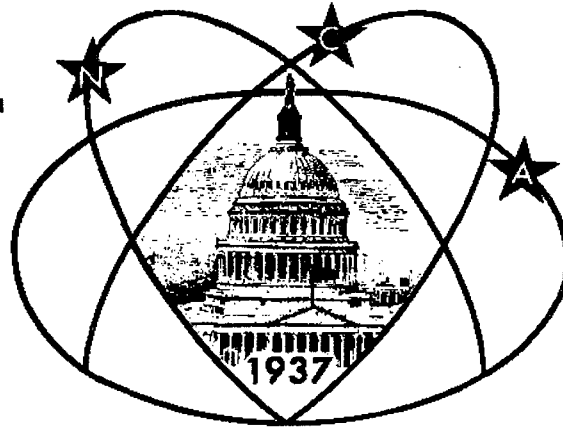


Star



Dust

National Capital Astronomers, Inc.

Phone: 301/320-3621

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Casey Lisse to speak on Comets

by Harold Williams

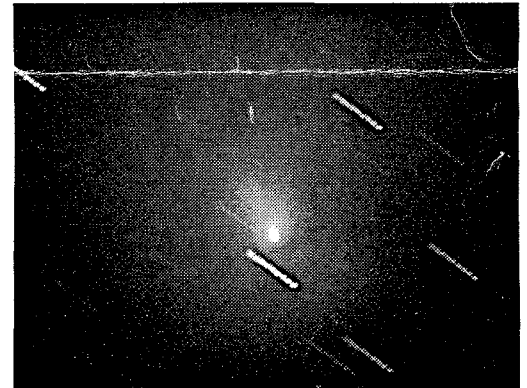
The next meeting of the National Capital Astronomers will be held Saturday, May 4, at 7:30 P.M. in the Lipsett Amphitheater of the Clinical Center (Building 10) at the National Institutes of Health (NIH). Casey Lisse, a research associate in the Astronomy Department at the University of Maryland's College Park campus, will speak about comets. Casey got his B.A. in chemistry from Princeton University, an M.S. in chemistry from the University of California at Berkeley, and an M.S. and Ph.D. in Physics from the University of Maryland. His Ph.D. dissertation was on "Infrared Observations of Cometary Dust by COBE," and his advisor was Michael A'Hearn, an NCA member.

Casey has been very busy observing C/1996 B2, Hyakutake, in every wave band available from sites all over the planet. His web page (<http://www.astro.umd.edu/~lisse/>) which is accessible from NCA's web page has information on DIRBE (Diffuse Infrared Background Explorer) observations of Comets OLR, Austin, Levy, and P/SW-3; dynamical and spectrophotometric modeling of P/SL-9 dust before Jovian impact, DIRBE observations of asteroids, ISO (Infrared Space Observatory) of ESA (European Space Agency) observations of dust in periodic comets.

I know from press releases of NRAO (National Radio Astronomy Observatory) that Casey lead a team using the VLA (Very Large Array) to detect thermally-generated radio emis-

sion from the comet hoping that variations in the radio brightness would allow determination of its rotation period. I know from the Washington Post that Casey lead a group that detected X-rays from the comet using the ROSAT satellite, plus I have seen these images on the web. From a DPS (Division of Planetary Sciences) e-mail to members I know that Casey observed using NASA/IRTF telescope on Mauna Kea. Some of these images from the web were showed briefly last month. It will be nice to see them in context by someone who actually took them and understands their significance. They are beautiful images.

Most of what we know about comets have been learned from a few bright comets that have passed close to the Earth. Casey's talk should increase everyone's knowledge about *Comets!*



Comet Hale-Bopp, ESO 3.5 meter (140 inch) New Technology Telescope, March 20, 1996

NCA Officer Nominations

The nominating committee, consisting of Jay Miller, John Graham, and Wayne Warren, has selected the following slate of nominees for positions as officers of the National Capital Astronomers for the 1996-1997 year. As is customary, elections will be held at the May meeting.

President:
Vice President:
Secretary:
Treasurer:
Audio-Visual Engineer:
Trustee:

Dr. Harold A. Williams
Andrew W. Seacord
Leith Holloway
Jeffrey B. Norman
Caleb Fassett
Robert N. Bolster

Trustees whose terms do not expire this year are: Nancy Byrd, John Graham, and Jay Miller. ☀

Calendar of Monthly Events

The Public is Welcome!

Daily—The Smithsonian Institution, National Air and Space Museum (NASM) Einstein Planetarium events. See page 6 for details. Recorded information (call anytime): 202/357-1550, or 202/357-1686.

Mondays through Saturdays, 11:30 AM & 2:30 PM—Goddard Space Flight Center (GSFC-Greenbelt, MD) guided walking tours. Start at Visitors Center. Details & Directions: 301/286-8981 (TDD 301/286-8103).

Wednesday, May 1—May "Sky Watch" column appears in *The Washington Post* "Style" section. It lists many events for that month.

Friday, May 3, 6:00 PM to 9:00 PM—Howard B. Owen Science Center Open House. Includes Planetarium, & Challenger Learning Center, Lanham, MD. Details & Directions 301/918-8750.

Fridays, May 3, 10, 17, and 24, 9:30 PM—NCA's Celestron-14 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.

Saturday, May 4, 5:30 PM—Dinner with our speaker will take place at Bombay Dining Indian Restaurant 4931 Cordell Avenue, Bethesda, MD., before the monthly meeting. We will start ordering at 5:30 PM. See the map on the back page for directions.

Saturday, May 4, 7:30 PM—The May NCA meeting will feature Casey Lisse speaking on "Comets." The meeting will take place at NIH in the Lipsett Auditorium in Clinical Center (Building 10).

Sunday, May 5 and Monday, May 20, 9:00 PM—University of Maryland (College Park, MD) Observatory open house. Includes slide show/lecture and viewing through telescopes. Held regardless of cloud cover. Details & Directions: 301/405-3001

Mondays, May 6, 13, and 20, 8:30 PM—U.S. Naval Observatory (USNO - Washington, DC) public nights. Includes orientation on USNO's mission, viewing of operating atomic clocks, and glimpses through the finest optical telescopes in the National Capital region. Information: USNO Public Affairs Office, 202/762-1438.

Tuesdays, May 7, 14, 21, and 28, 7:00-9:30 PM—Mirror-making classes with Jerry Schnall at the Chevy

Chase Community Center at Connecticut Avenue and McKinley Street, NW in Washington. Information: 202/362-8872.

Thursday, May 9, 8:00 PM—NASM 1996 G. E. Charles Lindbergh Memorial Lecture: Michael Collins (astronaut, *Apollo 11*), "From the Moon to the Mall," Langley Theater. Details & Directions: 202/357-1686.

Saturday, May 11, Night—Waning crescent Moon provides this month's *second longest* Saturday night "deep night" period, with Moon-free skies almost all night long, including between dusk and Midnight EDT. See explanation on page 3.

Saturday, May 18, Night—Waxing crescent Moon provides this month's *longest* Saturday night "deep night" period, with Moon-free skies all night long. See explanation on page 3.

Saturday, May 18, Dusk—(Civil twilight ends around 8:50 PM). Geoff Chester (NASM) presents sky watching at Sky Meadow State Park, near Paris, VA. Information and Directions: Sky Meadow State Park, 703/592-3556; Geoff Chester, 202/357-1529.

Saturday, May 18, 9:00 PM—"NCA and NPS sky watching program: *Exploring the Sky* in Rock Creek Park at Military and Glover Roads, NW. Bring binoculars and telescopes, although some telescopes available (thanks to NCA). NCA volunteers always needed! Details & Directions: Nature Center, 202/426-6829, Joe Morris (NCA), 703/620-0996.

Sunday, Monday, and Tuesday, May 19, 20, and 21, Dusk—Young crescent Moon, with Earthshine, conveniently situated for observation and enjoyment. Easily visible with unaided eye even from light polluted sights. Particularly impressive with the monuments from the Mall. Details: (recording - call on the above dates): 202/357-2000.

Sunday, May 26, 1:00 PM—GSFC public lecture: Tom Watzin (Manager, Small Explorer Project), "The Small Explorer Project," GSFC Visitors Center. Details: 301/286-8981 (TDD 301/286-8103).

Saturday, June 1, 7:30 PM—The June NCA meeting will feature NCA Science Fair Winners and a discussion about how NCA and individual NCA members might become involved in project ASTRO.

Wednesday, June 5—June “Sky Watch” column appears in *The Washington Post* “Style section. It lists many events for that month.

The Calendar’s Saturday “Deep Night” Periods—There is no better place to experience the Universe than at a dark-sky site during “deep night” periods. For many, Saturday nights represent the most convenient times to do that. Several relatively dark-sky sites are available for NCA members’ use in Maryland, Vir-

ginia, and West Virginia. Information: Daniel Costanzo, 703/841-4765. This deep night listing was prepared by Daniel Costanzo and Jay Miller.

Other events too numerous to mention here are listed in the publications *Sky & Telescope*, the *Astronomical Calendar 1996*, the *Observer’s Handbook 1996*, and in numerous software packages. NCA members can purchase all these at a discount. To join NCA, use membership application on page 7.

Superconducting Robotic Telescopes on the Moon

by Harold Williams

On Saturday April 6, 1996 at the National Institutes of Health (NIH) in the Lipsett Amphitheater, Peter Chen spoke to us on “Superconducting Telescopes on the Moon.” He first justified putting a telescope on the Moon; the Moon, as a stable platform, would allow better interferometric measurements than a less-stable orbiting spacecraft could provide. Obviously the dark sky and perfect seeing are advantages that would be shared by any telescope outside the earth’s atmosphere. The synchronized rotation and revolution of the earth’s Moon that keeps one side always facing the earth also makes for unprecedented long observing times. There would be no 24-hour aliases. Telescopes on the Moon have a long and varied history of proposals, but nothing has been realized except George Caruthers’ of NRL (Naval Research Laboratory) ultraviolet telescope used by the *Apollo 17* astronauts. All of these telescopic proposals of the past can be summarized as either pie in the sky that would not have really worked — but made good copy in Sunday supplements in the late sixties or seventies — or they were hideously expensive telescopes of limited scientific use, or both!

With a telescope on the Moon, the long viewing day would require the angular rate of the clock drive to be excruciatingly slow — 0.0004 arc second/second or with a typical gear 1 micrometer/second. There is just no way you can turn something this slow without friction with any known lubricant. When the telescope finally moves, it will jump. Peter demonstrated the solution to this problem by

levitating a piece of high-temperature superconductor (made at The Catholic University of America) with a magnet and some liquid nitrogen. Without anything touching, you can evidently design slow rotation without friction. This was an impressive demonstration of the Meisner superconductivity effect, in which a superconductivity sample excludes the magnetic field by levitating. Incidentally, on the Moon at night the temperatures reach liquid-nitrogen temperatures, so no energy need be expended in cooling.

Besides the friction problem, ultralight optics need to be developed, or launch cost would eat you alive. If you think about a typical large telescope on the earth what is the glass in the mirror really used for? The glass in the mirror typically is 290 tons (263,000 kilograms), and is present only to let you point the reflective surface, which is only 11 grams (.024 pounds) of aluminum. Stated that way, modern telescope design sounds sort of silly. The key is to produce thin surfaces by replication on an inverse surface with a graphite resin. Peter passed around a remarkably light but stiff, strong mirror made out of this graphite resin. The problem of the graphite fibers’ bleeding through and ruining the surface has been solved by an obviously proprietary materials-handling trick. This ultralight mirror has spin-offs for the rest of us, not just for lunar telescopes. The reason 1-meter (39 inch) telescopes cannot fit in the back of your van is the weight of the 1-meter mirror and all the stuff that it takes to haul and turn around such a heavy glass mirror. All of that changes with a cheap ultralight mirror. How would you

like to observe an occultation or just see a beautiful nebulae with your own portable 1-meter telescope that you could put in your van and take to a dark sky sight? I sure know that I would love to do this. Peter brought an ultralight 0.2 meter (8-inch) mirror in a telescopic enclosure to demonstrate some of the possibilities. This telescope could be lifted with your little finger. This program was real hands-on and minds-on science. Peter showed how light these optics were by showing us some charming pictures of his daughter, a kitten, and the ultralight telescope.

With superconducting bearings, an ultralight 1-meter telescope with a field of view of 100 arc seconds comes in at 20 kilograms (44 pounds), and with everything else only 120 kilograms (264 pounds), with a price tag of only thirty million dollars with a Pegasus or Taurus launch vehicle to the moon. Thirty million is within NASA new Small Explorer Class (SMEX) mission parameters. If NASA doesn’t come through, Peter intimated that maybe commercial concerns could be used to finance the telescope. Evidently when McDonald’s runs a movie tie-in publicity campaign it cost them around one SMEX in cost. Peter, being an employee of the Computer Science Corporation, a private commercial company, clearly has the entrepreneurial spirit. Besides impressing us with his hands-on talk, NCA must have impressed Peter Chen. He has now joined NCA as a new member!

As usual, we are indebted to NIH and NCA member Jay Miller for arranging to meet at NIH, where he works.



Study-Tour: Summer Escape to Blackwater Falls, WV

by Daniel Costanzo

This July, trade Washington's heat and humidity for the cool highlands and dark skies of wild and wonderful West Virginia on The Smithsonian Associates (TSA) three-day weekend study-tour devoted to naturalist and astronomy activities. It will be led by myself, and my colleague Rob Gibbs. It features a stay in Blackwater Falls State Park's rustic lodge, spectacularly situated on the rim of the Blackwater River canyon, sometimes called the Grand Canyon of the East. Also included are other natural wonders of West Virginia's Potomac Highland region, plus nature walks led by Rob, along with yours truly conducting a discussion of landforms, plus doing evening astronomy observation (if weather permits).

On Friday, July 12, we sojourn westward by bus from Washington, D.C. (the downtown Mayflower Hotel, with an additional pick up at the Vienna Metrorail Station). The trip out (and back too) offers a chance to see a spectacular slice of eastern North America's wonderful landforms, from coastal plain to highland. Points of interest will be highlighted along the way. Since I am much more an astronomer than a geomorphologist, I will be interpreting landforms with a cosmic twist, showing their connection to what many call a living Universe — the overall theme of this study-tour. (For instance, did you know that if all the carbonate rocks in the World's limestone formations, e.g., the Shenandoah Valley, suddenly released all their bound up carbon dioxide into the atmosphere, then Planet Earth would soon become another planet Venus? Well now you do.) Rob will also interpret flora and fauna as we traverse different ecological zones.

We stop for lunch in the Panorama Restaurant at the top of the Blue Ridge Mountains in the Shenandoah National Park. After crossing numerous spectacular ridges, we will be deep in the Appalachian Mountains, and visit Seneca Rocks. This formation, rising vertically from the valley floor higher than the Washington Monument, is inter-

preted by exhibits at the visitors center near its base.

By late Friday afternoon we arrive at the lodge, settle in, and have a buffet dinner in a dining room providing a spectacular canyon vista from its windows. Following that, those wishing to will be able to do an evening nature walk or observation of the night sky (if visible). To maximize Moon-free time, this weekend occurs near New Moon, offering (weather permitting) a chance to experience some of Eastern North America's few remaining relatively dark-sky sites. Small telescopes will be available for viewing both star clusters and nebulas in the magnificent rising Milky Way. Meteors, artificial satellites, the planet Jupiter, and stars of interest will also be viewed. This will hopefully amply demonstrate Earth's place in the Cosmos. If weather curtails observation, then an astronomical lecture may be given in the Lodge, and a nocturnal nature walk may be conducted.

Saturday morning (July 13) begins with some optional pre-breakfast bird watching, followed later in the morning by more nature walks in the park's lovely wooded areas along trails to Elakala and Blackwater Falls. This gives ample opportunity to view the falls' amber-colored waters noisily plunging several stories, then twisting and tumbling down the canyon's walls. After lunch in the lodge, we travel north to two nearby state parks. The first one protects the Fairfax Stone, which marked the western boundary of the land granted to Lord Fairfax, and is near the Potomac River's source. The second, Cathedral State Park, protects one of North America's last and most accessible stands of ancient giant hemlocks, some of which measure ten feet or more in diameter. Returning to the lodge by evening, we enjoy a traditional barbecue dinner followed by my giving the Park's Saturday evening public lecture on the Universe and dark sky preservation. Besides the wonders in the sky, the environmental degradations of light pollu-

tion, and the need to protect — as natural treasures — dark-sky sites like Blackwater Falls, will be discussed and demonstrated. Come dark, more optional night sky observation will be conducted (if weather permits).

Sunday (July 14) begins again with optional pre-breakfast bird watching, followed by a mid-morning departure from the lodge. A stop is made to take a boardwalk nature trail through a unique wetland in Canaan Valley. Another stop tours Smoke Hole Caverns, where we also eat bag lunches catered by the lodge. (This part of West Virginia is one of the World's premier caving areas.) Finally, we visit the area where Lost River mysteriously disappears into the ground. We plan on arriving back in Washington, D.C. by late afternoon.

The total cost is \$335 for TSA members, and \$447 for general admission (i.e. for non-TSA members). And this price is quite reasonable, considering it covers a three-day trip and includes everything from the bus, to lodging, to entrance fees, to all meals except breakfasts. To register, sign up for "Summer Escape to Blackwater Falls,

See *STUDY TOUR* page 5

Newsletter Deadline for June *Star Dust* MAY 15, 1996

*** DO NOT BE LATE!!! ***

We need everyone to work together. Please send your submissions in on time so that all NCA members will receive newsletters on time. Send your submissions to Gary & Alisa Joaquin, at 7821 Winona Ct., Annandale, VA, 22003. Leave a message on voice mail 703/750-1636 or send an ASCII file via e-mail at our **NEW** address: ajglj@erols.com. You can still continue to fax to 703/658-2233. We now have a modem on both our Mac and PC to receive information more easily. Submissions must be on time or they may not get in.

STUDY TOUR, from page 4

WV" (Code: 11N-2ZZ) by phone at (202) 357-4700 or (202) 357-3030; or by fax at (202) 786-2034; or by "snail mail" at The Smithsonian Associates, Smithsonian Institution, Department 0603, Washington, D.C. 20073-0603; or by the TSA Home Page on the World Wide Web at <http://www.si.edu/youandsi/tsa/start.htm>

In 1993, it was Sue Bassett's NCA "Dark-Sky Observing/National Radio Astronomy Observatory Tour" that introduced me to the wonders of Blackwater Falls, and gave me the original idea for these study-tours. This one is the third study-tour that Rob and I will have conducted. So we have some experience in doing this. As you consider going, please keep in mind that we sally forth "clouds or no," as I like to say. Rob and I have designed this trip to provide a delightful experience of West Virginia's phenomenal natural beauty whether the skies are crystal-clear or cloudy-rainy. But when skies are cloud-free, Blackwater Falls' nighttime vista on the Universe is spectacular. Come join us. ☼

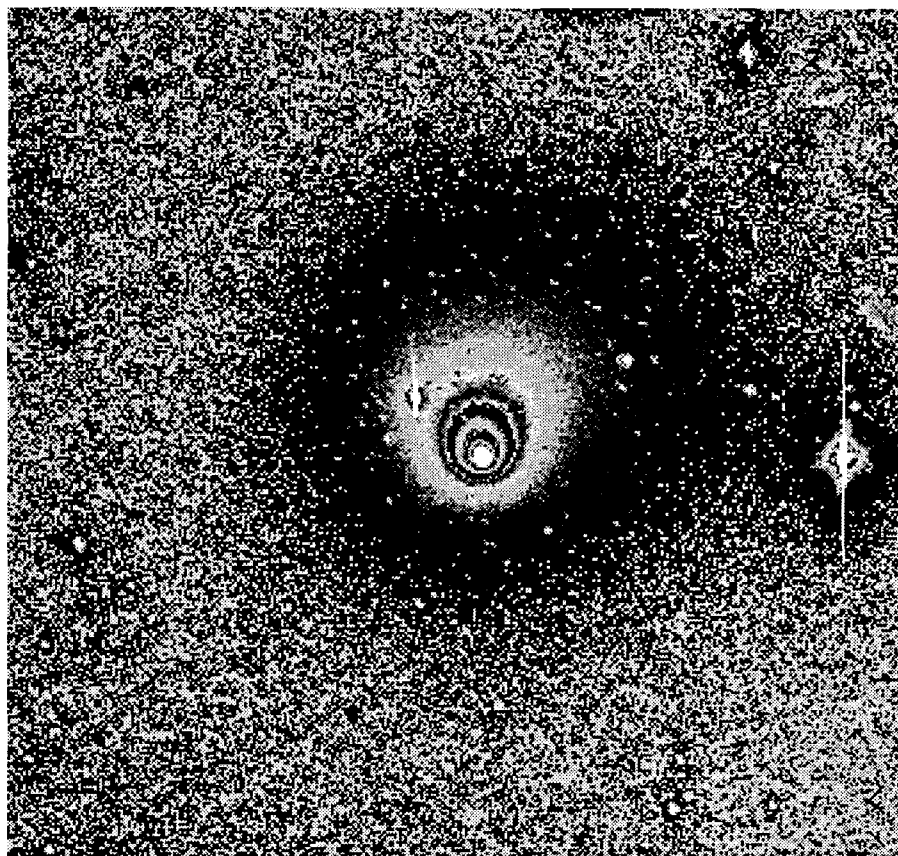
February 1998 Eclipse Trip

National Capital Astronomers, Inc. and Greenbelt Travel are planning a 5 day, 4 night trip to Curacao for the February 1998 eclipse. The projected price of about \$1000 per person, double occupancy, will include airfare from BWI, hotel room, airport transfers, and transportation to and from the viewing site. (Prices may vary since airfare cannot be locked in this far in advance.)

Curacao, a dutch island located just off the coast of South America, has a desert climate (rainfall is 20 inches per year). Tourist attractions include beaches, coral reefs for scuba and snorkeling, a famed shopping district, historical buildings, and restaurants for every taste and budget.

To be added to the mailing list, send a note to:

ATS — EC98
P.O. Box 2509
Laurel, MD 20709



First New Technology Telescopew (NTT) Image of Comet Hale-Bopp after Solar Conjunction

ESO Press Photo 10/96; 9 February 1996

Downloaded from the WWW by Alisa Joaquin (editor). This image is from the Comet Hale-Bopp Homepage (<http://www.halebopp.com>). There are several articles and images exclusively on this comet. Everyone that is connected should take the opportunity to go to the Comet Hale-Bopp Homepage and read all about it. Other addresses include:

- 1) <http://newproducts.jpl.nasa.gov/comet/news8.html>
- 2) <http://newproducts.jpl.nasa.gov/comet/ephem.html>
- 3) <http://newproducts.jpl.nasa.gov/comet/other.htm>*
- 4) <http://antwrrp.gsfc.nasa.gov/apod/ap951030.html>
- 5) <http://pdssbn.astro.umd.edu/hbhtml>
- 6) <http://www.eso.org/comet-hale-bopp.html>

**Other is a website that lists other links to Hale-Bopp information including the Homepage. Good Search.*

This false-color image of Comet Hale-Bopp (seen here in black and white) is the first to be obtained with a major astronomical telescope after the recent conjunction with the Sun. At the time of this observation, the comet was located in the southern constellation of Sagittarius, and only 32 degrees from the Sun.

This rather difficult observation was performed with the European Southern Observatory (ESO) 3.5-meter (140 inch) New Technology Telescope (NTT) in the morning of 9 February 1996 by Griet van de Steene (astronomer), Hernan Nunez (telescope operator) and Gabriel Martin (instrument operator) of the NTT team at La Silla. The data was immediately transferred by satellite link to the ESO Headquarters in Garching where the subsequent image processing was done by Hans Ulrich Kaeufl.

Since the comet was so close to the Sun, it had to be observed in the com-

See COMET HALE-BOPP, page 6

COMET HALE-BOPP, from page 5

paratively bright morning sky. It was acquired only 10 degrees above the eastern horizon, at an air mass of no less than 5.1. Three exposures of 5 minutes each were made through a red filter and with a 2000 x 2000 CCD in the EMMI multimode instrument. The image shown here is based on one flat-fielded 5-min exposure. The frame covers 9 x 9 arcmin; 1 pixel = 0.27 arcsecond; North is up and East to the left.

The present image was obtained when the comet was approximately 924 million kilometers (573 million miles) from the Earth and 802 million kilometers (498 million miles) from the Sun. It continues to move inwards through the solar system and will cross the orbit of Jupiter in about two weeks time, on 25 February.

A provisional evaluation of the new images indicates that Comet Hale-Bopp is apparently still developing nominally. The coma measures at least 6 arcmin across. A certain rotation of the coma isophotes is noted, clockwise from about NNE (innermost) to about NW (outermost). No other obvious asymmetries are present. The nucleus appears single of these exposures.

Some of the brighter stars show spikes in the N-S direction; this is a typical effect on the very sensitive CCD detectors. The trail of an artificial satellite crosses the photo in the upper left quadrant.

This photo signifies the beginning of a substantial Hale-Bopp observational campaign at ESO. Coordinated observations will be carried out during approximately 30 nights before the end of September 1996. Many different telescopes and instruments will be used.

For earlier photos of Comet Hale-Bopp obtained with ESO telescopes, please consult the ESO Hale-Bopp Homepage. ☼

Remember

Don't throw this newsletter away. If you are finished with it, pass it on to someone else to read. If not, then recycle it. It's right for the environment.



NCA Welcomes New Members

Vincent J. Byrne
9645 Lindenbrook St.
Fairfax, VA 22031

Stephen C. Darnell
14848 Hammersmith Circle
Silver Spring, MD 20906-5730

Vicki Guest
8831 Harmony Court
Owings, MD 20736

Douglas J. McDaughton
P.O. Box 265
Catharpin, VA 22018

Raymond E. Nemeč
Lisa Menec (Jr. member)
9001 Saffron Lane
Silver Spring, MD 20901

Lee R. Pennington
2313 Henslowe Drive
Rockville, MD 20854

Sondra G. Rhodes
8502 16th St., Apt. 208
Silver Spring, MD 20910-2937

Erick Schoenfeld
(Junior member)
4000 Massachusetts Ave., NW
Apt. 1308
Washington, DC 20016-5133

Mars Revisited

On June 18—19, 1996 at the National Academy of Sciences in Washington, D.C. NASA, the Planetary Society, and Lockheed Martin Corporation are pleased to announce plans to host a Mars symposium, "Mars Revisited: A Forward Look." NASA administrator Daniel Goldin and Carl Sagan have been invited to speak. Everyone is invited to attend this symposium. For reservations and further information please contact: Judy Cole, Symposium Coordinator, Science and Technology Corporation, 101 Research Drive, Hampton, VA 23666, [804]-865-7604 voice, [804]-865-8721 FAX, or e-mail cole@stcnet.com. ☼

Planetarium Events

Einstein Planetarium—
Smithsonian Institution, NASM,
Washington, DC. "The Stars To-
night," Daily at 3:00 pm, 202/357-
1550 or 202/357-1686.

"The New Solar System." Thirty
minutes long. Daily at 11:00 am to
5:00 pm.

Monthly Sky Lecture: "A Tale of
Two Comets," with Geoff Chester,
Saturday May 4, 9:30 am.

Family Star Watch: "Never Stop for
Directions," with Andy Johnson,
Saturday, May 18, 10:00 am.

Exploring Space Lecture: "To
Build A Solar System," featuring
David Morrison (Ames Research
Center, NASA), May 29, 7:30 pm.

**Rock Creek Park Nature Center
Planetarium**— Washington, DC.
Wednesdays, 3:45 pm, Saturdays &
Sundays 1:00 pm & 4:00 pm, 202/
426-6829.

**Howard B. Owen Science Center
Planetarium.** "Through the Eyes of
Hubble," accompanied by current
night sky presentation, Fridays,
May 10, 17, and 31, 7:30 pm, 301/
918-8750.

Arlington Planetarium—Arling-
ton, VA, "Space Elves." For all
ages. Friday, Saturday, & Sunday,
May 3, 4, 10, 11, 17, and 18, 7:30
pm, and Sundays, May 5, 12, and 19,
1:30 pm. and 3:30 pm. 703/358-
6070.

"Stars Tonight for May." Outside
observing follows (weather permit-
ting). Monday, May 6, 7:30 pm.

**Montgomery College Plan-
etarium**—Fenton Street, Takoma
Park, MD. "The Search for Extra-
terrestrial Intelligence," parking
permitted that evening in faculty/
staff-only parking lot, Saturday,
May 11, 7:00 pm.

National Capital Astronomers, Inc.

SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a non-profit, membership supported, volunteer run, public-service corporation dedicated to advancing space technology, astronomy, and related sciences through information, participation, and inspiration, via research, lectures, presentations, publications, expeditions, tours, public interpretation, and education. NCA is the astronomy affiliate of the Washington Academy of Sciences. All are welcome to join NCA. For information: 301/320-3621 or 703/841-4765.

SERVICES & ACTIVITIES:

Monthly Meetings feature presentations of current work by researchers at the horizons of their fields. All are welcome; there is no charge. See monthly *Star Dust* for time and location.

NCA Volunteers serve as skilled observers frequently deploying to many parts of the National Capital region, and beyond, on campaigns and expeditions collecting vital scientific data for astronomy and related sciences. They also serve locally by assisting with scientific conferences, judge science fairs, and interpreting astronomy and related subjects during public programs.

Discussion Groups exchange information, ideas, and questions on preselected topics, moderated by an NCA member or guest expert.

Publications received by members include the monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

NCA Information Service answers a wide variety of inquiries about space technology, astronomy, and related subjects from the public, the media, and other organizations.

Consumer Programs on selection, use, and care of binoculars and telescopes, provide myth-breaking information, guidance, and demonstrations for those contemplating acquiring their first astronomical instrument.

Dark-Sky Protection Efforts educate society at large about the serious environmental threat of light pollution, plus seek ways and means of light pollution avoidance and abatement. NCA is an organizational member of the International Dark-Sky Association (IDA), and the National Capital region's IDA representative.

Classes teach about subjects ranging from basic astronomy to hand-making a fine astronomical telescope. NCA's instructors also train educators in how to better teach about space technology, astronomy, and related sciences.

Tours travel to dark-sky sites, observatories, laboratories, museums, and other points of interest around the National Capital region, the Nation, and the World.

Discounts are available to members on many publications, products, and services, including *Sky & Telescope* magazine.

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

NCA Juniors Program fosters children's and young adults' interest in space technology, astronomy, and related sciences through discounted memberships, mentorship from dedicated members, and NCA's annual Science Fair Awards.

Fine Quality Telescopes up to 36-cm (14-inch) aperture are available free for member's use. NCA also has access to several relatively dark-sky sites in Maryland, Virginia, and West Virginia.

YES! I'D LIKE TO JOIN THE NATIONAL CAPITAL ASTRONOMERS

Enclosed is my payment for the following membership category:

Regular

Sky & Telescope and *Star Dust*. (\$48 per year)

Star Dust only (\$24 per year)

Junior (Only open to those under age 18) Date of birth: _____

Junior members pay a reduced rate.

Sky & Telescope and *Star Dust*. (\$34 per year)

Star Dust only (\$10 per year)

_____	_____	_____	(____) _____
First name	Middle	Last name	Telephone
_____	_____	_____	_____
Street or Box	Apartment	City	State Zip

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 mailing label. You may renew this subscription through NCA for \$24 when it expires.

Make check payable to: **National Capital Astronomers, Inc.**, and send with this form to:

NCA c/o Jeffrey B. Norman, 5410 Connecticut Avenue, NW, Apt. #717, Washington, D.C. 20015-2837.

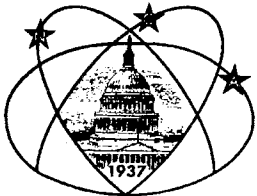
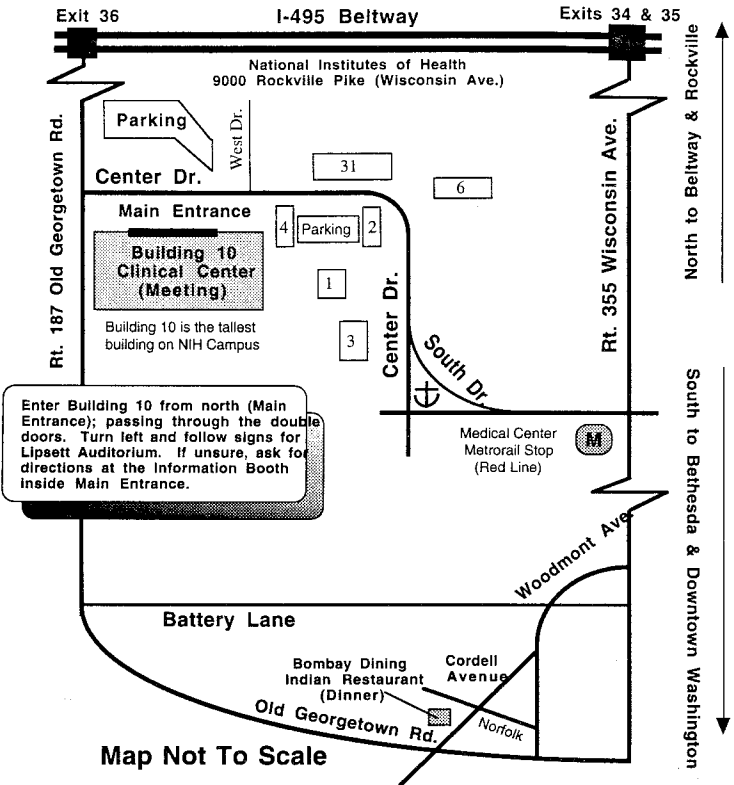
The following information is optional. Please indicate briefly any special interests, skills, education, experience, or other resources which you might contribute to NCA. **Thank you, and welcome to NCA!**

Getting to the NCA Monthly Meeting

Metrorail Riders—From Medical Center Metro Stop: Walk down the hill, pass the bus stops and turn right at the anchor onto Center Drive. Continue uphill to Building 10 (walking time about 10 minutes), the tallest building on campus. Also, the J2 bus line connects the Bethesda (7:16 PM) and NIH (7:23 PM) Metro stops with Building 10 (7:25 PM).

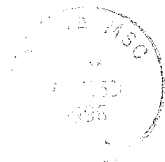
To Bombay Dining Indian Restaurant—Take Wisconsin Avenue toward Bethesda and bear right onto Woodmont (or take the next right onto Battery Lane). Follow Woodmont to Cordell (2 blocks south of Battery) and make a right. Proceed one block and cross Norfolk Avenue. The restaurant will be on the right in the next block (between Norfolk and Old Georgetown) across from Nam's. There should be plenty of parking in the garage (free on weekends) if you would rather not park on the street. Seats not guaranteed after 5:30.

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