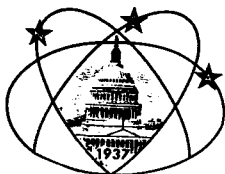


STAR

National Capital Astronomers, Inc.



DUST

Washington, DC (301) 320-3621

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By Joseph S. McCoy, Jr., © 1939 National Geographic Society

National Capital Astronomers 50 Years Ago

Do any of you old timers recognize these faces from the July 1939 issue, page 4, of *National Geographic Magazine*? They were members of our early telescope-making class, shown here with their hand-made telescopes.

Will Thornton submitted this item on our young organization from the *Geographic* article, "News of the Universe." We thank Barbara A. Shattuck of the National Geographic Society for supplying *Star Dust* a print from the original negative.

Founded in 1937 at the United States Naval Observatory by astronomer U.S. Lyons, the organization established the class as one of its first regular activities. After 50 years, the telescope-making class remains one of the regular NCA activities, still held two nights each week all year by Jerry Schnall with Keith Bell assisting. Long retired, founding astronomer U.S. Lyons, a life member of NCA, now resides in St. Petersburg, Florida.

SUMMER CALENDAR — *The public is welcome.*

Tuesday, August 1, 8, 15, 22, 29, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, August 4, 11, 18, 25, 7:30 pm — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, August 19, 8:30 pm — *Exploring the Sky*, presented jointly for the public by NCA and the National Park Service, on Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: John Lohman, 820,4194, or NCA, 320-3621.

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

JUNE COLLOQUIUM

Dr. Martin Harwit, Director of the National Air and Space Museum, addressed National Capital Astronomers on the occasion of the annual NCA high school science fair awards program at the Museum.

Dr. Harwit complimented the students, who had just received the NCA awards for their projects, which were displayed in the planetarium, saying that he was impressed with the ability they indicated, to carry on a project for many weeks or months.

To encourage the students, Harwit spoke of the gratification to be derived from a scientific career pursued for the pleasure of it, and dispelled some science-glamour myths that might otherwise lead to discouragement. With several classical examples, he traced the factors leading to both discovery and to understanding, noting the differences between the two. He recounted his own academic experiences from high school through post doctoral work, and his progress on through his career. With his unaffected sincerity and subtle humor, the eminent scientist related to their own experiences as he offered encouragement and realistic expectations of the path to a successful, gratifying career in science.

For a year following college, Harwit took some additional courses at Amherst College, where he worked for money to continue his education. The following year he acquired an assistantship at the University of Michigan. Needing to supplement his modest pay, he offered to stoke the furnace at a girls' dormitory for free meals. He found that being the only boy in a girls' dormitory was not as glamorous as one might think. After a while, he said, he was "just overlooked" — as though I were just one of the girls."

Although he felt that he was not a very good student, he worked very hard at the University of Michigan and obtained his M.S. in one year. He then started taking the doctoral examinations, and, he said, did rather poorly, which led the professor to tell him he really had no talent for science! (Look at him now! — ed.) At that time, during the Korean war, he was drafted into the Army and, having his M.S. degree, was assigned to a laboratory. "They didn't know I didn't have any talent for science!"

The war ended three days after he was drafted, but he stayed with the laboratory, in the Chemical Corps, which was involved in atomic weapons tests. He quickly became a consultant, as he "knew a little bit more physics than the chemical engineers did. They didn't know how little

that little bit was." After being in charge of a succession of projects, he was sent to Eniwetok and Bikini on hydrogen bomb tests.

Harwit commented that if all world leaders could see one of those frightening events they would never want it to be used.

Having been warned that the nearest young woman would be 3,000 miles away, he said, he stocked up on books. One of these, Fred Hoyle's "Frontiers of Astronomy," although a popular book, significantly influenced the physicist's career, as it focused his interest on astronomy.

After being discharged from the Army with good recommendations, he met one of those lovely young women who had been thousands of miles away (who was now sitting in the front row), married, moved to Cambridge, Massachusetts, and entered graduate school at MIT. There, "they didn't notice that I had no talent for science." Because MIT then had no astronomy, he majored in physics and attended Harvard for astronomy in an exchange program.

At Harvard, a professor who had been one of Fred Hoyle's colleagues, Tommy Grove, suggested to Harwit that upon acquisition of his Ph.D. he go to Cambridge, England, and work with Hoyle. Harwit took his advice, and as a post-doctoral fellow at Cambridge University, became associated with the man whose book had influenced him to major in astrophysics.

Following his Cambridge fellowship, Harwit went to Cornell University where he taught for 25 years, a full professor since 1968, and Department Chairman for five years.

"One of the things that helped me as a teacher," he says, "is that I didn't expect people to do well on examinations. In science, the important thing is not whether you can solve three problems in one hour, but whether you can solve one problem in three years." He pointed out that the psychology is quite different in the two cases. In the first case, one must have everything at hand, think fast, and churn out an answer that will "somehow psyche out the professor." On the other hand, for a researcher there is no one to "psyche out. you must psyche yourself up and have patience." It may be three years between successes, and there are many setbacks. It is a long-term effort requiring stamina, self-confidence, and a supportive family life.

As an example, he pointed to Einstein,

who was brilliant enough to solve four problems in one year, 1905, after which he took the next twelve years to develop his general theory of relativity. "Incidentally, he also was a bad student."

"A scientist," he says, "is one who can take beatings for a long period of time before becoming a museum director."

"Don't be too worried about making mistakes. Everyone makes them. Babe Ruth was the Home Run King. Not as well known was that he also had more strikeouts than anyone else."

Harwit then discussed how discoveries are made, and how understanding grows, "not the kind of thing you read about in books (unless you read mine) or are taught in the classroom." Using slides and Viewgraphs, he then discussed some of the factors involved in discoveries.

New instruments and improved performance lead to new discoveries. Understanding what has been discovered, however may take many years of calculations and analysis by many scientists. "Don't expect immediate success." Science is a collaborative effort. Seldom is both a fundamental discovery and its analysis and development of it's understanding attributable to a lone individual.

By the time a discovery is understood, the discoverer's original papers are often

forgotten (few papers over five years old are cited), and other workers are credited. Harwit gave several examples. "Don't expect justice."

Harwit emphasized that one should go into science for the love of it, not expecting fame. "If you want the Nobel Prize, it seems not as important to do great work as to work for a Nobel Laureate." A Nobel Prize is not likely to be awarded to a lone wolf. While apologizing for the apparent but unintended cynicism, Harwit cited a genealogy of Nobel Laureates from the book "The Scientific elite: Nobel Laureates in the United States," by Harriet Gluckerman. The physicist Oswald had an apprentice, Nernst, who had an apprentice, Millikan, who had an apprentice, Anderson, who had an apprentice, Glazer. All won Nobel Prizes. In Britain, Rutherford and Thompson between them had 17 apprentices, all of whom won Nobel Prizes. All were good scientists; however there are other good scientists. Harwit quoted Robert Merton of Columbia University, "To those who have, more shall be given." If you have already won prizes, you probably will win ten more, if not, you probably will not win any. "Go into science not for prizes, but for enjoyment." Robert H. McCracken

COMING NEXT MONTH

Dr. Michael Kaiser, NASA Goddard, will discuss the available early results of the Voyager 2 Neptune flyby, "the Last

Hurrah of the Grand Tour of the Planets," at the September 9 NCA colloquium in the National Air and Space Museum.

COMET BRORSEN-METCALF (1989c)

Dawn, Sun at -18 degrees.

Positions for Equinox 2000.0

UT	DATE	TIME	R.A.	Dec.	DELTA	r	h	Az	m1
1989	8 29	8 57	8 36.5	+31 55	0.847	.579	16	62	5.9
1989	8 30	8 59	8 43.8	+30 60	0.866	.567	15	62	5.9
1989	8 31	8 60	8 50.8	+30 4	0.886	.554	15	63	5.8
1989	9 1	9 1	8 57.6	+29 8	0.906	.543	14	63	5.8
1989	9 2	9 2	9 4.1	+28 11	0.927	.532	13	64	5.7
1989	9 3	9 3	9 10.5	+27 14	0.948	.522	12	65	5.7
1989	9 4	9 5	9 16.6	+26 16	0.969	.513	11	65	5.7
1989	9 5	9 6	9 22.6	+25 18	0.991	.505	11	66	5.7
1989	9 6	9 7	9 28.5	+24 20	1.013	.498	10	67	5.7
1989	9 7	9 8	9 34.2	+23 21	1.036	.492	9	67	5.6
1989	9 8	9 9	9 39.8	+22 23	1.059	.487	8	68	5.6
1989	9 9	9 10	9 45.3	+21 24	1.081	.483	8	69	5.7
1989	9 10	9 11	9 50.6	+20 25	1.104	.480	7	69	5.7
1989	9 11	9 12	9 55.9	+19 26	1.127	.479	6	70	5.7
1989	9 12	9 14	10 1.1	+18 27	1.150	.479	6	71	5.8
1989	9 13	9 15	10 6.2	+17 29	1.173	.480	5	72	5.8
1989	9 14	9 16	10 11.2	+16 30	1.196	.482	4	72	5.9

This ephemeris by Robert N. Bolster is for the most favorable period for observing the comet, when the Moon will interfere the least. The columns labeled h and Az are the altitude and azimuth of the comet at the beginning of morning twilight. The comet's closest approach to the Earth was on August 7, and perihelion will be on September 11.

LIST OF SKY PUBLICATIONS AT NCA DISCOUNT UPDATED

Sky Publishing Corporation has issued an updated price list for its publications available to members at a discount. Some prices have changed, some titles have been dropped, and some new items have been added. Orders must be placed by the NCA treasurer. Members' payments by check, made payable to National Capital

Astronomers, must include an additional 6 percent to cover postage and handling.

For information on prices of books, charts, atlases, planispheres, and "Spotlight Series" prints, please call the NCA treasurer, Ruth Freitag, at (703) 521-7831, or write: 1300 Army Navy Drive, Apt. 806, Arlington, va 22202-2025.

NCA WELCOMES NEW MEMBERS

Leonard Baker
4920 Sentinel Drive
Bethesda, MD 20816

George J. Cartron
7-T Research Road
Greenbelt, MD 20770

Richard and Erica Golden
9437 Wooded Glen Avenue
Burke, VA 22015

Margaret Huntington
6200 North 31st Street
Arlington, VA 22207

John E. Ormond
411 5th Street, NE
Washington, DC 20002

Wayne L.B. Wagner
6336 Lennox Road
Bethesda, MD 20817

William R. Winkler
3003 Pierre Place
College Station, TX 77840

THREE PROGRAMS OF PUBLIC PARK SERIES, EXPLORING THE SKY, REMAIN

These joint National Capital Astronomers - National Park Service programs for the public have been scheduled through October. All ages are welcome; there is no charge. Make it a family night and share telescopic views of many cosmic objects. The Moon, Saturn, Uranus, colorful multiple stars, nebulae, star clusters, and galaxies are all candidates, depending upon the weather.

The remaining three dates, all on Saturday evenings, are: August 19, 8:30 pm; September 23, 7:30 pm;

October 14, 7:00 pm.

An unusual feature of the series will be the full October Moon, usually avoided because the dazzling light washes out the spectacular moonscape and lights the rest of the sky. With proper filtration, however, certain features can be seen best at that time. The telescopes will be equipped accordingly.

For further information, call Dr. John Lohman: (703) 820-4194 (Arlington, VA), or NCA: (301) 320-3621 (Bethesda, MD).

NCA PARTICIPATES IN AAVSO MEETING

In May, Daniel Costanzo and Stephen Sharvais represented National Capital Astronomers at the 78th spring meeting of the American Association of Variable Star Observers in Williamsburg, Virginia. Costanzo spoke on "Variable Mars Observing Using Variable Star Observing Techniques."

Founded in 1911, the AAVSO is the leading source of variable star data. It

possesses the world's largest data bank on variable stars from observers worldwide. A recent NASA grant will support AAVSO observations of long-period variables with the upcoming HIPPARCOS satellite.

More observers are needed to monitor thousands of variable stars, including the Sun. For details, contact NCA's Research Division: Robert Bolster (703) 960-9126, or Stephen Shervais (703) 590-2204.

GEORGE E. GOULD, ROBERT M. LYNN, FORMER NCA OFFICERS

We regretfully note the passing of two long-time members and former officers of National Capital Astronomers.

George E. Gould, who was president of National Capital Astronomers in the late 1960's, died of cardiac arrest on July 28 at Olnev. Marvland Hospiatal.

Dr. Robert M. Lynn, who was treasurer of National Capital Astronomers in the late 1970's, died of cancer on July 9 at his home in College Park, Maryland.

The members of National Capital Astronomers extend their sincere sympathy to the families of these two members.

EXCERPTS FROM THE IAU CIRCULARS Robert N. Bolster

1. July 3 - Observations of the occultation of 28 Sagittarii by Titan were reported from several locations in Europe. The total occultation typically lasted 4 minutes, with the fading and brightening lasting 0.5 to 1 minute. Central flashes were detected by half of the observers.

2. July 4 - Periodic Comet Brorsen-Metcalf was recovered by Eleanor Helin

with the 46-cm Palomar Schmidt. The comet, designated 1989o, was 16 days ahead of its expected position.

3. July 7 - The discovery of a satellite of Neptune by Voyager 2 was announced. Observed on 17 frames over 21 days, the satellite, 1989 N1, is in a circular equatorial orbit, and has a period of 1122 days.

AIR AND SPACE MUSEUM OFFERS PROGRAMS IN SEPTEMBER

The following public programs will be held during September in the Albert Einstein Planetarium of the National Air and Space Museum:

Saturday, September 2, 9:30 am - Free Monthly Sky Lecture: "The Grand Finale - Voyager 2 at Neptune." Stanley G. Cawelti, Chairman of the Docent Council and Past President of NCA, will present a slide-illustrated lecture on what has been learned so far. Safe telescopic viewing of Sunspots will follow, weather permitting.

The current daily Einstein Planetarium

program, "Calling All Stars," tours the solar system and the universe, and discusses the scientific search for extraterrestrial intelligence. Call (202) 357-2700 for schedules and prices.

The Samuel P. Langley Theater features spectacularly realistic IMAX projection on a five-story screen. "The Dream is Alive" shows the solar system and the universe as seen from the Space Shuttle. Other current programs are, "On the Wing," and "To Fly." Call (202) 357-1686 for schedules and prices.

TREASURER'S REPORT

1. GENERAL FUND

INCOME

Dues		\$8,438.00
Sale of Observer's Handbooks		353.00
Orders for other publications		157.70
Sale of T-shirts		50.00
Telescope-making classes		437.00
Interest		229.01
Donations		518.00
Total Income		<u>\$10,182.71</u>

EXPENSES

Sky and Telescope subscriptions		\$4,320.00
Purchase Observer's Handbooks		335.00
Purchase other publications		155.93
Star Dust Printing	\$1,752.30	
Postage	1,494.20	
Total		3,246.50
Speakers' Diners		335.54
Astronomical League dues		458.30
Insurance - Liability		344.00
Telephone		362.26
Admin. incl. postage and copying		510.30
Total Expenses		<u>\$10,067.83</u>
Balance 1 July 1987		\$3,866.00
Excess income over expense		<u>\$114.88</u>
Balance 30 June 1988		<u>3,980.88</u>

Ruth S. Freitag
Treasurer

2. NCA TRAVEL

Balance 1 July 1988	1,698.59
Interest	92.85
Balance 30 June 1989	<u>1,791.44</u>
GENERAL FUND BALANCE	<u>3,980.88</u>

3. TOTAL NCA BALANCE 1 JULY 1989

\$5,772.32

Robert H. McCracken
Trustee

ASTRONOMY AND PERSONAL COMPUTERS Joan B. Dunham

Wonders of the Near Future — New developments in hardware and software continue to be announced. The pattern of the past ten years still continues — newer and better computer hardware, improvements in computer software, with more bang for the buck.

The Intel family of chips did not end with the 80386, used in top-of-the-line AT's, Compaq's, IBM PS/2's, and others. There is also the 80486. IBM has demonstrated a very fast computer built around that chip. Other vendors are designing boards to add '486 power to '386 machines. After the 80486 comes the 80586, which we might expect to see at some point — and then the '686.... Once software is developed to use these powerhouses, we can have PC's on our desks with as much computing power as mainframes. More immediately, we can expect to see the prices of the computers designed around the 80386 drop in the next year as computers based on the 80486 become available.

Shrinkage of computers also continues, with competitors vying to have the smallest and lightest portable computer, working towards a truly functional shirt-pocket PC. There are still some practical issues to consider. One is that the keyboard of today's shirt-pocket sized calculator is not suited to typing. Once you learn to type, holding a pad in one hand while poking keys with the index finger of the other hand is never satisfactory. Other major problems are the difficulty in reading small screens and storing data, but both of these are likely to be solved before the keyboard problem. Part of the difficulty in developing a keyboard to fit into a very small computer is that we have rather definite ideas on how a keyboard should respond and how it should feel. We like the feedback of having the keys depress when we press them and click as we type. Or, for that matter, having the mouse button click when we press that. It is hard to imagine how a very small device can provide that same feel. Several innovations that might have worked just as well as a keyboard have not been well accepted. These were, for example, mouse-sized devices that were studded with buttons, to be manipulated with one hand. Depressing combinations of the buttons produced the letters of the alphabet, numerals, or control keys. An over-achiever mouse announced recently supposedly has 128 (!) buttons.

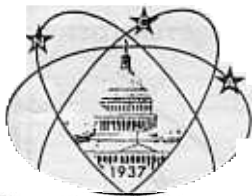
One of the very smallest of the new portables is a new Zenith portable weighing 5 pounds, that uses 2-inch diskettes. How well accepted yet another disk format would be remains to be seen, but Zenith is expecting to sell 100,000 of these machines next year.

The smallest portable today is probably the NEC Diskette, weighing just over 4 pounds, with a full-sized keyboard and screen. It uses a RAM disk, not a floppy, has a 2400 BPS modem, and a list price of \$3000. Toshiba, Sharp, and Mitsubishi have shown prototypes of color LCD displays, so, in the future, we do not have to expect to give up color displays when opting for portability.

Printer improvements are announced regularly. Some of the latest inexpensive 24-pin dot matrix printers produce very very good results. Even moderately priced printers offer features such as "forms printing," so that single sheets of paper can be used without removing the pin-feed paper. Some have special features to make it easier to type addresses on envelopes, or provide color print output with special ribbons. The print quality of 24-pin printers is approaching that of laser printer output. Laser printers themselves are tending to provide more features for lower cost. We can expect to find future laser printers for no more than twice or three times the cost of a dot matrix printer. If I were to buy a printer today, I would only consider a 24-pin dot matrix printer. In two years I might change my mind about laser printers, but right now they cost too much to buy and to operate, in comparison to dot matrix printers.

We can expect new developments in data storage, with more and more data stored in less and less space. One new technology with considerable promise is "digital paper," a flexible material from ICI that is written to and read from with a laser. High data-storage capacities at less cost (for the media) than ever before are promised, and perhaps some day even an erasable version. Also, digital audio tape (DAT) technology has improved. There is now a 4-mm DAT tape cassette that holds 1.2 gigabytes of data on cassettes the size of credit cards.

We will hear better sound from PC's (can't be hard to improve on the sound from mine), with voice synthesizers as standard equipment. Emerson Radio plans to market a male-female voice synthesizer as part of its PC line.



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

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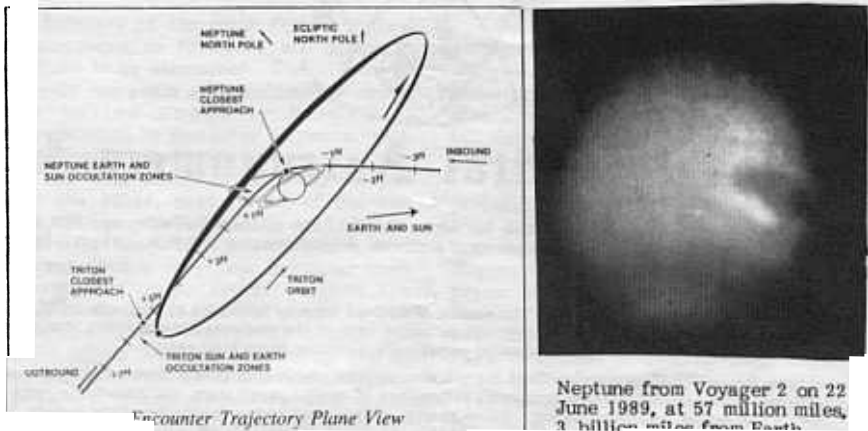
If family membership, list names of additional participating immediate family members in same household, with birthdates of all those under 18 years old:

NOTE: If you already subscribe to *Sky & Telescope*, please attach a recent mail label, or indicate 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!

VOYAGER 2 ENCOUNTERS NEREID, NEPTUNE, TRITON, AUGUST 24 - 25



Science Investigations/Objectives

Imaging	Obtain high resolution images	Plasma Investigation	Characterize distribution of magnetospheric plasma and its interactions with satellites and rings
Photopolarimetry	Obtain high resolution information on distribution of ring particles	Low-Energy Charged Particles Investigation	Measure composition and energy spectra of low-energy particles in planetary magnetospheres
Infrared Interferometry Spectrometry and Radiometry	Determine atmospheric composition and structure; energy balance of planets	Cosmic Ray Investigation	Measure composition and energy spectrum of cosmic rays and their interplanetary propagation
Ultraviolet Spectrometry	Observe ultraviolet emissions; perform extreme UV astronomy	Planetary Radio Astronomy	Characterize planetary radio emissions, and determine planetary rotation periods
Radio Science	Determine atmospheric structure and composition	Plasma Wave Investigation	Determine distribution of magnetospheric plasma and its interaction with energetic particles
Magnetometry	Characterize planetary magnetic fields and structure of magnetosphere		

These Voyager 2 Neptune encounter data and photo courtesy of NASA Jet Propulsion Laboratory, Pasadena, California.



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FIRST CLASS MAIL