

THE Lowell Observer

Spring 1997

Issue 34

Lowell reaches out to Native Americans

Amanda Bosh and Deidre Hunter, two Lowell Observatory astronomers, have initiated an educational outreach program to bring the excitement of astronomy to Navajo and Hopi schools. They are trying to inspire an interest in science among young Native Americans.

"Everyone agrees that science education is important, and no one appreciates this more than Native American educators," said Hunter.

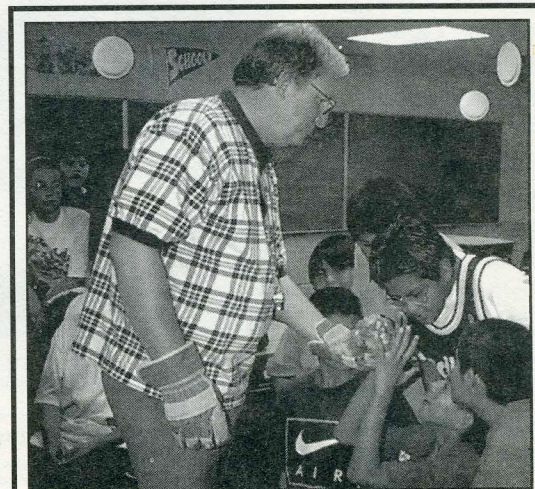
As a group, Native Americans are nearly absent from the physical sciences. For example, very few science teachers at Navajo and Hopi schools are Native American. Nevertheless, both the Navajo and Hopi nations are keenly interested in enhancing science education for their children.

The 1996-97 school year is the first year of this project which was started with funds from the Friends

of Lowell. Bosh and Hunter are using this time to learn how best to execute the project. They have been working together with two teachers who already have some background in astronomy and who are able to give advice on the educational aspects.

Throughout the year, Bosh and Hunter have conducted various demonstrations as part of these programs. These include making comets out of dry ice, simulating meteor impacts by dropping rocks into pans of flour, viewing the emission spectra of gasses and leading discussions on what equipment would be required to survive on the moon.

This educational program has two goals. The first is to use astronomy to get students excited about this subject and science in general,



Allen Doering shows his 6th grade class at Hopi Polacca Day School how a comet is made and what it looks like.

encouraging a life-long interest and, for some, more advanced study. The second goal is to help the teachers of

see Lowell

Page 2

Gamma-ray bursts: the investigation continues

By Mark Wagner

Ohio State University Astronomer

About once a day, a catastrophic event in space produces a short, strong burst of gamma-rays. The origin of these "gamma-ray bursts" is unknown, but recent observations are shedding new light on this astronomical enigma. Previously (with only one exception) no planet, star, galaxy or any other type of astronomical object has been associated with a gamma-ray burst.

Astronomers do know that the photons or light which characterize gamma-ray bursts have energies between 10,000 and one million

electron volts. For comparison, visible light photons have energies of only about three electron volts.

These bursts can last from just a few thousandths of a second to more than 15 minutes and may consist of a single smooth pulse or trains of separate pulses. If the bursts originate in distant galaxies, they may generate more energy than supernova explosions but release it in just a few seconds!

The Compton Gamma Ray Observatory (CGRO), launched in 1991, held many experiments designed to help solve the mystery posed by gamma-ray bursts. Unfortunately, the mystery has only deepened and it remains one of the most

intriguing, baffling and fundamental problems in all of astronomy.

The CGRO revealed that gamma-ray bursts were randomly scattered across the sky with the Earth seemingly at the center. Additional information regarding the nature and distance of the bursts came from plotting the number of bursts with respect to their intensity. These results supported the theory that the Earth seems to be near the center of the bursting sources, although no clear evidence exists to explain this phenomena. The most attractive scenario puts the bursts at cosmological distances and

see Gamma-ray

Page 2

Gamma-ray

from Page 1

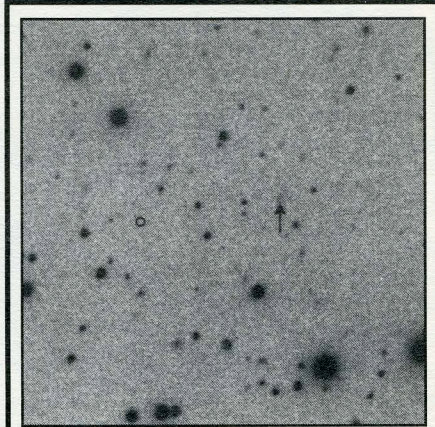
associates them with events in distant galaxies.

Currently, astronomers can only speculate on the origin of the gamma-ray bursts. Recently, a network of ground- and space-based observatories have started to clarify these questions. On February 28, an Italian/Dutch satellite known as BeppoSAX discovered a rapidly fading X-ray source in the constellation Orion where a gamma-ray burst had been observed only eight hours earlier. The observation revealed that X-rays might be associated with a gamma-ray burst.

Within days, a flotilla of radio and optical telescopes, including the Perkins and Hall telescopes at Lowell Observatory's Anderson Mesa site, examined the region of the sky where the X-rays and burst had been observed.

Shortly thereafter, a radio source and a faint object were discovered nearly coincident with the X-ray source. Following this, a flurry of reports, including one based on CCD images from the Perkins telescope, identified the object as a faint galaxy based on its fuzzy appearance (stars would appear far more sharp).

Less than a day later, we obtained the first spectrum of this object and confirmed that it was a galaxy at a distance of some 900 million light years. If the X-ray source was associated with this galaxy then the X-ray power first observed by BeppoSAX was equivalent to a *million* million Suns.



The arrow points to the galaxy first believed to be associated with the burst. The circle shows the location of the faint galaxy possibly associated with the gamma-ray burst.

But there were problems with this particular galaxy and its association with the gamma-ray burst. While its position was consistent with the fading X-ray source, it was not consistent with that of the gamma-ray source. Further observations obtained elsewhere revealed a rapidly fading optical

source which was associated with an even fainter galaxy whose position coincided with both the X-rays and the gamma-ray burst.

The results suggest that, in this case, the X-ray and optical sources from the galaxy are the same and that both are associated with the gamma-ray burst.

Future observations may demonstrate conclusively that the site of gamma-ray bursts are distant galaxies, but more observations and modeling will be required to understand their origin completely.

Lowell

from Page 1

Navajo and Hopi students learn about astronomy and astronomy-related activities so that they can better incorporate astronomy into their classrooms.

"With this project, we're not trying to convince students to become astronomers. Instead, our goal is to make science fun, accessible and interesting so they'll be more likely to continue learning about science, even if in very small ways," said Bosh.

The students are enthusiastic about the program and look forward to Bosh and Hunter's visits.

"I thank you for devoting your time to our class and school," one student wrote in a letter to them. "I hope you have a safe trip when you come to see us again."

During the year, Bosh and Hunter will visit classes and engage students in hands-on, astronomy-related activities. The teacher is directly involved in these visits and is able to learn about the activities in order to duplicate them with other classes.

At the end of the school day, Bosh and Hunter meet with other interested teachers at each school and show them the activities that were presented that day. By working with teachers as well as the students, the impact of the program is greatly increased.

Throughout the year, Bosh and Hunter also hold nighttime star parties at the schools that involve the parents and family members.

Bosh and Hunter find that a crucial element in the success of the program is to learn to present the astronomy activities in ways that foster learning specifically by Native American students. Students are more receptive if the activities capitalize on their learning styles and have a connection to their own culture and experiences.

This year, Bosh and Hunter have been working with three of

About The Lowell Observer

Friends of Lowell Observatory receive the newsletter as a benefit of membership. Memberships start at \$35.

For information, questions or comments on membership, please contact Alice Ferris at (520) 774-3358 ext. 213. For information on public tours at Lowell Observatory, call (520) 774-2096.

The *Lowell Observer* is published quarterly by Lowell Observatory, 1400 West Mars Hill Road, Flagstaff, AZ 86001-4499. The internet address is:

<http://www.lowell.edu/>

Contents Copyrighted by Lowell Observatory.
ISSN 1054-0059

Robert Millis

Director, Lowell Observatory

Anne Self

Editor, The Lowell Observer

An Outstanding Donor, June Thompson

On March 29, 1997, Pete and June Thompson, along with their daughters, Jessica and Didi, enjoyed a private viewing through Lowell Observatory's 31-inch reflector telescope.

"Seeing the sky through such a large telescope was breath-taking," June said.

June Thompson, as a member of the Trustee's Circle, is not only a significant donor to Lowell Observatory, but has always had a passion for astronomy.

"I've wanted to be an astronomer all of my life," June said.

Born in Corpus Christi, Texas, June consumed all the material she could find on astronomy during elementary school. By 6th grade, she was reading college-level astronomy books.

When she entered high school, June thought that another career might be of more value to her in the future and went on to receive a computer science degree at the Georgia Institute of Technology.

During college, June met her future husband Pete, who was also a computer science major. They were married in 1978 and stayed in Georgia after their graduation. June worked at the Georgia Institute of

Technology until 1979 when she was offered a position at Lockheed as a programmer. Upon graduation, Pete immediately developed Samna, a



June Thompson, an outstanding donor, has been interested in astronomy since she was in elementary school.

word processor company. Samna was such a great success that, in 1990, Lotus purchased the rights to the company and Pete went to work for them designing word processors.

In 1982, June discontinued her employment at Lockheed to raise their two daughters. Jessica is now 13 years old and Didi is 10.

The Thompsons moved to Flagstaff in 1994 because Pete had the opportunity to live in any city in the U. S. while retaining his position at Lotus.

"Flagstaff has everything that we were looking for in a town: a great climate, an excellent school system and a close proximity to a big city," said June. "It was a bonus to be near such an historic observatory."

June volunteers in the Flagstaff school district and is active in the Parent Teacher Organization. She enjoys ethnic cooking and Celtic music. Pete coaches his daughters' soccer and softball teams.

Together, they coach an "Odyssey of the Mind" team based in Flagstaff. This is a program in which teams must find the best solution to a certain problem. This year's problem consists of building the strongest bridge using balsa wood and glue.

The program encourages problem-solving skills and awards children for their mental accomplishments as opposed to physical accomplishments.

"It's great working with the kids and helping build their enthusiasm about science," June said.

Has June forgotten about her aspirations as an astronomer? Not in the least.

"After the girls are grown, I think I'd like to earn my degree in astronomy," said June. "I'm still fascinated by it all."

Lowell

from Page 2

Marty Nelson's 8th grade classes at the Navajo Tse' Bit Ai Middle School in Shiprock, N.M. and with one 5th and one 6th grade class of Allen Doering at Hopi Polacca Day School. Each year, they plan to work with teachers and science classes in the 5th through 8th grades.

"By targeting this grade range, we hope to reach students at the transition period between the inherent curiosity about the world of young children and the fixed negative

attitude toward science often seen in high school students," said Hunter.

Bosh and Hunter have modeled their program after the Astronomical Society of the Pacific's Project ASTRO funded by the National Science Foundation that pairs astronomers with teachers. With financial assistance from a NASA IDEA (Initiative to Develop Education through Astronomy) grant, the program is expected to continue next year with Bosh and

Hunter working separately with two new teachers at two new schools.

To continue to improve the program, they also plan to explore the involvement of a translator in the classroom visits, observe elementary school classes in order to get a feel for where middle school students are coming from, attend additional educational workshops and continue meeting with Navajo and Hopi educators.

Special Public Events

Eta Aquarid Meteor Shower, May 5

Though we will not be able to see Halley's Comet in the night sky for another 65 years, fragments of its tail remain producing a meteor shower. In addition to our regularly scheduled programs, mini-shows discussing the Eta Aquarids will be offered at 9:45 a.m., 12:45 p.m. and 2:45 p.m.

Memorial Day Astrofest, May 24-26

Three days of special indoor and outdoor programs will be offered this weekend. Science demonstrations, interactive multi-media presentations, tours and more will provide fun for the entire family.

Lowell Observatory Birthday, May 28

Today marks the 103rd birthday of Lowell Observatory. In celebration of its rich heritage, we will be offering historic programs and tours throughout the day.

Summer Solstice, June 21

Today the sun reaches its northern-most point from the celestial equator, making it the longest day of the year. We will be commemorating the first day of summer with mini-programs at 9:45 a.m., 12:45 p.m. and 2:45 p.m.

Messier Night, June 26

The celebrated French astronomer Charles Messier was born on this date in 1730. In his honor, we will make available several telescopes to view nebulae, galaxies and star clusters until 11:00 p.m.

SUMMER PUBLIC SCHEDULE

Nighttime Events

Features:

"Sky Tonight" presentations and telescope viewing.

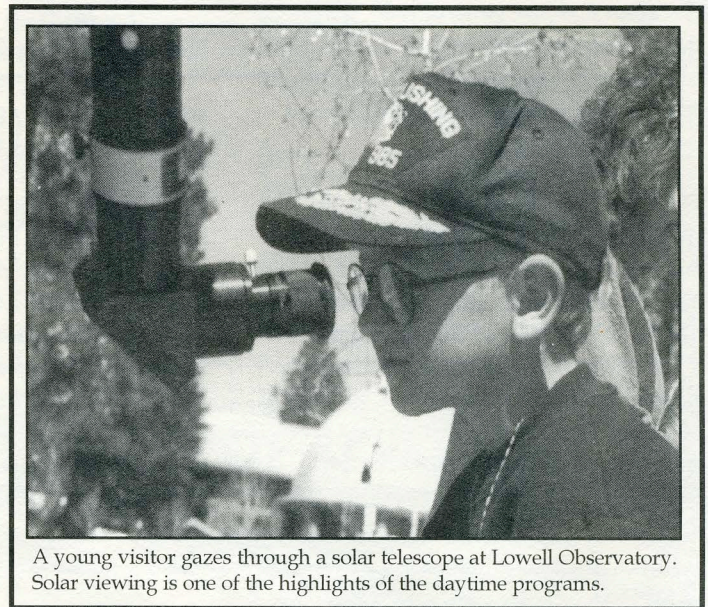
Hours:

May -

- Monday, Wednesday, Friday and Saturday, 7:30 p.m. to 10:00 p.m.
Programs at 8:00 p.m. and 8:45 p.m.

June-July -

- Monday - Thursday, 7:30 p.m. to 10:00 p.m.
Programs at 8:00 p.m. and 8:45 p.m.
- Friday and Saturday, 7:30 p.m. to 10:30 p.m.
Programs at 8:00 p.m., 8:45 p.m. and 9:30 p.m.



A young visitor gazes through a solar telescope at Lowell Observatory. Solar viewing is one of the highlights of the daytime programs.

Daytime Events

Features:

"Discovery at Lowell" slide show, tours of the Historic Rotunda, Clark, McAllister and Pluto domes in addition to solar viewing.

Hours:

May-July -

- Open daily, 9:00 a.m. to 5:00 p.m.
Programs at 10:00 a.m., 1:00 p.m. and 3:00 p.m.



Percival Lowell (Kevin Schindler), founder of Lowell Observatory, sits by the fireplace studying Mars.

Voices was a Resounding Success

Voices From the Past made its triumphant return to the observatory in March. Such notables as Johannes Kepler (Steve Lentz), Caroline Herschel (Jackie Eliason), Tycho Brahe (Tim Rodriguez), Henry Norris Russell (Jeff Henrikson), Hypatia (Chiyoko Ormsby) and the observatory's own Percival Lowell (Kevin Schindler) graced the Rotunda with their wisdom and humor. While two performances are scheduled each evening, the popularity of this series has grown to the point that additional shows are often provided. On the last weekend of March, more than 300 visitors came each night, compelling Henry Norris Russell and Percival Lowell to present three additional performances.



Hypatia (Chiyoko Ormsby) was an Egyptian mathematician, astronomer and the last librarian of the Great Library of Alexandria. She was murdered by a mob led by a paranoid bishop who wanted to destroy the world's center of learning.

Lunar Show Eclipses Expectations

March 26 boasted a deep partial lunar eclipse, with the Earth's shadow covering 92 percent of our closest celestial neighbor. The event drew more than 650 guests to Lowell Observatory, whose doors were open from 6:30 p.m. to 11:30 p.m. Four telescopes and two sets of binoculars were used throughout the evening to view the Moon, Mars, Hale-Bopp and other exciting celestial objects.

Thrill of Discovery Still Rings True

March 10 marked the 20th anniversary of the discovery of the rings of Uranus. Two of the discoverers, current Lowell astronomers Bob Millis and Ted Dunham, were on hand to offer their perspectives on this exciting scientific discovery. Public Program staff members also presented various interactive slide programs, liquid nitrogen and dry ice experiments, dome tours and other activities throughout the day.



Comet Hale-Bopp streaks across the sky displaying its multiple jets. (photograph courtesy of Henry Giclas, Astronomer Emeritus)

Hale-Bopp Demands Attention

As the second "comet-of-the-decade" in two years, Hale-Bopp has become so popular that the Public Program staff tailored both the regular daytime and nighttime schedule to focus on this exciting comet. Throughout the month, the "Discovery at Lowell" 1:00 p.m. show was replaced by a special program centering around comets, covering everything from their significance in ancient myths and legends to our current understanding of their composition, behavior and how they have influenced the development of life on Earth. The programs also gave specific attention to Hale-Bopp itself and its place in the current night sky. The evening "Sky Tonight" programs also focused on Hale-Bopp, and was highlighted by the creation of a comet using household materials.

Friends Corner

Friends survey results: the highlights

Thank you for your participation in our first-ever member survey. We had a 23 percent response rate and, with your help, we found out what we need to do to serve you better.

One of the great things we found out about you is the things you like most about Lowell Observatory. At the top of the list is telescope viewing. Two additional popular items are the history surrounding Lowell Observatory and the current research.

The vast majority of members appear to be satisfied with the services received from Lowell Observatory and have received prompt, friendly service.

The benefits that you said would interest you the most if they were made available were the ability to reserve admission to evening sky presentations in advance and a gift-shop catalog exclusively for you.

We found that only 17 percent of those who responded had ever attended a Friends Annual Meeting. This event is just for you and the staff

at Lowell Observatory would love to meet you in person. It's also a lot of fun and a great way to meet people who have similar interests.

For those of you who do attend the Friends Annual Meeting, your favorite elements are the lectures from astronomers and the telescope viewing.

Please remember, you don't have to wait until the annual survey to let

us know what's on your mind. If you have any comments, complaints, suggestions or are not receiving your benefits, let us know so we can take care of it right away!

(If you would like the complete survey results, please write to Anne Self, Public Information Officer, Lowell Observatory, 1400 W. Mars Hill Rd., Flagstaff, AZ 86001.)

Annual Meeting promises to be the best ever!

Don't miss the 10th Annual Friends meeting, August 23, 1997. Events will include special lectures by Lowell Observatory astronomers, tours of the Mars Hill campus and viewing through the Clark refractor, the 16-inch reflector in the McAllister Public Observatory and portable telescopes (weather permitting).

Plus, we'll introduce a new

member benefit, and give you a preview of plans in 1998 for the 10th anniversary year of the Friends of Lowell Observatory.

Invitations will be mailed in June to all members at the Friend Level (\$100) and above. If you're a Basic or Family member, take this opportunity now to upgrade your membership using the coupon below. Don't miss out!

JOIN THE FUN, BE A FRIEND OF LOWELL!

Yes! I'd like to:

- Join the Friends of Lowell Observatory.
 Renew my membership.
 Upgrade my membership.

New membership level: _____

Current membership contribution: _____

Amount of Payment: _____

NAME _____

STREET _____

CITY _____

STATE _____

ZIP _____

Membership Levels:

- Basic (\$35)
 Family (\$50)
 Friend (\$100)
 Contributor (\$250)
 Pluto Society (\$500)

Return this form to:
 Friends of Lowell Observatory
 1400 W. Mars Hill Rd.
 Flagstaff, AZ 86001-4499

New staff position: Public Information Officer



Anne Self, Lowell Public Information Officer.

Anne Self, a recent graduate of Northern Arizona University, joined the Lowell Observatory staff in January as the public information officer, a brand new position.

Anne, who majored in public relations with a minor in graphic design, has taken over editorship of *The Lowell Observer*. Her other duties include serving as the contact point at Lowell Observatory for media inquiries, assisting with marketing the observatory's educational programs and promoting local, regional and national media attention.

Anne served last year as President of the Public Relations Student Society of America (PRSSA) at NAU. She is also the recipient of the Gold Key Award, the highest honor bestowed on a PRSSA member.

Anne is active in the community and has been a youth director at Trinity Heights United Methodist Church since 1993.

Anne grew up in Phoenix, Ariz. and enjoys playing the piano and hiking.

Lowell Observatory Advisory Board

Lowell Trustee

Mr. William L. Putnam
Lowell Observatory
Springfield MA and
Flagstaff AZ

Advisory Board

Mr. Roger Bailey
Executive Director, Research
and Technology
Alberta Energy
Canmore, Alberta, Canada

Mr. William F. Baker
President, WNET/TV 13
New York NY

Ms. Lauren Barr
Vice President
BRE Properties, Inc.
San Francisco CA

Mr. Drew Barringer
President
Barringer Crater Company
Decatur GA

Mr. Frank Carrubba
Executive Vice President
Philips Electronics
The Netherlands

Mr. David Chase
President, Vestor Corporation
Flagstaff AZ

Mr. Nicholas B. Clinch
Attorney
Palo Alto CA

Dr. Frank K. Edmondson
Astronomer Emeritus
Indiana University
Bloomington IN

Mr. Philip Erard
Partner, Wertheim-Schroeder
New York NY

Mr. Robert Furlong
General Manager, KUTP TV45
Phoenix AZ

Mr. Henry Giclas
Astronomer Emeritus
Lowell Observatory
Flagstaff AZ

Mr. John Giovale
W.L. Gore and Associates
Flagstaff AZ

Mr. Martin Hecht
Hecht, Henschen & Associates
(retired)
Flagstaff AZ

Mr. John Hendricks
Chairman and CEO
Discovery Communications
Bethesda MD

Mr. David Henley
Senior Staff Research
Geophysicist, Shell Canada
Calgary, Alberta, Canada

Mr. James F. Henriot
Counsel, Eisenhower & Carlson
Tacoma WA

Dr. Arthur A. Hoag
Director Emeritus
Lowell Observatory
Tucson AZ

Ms. Ann Kirkpatrick
Attorney, Kirkpatrick, P.C.
Flagstaff AZ

Dr. and Mrs. Gerald Kron
Dr. Kron: Director Emeritus
USNO Flagstaff Station

Mrs. Kron
Former Editor
Publications of the Astronomical
Society of the Pacific
Honolulu HI

Mr. Robbert Leopold
Attorney
The Netherlands

Mrs. Eleanor Libby
Paradise Valley AZ

Mrs. Frances B. McAllister
Transition Foundation
Flagstaff AZ

Mr. James P. McCarthy
Attorney
New York NY

Mr. George Mitchell
Investment Counselor
Merrill Lynch
Salt Lake City UT

Mr. Patrick Nackard
President
Pepsi-Cola Bottling Company
Flagstaff AZ

Mr. Severo Ornstein
Woodside, CA

Mrs. Elizabeth D. Pickard
Flagstaff AZ

Dr. Michael C. J. Putnam
MacMillan Professor of Classics
Brown University
Providence RI

Mr. John D. Rauh
Sunapee NH

Dr. Gibson Reaves
Astronomer Emeritus
University of Southern
California
Rancho Palos Verdes CA

The Honorable John J. Rhodes
Counsel, Hunton & Williams
Former Congressman
Mesa AZ

Ms. Pamela Ross
Senior Contract & Proposal
Manager
Fluid Systems - Aerospace
Allied Signal
Tempe AZ

Mr. Brad Ryan
NE Division Manager
Arizona Public Service
Flagstaff AZ

Mrs. Anne Seamans
Marblehead MA

Dr. William Sinton
Adjunct Scientist
Lowell Observatory
Flagstaff AZ

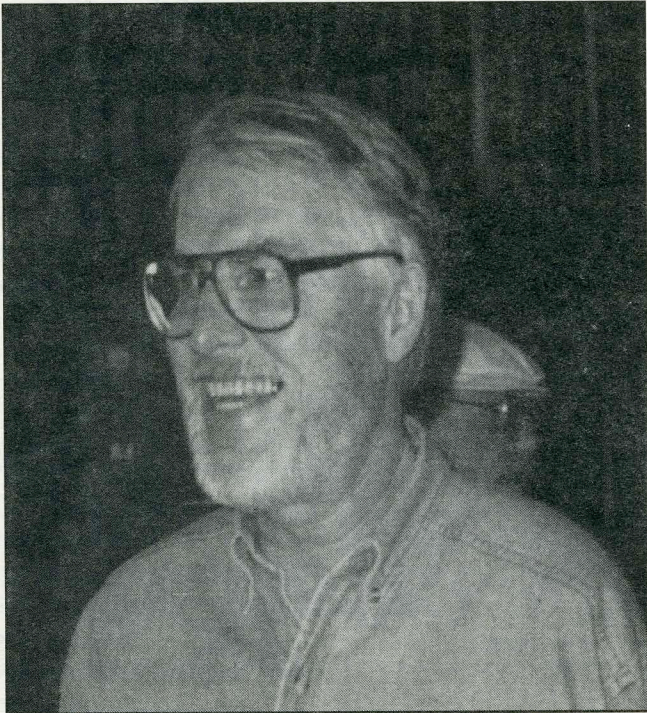
Mr. David Slipher
Kaiser Aluminum (retired)
Sedona AZ

Mr. Earl Slipher
Flagstaff AZ

Mr. Robert Veazey
Flagstaff AZ

Mr. John M. Wolff
Trustee
John M. Wolff Foundation
Scottsdale AZ

Leonard Martin, long time Lowell astronomer



Leonard Martin (1930-1997).

Long time Lowell Observatory astronomer and noted Mars observer Leonard Martin died Monday, April 7 at his home in Bend, Ore. He had only recently retired from Lowell and moved to Bend in March with his wife Claudia.

Leonard was devoted to the study of Mars. A consummately skilled observer, he played a pivotal role in Lowell's International Planetary Patrol Program, a global photographic surveillance of the planets which began in 1969. He was widely known for his studies of seasonal changes on Mars and his investigations of global dust storms. In recent years, Leonard became deeply involved in the use of Hubble Space Telescope for studies of the Red Planet.

Leonard was also an avid skier and sailor. Whether on the snowy slopes of Mt. Humphreys, at the tiller of his sailboat on Lake Powell or imaging Mars from the Summit of Mauna Kea, Leonard Martin was a happy man. He was great company, invariably considerate of the views and wishes of others and a friend to many at Lowell and throughout the astronomical community. He will be missed by us all.

Leonard is survived by his wife Claudia, daughter Jennifer and sons Chris and Nick. The family has requested that a fund be created in his memory to support Mars research. Individuals interested in contributing may send their gifts to the LJM Fund at Lowell Observatory.

THE LOWELL OBSERVER
 Lowell Observatory
 1400 W. Mars Hill Rd.
 Flagstaff, AZ 86001
 U.S.A.



Non-Profit Org.
 U.S. POSTAGE
 PAID
 Permit No. 170
 Flagstaff, AZ