

STAR

National Capital Astronomers, Inc.



DUST

Washington, DC (301) 320-3621

Volume XLVIII Number 7

April 1990

ISSN 0898

Barringer to Relate Story of Arizona Crater



MR. BARRINGER

Mr. Philip E. Barringer, whose family has long been associated with the famous Arizona Meteor Crater near Flagstaff and a son of the geologist and mining engineer for whom the crater is named, will address the April 7 National Capital Astronomers colloquium at the National Air and Space Museum.

The widely publicised recent close approach to the Earth of an asteroid has, judging from some of the enquiries we receive, raised a widespread perception of

impending doom; Barringer's presentation is expected to be of broad interest.

Mr. Barringer will review what is known of the formation of the crater, relate the story of its acquisition and exploration, discuss the early scientific controversies over its origin, illustrate its impact with an artist's sequence, and describe the physical condition of the resulting crater.

The crater remains in private ownership, but the family regards it as a public trust, and makes it available for meteoritical research as well keeping it open to the public.

Philip Barringer is Director of Foreign Military Rights Affairs in the Department of Defense, where he has negotiated U.S. military basing, access and status of forces agreements with NATO, Germany, the United Kingdom, Turkey, Spain, Iceland, Japan, the Philippines, Micronesia, Oman, Israel, Panama, and Honduras.

The youngest son of Daniel Moreau Barringer, he grew up in Philadelphia. He is a graduate of Princeton, Pennsylvania Law School, and the National War College. He served in the Army during World War II, and thereafter as U.S. Secretary of the Legal Directorate of the Allied Control Council in Berlin.

An enthusiastic hiker, Phil is President of the Appalachian Trail Club, plays Bassoon with a small chamber music group and is a member of National Capital Astronomers.

APRIL CALENDAR — *The public is welcome.*

Tuesday, April 3, 10, 17, 24, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, April 6, 13, 20, 27, 7:30 pm — Telescope-making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 362-8872.

Friday, April 20, 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 960-9126.

Saturday, April 7, 5:45 pm — Dinner with the speaker at the Smithsonian Restaurant, 6th and C Streets, SW, inside the Holiday Inn. Reservations unnecessary. Use the 7th Street and Maryland Avenue exit of the L'Enfant Plaza Metrorail station.

Saturday, April 7, 7:30 pm — NCA monthly colloquium in the Einstein Planetarium of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. Enter Independence Avenue side. Mr. Barringer will speak.

For other organizations' events of interest see elsewhere in this issue.

MARCH COLLOQUIUM

Dr. Nancy W. Boggess of the Infrared Astrophysics Branch, NASA Goddard Space Flight Center, presented early results of the Cosmic Background Explorer (COBE) observations at the March colloquium of National Capital Astronomers in the National Air and Space Museum.

Starting with the first fraction of a second of the "big bang" (BB), when the embryonic universe was a small, unbelievably dense mass of quarks at trillions of degrees, she briefly reviewed the evolution of the universe to the present.

A few hundred thousand years after the BB, the temperature had dropped sufficiently for nucleosynthesis to begin, and the universe became transparent. From that time on, according to the BB theory, matter and the primordial radiation evolved independently. Continued expansion and cooling resulted in the present isotropic radiation temperature of 2.7 K. Detection of the theoretically predicted radiation and its apparent isotropy won the Nobel Prize for Penzias and Wilson in the 1960's, as the first observational evidence of the BB.

Dr. Boggess pointed out that a very tiny fraction of the "snow" on a television set is caused by the 2.7-K radiation.

Until now, it has been difficult to measure this radiation remnant of the BB with sufficient precision either to detect with assurance any small anisotropy, or to confirm the expected black-body form. This is the mission of COBE, the first spacecraft dedicated to cosmology.

Before presenting the observational data, Dr. Boggess described the craft and its instrumentation.

COBE carries a Far Infrared Absolute Spectrometer (FIRAS), with a 7° field, to measure definitively, over the entire sky, the background spectrum from 100 microns to 1 centimeter. Three independent pairs (for confirmation) of Dicke-switched differential microwave radiometers will measure background amplitudes at three wavelengths shortward of 1 cm.

They, too, are to map the entire sky, to seek anisotropies from which galaxies or galactic clusters might be formed.

A narrower-field, telescopic infrared experiment, the Diffuse Infrared Background Experiment (DIRBE) will seek to detect and identify for the first time a remnant of the light of the first luminous objects in the universe. This remnant is expected to be evident as a cosmic infrared background in the spectral range from 1 to 300 microns.

All of the cryogenic detectors are necessarily maintained well below the 2.7 Kelvin background. The detectors - FIRAS, DIRBE, and a black-body calibrator for monthly calibrations (a significant first), are cooled by their placement within cavities in a 600-liter dewar of superfluid helium at 2 K. The three differential microwave radiometers are not cryogenic.

FIRAS is a Fourier-transform spectrometer. DIRBE has photovoltaic germanium and silicon detectors and bolometers for ten photometric bands covering the range from 1 to 300 microns. The instruments are shielded from radiation emanating from the Earth and Sun by an umbrella-like shade and elaborate baffling. The black-body calibrator, which has an emissivity of 0.9999, Dr. Boggess regards as the best in the world. For the monthly calibrations it is moved from the dewar to the mouth of the FIRAS horn, where it completely blocks the FIRAS from the sky.

Launched on November 18, 1989 by a Delta rocket into a near-polar orbit of 99° inclination at an altitude of 900 Km, COBE always faces away from the Earth, and more than 90° from the Sun. The orbital plane thus advances one degree each day, scanning the entire sky each six months. The 7° field of the FIRAS is coaxially aligned with the once-per-minute spin axis of the COBE. Its daily advance thus provides generously overlapping scans. The axes of the other instruments, however, are disposed at 30° from the COBE axis, thus trace circular scans of half the sky each day. The helium supply is expected

to suffice for one year, providing two complete axial FIRAS scans of the sky. The differential microwave radiometer, however, not being cryogenic, is to continue to operate for another year to smooth the data.

Shortly after launch, tests, adjustments, and calibrations were performed. Subsequent FIRAS observations soon revealed precisely the black-body spectrum at 2.735 Kelvins that is convincingly consistent with the BB theory. Upon submission for publication, this observation was characterized by an Astrophysical Journal referee as "one of the most important cosmological experiments of the 20th century."

The three-frequency microwave radiometers: 31, 53, and 90 GHz observed the known doppler difference from solar system motion around galaxy with no anisotropies evident in these preliminary observations. While

further observations may disclose some small anisotropies, they will not be large.

DIRBE is presently mapping the galaxy at 1.2 microns. At 3.4 microns, it will eventually map through the galactic polar regions deep into extragalactic space. In the galactic plane at 240 microns, never before mapped, DIRBE is showing the shapes of dust and gas in the Cygnus arm. There is heavy interference from the South Atlantic Anomaly, but those inputs can be subtracted from the data. These are preliminary DIRBE observations; more useful observations are expected to follow. A matter of concern is that so far there are not sufficient anisotropies observed to account for galactic formation within the age of the universe. Perhaps COBE will eventually answer some of the interesting questions that its answers raise. Robert H. McCracken

NCA THANKS AREA ASTRONOMERS MEETING ASSISTANTS

The March 29 Washington Area Astronomers Meeting hosted by National Capital Astronomers at the University of the District of Columbia was very gratifying to those whose efforts contributed to its success. This was the first of the series of these very useful meetings that has been held at a location with both parking and Metrorail at the door. We enjoyed the many conveniences of the modern facility in an upper Northwest Washington neighborhood, and the friendly and helpful hospitality of the staff.

The meeting was opened by a

welcoming address by Dr. Philip Brach, Dean of the the College of Physical Sciences, Engineering, and Technology. Seventeen authors then discussed their wide range of current work in astrophysics, astrometry, and related topics.

Following the seventeen excellent papers presented, an opportunity to meet and discuss with the authors was afforded by a superb reception, with delightful hors d'oeuvres, expertly catered by Mrs. Nancy Kalie and her Mother in Law, Mrs. John Kalie, and Edith Corliss. (Your editor is biased - Nancy Kalie is my daughter! RHM.)

UNIVERSITY OF MARYLAND ASTRONOMY PROGRAM COLLOQUIUM SCHEDULED

The University of Maryland Astronomy Program Colloquia are held each Wednesday at 16:00 at the UMD Computer and Space Sciences Building (CSS), Room 1113. For more information, call Dr. Roger Bell, Astronomy Program, (301) 454-3005.

- 4 April - "Pulsar timing, Gravitation, and Cosmology," Dr. Joseph Taylor, Princeton University
- 11 April - "Structure and Kinematics of Elliptical Galaxies," Dr. Marijn Franx, Center for Astrophysics.
- 18 April - "The Relationship between Low Mass X-ray Binaries and Millisecond Pulsars." Dr. J.E.

Grindlay, Harvard College Observatory.

- 25 April - "Carbonaceous Compounds in Comets and the Interstellar Medium," Dr. Roger Knacke, Marshall Space Flight Center.

The colloquia are preceded by tea at 15:30 in the Computer Science Building (CSS), Room 1113, and are followed by refreshments. Park at meters in the garage (Meters take quarters only - ed.) at the corner of Regents Drive and Stadium Drive, across the street from the CSS Building.

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following occultations. There is one asteroidal, but no lunar graze expeditions

planned in February. For further information call the NCA-IOTA Information Line: (301) 474-4945 (Greenbelt, MD).

Date	Time	Place	Vis Mag	Pent Sunlit	Cusp Angle	Min Aper
Grazing Lunar:						
04-06-90	01:28	South Hill, VA	4.6	85	19N	5 cm
04-19-90	08:39	Burtonsville, MD	8.8	39	4N	20 cm
04-28-90	01:30	Potomac, MD	7.7	12	16N	5 cm
04-29-90	00:40	Odenton, MD	9.3	20	16N	20 cm
04-29-90	01:17	Bel Air, MD	8.6	20	15N	20 cm
Asteroidal:						
			Star Mag	Delta Mag	Name	
04-02-90	08:28	DC & VA	12.0	2.7	(86) Semele	20 cm
04-15-90	00:30	NY,CT,RI	10.5	4.0	(410) Chloris	10 cm
04-21-90	00:46	Labrador, Nfld*	8.9	4.0	(146) Lucina	5 cm
05-06-90	02:26	Yucatan,Jamaica*	11.0	3.0	(584) Semiramis	15 cm

* Appulse to be observed for possible satellites or path shift.

NCA INVITED TO VIEW COMET AUSTIN FROM HOPEWELL CORPORATION OBSERVATORY

NCA members, families, and guests are invited to open house at Hopewell Observatory on Saturday evening/Sunday morning, April 28/29, to view Comet Austin (1989cl).

the comet, of course!) Coffee, tea, cocoa, and soft drinks will be provided by the Hopewell Corporation.

From the Beltway, go west on I-66, 25 miles to the Haymarket exit at U.S. 15. Left on 15, 0.25 mile to traffic light, right on Route 55, 0.75 mile to County Road 681. Right on 681, 3.2 miles to end, left on County Road 601 (gravel) 1.2 miles to County Road 629, Right on 629, 0.9 mile to narrow paved road at open gate on right. (Directly across from an entrance gate with stone facing on left). Turn right, go 0.3 mile to top of ridge, go around microwave station and continue on dirt road through woods a few hundred feet to the observatory. Further information? Call NCA: 320-3621.

EDT

20:01 Sunset
 20:29 Civil twilight ends
 00:38 Moonset
 02:32 Comet Austin rises, Az = 18°
 04:37 Astronomical twilight begins.
 Comet altitude = 18°
 05:13 Nautical twilight begins.
 Comet altitude = 24°
 06:16 Sunrise

If you wish, come early (any time after 4:00 pm) and bring your prepared picnic dinner (...and stay overnight for

U.S. NAVAL OBSERVATORY TOURS IN APRIL

The next Monday night public tours of the Naval Observatory are scheduled to begin at 8:30 pm EST on April 2, 9, 16, 23, and 30.

Passes will be issued to the first 100 persons in line at the gate across from the British Embassy, at Massachusetts Avenue and the

southeast side of Observatory Circle at the end of the circular road. Some form of photoidentification will be required. Parking for the tours is not allowed on the grounds except for the handicapped; ample parking is available near the gate. Information 653-1541.

OPTICAL SOCIETY SCHEDULES MEETING

The monthly lecture meeting of the National Capital Section of the Optical Society of America will be held on April 18 at Charlie's Place in McLean, Virginia. The topic will be "Defining and Measuring Laser Beam Quality," by Anthony Siegman, of

Stanford University.

The social hour will begin at 6 pm, dinner at 7:00, and the talk at 8:00. For information on registration and cost, call Dick Bulova at (703) 323-1283 (H), or (703) 664-6771 (W).

AIR AND SPACE MUSEUM OFFERS PROGRAMS IN APRIL

The following free public programs will be offered during April in the National Air and Space Museum:

Saturday, April 7, 9:30 am, Albert Einstein Planetarium* — **Monthly Sky Lecture: "Comet Austin,"** Dan Costanzo, National Capital Astronomers. Discovered in Australia last December, Comet Austin should be visible to the naked eye during much of April and May. Costanzo, a veteran comet watcher, will present

viewing strategies.

Wednesday, April 11, 7:30 pm, Albert Einstein Planetarium — **Exploring Space Lecture Series: "The Great Attractor Mapping the Mass in the Universe,"** Dr. Alan Dressler, Carnegie Institute of Washington, will discuss his independently confirmed discovery of a region in space which is gravitationally affecting the motions of galaxies, including the Milky Way, within several million light years

SMITHSONIAN ASSOCIATES OFFER COMET TRIP

Participants in a Smithsonian Resident Associates trip led by Daniel Costanzo and, tentatively, Walter Nissen, both of NCA, will view Comet Austin, weather permitting, from Big Meadows on a crest of the Blue Ridge Mountains in Shenandoah National Park.

The tour will depart at 11:30 pm

on Friday, April 27, and return at 8:30 am the following morning (rain date May 4-5). Costs will be \$38 for Resident Associate members, \$51 for nonmembers. No refunds will be made to those unable to go on the rain date, if it is needed, unless a substitute is found. For further information call (202) 357-3030.

PIONEERS USED TO MAKE FIRST MEASUREMENTS OF INTERSTELLAR LIGHT

Using extensive data from the Pioneers 10 and 11 photopolarimeters, Dr. Gary Toller, Goddard Space Flight Center, and associates, have made the first "pure" measurements of the various sources of background light in the solar system, galaxy, and the universe.

They find that 82 percent is from faint stars. Most of the remainder is galactic light diffused by dust. The final component, less than 0.6 percent, originates beyond the galaxy.

These measurements are the first made without interference from the solar system. Combined with other

kinds of measurements, some made from the Earth, they provide clues to chemical composition of solar, galactic, and cosmic dust, have accurately determined the Sun's position above the galactic plane about 12 parsecs, and have confirmed estimates of the "missing mass" in the universe.

The Pioneers began making measurements of extra-solar-system light more than a decade ago. Their greatly increased distance now makes very precise measurements possible. Pioneer 10 is 4.4 billion miles from the Sun, and has left the solar system. Both Pioneers are still returning data.

FOR SALE

Telescope: Celestron C8 Super Polaris Schmidt-Cassegrain with quartz drive and full-aperture glass solar filter. Thomas Wiederrecht, (301) 764-9077.

Telephoto Lens, Celestron 125-mm aperture, 750-mm focal length, in excellent condition. Walter Nissen, (301) 585-5711.

Video Camera JVC Model GX-8. Removable lens, rated sensitivity 10 lux. Vaughn Pischke, (703) 241-2272.

Sky & Telescope: January 1976 - December 1988. Free to a good home. Bernie

Kaufman, W: (202) 767-0513, H: (301) 449-7498.

Free Astronomy Journals: Jim Trexler is moving and is making the following issues available to NCA members:

Sky & Telescope 1959 - 1989 (nearly complete)

The Observatory (British) 1974 - 1986

The Moon and the Planets 1978 - 1983

Astronomical Journal 1984 - 1989

Call Trexler at (301) 839-3490 to arrange for pickup. Any remaining will be available in his station wagon after the April 7 meeting.

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Home Office Design — David and I are trying to set up a home office to accommodate computers, printers, modems, diskettes, software manuals, newsletter production, occultation predictions and reductions, journals, books reams of paper reporting observations, observing equipment, and other assorted hardware, such as the occultation information answering machine. It is somewhat like trying to fit a large and active cat into a small box. While it might be possible to cram everything in, the results would be regrettable. We have learned a few things about designing offices that include computer equipment during this exercise.

One lesson we have learned is that nothing feels quite so luxurious as having lots of room devoted to work, with large desks or table tops where projects can be laid out and left until finished. It is luxurious because most of us cannot afford to buy so much space just for a home office, especially one for hobbies or home finances. But we have noticed that many pieces of computer furniture and home office designs provide very little space. Some compact units made to conceal computers when not in use have no extra space for papers or books once the computer is installed. Work areas that are very small are inefficient and frustrating. If a home office is not convenient to use it probably will not be used.

Storing diskettes, software manuals, and computer supplies takes room. After a few years, the accumulated software storage begins to require quite a lot of room. The diskettes and manuals take the equivalent of a bookcase or two. The diskettes and manuals should be easy to retrieve while using the computer.

Managing the wiring associated with computers and peripherals also takes quite a bit of room. The wiring can be tucked away, taped to the underside of tables, put into wire guides, or otherwise concealed if the intention is to move the computer or change peripherals only infrequently. But if you want to be able to move the computer to make room for something else, or switch printers from one machine to another, then you want the cables and wires free to move. We allowed for the room to leave the wires out on top of the desks, but are not very happy with the scraggly appearance.

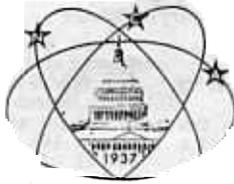
It is impossible to have too many outlets in an office with a lot of computer hardware. There is always a need for one more outlet. Best of all is to have outlets at desktop height. Plug-in strips mounted to the back edge or underside of the desk, or on the wall, are almost as good. If possible, the outlet for the computer should be on its own circuit. The computer should also have a surge protector or line conditioner for protection. Plug-in strips with surge protectors are readily available. Line

conditioners are more expensive units that smooth the power line glitches too small to trigger a surge protector, but enough to halt a computer. The least expensive are about \$200, and are about the size of a football.

Prices and Computing Power — The price of computing power continues to drop. Last fall, we were offered an add-on board to give a PC-XT the power of an 80386 computer. The price is higher than today's prices for mail-order 80386 computers. The XT upgrade board, with some software and a math co-processor, but no monitor or hard disk, was \$2795. Opening a computer magazine at random, the same speed 80386 processor with some software, VGA monitor, 65M hard disk, but no math co-processor, is \$2695. Another dealer offers a similar system with a monochrome monitor for \$2599. The XT upgrade offer said "Once our inventory runs out, we won't be able to offer these savings." indeed.

The new MS-DOS computers are based on the Intel 80386, 80386SX, and 80486 microprocessors. The 80386, introduced in 1986, is a 32-bit processor that communicates to the rest of the machine (memory, for example), in 32-bit words. The 80386SX, introduced at the end of 1988, is a compromise. It does communicate as a 32-bit processor, but communicates in 16-bit words, allowing it to use designs and less expensive components similar to those for the AT, an 80286-based computer. The top of the line is the 80486, which is composed of and improved 80386, an 80387 co-processor, and a memory cache. The future may well be that 80386SX machines will be basic or entry-level machines, with the 80486 for those who want a machine that offers the power and speed of a small mainframe computer. All these chips run the same software and operating systems. This includes being able to operate multiple 8086 applications (MS-DOS based) simultaneously. The 80385SX machines comparable to the 80386 mentioned above are about \$2200. One mail-order firm offers an SX with a 32-M hard disk and an amber monitor for \$1400.

Part of the reason for the dropping prices is that Intel has cut the prices of the SX considerable to compete with the faster 80286 chips made by its competition. What does this mean for the future of the 8088, 8086, and 80286-based computers, the PCs, PC-XT's, and AT's? The lower prices for the SX machines put severe strain on the manufacturers to make complete XT or AT systems, with hard disks and color graphics monitors, and still make money selling them at prices low enough to compete with the SX's. We may see absolutely incredible prices for these computers in about 8 months as dealers unload their inventories. They will be history in two or three years.



National Capital Astronomers, Inc.

is a non-profit, public-service corporation for advancement of the astronomical sciences. NCA 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 colloquia held at the National Air and Space Museum of the Smithsonian Institution. 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 NCA newsletter, *Star Dust*.

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 lead 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

Regular (\$32 per year) Each regular member receives *Sky & Telescope* and *Star Dust*.

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

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Sky & Telescope and *Star Dust* (\$25 per year)

Star Dust only (\$10 per year)

First name or initial Middle or initial Last 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 mail label, or indicate expiration date: _____. A prorata adjustment will be made.

Make check payable to National Capital Astronomers, Inc., and send with this form to: Patricia B. Trueblood, Secretary, 10912 Broad Green Terrace, Potomac, MD 20854.

The following information is optional. If you would like to participate actively in NCA affairs, please indicate briefly any special interest, skills, vocation, education, experience, or other qualifications which you might contribute. Thank you, and welcome!

EXCERPTS FROM THE IAU CIRCULARS Robert N. Bolster

1. February 10 - Myiazaki, Oriental Astronomical Association, observed the appearance of a rare bright white spot in Jupiter's North Temperate Belt.

2. February 14 - W. Liller, Vina del Mar, Chile, detected the outburst of a recurrent nova in the Large Magellanic Cloud on a Problicom photograph.

3. February 20 - W. Liller discovered a nova of 9th magnitude in Sagittarius.

4. February 25 - A photograph of Comet Austin taken by Schuster and

Pizarro with the ESO Schmidt telescope showed an ion tail 2.2 degrees long, and a dust tail 20 minutes long.

5. March 14 - K. Cernis, U.S.S.R., and T. Kiuchi and Y. Nakanura, Japan, (on March 16) independently discovered a comet of 9th magnitude near M31 in Andromeda. Orbital elements by Nakano indicate that comet 1990b passed perihelion on March 17 at a distance of 1.07 AU.

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Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit, public-service corporation for advancement of astronomy and related sciences through lectures, expeditions, discussion groups, conferences, tours, classes, public programs, and publications. NCA is an affiliate of the Washington Academy of Sciences. President, Kenneth R. Short. Star Dust deadline 15th of preceding month. Information: (301) 320-3621. Material for publication: Robert H. McCracken, Editor, 5120 Newport Avenue, Bethesda, MD 20816.

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