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## Dr. Julie Lutz Will Discuss Planetary Nebulae and Their Relationship to Late-Stage Stellar Evolution



stage of late evolution in which the star is blowing away its entire outer envelope. The Ring Nebula in Lyra, familiar to many of us with small telescopes, is perhaps the most famous example.

Dr. Julie Lutz is currently serving as Director of the Division of Astronomical Sciences at the National Science Foundation. She is usually at Washington State University where she is professor of Astronomy and Director of the Planetarium. At present she also holds office as President of the Astronomical Society of the Pacific, an organization of astronomers with over 6000 members in approximately 70 countries and is thus one of the largest astronomy groups in the world. She is an enthusiastic observer, making frequent use of telescopes in both the northern and southern hemispheres in carrying out her research. Dr. Lutz also has a strong interest in astronomy education, developing and co-teaching an innovative science course for university students who are planning to become teachers. She has been active in the American Astronomical Society both on its Publications Board and in the Shapley Lecture Program and has served on several committees dealing with the status of astronomy in the United States. We look forward to welcoming her at our October meeting

The October 5 meeting of National Capital Astronomers will be addressed by Dr. Julie Lutz on the subject "My Adventures with Planetary Nebulae". Planetary Nebulae, so named because they resemble planets when viewed through a small telescope, appear as faint greenish disks or smoke rings around certain faint stars. These stars are undergoing a rapid

### September Calendar..... *The Public is Welcome*

Saturday, October 5, 7:30 pm - NCA Monthly Meeting will be held in the Bunim Room at the National Institutes of Health.  
For directions refer to map and description on inside back page.

N.C.A. has reserved space at Frascati's Restaurant in Bethesda for those who would like to have dinner with the speaker before the meeting. Reservations are for 5:30 Sharp!

For directions refer to map and description on inside back page.

**Sunday evening, October 6-7, 5:30 pm to dawn - OPEN HOUSE AT THE HOPEWELL CORPORATION OBSERVATORY**

NCA members, families, and guests are invited to the autumn open house at Hopewell Observatory on Sunday evening October 6-7 to view the fall sky and Saturn, Uranus, and Neptune. Sunset will be at 6:46 and twilight will end an hour and a half later. Come earlier if you wish (any time after 5:30 pm) and bring your prepared picnic dinner. Coffee, tea, cocoa, and soft drinks will be provided by the Hopewell Corporation.

**Directions:** From the Beltway (I-495) go west on I-66 25 miles to Exit 9 at Haymarket onto U.S. 15. Go left on 15 0.3 mile to traffic light, right onto Va. 55, 0.8 mile to Antioch Road (Co. Rt. 681). Go right on 681, 3.2 miles to end, left on Waterfall Road (601) 1 mile to County road 629. Right on 629 0.9 mile to narrow paved road at right with orange pipe gate. (Directly across from an entrance gate with stone facing on left.) Turn right, go 0.3 mile to top of ridge, around the microwave station and continue on dirt road through woods a few hundred feet to the observatory. Park along the road short of the buildings. The event will be cancelled if it is raining or hopelessly cloudy. For further information call (703) 960-9126 or (301) 320-3621.

**Friday, October 11, 18, 25, 8:30 pm - NCA 14-inch telescope open nights with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at (703) 960-9126. Saturn will be the featured object on the 11th, and Saturn and the Moon will be featured on the 18th.**

**Tuesday, October 1, 8, 15, 22 7:30 pm - Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, (202) 362-8872.**

**Friday, October 11, 18, 25, 7:30 pm - Telescope-making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, (202) 362-8872.**

**Saturday, October 12 at 7:30 pm, and November 9 at 7:30 pm - Exploring the Sky at Rock Creek Park, on Glover Rd. NW, near the Nature Center. For further information call John Lohman at (703)820-4194 (Arlington).**

**1991-1992 Speaker Schedule:** As part of its program for the coming year National Capital Astronomers has arranged talks covering a wide variety of astronomical subjects. Note the dates of the following events so that you can be sure of attending and tell your friends.

- **October 5:** Julie Lutz (National Science Foundation) "Planetary Nebulae."
- **November 2:** Alan Boss (Carnegie Institution of Washington) "The Origin of the Moon".
- **December 7:** Gregory Paul (author) "Computers, Robotics and Space Travel".
- **January 4:** Maurice Shapiro (NASA) "How Cosmic Rays get Started".
- **February 1:** James Zimbleman (National Air and Space Museum) "Geology of Mars".
- **March 7:** Harold Williams (Montgomery College) "The Formation of Stars".
- **June 6:** Presentation of High School Science Fair Awards (preceded by Pizza Party).

## September Lecture

Dr. Richard Kerr, of the journal Science, talked to us on the subject of "What Killed the Dinosaurs?" at the September meeting in the National Institutes of Health.

Sixty-five million years ago, the Cretaceous age ended and the Tertiary began. Seventy percent of the species that lived in the Cretaceous era became extinct. The domination of the dinosaurs ended and that of mammals began. The question of whether or not this extinction was gradual, over millions of years, or sudden, within a few thousands of years, and what role,

if any, an impact by an extra-terrestrial object played in that extinction has been discussed for the last decade. To Dr. Kerr, the consideration of the role of impacts on the evolution of life on Earth has been the most exciting development in Earth sciences since plate tectonics in the 1960's.

In the 60's, geologists and astronomers argued over whether the craters on the Moon were caused by volcanic activity or by impacts from solar objects. When mankind flew missions to observe the other planets and their satellites, it was discovered that cratering was

very common throughout the solar system. We then realized that these craters were caused by impacts. Searches were made to find remains of impact craters on the Earth, and Dr. Kerr showed us a map of the locations of approximately 120 craters with known locations around the world. The smallest crater is 11 meters, located in Kansas. The largest is in South Africa, 130 kilometers in diameter. Cratering, we now know, is pervasive and inevitable for solar system objects.

Walter Alvarez, Luis Alvarez, Frank Asaro and Helen Michael were measuring the clay layer between the Cretaceous and Tertiary (known of the K-T boundary) from a site in Gubbio, Italy, to try to determine how long it took for sedimentation to deposit that clay. They measured the iridium in the layer, thinking that this would give a measure of how much material had been deposited by micrometeorites. Iridium is not commonly found in terrestrial materials, so they assumed that, if they found iridium, its origin would have been extraterrestrial. The more iridium, the longer that layer of clay had been receiving deposits from micrometeorites. They found instead much too much iridium to explain from such a slow deposit process. The rocks above and below the K-T boundary did not have such anomalous concentrations of iridium.

Further analysis showed that the K-T boundary composition was similar to that of chondritic meteorites. Continued analysis of K-T boundary layers from around the world (more than 125 sites) has found enriched iridium and chemistry similar to chondrites. In addition, millimeter and sub-millimeter sized spherules of clay-like materials have been found. These are thought to be the products of impact, from molten material thrown into the sky to be deposited miles from the impact location.

The impact of a 10 kilometer asteroid with the Earth would make a crater about 30 kilometers deep and 175 kilometers across. It would create a global disaster. Tidal waves several kilometers high from such an impact would sweep around the world. Other global effects would follow quickly. The material thrown into the sky would block the Sun for months, making it dark and cold, and then warm as the greenhouse effect became dominant. Huge fires ignited by the impact would generate pyrotoxins, dioxin, and acid rain. Plants would die, so the plant-eating animals would die, which would lead to the death of carnivores.

The theory that the K-T boundary was marked by an impact of an extra-terrestrial object was not accepted well at first. Alternate theories to explain the clay composition were suggested. In particular, one theory was that a huge volcanic eruption was responsible for the iridium

anomaly. However, further investigation found evidence of shock and stress fractures in microscopic quartz crystals from these K-T boundary materials. These were not present in quartz crystals from volcanic materials. Also, very recently, small diamonds similar to those found in chondrites have been found in the K-T boundary. The evidence for a large impact seems very strong.

Another interesting concept was the idea that mass extinctions occur about every 26 million years, and perhaps each was caused by an impact. A theory was proposed that the Sun has a faint companion in a highly eccentric orbit that causes the extinctions by passing through the Ort cloud of comets every 26 million years. Although a search is underway for Nemesis, a small solar companion could not stay in such an orbit because gravitation perturbations from other stars would make the configuration unstable. The companion would not stay, but would leave the Sun's neighborhood.

Not all of the other extinctions have been as sudden as the one at the K-T boundary. Some have been gradual. Also, there is a lot of evidence for an impact at the K-T boundary, but not as much at other boundaries.

Small life forms that became extinct at the end of the Cretaceous era have been found to within a few centimeters below the K-T boundary. Since dinosaurs are large, and relatively few remains are found, it is difficult to determine exactly when they became extinct. Were they present in large numbers right up to the K-T boundary, or were they already nearly extinct, and the impact the final blow? Volunteers from the Milwaukee Public Museum have mounted a campaign to see how close to the boundary remains can be found. Their success would indicate that, the more one looks, the more one finds. The dinosaurs were likely to have been present in number and variety up to the K-T boundary.

Where is the crater? A candidate was found in Manson, Iowa, 26 km across. This was discovered when drilling wells for water. The crater is completely covered by sediments and not observable from above ground. The materials are of the right time, but the crater seems a little small.

About 10 years ago, a geologist with Pemex found a crater off the coast of Yucatan, not too far from Cancun. It was not until a newspaper reporter heard of a search for a larger crater than the Iowa one being conducted in the Caribbean that the importance of the Yucatan crater was realized. This crater, the Chicxulub Crater, is 180 km in diameter. It is not yet dated, but work is underway.

It is not at all improbable that two (or even more) impacts would occur about the same time. A comet passing near the Sun, for example, may be disrupted into two or more pieces which could be traveling near one another when impacting the Earth.

To show us the power of an impact, Dr. Kerr displayed a photograph of the Tunguska area after the impact. Trees were felled in a 1600 square-kilometer region of Siberia from what is thought to be a 30 meter chunk that exploded before it hit the Earth. Such a rock may impact

the Earth about every 2000 years. Fortunately, even now, there is lots of open space for such a rock to hit, but this is not something one would want to land in the back yard.

A large impact, large enough to wipe out civilization, is rare but inevitable within the life of the Earth. Whether or not we can take note of such a potential disaster in these tumultuous times remains to be seen, but perhaps we can take a lesson from the dinosaurs

Joan Bixby Dunham

## Occultation Expeditions Planned

Dr. David Dunham is organizing observers for the following occultations. For further information call the IOTA information line (301) 474-4945 (Greenbelt, MD).

Date	Time	Locality	Visible Magnitude	Percent Sunlight	Cusp Angle	Minimum Aperture
<i>Grazing Lunar:</i>	EDT					
Oct. 2	04:29	Fairfax VA, Largo MD	7.9	34	2S	20 cm
<i>Asteroidal:</i>	Time	Locality	Star Mag.	Delta Mag.	Name	Aperture
Oct. 15	01:34	Carolinas**	8.4	2.5(44)	Nysa	5 cm
Oct. 29	22:54*	VA, DC, MD	12.5	0.4	(704)Interamnia	25 cm
Nov. 1	01:44*	Labrador**	9.1	3.2	(386) Siegena	5 cm

\* EST, \*\* Appulse to be observed for possible satellites or path shift. Observers should obtain a finder chart from Dunham or IOTA.

## Excerpts from the IAU Circulars

R.N. Bolster

- 1. August 2** - Astronomers from the Paris Observatory, University of Hawaii, and the Joint Astronomy Center detected CO and HCN in the atmosphere of Neptune. CO emission at 345.8 GHz was detected in May with the James Clerk Maxwell telescope and at 230.5 GHz in June with the Caltech Submillimeter Observatory on Mauna Kea. HCN was detected at 354.5 GHz in August with the latter instrument.
- 2. August 3** - R.H. McNaught and K.S. Russell, Anglo-Australian Observatory, discovered a comet (1991v) of 17th magnitude in Telescopium with the U.K. Schmidt Telescope at Siding Springs.
- 3. August 31** - Gonzalez, Kidger, Rodriguez, and Barrera, Agrupacion Astronomica de Tenerife, detected a splitting of the North Equatorial Belt on Saturn using the 51-cm telescope at Teide Observatory. They also reported that the Equatorial Zone had decreased in brightness.
- 4. September 3** - McNaught and Russell discovered another comet (1991w) of 18th magnitude in Aquarius. The orbital elements by Marsden indicate a near-record perihelion distance of 7.1 AU.

## Astronomy and Personal Computers

Joan Bixby Dunham

New Product Development:

What makes a new product sell? There are many software developers who would like to know. I know of several people who have written what seems like a very good product that must be useful to someone, but just don't have much success in selling their software? Why is

that? It is not always obvious. For many of us, "success" means that we sell enough to break even. In fact, we may define "breaking even" as "making more money than we spend duplicating disks and mailing costs" and leave out the many hours of labor spent making the program run. It would be nice to write the software equivalent of

the hula-hoop, but most of us do not expect that type of popularity, especially from software for astronomy.

Sometimes, though, we can see that a product is a sure-fire failure, and we wonder at the capacity for self-delusion of developers, and sometimes of large companies. I saw an example recently, being offered by Kodak. They are planning to offer a service of copying prints and slides to CD's, 100 pictures per CD. The pictures could be displayed on a TV, or manipulated on a PC, where manipulation was defined as zooming or cropping. I think that it would be very nice to be able to make my own color prints without the mess and inconvenience of using a darkroom. This would be particularly nice for astronomical subjects, which are often misunderstood by commercial processors. But that is not what Kodak is planning to offer. In fact, hard-copy output was never mentioned. The Washington Post writer remarked that customers would think that 100 prints per CD was not enough for the expense. I think they are likely to complain that, if they wanted to show pictures on the TV, they would have used a video camera. The resolution of a TV is not nearly as good as that in a print (high definition TV will be better, but still not as good), and, without the motion of the subjects from a video image, the poor resolution becomes quite obvious.

Star Catalogs on a PC: Why aren't star catalogs distributed as databases? I proposed that a star catalog needed for a spacecraft mission be created and maintained as a database, using database software. We will be doing that, but I am somewhat surprised that no star catalog seems to be available in that form. It is trivial to

convert small catalogs (several thousand stars or less) to a database format, and I have done it several times. All that is necessary is to define a database with fields that match exactly the lengths of the formatted records on an electronic version of the star catalog. If the right ascension, for example, takes 10 characters to give, then the field is defined to be 10 characters long. The database software is commanded to ingest the star catalog data as a "flat file" input format. In some databases, this is called "importing". In others, the command is called "append". The file format is sometimes described as word processor output, with a record per entry that ends with a carriage return.

Once the star catalog is in a database, it can be sorted, fields of data may be added (or deleted) for each entry, and new star data can be entered. In the case of the star catalog for which I am familiar, we also will need to prepare the macros to extract information used in a fixed file format by other pieces of software. If experience shows that there are good reasons why star catalogs are not distributed in database format, I will report on that. But I suspect the reason why they have not been distributed this way in the past is just inertia. One of my co-workers suggested that perhaps the reason has been the slowness of response of the database to inquiries. That may have been true with older machines, but that is not a problem on a 386 with a large and fast hard disk. I would be very surprised if any of the catalog retrieval and maintenance takes longer with a database program than it would take to write and debug special purpose software for data retrieval or file update.

## New Members

Susan Fox  
6821 Jackson Ave.  
Falls Church, VA 22042

Frank & Pamela McAllister  
36 Thrush Rd.  
Sterling, VA 22170

## Montgomery County Planetarium Schedule

**Saturday, October 5, 7:00 pm** - Montgomery College's 1991 Eclipse Expedition.

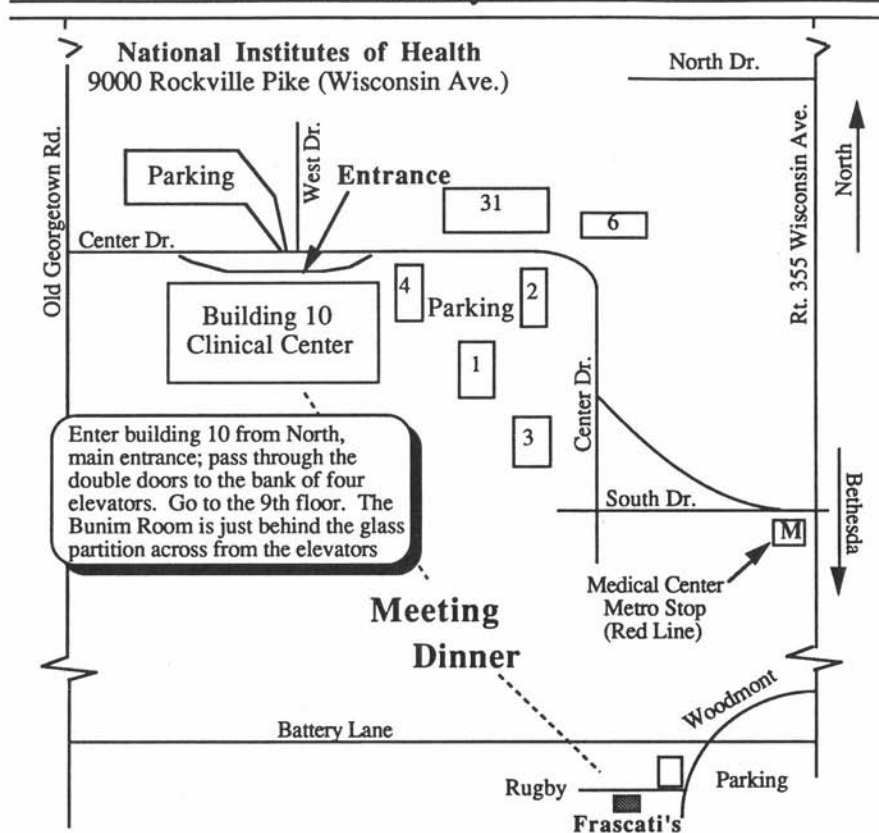
**Saturday, November 16, 7:00 pm** - Uncovering the Stars, Cleaning Up Light Pollution.

**Sunday, December 22, 7:00 pm** - The Day of the Sun's Return, the Winter Solstice.

For information contact: Dr. Harold Williams, Planetarium Director,  
Phone No. 301-650-1463 (Office), 301-942-1014 (Home)

## Getting to the October NCA Monthly Meeting

- - I 495 Beltway - -



•Subway Riders - From the Medical Center Metro: Walk down the hill, pass the bus stops and turn right at the anchor (onto Center Dr.). Continue uphill to building 10, the largest building on campus.

•To Frascati's: Proceed down Wisconsin Ave. toward Bethesda bear right onto Woodmont (or the next right onto Battery La.), follow Woodmont across Battery, take a right onto Rugby and park. The restaurant will not guarantee seats after 5:30.

# National Capital Astronomers, Inc.

is a non-profit, public-service corporation for advancement of the astronomical sciences and is the astronomy affiliate of the Washington Academy of Sciences. For information, call NCA: (301) 320-3621.

## SERVICES AND ACTIVITIES:

**A Forum** for dissemination of the status and results of current work by scientists at the horizons of their fields is provided through the monthly NCA Meeting. ( See monthly *Stardust* for time and location.) All interested persons are welcome; there is no charge.

**Expeditions** frequently go to many parts of the world to acquire observational data from occultations and eclipses which contribute significantly to refinement of orbital parameters, the coordinate system, navigation tables and timekeeping. Other results of this work under continuing study include the discovery of apparent satellites of some asteroids, discovery of apparent small variations in the solar radius, and profiles of asteroids.

**Discussion Groups** provide opportunities for participants to exchange information, ideas, and questions on preselected topics, moderated by a member or guest expert.

**Publications** received by members include *Sky & Telescope* magazine and the monthly publication of NCA, *Stardust*.

**The NCA Public Information Service** answers many astronomy-related questions, provides predictions of the paths and times of eclipses and occultations, schedules of expeditions and resulting data, assistance in developing programs, and locating references.

**The Telescope Selection, Use, and Care Seminar**, held annually in November, offers the public guidance for those contemplating the acquisition of a first telescope, and dispels the many common misconceptions which often leads to disappointment.

**Working Groups** support areas such as computer science and software, photographic materials and techniques, instrumentation, and others.

**Telescope-Making Classes** teach the student to grind and polish, by hand, the precise optical surface that becomes the heart of a fine astronomical telescope.

**NCA Travel** offers occasional tours, local and world-wide, to observatories, laboratories, and other points of interest. NCA sponsored tours for comet Halley to many parts of the southern hemisphere.

**Discounts** are available to members on many publications and other astronomical items.

**Public Programs** are offered jointly with the National Park Service, the Smithsonian Institution, the U.S. Naval Observatory, and others.

### PLEASE ENROLL ME IN NATIONAL CAPITAL ASTRONOMERS MEMBERSHIP

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If family membership, list names of additional participating immediate family members in same household, with birthdates of all those under 18 years old: \_\_\_\_\_

**Note:** If you already subscribe to *Sky & Telescope*, please attach a recent mail label, or indicate the expiration date: \_\_\_\_\_. A prorated adjustment will be made. Make check payable to National Capital Astronomers, Inc., and send with this form to:

Leith Holloway 10500 Rockville Pike Apmt. M-10, Rockville, MD 20852.

The following information is optional. Please indicate briefly any special interests, skills, vocation, education, experience, or other qualifications which you might contribute to NCA

Thank you, and welcome!

\_\_\_\_\_

## FOR SALE

Celestron 750mm f/6 telephoto lens/telescope. Schmidt-Cassegrain in excellent condition. Everything original, special coatings, lens caps, case, plastic liner, tripod adapter. Big, bright photos at immense distances. Ideal for observing from a vehicle. \$600 or best offer.

Call 301-585-5711 or write Walter I. Nissen, Jr, CDP, 8101 Eastern AV #202, Silver Spring, MD 20910 or leave message on NOVAC BSS 703-256-4777.

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