2.5 million bibliographical references.

The CDS Service that maintains SIMBAD at Strasbourg University and Harvard University peruses over 90 journals for Galactic objects. Astronomers at recognized institutions in the United States, Europe, and Japan can obtain free passwords to get internet access to SIMBAD. Applications for a password may be sent by E-mail to CDS Service located at the Strasbourg, France Astronomical Data Center: question@simbad.u-strasbg.fr. A User's Guide for SIMBAD may be retrieved from ftp://cdsarc.u-strasbg.fr/pub/simbad/guide13.pgz.

SIMBAD is just one the CDS acronyms taken from stories of The Thousand and One Nights. The stories were written in the gold-
en age of Islamic astronomy. The son (Al-Ma’mun) of the sultan (Haran Al-Rashid) of the Thousand Nights stories commissioned translation of Ptolemy’s work into Arabic and also founded observatories in Baghdad and Damascus. CD’s ALADIN is an interactive digital computer atlas. The VizieR is a search program for a large catalog library. And the Astronomer’s Bazaar allows access to over one thousand astronomy catalogues on-line.

As a result of so many naming systems and catalogues, a bright or interesting star may have quite a few names. The multiple names are found on astronomy software programs. For example, in the Voyager III Dynamic Sky Simulator program (Carina Software), clicking on a mapped start causes at least 8 different start names pop up. For Betelgeuse one reads: Alpha Ori, 58 Ori, HR 2061, SAO 113271, HD 39801, BD M+4 1005, and Hipp 27989.

The idea of one start (and other sky objects) having different names may seem odd to both students and adults in our planetarium audiences. Brian Marsden says, “The existence of multiple names is very important from the point of view that it provides redundancy, thereby making it clear that, by supplying more than one designation as a check, we know which object we are talking about.”

The existence of multiple names is a fact of astronomy life, and we have a responsibility to explain the situation to those who attend our star programs. An understanding of multiple names can help people who make use of astronomy software programs like Voyager and on-line astronomy sources.

Double and Multiple Stars
Since so many stars are doubles or multiples, a system for naming the components is necessary. In a naked-eye binary, two stars close together, whether a physical binary or not, the western one is labeled A. For example, Zubenelgenubi, Alpha Librae, is a wide double star. The western star is named Alpha-1 Librae and the eastern star is named Alpha-2 Librae, even though Alpha-2 Librae is much brighter than Alpha-1 Librae.

For stars in a telescopic binary or multiple system, the brighter or the first discovered star (they usually go together) is called A, and the fainter, B (and then D, E, etc.) The Roman letters follow a Bayer, Flamsteed, or catalog designation. Thus the white dwarf companion of Sirius is named correctly with all of the following: Sirius B, Alpha Canis Majoris B, and HD 48918B. Perhaps one of the most difficult areas of astronomical nomenclature to understand, astronomers in different disciplines or specialties involving study of binary stars have different ways of referring to them. Stars expert James Kaler explains that the term “primary” means different things in the different disciplines.

Variable Stars
In 1862 Friedrich Argelander began the BD system for variable stars that is in use today. Since capital Roman letter Bayer designations go only as far as Q in the alphabet for faint stars, Argelander proposed using the letters R to Z for naming the variable stars in each constellation. When some constellations were found to contain more than nine variable stars, the naming system was expanded to two-letter designations, and then to numbers. Now the designation consists of one or two letters and the genitive case of the constellation or a “V” with a number and the genitive (or its abbreviation) of the constellation name. U Sagittarii, RR Lyrae, and V1500 Cygni all are variable stars.

The first variable found in a constellation receives the letter R, the next S, and so on up to Z. The tenth variable is RR, then RS up to RZ. The nineteenth is SS, the ST, up to SZ. The pattern continues to YY, YZ, and ZZ and then AA, AB to AZ, BB to BZ up to QQ to QZ. The letter J is omitted to avoid confusion with the letter I. Thus there are 334 possible designations for each constellation with this scheme, and beyond that the V with a number is used. If a star with a Bayer designation is found to be a variable, it is not given a new name, so Beta Persei (Algol), and Omicron Ceti (Mira) do not have letters or V numbers. Variable stars are classified in groups named for one typical representative, such as “Mira stars” or “RR Lyrae stars.” “Cepheid” is the name usually applied to stars like Delta Cephei. Sagittarius has the largest number of variable stars, with a star recently getting the designation of V4333 Sgr.

Extrasolar Planets
With well over 100 extrasolar planets now known, some might think that the IAU would by now have invented a proper names system for these planets. Geoffrey Marcy, who has participated in the discovery of a majority of the extrasolar planets, would like to see a system which bestows names on the extrasolar planets “representing the elusive but crucial element of human social coexistence on Earth. These would be words, in different languages, for peace, fruitful coexistence, compromise, empathy, and personal and global insight. The new planets should belong to everyone — to all nations and cultures.”

James Kaler says that it is beneficial to keep the system simple because even now there are too many of these objects for all to have proper names. And certainly more of these objects will be found. Alan Boss, who heads the IAU section to name such planets, explains that at this time there is no agreement for proper names among those astronomers working in the extrasolar planets field. The star (primary) of a system now gets the letter A after the star name and its planets get b, c, d, etc. The stars with extrasolar planets sometimes have tongue-twisting designations that must be mentioned over and over again in discussions and papers. One host star which has a Henry Draper classification is HD114762. William Cochran of the University of Texas found this unwieldy enough that he named the host “George.” And Alfred Vidal Madjar of France refers to the host star HD209445A as “Osiris.”

Hélène Dickel, Past Chair of the IAU Working Group on Designations, points out that extrasolar planet identification and study is still a very young field. Astronomers are too busy discovering new planets to spend much time on their names. A system already exists for naming multiple objects, found in the Washington Multiplicity Catalog (http://ad.usno.navy.mil/wds/new wds .html). Among many new multiple objects that most surely will be discovered with the next series of space telescopes, probably there will be a lot of extrasolar planets. Dickel thinks it likely that astronomers will designate these extrasolar planets, along with the other binary and multiple objects,
with the naming system found in the Washington Multiplicity Catalog.

Novae and Supernovae
A newly-discovered nova is named with the year in which it occurs written after the genitive case of the constellation. Later the nova receives a variable star designation. So Nova Cygni 1975 is also V1500 Cygni.

If there is more than one nova per year in a given constellation, the novae initially are distinguished as No. 1, No. 2, etc. This system also is applied to novae in the large Magellanic Cloud (LMC) and Small Magellanic Cloud (SMC), but not to other galaxies.

In other galaxies novae and other variables receive only “V” numbers.

A supernova is named with the year it occurs and a capital Roman letter for its order in a list of supernovae recorded within that year. If the star had one or more catalog designations before it reached supernova stage, the catalog names are retained and now said to apply to the “precursor” stars. For example, supernova 1987A (SN 1987A) was identified with the precursor star named Sanduleak -69°202. The precursor was the 202nd object within the 69th degree south of the celestial equator in The Deep Prism Survey of the Large Magellanic Cloud, published at Cleveland, Ohio’s Warner and Swasey Observatory by Nicholas Sanduleak (1933-1990). SN 1987A was the first supernova of 1987. If all 26 of the capital Roman letters have been used for supernovae before reaching the end of a particular year, then double lower case letters are applied. SN 2005aa would be the name of the 27th supernova of 2005. Names are applied in a sequence of aa through az, then ba through bz, and so on. The nominal reason for switching to lower-case double letters was that it allowed designations to sort correctly by computer. In reality, says Brian Marsden, there is a historical reason: lower-case single letters used to be used for comet designations (which changed in 1994), while upper-case double letters are used for provisional names of minor planets (asteroids) and TNOs or KBOs, both of which are discussed later in this article. Since there are only about three supernovae in a given galaxy in a thousand years, this naming system’s number of possibilities is sufficient for supernovae that are seen in all galaxies.

The very energetic objects called gamma ray bursts (GRBs) have been matched conclusively with supernova explosions if they last from 2 seconds to several minutes (long duration). Normally a gamma ray burst gets the name of GRB followed by numbers of year, month, and day of discovery, such as GRB 021211, named for the GRB found on December 11, 2002. If more than one gamma ray burst is discovered on the same day, a capital Roman letter of A, B, etc. is added to the designation. The reason for using the date instead of right ascension and declination is that frequently GRBs have very poorly established initial coordinates. Most of the time the positions of pulsars (neutron stars which are one kind of supernova remnant) are well known. Therefore a naming system including right ascension and declination is used. See http://cdswebui-strasbf.fr/cgi-bin/Dic.

Strictly speaking, category designations are not names. However, it is useful to know that supernovae are classified into two main categories, I and II, with Ia and normal-type II being the most common. Frequently the supernova category is given with the discovery or research information. Type Ia (SN Ia) supernovae have been observed in all types of galaxies, while types II (SN II), Ib (SN Ib), and Ic (SN Ic) have been observed only in spirals, barred spirals and irregular galaxies. The type of star which becomes a SN Ia is thought to detonate (supersonic burning front) or deflagrate (subsonic burning front) an accreting white dwarf in a binary system. The star becoming a normal SN II is thought to be caused by core collapse of a very massive star. Spectra and light curves are used to distinguish supernovae types. Supernova 1987A was a II pec (II peculiar) core-collapse supernova.

Type Ia supernovae have a very important role as standard candles in determining distances to remote galaxies. Within the past five years, observations of Type Ia supernovae have shown that the Hubble constant is not really constant, that its value increases at very large distances. Along with additional data, the upward turning curve of recessional velocity of distant galaxies containing Type Ia supernovae has pushed astronomers to invoke the exotic concept of abundant dark energy. Topics of dark energy and Type Ia supernovae go together in a planetarium program about cosmology.

Coordinate System Epoch and Time are Important
Early star charts had no coordinate axes. Bayer introduced grid lines in his 1603 Uranometria, so that each star could be distinguished to within a few tenths of a degree. Flamsteed’s posthumous British Catalogue contained two innovations that have been invaluable to astronomers: right ascension and declination of stars and an adjustment for precession.

To communicate positions of very faint objects seen with today’s powerful telescopes requires very precise coordinates. Astromers study objects at many different wavelengths, so they need a precise system for matching observations.

Precession movement, the slow westward migration of the vernal equinox position along the Zodiac, is a very important consideration in fixing accurate coordinates. Hipparchus of Nicaea and Rhodes (190 BC-120 BC) made a highly accurate calculation of the rate of precession, 46° per year. That is very close to the modern value of 50.26° per year, and it is much better than the value of 36° per year found by Ptolemy nearly 300 years later. A number of studies indicate that probably precession was noticed earlier by ancient Egyptians. Hipparchus may have employed BabyIonian data to find the length of the tropical year (time between successive arrivals of the sun at the vernal equinox), checking it against data he gathered himself as well as data of earlier Greek scientists. Applying his determined value of the tropical year, Hipparchus deduced the precessional rate.

As precession constantly changes the position of a star or other object with respect to the vernal equinox or any reference position, the exact time or epoch on which the right ascension and declination (or other coordinates) are based must be identified. For any date the coordinates can be adjusted to a standard date, the epoch. The most common standard date for coordinates given in the twentieth century was 1950.0 and the interval of time from that epoch was based on the sun reaching longitude 285°. This is the
The Nine Planets

Most planetarians are aware that the planet names we use are all those of Roman gods, with many of the attributes of Greek gods. But a review, with further details, should be given in any inclusive treatment of astronomical names.

Mercury is the Roman god of commerce, travel, and thieving and is the counterpart of the Greek messenger to the gods, Hermes.

Venus is the Roman name representing Aphrodite, the Greek goddess of love and beauty. Mars was a Roman god of agriculture before its association with the Greek god of war, Ares. Jupiter (Jove) is the patron god of the Roman state, counterpart to the chief Olympian god Zeus, son of Cronos, Saturn, like Mars, was a Roman agricultural god until it became identified with the Greek Cronos, son of Uranus and Gaia.

When Uranus was discovered by William Herschel (1738-1822) on March 13, 1781, he proposed the name of “the Georgius Sidus” (George) in honor England’s King George III (1738-1820), sometimes called the “insane king”, a condition resulting from a genetic disease or “the king who lost America”. Others called the new planet “Herschel.” But it was “Uranus,” the name suggested by Johann Bode (1747-1826) because Uranus would fit with the other planet classical names, which eventually stuck. By about 1850 all astronomers had accepted the name Uranus. We realize now that Uranus was seen in 1690, by John Flamsteed, because Flamsteed recorded it on a star chart as 34 Tau.

The story of Neptune's discovery, which twists through details of previous sightings, work by people in both Europe and Great Britain based on theoretical calculations, and chance events that possibly robbed some astronomers (and an amateur astronomer) of fame, is well worth planetarium program time. After Neptune was discovered and its orbit had been worked out reasonably well, old records showed that earlier astronomers had seen it. Galileo was just one of those who saw Neptune, recording the planet at least three times, first on December 28, 1612, and then on January 27 and January 28, 1613. Galileo even noted that Neptune, which he called a star, had moved away from another point, now known to be a real star. Joseph Jerome de Lalande (1732-1807) of France recorded Neptune on May 10 and 12 in 1795, John Herschel (1792-1871) even saw it, on July 14, 1830, recording it as a star. John Lamont (or Johann von Lamont, 1805-1879), who was born in Scotland but who lived most of his life in Munich, recorded Neptune at least three times — October 25, 1845, September 7, 1846, and September 11, 1846 — the last date just 12 days before its identification as a planet.

The name Neptune, Roman god of the sea and counterpart to the Greek Poseidon, was applied to the eighth planet soon after it was found. Conventionally, credit for Neptune’s discovery is given equally to Urbain Jean Joseph Leverrier (1811-1877) of France and John Couch Adams (1819-1892) of Great Britain. Both Leverrier and Adams calculated the probable location of a new planet, based on the deviation of Uranus from its predict-

ed orbit applying Newton’s gravitational law. The first sighting, based on Leverrier’s predictions, was on September 23, 1846, by Johann Gottfried Galle (1812-1910) and Heinrich Ludwig d’Arrest (1822-1875) at the Berlin Observatory. See http://www-groups.dcs.stand.ac.uk/~history/HistTopics/Neptune (1996).

As an interesting sideline to Neptune’s discovery, it is difficult to determine if Adams and Leverrier deserve equal credit. Some documents pertaining to Adams’ work were found in Chile in 1999, and they have been studied by historian Nicholas Kollerstrom of University College London. Kollerstrom believes that British claims have been exaggerated. Traditionally Britain’s Astronomer Royal George Airy (1801-1892) has been criticized for being slow to respond to Adams’ request to look for the planet, in fact being mentioned by biographers as the most controversial Astronomer Royal. Adams gave Airy information on the position of the “new planet” on October 21, 1845 and it was July 9, 1845, before Airy asked James Challis (1803-1882), Director of the Cambridge Observatory, to begin a search for it. Challis reluctantly looked and saw the planet on both August 4 and August 12, 1845; but then he did not take the necessary time to compare all the points seen at those times with points he had recorded on July 30. Challis would have found Neptune if he had made all of the tedious comparisons. From analysis of the Chile documents, Kollerstrom concludes that Challis did not have a good indication of the planet’s location. The records show that Adams changed his mind repeatedly and that his predictions varied over 20 degrees of sky. But better maps would surely have helped Challis. Brian Marsden notes that “Galile and d’Arrest had the singular advantage of the availability of the new Berlin chart of the appropriate region.”

Pluto (with now-questionable status as a planet) was discovered on February 18, 1930, by Clyde W. Tombaugh (1906-1997) using a blink comparator at the Lowell Observatory in Flagstaff, Arizona. The discovery of the ninth planet was the culmination of a third search funded by Percival Lowell. Tombaugh found Pluto (magnitude of approximately 13.5) in a position calculated from supposed perturbations by Uranus and Neptune. Now we understand that the gravitational effects are far too small to make such perturbations. Thus Tombaugh’s discovery was a fortunate accident. Tombaugh’s story of Pluto’s discovery, recorded in a number of places, is very engaging and worthy of treatment in planetarium programs. On October 22, 1988, at the annual Great Lakes Planetarium Association (GLPA) conference at Bowling Green, Ohio, Tombaugh delivered a spell-binding presentation of “The Discovery of the Planet Pluto”. He distributed photographs and wrote personal autographs on them for conference partici-

pants.

The name Pluto, the Roman god of the underworld and the counterpart of the Greek god Hades, was first suggested by Venetia Burney, an eleven-year-old girl from Oxford, England. Pluto is so far from the sun that it seems to be in the solar system’s underworld. Appropriately, the first two initials of Pluto are those of the benefactor of searches for it, Percival Lowell. The following names also were suggested for the ninth planet: Atlas, Aretemis, Tantalus, Chronus, Perseus, Vulcan, and Minerva, although Minerva was already a minor planet.

People have speculated on the possibility of a major “Planet X” beyond the orbit of Neptune. (Pluto also was given the title of “Planet X” before its discovery.) When Voyager 2 flew near Neptune, the discrepan-
cies between data showing existence of another planet and data showing no planet vanished. There is no planet the size of Earth or larger in the region beyond but near to
Neptune. If an Earth-sized object someday is found far beyond Neptune, the IAU may have a chance to name a new planet.

Planetary Nomenclature
How Names are Approved
Generally, when images first are obtained for the surface of a planet or a satellite, a naming scheme is chosen. A few of the major features are given names, usually by the members of the appropriate IAU task group. When later higher resolution images and maps are available, features that investigators want named are supplied with names. Suggestions to the task group may come from any source, and a file is kept of appropriate names that may be used. Names successfully reviewed by a task group are submitted to larger panel, the Working Group for Planetary System Nomenclature (WGPSN). After review by the WGPSN, successful names are considered as approved provisionally and they can be used on maps and in publications as long as the provisional status is stated clearly. The provisional names then are presented for adoption to the IAU General Assembly, which meets every three years. A name is not considered to be official until then. Transactions of the IAU list approved names. If you wish to make a suggestion, you can submit it to the U.S. Geological Survey, Branch of Astrogeology, Attention Jennifer Blue, Room 409, 2255 N. Gemini Drive, Flagstaff, Arizona 86001 or E-mail jblue@usgs.gov. Suggestions are forwarded to the appropriate IAU task groups.

Some General IAU Rules
Rules for all names adopted by the IAU follow certain general rules and conventions, which have been reexamined and amended through the years. Planetary Nomenclature rules are as follows:
1. The name should be simple, clear, and unambiguous.
2. The number of names chosen for each body should be kept to a minimum, and their placement governed by the requirements of the scientific community.
3. Duplication of the same name on two or more bodies should be avoided.
4. Individual names chosen for each body should be expressed in the language of origin.
5. Where possible, themes established in early solar system nomenclature should be used and expanded upon.
6. Solar system nomenclature should be international in its choice of names. Recommendations submitted to the IAU national committees will be considered, but final selection of the names is the responsibility of the IAU. The WGPSN strongly supports equitable selection of names from different ethnic groups/countries; however, a higher percentage of names from the country planning a landing is allowed on landing site maps.
7. No names having political, military, or religious significance may be used, except for names of political figures prior to the 19th century.
8. Commemoration of persons on planetary bodies should not be a goal in itself but should be reserved for persons of high and enduring international standing. Persons being so honored must have been deceased for at least three years.
9. When more than one spelling a name is extant, the spelling preferred by the person, or used in an authoritative reference, should be used. Diacritical marks are a necessary part of a name and will be used.
10. Ring and ring-gap nomenclature and names for newly discovered satellites are developed in joint deliberation between WGPSN and IAU Commission 20. Names will not be assigned to satellites until their orbital elements are reasonably well known or definite features have been identified on them.

Naming Conventions
In addition to the above rules, the WGPSN and its task committees of the IAU follow these naming conventions
1. Names for all planetary features (usually in Latin) include a descriptor term, with the exception of two types. The first exception is craters and the second exception is some features on Io (Jupiter satellite) and Triton (Neptune satellite), because they are recognized as being transitory.
2. The naming convention for a feature type does not normally depend on size. Exceptions to this rule are channels (valles) on Mars and craters on the Moon, Mars, and Venus. Naming conventions for craters and channels do depend on size. Regio was used as a classification feature on early maps of the Moon and Mercury, drawn from telescope observations, to describe vague albedo features. Regio now is used to delineate a broad geographic region.
3. Named features on bodies so small that coordinates have not yet been determined are identified on drawings of the body that are included in the IAU Transactions volume of the year when the names were adopted. Satellite rings and gaps are named for scientists who have studied these features. A system for planetary atmospheric features at present is informal. A formal system will be chosen in the future.

4. Boundaries of many large features (terrae, regions, planitiae, and plana) are not topographically or geomorphically distinct. The coordinates of these features are identified from an arbitrarily chosen center point. Boundaries and subsequent coordinates may be determined more accurately in the future from geochemical and geophysical data.

Organization of the Planetary Nomenclature Gazetteer
A system of naming planet surface features is needed so that a particular feature on the surface of a planet or a satellite can be located, described, and discussed.

One can obtain detailed information about all names of topographic and albedo features of planets and satellites, as well as some planetary ring and ring-gap systems beginning at http://planetarynames.wr.usgs.gov. The document is under continuous development. The edition of the Gazetteer of Planetary Nomenclature described at this website at the time this article was prepared contains all bodies named and approved by the IAU from 1919 through 1997. The appendices available at this address are very informative.

Forty-seven descriptor terms or feature types are listed in the Planetary Nomenclature Gazetteer. Appendix 4 gives 172 specific sources of planetary names. Appendix 5 contains definitions of all Latin-named feature types with their plurals: astrum, catena, cauvis, chaos, chasma, colles, corona, crater, dorum, eruptive center, facula, farrum, flexus, flactus, fossa, labes, labyrinthus, lacus, landing site, large ringed feature, lenticula, linea, macula, mare, mensa, mons, oceanus, palus, patera, planitiae, planum, plume, promontorium, regio, reticulum, rima, rupes, scopulus, sinus, sulcus, terra, tessera, tholus, undae, vallia, vastitias. The terms lacus (small plain), oceanus (large dark area), palus (small plain, promontorium (headland), and rima (fissure) are used only for the Moon. Notice there is no canale (canali).

Appendix 6 of the Gazetteer lists the categories of features by planet and satellite and the adopted convention for naming a particular feature on that planet or satellite. For example, craters on Mercury must be named for deceased artists, musicians, painters, and authors. Rupes (scarps, denoted as rup- for the plural) are to be named for ships of discovery or scientific expeditions, and valles (valleys) get the names of radio telescope facilities.

Venus’ 22 different types of features receive names for women and goddesses. Valles (valleys) on Venus get either the names of river goddesses, if they are less than 400 km in length, or the name for the planet Venus in different world languages, if they
are over 400 km in length. Venus’ craters receive either the names of famous women, if they are over 20 km in diameter, or common feminine names if they are less than 20 km in diameter. Features called fossae (long, narrow, shallow depressions) and lineae (dark or bright elongate markings) receive names of war goddesses. This latter convention seems strange for a planet that the Greeks held as a goddess of love and beauty.

The one exception to the women-only names rule for Venus is 19th century scientist James Clerk Maxwell of Scotland (1831-1879). Maxwell, famous for his theories of electromagnetism which allowed the Venus Magellan mission’s radar, is honored with Maxwell Montes. Maxwell Montes is the highest mountain on Venus, taller than Earth’s Mount Everest.

In Appendix 7 of the Gazetteer one finds the source of names for planets and satellites, as well as discovery dates. A total of 38 of Jupiter’s satellites and 30 of Saturn’s satellites are found in the approved-name list. More have been confirmed. It is not clear that all of the unconfirmed satellites of Jupiter and Saturn actually are satellites. Asteroids Eros, Gaspra, Ida, and Mathilde, are listed in this source, although many additional asteroids now have names (See the discussion below.) Most planet and satellite names are characters found in classical mythology.

The names of the Uranian satellites come primarily from plays by Shakespeare (Englishman William Shakespeare, 1564-1616, although the actual writer of “Shakespeare” is disputed) Interestingly, there is an Ariel in The Tempest by Shakespeare, but there also is an Ariel in The Rape of the Lock by Alexander Pope (1688-1744). Brian Marsden thinks it likely that William Lassell (1799-1880), who discovered the pair of satellites in 1851, intended Ariel and Umbriel both to represent characters from Pope’s work.

The complete IAU file of planetary nomenclature is sorted in two ways, first, alphabetically by planetary body, satellite, and feature type; second, alphabetically without respect to planet or feature type. Coordinates listed in columns labeled “lat” and “long” are taken from the maps identified in columns “quad” and “map,” or from digital images. Coordinates of features are updated occasionally as new observational data become available. For maps published by the United States Geological Survey (USGS), the field “quad” identifies the informal name of the map, and the field “map” lists the USGS map identification “I” number. For identification on lunar maps published in the 1960s and early 1970s or Russian maps of Venus published in 1985 and 1986, different systems of identification are used.

Continent and ethnic group are identified in the gazetteer by “ct” and “et.” This system allows astronomers to balance representation from different countries.

The Moon

Although the Moon currently is subject to the naming procedures of the WGPSN found in the Planetary Nomenclature Gazetteer, the Moon’s unique position both in our sky and in history makes it worthy of additional discussion. The book Mapping and Naming the Moon: A History of Lunar Cartography and Nomenclature by Ewen A. Whittaker, is a wonderful source of information.

The maria, which always are directed toward the Earth as the moon rotates in the same period that it revolves, have inspired name creation throughout human history. The Chinese idea of a rabbit sitting on its haunches pounding rice is what Whittaker calls “an excellent example of a springtime moonrise image” (p. 6). The perception of a dragon, tree, and little man which can be traced to Albertus Magnus (c. 1193-1280), found its way into present lunar nomenclature, first via Shakespeare, as he wrote of “the dog, the bush, and the man,” and then to Pierre Gassendi (1592-1655) of France, as he included Homunculo (“the little man”) in his system dated to about 1630.

Two lunar names mentioned by Plutarch (c. 46 AD-119 AD), which survived to the first half of the seventeenth century, are Penetralia Hecates and Caspia. Plutarch wrote that the “greatest hollow” on the moon was called the Shrine of Hecate. Whittaker concludes that the Shrine of Hecate, where souls passed, probably refers to Mare Imbrium. The Moon’s Caspia or Caspian Sea evidently was a non-specific feature that was applied to Mare Crisium by the seventeenth century. Plutarch categorized the part of the Moon turned away from Earth as The Elysian Plain and the part toward Earth as The Plain of Persephone.

Leonardo da Vinci (1452-1519) of Italy and Jan van Eyck (c.1390-1441) of Belgium, artist-inventors, and William Gilbert (1540-1603), physician to Queen Elizabeth I of England and an early investigator of magnetism, made the only known pre-telescopic drawings of the moon. A book that Gilbert published in 1651 contains a lunar map with a total of 13 Latin names. We find Britannia for Mare Crisium, Continens meridionalis for Mare Nubium, Insula Borealis for parts of Mare Frigoris, Regio Magna Occidentalis for Mare Serenitatis, and Regio Magna Orientalis for Mare Imbrium. Gilbert, agreeing with da Vinci, thought that dark areas represented land and light areas represented seas.

The first lunar map made with the aid of a telescope was drawn by Thomas Harriot of Great Britain (c.1560-1621), although almost no one knew of it until 1665. Harriot made his first lunar sketch four months before Galileo. Mistakenly, Galileo usually is given credit for the first telescope map of the moon. The credit probably was misplaced because Galileo published sketches and descriptions in his book Sidereus Nuncius (Sidereal Message). Harriot used a system of numbers for lunar features that were somewhat like the Bayer designations for stars.
Galileo and several later observers used systems of letters, matching letters with descriptions in their books.

Although many also think that Galileo gave the name maria to the moon’s large dark basins, he did not. Galileo made a point of writing that he did not believe that the moon was composed of soil and water (including seas, the meaning of the Latin maria).

Pierre Gassendi (1592-1655) of France first applied the Latin terms mare and maria to the moon’s dark regions. Gassendi never finished his map project, but his notes show the features he called vallis, rupes, and mons, terms that are still in use.

Three lunar observers (Michael Van Langren of Belgium, in 1645; Johannes Hevelius, in 1647; and P. Giovanni Riccioli of Italy, in 1651) published maps with competing systems of lunar nomenclature. Van Langren used names of European royalty, philosophers, scientists, mathematicians, patrons, explorers, religions leaders, and 14 saints. Hevelius used classical names of countries, seas, and other features, and 16 of his feature terms are on the IAU Gazetteer list. Riccioli adopted the personal-name idea of Van Langren, accepting 63 of Van Langren’s names and adding 147 names of people both living and deceased who had a connection to astronomy.

Riccioli was a Jesuit priest, obliged in 1651 to publicly announce a belief that the Earth does not move. Riccioli therefore positioned features which he named Copernicus, Rhaeticus, Moestilinus, Reinholdus, and Aristarchus (along with other features named for people who believed that the Earth moved around the sun) in the “ocean,” Oceanus Procellarum. Curiously, the crater Copernicus is larger than that of Tycho and the crater Aristarchus is the most brilliant object in the Ocean. As Ewen Whitaker suggests, it seems that Riccioli was telling posterity in a subtle but graphic way that he thought the Copernican system really was correct.

More about the development of lunar names can be found in Whistaker’s outstanding book. After the publications of Van Langren, Hevelius, and Riccioli, lunar nomenclature was well on its way to its modern form.

Named Lunar Formations by Mary Blagg and Karl Muller was published in 1935, the first lunar publication of the IAU Nomenclature Committee following the IAU’s formation in 1922. The publication contained the first complete and official listing of lunar nomenclature. The System of Lunar Craters (SLC), quadrants I, II, III, IV was published in sections by D.W.G. Arthur and others between 1963 and 1966, under the direction of Gerard P. Kuiper (1905-1973). Later they were republished as Lunar Quadrant Maps.

These catalogues were adopted by the IAU, and they are the basis of lunar nomenclature that was added later. The SLC maps were invaluable in the Apollo Lunar Program.

The NASA Catalog of Nomenclature (1982), prepared following the Apollo Lunar Missions, is the updated version of the SLC. Apollo Landing Sites are accepted IAU features. Jonathan McDowell has entered its information into a frequently-updated online database. See http://www.planet4589.org/astro/lunar.

Charles A. Wood, who helped prepare the SLC maps, explains what has led to some confusion in some lunar feature designations today: In 1837 Johann Heinrich Madler (1794-1874) and Wilhelm Beer (1797-1850) of Germany published the first detailed set of lunar maps using a 9.5-centimeter refractor. They resolved many new craters with positions near larger craters, which already had proper names. Madler and Beer gave the new craters upper-case Roman letters, with “A” usually being the largest or nearest to the named crater, and they applied letters near the end of the alphabet to battered craters. The Roman letter designation system for craters established by Madler and Beer was perpetuated in the SLC maps. Even though the Roman letter system remains official IAU nomenclature, the IAU does not keep track of it.

Additionally, Madler and Beer gave lower-case Greek letters to positive lunar relief features such as mountains, ridges, and domes. In their publication for the IAU in 1935, Blagg and Muller tabulated the Madler-Beer letters. When the SLC maps were made thirty years later, each Greek-lettered feature was examined and either retained or eliminated, and many additional features were given new Greek letters. Recently, when Wood tried to identify all of the lettered craters and peaks on an SLC photograph of a relatively uncluttered part of the moon, even though he had helped to prepare the designations, he could not do it! The specific sequence of events that has caused lunar designation confusion are a) The SLC cartographers did not publish a catalog of the Greek-lettered features to accompany their map; b) The IAU accepted the SLC maps as the authority on features; but, ambiguously, c) the IAU later totally abandoned Greek-lettered features.

Patrick Moore, well known English author of many popular astronomy books and discoverer of Mare Orientale in the 1930s, co-named Mare Orientale together with H.P. Wilkins. Moore explains that Mare Orientale now is a misnomer. Orientale means “east,” and Mare Orientale is on the east side of the moon as seen in the sky from Earth. But IAU policy, which names the moon and planet directions as they would be seen from the surface of the object, switches Mare Orientale to the west side. The awkward name persists.

In a view of the moon with its south pole in the center and 0 degrees longitude at the top, such as the mosaic composed of 1500 images taken in 1994 by the Clementine spacecraft’s cameras, one moves clockwise for east lunar longitudes and counterclockwise for west lunar longitudes.

Seth Shostak, Public Programs Scientist at the Search for Extraterrestrial Intelligence (SETI) Institute, located in Mountain View, California, notes that the moon was the first astronomical object considered for possible tenants, and that Plutarch made the first speculations. The idea of life on the moon became politically unpopular later, when medieval religious authorities declared the moon was a perfect and unblemished sphere. When the telescope era began, the speculation on lunar life was revived. Science fiction stories such as Jules Verne’s From the Earth to the Moon (1865) and H. G. Wells’ The First Men in the Moon (1901) describe trips by Earth explorers, including interesting names, but not ones that officially were adopted.

**Venus Mapped First**

Venus was the first solid body mapped beyond Earth and the Moon. In 1726-1727, sixty years before William Herschel produced an initial crude map of Mars, Francesco Bianchini of Rome (1662-1729) made many sketches of Venus. Bianchini published a composite Venus map in 1728 in his book Hesper et Phosphori Nova Phaenomena.
sive Observationes circa planetam Veneris. Bianchini mistook markings for permanent surface features, from which he incorrectly determined the length of Venus’ day and the orientation of its rotational axis.

Bianchini made a Venus chart in gores, which he intended to be cut out and pasted on a ball to make a globe. The gores include names for dark patches which Bianchini thought were seas. Bianchini’s Venus geography commemorated scientific institutions in Paris and Bologna, as well as explorers, monarchs, and astronomers. He named a “sea” for Magellan at Venus’ South Pole. Today we identify Bianchini’s “sea” patches as clouds. Newer Venus maps were published in the 1800s, still giving the mistaken impression that Venus markings are surface features visible with optical telescopes.

Percival Lowell (1855-1916) drew a Venus map with names he created himself. The map appeared in Popular Astronomy in December, 1896. Most of Lowell’s linear features appear to radiate from a central spot that he named “Bilt.” Lowell thought that these shaded arcs he detected were mountains.

Lowell and his Flagstaff colleagues also recorded linear features on Mercury, Mars, and Jupiter’s satellite Ganymede. The lines which Lowell included on his Venus map were rejected more vehemently by astronomers at other institutions than lines drawn on the Flagstaff maps of Mercury, Mars, and Ganymede. Ironically, in comparing Lowell’s 1896 drawing of Venus with a Pioneer Venus image, we see a strong similarity. The Y-shaped pattern in clouds opening to the west, which is even more obvious in ultraviolet light, is what Lowell apparently saw.

Mars: A Few Details

With so many new Martian details observed recently by the Orbiter, Odyssey, and MER cameras, the IAU may feel pressure to accelerate the naming process on Mars. We can speculate on the futures of the many NASA-named rocks that have been cut and photographed by MER rovers Spirit and Opportunity. Will the rocks someday be picked up and claimed for Martian museums once there is a human presence on the Red Planet? Will the rocks be left in place with protective barriers and identifying plaques? Will the rocks be ignored and disappear from records when people colonize a region, as geological features have disappeared on Earth?

In 1877 two events important to Martian nomenclature occurred when Mars came to a perihelion opposition, a distance of only 35 million miles from Earth. The first was the discovery (at the United States Naval Observatory) and naming of the Martian moons by Asaph Hall (1829-1907). Hall selected names Phobos (Fear) and Deimos (Panic) from the attendants of the war god Mars, described in the fifteenth book of Homer’s Iliad. The names were suggested to Hall by Henry Madan (1838-1901), Science Master of Eton in Eton, England. (Incidentally, Henry Madan was the great-uncle of Venetia Burney, who proposed the name of Pluto for the ninth planet.)

The second Mars naming event of 1877 was the publication of a map by Giovanni Schiaparelli (1835-1910) of Italy. This map was the first with canali, features criss-crossing Mars. Schiaparelli did not first give the name of canali to these features; they were first reported and named in 1869 by Father Pietro Secchi (1818-1878), also of Italy. In 1879 Secchi also first noted the existence of joined canali. Affirmed by Schiaparelli, both Secchi and Schiaparelli thought the joined canali were the result of seasonal changes on Mars. They referred to their observed joined canali as “gemination.” The canali, which means “channels” in Italian, created a sensational public image of intelligent Martian life when canale (singular) and canali (plural) were interpreted in the English language as canals holding water. Today perceptual psychologists, noting how both the human eye and cameras perceive astronomical details, explain the mechanisms for the observed but nonexistent surface canali with a high degree of confidence.

To map Mars as he saw it, Schiaparelli created many new names, diverging from names proposed by Camille Flammarion (1842-1925), who had just finished a Martian map. Schiaparelli explained that he needed to create a new nomenclature system to show features that had not been seen before. Among Schiaparelli’s 20 canali names, we find Ganges, Indus, Nilosyrtis, Triton, Lethe, Nilius, Hercules Columnna, and Phison. Although Schiaparelli modestly noted that he did not ask that his system be approved by astronomers, many of his names other than the canali still are used today. Two exceptions are Valles Marineris and Olympus Mons. Valles Marineris was known on Schiaparelli maps as Agathadaemon. Schiaparelli gave the name of Nix Olympica to what is now Olympus Mons. The complete story of early Martian maps and the people who made them can be found in the book The Planet Mars by William Sheehan.

Some features on Mars recently have been named for the three members of the Apollo 11 crew who died in the fire at Kennedy Space Center, Florida, on January 27, 1967.

On January 27, 2004, the Mars rover Spirit in Gusev Crater looked west to three nearby hills, White Hill, Grissom Hill, and Chaffee Hill. The Apollo I Hills could be seen along a north-south line, between 7.5 kilometers and 14.3 kilometers from the rover.

On January 28, 2004, NASA announced plans to name the landing site of the Mars Opportunity rover in honor of the Space Shuttle Challenger’s final crew. The area in Meridiani Planum where Opportunity landed, on the opposite side of Mars from the Apollo I Hills, will be called Challenger Memorial Station.

The Gusev Crater landing site was renamed Columbia Memorial Station (see illustration above).

Two IAU Working Groups

In addition to the Working Group for Planetary System Nomenclature (WGPSN), there is an IAU Committee on Small Body Nomenclature. This second committee deals with the assignment of temporary and permanent names of newly discovered minor planets (asteroids) and comets, based on the information maintained at the IAU Minor Planet Center. Brian Marsden is the director of the Minor Planet Center, maintained at the Harvard Smithsonian Center for Astrophysics.
Minor Planets (Asteroids)

More than 250,000 minor planets (asteroids) have been discovered to date, with discoveries greatly accelerated by the recent successes of the LINEAR, NEAT, Spacewatch, and other search programs incorporating wide-field, multiple-night, CCD coverage of the sky. Of these 250,000, 85,117 have adequate orbit determinations to qualify for naming. Only a relatively small percent of those with known orbits actually have been named: 11,302.

Each minor planet first gets a provisional code, then a final number once the orbit has been determined, and finally (for many) a proper name that is attached to the final number. Michael A’Hearn, a former chair of the IAU Committee on Small Body Nomenclature (which used to be called the Small Body Names Committee), notes that quite a variety of names have been suggested for and approved for minor planets from many different sources, including children’s heroes, pop culture and classical music. The recently-named Misterrugers for US television legend Fred Rogers is an example of inclusion of a famous cultural name.

Rules for the proper name of a minor planet (asteroid) are 16 letters or less; nothing offensive; if a military or political name, then the person must be deceased for at least 100 years; no pets; no confusing spellings or pronunciations; and no names too similar to present asteroid names. The suggested name and a brief defense of it go to the IAU’s Committee on Small Body Nomenclature, which must make the final approval. (See http://www.ssastroumd.edu/IAU/csbn/data/names.shtml. If you would like to suggest a name for an asteroid, write to: namingcamp@mpcc643.org.

Minor planets that have been observed on two or more nights are given provisional designations that consist of a designation with the year of observation, the upper-case code letter identifying the half-month of observation during that year, and a consecutive capital letter to show the order of discovery announcement during that half-month, which is sequenced through the alphabet as many times as necessary.

Further details on the provisional naming system for minor planets are given below in the section “Nomenclature Chaos at the Edge of the Solar System.” Minor planets and Kuiper belt objects (KBOs)/trans-Neptunian objects (TNOs) are united into one large group in the provisional naming system.

Many times a newly-sighted object is followed for about a month, providing data to determine a fairly-accurate orbit. When the orbit has been determined to a set precision standard, the object’s status is recognized with a permanent number. For ten years after it receives a permanent number, the minor planet’s discoverer has an option to suggest a proper official name. Anyone may suggest a name to the discoverer within that ten years or to the committee directly in following years, and there is no fee. (It seems ironic that a name received in this way is free, as one considers the hefty charges of companies selling stars.) A brief citation of why the nominator believes the person or entity is worthy of the name is submitted to the IAU Committee with the nomination.

The name and citation are placed on a list, and every two months the Committee reviews submissions. The committee’s 15 members work mostly by E-mail, says member Donald Yeomans; and members usually provide one of three standard responses: “Yes,” “no,” or “heck no.” Usually a majority vote prevails, but three “heck no’s” will eliminate a submission.

Following a suggestion from Planetarium Director John G. Radzilowicz at the Buhl Planetarium in Pittsburgh, where Fred Rogers (1928-2003) had his long-running children’s television series, Marsden searched for an asteroid with the code letters FR for Fred Rogers. Marsden found it in an asteroid discovered by Eleanor Helin on March 21, 1993. So asteroid Misterrugers was identified with the asteroid having the provisional name of 1993 FR. And the new name became (26858) Misterrugers or Misterrugers 26858.

I am personally acquainted with the naming procedure for a minor planet, as my father Richard Emmons had one named for him a few years ago. Eleanor Helin, in consultation with Marsden, suggested that a minor planet she had discovered in 1985 be named (5391) Emmons. This asteroid was provisionally 1985 RE2, so it was another case, like 1993 FR for Fred Rogers, of Marsden selecting it because of particular initials. Helin was aware of satellite observations my father had made that helped to prove that the near-space environment is safe for human exploration and that he had “inspired many people who have become very well known in [astronomy] in their own right.” In 2000 the IAU officially named (5391) Emmons with the citation: “Richard Emmons (b 1919), emeritus professor of physics at Ohio’s Kent State University, had his interest in astronomy sparked by an article published soon after the discovery of 1932 HA, now (1862) Apollo. He was an early observer of artificial satellites.” In a congratulatory letter following the IAU announcement, Helin wrote to my father, “Enjoy your namesake from ‘here to eternity.’”

Examining the list of minor planets with proper names, we find quite a few scientists. A sample includes: (2001) Einstein, (1691) Oort, (4987) Flamsteed, (4804) Pasteur, (4674) Pauling, (7008) Pavlov, and (12294) Avogadro. Isaac Asimov (1920-1992) and Carl Sagan (1934-1996), important popularizers of science in the second half of the twentieth century, also have namesake asteroids, (5020) Asimov and (2709) Sagan. Musician-named asteroids are an important subset, including (1814) Bach, (1815) Beethoven, and (1818) Brahms along with the much more recent English group, the Beatles. Asteroid (4150) Starr, for example, is named for Beatles Ringo Starr.

Marsden says, “I’m happy to see imaginative names ... It doesn’t have to be serious. If it is somewhat entertaining, that’s great. Some of the best names are whimsical ...” The citation for Ringo Starr’s asteroid states that he is “a Liverpudlian of lively personality and deadpan humor who occasionally sat in as drummer with the Beatles during the early days in Hamburg.”

The seven members of the last crew of the Space Shuttle Columbia (STS-107), which disintegrated during reentry on February 1, 2003, are immortalized with asteroids, all with orbits in the region between Mars and Jupiter, all also discovered by Eleanor Helin. Names honor Commander Rick Husband, pilot William McCool, Mission Specialists Michael Anderson, Kalpana Chawla, David Brown, and Laurel Clark, and Israeli payload specialist Ilan Ramon. NASA made the announcement in August, 2003 and with IAU approval, also in August, 2003, the astronaut-named asteroids were added to the official list.

The IAU also approves names for satellites of asteroids and features on asteroids. The first natural satellite of an asteroid, the aster-

Ida and Dactyl. While en route to Jupiter in 1994, the Galileo spacecraft passed close to the minor planet (243) Ida and discovered that it has a tiny moon. The members of the Galileo Mission’s imaging and infrared teams recommended the moon name Dactyl to the IAU, which was approved six months later. The Dactylite were a group of creatures in classical mythology, who either lived on Mount Ida or who were the children of Ida by Zeus. (243) Ida is about 58 kilometers long and 22 kilometers wide, while tiny Dactyl is only 1.6 kilometers wide. Credit: Galileo Project, JPL, NASA.
oid (243) Ida, was found while data was ana-
yzed in March, 1994, by members of the
Galileo Mission’s imaging and infrared
teams. The project recommended the name
Dactyl to the IAU, which was approved six
months later. That name comes from “Dactyl,” a group of creatures in classical
mythology, who either lived on Mount Ida
or were the children of Ida by Zeus.

The first IAU-approved asteroid surface
features were for (951) Gaspra, visited by the
Galileo spacecraft in 1991. Three regions on
Gaspra were named for scientists associated
with the asteroid. Neujmin Regio was named
for Grigorij Neujmin (1886-1946), the
Ukrainian astronomer who discovered Gaspra
in 1916. Yeates Regio honors Claymene
Yeates, Galileo Science Manager until his
death in 1991, and Dunne Regio recognizes
James A. Dunne, who served as Galileo
Science and Mission Design Manager until

Comets

Comets are named for their discoverers (or
for the identification of periodic comets,
such as Halley’s Comet). Many amateurs
have gained fame by discovering one or
more comets. Until August, 1994, each new
comet was designated by the year of its dis-
covery, followed by a lower case letter for
the order in which it was discovered that
year. Comet 1983d was the fourth comet
discovered in 1983 and was named Comet IRAS-
Araki-Alcock for the Infrared Astronomy
Satellite (IRAS) and the two astronomers
who each observed the comet.

Comet P/Shoemaker-Levy 9, whose frag-
ments bombarded Jupiter, gave us one of the
main astronomical spectacles of the Twen-
tieth Century. Planetarians attending the
July, 1994, IAP Conference at Cocoa Beach,
Florida, will remember televised pictures of
the first of the fragment impacts coinciding
with the close of the conference. Co-named
for Eugene and Carolyn Shoemaker (Eugene,
1928-1997) and David Levy, and also known
as 1993e, the comet fragmented into 21
known pieces when it approached Jupiter.
Upper-case letters were assigned to each of
the individual pieces, and pictures of Jupiter
showed the signature of the pieces impact-
ing Jupiter with successive “black eyes.”

A detailed resolution to change the comet
designation system to one that more closely
resembles the minor planets system was
adopted by the IAU General Assembly in
August, 2002. Instead of the year/letter and
year/Roman numeral systems of the past
(where the Roman numeral was for the order
of perihelion passage), a new comet dis-
covery now receives a designation with the year
of observation, the upper-case code letter
identifying the halfmonth of observation
during that year, and a consecutive numeral
to indicate the order of discovery announce-
ment during that halfmonth. For example
the third comet discovery reported during
the second half of February 2005 would be
designated 2005 D3. (See http://www.cfa.harv
ard.edu/iau/lists/CometResolution.html)

The particular nature of a cometary
object may be indicated by an initial
prefix. The prefix A/ should precede a comet
designation which has been found to really be a minor planet since its
discovery (unless, as usually
happens in practice, the comet-
minor planet is assigned a name
reflecting its dual status). C/ is
attached to a periodic comet
defined to have a revolution peri-
od of more than 30 years or con-
ﬁrmed observations at more
than one perihelion passage. P/ is
given to a comet with a revolu-
tion period of less than 30 years,
X/ goes to a comet that cannot
have a meaningful orbit comput-
ed, and D/ is for a periodic (P/)
comet that not longer exists or is
judged to have disappeared. If the
comet return is observed, the P/
or C/ is preceded by a sequential
number of the number of certain
returns. The designation C/2005
D3 would be used for the third
comet in the second half of
February, 2005, if it had a calcu-
lated revolution period longer than 30 years.
The designation P/2005 D3 would be applied
to the third comet in the second half of
February, 2005, if it had a calculated revolu-
tion period of less than 30 years. If a hypo-
thetical comet P/2005 D3 were observed dur-
ing 50 perihelion passages, it would then be
S0P/2005 D3.

To be considered a “discovery,” the
observer must confirm the comet sighting
with additional observations on following
nights. After conﬁrmation, the observer
sends an E-mail to the Smithsonian Astro-
physical Observatory. Reported comets are
compared with data lists of known objects
to see if the comet really is a new discovery.

It is acceptable for an object to be design-
nated as both a comet and a minor planet.
This applies primarily to objects that have
been given a permanent number, like the
85,117 minor planets with good, multiple
opposition orbits. Brian Marsden points out
that the following objects now have dual sta-
tus: (2060) Chiron (1977 UB) = comet
95P/Chiron; (4015) Wilson-Harrington (1979
VA = comet 107P/1949 (Wilson-Harrington);
and 7968 Elst-Pizarro = 133P/1996 N2 (Elst-
Pizarro). The part of the name of these dual-
status objects representing their provisional
minor planet status will be discussed with
KBOs or TNOs within the later section
“Nomenclature Chaos at the Edge of the
Solar System”.

Meteorites

Jeffrey Grossman, current chair of the
International Meteorite Nomenclature
Committee, summarizes the IAU system of
names: All meteorites are named for geo-
graphic features near a particular find or fall
site, commonly towns, streams, mountains,
and lakes. If there are not enough features to
to name all the meteorites from an area, a geo-
graphic name is selected and numbers are
appended to form a series.
In Antarctica and in a part of the Sahara,
both of which are productive sites or “strewfields,” the numbers following the
location name are the 2-digit expedition-
year plus a 3-4 digit specimen sequence
number. In the rest of the Sahara, Oman, Western
US, and Australia, the numbers do not
include the year; only the sequence number,
as in “Dhofer 321,” where Dhofer is the
location, and this specimen is number 321 found
there. In the Hammada al Hamra section of
the Sahara, the first meteorite found on the
Hammada al Hamra plateau received the
designation Hammada al Hamra 001 (HaH
001) and the most recent, the one-hundred-
fourty-sixth, is Hammada al Hamra 146.
Ralph Harvey of Case Western University in
Cleveland, Ohio, gathers meteorites in
Antarctica. Harvey notes that a meteorite
found in Antarctica’s Allan Hills gets what
ALH84001 meteorite. This famous meteorite, officially named “Allan Hills 84001,” was the first (001) meteorite found in Antarctica’s Allan Hills during the 1984–85 gathering season. All scientists agree that ALH84001 came from Mars because gas pockets within it and similar meteorites have an isotope composition that is identical to that in the Martian atmosphere. But there is strong disagreement on whether ALH84001 contains evidence of tiny past Martian life. Credit: JSC, NASA.

he terms “a convenience designation” (that is, not an IAU-sanctioned name) of AH combined with its southern-summer find date. “AH 84” denotes that the meteorite was found in the austal summer gathering season of 1984-1985. Harvey notes that a Japanese “convenience designation” for an Antarctica meteorite is a single alphabetic character (such as Y for Yamato Mountains) instead of the two or three letters used by US collectors in Antarctica.

Famous meteorite “AH 84001” is officially “Allan Hills 84001”. It was found in the Allan Hills in December, 1984, and it happened to be selected as the first (001) among the hundreds of specimens gathered that season. ALH 84001, with an original mass of 193 kilograms, was first classified as one of the SNC meteorites (with mineral compositions of shergottite, nakhlite, and chassigny). More recently this group is simply referenced as “the Martian meteorites”, because, unlike the others in the SNC group, ALH 84001 lacks the SNC minerals. ALH 84001 not only has been identified as Martian, but its probable location of origin on Mars has been found as well. Since August, 1996, ALH 84001 has been the focus of a hot debate over whether or not it carries evidence of simple past Martian life.

If two or more numbered meteorites later are found to be paired, their names are not changed. The groups are then referred to collectively by the lowest specimen number, the most widely studied piece number, or the largest piece number.

Most of us in planetarium positions have met a visitor who wants to know if a particular rock is a meteorite. Perhaps like me, you have seen quite a few pieces of industrial slag which look like meteorites. If you are unable to differentiate between meteorites and “meteor wrongs,” it is best to contact an expert at a university near to your planetarium. To obtain a number for an individual meteorite, (which it needs in order to be mentioned in a journal article) you are invited to contact Sara S. Russell, Dept. of Mineralogy, Natural History Museum, London, at the e-mail address: meteorite@nhm.ac.uk. A scholarly application for a meteorite name also can be found on the web page: http://www.uark.edu/campus-resources/metsoc/bullform.htm.

Nomenclature Chaos at the Edge of the Solar System

A few years ago the classification of Pluto as a legitimate planet came under attack, and the debate continues. Instead of a planet, Pluto may be a “KBO,” or as become more accepted, a “TNO.” Pluto’s satellite Charon may also be a KBO/TNO.

In the 1950s, Gerard Kuiper predicted that a belt of objects near the plane of the ecliptic existed beyond Neptune. In 1992, the first such anticipated body was found and astronomers used the term “Kuiper belt object” (KBO). Then it was learned that in 1943, prior to Kuiper, astronomer Kenneth Edgeworth (1880-1972) had made a similar prediction. So some astronomers began using the designation “Edgeworth-Kuiper objects” (EKOs or EKBo) for objects in the belt beyond Neptune. A 1930 prediction by Frederick C. Leonard of the outer belt was brought to light in 2000 by Brian Marsden, and the term “Leonard-Edgeworth-Kuiper belt object” (LEKBo) was then applied. Some astronomers suggested that it would be advisable to discontinue using people’s names, changing the distant objects’ designation to “trans-Neptunian objects” (TNOs). Currently KBO and TNO are used interchangeably, although the term “trans-Neptunian object or “transneptunian object” (TNO) is gaining acceptance. The Scientific Organizing Committee of the European Southern Observatory (ESO) Workshop on “Minor Bodies in the Outer Solar System” held in Garching, Germany, in 1998, specifically recommended the term TNO over the term KBO and other designations. Those who propose the change from KBO to TNO probably know that Kuiper did not predict any object like those we actually observe. Kuiper speculated that a circular ring of comets beyond 50 AU and a couple of very large asteroids (like Ceres) beyond 38 AU might exist. However, he did not foresee a multitude of small minor planets beyond Neptune. Kuiper once remarked that it would be ‘puzzling’ if there were asteroidal bodies beyond 30 AU.

Further complicating classifications, TNOs that have a 2:3 orbital resonance with Neptune are called “plutinos.” Still another division, “cubewanos” (a term derived from sounding out the letters and number of TNO 1992 QBI), are objects of a division of TNO that remain in the main belt, never traveling inside Neptune’s orbit. Cubewanos are confined to a belt of 42-47 astronomical units from the sun, with eccentricities of less than about 0.15. The term “classical KBO” sometimes is meant to be synonymous with “cubewanos”. Another group, “scattered disk objects” (SDOs) have more eccentric orbits.

For naming purposes all TNOs/KBOs are considered minor planets. All minor planets receive provisional names (before getting final numbers and possible proper names) that include two capital Roman letters. This is different from comet provisional names that receive only one capital Roman letter. The first discovered KBO/TNO received the provisional name 1992 QBI. This designation shows the year, the halfmoon, and the order of discovery in the halfmoon. For each month the “second half” is defined as beginning at 16d 00h and 00m Universal Time (UT). The first letter, such as the Q in 1992 QBI (and also as in a comet designation such as 2005 D3), defines the halfmoon. A first letter of A denotes the first half of January, a B denotes the second half of January, a C

Pluto and Charon. This image of Pluto and its large satellite Charon was taken by the Hubble Space Telescope on February 21, 1994. Pluto was discovered by Clyde Tombaugh at Lowell Observatory in 1930, and Charon was discovered by James Christy in 1978 at the U.S. Naval Observatory. Pluto is named for the god of the underworld and Charon is named for the ferryman who crosses the river Styx. In addition, Pluto honors Percival Lowell, who funded searches for the planet. Charon sometimes is pronounced “Sharon,” honoring James Christy’s wife Charlene, nick named “Char”. Credit: NASA, ESA/ESO Space Telescope European Coordinating Facility.
denotes the first half of February, and a D denotes the second half of February. The letter J denotes the first half of May and a letter K denotes the second half of May, because the letter I is omitted to avoid confusion with the letter J. (In some old publications the letter I was omitted and the letter I was retained.) The letter Q, as in 1992 QBI, denotes the second half of August. The letter Y is the designation for a minor planet or TNO found in the second half of December.

The second letter in the minor planet/ TNO designation, such as the B in 1992 QBI, it denotes the order of discovery within the half month. The second letter system, like the first letter, also excludes the letter I but here includes the letter Z, so there could be 25 designated objects with a given year and a given halfmonth that receive only two letters.

If more than 25 minor planets and TNOs altogether are found for a given year and a given halfmonth, the 26th object is designated QA1, the 27th object is QBI, continuing to QZ1. After that come QA2, QB2...QZ2, etc. Often many objects are found during half a month. For example 2003 VB12 is the provisional name of the 302nd object found in the first half of November, 2003. At the Minor Planet Center, Marsden says that in some halfmonths they have cycled the second letter through the alphabet more than 300 times, representing more than 7500 objects.

Over 800 TNOs have been discovered. Some of the larger TNOs have proper names suggested by their discoverers, which the IAU rules should be creation gods. The discoverers of 1992 QBI suggested "Smiley," for dark world spies in books by author John Le Carre. If Pluto and Charon are TNOs, they are the largest and third largest ones, respectively. The second largest TNO is 2004 DW.

The TNO (50000) Quaoar, discovered in 2002, was given the provisional designation of 2002 LM60. Its discoverers proposed the proper name of Quaoar for a creation god of the Native American Tongva tribe, the original inhabitants of the Los Angeles Basin. Quaoar, the god, was said to instill order by laying out the world on the back of seven giants before creating the lower animals and humans. Quaoar, the TNO, is about half the diameter of Pluto and is larger than Ceres, the largest minor planet.

A number of TNOs are about 1000 km in diameter (20,000) Varuna, provisionally designated 2000 WR106 (found in 2000, and named for an important pre-Vedic god in Hindu mythology, the keeper of the cosmos and the keeper of cosmic order); Ixion, provisionally designated 2001 X76 (found in 2001 and named for the classical father of the Centaur tribe); and three other provisionally designated objects—2002 TX300, 2002 UX 25, and 2002 AW197.

The recently-discovered object called Sedna, an Inuit sea goddess, lies beyond the Kuiper belt. Sedna, as yet an unofficial name, is well in from the Oort Cloud, but it is too far out to be a scattered-disk object (SDO). Following IAU minor planet rules, Sedna has the designation of 2003 VB12.

Oort cloud objects are more distant from the sun than TNOs, and they are not limited to the plane of the ecliptic like TNOs are.

**Deep Sky Objects**

Deep sky objects include star clusters, nebulae, galaxies, and quasars. Deep sky objects are those beyond the solar system which can be studied well only with telescopes, although some are faintly visible with the unaided eye. Many are visible in a variety of wavelengths, and most have multiple listings. The website http://adc.gsfc.nasa.gov/adc/quick_rel/common_names.html#top lists 426 astronomical catalog sources, some different volumes of the same catalog, some of stars and variable stars mentioned earlier, and some for solar system objects. However, many of the catalogs are for deep sky objects. The same deep sky object, listed in different catalogues, gets different names. The situation of multiple names for deep sky objects is like that of multiple names for stars and other objects — it is confusing. Fortunately web-site references usually give multiple names for a given deep sky object.

The Messier Catalog numbers with a total of 103 objects (or 107, 109, or 110, depending on which of the later additions one accepts) applied by Charles Messier (1730-1817) in the late 18th century is the most popular naming system for deep sky objects. Finding new comets was Messier’s astronomical passion. Messier compiled a list of fixed sky objects so that he would not mistake them for comets. Many of the so-called Messier objects had been discovered before Messier; sometimes their earlier identification was unknown to him. Messier’s colleague Pierre Mechain (1744-1804) found many of the Messier objects. Messier gave Mechain proper credit for his discoveries.

Messier’s list contains most of the bright nonstellar objects in the northern two-thirds of the celestial sphere. Most amateur astronomers who become interested in viewing deep-sky objects begin with the Messier list. A good web site for the Messier (M) objects is order, 1-110, along with their popular names, constellation location, and other information is http://www.rclarke.org.uk/messier2.htm. Most planetarians know that M1 is “the Crab Nebula,” M31 is “the Andromeda Galaxy,” and M44 is the Praesepe or “the Beehive” (identified as a cloud by Ptolemy, but shown by Galileo’s telescope to be stars instead of a cloud.) However, we can expand

Sedna. This is an artistic depiction of Sedna, the unofficial Inuit ocean-goddess name of an object discovered in November, 2003, by Michael Brown of the California Institute of Technology, Chad Trujillo of the Gemini Observatory in Hawaii, and David Rabinowitz of Yale University. Following IAU minor planet naming rules, the object is 2003 VB12. It is three times farther from Earth than Pluto, taking 10,500 years to revolve about the sun. Sedna/2003 VB12 is about three-fourths the diameter of Pluto and the second reddest object in the solar system, second only to Mars. Credit: NASA/JPL-Caltech/R. Hurt (SSC-Caltech).
our vocabulary of creative nicknames for the Messier objects (unofficial names, of course) by referring to the above website. The list offered here reveals that M64 in Coma Berenices is “the Sleeping Beauty” or “the Blackeye” Galaxy. A wonderful photographic montage of M64 appears on p. 19 of the May, 2004, issue of Sky & Telescope, designated as “the Blackeye Galaxy.” The unusual photograph was created by the Hubble Heritage Project using blue, green, red, and near-infrared light.

M17 is variously the “Omega Nebula,” “Swan Nebula,” “Horseshoe Nebula,” or “Lobster Nebula,” while M76 is the “Butterfly Nebula,” “Little Dumbbell Nebula,” “Cork Nebula,” or “Barbell Nebula.”

John Bakedlund has a favorite list of imaginative but unofficial names for astronomical objects beyond the Messier objects, which planetarians might find useful, for the same reason that he lists them: “...they add color to interesting objects that have dull catalogue names.” In Bakedlund’s list we find “Ghost of Jupiter,” “Coat hanger Cluster,” “Silver Coin Galaxy,” and “Inkspot,” all interesting descriptive names one might mention in planetarium programs. See http://www.geocities.com/rascb/objnames.htm. Another site listing a large number of common names or “nicknames” for deep sky objects along with their official designations, maintained by the Grasslands Observatory, is http://www.3towers.com/miscella.htm.

Astronomers differ in their disposition toward the deep-object nicknames. Astrophysicist James Kaler prefers the official designations, judging that way too many “cute” names are applied. It appears that some feel compelled to give a jazzy name to almost every interesting new object found by the HST, the Chandra X-Ray Observatory, and other space telescopes. And this, says Kaler, diminishes the dignity of astronomy. Astronomer John Feldmeier notes that both professional and amateur astronomers frequently use abbreviated or unofficial names in their day-to-day conversations about their work. Regardless, astronomers adhere to IAU names in papers and journals.

Often newly-discovered planetary nebulae receive official names based on their discoverers. For example, when astronomers George Jacoby and Laura Fulton found planetary nebulae in the Galactic halo, the nebulae were named JaFu1, JaFu2, etc.

The New General Catalogue of Nebulae and Clusters of Stars (NGC) was published by John L. E. Dreyer (1852-1926) in 1888. The NGC was the work of the father-and-son astronomers William and John Herschel, and surely William’s sister Caroline Herschel (1750-1848),

Galactic Center. There are a total of 17 Messier objects and other telescopio objects in the region of Sagittarius and the Galactic Center. The sky is a 30-minute exposure on Ektachrome 400 film taken from Cerro Tololo, Chile, using a Canon 50mm lens wide open at f/4.8. North is at the top. The photograph spans an area of about 27 by 40 degrees. We see the intricate absorbing dust lanes that block the actual galactic center and the yellow color of old stars, dimmed to brown where the strong reddening by interstellar dust. Since this film has a response to the red light of H-alpha from emission nebulae, the many H II regions are clearly seen. The largest telescopes used by Messier while looking into the Galactic Center and elsewhere were 190-mm and 200-mm reflectors. But the speculum mirrors of those telescopes would have had the equivalent light gathering power of present-day 80- to 100-mm reflectors. Alan Dyer points out (Observer’s Handbook, The Royal Astronomical Society of Canada) that a modern observer should be able to see all the Messier objects, in the direction of the Galactic Center and across the celestial sphere, with a dark sky and either an 80-mm refractor or a 100-mm reflector. Credit: William C. Keel (University of Alabama, Tuscaloosa), Cerro Tololo, Chile.
who observed in the eighteenth and nineteenth centuries. The Dreyer/Herschel NGC contains a total of 7,840 objects that are not single stars. Objects are numbered in order of right ascension based on an 1860 epoch. With subsequent publications in 1895 and 1908 (the Index Catalogues, abbreviated IC), Dreyer listed 13,226 objects — almost every non-point like telescopic object beyond the solar system visible with a 30-centimeter telescopes from a backyard observing location having slight to moderate pollution.

Some other important catalog systems for deep sky objects include the ESO (European Southern Observatory), IR (Infrared Astronomical Satellite), Mrk (Markarian), and UGC (Uppsala General Catalog). The numbers which follow the letter designation can indicate either the order in the list or the location.

The NASA/IPAC Extragalactic Database (NED) contains positions, basic data, and over 1,275,000 identifications for 767 extragalactic objects, references to 33,000 published papers, 37,000 notes from catalogues and other publications, 1,200,000 photometric measurements, and 500,000 position measurements NED has 15,500 abstracts of articles about extragalactic objects and is far more complete in extragalactic objects than is SIMBAD, although SIMBAD now also carries extragalactic as well as galactic data. (Since NED began in 1988, and SIMBAD began incorporating extragalactic data in 1983, one could peruse SIMBAD if interested in extragalactic literature for the years 1983-1988.) A big advantage of NED is that it is accessible without charge or password to all at nedwww.ipac.caltech.edu.

Another major astronomical data base for extragalactic information is the Lyon-Meudon Extragalactic Database (LEDA), created in 1983. LEDA has finding charts of galaxies at almost any scale. These and more specialized data from LEDA also are free to all at www.ledabase.fr.

The NGC/IC Project currently is trying to clear up identification problems relating to both stars and deep sky objects. Amateur astronomers find the NGC to be a very important source. But, as Steve Gottlieb notes, “A staggering 15 to 20 percent of all NGC entries have known or potential identification problems - poor positions, misidentifications, duplicate entries, incorrect classifications, and confusion with single or multiple stars or even Palomar Sky Survey plate defects.”

Initiated by Harold Corwin of the NASA Extragalactic Database (NED) team, a collaborative project of piecing together the true discovery stories and presenting corrected identifications and modern data for the entire NGC (New General Catalogue) and IC (Index Catalogue) is under way. One can access the NGC/IC Project site at www.ngcic.com to find summaries of several thousand puzzle solutions by principal investigators Harold Corwin and Malcolm Thomson. Also, German amateur astronomer Wolfgang Steinicke has compiled a Revised NGC/IC with exact positions, catalog data, and table of biographical information on the original 160 contributors to the NGC and IC.

The Big Bang

The simple name of “the Big Bang” for the origin of the universe is used by all astronomers. Fred Hoyle (1915-2001) introduced the term in a series of popular radio talks in the in Great Britain in the late 1940s. Ironically, Hoyle probably intended the term to be derogatory, a put-down to arguments given by George Gamow (1904-1968) for a sudden beginning of the universe. Hoyle retaliated with “the Steady State Universe” theory. Proposed in 1948 by Hoyle, Hermann Bondi, and Thomas Gold, The Steady State Universe has no beginning. When cosmic microwave background radiation was discovered in 1965 by Robert Wilson and Arno Penzias (for which they received the 1978 Nobel Prize in physics), predicted by George Gamow, Ralph Alpher, and Robert Herman in 1948-49, the Steady State Universe theory lost favor.

In the August, 1993, issue of Sky & Telescope, Timothy Ferris announced a contest to rename the Big Bang. There were three contest judges: Carl Sagan, Ferris, and Hugh Downs. Although over 13,000 entrees were submitted from 41 countries, the judges could not find a better name. Concluded Sagan, “Here’s nothing that even approaches the phrase ‘Big Bang’ in felicity ... The idea of space-time and matter expanding together and not ‘into’ anything may be permanently beyond reach in the universe of short and lucid phrases.”

Some Final Thoughts

And so we reach the end of a very long look at how celestial objects are named. Naming seems to be a human need, or at least a result of the way the human mind functions. Naming also heightens our perception of human importance in the scheme of things. Percival Lowell remarked, “Naming a thing is Man’s nearest approach to creating it.” Somehow our involvement makes the thing we name more meaningful.

Early cultures kept the terrors of night darkness and the unknown away by giving names to the constellations. As they attached names over time people became more comfortable with the universe and more accepting of its objects. When people categorize an object, the act may create a feeling of understanding, even though actual understanding does not exist.

Proper names resonate with particular meanings, adding a motivational aspect to learning astronomy. Justifying his names for Martian features, Schiaparelli said: “…grant me the chimera of these euphonic names, whose sounds awaken in the mind so many beautiful memories.”

So there are multiple human reasons for naming astronomical objects: 1) to make the universe more meaningful and interesting, 2) to communicate information about objects.
in the sky and 3) to tame the cosmos so that we feel more comfortable within it. The names that we use for astronomical objects have interesting stories that we can and should share in planetarium programs, stories that for psychological and other reasons are likely to resonate with interests of members of our audiences.

We must be grateful to the IAU committees who work very hard to establish workable systems and approve new appropriate names for objects, even though their efforts do not eliminate all confusion. With an explosion of discoveries from new telescopes and space explorations, it is hard for the official naming processes to keep up. The details and number of official naming conventions, unless one uses them continuously, are tedious. And multiple names continue to confound many of us. We may hope that the present situation of multiple names for so many objects will someday become more user-friendly. In spite of these inconveniences, consider what the condition of astronomical nomenclature and its uses would be if the IAU committees did not regulate object names... an unmanageable tangle of misidentifications.

To close in the vein with which this article began, Andre Heck of the Strasbourg Astronomical Observatory takes an unusual stand regarding adopting a star or another sky object. Heck suggests that “instead of posing as a shocked goddess,” at the practice of forming a personal connection with an astronomical object, astronomers should take advantage of the interest which has been shown by people responding to the businesses which “sell stars.” The astronomy community, says Heck, should build on public and student interest in astronomy by promoting the “adoption” (not the selling) of various sky objects. Heck concludes that supplying people who “adopt” sky objects with accurate and up-to-date information about their objects, including professional data and bibliographical references, and sometimes complete scholarly papers, combining all the information in a pleasing package, would cost little and be very educational. Heck enthuses, “I see kids and adults showing around information on the latest advances relating to their adopted objects.” Heck believes that this mode of popularizing astronomy as well as accurate education of an interested sector of the public could create a large source of political and economic support for astronomy.

Continuing his provocative discussion, Heck notes, “We should never forget that we Earth-based astronomers have no more right to name celestial objects than hypothetical beings living somewhere else in space. Our rules are no more than human-made naming conventions, recognized by our learned bodies, to avoid confusion and allow immediate identification.”

I am grateful to many people who answered questions as I prepared this manuscript. Particularly, I thank four astronomers who read the manuscript carefully and made many suggestions: Hélène R. Dickel, Research Professor of Astronomy Emerita, University of Illinois and Member/Past Chair of the IAU Working Group on Designations; James B. Kaler, Professor Emeritus of Astronomy, University of Illinois; E. C. Krupp, Director of Griffith Observatory; and Brian G. Marsden, former Associate Director for Planetary Sciences at the Harvard-Smithsonian Center for Astrophysics and Director of the Minor Planets Center.

Selected References

Reports from Armand Spitz Scholarship Recipients

Lars Broman
Dalarna University
SE-781 88 Borlänge, Sweden

In October 2003, the International Planetarium Society Council met in Jena. During the meeting, I submitted a request for grants from the Armand Spitz Fund for Planetarium Education to support two master students' internship and field work at a planetarium for three months, April-June 2004. Eligible for receiving a grant are students attending a 50-week Master's Program in Science Communication at Dalarna University. The Council decided as follows:

* The students will submit a report to Council describing their experiences and the significance of their project.
* The report will be published in the *Plan - etarian* and posted on the IPS Website.
* Two scholarships of $500 (USD) will be awarded for one year and will then be evaluated for a possible second year renewal.

Three students applied for a scholarship: Claudette Martin doing her field work at H R MacMillan Space Centre in Vancouver, BC, Canada, and Hamid Asgari and Kayvan Seyed Nejadian doing a joint field work at Falun Science Center, Falun, Sweden; this center includes the Stella Nova Planetarium. One scholarship was awarded to Martin and one scholarship was shared by Asgari and Seyed Nejadian. Their reports were given to IPS Council in Valencia on 4 July, and the Council also decided to give similar scholarships to two of the students who begin their studies in September.

Below follow the reports, slightly edited. The theses will, when completed, be available at www.ScienceCommunication.se.

Clauutette Martin:
Examining Visitor Attitudes and Motivations at a Space Science Centre

Broad, comprehensive audience studies have never been conducted at the H. R. Mac-
Millan Space Centre. While I am already an employee at this facility, the Master of Science Communication (Dalarna University) internship period has given me the opportunity to focus my time on the research and analysis of this critical information with the aim of improving our visitors' experience.

Examining Visitor Attitudes and Motivations at a Space Science Centre has the following four aims:

1) To investigate the assumptions, conclusions, and studies that were made of visitor attitudes during the planning phase of the 1999 expansion.
2) To investigate the visitors' motivations for visiting the space centre. In Vancouver, the public has a wide array of choices for their leisure activities and spending. How do they preferentially rank some of these activities and why are they choosing to come to the Space Centre?
3) To investigate the visitors’ attitudes and feelings towards space science and astronomy.
4) To investigate the visitors’ factual knowledge of space and the universe.

At this time, only the results of questions 2 and 3 are analyzed. One of the more striking results is the noticeable dislike for computer-related activities. Given that the Space Centre's exhibit gallery consists mostly of computer games and monitors, this is a point which management will no doubt wish to take into consideration during the hoped-for redesign.

Though the project itself is somewhat narrow in scope, it will provide an insightful look into the thoughts and motivations of our audiences and will serve as background information to a larger scale feasibility study, scheduled to commence this fall.

Acknowledgement. The grant from Armand Spitz Fund for Planetarium Education that has helped financing my masters studies is gratefully acknowledged.

Kayvan Seyed Nejadian and Hamid Asgari:
Important Parameters in Designing and Presenting Exhibits and Planetarium Programs in Science Centers

In August 2003, we arrived in Sweden as two international students of Dalarna University and started studying the program of Master of Science Communication. At that time we knew little about planetariums and their roles in informal learning. We had heard that there is a planetarium in the north of Tehran, Iran, but unfortunately we did not have the chance to visit it before coming to Sweden.

At the beginning of our Master's Program, we had an enjoyable and educational experience; we started the program by taking part in a study tour of Sweden and Finland with Professor Lars Broman (the Head and Coordinator of the Program), Per Broman (Lecturer) and other students of the program. At the first step, we visited The Future's Museum (Framtidsmuseet) in Borlänge, a museum with the Kosmorama planetarium. In Kosmorama, which is located at the heart of the museum, we could have exciting space adventures regarding galaxies, planets, stars and so on. Visiting this planetarium and watching the planetarium program, as our first experience in this field, was very interesting and exciting for us.

We continued our study tour in order to visit some other science centers and planetariums such as Tom Tits Experiment, Tekniska Museet, The Natural History Museum with its great Planetarium (Cosmonova), and Heureka in Finland with its planetarium (Verne Theatre). We learned a lot about science centers, planetariums and planetarium programs during the study tour. After the study tour we had a discussion with Lars and Per Broman and with other students about our observations and opinions of the study tour, the science centers, and the planetariums which we visited. We also discussed the
important role that planetariums play in science centers.

While studying the program, we also had various theoretical and practical lectures regarding planetariums with Lars Broman and Per Broman. Examples of these lectures are Starlab, producing an AV scene, writing a planetarium program manuscript, and producing a planetarium program. In the Starlab we became familiar with setting up a temporary planetarium and in working with its related equipment for showing a planetarium program. We became familiar with the names of famous constellations in the night sky. At AV scene production, we learned how to work with image editing and audio software for making an AV program. We also wrote our own planetarium program manuscripts and made our AV programs. Kayvan’s program is titled The Life of Stars and Hamid’s program is titled The Planets of Our Solar System.

At the end of the program and during our internship at Falun Science Center, we had a chance to work in a planetarium. We had 27 groups of kids from different schools in Falun as the visitors, for whom we ran the planetarium programs. That was a new, interesting, and exciting experience for us. The total time of the planetarium program for each group was about half an hour which included presenting a slide show and a starry night program. We had three slide shows for different age groups: Andromeda Story (for 10-to 12-year-old kids), Journey through Space (for 13- to 15-year-old students) and The Planets of our Solar System (for age 16 and over).

In the starry night program, we described famous constellations in the northern sky in spring and/or autumn. After their visit, the students were given questionnaires which asked their opinions of the slide show and the starry night program. We have some interesting preliminary results from our observations, from the questionnaires, and from formal and informal interviews with the teachers.

We can refer to some of the preliminary results that emerged from 384 questionnaires. The results indicate that the starry night program is more difficult than the slide show for the students. But in spite of this, the starry night program is more interesting for them than the slide show.

According to preliminary results, although the planetarium programs are a little more difficult for girls than for boys, this difference is not considerable. The evaluation of the questionnaires indicates that boys are a little more interested in slide shows than are girls. It also shows that girls like the starry night program a little more than boys, but there is not a big difference between the interests of boys and girls in planetarium programs.

The final results depend on the accurate and detailed evaluations of the questionnaires, interviews, and observations. We will use the final results of our research for writing our master’s thesis titled Important Parameters in Designing and Presenting Exhibits and Planetarium Programs in Science Centers.

These results will help us to recommend guidelines and to create a framework for making better planetarium programs in the future.

Acknowledgement. We gratefully acknowledge the grant from Armand Spitz Fund for Planetarium Education that has helped us finance our master studies in Sweden.

Science Communication Students at Dalarna University Kayvan Seyed Nejadian standing and Hamid Asgari sitting in Stella Nova Planetarium. Photo Per Broman.

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Kosuke Sasaki  
November 14, 1933 - June 12, 2004

It is with great sadness that I inform you of Kosuke (Kosy) Sasaki’s passing. He died at his home in Monroe, New York on Saturday morning, June 12th, from complications due to lung cancer. He is survived by his wife Chako, his son Tsutomu (Storm), and his daughter Mayumi.

Kosy first came to the USA as an engineer and designer for GOTO, designing and installing the model Saturn at Vanderbilt Planetarium in Long Island, New York, in 1971. Shortly thereafter, he stayed in the US working for Viewlex, Inc., as their planetarium consultant, installation engineer and service representative. He continued this role with Viewlex when they shifted their sales from GOTO to Minolta Planetariums. In the 1980s Kosy took over the Minolta US sales representation and later became their planetarium technology and sales consultant. During the 80s and 90s, Kosy convinced Minolta to combine full-dome digital projection and full-dome laser graphics with Minolta’s optical-mechanical star projectors, and the “GeminiStar” concept was born. Baton Rouge’s Pennington Planetarium is one of the latest examples of Kosy’s dream planetarium. For his many contributions to planetariums, he was named an IPS Fellow, only one of four Japanese to receive this honor.

Kosy often told me that “the show is everything” and that lasers, digital projectors and optical-mechanical star projectors are merely tools to create exciting and meaningful programming. He also reminded me that in our field, “people are still the greatest technological asset.”

The memorial service for Kosy was attended by several planetarians, including former IPS President Bill Gutsch, who talked of the bridges Kosy built between Japanese and US planetariums and the critical role he played in bringing the IPS Conference to Osaka in 1996.

Kosy loved planetarium people, and at conferences, you could often find Kosy surrounded by them, together laughing and sharing war stories about their planetarium adventures. Mr. Imai, president of Konica Minolta Planetariums, may have described him best when he affectionately called Kosy a “joyous and sometimes unmanagable child.”

In the end it may be his colleague Shigeki Ogawa’s elegant memorial words that console us, “Sadly, he is already in a distant galaxy. But we have a telescope named memory. And with it, we can see him at any time. He will live in our mind for a long time. Goodbye Kosy. Sayonara Sasaki-san.”

I hope that any time planetarians get together to laugh and share a story, they will remember Kosy and offer a toast to this kind and generous man.

- Philip Groce
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It’s hard to believe that 2004 is nearly over, and that so many of the extreme exploration events we planned for several years ago have already occurred. I need more time to get ready! It has been a pleasure working more closely with many of you this year, sharing the tension and joy of the Mars landings, the drama of Spirit’s memory problems, Stardust’s breathtaking images of Comet Wild-2, and Cassini’s smooth passage through Saturn’s rings. Mars Global Surveyor, Mars Odyssey, and Mars Express continue sending astonishing imagery of Mars’ surface. The Spitzer Space Telescope is shedding light (so to speak) on many of the mysteries of the universe, including the nature of dark matter and black holes. Hubble continues its legendary observations as discussions continue about prolonging its lifetime, as Chandra and Galex make their x-ray and UV contributions. The grand Voyagers may have left our solar system... or not — the debate continues.

The year 2005 promises to be nearly as exciting, especially if the rovers survive the Martian winter. We look forward to Huygens’ descent through Titan’s atmosphere on January 14 (UT), and Deep Impact’s date with Comet Tempel 1 on July 4, as well as boatloads of data from Cassini’s Lunar-A, Selene Mars Reconnaissance Orbiter, and Venus Express are scheduled for launch in 2005. Hayabusa (formerly MUSES-C) is scheduled to arrive at asteroid Itokawa. So don’t get too comfortable yet — there will continue to be lots of new information to incorporate into your programs!

Deep Impact is scheduled for launch December 30, 2004, and the Deep Impact Education and Outreach team has just released a new planetarium show, Deep Impact: Rendezvous with a Comet produced for them by Fiske Planetarium, Boulder, Colorado. Courtesy of the NASA Deep Impact team, free copies of the complete Deep Impact show kit are included in this issue of the Planetarian as a three-DVD set. A complete Spanish version is also available upon request. Fiske is also nearing completion of Space Storm, available in fall 2004, which investigates space weather and the effects of solar activity on Earth. Funded by NASA’s TIMED mission in association with the University of Colorado’s Laboratory for Atmospheric and Space Physics (LASP), Space Storm addresses solar structure, sunspots, coronal mass ejections and solar wind interactions with Earth’s atmosphere, satellites and telecommunications. The show also includes breathtaking images and movies from the TIMED, SOHO and Yokoh spacecraft. The complete show kit is fully available in Spanish as well. Contact Fiske’s Operations Manager Tito Salas at Francisco.Salas@colorado.edu if you are interested in this show.

Most of us are lucky enough to be able to enjoy the night sky and the images from spacecraft with our own eyes. However, teaching astronomy to people who are visually impaired presents unique challenges. The rest of this month’s column is a condensation of an article about how several NASA-funded educators are developing teaching techniques for this segment of our population.

Touching the Stars by Naomi Lubick


Kenneth Quinn took his first class in the geology department at Edinboro University of Pennsylvania two years ago. The course was an atmospheric and space science class, taught half in the school’s planetarium, and the other half with climatology maps and other very visual tools. Quinn is completely blind, but the 23-year-old senior had an advantage: His professor, David Hurd, is one of many researchers and teachers making the physical sciences visible to students who are visually impaired or blind.

Quinn, who had some sight until he was 5 years old, was able to see the solar system and stars through complex “thermoform” models that Hurd, an astronomer and atmospheric scientist, and his colleagues have developed to convey the stars and universe in plastic.

Using string, beads and other materials, Hurd and John Matelock, a tactile illustrator for the university, have made star charts, a tactile map of the moon, and a tactile image of the Cassini-Huygens spacecraft. Each thermoform reproduction is made by heating plastic sheets that raise in relief over a model’s surfaces in a vacuum sealing process. For the past three semesters, Hurd says that he has had at least one blind student in his introductory astronomy course. “It’s become my passion over the past five or six years,” he says, and though the course is still highly visual, “it’s accessible to special-needs students. The emphasis is, if the student is there, we have to make every effort to make sure that they are experiencing the same thing as other students.”

That philosophy is part of “universal design,” which advocates making teaching tools for select groups of people, in hopes of making information more accessible to all. A 1999 study from the American Foundation for the Blind estimated that 93,600 students in the United States are severely visually impaired (that number includes more than 55,000 children who are legally blind). These numbers are radically different from U.S. government counts, which show just over 27,500 visually impaired students, from ages three to 21, served under the Individuals with Disabilities Education Act in 2002. Both sets of numbers, however, indicate a large demand for alternative methods to teach all kinds of visual topics.

Cassandra Runyon, a planetary geologist at the College of Charleston in South Carolina, acts as a point person for a community of teachers interested in such alternative techniques. Her own goal is to teach visually impaired students remote sensing, an entirely visual science, and to then eventually adapt her materials to blind, deaf, hearing-impaired and orthopedically impaired students.

Runyon’s former student Jason Permenter, now a graduate student in the geography department at the University of Cambridge in England, has created a curriculum using 3-D clay mountains with brightly colored clays delineating different geologic deposits and
landscape components. He says he hopes to reach sight-impaired students who may be turned off by the difficulty in understanding “anything in the geosciences because it’s all visual.”

But these physical models and other universal access teaching methods may also benefit sighted students or students with different challenges, Runyon says. After having increasing numbers of students with a variety of disabilities, she says that her father, an artist, challenged her to find new ways to get visual information across in the classroom. “Then I realized what we were doing to get things across to the disabled students was helping the other students,” she says, “in basic concepts as well as the more complex ones.”

Indeed, physical teaching models can “help everybody learn whether or not they have normal vision,” says Susan Sakimoto, a planetary geologist at NASA Goddard in Maryland. The 3-D models her team makes have proven useful in teaching classic lessons in topography, scale, and vertical exaggeration, the sorts of concepts that professional scientists take for granted, she says, but for which an average middle school student “will go, ‘what?’”

The first pair of models made by the NASA team consists of vertical exaggerations of Mars’ Olympus Mons and Earth’s chain of Hawaiian Islands. Sakimoto has given the models to her education students at the Johns Hopkins University in Baltimore, and the team has shipped models to teachers across the country who have volunteered to test them.

Quinn, who has “beta-tested” the new materials that come out of Edinboro University of Pennsylvania and NASA, has conducted comparisons with other products as a project for Hurd. He says that in the past, available materials were “hit and miss.” But recently, Quinn says, the field has been “on an upward swing.”

Just this year, the National Federation of the Blind (NFB) organized its first summer camp for visually impaired students. The week-long course coupled high school students with NASA scientists to build and launch a rocket.

Barbara Ceadle, president of the National Organization of Parents of Blind Children within NFB, says that the summer camp includes lessons “blind kids are often excluded from.” Ideally, NFB will create a central clearinghouse for adapted resources for teachers and students, Ceadle says. Currently, “there is no centralized place,” she says.

Several institutions have programs that cater to college students. Wendi Williams of the University of Arkansas at Little Rock says she wants to make sure teachers are communicating and moving toward programs that work effectively. Following successful sessions at previous meetings, Williams will chair an oral session at this year’s Geological Society of America meeting in Denver that is one of four on teaching geology to disabled students. For the past two years, Williams’ geology department has served as a “guinea pig” for teaching techniques that will be applied to other disciplines at the university.

The geosciences are a good place to start because “we have toys to play with in geology and we have been creative in modifying them,” Williams says. “We’re going to be doing this across the sciences because it’s the right thing to do.”
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Or See you in IPS2004 in Valencia, Spain (July 4-8, 2004)
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- a short-arc lamp with three times the efficiency of halogen lamps, nearly twice the color temperature of tungsten lamps, and an output of four times that of small-filament tungsten-halogen lamps producing a light that is pure, safe, UV-screened, and cold to the touch.
- 4 quartz-halogen, fully-adjustable gooseneck side lamps for reading and drawing ease inside the dome.
- azimuth and meridian reference projections.
- the MultiLens Starfield Cylinder includes new custom-designed lenses imaging the 70 brightest stars eliminating chromatic and coma aberration and resulting in the most accurate starfield of any small planetarium projector.
- an extraordinarily precise depiction of the Milky Way that includes features like the Coal Sack and the Milky Way center, as well as the Large and Small Magellanic Clouds and Andromeda Galaxy.

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A much safer and convenient way to view the brilliant light of the sun. Useful for group viewing, the Sunspotter allows several observers to track sunspots as they appear, move and vanish.

"It's a clever device, an easy and extremely portable way to view the sun... it's a great way to demonstrate that the sun rotates, that sunspots change, and that the number of sunspots changes over the solar cycle. I'm sold on them."

— Jim Manning, Taylor Planetarium, Museum of the Rockies, and Associate Editor, The Planetarian

"I imagine that it's one of the few tabletop experiments about which, 200 years from now, they will say 'that's how they made clever, quality instruments.'"

— Dr. Neil deGrasse Tyson, Astrophysicist and Astronerd
Spain Travels:
My husband, Tom, and I took advantage of some time before this year’s conference and spent fifteen days traveling around sunny Spain and enjoying the unique people, culture, sites, and food. We treasure what we experienced during our travels and at the conference. We came home with wonderful impressions and memories of this beautiful country.

One of the professional highlights of our pre-conference trip was a visit to the Madrid Planetarium (http://www.planetades.info-general.htm). Asunci´on S´anchez Justel (asanchez@cosmos.astro.uson.mx), the Planetarium Director, was most gracious. In the middle of setting up for opening an important new exhibit, “Living in Space”, she took the time to show us all around her facility and even accompanied us during a planetarium show.

It was a new 45-minute program for young children called “En órbita con L´opez” which was directed by Toˆno Bernedo. Nicol´as Cardiel and Toˆno Bernedo wrote the script. Toˆno also did the original 3D animations and drawings, which were fantastic. “In Orbit with L´opez” is an interactive story where the audience tours the universe through the eyes of satellites and is encouraged to shout out answers to puzzles and problems. It was delightful to hear both children and adults actively become involved in this show. Asunci´on and her staff are, in my opinion, to be commended for their dedication to using high-tech equipment as tools that are used effectively in telling a story and in engaging the audience in their own learning.

Another interesting aside is that Toˆno also designed a device that allows each of their planetarium Barco projectors to slew to different positions so that they can project images in a variety of locations on the dome. Thus he has maximized the effect of existing equipment at a fraction of the expense for buying new equipment that would accomplish the same thing.

IPS Conference Vendor Floor:
There were many interesting exhibits on the Conference Vendor Floor. The most notable changes this year were the increased number of mobile domes and the advent of digital projection systems for mobile planetaria.

I only had time to visit the booths listed below. I will try to highlight more about these and other companies in future columns if/and when they send me information. (The first to be highlighted in this column is in the digital realm, Sky-Skan’s defini-ti PD.)

The vendors I visited and the products of interest to small and portable domes are listed here in alphabetical order:

**Aula del Cosmos:**
Albert PlÀ, PlÀ I Margall, 08024 Barcelona (Spain); Phone: 93 284 1216 (62 669 7363); Fax: 93 210 8246; e-mail: aulacosmos@menta.net or aulacosmos@telefonica.net

Products: Auxiliary projector and a new and improved hand-held slide projector. Quim GuixÀ supplies domes for this company. (See below.)

Comments: People especially liked the hand held projector; it has an attached wheel that can hold several slides and images. The auxiliary projector has a unique light source that can be raised and lowered to make projected images appear to rise or fall.

**CUBEX:**
ASTRONOMIA EDUCATIVA S.R.L., Buenos Aires, Argentina; Phone: +54-11-4697-2815; Web: http://www.cubex.com.ar

Products: Portable planetariums, domes and auxiliary equipment.

Comments: The projector has 2000 (GOTO EX-3 type) stars-no colors. The planets, sun and moon have individual projectors. This year’s model of the projector has a more professional appearance and operating system than the original and has two goose-necked side lights and a reversible motor.

**Gambato Costruzioni per Astronomia:**
Via Canaletto N. 43 - 30037 - Gardigiano di Scorzè - VE - Italy; Phone/Fax: (39) 04 15 83 0145; Website: www.gambato.it; e-mail: info@gambato.it

Products: Custom designed and built planetariums and domes from 3 meters to 19 meters (stationary and mobile) and domes for observatories.
**Quim Guixà:**
P.O. Box 102, 08440 Cardedeu, Barcelona (Spain); Tel: (34) 93 845 2549; Fax: (34) 93 845 1748; e-mail: info@quimguixa.com; Web: http://www.quimguixa.com.

Products: Custom designed and built fixed and inflatable domes for projection.
Comments: These domes are very sturdy. People really liked the fact that this company produces domes of many colors and designs.

**RSA Cosmos:**
Z.I. de la Vaure, B.P.40, 42290 Sorbiers, France; Tel: +33 (0) 4 77 53 30 48; Fax: +33 (0) 4 77 53 38 61; e-mail: sales@rsacosmos.com; Web: www.rsacosmos.com

Products: Planetariums and domes from 3 meters to 23 meters; they have both stationary and mobile planetariums available.
Comments: They tell me that there will be an update to their portable model by the end of this year; it will be called Cosmodysseé IV.

**Learning Technologies, Inc.:**
40 Cameron Avenue, Somerville, Massachusetts 02144 USA; Phone: 1-800-537-8703 (U.S. only) or 1-617-628-1459; Fax: 1-617-628-8606; Web: http://www.starlab.com.

Products: Portable planetariums, domes, solar telescope (Sunspotter) and Project Star and other hands-on educational materials.
Comments: The newest projector (Fiberarc) has some nice added features: The light source is about four times brighter than the standard projector. It also has four goose-necked side lamps, a meridian projector and cardinal directions projector as well as a motor that is reversible. The newest projection cylinder has 70-lensed stars and so produces an even nicer starry sky.

LTI announced that it has received a grant from the National Science Foundation to research and develop a low cost digital projector for use in the Starlab. Progress is well underway on this project.

**Stargazer Planetariums:**
5 Elmwood Place, Hartlepool, TS26 0LE United Kingdom; Web: http://www.stargazerplanetariums.co.uk; e-mail: raymond@stargazz.demon.co.uk.

Products: Custom designed and built inflatable domes for use as planetariums or small theatres.
Comments: These are sturdy domes and people really appreciate the excellent air circulation in

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**Albert Pla demonstrates his new hand-held slide projector. Photo by Susan Button.**

Comments: The easy-to-use projector has stars that are individually lensed on the projector ball; this creates a very pleasing sky on the dome. The portable dome is not inflatable; it is sturdy and takes about 6 hours to set up. Excellent for a semi-permanent exhibit.

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**Jaak Jaaniste, representing the Estonian Astronomical Society, presented a workshop about Estonian Sky stories and traditions. Photo by Susan Button.**

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**One of the many colorful domes produced by Quim Guixà. Photo by Susan Button.**
these domes. The newest development with this manufacturer is that they are now also producing single skin domes and can provide an interior or color that is compatible with digital projections.

Digital Revolution for Mini-domes:
The race continues! As indicated in past columns, there has been a big development in the portable planetarium world. Smaller and truly portable versions of digital projection systems are now on the market.

Digitalis Education Solutions (PO Box 2976, Bremerton, Washington 98330 USA; Phone: 1-360-616-8915; FAX: 1-360-616-8917) advertised at the November 2003 ASTC meeting that the first of these real-time digital projectors was for sale.

Sky-Skan believes that they are the first since they announced, in October 2003, the creation of definiti PD, the first real-time digital planetarium system designed for portable domes.

Paul Tetu (Sales and Systems Specialist, Sky-Skan, Inc.; Phone: +49-40-5480-8879; FAX: +49-40-5480-8878; E-mail: tetu@skyskan.com; Website: www.skyskan.com) tells me, “The system uses a single fisheye projector that utilizes the projector’s full resolution onscreen. As a teaching tool, it quickly gained a great deal of attention due to the programming flexibility it provides within a single package.”

“The digital portable planetarium was developed in part through the Immersive Earth Project led by Rice University and Dr. Carolyn Sumners at the Burke Baker Planetarium (Houston, Texas). Carolyn was working on an astronomy outreach grant funded by the REASON program of NASA’s Office of Earth Science and was looking for a partner to turn her prototype into a packaged product. Sky-Skan produced a fully packaged system complete with dome, shows and option- al automation of external devices that can be set-up by the average schoolteacher, while also maintaining the same functionality and compatibility as its ‘big dome’ brethren.”

“definiti PD’s (sic) development is driven by customer needs and requests. The live user interface is simple by design, allowing even an untrained user to present a star show by going instantly to any location and time, turn objects on and off (e.g. grids, sun, moon, planets, star trails, etc.), adjust the brightness of the star field, set the sky in motion, display current position and time, as well as use the mouse onscreen as a lecture pointer. Additional pages allow customer-defined buttons to be created to display any function of which the system is capable, including displaying graphics, video, and even running entire shows. The software and graphics system is designed to be fully compatible with all current and future projection technologies and has been engineered with advances in mind.”

Carolyn Sumners and Tony Butterfield presented a workshop using the definiti PD in this prototype dome. Photo by Susan Button.

Carolyh Sumnens works with the definiti PD. Photo provided by Sky-Skan.
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The Clementine Atlas of the Moon


Reviewed by Richard Dreiser, Yerkes Observatory, Lake Geneva, Wisconsin, USA.


On November 28, 1966, Lunar Orbiter II took a magnificent photograph of the lunar crater Copernicus from about 45 kilometers above the Moon’s surface, 240 kilometers due south of the rayed crater. ‘The Photograph of the Century’ would change our ideas of the Moon.

This was the first time anyone had seen Copernicus at such an angle and under such high resolution. Astronomers on Earth had previously been mostly limited to studying telescopic images of the Moon, blurred by the effects of the Earth’s turbulent atmosphere.

The Times Atlas of the Moon was published in 1969, just before the first astronauts set foot there. The Times Atlas included all 44 of the Lunar Astronomical Charts (LACs) published earlier and separately by the US Air Force. These “airbrushed, shaded-relief maps, overlain by topographic contour lines,” all done to the same scale of 1:1000000, represented the best series of lunar maps available. However, these LACs were based on information made from Earth-based telescopic images.

Beginning in the late 1960s, vast amounts of new lunar images and other information were obtained via robotic spacecraft and by humans en route to and on the Moon.

Long out-of-print, used copies of the Times Atlas of the Moon today sell for more than one hundred dollars, that is, if you can find a copy. It is easy to find new and used copies of over one-dozen old and new lunar atlases from booksellers on the web. Many contain at least some of the new lunar information, but none but the Clementine Atlas provide as definitive a collection of the new findings.

The Clementine Mission in 1994 provided scientists with the first complete global mapping of the Moon. The Clementine Atlas of the Moon is the first atlas to include all of the 144 LACs necessary for complete coverage, done to uniform scale and format.

Without question, The Clementine Atlas represents the finest work on lunar features to date. It comprises the most complete database available of lunar nomenclature, including often-overlooked satellite or secondary craters found around larger ones.

The first forty pages consist of information about the Moon, its motions, properties, and history, followed by a short history of lunar exploration. The Apollo Program is covered, as is the history of Soviet robotic lunar landers. There is an excellent brief introduction to lunar rocks and a section on recent lunar exploration, from Clementine to today. The information about Clementine imaging will prove particularly useful to those interested in space exploration.

There are eight full-color plates of lunar images which include lunar: topography; iron content; titanium content; false-color composite (in which subtle variations in rock type are emphasized); true-color image; geology (in which colors primarily indicate ages of rock); thorium content; and, epithermal neutron flux (the latter two obtained from Lunar Prospector data). Finally, there are seven pages of details on the mapping, including an index.

The final twenty-six pages feature a Gazetteer of over 1200 lunar features and impact craters, from Abbe to Zeno. Let’s hope future astronauts will someday make the trip to Hell and Back!

The first astronauts successfully landed on the Moon in 1969. No humans have visited the Moon since December 14, 1972.

On January 15, 2004, President Bush unveiled an ambitious plan to return Americans to the moon by 2020 and use the mission as a steppingstone for future manned trips to Mars and beyond.

Whether or not NASA decides to send humans back to the Moon in the next twenty years, amateur and professional astronomers and the public will continue to have a great interest in that satellite. The Clementine Atlas of the Moon is a welcome addition to the literature, well worth the publisher’s price (but note that the persistent may be able to find a new copy out there for less).
Mathematics In Nature, Modeling Patterns in the Natural World

Review by Bruce L. Dietrich, Wyomissing, Pennsylvania, USA.

In addition to his truly revolutionary celestial observations, Galileo noted that “the book of nature is written in the language of mathematics.” His quantitative approach to understanding the natural world marked the beginning of modern science. Today, even Pop Culture seems to have discovered math. A current best selling mystery novel introduces both Fibonacci Numbers and the Golden Mean as literary devices.

While the physical sciences and mathematical theory have marched together for four hundred years, the living world was long immunized from intensive mathematical intrusion. However, Mathematics in Nature combines astute observations from both realms with computational vigor.

This is a beautiful book for the calculus-literate reader. It is organized to encourage understanding of a given phenomenon at many complementary levels. There are crystalline photographs of multiple rainbows, Antarctic halo displays, self-revealing leaf arrangements, and for those with a high reach, even giraffe coat patterns. The abundant (357 citations) bibliography beckons us to go the primary source material.

However, since standard spreadsheet programs contain huge arrays of built-in formulae, and comprehensive web sites provide us with an additional 73,000 mathematical expressions, one may well ask, why this book? Because in it you walk beside a master teacher who radiates the joy of sharing his engaging vision of our world from both sides of the brain. From the preface right through his wonderful blend of literate exposition and equations there is amazingly little dross.

While he does not develop a formula for determining the net carbs in a glass of Chateau d’Yquem, he does share his explorations of clouds in a glass of beer, clearer visibility during rain rather than fog, albatross flight characteristics, the meander pattern of streams, and so much more. All of this happens within the context of genuine intellectual camaraderie and rich humor.

John Adam earned his Ph.D. in theoretical astrophysics from the University of London, did a post-doc stint in applied mathematics at St. Andrews, and was a Fulbright Scholar in Mechanical Engineering at the University of Rochester. His research has covered many areas including astrophysical fluid dynamics, magnetohydrodynamics, and the mathematical modeling of tumor growth and metastasis, and most recently wound healing. This unique text is an outgrowth of his course in mathematical modeling. It is a keeper.
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definiti™ PD

Sky-Skan in cooperation with the ekumenii lab
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Courtesy of NASA, a FREE copy of Fiske Planetarium’s new show “Deep Impact: Rendezvous With A Comet” is included with this issue. These complementary DVDs (three in all) contain a comprehensive manual, all of the images, audio, and video needed to run the show, and plenty of extras.

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available Fall 2004!
President’s Message

Jon W. Elvert, Director
Irene W. Pennington Planetarium
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70802 USA
(1) 225-344-5272
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jelvert@lasm.org

As I write this President’s Message, the Seventeenth Biennial IPS2004 Conference, hosted by the Hemispheric organization, has just come to a close. There were more than 300 delegates representing 53 countries in attendance and I am privileged to have had the opportunity to serve asIPS President during this very memorable conference in Valencia. I was delighted to see so many new members, as well as to meet a large number of delegates from planetariums across Europe and even from countries not typically in attendance at these conferences such as Egypt, Brazil, Chile, and Kuwait. Due to the publishing deadline of this issue and my post-conference visits to planetariums in Madrid and Lisbon, Portugal, a more detailed report on the conference, including minutes of the Council meeting, will appear in our winter issue of the Planetarian. You will also receive the conference proceedings on a CD-ROM in a later issue.

My sincere thanks to the entire Hemispheric organization, especially Esperanza Infrer, Jose Carlos Guirado, Maria Loles Ballart and their entire tireless staff for being our host of IPS 2004 and for providing a warm hospitality with incredible mid-day regional meals. This conference provided plenty of opportunities for informal professional exchange and a wealth of educational experiences, so I thank our hosts for making this possible.

I was especially pleased with the quality of the paper and panel sessions, the workshops and the products and demonstrations in the vendor/exhibition area. Although there were session delays and some vendor disappointments during the evening all-dome festival and demonstrations, in the end I believe we were witness to the creative energy in the digital world that certainly made this conference another “watershed.” And like all conferences, this one could not have been possible without hard work, dedication, and patience of the IPS Council members (17 regional representatives attended the meeting), which met two days prior to the opening ceremonies and whose work is to improve and expand our organization. A number of items were debated and voted upon which will effect our organization, but of all the committee reports the Strategic Planning Committee’s report was the most detailed. This committee delivered their long anticipated analysis and recommendations and will now review further input before any decisions are finalized. This committee’s report to Council will also appear in more detail in this next issue. We also received reports or heard presentations from attending affiliate representatives and committee chairs, giving an overview of what’s going on in the IPS.

Thanks also needs to be expressed to my fellow officers, especially our Executive Secretary Lee Ann Hennig, who have all worked some very long hours in assisting in the conference’s preparation and organization. This conference, of course, could not have been possible without all of you who attended and contributed to the exchange and sharing of ideas, including the vendors and sponsors for their financial support and who continue expanding the tools and ideas to help make our profession innovative and interesting for our planetarium audiences.

The award of the IPS Fellow was bestowed to Jack Fletcher, Hans-Ulrich Keller, Uwe Lemmer and Jim Rusk. Martin Ratcliffe was awarded the past-president’s plaque honoring his tenure as president. Candidates for the highest award our organization can bestow on a member, the Service Award, will be considered during next year’s Council meeting, which is yet to be determined by President-elect Martin George. These awards serve to highlight that our society is as worthwhile as its individual members make it. My congratulations and thanks on behalf of our society to our new Fellows.

One of the most important aspects of our conferences is finalizing the slate of officer candidates for this coming fall election. Candidates for the IPS President (in alphabetical order) are Anthony Fairall, Cape Town, South Africa and Susan Reynolds Button, New York, New York, USA. For Secretary: Lee Ann Hennig, Alexandria, Virginia, USA. For Treasurer: Shawn Laatsch, Greenville, North Carolina, USA. Congratulations and best wishes to all of the candidates. Our fall elections will be conducted on-line in the member’s only area on the IPS web site. Further reminders and electronic voting procedures will be announced on IPSNews and on Dome-L, but paper ballots will be sent to those without Internet access. In addition to the candidates, we will be voting on whether to abolish the Ethics Committee. Reasons for voting on this particular committee have been printed in previous issues of the Planetarian, but a summary of why we need to vote on this matter will appear on the ballot.

I personally hope that voting on-line increases member participation in elections and opens the door for future opportunities in conducting IPS business. I encourage all of you to vote. You can explore the new look of our web site, which is being redesigned to make for easier navigation. Alan Gould, Web Committee Chair, outlines the new design in his committee’s report below.

The IPS Council and membership also heard an updated report on our IPS 2006 Conference in Melbourne, Australia. Both Martin Bush and Martin George, our Australian hosts, described what promises to be a very exciting conference “down under.” According to the preliminary schedule, the following dates for IPS 2006 are July 13 – 18. More information, including the pre-and post conference tours will be announced in months to come. In looking ahead to 2008, there were four host candidates who presented a pitch to select their site. They were: Planetario de Morelia, Morelia, Mexico; Glasgow Science Centre, Glasgow, Scotland; Chabot Space & Science Center, Oakland, California (USA) and Adler Planetarium, Chicago, Illinois (USA). You should contact your regional representative for further information on these sites and expresses your preference. Your representative will be voting on the selection of our 2008-conference site at the Council meeting next year.

Again, to our Valencia hosts, their administration and numerous volunteers - Gracias!

Committee Chair Reports

As part of my promise to provide a venue for IPS Committees to be more visible in the context of the membership, the following quarterly reports provide current updates and highlights from the Planetarium Development Group Committee and the Web Committee.
IPS Planetarium Development Group
Ken Wilson, Chair
Science Museum of Virginia
Richmond, Virginia USA

The function of this committee is to develop written suggested guidelines for the development of new planetariums. The Planetarium Development Group grew out of a brainstorming session we had at the IPS '88 conference here in Richmond. Over the years I'd noticed that whenever we planetarians gathered and chatted informally, we’d hear horror stories of how this or that new planetarium had important flaws that any experienced planetarian could have foreseen and avoided. Often this was due to hiring the planetarium director and staff long after the architect and vendors had locked in on a design. It seemed to me that one explanation for this was just ignorance on the part of architects, planners, museum directors, and others who initiate and execute new planetarium projects. In our own self interest I thought it would be a good idea for the IPS to put together a guidebook of our collective wisdom on planning and designing planetariums and make it as widely available to those embarking on such a project with good intentions but little experience or background knowledge about this specialized facility called a planetarium.

Volunteers from the initial meeting in Richmond, plus others recruited from the IPS membership, put together our first publication, a booklet entitled “So You Want to Build a Planetarium” which was published by IPS and distributed to the membership in 1994. It is now available in electronic form on the IPS web site. After this booklet was completed we realized that, although it pointed out many, if not most, of the key issues to consider when building a planetarium, it did not give a lot of detailed advice. We decided then to use the booklet as a basis for a longer, more detailed publication with specific chapters focused on the key areas (e.g., selecting as star projector, safety and security, etc.)

Each of these chapters was/is to be written by an (non-vendor) IPS member with experience in the particular area of that chapter and peer reviewed by at least two other (non-vendor) IPS members to assure objectivity and completeness. This process has been long and slow, because it has been difficult to recruit volunteers with suitable experience and willingness to write a chapter. Several volunteers have not been able to fulfill their commitments, which have lead to further recruitments.

At the IPS meeting in Wichita, we decided to publish the longer guidebook, piece-by-piece, on the IPS web site, so that the completed chapters could be of benefit to a wide potential audience while the remaining chapters were completed. Rather than make this guidebook only available to IPS members (as most IPS publications are), we believed that would defeat the purpose of this particular publication. The planetarium development guidebook serves its purpose best when it gets into the hands of non-IPS members who are planning and designing the places where IPS members ultimately will be working and coping (or not coping) with design shortcomings. Thus the web is the ideal place for it.

In the future I see this as a living document with each chapter being revised over time on an ongoing basis, as needed. When the final chapter is completed, if not sooner, I see us make a big push to publicize the existence of this guidebook, especially among museum/science center directors, board members and architects.

IPS Web Committee
Alan Gould, Chair
Lawrence Hall of Science
Berkeley, California USA

This committee has developed and maintains the IPS web site on the World Wide Web portion of the Internet to provide information on the Society and its activities, with links to related Web sites.

In winter 2003-2004, small improvements to the IPS website included things such as updated information on people’s contact info, subtle font changes and minor page layout refinements, new IPS Membership Directory and Resource Directory files (PDF) maintained now by Dale Smith in the members-only area, and more robust directory update forms. New versions of IPS brochures were posted.

We have expanded the IPS Web Committee to include more volunteers and talent. In January 2004, new IPS-VWWV committee member Joyce Towne did an analysis of the existing IPS website and found that overall, it is easy to use, and has a lot of appropriate info on it— for members and new/casual visitors. Also in January of 2004, the Science Museum of Virginia, thanks to efforts of IPS-VWWV committee member Ken Wilson, volunteered to host the IPS website. This will remove the cost of keeping the IPS web site on a commercial server (Verrio up until now). In April 2004, Randi Slaughter, IPS-VWWV Committee member, also at Science Museum of Virginia, began to devote serious time to IPS website redesign. The results are promising. As of June 2004, Randi has done some significant work on creating templates for new IPS web pages. Sample pages were posted on a private website and reviewed by IPS Web Committee persons Joyce Towne, Ken Wilson, and Committee chair Alan Gould. There were simple versions and a flash-style version of the home page being considered. Issues such as load time and accessibility for seeing impaired are being considered.

We are soon going to be in a position to evaluate whether a new site design will be truly possible with IPS volunteer effort only, or if we will need to spend money on professional website design help.

We are also working with IPS Elections Committee Chair, Steve Mitch, in preparing a mechanism for voting via web form in the upcoming IPS election. Stay tuned.☆
Sky shows NOW AVAILABLE from the Adler Planetarium

Skywatchers of Africa
Leading visitors on an exciting exploration of Africa and its peoples’ captivating cultural uses of the sky over thousands of years. Skywatchers highlights the diversity of African cultural astronomy and celebrates our shared human experience.

30 minutes / 300 slides / $795 for show kit
$695 for show kit with artwork on CDs instead of slides

Images of the Infinite
The Hubble Space Telescope (HST) has provided us with spectacular awe-inspiring images and has enriched our understanding of the Universe. This sky show highlights the history and top science findings of the telescope, and takes audiences on an unforgettable tour through the Solar System, Milky Way Galaxy, and to the limits of the visible Universe!

35 minutes / 306 slides / $895 for show kit with video laser disc
$795 for show kit without laser disc

 Spirits from the Sky: Thunder on the Land
This sky show provides a never-before-seen journey into the culture of the Skidi Pawnee Native American Nation. Produced in cooperation with the Tribal Elders, Sports from the Sky explores the Skidi Seneca cultural philosophy of patterning their lives from the observations they made of the Earth and celestial phenomena. Funded in part by a grant from the National Science Foundation.

37 minutes / 386 slides / $475 for show kit

Clouds of Fire: The Origin of Stars
Exploring the interconnection of all matter in the Universe, Clouds of Fire presents an overview of star formation and the modern instruments which help us gain a clearer picture of stellar life cycles.

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Voice of God coming from the dome? In light of this statement, how do you tackle the religious sensitivities of some of your patrons, without doing science a disservice?

I took advantage of having so many planetarians gathered in one place in Valencia to record on audio tape their thoughts on this topic, and transcribe their words after I returned home. Hence the quotation marks on each contribution.

Dennis Simopoulos in Athens has the starter's gun in his hand (hey, it was left over from the Olympics!) so let's hear his thoughts.

"Greece is a country with - "
Sorry, Dennis, that was a false start. Let's do it again.

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"Greece is a country with only one religion; 99% of the country is Greek Orthodox. So we're fortunate that we don't get different denominations to be sensitive about. But even with the Christian Greek Orthodox view, which is quite liberal in comparison with other denominations, we could get into trouble.

"The way I've dealt with it up to now is to have respect for the scientific realities, not as theories but as facts that have been carefully observed. Therefore, no religion could possibly counter what we present in the planetarium. There is only one problem. When we get into the theoretical aspects of astronomy, such as how the Universe began, or parallel universes, then there is a negative reaction that we are just presenting a theory. Therefore, in these instances we are careful about the wording we use so that nobody could accuse us of being agnostic or non-religious, although we are both."

Dennis Simopoulos
Eugenides Planetarium
Eugenides Foundation
387 Syngrou Ave., Paleo Faliro
Athens 175-64, Greece

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"My thoughts on this subject have always been to say that this is the science, this is what we know and this is a scientific institution. But I've always been sensitive and diplomatic about it. I see now that the way to talk to people about it is to say that science is a moving thing. You don't want to hang your beliefs on that. If you believe something it should be in your heart, it's not going to change. If you have the flexibility then you're setting yourself up for a fall if you hang your religious beliefs on science, because science is always changing. It builds it's own seeds of destruction into every theory. No theories are ever proven, we just gather more evidence for them."

"Faith is totally different. You can't quantify love or happiness. People try, but you can't. These are things in another realm. Science needs to quantize. It's a search for understanding which is the really important thing, and that's what I try to explain to people."

Karl von Ahnlen
Minolta von Ahnlen
DeAnza College
21250 Stevens Creek Boulevard
Cupertino, California 95014-5797, USA

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"When people have problems with what we say in our planetarium shows I explain to them that we try to offer the best, most likely answers to the mysteries of the universe the best way that scientific evidence suggests things are. Now it's quite possible that God made the Universe on a much shorter timescale than on what it appears to be, but if everything was made in such a miraculous way then such a miracle is by definition outside of science, and it's therefore not the place of science to comment. What science does is to suggest the most likely explanation based on the evidence at hand.

"The Bible says that Adam was made from dust, and that's what astronomy tells us, too. All living things come from dust that was blown off supernovae before the Sun was formed. So maybe we are made from dust after all."

Toby Click
Planetarium Manager
Mark Smith Planetarium
Museum of Arts and Sciences
4182 Forsyth Road
Macon, Georgia 31210-4806, USA

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"When I worked at the Fels Planetarium in Philadelphia we had to pay particular attention to how we produced the winter holiday show, because there were so many different cultures in the city. It didn't make sense to focus solely on the Christian holidays, so the question became whether to represent many winter holidays in the show or to simplify things and keep it to just a few winter holidays. It was always a tough call."

Joyce Towne
Customer Accounts Director
Spitz Inc.
PO Box 198, Route 1
Chadds Ford, Pennsylvania 19317, USA

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“I usually tell our audiences that ‘current scientific thought tells us or indicates that...’ before I give out facts that may affect people’s religious sensitivities. When I’m writing a script and I’m doing a re-write, I look for anything that may be a sensitive topic and put those words in. When I’m talking to a teacher or an adult who has disagreements with scientific thought I tell them that this is a scientific institution and that is the point of view we’re putting forward, just as a church is an institution and they put forward the religious point of view. Although I don’t do this, I feel like I want to say that I don’t go into a church and espouse my scientific point of view, so why should the reverse happen?

“We had an incident happen in our planetarium once, when a group of visitors objected to the teaching of mythology of any kind in a planetarium. They told me that their religion rejects mythology and they objected to hearing about any mythology that conflicts with their religious beliefs. Their interpretation was that anything other than Bible stories were forbidden. Our program advertisement didn’t specifically say that mythology was going to be included. So they asked for their money back. It was a live sky tonight tour, and they began to filter out the door halfway through the program, two by two, and they complained to me afterwards. We had a discussion and I apologized that they weren’t fully informed beforehand about the show’s content, although I thought, How else could you interpret the description of the program? I believe they got their money back and everyone was happy. But nevertheless, they were exposed to mythology, and so I’ve corrupted them!”

Dave Maness
Director of Astronomy
Virginia Living Museum
524 J Clyde Morris Boulevard
Newport News, Virginia 23601-1929, USA

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“When I was running a planetarium, which I haven't done for a number of years now, when I dealt with sensitive religious issues I tried to put it in a historical context, not presenting it as dogma but with a historical perspective. Perhaps I was less than politically correct, because we’re scientists first and to present things from the objective standpoint of science was the guiding philosophy that I would employ in my responses to people who would question issues raised in programs, whether it dealt with the origins of the universe or supernatural beings, and so on. If my responses offended people, that was a lesser concern. I had a responsibility to be scientifically accurate.”

John Hare
Ash Enterprises
3602 22nd Avenue West
Bradenton, Florida, 34205, USA

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“Most people who have strong religious viewpoints are people who are interested in truth, and even though they may have deep suspicions about science I think they’re open to the perspective of the search for truth. They have derived their own religious beliefs as a result of their own personal search for truth. So what I’ve often done is to demonstrate how science was born within a deeply religious Christian culture, which believed that Nature is something that was created with a set of qualities that allowed it to be understood and explored.”

John Stoke
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, Maryland 21218, USA

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“I’ve had problems in teaching the Big Bang, when a kid asks me what happened before that event. I’m careful to pref ace my reply with, ‘In my opinion…’ and that’s fine with the faculty and the parents because I’m giving a personal opinion. I don’t say anything until I’m asked about what happened before the Big Bang.”

Donna Pierce
Highland Park Planetarium
4220 Emerson
Dallas, Texas, 75205, USA

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“Handling religious sensitivities is very touchy. What I try to do is explain that this is a scientific explanation, and that religion offers other ones. I don’t believe the two are fundamentally opposed. In fact I believe the two can blend quite well together. Science explains how things happen, whereas in my mind religion tries to explain the bigger question of why. If I’m talking to a group of kids from a religious school, or ones that are tutored from home for religious reasons, I will ask them beforehand if there are any areas that they’re sensitive about, and then I try not to discuss those areas. When I’m asked a sensitive question I will approach it from a scientific point of view, but I’ll explain that there are other explanations. I’m not opposed to those explanations, but this is the way a scientist would explain it. It’s up to each person to make their own ultimate analysis, and reach their own explanation.”

Shawn Laatsch
P.O. Box 1812
Greenville, North Carolina 27835 USA

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“In Kansas we have a very conservative religious background, but we do have a religious fundamental element. At our site we have an official statement that our marketing department uses if we get a question similar to the Forum topic, which states that as a science center we reflect the understanding of our Universe that is accepted by the National Academy of Sciences. That removes us from any personal conflict with an individual, which is useful for us.

“You need to be non-combative in your response to people, to respect their point of view, because the language of their understanding of the world is culturally different from that of science. If you talk about your understanding of science in scientific terms to somebody who has very strong religious beliefs and their own understanding of how the Universe works, there’s no way to debate that using your own language. It’s like speaking French and Japanese to each other. It doesn’t work. So you either have to study their language, the language of believing the Bible as a literal book, study that and understand how it comes about, then have a discussion, about whether that is true or not. Or don’t bother. Don’t get engaged.

“In Wichita I have a friend who’s a Minister and a retired English literature professor. He’s been a Minister for a significant part of his life. He used to be a fundamentalist preacher, and has changed his views to the more mainstream scientific theories. He emphasizes that religion is about relationships between people, but science is about understanding the world and the Universe around us. Once asked if he could give me a list of ten things in the Bible that aren’t clearly, literally true. Because either he understands them as literal tools, such as poetry or allegory, or there are factual things in there which end up as contradictions. He advised me as a very good friend to not even try to go into the debate. I’d be wasting my breath.

“I like to engage these people, to talk to them on an open, warm level of understanding. Having said that, when they’re leaving the planetarium you only have about ten seconds to speak to them. They’ll say, ‘You know the Big Bang is just a theory. You didn’t say anything about the creation.’ And my fast answer is, ‘We talk about the how and the when, not the who and the why.’ And I leave it at that.”

Martin Ratcliffe
“When dealing with cosmological issues, I always stress that the ideas and stories are based on scientific evidence. I respect that there differences of opinions and beliefs in many areas, but as scientists we must look at the facts and base our models on those facts and observations.

“Being in a public school we aren’t allowed to promote religion, but we are expected to respect the religious diversity represented by our students. For that reason we are forced to direct questions related to religion back to the home and family for further discussion.

“So in general when I know I may be dealing with a topic that might confront a religious belief I usually preface the discussion with, ‘scientists have determined ... based on ... data/evidence ...’”

Lee Ann Hennig
Thomas Jefferson High School Planetarium
6560 Braddock Road
Alexandria, Virginia, 22312, USA

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In the March 2004 Planetarian I reviewed the book, A New Look At An Old Earth, which I encourage everybody to read. It’s written by a committed Christian, who also has a degree in physics. He gives fair treatment to both sides of the creation versus science argument, and you’ll find much in those pages that can be used in discussions with your patrons. Although, it’s clear from the above contributions that we shouldn’t go into these discussions with any realistic hope of converting people en masse. Any change that occurs has to be driven from within.

To wrap up, I’m reminded of an interview that Barbara Walters did with Isaac Asimov. Walters asked the Good Doctor if he’d found God. Asimov replied, ‘I’m sure he’s more intelligent than I am. Let him find me’.

Here’s the subject for the next Forum column:

There’s clearly a ‘digital divide’ growing in the planetarium community. On the one side are planetarians who don’t like full dome video technology, and on the other are those who have been fully converted, and see the technology as the key to our profession’s long-term, stable future. How can that gap be bridged?

If you can get me your contribution by the deadline of October 9, I’ll be very pleasedified, as George Bush would say.

OK, that’s it for now. I’m off to study Australian red and white wines.☆
Coronado is the world leader in Solar observing instrumentation. For the past 40 years, we have been providing innovative optics to the scientific community and for the past 8 years, this technology has been available to the amateur observer. Our standard Hydrogen Alpha filters are all <0.7A and, at this narrowband, the Sun's surface detail and prominences are visible in electrifying detail. For the more serious observer and the professional, we provide instruments as low as 0.25 A and at other spectral lines. Our dedicated Solar telescopes in the MaxScope series are available in 40, 60, 70 & 90 mm apertures and the contrast and resolution are outstanding. For those of you who wish to utilize your night time telescope we provide filters from 40mm to 140mm with the necessary adaptor plates. For travel convenience and startling 3D images, the BinoMax matched filter set for Canon 12 x 36 IS binoculars is wowing the crowds from Hong Kong to Halifax.

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June 8th, 2004!!!
What’s New

Jim Manning
Taylor Planetarium
Museum of the Rockies
Montana State University
Bozeman, Montana 59717
USA
manning@montana.edu

The rocket worked!
With Cassini’s successful braking action on June 30/July 1 that allowed Saturn to capture the bus-sized spacecraft into a useful orbit, Cassini completed a seven-year round-about trip and Saturn acquired a new and temporary moon. And if the early images and data – of the clouds and Phoebe and the rings and tantalizing Titan – are any indication, the trip out is completed but the ride is just getting started. Goodness knows what we’ll learn next, but I’ll bet it will keep us busy updating our Saturn and current events shows with all sorts of new things as the data flows Earthward.

While Cassini was inserting itself into the Saturnian system, much of the world’s planetarium community was busy getting ready to insert itself in L’Hemisféric at the Ciudad de las Artes y las Ciencias – the City of Arts of Sciences – in Valencia, Spain, for the 17th biennial conference of our august organization. There was quite a flow of data there as well. For about four and a half days, L’Hemisféric – the complex’s esthetically designed planetarium facility meant to look like a giant lidded eyeball in repose in a lovely lagoon – had a chewy planetarian center as more than 300 of us gathered to learn and exchange information about what’s going on under planetarium domes from the smallest to the largest.

There was something for everyone, from innovative lessons in portable planetariums, to educational techniques both simple and complex, to the latest applications of high technology (for domes large and small), to news of space missions from scientists involved in them – all of it interspersed with some spectacular dining experiences, the bustling Mediterranean setting of Valencia, and a generous dash of Spanish hospitality.

The result was rather like the Valencia-invented paella a hearty experience with all sorts of delicious tidbits to be had, served up in a vessel that you could grab hold of and savor. That makes this issue’s column something of a “What’s New” paella as well. Dig in, and enjoy.

Out of Valencia – Strategically
Every two years, we in the planetarium business get a fascinating global view of ourselves: what’s changing, what’s not, what’s working, what’s new, what’s going on in general, what we need to know about, what people are thinking.

It’s even possible to get a sense of this in the IPS Council meeting that precedes it – from the affiliate organization reports, the agenda items, and the discussion. One large item on the agenda at this year’s Council meeting was the presentation of the strategic planning report prepared by consultants Ian McLennan and Robert Ballantyne as a result of surveys, interviews, and other data acquisition as our organization takes a look at itself to see where we are, where we’re going, and what we want to be in the future. The report, which was also presented at the business meeting during the conference, offered some interesting insights and some even more interesting options for possible future action – from leaving the organization largely as it is to making some very significant changes in how we operate and serve the membership.

In the coming months, the Council, the Strategic Planning Committee chaired by John Dickenson, and the consultants will be creating mechanisms and a process (as requested by the Council) for fleshing out the recommendations and providing additional data as Council deems necessary for serious consideration of the proposals.

This is important. Stay tuned for more news about this, as the organization’s leadership carefully considers how IPS can best serve the world planetarium community.
Since that means you, don’t be shy about speaking up if you haven’t done so already — and even if you have.

In the meantime, what follows is a large helping of other news out of the Valencia conference. Attend...

**Techno-Doming**

Computer geeks may indulge in web surfing, but we in the planetarium business tend to go “techno-doming” at our conferences these days, as we buckle into our seats in the host planetarium (and ever more frequently, under petite domes in the vendor area as well) and see where constantly-innovating planetarium system vendors are going to take us this time — whether it involves the new full-dome digital systems or the more traditional opto-mechanical approaches. Every conference, it’s somewhere a little bit farther than before, and the Valencia conference was no different.

It’s always tricky trying to install complete technologies temporarily in host facilities for demonstration purposes, and this year, circumstances were such that most of the full-dome bits in *L’Hemisphère* were projected either through a set of Zeiss ADLIP projectors or Barco’s DLP (Digital Light Processing) projectors. It’s therefore difficult to judge the relative qualities and merits of separate systems not seen in their normal configurations and hardware settings. But this situation illustrated quite powerfully the importance of being able to run full-dome content on any system, and added valuable momentum, I hope, to the notion of developing industry standards now while full-dome technology is still young. This was a notion that was explored in some depth at the “Standards Summit” organized by the Rose Center’s Ryan Wyatt and others in Valencia. (More about this next time.)

In any case, one could still judge content, and of that there was plenty. Here’s a small cornucopia of what we saw under Valencia’s big dome, under several smaller domes besides, and what’s up with the companies that created and/or presented it...

**Carl Zeiss Jena GmbH,** Planetarium Division, 07740 Jena, Germany, telephone +49-3641-642283, fax +49-3641-643023, e-mail planetarium@zeiss.de, web site www.zeiss.de/planetariums, installed its laser projected full-dome ADLIP system at Valencia not only to show its own stuff, but nearly everybody else’s as well. Despite the challenge of the 24-meter *L’Hemisphère* dome and its film-grade reflectivity, the temporary installation, reconfigured to cover about three-quarters of the 30-titled dome in the primary viewing area, performed quite creditably in showing off a sizable body of full-dome work from a wide variety of sources.

Those of us who saw the clever ZULIP demonstration in Montreal in 2000 (ZULIP being the single-projector slewable laser projection system marketed by Zeiss) were treated to the next chapter as the characters from Montreal, in the form of zygote-like spheres, moved on to discuss and demonstrate the full-dome capabilities of the ADLIP system. We were whisked through blood vessels and DNA strands and wormholes, pelted by a digital storm, and treated to an intriguing pull-back perspective of a volcano on Io as well as interesting bits on Egypt and Copernicus among other full-dome adventures. All nicely done.

Something very definitely new this year from Zeiss was the two-headed ZKP 4 projector designed to provide full-dome digital capability for small domes up to 6 meters (20 feet) in diameter. The system uses DLP projection technology in a two-projector design with Zeiss optics and a resolution of 1280 X 720 pixels for each channel — each channel covering half of the dome area. The system uses Sky-Skan DigitalSky software to create a Sky-Skan/Zeiss version of the definitive system (more about definitive later).

The system is small, cute, and does a fine job of projection based on the starfields and full-dome video bits I saw displayed in a small dome set up in the trade show area. A live user interface provides a user-friendly way to get around the twin projector’s universe, providing the sorts of traditional control capabilities we of the knob-and-slider generation like. This is another very worthy entry in the effort by many vendors to bring the capabilities of full-dome digital projection to the smallest of spaces and well as to the largest.

I might also add that during breaks in the dome demos, we caught glimpses of the *L’Hemisphère* Zeiss Universarium VIII starfield as well — but not nearly enough, in my opinion. Beautiful, crisp starfield. Despite the tricks and capabilities of the full-dome systems, sometimes it’s still nice just to sit back and look at a really fine rendition of the starry night sky.

For more information on these and other Zeiss products, contact Volkmar Schorcht (e-mail schorcht@zeiss.de or telephone +49-3641-64-2283) as given above to learn more. Seiler Instrument & Manufacturing remains the U.S. contact for Zeiss; contact Laura Misajet, the planetarium sales division manager, at e-mail zeiss@seilerinst.com or telephone +1-610-766-0673.

**Barco Simulation,** with U.S. headquarters at 600 Bellbrook Avenue, Xenia, Ohio 45385 USA, telephone +1-937-372-7579, fax +1-937-372-8645, e-mail edutainment.us@barco.com, web site www.edutainment.barco.com, and with European headquarters at Noordlaan 5, 88520 Kuurne, Belgium, telephone +32-56-36-82-11, fax +32-56-36-86-51, e-mail info.edutainment@barco.com, had a bigger presence at the meeting in Valencia - more so than at meetings past. And in the past, I’ve tended to think of the company primarily as a source of video projectors for both “traditional” and full-dome use in planetariums (among other venues), but they are clearly about more than just that.

To begin with, Barco provided the second set of projectors used for full-dome display in Valencia - a set of DLP or “Digital Light Processing” projectors, which seems to be the next evolution of the more familiar CRT or LCD projectors most of us still use. The DLP projector, as I understand it, uses a chip for image display like the LCD, but of a different kind. The DLP chip is called a digital micromirror device, in which each pixel on the chip is a tiny tiltable mirror. The function of this chip results in higher resolution and greater color accuracy than that seen in other types of video projectors - and so makes a good alternative to the standard CRT for full-dome projection, for example.

Barco demonstrated a pair of these at work in addition to the full-dome configuration, and they looked very good; the edge-blending of the pair was sufficiently good that I wasn’t at first aware that the image displayed was being created by two separate projectors until the fact was pointed out to me - and that impressed me. The company is now offering DLP projectors to its clients, and six of them were provided for the Sky-Skan full-dome installation on the Queen Mary 2.

Barco provides more than hardware in its world-wide video installations; it offers services including conceptualization, concept design and engineering, project management, on-site installation and integration, and after-sales service and maintenance on systems including many designed for science centers and related facilities. One bit in par-

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The twin projector system for small domes, courtesy Carl Zeiss Jena GmbH.
Barco installations, courtesy of Barco Simulation.

To start, we saw another very nice rendition of the night sky via DigitalSky, with its bright, signature simulation of the Milky Way. We saw a real-time abstract, constellation treatments, a solar system model, bits from its program Infinity Express, and other fine visualizations. But one thing Sky-Skan has always been good about (much to its credit) is showcasing the work of others — and we saw so many trailers and sequences from other sources that it’s hard to keep track of it all. Much of it was from programs that Sky-Skan is licensed to sell, including offerings from the National Space Centre in Leicester, England (Big, SETI, Mars) and the Rose Center at the American Museum of Natural History in New York (Passport to the Universe, The Search for Life: Are We Alone?, and SonicVision) and the Houston Museum of Natural Science (Earth’s Wild Ride) — you’ll read more about some of these programs farther along. A few additional that I’ll mention here are a science fiction adventure called Escape from Abraxis from Melbourne (of which we saw snippets), and a son-of-Finding-Nemo sort of program produced by Softmachine called Kaluoka’hina, The Enchanted Reef in which a colorful and appealing school of Nemo-esque fish characters must save their beloved reef by “touching the moon.” Looks good. We also saw bits of the IMAX movie Solar Max rendered for full-dome, and much else.

In particular, David Beining from the LodeStar Astronomy Center in Albuquerque, New Mexico USA brought a rich sampling of entries from LodeStar’s “Domefest” held earlier this year, in which digital visualizers from all over had a chance to show their stuff. And a varied assort-

Steve Savage and friends under a digital sky, courtesy of Sky-Skan.

Ticular that intrigues me is its Magic-Y system, in which subjects use “magic sticks” to aim at video screens and manipulate data and imagery on those screens, from solving problems and building structures to playing games, with many science education applications. It looks like an excellent way to provide interactivity in learning.

Another Barco bit that intrigues me is its Barco Innovation Partner (BIP) program for science museums and planetariums, in which the company offers to partner with institutions engaged in major renovations or the creation of new exhibition areas. If I understand it correctly, Barco offers to provide matching funds for innovations if the projects “exhibit 30 percent investment on innovation and prototyping for each dollar or euro invested on product line systems from Barco or Barco consortium vendors.” Thus it seems that Barco is willing to encourage and to help finance innovation — especially those innovations concerning immersive and interactive experiences — among clients of its products. The program is open to the worldwide science museum and planetarium community up to a maximum of 20 organizations. So if you’ve got an innovative idea and a little money, contact Barco to investigate partnership possibilities; you could end up being a BIP on the radar screen of science education innovation!

Contact Barco as given above, in North America or in Europe.

Sky-Skan, Inc. 51 Lake Street, Nashua, New Hampshire 03060 USA, telephone +1-603-880-8500, fax +1-603-882-6522, e-mail office@skyskan.com was responsible for a great deal of the data flow in Valencia, providing its own demo of DigitalSky in the planetarium as well as hosting the now-ubiquitous late-night “film festival” that provides an eclectic mix of what planetarians seem most hungry for in full-dome systems: content. And in Valencia, content abounded.
The definitive system, courtesy of Sky-Skan.

Productions programs remastered for full-dome systems.

Sky-Skan has lots going on these days; visit the web site or contact the Skanners (especially sales and systems specialists Paul Tetu [tetu@skyskan.com] and Stephanie Wilson [wilson@skyskan.com]) as given above to learn more. In addition to the U.S. head office you can contact the European main office at Sky-Skan Europe GmbH, Museumsinsel 1, D-80538 Munich, Germany, telephone +49-89-6428-9231, fax +49-89-6428-9232, e-mail smith@skyskan.com, or the Australian office at Sky-Skan Australia Pty Ltd, 441 Spencer Street, West Melbourne, Victoria 3003, telephone +61-3-9329-5501, fax +61-3-9329-6609, e-mail white@skyskan.com.

**Discovery Dome/E-Planetarium** are the new names for the original “definiti” experience still offered by the Houston Museum of Natural Science as developed during its Immersive Earth project in partnership with Rice University in Houston. And Carolyn Sumners and Tony Butterfield of the Burke Baker Planetarium and Pat Reiff of Rice were all in Valencia offering that experience in a portable dome. I had a chance to view some of the sequences and capabilities of the system there, from the Titanic rolling past to dinosaurs to future speculations on moon missions. It was great fun - in part, I think, because it provides a more intimate full-dome experience which I think is very appealing to a section of our clientele - and it's pleasant to note how well it all comes off in those small, inflatable domes. It brings the new technology to anyone, potentially.

The trio demonstrated the technology at a recent Conference for Achievement in Science Teaching in Texas in a 3-meter (10-foot) “umbrella” dome and surveyed the teachers who experienced it. They received a gratifyingly positive response, with the vast majority wanting to consider scheduling it for their schools, and a significant number willing to consider buying the system. Notably, the Houston trio identified a group of teachers who were most interested in possible Earth science applications rather than astronomy applications - which attests to full-dome’s value as a way to expand our audiences and serve a larger pool of people by diversifying our offerings.

To get a copy of the survey and/or to learn more about what the creative team in Houston is up to, contact Carolyn (csummners@hmns.org) or Tony (butterfield@hmns.org), at the Houston Museum of Natural Science, or Pat (connect@spaceupdate.com) at Rice University. Pertinent web sites include www.immersiveearth.com and www.earth.rice.edu.

**Silicon Graphics, Inc. (SGI)**, 1600 Amphitheater Parkway, Mountain View, California 94043 USA, telephone +1-650-960-1980, web site www.sgi.com, has several digits in different pieces of the digital pie, as I was reminded again in Valencia.

First, as I understand, its technology can drive the Zeiss ADLIP. It also offers its Digital Planetarium as a turnkey immersive system of which the new Hayden Planetarium in the Rose Center at the American Museum of Natural History in New York is a prime example. And it additionally offers versions of its digital systems for immersive (as opposed to domed) theaters and for flat-screen applications. The core of its system is the Onyx platform with a graphics subsystem called InfiniteReality that integrates 2D, 3D, volumetric and video data - there are several versions of the Onyx/InfiniteReality system, and additional graphics subsystems.

I saw an SGI content piece called “What Happened to Mars?” in the neighboring SEOS setup in the trade show area - a very nice bit visualizing how Mars may have been and how it changed - which offered a good example of how such content could be incorporated into exhibitory as well as domed applications.

For more information, contact SGI via its corporate office as given above, or through any of its worldwide telephone numbers: in North America, +1-800-800-7441; in Latin America, +1-650-933-4637; in Europe, +44-118-925-75-00; in Japan, +81-3-5488-1811; or in the Asia Pacific region, +65-77-0290. And speaking of...

**SEOS**, Edward Way, Burgess Hill, West Sussex, RH15 9UE, United Kingdom, telephone +44-0-1444-870888, fax +44-0-1444-870777, e-mail info@seos.com was present at our conference for the first time in my recollection - and was a very good addition. The company specializes in creating display systems for visualizations and simulations ranging from wide-angle displays and virtual reality environments to head-mounted devices and multi-media setups.

For the IPS conference, SEOS specially built the 3.6-meter (24-foot) 20-tilted dome display for its booth. The arrangement offered a four-channel blended image with a 180 by 160 field of view using its ScorpionRT media management product. I was most impressed with the setup, for which I could think of many applications in our theaters and exhibit areas. The imagery was colorful and crisp, and the sound very good.

SEOS offers additional products for providing turnkey displays, including environment control, playback systems, lighting, audio, and assorted production tools. It's great to come across another company that can offer useful products and services to our industry, and if you'd like to explore SEOS further, I'm sure that Alison Wright at telephone +44-0-1444-462405, e-mail alison.wright@seos.com would be happy to talk with you.

Note also the contacts for the North American office at 3451 Technological Ave...
Spitz also had a small dome present for demonstrating its SciDome system, which looked as good as I'd remembered it from last year in Salt Lake City; the system uses Starry Night software to very good effect for its astronomy applications, and it also does a nice job with pre-rendered full-dome pieces such as Legends in the Night Sky: Orion, a sprightly telling of the tales of Orion the hunter that I saw in complete form last year also in Salt Lake City. Orion is a collaborative effort between Audio Visual Imagineering (AVI) and Spitz Creative Media, and we saw the trailer both in the big dome and in the SciDome - great piece of work.

Spitz also markets National Space Centre shows (as does Sky-Skan) such as Big and Mars. It also sells a big-dome version of its full-dome system called Electric Sky II for facilities from 12 to 26 meters (40 to 85 feet) in diameter; it uses a single channel format.

Two new bits I picked up at the conference first, a new show is currently in production with the working title of Black Hole, in collaboration with Thomas Lucas Productions, the Denver Museum of Nature and Science, NOVA, and the NCSA. And second, Spitz has a new dome wrinkle that actually removes a wrinkle by eliminating the overlap of its domes' horizontal seams. The new technique is called "Premium Seam" and involves on-site abutment rather than overlap of the horizontal seams that always show up when you have cove lighting that takes up the sides of the dome. It's more expensive than a horizontally-seamed dome to put up, but also eliminates one of the potential distractions in presentations. Spitz also offers a dome cleaning service for when the old hemisphere just gets a little too dingy.

For more information on the full Spitz line of products and services, contact marketing director Scott Huggins at shuggins@spitzinc.com, sales manager Allan Wells at awells@spitzinc.com, or customer accounts director Joyce Towne at jtowne@spitzinc.com.

Konica Minolta Planetarium Co., Ltd., 2-3-10 Nishihonnouchi, Hishi-ku, Osaka, 5500005 Japan, telephone +81-6-6110-0570, fax +81-6-6110-0572. web site konicaminolta.jp/planetarium, also has several new things afoot - in both the traditional and new-fangled planetarium technologies.

One such thing is the new Infinium $, the "smaller brother" of the Infinium II as described by Phil Groce in Valencia - a new generation of opto-mechanical planetarium projector powered by light valve technology that is capable of both manual and automatic control. The new system fits in domes from 12 to 20 meters (40 to 65 feet), and is deliberately designed to produce a low profile to make it suitable for use in conjunction with other types of projection (such as full-dome projection, I'm guessing). The first copy is to be installed at DeAnza College in Cupertino, California in 2005-6.

Phil also announced that Konica Minolta's full-dome technology will be taking a giant leap with the development of the Super MEDIAGLOBE, destined to be the bigger brother of the current MEDIAGLOBE and MEDIAGLOBE Lite full-dome systems for smaller domes (of which some 30 had been sold as of the conference). The new system will work for theaters in the 9 to 18 meter (30 to 60-foot) range, and will accordingly have higher resolution. MEDIAGLOBE purchasers receive five planetarium programs plus a library of 40 short programs and animations - and the next 20 purchasers can get a copy of Legends of the Night Sky: Orion as part of the deal. Check out the web site at www.mediaglobeplanetarium.com.

For more information, you can contact the company's headquarters listed above, or you can contact the U.S. Office at 725 Darklington Avenue, Mahwah,
The SUPER URANUS in Morioka, Japan, courtesy of GOTO INC.

ing system of its CHRONOS projector, making the stars three times brighter, and making the sun, moon and planet projection group more compact. The projector is designed for domes from 12 to 20 meters (40 to 65 feet) in diameter. This fits the new system nicely between the CHRONOS and the SUPER HELIOS projector for the largest theaters.

Ken also described GOTO INC’s plans to produce planetarium “hybrid” systems combining its line of opto-mechanical projectors with it’s full-dome Virtuarium system. These GOTO HYBRID systems will incorporate the SUPER URANUS and the CHRONOS as well as the SUPER HELIOS to offer “the best of both worlds,” Ken says. Cool stuff indeed - and if you can afford to get both a full-dome system and a traditional pinpoint starfield, I think you really do get the best of both worlds.

For additional information, you can call on the office in Japan or Ken Miller and Toshi Yasuda in Hawaii at the GOTO INC, USA office at 401 Kamakae Street, Suite 319, Honolulu, Hawaii 96814 USA, telephone +1-888-847-5800 or +1-808-597-8688, fax +1-808-597-8682, e-mail gotous@earthlink.net.

Evans & Sutherland, 600 Komas Drive, Salt Lake City, Utah 84108 USA, telephone +1-801-588-7500, fax +1-801-588-4520, web site www.es.com was of course the other partner in the Asian Digistar 3 laser system initiative with GOTO INC, and sales director Jeri Panek offered further news in saying that some 35 of the D3 systems (for large and small facilities) had been sold to date worldwide, with most already installed. This includes several contracts for the system sporting the new E&S laser projection technology soon to appear. Jeri mentioned that there will be an open house for the regular D3 in London in late September, as well as late September demos of the new laser technology in Salt Lake City.

E&S brought a wosser demo with them to Valencia, but elected not to show it in the big dome because they weren’t satisfied that it came off looking as good as they wanted it to - alas, the pitfalls of temporary installations, especially when you don’t have your own hardware present. But the E&Sers did have a D3 SP – the single-channel D3 for smaller domes – in the small Mirage dome (more about Mirage later) in the trade show area and showed it there, and also ran the demo at their own tiny domed screen at the E&S booth.

It was quite wonderful, and a masterful demonstration of the D3 capabilities. There was a clever opening tribute to Valencia using multi-image/virtual slide projector techniques, followed by a dizzying array of short pieces from E&S and user sources. There were familiar snippets of some of E&S’s shows such as their Egypt show, Universe and The Future is Wild, but there was also much that was new: underwater scenes, colorful abstracts set to heavy metal music, a tour of the ancient Mausoleum, and solar system vistas. There were bits from other sources, including a scene from the London Planetarium’s Warriors program, Mirage’s Origins of Life, and the Clark Planetarium’s Saturn show. And it ended spectacularly with Saturn imagery and a planetary collision set to the Italian aria Nessun Dorma that Luciano Pavarotti likes to sing. Throughout, the soundtrack was a powerful accompaniment, and reminds us once again that half of “audiovisual” is audio.

One simple sequence that stood out for me was a full-dome/multi-image presentation of Van Gogh paintings set to the Don McLean song Starry Starry Night. I’m a big fan of Van Gogh, and his bold and vibrantly-colored paintings translated beautifully to this format, and lent themselves well to simple and tasteful choreography. What I enjoy so much about a sequence like this is that it reminds us that despite all the tricks the new systems can perform, we don’t always have to throw everything on the dome at once to create a powerful experience. Sometimes a simple, beautiful moment wins the day.

To learn the latest about what’s going on at E&S, contact Jeri Panek at jpanek@es.com, or call the number given above.

Mirage 3D. Hoenderlostraat 5L, 2573 RK The Hague, The Netherlands, telephone +31-70-3457900, e-mail rs@mirage3d.nl, web site www.mirage3d.nl, has already been mentioned several times, and is another of the digital software and content companies creating products for our use.

Robin Sip, who in the past was associated with Omniversum in The Hague, is busy with his colleagues creating cycling and driving simulator programming and also planetarium-related materials. The company offers its WorldVision real-time software for planetariums and can develop graphical user interfaces around other software. If I understand correctly, the Mirage 3D software can create a real-time world by assembling and manipulating models rather than programming them (providing simulation rather than animation) provides spherical correction in video, and offers playback capabilities for full-dome video programming.

The company has several content products that were screened in Valencia both in the big dome and in its small vendor area dome. These included a 20-minute astrolology program called Origins of Life whose snippets were most impressive, ranging from underwater scenes of fish and whales to Martian vistas and spacecraft.

The company has also developed a short program on ConeXpress, the brainchild of a Dutch company in which relatively inexpensive “rescue” satellites are launched, using their ion propulsion drives to rendezvous and mate with ailing satellites such as geosynchronous satellites that may have run out of fuel, gotten out of position, and have lost stability. The ConeXpress craft provide the necessary fuel source and stability to reposition and stabilize such spacecraft to extend their working life at a fraction of the cost of replacing these satellites with new ones. Once its job is done, the ConeXpress craft can

Saturn scene from Universe, courtesy of Evans & Sutherland.
then move on to nurse other satellites.

We viewed a decidedly European version of the ConeXpress footage, which employed evocative music at the critical moments of rendezvous and was very funny. I don’t think I’ll ever regard the song *Je t’aime* in quite the same way again ...

Good stuff from Robin and the Mirage 3D gang. I especially like that their products are compatible with a wide range of full-dome systems, which is important. Watch for more good stuff in the future.

**RSA Cosmos**, Z.I. de la Vaure, B.P. 40, 42290 Sorbiers, France, telephone +33-477-533-048, fax +33-477-533-861, e-mail sales@rsacosmos.com, web site www.rsacosmos.com, had a great deal to show us this year in Valencia.

For some years the company has marketed a portable planetarium called Cosmodyssee III with inflatable dome (which has been reviewed in past columns). Now it’s moving seriously into the digital planetarium market with a full range of products and services.

During one of the big dome sessions, the assembled IPS delegates had an opportunity to see a demonstration of its digital software package called “In Space System,” during which we saw an excellent 3D demonstration of the reason for seasons and eclipses and flew to the Pleiades. We also saw a string of scenes from a fairy tale and solar system models and scenes. I think that RSA Cosmos produced some of the most colorfull programming we saw in Valencia, and began with a charming sequence in which a bespectacled character entered the virtual room created on the dome, wiped off the “lens” which allowed us to see the scene, and then “opened” the dome for the demonstration to come.

RSA Cosmos also offered demonstrations of its software package at its vendor booth, showing how to negotiate its 3D cosmic data base in fine and user-friendly fashion, with the ability to manipulate the data with all of the usual planetarium functions, and to create “scripts” allowing the playing of pre-programmed sequences ranging from short bits to full shows. Nice.

The company also provides digital projection options for small and medium-sized planetariums, and a modeling, animation and rendering package called NovaMax for creating content.

I was most impressed with all that I saw from RSA Cosmos. There is clearly another player in the world of digital planetarium technology; watch for more good things in the future, and for more information on the company’s wide range of products and services, contact Christophe Bertier at christophe.bertier@rsacosmos.com or as given above.

**Audio Visual Imagineering (AVI), Inc.**, 8440 Tradeport Drive, Suite 109, Orlando, Florida 32827 USA, telephone +1-407-859-8166, e-mail joanne@av-imagineering.com, web site www.av-imagineering.com, which markets its Omniscan laser system (of which *L’Hemisphère* has one in residence) with content to match, ran the system through its paces for us in Valencia.

In particular, Joanne Young guided us through four different ways in which the system can teach the constellations: first by drawing standard constellation figures in laser light, second by animating those figures and adding musical bits (as in strumming the strings of Lyra the lyre), third by enhancing the constellations with little scored laser shows, and fourth by producing full-fledged laser-based tellings of the legends of the constellations.

In the fourth case, we were treated to a part of AVI’s *Legends of the Night Sky: Perseus and Andromeda* which I’ve seem many times and always enjoy. (AVI, in collaboration with Spitz, has also produced a full-color, pre-rendered version of the tales of Orion for full-dome use, and it’s quite excellent.) In the third case, we saw a piece of one of AVI’s newest offerings called *Symphonies of the Sky*, in which several constellations of each season are showcased in mini-concerts featuring Omniscan laser imagery choreographed to classic music. In Valencia, we saw the piece produced for Cygnus. Very nice!

AVI also markets a baby laser projector called Skylase, offering full laser capability for small domes in a neat package. Joanne says that the product has been popular as a rental for small facilities, and can also be purchased.

AVI’s products comes with libraries of laser effects and programs produced for the medium. The company does good work and offers good stuff, so if you’re in need of some complementary technology and content for your planetarium, be sure to talk with...
Joanne Young using the contact information already given. I look forward to more legends in the night sky from AVL.

Gambato sas, 30037 Gardigiano di Scorzè, Venice, Italy, telephone and fax +39-41-5830145, e-mail info@gambato.it, website www.gambato.com, was also present in Valencia with examples of both its domes and planetarium projectors – of which it sells extensive lines.

The company makes planetarium domes from about 13 to 52 feet (4 to 16 meters) in diameter. But it doesn’t stop there. It also makes exterior domes for planetariums – notably the “Geode” which uses a mirrored steel facing for a shiny effect – and a variety of observatory domes, of which the example displayed at its vendor booth was both sturdy and esthetic. The company also constructs sliding roofs for telescope installations.

The company’s line of opto-mechanical projectors include models to go under most any of its domes. One was in service under a Gambato dome at the company’s Valencia setup, and I had a chance to see it in action. The Milky Way looked a bit unusual to me (ah, these temporary setups), but the starfield looked good, and the instrument was nicely engineered.

Here is yet another planetarium and dome manufacturer to check out when you’re in the market. The contact information will lead you to the information you need, including prices. Enjoy!

standard 5-meter (16-foot) version. As I understand, either the older star projector or the newer fiber optics version will work in the larger dome.

In addition, Learning Technologies has a new Polynesian cylinder available for the Starlab thanks to the work of the Gemini Observatory in Hawaii in collaboration with Hawaii’s Polynesian Voyaging Society and the Aha Pumana Leo Hokualaka’i voyaging program. Gemini’s Janice Harvey demonstrated the use of the cylinder for teaching the Polynesian night sky and celestial navigation during the course of the conference.

Master navigators Nainoa Thompson and Kalepa Baybayan helped to develop the cylinder, the Bishop Planetarium in Honolulu provided information, Dr. Richard Crowe of the University of Hawaii at Hilo will write the accompanying educational exercises, and the Public Information Office staff for the Gemini Observatory along with Crowe and Baybayan will design activities.

I had the good fortune to meet Nainoa Thompson when the Bishop was developing its NASA-funded “Explorers” programs some years back; Polynesian style of steering by the stars is not only impressive, but shows how important was the integration of Earth and sky for voyaging cultures. This cylinder is a great idea, and it will be another very fine addition to the Starlab arsenal of educational programs. Check with Learning Technologies for more information and availability.

Aula del Cosmos, C/Pi i Margall n5, 3er-3a, 08024 Barcelona, Spain, Telephone +34-932841216, fax +34-932108246, e-mail auladelcosmos@telefonica.net, website www.auladelcosmos.com, is another company offering technology to the portable planetarium community in several very clever ways.

First, the company sells an inflatable dome called Sphaera that comes in a variety of dome diameters from 3 to 6.5 meters (10 to 21 feet), with larger custom sizes as desired. Its outside is strikingly painted in cosmic swirls.

The company also sells the “Scenic,” a clear acrylic cylinder on a stand containing a long, thin light source in the center. It can be fitted with photographic film to create all manner of projections on an inflatable dome – panoramic scenes, graphics, and imagery of all sorts.

It also sells a hand-held projector called the Flypic, and for me, it was love at first sight. The device is about the size of a large flashlight fitted with a four-slot Geneva wheel-style mechanism in which standard
should have become available in August as you read.

ChimPANzee is a slide-rendering program for producing panoramas and all-skies custom-made for your theater, and was featured in this column a few years ago. The product continues to prosper, and the new version uses IMR technology that makes the creation of slide masks easier. The goal is to produce perfectly aligned slide sets for panoramas and all-skies—staples still in the vast majority of non-full-dome planetarium facilities around the world.

The basic cost of the version 3.0 package is €795 (about $940 U.S. at the current exchange rates), or €249 (about $295) for the version 3.0 upgrade if you have one of the earlier versions.

As someone remarked to me recently, many of us are likely to be using slides as our primary technology beyond the planetarium projector for some time to come, regardless of external factors. So long as that is true, there will be an important place for software such as that provided by Alexander Colsmann. Talk to him by the routes given above.

Just Doming

In addition to Spitz and Gambato and their dome-building proclivities, there were other dome-related companies in attendance at Valencia:

Astro-Tec Manufacturing, Inc. 550 Elm Ridge Avenue, P.O. Box 608, Canal Fulton, Ohio 44614 USA, telephone +1-330-854-2209, fax +1-330-854-5376, e-mail astro-tec@astro-tec.com, web site www.astro-tec.com, is another company specializing in dome-building, with construction all over the world. In Valencia, they also displayed a new “Ultimate Seam” approach to dome construction that eliminates the horizontal seam by custom-abutting dome panels to avoid the lines that become obvious with some methods of cove lighting. As in the case of Spitz, these horizontally “seamless” domes cost a little more to put up, but the technique makes the dome look smoother when we light it up.

Astro-Tec also offers powder coating for its domes, and has a line of smaller fiberglass domes for all sorts of applications. To learn more about services and products, contact Stephanie Hopper and the Astro-Tec crew in Canal Fulton.

Stadspoolen AB, Gullmarsvägen 42A, 120 39 Ärsta, Sweden, telephone +46-8-556-701-50, fax +46-8-556-701-51, e-mail infostadspoolen.se, web site www.stadspoolen.se, can help you out if you already have a dome, but it’s just gotten too dingy or dirty to stand any longer. This is a Swedish dome-cleaning company that can not only give your dome the once-over, but can also clean hard-to-reach places such as skyscraper windows and large film screens (such as those in IMAX theaters) if either falls within your ken. Contact the company as given above.

Content Content Content

Technology of all sorts is fine, but you’ve got to have something to show with it. Fortunately, there was a great deal of content of all sorts available for viewing in Valencia. You’ve already received a healthy dose of it if you’ve read this far; here is an additional smattering of what we saw, with some information about the creators:

Starlight Productions, LLC, 5951 S. Wahlquist Lane, Murray, Utah 84101 USA, telephone +1-801-266-7207, web site www.starlight-rod.com, showed a nice bit of content on the big dome in the form of an animation of the return of the Genesis spacecraft to Utah this September for a mid-air capture and retrieval of its cargo of solar

The Sphaera, courtesy of Aula del Cosmos.

The Flypic, courtesy of Aula del Cosmos.

Fulda Planetarium alignment grids, courtesy of Alexander Colsmann.
Dome cleaners, courtesy of Städ- poolen AB.

wind particles. The piece shows Genesis tucking its treasure back into its return container, streaking through the atmosphere, deploying its parasail, and getting picked off by a helicopter that hooks its parasail before it can hit the ground. It’s a nice piece of work.

Starlight’s web site shows a variety of visual sequences made for use in the full-dome equivalent of laser shows (that is to say, musical shows using full-dome visualizations in place of laser imagery) as well as some astronomical sequences. Aaron McEuen expects to have a video library containing about two hours of material by December, and his company additionally offers Digistar production tools crafted in Lightwave.

Aaron also hinted at a big new production involving collaboration with some big names in the entertainment industry - the result of which may be a family-oriented solar system show. Stay tuned, and check out the Starlight web site for information on products and services.

Event Horizon, Inc. 1606 Central Avenue SE, Suite 105, Albuquerque, New Mexico 87106 USA, telephone +1-505-248-0258, fax +1-505-248-0266, e-mail info@eventhorizon -corp.com provided one of the more esoteric bits of content during the conference by plunging theater-goers into a full-dome model of the solar system that first was simulated in “normal” space, then in square root space, and finally in logarithmic space, providing three very different views indeed. It was just one such model produced by a company that specializes in interactive model-

and simulation-based environments for education and exploration.

The core of the effort is the company’s Phoenix system, a software package designed to provide tailored experiences for shows, participatory exercises, and visualization of scientific content. According to the company brochure, the system supports “sound, spoken commands, voice feedback, spatial and temporal movement, object control, teleportation, stereo display, information probes, and multi-user environments.”

Teleportation? Cool!

I don’t think we teleported during Event Horizon’s Valencia demonstration, (except in the simulated sense as we hopped about in the data base), but we did watch the solar system get squeezed in bizarre ways - the square root version creating a cozier environment with planet orbits closer together, and the logarithmic version turning it very strange indeed by making the orbits of the planets’ satellites the dominant feature in a solar system where the planets’ orbits were scrunched uncomfortably close together.

At first the logarithmic model just confused me - which illustrated for me the importance of having the proper context for interpreting what you’re seeing - but later it made sense as a ready comparison of how the satellite systems of the planets differ in their dynamics. Aside from an apparent lack of relative scale in the sizes of the various moons of Jupiter when they were modeled with their orbits, and a partial Triton surface that was not modeled onto a sphere, the accuracy of the construction, especially in its orbital mechanics, was notable. I couldn’t make out any background constellations in the model, which made me think that the starfield used was perhaps a randomly-generated one. But I could easily see how an accurate background starfield would provide additional useful applications for a model such as this for us planetarium types.

This is just one of many scientific simulations offered by Event Horizon. Others include a data-based simulation of Comet Shoemaker-Levy 9 smacking into Jupiter, a graphical representation of the depletion of the ozone layer over Antarctica, models of the International Space Station, and a simulated mission to Pluto.

There’s lots of potential here for well-interpreted full-dome simulations with educational clout, not to mention the possibilities for exhibitory and scientific visualization. It’s always nice to find new organizations that have something useful to offer. To learn more about Event Horizon’s modeling and interactive environments, contact David Naquin, vice president for sales and marketing, at +1-505-248-0258 or dnaquin@eventhorizon -corp.com. And be careful that that logarithmic universe doesn’t twist your mind!

Loch Ness Productions. P.O. Box 11598, Groton, Massachusetts 01450 USA, telephone +1-978-448-3666 (toll free: +1-888-4-NESSIE), fax +1-978-448-3799, e-mail info@lochness -com, web site www.lochness.com, presented a full-dome rendering of its new program Hubble Vision 2 during the conference. The program updates the Nessie’s original Hubble Vision with much new material and loads of HST images, taking the time to explain what

The logarithmic solar system, courtesy of Event Horizon.

Genesis spacecraft, artist’s conception, courtesy of NASA.
the images mean in terms of understanding the universe, its residents, and its processes. It's a good, solid astronomy show in classic Nessie fashion, with crisp writing and a nicely-matched musical background.

It was fun to see it rendered in full-dome format. I've seen several Loch Ness shows translated in this way, and it's good to see the Nessies begin to make use of the digital capabilities with some new programming flourishes. It will be fun to see these programs evolve in their new environment as 3D elements inevitably increase.

The program is available in an easily adaptable format for virtually any planetarium facility, of course. The Nessies' default package provides images in digital format for adaptation, but they can also provide glass-mounted slides for an additional fee. The soundtrack comes in DVD format; inquire about options if you need one. The basic show cost is $595 U.S. for licensing, printed script and production notes, the DVD containing soundtrack, an optional video clip and a programmer's reference demo of the show, and a data CD containing the images. If you want 35mm slides, it's an additional $599 for 200 mounted and masked slides and $39 for “multi-panel "images"” - that is, a couple of all-skies.

Loch Ness also provides masters for full-dome theaters at a “buck-a-pixel" pricing formula. Thus, for a dome master that's 1024 by 1024 pixels in size, add $1,024 to the $595 basic fee.

Our colleague Jack Dunn provided a testimonial for Hubble Vision 2 on Dome-L recently, and I can't say it any better than he did: "I think this represents how technology is helping us without overwhelming us. This show was installed faster than any program I've ever purchased or received as a show kit. I think a lot of this goes to the DVD reference video Mark Petersen did. Having a video I can pause and move at will, showing me exactly what should be up - and when - complete with timecode on the screen, made this a piece of cake ... In the book which comes with the show are thumbnails of all the digital images - another really handy feature. I'd like to have all our vendors and producers look at these ideas for any shows they still distribute in the old-fashioned, non-full-dome way ... It is nice to do a show with real astronomy that both I and the audiences (who are paying the bills) can enjoy."

Mark C. and Carolyn Collins Petersen are in the process of converting all of their currently-available shows into full-dome format while still providing their products in the aforementioned digital format for adaptation by more traditional facilities. The full-dome versions are being sold by Sky-Skan as well as by Loch Ness itself.

I understand that the Nessies have acquired an edible dome with full-dome projection for the conversion project - to go along with their (infamous) Henrietta Leavitt Flat Screen Planetarium. In fact, the new Loch Ness planetarium facility was just christened in Valencia; it will be known as the Larry-dome in memory of the late Larry Cat - as in Larry Cat in Space. You heard it here ... The Rose Center at the American Museum of Natural History in New York is also making its programs available to other full-dome facilities, and we saw two of very different stripe in Valencia. The first was The Search for Life: Are We Alone? narrated creditably by actor Harrison Ford, written by the Ann Druyan/Steven Soter duo that also wrote the Rose's opening show (Passport to the Universe) with visualization by the team at Rose. It considers life on the Earth and speculates about life elsewhere, hitting all the high spots by turning the audience eye to Mars, Europa, the discovery of exoplanets, and the possibility of other Earths somewhere Out There.

The visualizations are very impressive - this show being partial to the sweeping vistas and fly-throughs and fly-pasts that were characteristic of the Rose's Passport show. There are nice details in the bit about hydrothermal vents at the bottom of Earth's oceans, and a fine 3D visualization of Pathfinder data as we pan the Rock Garden where little Sojourner worked. And the setup of the alien two-sun system where an Earth-like planet drifts past, its night side covered in artificial lights like Earth, was a great touch.

Personally, I thought the show teased us by sailing us past Europa and this alien Earth, speculating about the possibilities, and then moving on without actually bringing us in for a closer if speculative look - imagining an under crust ocean on Europa teeming with odd seafood, or sweeping low over alien cities and landscapes - things like that. A few more intimate stops of this sort along the way (as happened on Mars with the Pathfinder data) might have offered some pleasant respite from the relentless sense of travel. But that's just me. The production values and imagery in the show are first rate, the space tour you get is impressive, and the audience reaction cited in the color brochure is very positive indeed. I'd not seen a screening of this show before, and I enjoyed the experience.

The second Rose experience was of a very different kind. SonicVision is the Rose's answer to the laser show when you have an amazing full-dome digital technology instead of a laser. To call it sensory assault is probably to put it mildly! We were whisked through great frenetic tangles of imagery, pummeled by digital models, stretched through Escher-like environments, and panted by virtually every color the system must be capable of producing - all to contemporary laser-show-like musical selections. I'm sure I saw at least one kitchen sink hurtle past, probably more. The sheer load of imagery was mind-boggling: I can't imagine how long it must have taken to create these pieces, but it must have taken a very long time to create both the mass and intricacy we experienced. It's an amazing effort, and a wild ride.

The first such show I've experienced was last year at the Clark Planetarium in Salt Lake City, which visualized classic rock songs and Pink Floyd (of course) with a variety of 3D visualizations, multi-image, and all the techniques available in its particular digital bag of tricks. These sorts of shows are a natural and predictable outcome of the technology, and serve, I think, a valuable role in the same way that laser shows have: to diversify the portfolio, varying the offerings, and draw in nontraditional crowds. It will be as interesting to see how these programs evolve as it will be to see how the more educational programs develop.

But I digress again, slightly. Sky-Skan markets both of these Rose shows as well as Passport. For more information directly from the source, you can contact either Nancy Lynn at the American Museum of Natural History at +1-212-769-5125 or e-mail nlynn@amnh.org, or Raymond Salva at +1-212-496-3682 or salva@amnh.org.

And speaking of Clark ...

Clark Planetarium, 110 South 400 West, Salt Lake City, Utah 84101 USA, telephone +1-801-538-2104, fax +1-801-531-4928, web site www.clarkplanetarium.org, is beginning to

Hubble Vision 2, courtesy of Loch Ness Productions.
section, moving literally through the archways of one environment into the town square of another and so on. Data was had from the use of multi-image and virtual slide projector screens in an environment that folded over us and receded as called for. The Saturn vistas were lovely, and the ending of the show was powerful as it made the all-important human connections to that far-off ringed orb as the show completed its circle with data flooding out from Earth to a future Saturn colony carrying a personal message from a child to an astronaut parent. Well-done - if I do dare to say so myself.

Clark has other shows on the auction block as well, including Rock Hall of Fame alluded to earlier that provides full-dome choreography for classic rock songs in lieu of laser, and Secret of the Cardboard Rocket. This last - a full-dome remake of Hansen’s classic kid/family show about two kids exploring the solar system in a cardboard rocket accompanied by a talking book - is simply a stunner on the full dome. It’s richly-colored and effectively realized and is a prime example of what the new technology can become in the hands of talented producers out in the field.

I don’t know much about pricing, since the selling of full-dome shows is even newer than the technology. But you can contact Clark’s production manager, Mike Murray, at +1-801-456-4949 or mmurray@slco.org and find out.

National Space Centre (NSC). Exploration Drive, Leicester LE4 3NS United Kingdom, telephone +44-116-258-2118, web site www.spacecentre.co.uk, screened its latest show offering, Mars in Valencia in full-dome format - and I can only say that I was captivated by it.

The program covered all of the usual bases for a Mars show - a bit of history, a bit about our fascination with the planet, something of past Mars missions (both successful and not) and a good bit about recent and current missions (I was amazed at how up-to-date it was on the Mars rovers and Mars Express, for example) and speculations about a past and livelier Mars and how we may be theMartians of the future. But the NSC produc-

A scene from SonicVision, courtesy of the American Museum of Natural History and Sky-Skan.

offer its full-dome shows for sale, continuing the long tradition of its earlier incarnation, the Hansen Planetarium, if at a little higher price point. And this includes its latest, called Destination Saturn.

In Valencia, I had a chance to see the program in the Mirage 3D dome via the E&S Digistar 3 SP projector, and I was impressed. In the interest of full disclosure, I should mention that I assisted in the scripting of the program. But I had nothing to do with the actual visualization, and the visualization is very cool.

What I’ve seen from the Clark staff in the past is innovation and clever use of their digital tools, and this show is no exception to that. The program begins on Titan with data from the just-landed Huygens flooding out to Cassini and then on the Earth, setting the stage for an examination of the planet that provides historical context, what the Voyagers showed us, and then what Cassini is all about and what we hope to find out now that its mission is underway. I was particularly taken with the ingenious way one scene transitioned into another in the expositive

Saturn, courtesy of Cassini and NASA.
Wellcome Trust in Britain for developing a new program on humans in space. Can’t wait!

Livinglobe is a German production company that provided one of those “now for something completely different” moments at the conference when it screened its full-dome adaptation of Shakespeare’s Romeo and Juliet and in modern form entitled R and J. The piece - a combination of live action film and full-dome abstract treatments - was developed in collaboration with Carl Zeiss Jena and Sky-Skan Europe for presentation via SkyVision and ADLIP.

The short film is set in the Canary Islands with a young costumed cast reminiscent of Godspell and Jesus Christ Superstar. The highly stylistic film hit the highlights of the original Romeo/Juliet tale using a variety of unusual camera angles and impressionistic film techniques that makes it a fascinating piece to watch. Alas, Romeo and Juliet still die at the end, but they do so with full-dome aplomb.

Presentations like this stretch the imagination and can get us thinking about all of the ways in which we can use our audiovisual environments. And it’s nice to see film pieces that were created with our environment in mind, rather than just shoehorned onto the dome. Alas again, I don’t have contact information, or even a web site address for Livinglobe, but if you want to learn more, I’m sure that the folks at Carl Zeiss Jena or Sky-Skan can set you in the right direction.

CosmicSky, 16 Sunray Avenue, SE24 9PY London, United Kingdom, web site www.cosmicsky.com, is another company that specializes in alternative programming for the planetarium, focusing on artistic and emotional experiences that incorporate science rather than the other way around, I think. Last column, in fact, I discussed its Rhythm of the Night program, a relaxation program designed to use soft, soothing narration, natural sounds, and spare visualization under the dome to get people to chill out.

In Valencia, I had a chance to experience a little bit of the program in a planetarium setting, and found it enjoyable. Once I was relaxed, I was immediately jolted out of my reverie by a snippet by another CosmicSky program called The Celestial Journey. This one keys on three stories about different perceptions of the sky, from an Inuit hunter to a desert nomad to a Scottish whaler caught in a southern sea storm. We rollicked with the whaler for a while as he waxed poetic about the gale and the stars were covered and then uncovered by storm clouds and lightning. Again, the visualizations were simple, but the poetry was compelling, and much of the show piece ran in my mind.

If the real estate mantra is “location, location,” the planetarium mantra might be “variety, variety, variety.” Programs such as this can provide an example. If you want to learn more, contact Francisco Diego (fd@star.ucl.ac.uk) or Gill Russell (gill.russell@abdn.ac.uk) and visit the web site.

**Space Telescope Science Institute.** 3700 San Martin Drive, Baltimore, Maryland 21218, telephone +1-410-338-4394, fax +1-410-338-4579, e-mail hubblesource@stsci.edu, web site hubblesource.stsci.edu has provided great gobs of content for science educators and planetarium types over the years, thanks to the good work of John Stoke (stoke@stsci.edu) and the other folks in the Office of Public Outreach there.

One new bit (at least to me) that I learned about from John this conference was that the Office has produced, along with STScI scientists and visualizers, a three-minute trailer for IMAX theaters called Hubble: Galaxies Across Space and Time. Based on 600 million pixels of source material, the film offers viewers a nine billion year time trip backwards to an era when galaxies were new, featuring a fly-through of a 3D data base of some 10,000 galaxies whose approximate distances were determined from ground-based red-shift data. The trailer is available to IMAX facilities for free three-month loans; contact John for more details. Of course, the question we all want to ask is when the feature will be available on DVD, video, and in digital formats for use in our assorted planetarium theaters and exhibit areas. Soon, let’s hope; it sounds like a great piece.

John’s signature ViewSpace product continues to fascinate people in more than 100 facilities. This item uses a multimedia PC and some form of large-format display to run “celestial tours” of Hubble imagery and brief movies with short interpretive captions and John Serrie music. There are regular updates. It now comes in two flavors: CD-ROM, and an internet version which adds such features as planetary mission updates and the Astronomy Picture of the Day. It’s a wonderful service.

But there are lots of such services available from STScI these days; check out the HubbleSource website given above to learn about these two products and many others: video shorts, traveling exhibits, exhibit components, video clips for full-dome visualization, slide sets, transparencies, and even the IPS slide service. Indulge, and do thank John and his colleagues when you see them.

[allsky.de.](http://www.allsky.de) Hertzstr. 35, D-24149, Kiel, Germany, telephone +49-431-12279816, fax +49-431-12279815, e-mail info@allsky.de, web site www.allsky.de, has been written about before in this column. But in Valencia the assembled conference had a chance to see some new and very impressive all-sky imagery created by the globetrotting group.

The growing inventory of images is impressive: New York’s Times Square, Abu Simbel in Egypt, Norwegian glaciers, German forests, Spanish plazas, Bolivian cactus deserts, Moroccan mosques, mountaintop observatories, the interior of St. Peter’s in Rome - nothing escapes their fisheye cameras, and everything looks great.

In Valencia, a number of their all-skies were displayed via the on-site full-dome technology, allowing us to experience underwater scenes and some remarkable nighttime scenes of Karnak in Egypt for example, in which the monuments were floodlit and DigitalSky provided a slowly moving starfield backdrop, masked so that stars winked off and on as they disappeared behind columns and ruins and reappeared once more. It was another of those simple, beautiful moments that wins the day, and the effect was quite stunning.

Even if you don’t have DigitalSky, these all-skies are perfect for conventional all-sky display. The standard all-skies cost €130 (about $155 U.S. at current exchange rates), and the special Egyptian and underwater all-skies, €190 ($225). Astronomical all-skies of celestial imagery go for €95 ($115), and they have a couple of Christmas pans that sell at the standard all-sky rate.

allsky.de also has a couple of children’s programs for sale, and offers a variety of services. Do you need someone to go shoot a custom all-sky for you? Do you need digital image processing done, and analog materials digitized? What about custom computer animation, or slide creation? They can do it all.

Great, great stuff - and the allsky.de fellows in Valencia provided us all with crisp apples tattooed with their logo besides. What’s not to love? Check with Tim Florian

A portion of the Hubble Ultra Deep Field, courtesy of the Space Telescope Science Institute and NASA.
lows named John Kaufmann and Dan Dennis who have both theater and planetarium backgrounds. I was fortunate enough to catch one of their improvisational and audience-participation performances in Valencia in the intimate confines of the Gambato planetarium in the trade show area.

As with all good stories, it began with conspiracy theory. We had clandestinely gathered, we were told, away from our “village” in a forest clearing on a clear night to reconnect with the sky – something the shadowy “World Regime” was steadily trying to deprive us of through light pollution, mass media, and other nefarious strategies. And we were to reconnect through “the personal mythology of our dreams.”

Our first act was to scribble down on a slip of paper a dream we’d had; these were collected by Kaufmann and Dennis in their roles as Conductor and Proxy respectively. Then the lights went down and we were reintroduced to the starry night sky – to some of the mechanics and motions, the properties of its four “quadrants” (directions) and something of the history of familiar constellations. We then cast away our previous knowledge to see the sky anew – and to fill it with constellations of our own experience, based upon our dreams.

Proxy and Conductor then took the audience on a charming improvisational journey. Dreams were drawn at random from the box and read aloud, and the audience was engaged to find constellations in the sky based on the images of the anonymous dreams – in an “unfolding” of Jung’s Collective Unconscious, to get clinical about it. But it was just plain fun as our leaders and the audience got into finding new constellations and linking the constellations from three randomly-selected dreams into a story that led to the on-the-spot creation of a song about our new mythology of the sky. People who normally wouldn’t be caught dead singing along in a group experience were caught singing along, and a thoroughly fun (and meaningful) time was had by all. And believe me, lessons were learned, and we all emerged with a new appreciation of our medium and the sharing of a unique experience that was all our own.

It was a singular experience. And the only technology in evidence was the starfield, a pointer, the red flashlights on the heads of the performers, and a guitar.

This is a wonderful use of the planetarium and an extraordinarily effective way to connect with the audience and connect them with the sky. It’s perfect for the intimate setting of a small or modestly-sized planetarium, perhaps even more so than for the large ones, although it would translate well anywhere, I think. Actors fill the space they’re given, yes?

Kaufmann and Dennis have been honing their act in Seattle, Washington at the Pacific Science Center, but are taking their show on the road under the management of AJ Epstein, president of The Ethereal Mutt Limited at telephone +1-206-352-1777 or e-mail aj@mutt.com, who can provide booking information. One caveat: it won’t be cheap. I was quoted a cost of $5,500 U.S. plus travel expenses for a week of eight performances. But this sort of program is the kind that could be supported by humanities grants, donors, or collaboration with your local theater troupe or university theater arts department who may share the cost; Kaufmann and Dennis are willing to conduct seminars on improvisation and performance as part of the week’s experience.

If you’ve got a chance, see these guys and experience one of their programs. You won’t be sorry. You’ll leave plotting schemes to get them to come visit your planetarium – and with fresh ideas of your own about the importance of human involvement and connection and how you can reinvigorate your own work in these very important ways. Personally, I may have to go see my analyst to discuss that dream that I wrote down, but that’s another matter …

Starball also has a CD (called Starball) that lets you relive the experience through some of the catchy songs and a stream-of-consciousness recitation of selected dreams that have emerged from previous Starball performances. Listen to it under the starry sky of your own planetarium and you can get a flavor of what Kaufman and Dennis do.

For more information – about the program and the CD – check out the Starball web site at www.linger.org. Enjoy – consider seriously.

Finally …

Well … if you’ve waded this far, congratulate yourself on your fortitude. Of course, it’s hard to get to everything at a conference since so much happens at the same time, and there are many morsels out of Valencia I could yet relate. But they will have to wait until the December column. It will probably take you until the end of November to digest what’s here anyway.

So digest, and have a productive fall/spring according to your hemisphere, and see you back here as December rolls around. Until then, as always … “what’s new?”

Bolivian cacti, courtesy of allsky.de.

Horn at horn@allsky.de or access the web site for your all-sky needs.

Starballing

It can easily seem from these mammoth post-conference columns as though our conferences are technology top-heavy, especially with digital software packages and expensive equipment and stuff that many (most?) of us can’t afford, at least not right now. It may seem that way because that’s often “what’s new” in these days of breathtaking technological advance.

But not always, and not really. There was plenty to discover in Valencia for planetarians of any mode, and it wasn’t all technology-heavy. Consider the delightful discovery of the “Starball” guys, for instance.

“Starball” is a program of performance art for the planetarium, combining astronomy, theater, original music, and Jungian psychology. It’s written and performed by two
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- Hamburg Planetarium, Germany
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- Moody Planetarium - Texas Tech
- Museo del Nino, Papaloapan - Mexico City
- Children's Museum of Virginia
- Panther Academy Planetarium - Paterson, NJ
- Mauna Kea Astronomy Education Center - Hilo, HI
- Tels Planetarium - Philadelphia, PA
- Waymouth High School, MA
- Community College of Baltimore County
- Aerospace Education Center - Little Rock, AR
- East Kentucky Science Center
- Clarkstown South High School - Nyack, NY
- Ingram Planetarium - Sunnyside NC
- Science Center of Iowa
- Avampato Discovery Museum, Charleston, WV
- Rowan University - Glassboro, NJ
- Mt. Cuba Observatory - Delaware
- Asahikawa Planetarium - Yokohama, Japan
- Delmont High School - Decatur, IN
- Challenger Center - Tallahassee, FL
- Tulsa Air & Space Museum
- Denver Museum of Nature and Science
- Hickory Environmental Center - Oakland, NC
- Hibbing Community College - Minnesota
- Gerald Malon Planetarium - Norristown, PA
- Beijing Planetarium, China
- Mclintock HS - Indianapolis, IN
- Independent School District - Braiderd, MN
- Whitman College - Walla Walla, WA
- North Penn School District Planetarium, Lansdale, PA
- Bahcesehir College
Association of Dutch-Speaking Planetariums

On 15 May 2004 the ADSP had a meeting in the Europaplanetarium in Genk, Belgium. There was a short discussion of the fact that AGFA and Kodak are stopping the production of graphical litho film, which could grow to be a big problem in the future. The members will try to make every producer of planetarium materials aware that not everybody speaks English. Too much (almost all) material that comes from other planetariums has text fixed in the images and/or no separate sound tape. The meeting would like to get material from other countries but without text in their language with it. The next meeting of PLANed (ADSP) will be held in Valencia. There are plans for a workshop in Brussels where Johan Gijsenbergs will teach more about all-dome and panorama production.

After the meeting there was a big celebration of the 20th anniversary of Limburgse Volkssterrenwacht, the organization that in 1991 founded the Europaplanetarium. During this event the auditorium of the Europaplanetarium was officially opened, with the inauguration of work of art made by the artist Piet Stockmans. This artwork represents the surface of the moon with the crater Venableus. The auditorium was named after the Belgian astronomer Godfried Wendelen (Vendelinus in Latin). With a reception and a planetarium show called Red de Nachtw (Save the Night), the official part of the day was over.

The Europaplanetarium staff spent a lot of time preparing the public for 8 June. They made a short 20-minute planetarium show called Venus Transit. They tried to get the attention of the public by following the footsteps of James Cook. A replica (built by Frans Van Loo) of the ship Endeavour, about 3 meters long and 3 meters high, was placed in the entrance hall. The Venus show was presented after every regular show from the beginning of May. On 26 May they had a workshop for children on Tahitian dancing with more than 100 children attending.

On 5 June they organized a Venus Event with a lecture on the transit of Venus, several stands about Tahiti, a workshop on Tahitian dancing for adults and children, a tattoo shop (with henna) did some tattoos from Tahiti, and during the evening two performances of Tahitian dancing by a professional Tahitian dance organization. During the whole evening people could eat special Tahitian food, prepared on the spot, and drink exotic cocktails to get them more and more in the mood.

On 8 June they could follow the transit in the Europaplanetarium under the best weather conditions. On the big Videowall people could see the first and second contact and then they could go on to see the planetarium show or have a look through the telescope or join the staff for breakfast (again Tahitian style). Seeing the atmosphere of Venus was the high point of the day. All in all it was a great success with more than 300 other visitors, and it was made possible with the support of the Province Limburg Department of Culture.

Association of French-Speaking Planetariums

Spring 2004 was especially rich in events and exchanges. The 10th edition of AFP’s journal Planetarium was distributed with a new look. It will be presented in the next Planetarian issue!

AFP held its annual meeting (16th colloquium) in the planetariums of Saint-Etienne and Vaulx-en-Velin, 20-23 May, organized by Ghaouati Hansali and Patrick Millat, with 80 people coming from France, Belgium, Italy, and Spain. Sessions devoted to technology presented highlights on the new products by Evans & Sutherland, Zeiss, Sky-Skan, with peculiar innovation by the French constructor RSA-cosmos. The shows L’aveugle aux yeux d’étoiles (RSA-cosmos, full-dome video, Saint-Etienne) and Lointaines galaxies (Digistar, Vaulx-en-Velin) are really wonderful.

Two workshops were devoted to links between planetariums, education, and culture; contacts and collaborations will be improved both with official institutions and with teachers. A very important point was deeply discussed in a specific session Statut des animateurs, focusing on the various jobs and salary levels in the planetarium world, and the necessity of improving the insertion of our jobs inside the social collective agree-

An image from the show “Venus and the planets hunters.” Panorama by Christophe Chevallier.
ments. After these hard workshops, the discovery of some strange aspects of the historic Lyon-city was followed by a gala dinner in the Beaujolais country!

The show Venus and the planet hunters was distributed to 16 planetariums, and presented on 8 June at the occasion of the transit of Venus followed by thousands of people. The show presents the description of Venus inside the solar system, the transit event (celestial mechanics), the human adventures of Janssen and Mouchez, and the methods of discovering exo-planets with highlight on Osiris. With a duration of 40 minutes, 20 all-skies/panoramas, and 15 video sequences, the show is now running over the summer.

British Associations of Planetariums

Another IPS Conference has come and gone, and this time what must surely be a record sixteen BAP members (plus three “significant others”) made the trip to Valencia, constituting one of the largest, if not the largest, affiliate groups there. There will be plenty of conference news elsewhere, so it is enough to say here that the setting for IPS 2004 was spectacular in architectural terms. The conference also continued the tradition of early morning paper sessions and late, late nights spent under the dome, agog at where technology is taking our business. In between came the siesta, when delegates were served a delightful three-course lunch al fresco, with wine freely flowing.

Around the UK: The astronomical community in parts of the UK is still reeling from an experience all-too rare - i.e. a major event not kicked into touch by the weather. The transit of Venus was a triumphant occasion when the sun shone from day-break to its end, and many members, particularly in the southeast, were involved in activities introducing people to the excitement of a once-in-a-lifetime phenomenon.

This summer Tussaud’s London Planetarium has a new look along with a new name. The Show Dome, as it is now called, opened on 14 June after a frantick six weeks refit. London now has Digistar 3 and the old theatre-style seats have been replaced by (chewing gum proof) benches. The stage area has also increased in size to accommodate live performance. The new arena-style auditorium opened with a ten-minute version of an E&S show, Journey to Infinity. At the end of July it will be joined by Warriors involving some very lively action and audience participation under the watchful eye of Zeus. Live school shows will restart in the autumn.

For two of our members, however, the last month or so have been anxious ones. Eva Hans of South Tynside Planetarium in the North of England, and Mario Di Maggio of the ScottishPower Space Theatre in Glasgow, both had the threat of redundancy hanging over them. In Eva’s case the existence of the planetarium was also at risk. The two projects are very different, but both serve local communities with real evidence of success. Thankfully the threat to both members has receded and Glasgow Science Centre is continuing to put together its bid to host the 2008 IPS Conference.

Canadian Association of Science Centres

The 2004 IPS Conference held in Valencia, Spain, was quite well attended, with almost 350 people registered. Included in this number were several Canadians who attended despite the very recent CASC Conference held at Edmonton’s Odyssium facility. From Canada came Montreal’s Pierre Lacombe, Edmonton’s Max Scharfenberger, Calgary’s Bill Chomik, and from Vancouver, John Dickenson and Robert Ballantyne.

At the June CASC Conference in Edmonton it had been discussed that Canada’s major planetariums might consider collaborating on the issue of what new technology might be adopted as they all move towards a restructuring of their facilities. It looks as if the Odyssium may well be the first facility to move ahead with this work, followed perhaps by Vancouver, Calgary, Winnipeg, and Montreal. Now that the dialogue and discussion has begun it will be very interesting to see how each facility makes its new technology choices.

Council of German Planetariums

The main event was the meeting of the planetariums of German language (Arbeitsgemeinschaft Deutschsprachiger Planetarien
The new Mediendom in Kiel houses a Digistar 3 in a 9-meter diameter dome without a star projector in its center. In various workshops participants learned more about image and video processing and how to use the Digistar 3. Fascinating shows that were partially produced by the crew of the Kiel University of Applied Sciences around Eduard Thomas, were presented and this meeting was held in a very courteous atmosphere.

Very impressive by its technical possibilities was the totally renovated planetarium in Hamburg, where Thomas Kraupe and his team presented shows demonstrating all their complex technologies on Sunday evening. During the conference the participants discussed the pros and cons of all-dome video projection systems, and vendors presented their new products.

Famous Reeperbahn and the port of Hamburg were also visited by some of the conference attendees. Some of the 120 participants came from Denmark, Belgium, France, Switzerland and Austria, which stresses the importance of the ADP in Central Europe. Consequently, the next conference in 2005 will be hosted by the Europlanetarium in Genk (Belgium) together with the Association of Dutch and Flemish speaking planetariums.

Many German participants will travel to Valencia, where Allsky.de from Kiel will present new all-skies and Munich’s Forum Planetarium will show parts of their very successful Queen-Heaven show.

The transit of Venus was also a major event for most planetariums. At Osnabrück the planetarium and the local astronomy club set up telescopes in the center of the city. Hundreds of school students and passers-by took the chance to see the black Venus in front of the sun through solar eclipse glasses, in projection, or through the telescopes.

**European/Mediterranean Planetarium Association**

Seven months have passed since the new Eugenides Planetarium screened its first planetarium show after an extensive renovation. Until the end of May, 300,000 visitors have enjoyed *Cosmic Odyssey* and *The Unending Voyage*, both productions of the Eugenides Foundation, an impressive number by any standard. It is also very gratifying to staff that that a 20-minute version of *The Unending Voyage* is planned to open on the world’s first floating planetarium aboard the brand new cruise liner Queen Mary 2 while it is docked at the port of Piraeus during the Summer Olympics of 2004.

The Technical Museum of Thessaloniki (TMTb) was established in 1978 as an educational non-profit organization for the collection, documentation and preservation of Greece’s technological and industrial heritage, as well as for the dissemination of the natural sciences and technology in general. TMTb, realizing the need to update and to improve and expand its services, decided in 1997 to establish a brand new Science Center and Technology Museum in a land area of 49,000 m² that was specifically granted to it for this purpose by the Municipality of Thessmi, and with funds from the European Investment Bank and the Hellenic Ministry of National Economy.

The new Science and Technology Museum of Thessaloniki will feature a large format theatre (8/70) with a flat giant screen of 17-23 meters, a planetarium with an 18-meter-diameter dome and 150 reclining seats, a motion simulator module with 18 seats, an interactive exhibit area which will be focusing around the central theme of *Science and Human Perception*, and a temporary exhibition area. Presently, the last phase of the electromechanical installations is taking place and Telmaco S.A. is currently installing the rest of the audiovisual equipment. It is expected that the construction phase of the project will be completed by the end of June 2004 and that the new science centre will open its doors to the public sometime this coming fall.

**Great Lakes Planetarium Association**

**Illinois**. During the summer, the Lakeview Museum Planetarium in Peoria ran six different shows on weekdays and two shows on weekends. The Interplanetary Bicycle Ride is...
scheduled for 14-15 August. This spring, 150 runners participated in the Interplanetary 5K. Stricker Planetarium on the campus of Olivet Nazarene University in Bourbonnais joined the Night Sky Network. Working with the local Kankakee Area Stargazers, the planetarium is now part of the amateur astronomy network and is now seeking ways to increase its educational influence into the Kankakee community through sidewalk observing sessions, small star parties, and educational programs in schools.

The Cernan Earth and Space Center of Triton College in River Grove hosted the Illinois State Meeting on 1 May. Those in attendance were shown the Cernan Center’s new way of producing and presenting its popular Monthly Skywatch series, as well as its front-mounted laser projectors which provide an exciting augmentation to their laser light shows. The William M. Staerkel Planetarium at Parkland College in Champaign went to a reduced summer public schedule for the months of June and July. Public audiences and school groups had to side-step construction equipment this summer as the college remodeled and re-landscaped the entryway to create a college donor “walk-of-fame.”

Indiana. The 2004 Indiana Spring Meeting was held in Fort Wayne on Saturday, 8 May. The morning session was held at the University of St. Francis’ Edwin Clarke Schouweiler Memorial Planetarium. A morning paper session was followed in the afternoon by a tour of the “Mission to Mars” learning center at Wayne High School Planetarium. The day concluded with a presentation on the nuts and bolts of launching and maintaining communications satellites by Jon Thomas of Fort Wayne, who is a communications satellite launch engineer with Lockheed.

Peggy Motes from the Muncie Community Schools Planetarium recently traveled to the St. Louis Science Center to film the “Passport to Knowledge” electronic field trip with Bill Nye the Science Guy. Amera Platt from the Wayne High School Planetarium also attended the event, which focused on the JPL/NASA Mars Exploration Rover Missions.

Michigan. The Cranbrook Institute of Science in Bloomfield Hills is sad to report the departure of Jeffrey Bass, who has left to take a position at the Milwaukee Public Museum. In his place, Michael Narlock was promoted to Head of Astronomy and Planetarium. Cranbrook recently celebrated its 100th anniversary on Astronomy Day. The day brought approximately 4,500 to Cranbrook, where patrons enjoyed planetarium programs, solar observing, activities by members of the Warren Astronomy Society, and a talk by former astronaut Jack Lousma.

In Marquette, the Shiras Planetarium has placed an order for a new Konica Minolta MediaGlobe Lite and Astro-Tec dome. Konica Minolta is doing their best to engineer a design that will allow them to keep their Minolta 5068 along with the new full-dome digital system, creating a one-of-a-kind facility that gives them the best of both worlds (opto-mechanical and digital). Installation is scheduled for this summer.

At the Ensign Planetarium in Dearborn Heights, it’s been a busy winter and spring with public shows. Since all shows are performed live at the Ensign by Director Carrie Zaitz, she can tailor each show to her audience. Carrie recently introduced a workshop for girl scouts – making models of Saturn from old CDs, a 5-centimeter styrofoam ball, and lots of glue and glitter. The Ensign opened early on the morning of the Venus transit, with webcasts running inside the building and telescopes operating outside.

This winter and spring, the Delta College Planetarium in Bay City has been running numerous classes, field trip programs, and Girl Scout workshops. They also had a “Fun with Telescopes” workshop for parents and kids in May. This summer, they offered stargazer dinner cruises on a two-masted schooner on Saginaw Bay, and hosted their annual fireworks fundraiser on July 3rd.

For the staff of the Dassault Systèmes Planetarium, the main event this spring was Astronomy Day. With over a thousand visitors attending, they were assisted by members from the Ford Amateur Astronomy Club. Visitors enjoyed the MarsQuest exhibit and planetarium show, as well as a Build Your Own Telescope class for children and their parents. The Chaffee Planetarium in Grand Rapids debuted a new laser light show set to excerpts from Carl Orff’s Carmina Burana to accompany a blockbuster exhibit about the Middle Ages entitled Gracia Dei, a Journey through the Middle Ages which opened 22 May. Summer Science Camps and Science à la Carte Activities ran during the summer.

Kalamazoo Valley Museum Planetarium in Kalamazoo ran some special Venus transit activities in early June. On Transit Day, they opened their doors at 5 a.m. for a special event featuring the Transit of Venus webcast by NASA and the Exploratorium, and a live views of the egress beginning just before 7 a.m. Coming this fall, Abuelo’s Stories for the Seasons will have its opening on 25 September. This locally-produced show features a mix of regional Hispanic culture with an explanation of seasonal changes.

The Exhibit Museum Planetarium Director Matthew Linke will be the guest planetarium lecturer on board the Queen Mary 2 on its cruise of the Mediterranean 1-12 August. Using the planetarium housed within the Illuminations Theater, Matt will be presenting star talks dealing with the history and significance of the region to much of our current sky mythologies.

Ohio. In May, the Erie Planetarium conducted a long-distance conversation with astronaut Mike Fincke aboard the International Space Station. Astronaut Fincke spoke to a crowd of about 400 kids and adults in Erie in May, 2003, and promised a connection to the Space Station whenever he went up. The Bowling Green Planetarium offered a series of Sunday afternoon shows for young skywatchers in April. Poetry readings returned to the BGU agenda in April. School shows, public shows, and BGU astronomy classes kept the planetarium busy this spring, and director Dale Smith taught a senior-graduated class on stellar structure.

Gene Zajac from the Shaker Heights Planetarium teamed up with Dan Francetic near Columbus to present an hour-long program on Mars before an audience of fifth-grade classes. They described how our view of Mars has changed as a result of scientific investigation. Gene and Dan had a rover model, jarosite crystals, hematite, “blueberries” from Mars, a MER sundial replica, and the made rockets using simple materials and Estes engines. Finally, there is sad planetarium news from Columbus, where a critical CO3 levy failed in April. As a consequence, the planetarium will be closed in early September. Everyone hopes that a way can be found to keep the planetarium open.

Wisconsin/Minnesota. A star is born! Dave DeReme is happy to announce that ground breaking for a new Charles Horwitz Planetarium in Waukesha, Wisconsin, took place in June. Dave estimates that one orbit later, the new 12.2-meter, 90-seat theater will open to the public. Minnesota Planetarium staff members continue to produce and sell its star shows and, like many planetaria, also hosted a Venus transit event on 8 June.

Bob Allen from La Crosse, Wisconsin, will be hosting model rocketry classes this summer. In Hibbing, Minnesota, Marc Rouleau presented the SolarMax film as well as a home production called Whales. Karen Klacmanzy in Menasha, Wisconsin has begun running laser shows from Laser Fantasy International, and she reports outstanding attendance. Their own production of Stars in my Summer Sky was one of three programs that ran during the summer.

Italian Planetaria’s Friends Association

In the center of Italy a new planetarium 10 meters in diameter and with 64 seats is managed by Fausto Marini, who also manages the Observatory of Colle Leone. The two facili-
ties are situated in the small town of Mosciano Sant’Angelo, Teramo. Marini visited the London and Caracas planetariums eight years ago and decided to realize one near his own observatory. In 2005 the Planetarium and Space Museum of Pino Torinese Astronomical Observatory in Turin, www.planetariumitorino.it, the first digital planetarium in Italy will open, equipped with a Digistar 3. Turin will be the site of the Winter Olympic games in 2006.

The National Meetings of Italian Planetaria Friend’s Association are held each year in October. The next Meeting will be held on 10 October in the Planetarium of Rome, Museum of Roman Civilization. The first European Meeting of Itinerant Planetaria was held in 1995 in Brescia, Italy, and the second Meeting in Strasbourg, France, in 1999. The third European Meeting will be held in Nantes, France, on 6-8 May 2005, during the National Meeting of the Association of French-Speaking Planetariums.

Each year Serafino Zani Astronomical Observatory has been organizing an appointment called A Week in Italy for an American Planetarium Operator. A similar week will be organized next November for a French planetarium operator and next year for a Spanish planetarium operator. The planetarians who win these trips present lessons in French or in Spanish to Italian students with the itinerant planetarium Starlab.

Invitation to Italy with the Sky in the Eyes is the title of the web pages www.brescia scienza.it that includes all programs that are devoted to foreign colleagues interested in visiting Italy. In the Brescia area it is possible and worthwhile to visit monuments, museums, and historic buildings that are of astronomical interest. In Valley Trompia, Brescia, where Serafino Zani Astronomical Observatory is located, there is a museum system called Iron Way which describes mining, old ways of working, and the industrial activities that characterize the district. In Brescia, an exhibition will be open at Santa Giulia Museum 22 October 2004 - 20 March 2005 with more than 100 paintings by Monet and other French artists. Images are found at http://www.colibrionline.it/MG/planetari_news.htm.

Japan Planetarium Society

JPS and other associations for planetarium community will publish a White Paper of Planetariums in Japan next year. The publishing committee is collecting its data from all over the country.

New Sunshine Planetarium in Tokyo is now releasing the first program Wonders of the Universe. Their attendance counted 100,000 from the opening day on 20 March to 3 June. Konica Minolta Planetarium Co., the mother company of Sunshine Planetarium, estimates 300,000 to 400,000 people will come to see the planetarium in a year.

Unfortunately, June is the monsoon season in Japan (except the Hokkaido area). Almost all places at Honshu, Kyushu and Shikoku Islands in Japan were covered with thick clouds on Tuesday, 8 June. But during a few seconds (or a few minutes in some regions) the sun appeared through a crevice in the thick clouds. Also, JPS reporter Shoichi Itoh was fortunately to see the Venus transit for a few seconds! Though many people planned to send their solar images via Internet, they failed except in Hokkaido.

Nordic Planetarium Association

There were 16 NPA delegates from Denmark, Estonia, Finland, Norway, and Sweden who participated in IPS-2004 in Valencia. Prior to the conference, IPS Council met and decided to give the Armand Spitz Fund for Planetarium Education scholarships to two new master students, studying at Dalarna University, Borlänge, Sweden 2004-5.

Good news: Nordlysplanetariet i Tromsø is being brought back into operation after having been closed down for some time. It is Nordnorsk Vitensenter - Northern Norwegian Science Center - with Anne Bruvold as
project leader, who will re-open the world’s northernmost planetarium. Both public shows and school shows are in the planning. The planetarium also owns a mobile Starlab planetarium used for school visits.

The transit of Venus on 8 June was followed on many places in the Nordic and the Baltic countries. Dalarna University had set up a Sunspotter and a computer for live and simulated views of the event right in the middle of downtown Falun. Per Bromlan and two students had a steady stream of visitors all morning, especially after the local radio station had covered the transit from 8 to 8:30 with a reporter in place. One woman told the reporter: “Wow, it is so small!” expressing the overwhelming experience that the sun is immensely larger than Venus - and thereby also in comparison with the earth. Also the regional TV station came and made a report on the evening news. The Future’s Museum in the neighboring town Borlänge had visitors coming by all morning, watching the transit under planetarian Håkan Sandin’s supervision.

**Pacific Planetarium Association**

The Western Alliance of Planetariums conference will be in San Diego, California on 29 September to 2 October 2004. John Young and Reuben H Fiecle Science Center will host the conference. The Theme is *Planetary Exploration*. The call for papers went out in June, so if you have a contribution or wish more information, please email John at jyoung@rhfleet.org.

The 9-meter dome at El Camino College in Torrance, California, will get a new CHRONOS projector scheduled for installation in January, 2005. Spitz, Inc. is the prime contractor, and the installation includes the CHRONOS under a special cooperative agreement with GOTO USA INC. Several other planetariums in the western states will have similar installations. For information, contact KenMiller@gotousa@earthlink.net.

De Anza College will also receive the newest Konica-Minolta projector called the Infinium S. This machine uses optical fibers to create a wonderful, realistic sky. It has fast and accurate computer positioning of the planets and other celestial bodies. Installation will begin later in 2005. For information, contact Karl von Ahnen at Minolta Planetarium, De Anza College, Cupertino, California.

Bakersfield College Planetarium gets an upgrade for its 7.2-meter (24-foot) dome. The dome itself will be expanded to 10.8 meters (36 feet). The Spitz A3P projector and seating will be replaced. Bakersfield is selling the 7.2-meter dome, the Spitz A3P, and concentric bench seating in December 2004. If anyone is interested contact Nick Strobel at nstrobel@bakersfieldcollege.edu.

Holt Planetarium at Lawrence Hall of Science, University of California, Berkeley, California, has adapted two planetarium programs. *Transit of Venus* is a highly popular program produced by the Great Lakes Planetarium Association. It was shown in many planetariums in the USA and it got good reviews. *Ring World* is from the Jet Propulsion Laboratory in Pasadena, California. Holt Planetarium staff adapted the script to add questions for the audience and two activities. The adaptation of *Ring World* is on the PASS website http://aurancehalloffscience.org/pass. Contact Alan Gould, planetarium Director www.lhs.berkeley.edu/planetarium.

Keith Johnson, PPA treasurer, has moved to become director of the new Edelmann Planetarium in Glassboro, New Jersey. Bob Pippin, past president of PPA for two terms, has graciously agreed to be the interim PPA Treasurer.

Independence Planetarium brochures will be distributed to 597 public schools and 756 public and private schools in the San Francisco Bay Area. Located in San Jose, California, about 24,000 students visit Independence Planetarium each year. Marketing for the planetarium is a major project and involves networking in many creative ways. Recently Independence Planetarium staff was honored to have as guest speaker Denise Schmandt-Besserat, who is listed as one of the 100 most influential authors of the 20th century. Independence planetarium staff will also expand networking with the Martin Luther King Library in San Jose.

**Southeastern Planetarium Association**

SEPA just concluded a tremendously well-run meeting in Richmond, Virginia. The conference was a joint meeting with MAPS and a large number of delegations were in attendance. Although a few major displays were set up, vendor participation was limited mostly to talks and PowerPoint presentations because of the soon-to-follow IPS conference in Spain. An interesting side trip to Charlottesville included a visit to Monticello, Thomas Jefferson’s home and estate. Jefferson’s involvement with the sciences, particularly astronomy, was evident in many aspects of his home. The tour was even more interesting because we visited after-hours and had the privilege of being the only group on-site.

SEPA members voted for Cocoa, Florida, as the site of the 2006 conference. The host institution will be the Astronaut Memorial Hall and Planetarium directed by Mark Howard. Cocoa, as you may remember, was the site of the 1994 IPS conference. Atlantic’s Fernbank Planetarium will host the next SEPA conference. Dates are 14-18 June 2005.

SEPA’s highest recognition of service, the Paul Campbell Fellowship Award, was awarded to three recipients, Jon Bell, Fort Pierce, Florida, Kris McCall, Nashville, Tennessee, and Gary Meibbaum, Luling, Louisiana. The award is given for long years of excep-
tional service to the organization. Two Emeritut Membership awards were granted to retired SEPA planetarians, Mike Ryan, formerly of the Howey-in-the-Hills, Florida planetarium, and Jim Hooks, formerly of the Robeson Planetarium, Lumberton, North Carolina.

New officers were elected and will assume office on 1 January 2005. President Elect is Adam Thanz of Bays Mountain Planetarium, Kingsport, Tennessee, Duncan Teague, continuing as Secretary/Treasurer, Craigmont Planetarium, Memphis, Tennessee, and John Hare, continuing as IPS Council Representative, Ash Enterprises International, Bradenton, Florida. SEPA will produce a solar system show that will be distributed to members free of charge. Expected completion is sometime in early 2005. Further information regarding SEPA is available at the website www.sepadomes.org.

**Southwestern Association of Planetariums**

Last spring the Highland Park Planetarium in Dallas, Texas, hosted Phil Groce, Genta Matsumura and their crew from Konica Minolta at an open house to demonstrate the Mediaglobe in action. Technicians from Konica Minolta spent 19 May setting up the equipment and enjoying the hospitality at Highland Park High School (ask Kazu Katabatake about the free ice cream). The Local Group composed of planetarium directors and their spouses, school board members, and friends from the Fort Worth/Dallas Metroplex met for dinner at Gordo’s before the presentation under the Highland Park dome with most staying until well after midnight.

George Owen, Director of The Murray J. Frank Planetarium in Beaumont, Texas, was in the area for the meeting and visitation of local planetariums. Hosts for Owen’s visit included Jim Rusk, Director of Mesquite Schools Planetarium, Steve Balog, Director of St. Marks School of Texas Planetarium, Wilgus Burton, director Garland ISD Planetarium and director Donna Pierce, Highland Park. Other attendees for the demonstration included Chaz Hafey, Science Place Planetarium, John Cotton/Carol Jordan, Science Place Planetarium, Bess Amaral, St. Marks School of Texas Planetarium, Linda Irby, Richland College Planetarium/Science Place Planetarium, Tim Black, UTA Planetarium, and John (retired) and Ann Pogue, Grand Prairie Schools Planetarium. Groce and his crew are to be commended for a most informative, interesting, and exciting evening under a dome in Texas!

The Beaumont Enterprise recently wrote: Sky Master is Your Guide to the Planets and stars. George Owen, director of The Murray J. Frank Planetarium, was the feature article last spring in the Beaumont, Texas, local newspaper citing Owen’s work with faculty, students and administrators since 1968 when the planetarium was built at Forest Park High School, which later became West Brook High School. The A3P projector was installed by Spitz Labs of Chadds Ford, Pennsylvania. The equipment and roof were built by a National Science Foundation grant. The cost at that time to the district was $6,000. In 1986 the school district moved the equipment and the curved inner roof to the Murray J. Frank building, made specifically for it. It seats more than 60 students and is used daily. Owen estimated that since the planetarium opened more than 360,000 students have visited. Occasionally, students from other school districts have the opportunity to use it and The Astronomical Society of Southeast Texas also meets there each month. Recently one science teacher remarked “the best part for the students knows they can walk out of their home on the same night and see for themselves what Owen was talking about!”

A 70th Blaze was held under the dome in the Highland Park Planetarium 7 May to celebrate director Donna Piece’s 70th birthday. Teachers, administrators and friends came forward to help her blow out all 70 candles! As a safety precaution a Highland Park High School janitor was standing by with a fire extinguisher. Donna Pierce was planetarium educator at The Science Museum Planetarium (formerly The Dallas Health and Science Museum) for 15 years before becoming director of the Highland Park Planetarium in 1980. As past president of SWAP Pierce is currently serving as SWAP’s representative to the IPS Council.

Grand Prairie Independent School District’s Board of Directors announced the naming of The Grand Prairie Schools Planetarium for former director John Carl Pogue. Pogue is a well known educator in the planetarium field, an active member of SWAP since the 1960s, served on the IPS Executive Council for 8 years, President-elect for 2, and as President of IPS. Effective 19 August 2004, the new Director of the Hudnall Planetarium will be Tom Hooten and Helen Mears will remain on as Astronomy Educator at the Planetarium. Tim Black of the Fort Worth Sidewalk Astronomers is the new Planetarium Director at the University of Texas at Arlington.

The Science Place has been awarded a $770,000 grant from Crystal Charity Ball to completely refurbish The Science Place Planetarium. They are going to tear it out to the circular wall. John Cotton will take out all the wiring he put in 34 years ago! A Goto Chronos star machine, some variety of video system, automation system, new daylight system and other details will be installed. The Cook Center Planetarium on the campus of Navarro College in Corsicana had over 25,000 people come through the planetarium doors to enjoy star shows, laser shows, and large format film during the last year. Summer activities will include their

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Bess Amaral, Steve Balog (hidden), Todd Mortensen, Kazu Katabatake, Phil Groce at Highland Park Planetarium. Photo Wilgus Burton.
annual summer camp offerings.

In June, Cook Center will be repairing the dome shutters on their observatory tower in order to finally make the facility operational. The observatory will house a 35.5 cm Celestron Compustar telescope. The power module was repaired and a new logic chip installed to take care of the Compustar controller’s 2K issues. The telescope will function as a research tool for students enrolled in astronomy courses at the college. Students will use the scope and the ST-6 CCD camera to photograph a variety of objects for astronomy research projects. Although the observatory isn’t exactly located in a great dark sky locale, the important issue is that astronomy students will gain some experience with an observatory that wouldn’t be possible in a standard classroom.

Wilgus Burton at the Garland ISD Planetarium had a 12% decrease in budget and an attendance drop as well. Largely due to the lack of astronomy-related material in the new 8th grade portion of the TEKS, the Texas

Essential Knowledge and Skills requirements, 8th grade classes did not participate. The annual attendance dropped from 20,000 to 13,400. Burton will be recreating teacher’s guides and writing and producing an automated version of his planetary program for 6th grade during the summer.

**Calendar of events**

This is a new addition to International News. This first calendar is quite incomplete, but all readers are very welcome to send input to the next Calendar before 1 October. Events within the next year will be included as long as the event is open also to others than e.g. members of the regional association. Follow the style used here: just date, name and place of the event, and website or e-mail address for more information.

**2004**

29 September - 2 October. The Western Alliance of Planetariums conference, Reuben H Fleet Science Center, San Diego, California, USA. jyoung@rhfleet.org.

10 October. National Meetings of Italian Planetaria Friend’s Association, Planetarium of Rome, Italy. info@serafinozani.it.


**2005**

6-8 May. Third European Meeting of Itinerant Planetaria, Nantes, France. info@serafinozani.it.


16-18 September. Nordic Planetarium Association Conference, Orion Planetarium, Jels, Denmark. orion@audk.

(Mobile continued from page 35)

*Comments:* I viewed this system at the conference and found it to have good possibilities as a teaching tool. The images and stars are quite acceptable, however, in order to increase resolution this company has truncated the sky so that about 20-30% of the sky is black (no images) so the audience must face in one direction. The fact that you can choose to work with images in 2D or 3D is a unique characteristic of this system; I was told that this capability does not exist in other models of digital projection systems manufactured to date. This capability allows the user to work in 2D when increased resolution is desired; thus you can create a more acceptable starfield.

Sky-Skan and Carl Zeiss (http://www.zeiss.com) have combined efforts and expertise to create a definitive PD system with a double-head ed projector to effectively double the digital resolution. Although I was unable to schedule a time to view this system, all reports heard from others say that this system does indeed produce excellent clarity and resolution ... and the price, of course, reflects this.

According to Stephanie Wilson, Sales and Systems Specialist, Sky-Skan, Inc. (51 Lake Street, Nashua, New Hampshire 03060-4513; Phone 1-603-880-8500 or 1-800-880-8500; FAX: 1-603-882-6522; e-mail: wilson@skyskan.com), “The Zeiss Twin projector is the latest and most revolutionary of the projectors available within the Sky-Skan definitive planetarium system line. The Twin projector is designed for domes up to 6 meters (19 feet) in diameter and provides approximately fifty percent more pixels on a 360-degree dome than a traditional 1024 x 1024 single lens fence system. Using DLP projection technology and two wide-angle lenses, the Twin projector produces the highest image resolution and sharpest contrast of pre-rendered content and of 2D and 3D.

A view of the definitive PD interface. Photo provided by Sky-Skan.

(Please see Mobile on page 78)
A proven and reliable technology of the highest standard, Omniscan features excellent and timely service support, a Users' Group for downloading laser graphics and animation updates at no charge, and exciting laser entertainment shows.

Good things come in small packages. SkyLase, affectionately called “Omniscan Jr.”, features a small projector with laser diodes for an incredibly small price for small domes 30' and under. SkyLase carries the same benefits of excellent service and spectacular laser entertainment shows.

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Joanne Young
Audio Visual Imagineering, Inc.
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expos has such interesting architecture driven the masses into our houses of stars. Plenty has been written on Dome-L about just what and what isn’t a planetarium. Which shows are better, live or canned? Regardless of whether you’re doing you 1000th showing of RingWorld or your first star ID show, remember that you’ve got the greatest job in the world! Also remember that your visitors have come to see your show not just for the spectacle but also for the solitude provided by the planetarium. The human tradition of gathering beneath a hemispheric screen to explore the universe extends far into the past. Here are some unusual and interesting variations on the planetarium experience that I’d like to share with you.

What’s In A Name?
The next time you find yourself in the Boston area, take the time to visit The Mapparium at the Mary Baker Eddy Library for the Betterment of Humanity. This three-story walk-through globe has been a popular attraction for over 60 years. It was designed and built by Boston architect Chester Lindsay Churchill at a cost $8,900. The globe is 9 meters in diameter and is transected by a glass walkway. Refurbished in 2002, this marvel in stained glass and bronze frame has been outfitted with 206 LED light fixtures that can be programmed to display up to 16 million colors to create a dazzling light show. An original seven-minute program, A World of Ideas, compares the differences in the world of today to when the globe was installed in 1935. Located within the library named for the founder of both Christian Science and the Pulitzer Prize winning Christian Science Monitor newspaper, the Mapparium is open every day except Mondays and major holidays. In case you can’t wait to get a closer look in person, make the trip via cyberspace at http://www.marybakereddylibrary.org.

Take another trip back in time to examine Screen Practice Before Film to get a glimpse at the great grandparents of the planetarium at this website from the Bill Douglas Centre for the History of Cinema and Popular Culture at the University of Exeter in England. Just

While looking at some of the photo albums posted to the web from the various attendees of the IPS Conference in Spain (www.allsky.de/ips or www.stargazer-planetariums.co.uk/NewSite/links.htm), I couldn’t help but notice a lot of new faces that I didn’t recognize. After 25 years in the business and with a number of conferences under my belt, I often wish that some of the newer planetarium staff members at your facilities could attend conferences. I think that these meetings would sharpen their skills and cement their interest in the field. I don’t know if it is the addition of all of the new companies that have cropped up in recent years or the European location that has brought so many new faces on the scene. Regardless of the reason, if you are new to the planetarium business, send me some information about yourself and your involvement in the planetarium field. I am sure others would like to get to know you and learn about your work and how it impacts planetarium visitors around the world.

Also while looking at the pictures of L’Hemispheric, I was reminded how unique our business is. Not since the great world

300 60-watt bulbs were replaced by 206 LED arrays to illuminate the Mapparium! Photo by Mark Thayer, courtesy of The Mary Baker Eddy Library, Boston, Massachusetts.
type http://www.btfv.ac.uk/projects/exeter.htm and get ready for a roller coaster ride through big screen excitement in Victorian England. The Mapparium of its day, Wyld's Monster Globe opened in 1881 and was located in Leicester Square in London. This 18-meter, 4-tiered, 3-dimensional colossal was a metropolitan institution for nearly ten years. If you attended the IPS conference in London in 1998, you'll remember that this area is still known for its theaters and amusements. The work of Drs. John Plunkett and Duncan Petrie, this website reveals the marvels of panoramas, dioramas and magic lanterns!

It doesn't matter whether you call your facility an Atmospherium, Ecotarium, or Special Purpose Room, you'll always have the ability to enlighten and inspire others. Good luck! One person who spent the last 30+ years enlightening and inspiring us all to create the best theaters and the best shows has left this planet to soar among the stars. It is with heavy hearts that we send...

...Our Condolences to the friends and family of Kosuke (Kosy) Sasaki. (See notice earlier in this issue on page 27.) Kosy will be remembered for his kindheartedness and his dedication to our profession. He was recognized at a touching tribute given by his long time friend Phil Groce at the banquet of the MAPS/SEPA conference in Richmond, Virginia. With his wife, son, and daughter in attendance at their first conference ever, all of us had this brief but fitting chance to bid him farewell. There will never be another like him.

People On The Move

After 17 years at the Fleischmann Planetarium in Reno, Nevada, John Johnson has left the high desert for the New Jersey low country. He is now the Director at the Edelman Planetarium at Rowan University in Glassboro, New Jersey. The Edelman features a Spitz 1024 inside a 12-meter dome.

Five staff members had their positions eliminated in July in response to a budget deficit at the Flint Cultural Center in Flint, Michigan. Effected by the decision were Longway Planetarium Director Michael Gardener and Laser Operations Manager Ryan Eckleberry. Gardener had been with the planetarium since 1968 and had been the director for 16 years. James Johnson, Associate Director and 33-year veteran of the nearby Sloan Museum, was also let go.

Stephanie Wilson has joined the team at Sky-Skan, Inc., as their new Sales and Systems Specialist. She is a recent graduate in Communications from the University of New Hampshire in Manchester, New Hampshire. Stephanie had an opportunity to take a crash course in all things planetarium thanks to her attendance at a number of conferences. She is very impressed by the hard work and dedication of all the planetarians she has had a chance to meet. If you see her at an upcoming conference take the time to introduce yourself and welcome her to our happy family! You can reach her via email at wilson@skyskan.com.

Congratulations ...

...to Wendy Ackerman on her promotion to Assistant Director of IMAX & Planetarium at the Maryland Science Center. Wendy coordinates activities at both the Davis Planetarium and the MIE Properties IMAX 3D Theater! The Maryland Science Center has recently doubled the size of its exhibits space with a new addition. If you're in Baltimore, stop by and visit Wendy or if you have any questions email her at her new address, wack@marylandsiencecenter.org.

...to museum and planetarium developer Takayuki Ohira on the installation of his MEGASTAR-II Cosmos Star Projector at the National Museum of Emerging Science and Innovation in Odaiba in the Tokyo Bay region of Japan. The MEGASTAR-II Projector reportedly can display up to 5 million stars. The museum is headed by none other than Japan's first spacerman Mamoru Mohri who became the first Japanese citizen to fly into space in 1992 as a payload specialist aboard the U.S. space shuttle Endeavour. Mohri returned to space in 2000 as a member of STS-99. With the increasing amount of attention being paid to space science subjects in recent headlines, the new planetarium hopes to fill the void left by the most recent public planetarium closings in Japan.

...to the three recipients of this year's Paul W. Campbell Fellowship Award bestowed at the MAPSEPA joint conference held at the Science Museum of Virginia and the Ethyl Planetarium in Richmond, Virginia, on June 25, 2004! The award was established in 1997 to honor SEPA members who exemplify the best qualities of personnel working in the planetarium field. The trio of honorees included Jon U. Bell (Director, Hallstrom Planetarium, Indian River Community College, Fort Pierce, Florida), Kris McCall (Director, Sudekum Planetarium, Nashville, Tennessee) and Gary Melbaum (Director, St. Charles Parish Library Planetarium, Luling, Louisiana). See the photo on the next page.

New and renewed!


The Cité de l’Espace Planetarium in Toulouse, France, has become the 35th customer to purchase a Digistar 3 from Evans & Sutherland. The Cité de l’Espace Planetarium, the largest planetarium in the south of France, opened in 1997 with an E&S Digistar II operating in a 15-meter dome. As a result of the planetarium's success over the past seven years, the City of Space is constructing a new facil—
ity called Astra...ria, adjacent to the existing planetarium, Astra...lia will house a 20-meter domed theater equipped with Digistar 3. Director Marc Moutin plans to have the installation completed during the first quarter of 2005.

Our man in Moscow Rob R. Landis writes to report that renovation is underway at the Moscow Planetarium in Russia. “Andrey Lobanov has documented the continuing construction underway at the facility. Due to the laws and guidelines for the city, the Moscow Planetarium structure had to be preserved. However, it was jacked up nearly six meters to make room for offices, exhibit space and more.” Get a close up view of all the plans while getting a brush-up on politics at the English version of their website at http://www.planetarium.ru/english/english.html.

On April 29, 2004, Kobe Science Museum opened a renovated planetarium theater with GOTO’s GS...Kobe star projector and VIRTUARIUM in Kobe, Japan. Audiences were impressed with the harmonic presentation of both opto-mechanical star projector and all dome video projection. The opening show Planetaria was shown. A version of the VIRTUARIUM was created which projects images on a skew to avoid a planetarium projector in the middle. GOTO employed 6 DLP projectors to create an evenly-matched and seamless image.

Nicknamed “Cosmo Land” since opening in 1987, Miyazaki Science Center has been providing quality educational experiences for school and public audiences in Miyazaki, Japan. This March, it received a new state-of-the-art projector, a GOTO SUPER HELIOS, joined with an all dome video system. With this integrated system, audiences can enjoy the stunning star field of SUPER HELIOS as well as a variety of images on the screen reproduced by all dome video including rendered video, direct images from the Internet or even snapshots from a digital camera!

Delta College Planetarium in Bay City, Michigan, is getting a new roof after a storm ripped off decorative panels two years ago. In a related story, Tarleton Science Planetarium at Tarleton State University in Stephenville, Texas, had an indoor weather show when a severe storm blew through during a meeting of Texas physics teachers. Despite the trickles of the conference continued uninterrupted. One theory proposes that a lighting strike may have weakened the welds on the exterior copper dome.

They say all roads lead to Rome. And now all roads lead to the Rome Planetarium. Reopened after 20 years, the new facility is part of the Museum of Roman Civilization. Originally housed within the Diocletian Baths in the Minerva Hall, the original Zeiss Model 2 projector has been moved to a place of honor in the exhibit galleries near the new planetarium. The new planetarium theater has been equipped with an RS Cosmos SN 95 star projector and an immersive space system including allskys and panoramas. Among the installations and facilities in the adjacent Astronomical Museum area are two big dioramas, representing the lunar surface and the surface of Jupiter’s moon Europa; a section of a star which visitors can enter to see the inner structure of a star; scale models of the planets and of the moon; 10 multimedia workstations with interactive displays; 35 display cases containing models of satellites and space probes; 15 video monitors, and a bookshop. News reports have indicated that the planetarium has had to expand its hours to facilitate the enormous public response to its programs. Please visit their website to see some great photos of these impressive facilities: http://www.reframe.it/planetario.

Going once, going twice...

Schreder Planetarium in Redding, California, is removing their circa 1979 Viewlex IIB/Minolta MS-8 star projector including control electronics and console. They want to have the projector dismantled and packed for shipping by the end of 2004. Anyone who is interested in bidding on the surplus equipment should contact Brian Grigsby at 530-225-0295 or bgrigsby@shastacoe.org. If you have technical questions you may also contact Curt Dodds at 530-604-3737 or by email at cdodds@simpsonca.edu.

The Bakersfield College Planetarium will be expanding and upgrading its equipment starting in mid-December 2004. They’ll have the Spitz A3P and 7.3-meter Spitz dome installed in 1962-3 and three rows of concentric padded bench seats available for sale mid-December 2004. The A3P has been well-maintained over the past 40+ years (via Spitz and Ash Enterprises) and still has “at least” another 15-20 years of life left. Price for the package $30K + shipping costs. For more details, contact Nick Strobel via email at nstrobel@bakersfieldcollege.edu and keep an eye on their expansion plans at http://www.bakersfieldcollege.edu/planetarium.

Featured Planetariums

GOTO INC of Japan operates two planetariums under its category of Management Services. GOTO is committed to sharing what it is learning from operating these theaters with the rest of the planetarium world. These two facilities provide a wide range of shows and programs to a variety of audiences. The first is the Machida Starhall perched high atop the Tokyo Machida Department Store. Here you can participate in interactive and live planetarium shows as well as summer camps, Christmas shows, and healing shows. Located in Machida city in the western part of Tokyo, the planetarium is equipped with a GOTO G1014-si in a 12-meter dome. In addition to star shows, the Starhall recently served as a backdrop for the filming of a popular Japanese television program. They also held their annual Tanabata Star Festival the weekend of July 3 to 7, 2004. Admission to the festival was free if you were wearing Yukata (informal cotton Kimono). Visitors to the top-of-department store planetarium enjoyed viewing what they would see in the night sky, listening to the story, and writing their wishes on strips of poetry paper in various colors. Back on March 20, 2004, the Starhall hosted a group of media, VIP guests, and invited audience members to witness the premier showing of the Moomins 2 planetarium show. The Moomins are the creation of Finish writer and artist Professor Tove Jansson. Jansson passed away in Helsinki in 2001. Her Moomins stories have been translated into 34 lan-
Did you know...

... about the recent Dome-L thread about emergencies under the dome? It prompted this charming little story about the marvels of the universe under the dome. It comes from Steve Berr, Mid-Atlantic Starlab Sales Representative, “Many years ago when we switched the star lamp from incandescent bulb to arc lamp, promoting our A3 to A3P status, I was proudly showing the new sky to a class of 2nd or 3rd graders. With the stars at their most magnificent, a small voice piped up: “What if the glass breaks?” I immediately thought: “How does this little girl know about the problems that were reported about the arc lamp shattering on some rare occasions?” I quickly reassured her that there was a fish-eye lens over the lamp, and the whole thing was enclosed in metal sphere, so even if the glass broke, it would make a mess, but not be dangerous. She again asked “but what if the glass breaks?” I again reassured her, only to be asked the same question again. Somewhat mystified, not only about what I thought she knew, but that she wasn’t being convinced, I finally asked: “What do you mean?” She then explained. It seems that from her point of view the dome she came in under was mysteriously replaced by a glass dome that revealed the stars in the sky above, and she was worried what would happen if indeed that large glass dome broke! Moral: It isn’t always what you think it is. Listen to questions with the ear of the questioner. Don’t look for sophistication where none exists. Her daddy was not a Spitz technician who brought his problems home, she wasn’t a technological prodigy, she was just a child who was taken in by the wonder that a planetarium produces. The situation was very like the anecdote about the mother who answers the question of “where did I come from” with a long biological discussion, when the correct answer was “You came from Philadelphia, when you were six months old”...

... that Jon U. Bell (Hallstrom Planetarium Director, Indian River Community College, Fort Pierce, Florida) had to leave the IPS Conference in Valencia early to rush home because his wife went into premature labor. Their daughter, Ruth Elizabeth Bell (whom they’ve nicknamed, “Valencia,”) was born at 1:05 pm EDT on Monday 5 July.

... the Danish Astronomical Association (or DAA for short) still has their SPECTACULAR VENUS PASSAGE site available via the internet at http://www.rumnet.dk/8af2774? You can also contact Camilla Bacher (formerly with the Orion Planetarium in Rodding, Denmark) via email at bacher@fysku.dk.

... that while in the process of writing this edition of the column I went looking for some reference to the conference in Valencia. A quick search of “IPS Conference” turned up links to the following IPSs, including the International Pyrotechnics Society, International Proteolysis Society, International Primatology Society, International Pluto Society, and International Publishing Services just to name a few.

... that Evans & Sutherland Computer Corp, and GOTO INC recently announced an agreement for the manufacture of optical components for the forthcoming E&S Digistar 3 Laser Projector. The agreement calls for GOTO to manufacture the optical core for D3 Laser systems sold in Japan, Korea, and Taiwan, with the option of extending into further territories. Under development for the last eight years, the Digistar 3 Laser Projector should be available sometime in 2005.

... that the new Science Fiction Museum and Hall Of Fame has opened at the Experience Music Project in Seattle, Washington. It houses not only Captain Kirk’s chair, but also Robby the Robot, Gort, and R2-D2. They’ve even equipped the museum with a spacey director - none other than Dr. Donna Shirley, formerly with NASA’s Mars Sojourner Rover Mission! They have a long list of links on their “Community Page” and it looks like they’ll include your museum’s website if you send them your URL. Visit their website at http://www.sciencefiction-experience.com and click on the Community Icon to see the extensive list of links to museums and science centers.

... that the GOTO SUPER HELIOS planetarium star projector was recently showcased as an specialty lighting tool for wedding banquets at the Yokohama Prince Hotel in Yokohama, Japan? This one time demonstration was shown to hundreds of potential couples and guests who witnessed a special demonstration of the super high luminosity of the SUPER HELIOS on the ceiling of the hotel’s ballroom! You’ve got to see it to believe it, so visit http://www.gotocom.jp/topics/todayphoto/040707-e.htm. Will this boost the number of requests for planetarium weddings? Stay tuned!

First Ever Gibbous Awards!

There was some talk on the Internet recently about the possibility of creating some sort of awards for planetarium shows. It was pointed out that the Griffith Observatory hands out the Boeing Award for Science Writing, but I thought that since I have the distinction of recognizing all things planetarian for this illustrous publication, that I should also take the time and effort to periodically hand out a few fictitious honors of distinction to those around our field who have excelled in the fields of astronomy and space science or who have provided some kind service no matter how great or how small. So without further ado... The George Jetson Award goes to Burt Rutan’s Scaled Composites and SpaceShipOne for the first private manned space flight! Some amazing pictures can be found at www.scaled.com/projects/tierone/index.htm.

The Giovanni Schiaparelli Award goes to the teams of the Spirit and Opportunity Rovers for their amazing Martian pictures and our whole new understanding of the Martian surface.

The Captain Cook Award goes to The Transit of Venus show, written by Chuck Bueter and Art Klinger and produced in part by a PLATO grant. It was distributed free to GLPA members and made available to others for as little as $15 (if you make your own slides).

The O. Richard Norton Award goes to Steven LJ Russo (Schenectady Museum, Schenectady, New York) for his quick response to a Dome-L inquiry about Walker Constellation Projectors. “Walker Projectronics - A division of the General Metrics Corporation was the ‘staple constellation projector’ for the 20 and 30 foot domes back in the 1970s. They used a GE 605 lamp, which at one time were very rare, but are easily found now. Charlie Walker stopped making ‘projectors’ back around 1984 or so, to put more effort into his hobby of restoring antique pipe organs. The last time I saw him was back in the mid 1990s, when he thought that he would possibly get back into the business filling ‘special orders upon request’ for small portable planetariums. That was the last I heard from him. Here at the Suits-Bueche Planetarium, all of our constellation outlines are Walkers. When we did our renovation, East Coast Control Systems custom made a controller that can operate our Walkers. The result is that we can run up to 12 constellations at a time.” Anyone with info or pictures of Charlie please send them to me at the address at the beginning of the column and I’ll be sure to put them in a
future column.

The Lord of the Rings Award goes to Alan Gould at the Lawrence Hall of Science for his adaptation of the RingWorld show to be audience participation! Get the interactive info from Alan at adgould@comcast.net. With permission from JPL (thanks to Alice Wessen), Alan has posted the adapted script (with audience activities and good questions to ask) on the PASS website http://lhs .berkeley.edu/pass; scroll all the way to the bottom of the page to find the script and activity handouts. Any planetarium may freely use these materials!

The Frank Lloyd Wright Award goes to Claudio Veliz, Architect (http://www.cvarchitect.com). Claudio, can you send me a link to an architecture list serve where I can debate the pros and cons of architecture?

Ground Control to Major Tom,

I’m writing this on the eve of the 35th Anniversary of the

Buzz Aldrin with assembled seismic experiment. Photo ASI
40-5949 from the website www.projectapollo.com Photo Credit: NASA archival photo scanned by Kipp Teague.

Apollo 11 Moon Landing and I can’t help but think about the last time I took the time to celebrated this lunar anniversary. It was with some of you in Cocoa Beach, Florida, at the 1994 IPS Conference. We had just huddled around a telescope on the beach at the Hilton Hotel to catch a glimpse of Jupiter as Comet Shoemaker-Levy 9 was about to give the planet a series of black eyes. And there in the glorious Florida sky was the moon grinning down on us as it has for countless millennia, saying “Hey, I’m still out here waiting for your return.”

Do you have a fond memory you’d like to share of conferences past? Would you like to congratulate a colleague on a job well done? Do you have a picture of some strange old projector or a still from your latest and greatest production? Send them to me at the address above. We would all enjoy sharing in your experiences and marveling at your planetarium creations!

(Mobile continued from page 72)

starfields than any fisheye system for small domes available today.”

Comments: I will have to take her word for it until I can see it for myself. Look for this product at your next meeting and let me know what you think too.

American, French and Spanish “Weeks in Italy” Contest:

Each year Serafino Zani Astronomical Observatory (Lumezzane/Brescia), in collaboration with the IPS Mobile Planetarium Committee and with the support of Learning Technologies, Inc., hosts 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 is provided, along with bed and meals from Monday to Sunday (lunch and dinner Saturday and Sunday, on your own).

Beginning last year a similar yearly experience also involved a French planetarium operator (last year’s winner was Richard Hamou, Marseille Astronomical Observatory) and on the occasion of this year’s IPS Conference, in Valencia, a similar opportuni-

2005 European Meeting for Mobile Planetaria:

The first European Meeting of Itinerant Planetaria was held in 1995 in Brescia (Italy) and the second Meeting was held in 1999 in Strasbourg (France). The third European Meeting will be held in Nantes (France) on May 6-8, 2005 during the National Meeting of the Association of French-Speaking Planetariums (APLF). If you would like to attend and have ideas to share about this initiative or wish to present a workshop or bring equipment to demonstrate please contact Loris Ramponi (info@serafinozani.it or www.bresciaclenzi.it) and me (sbutton@ocmboces.org) as soon as possible.

Signing Off:

It was wonderful to meet in Valencia with friends from around the world and it was inspiring to hear of many creative projects that are experiencing success and to see the latest technology available to our profession. I look forward to reading the Conference Proceedings and to sharing what I discovered with regional organizations this year. Please contact me with follow-up information and tell me how you used what you learned.
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Overhead:
The South Eastern Planetarium Association begins each regional conference with a meeting welcoming new members and first-time conference attendees. Carole Helper gives a welcome speech, and each of the executive committee members introduces him/herself, offering any assistance our newest members may need during the conference. Some add pearls of wisdom, such as Duncan Teague’s remark about planetarians’ eager “shop talk” when we gather:

“There’s only so much your spouse can take, and here you can talk to someone who cares.”

I had inquired of Dave Hostetter if he utilized the Northern Lights planetarium program, volume 13 in the Planetarium Activities for Student Success (PASS) series from the Lawrence Hall of Science in Berkeley, California (see http://www.lawrencehallofscience.org/pass for more details). With a surprised look, he replied, “That show? In Louisiana? The northern lights have been visible twice. The first time was just after the first shuttle launch, and people thought the shuttle caused them. The second time, the sky actually turned red, and people called in a panic that it was The Alien Invasion.”

Planetarians are a resourceful lot. Dave related that when an important special effects projector lamp burned out just before a show, it was discovered that there were no more 12-volt lamp replacements. A quick-thinking staff member sent someone off to the hardware store, while he went out the parking lot, removed the brake light lamp from the Director’s car, and replaced the projector lamp with it. When the show was over, the brake light lamp was returned to the car.

At that same meeting, radio astronomer Mark Whittle shared files of sound waves gathered from the earliest days of the universe. “I wanted to know how the sound got started,” he said. “And I know what you’re all thinking: Well, duh, it was a BANG.”

Many of us enjoyed the transit of Venus this past June. As your stories about that event arrive, I’ll include them in this column. Gene Zajac was kind enough to describe the transit from Shaker Heights High School in Ohio. East coast U.S. observers caught the transit as the sun rose, sometimes through morning mist.

“The haze lasted much longer than I expected as the funnel viewers did not work until 6:30 AM. Same for the telescopes. Then it all came together. One teacher from my high school had a particularly great time. Jane Ulrich teaches Latin at my high school and I had done special programs for her about early views of the universe and early Greek philosophers. She stayed the entire time, until 7:15 AM. She came to me later that day, at 4 PM, in the planetarium. I was headed home, but she wanted to share a thought.

“She started by talking about a trip she was on with her Latin students to Rome a number of years ago. They were in Rome and some students wanted to go to the vespers service. Jane is not Roman Catholic but decided she would take them. As they neared the area she noticed how the crowd kept growing. People grew very quiet and then she discovered the reason for the large crowd. The Pope was doing the service. They were 10 feet away from him. One of her fondest memories was being there and feeling the soft breeze on her back as she savored the moment.

“Tears welled in her eyes while stupid me was wondering what the point was. She said, “Today I was on the hill with the gentle breeze blowing on my back. You and Kelly (Jons) had all these people excited about what we were seeing. I felt the same chill I did back in Rome. Thank you!”

“Jane added a wonderful memory into my life with her words. I found a picture of her in the pictures Rob Sylak took for me. She is all smiles with her hair blowing in the wind.

“What will be remembered is not the facts but that feeling one had. My first planetarium experiences had two slide projectors and the star machine. Kids returning entered wide-eyed and having on their lips the question I hear most, “Do you remember me?” With that question they are wondering, because they do remember us and their past experience.

“I will remember Jane. Years from now we may meet after we have both retired from Shaker. She may walk up during a welcome-back celebration Shaker has for the retirees. If she asks me the question, I will say, ‘Carpe Solem!’

“Don’t we have the coolest jobs?”

George Fleenor, of Bradenton, Florida, USA, captured this image of the transit of Venus on June 8, 2004, with a Nikon D100, two-second exposure at 900 mm.

Ninth Annual Boeing Writing Contest

The Griffith Observatory, in the interest of stimulating the flow of information between scientists, science writers, and the public, proudly announces the sponsorship by Boeing of an annual offering of awards for the best articles in astronomy, astrophysics, and space science.

Awards will be made on March 15, 2005, for the articles which best communicate to the average reader, material of current or historical interest in astronomy, astrophysics, and space science. The first prize is $1,000. Entries must be postmarked by December 31, 2004.

Address all articles to

Awards Committee
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